Alameda County Water District

URBAN WATER MANAGEMENT PLAN 2020-2025

ACWD

ALAMEDA COUNTY WATER DISTRICT

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ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACWA	Association of California Water Agencies
ACRP	Alameda Creek Recapture Project
ACWD	Alameda County Water District (District)
ADWF	average dry-weather flow
AF	acre-foot (325,900 gallons)
AF/yr	acre-feet per year
AHF	Above the Hayward Fault (aquifer)
AMI	Advanced Metering Infrastructure
ARP	Aquifer Reclamation Program
AWE	Alliance for Water Efficiency
AWTF	Advanced Water Treatment Facility
AWWA	American Water Works Association
Bay Area IRWMP	Bay Area Integrated Regional Water Management Plan
BAWSCA	Bay Area Water Supply and Conservation Agency
BayQWEL	Bay Area Qualified Water Efficient Landscaper
BDCP	Bay Delta Conservation Plan
BDWQCP	Bay Delta Water Quality Control Plan
bgs	below ground surface
BHF	Below the Hayward Fault (aquifer)
BMP	(Water Conservation) Best Management Practices
CAT	(California) Climate Action Team
CA DOF	California Department of Finance
CalWEMP	California Water Efficiency Partnership
CASGEM	California Statewide Groundwater Elevation Monitoring
ccf	hundred cubic feet (748 gallons)
CEQA	California Environmental Quality Act
cfs	cubic foot (feet) per second
CHARG	Coastal Hazards Adaptation Resiliency Group
CII	Commercial, Industrial and Institutional
CIMIS	California Irrigation Management Information System
CUWA	California Urban Water Agencies
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CWC	California Water Code
CY	Calendar Year
CYES	California Youth Energy Services
DBP	Disinfection by-product
DCR	(DWR's SWP) Delivery Capability Report
Delta	Sacramento-San Joaquin Delta
DERWA	Dublin San Ramon Services District – East Bay Municipal Utility District Recycled Water Authority
Desal Facility	Newark Desalination Facility
DFG	(California) Department of Fish and Game; renamed Department of Fish and Wildlife (see DFW)
DFW	(California) Department of Fish and Wildlife
DMM	demand management measure
DPR	Direct Potable Reuse
DRA	Drought Risk Assessment
DYTP	Dry Year Transfer Program
DWR	(California) Department of Water Resources
EBRPD	East Bay Regional Park District
EBDA	East Bay Dischargers Authority

ACRONYMS AND ABBREVIATIONS (Continued)

EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ELT	Early Long Term
EPA	U.S. Environmental Protection Agency
ESA	Energy Savings Assistance
FAT	Full Advanced Treatment
FERC	Federal Energy Regulatory Committee
FY	Fiscal Year
GIS	Geographic Information System
GPCD or gpcd	Gallons Per Capita Per Day
gpd	gallons per day
GPM	gallons per minute
GSA	Groundwater Sustainability Act
HET	High Efficiency Toilet
HEU	High Efficiency Urinal
IPR	Indirect Potable Reuse
IRP	Integrated Resources Planning
IRPM	(District's) Integrated Resources Planning Model
IRWM	Integrated Regional Water Management
ISA	Interim Supply Allocation
LEAF	Local Ecology & Agriculture Fremont
MaP	Maximum Performance
MCL	Maximum Contaminant Level
mg/l	milligrams per liter
mgd	million gallons per day
MOU	Memorandum of Understanding
MSJWTP	(District's) Mission San Jose Water Treatment Plant
MFR	multi-family residential
MSL	mean-sea-level
MTC	Metropolitan Transportation Commission
MWELO	Model Water Efficient Landscape Ordinance
NDF	Newark Desalination Facility
NPDES	National Pollutant Discharge Elimination System
NMFS	National Marine Fisheries Service
PCO	Professional Certifying Organization
PEIR	Program Environmental Impact Report
PG&E	Pacific Gas & Electric Company
ppm	parts per million
PWFE	Purified Water Feasibility Evaluation
QWEL	Bay Area Qualified Water Efficiency Partnership
R-GPCD	residential gallons per capita per day
RHNA	Regional Housing Needs Allocation
RO	Reverse Osmosis Process
RWQCB	Regional Water Quality Control Board
RWS	(Hetch Hetchy) Regional Water System
SB	Senate Bill
SBP	Salinity Barrier Program
SBWR	South Bay Water Recycling
SDWA	Safe Drinking Water Act
SEP	Salt Evaporator Pond
SFPUC	San Francisco Public Utilities Commission
SFR	single-family residential
SFWD	San Francisco Water Department
SGMA	Sustainable Groundwater Management ACT
sq. ft.	square foot (feet)
SB X7-7	Senate Bill X7-7

ACRONYMS AND ABBREVIATIONS (Continued)

SBA	South Bay Aqueduct
SFPUC	San Francisco Public Utilities Commission
SWC	State Water Contractors
SWSD	Semitropic Water Storage District
SWP	State Water Project
SWRCB	State Water Resources Control Board
USD	Union Sanitary District
TAF	1,000 acre-feet
TDS	total dissolved solids
ULFT	ultra low flow toilet
USBR	U.S. Bureau of Reclamation
USC	Urban Stakeholders Committee
USD	Union Sanitary District
USGS	U.S. Geological Survey
UWMP	Urban Water Management Plan
WEMP	Water Efficiency Master Plan
WSA	Water Supply Agreement between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County and Santa Clara County
WSAP	Water Shortage Allocation Plan
WSCP	Water Shortage Contingency Plan
WSEO	Water Supply Emergency Ordinance
WSIP	Water System Improvement Program
WTP	Water Treatment Plant
WTP 2	(District's) Water Treatment Plant Number 2
WUE	Water Use Efficiency
WWTP	Wastewater Treatment Plant
Zone 7	Zone 7 of the Alameda County Flood Control and Water Conservation District

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CHAPTER 1 INTRODUCTION

1.1 PURPOSE

This update to Alameda County Water District's (District) Urban Water Management Plan (UWMP or Plan) has been prepared in response to the State of California's Urban Water Management Planning Act, Water Code Sections 10610 through 10656. The Act requires that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an urban water management plan. The Act also requires that water suppliers provide updates to their Plan every five years.

1.2 PLAN PREPARATION

This UWMP Update covers the period from 2020 through 2025 and is the eighth plan adopted by the District's Board of Directors[1]. Several changes have occurred since the District's first UWMP was adopted in 1985, which have resulted in the need for a broader, more sophisticated representation of the District's water supply, demand management, and operational alternatives. Accordingly, in 1992, the District began implementation of a planning effort that would apply the approaches and techniques of integrated resources planning (IRP) to ensure that appropriate facility and resource decisions are made. IRP is an inclusive process that begins with the premise that a wide range of traditional and innovative supply-side and demand-side (conservation) resources must be considered. The process also provides information on potential consequences and aids in judging the value of trade-offs among resource strategies.

In August 1995, the District's Board of Directors adopted the recommendations of the District's Integrated Resources Planning Study as its roadmap for both supply and demand-side planning through the year 2030. Because this planning process involves assessment and treatment of water use efficiency savings as a resource that is evaluated as rigorously as supply-side options, the IRP process and results form the foundation for this and future UWMPs. Essential to IRP planning is the commitment to completed frequent updates and revisions in order to adapt to changing conditions, needs, legal requirements, and technologies. In 2006, the District completed a 10-Year Review of the IRP which confirmed the recommended strategy and helped guide additional implementation elements. In response to significant changes in water supply, demands, and the California Water Code between 2007 and 2011, the District accelerated completion of a second IRP review (2014 IRP Review). Table 1-1 provides a comparison of the key components of the District's IRP and 2020-2025 UWMP Update. The next update of the IRP is planned for 2025.

The District is preparing to update the 1995 IRP as it nears the end of its 30-year planning horizon. In addition to periodic IRP Reviews over the years, the District's Water Resources Staff in 2020 initiated a series of public workshops with the Board of Directors to evaluate the changes in California water management, recent legislative actions resulting in new water supply planning regulatory requirements,

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[1] The normal UWMP submittal cycle requires that Urban Water Management Plans be prepared and submitted in December of years ending in five and zero. However, because of changes in UWMP requirements, State law has extended the deadline for the 2020 Plan to July 1, 2021.

and lessons learned from the 2012-2016[2] statewide drought during which the Governor of the State of California issued a statewide mandate for 20% conservation.

A key policy criterion used in the formulation and evaluation of water supply strategies in the IRP process is to maximize local control of resources while maintaining a high level of service reliability. This is especially important for the District because of the 60% reliance on imported water supplies from the State Water Project (SWP), owned and operated by the Department of Water Resources (DWR), and San Francisco Public Utility Commission Regional Water System (SFPUC RWS). As described in this UWMP, the District's long term water supply strategy includes maximizing the use of local water supplies (local groundwater and surface water, brackish groundwater desalination, and recycled water), together with off-site groundwater banking of SWP supplies and a strong demand management program to minimize dependency on imported supplies.

Table 1-1
Comparison of UWMP and
the District's Integrated Resources Plan (IRP)

Item	2020-2025 UWMP	1995 IRP & Subsequent Reviews
Planning Horizon	2045 (25 Years)	2030
Planning Criteria	* Reliability * Water Quality * Environmental Impacts * Local Control	* Reliability * Water Quality * Environmental Impacts * Local Control * Cost
Demand Projections	Yes	Yes
Existing Water Supply Availability	Yes	Yes
Supply Opportunities: - **Demand Management** - **Recycled Water** - **Water Transfers**	Yes	Yes
Long-Term Water Supply Strategy	Yes	Yes
Water Quality Considerations	Yes	Yes
Cost Optimization	No	Yes
Treatment & Production Facilities Needs	No	Yes
Shortage Contingency Plan	Yes	No
Climate Change	Yes	Yes
Drought Risk Assessment	Yes	No
Seismic Risk Assessment	Yes	No
Energy Analysis	Yes (intensity)	Yes (cost)

The District has coordinated with all appropriate agencies in the development of the District's IRP and this UWMP Update. Table 1-2 below provides a summary of the agencies that the District has coordinated with and the relevant information incorporated in this UWMP.

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[2] The California Department of Water Resources references the last major drought as starting in 2012 and continuing through 2016. The State declared a drought emergency and implemented drought response actions from 2014 – 2017, declaring the end of the drought in April 2017. The District declared a water shortage emergency in 2014 and rescinded the declaration in 2016 when supplies were sufficient to meet demands for the current year, as well as a hypothetical extended three-year dry period.

Table 1-2
Agency Coordination

Agency the District has coordinated with…	Relevant information incorporated in the UWMP
California Department of Water Resources	Estimated future reliability of State Water Project supplies
San Francisco Public Utilities Commission	Estimated future reliability of San Francisco Regional Water System supplies
Bay Area Water Supply and Conservation Agency	Estimated future reliability of San Francisco Regional Water System supplies
Union Sanitary District	Potential future water reuse supplies and projects
City of Fremont	Projected future land use conditions (City General Plan) in Fremont
City of Union City	Projected future land use conditions (City General Plan) in Union City and hazard mitigation and seismic risk
City of Newark	Projected future land use conditions (City General Plan) in Newark and hazard mitigation and seismic risk

As per section 10621 (b) of the Urban Water Management Planning Act, the District notified the cities of Fremont, Newark, Union City, Hayward, and Milpitas of the District's UWMP planning process, as well as the County of Alameda and the County of Santa Clara. In addition, other agencies that the District coordinates with regarding water supply issues were also notified. These agencies include: State Water Contractors (SWC) and Bay Area Water Supply and Conservation Agency (BAWSCA).

1.3 PUBLIC REVIEW AND ADOPTION OF PLAN

Section 10642 of the Urban Water Management Planning Act requires urban water suppliers to make the Plan and the Water Shortage Contingency Plan (WSCP) available for public review and hold a public hearing prior to adopting the Plan and WSCP. The Plan also includes an appendix that meets the requirements of the Delta Plan Policy WR P1, “Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance” (“Reduce Reliance on the Delta”; California Code of Regulations, Title 23, section 5003) and this appendix is also a new appendix to the 2015-2020 Plan. The Reduce Reliance on the Delta appendix is addended to the 2015-2020 Plan. The Draft Plan, WSCP, and the Reduce Reliance on the Delta addended appendix to the 2015-2020 Plan were made available for public review and comment beginning on April 23, 2021. In order to encourage the active involvement of diverse social, cultural, and economic elements of the population within the District's service area, including both residential and non-residential customers, the District made copies of the Draft Plan available on the District’s website. Comments were received through May 13, 2021. A public hearing for the Plan, SBX7-7 compliance, WSCP, and the Reduce Reliance on the Delta addended appendix to the 2015-2020 Plan was held on May 13, 2021. Notice of the public hearing was provided to the County of Alameda, the County of Santa Clara; the Cities of Fremont, Newark, Union City, Hayward, Milpitas, and San Jose; the California Department of Water Resources; SWC; BAWSCA; Zone 7 Water Agency; Santa Clara Valley Water District; East Bay Regional Park District; USD; SFPUC; and Semitropic Water Storage District on April 28, 2021. The notice of the public hearing was sent to East Bay Municipal Utility District on April 29, 2021. Two notices of the public hearing were also published in the local newspapers (*The Argus* and *The Tri-City Voice*) at least once a week for two successive weeks prior to the public hearing. The Plan, the District’s reaffirmation of approach for SBX7-7 compliance, the WSCP, and the Reduce Reliance on the Delta addended appendix to the 2015-2020 Plan were adopted on May 13, 2021, by the District's Board of Directors Resolution No. 21-021 (reference Appendix F).

As per the requirements in Water Code sections 10644(a), 10645(a), and 10645(b), a copy of the District's Plan, WSCP, and the Reduce Reliance on the Delta addended appendix to the 2015-2020 Plan will be provided to the following entities: the California Department of Water Resources, the California State

Library, Alameda County and the Cities of Fremont, Newark, Union City, and Hayward on or before July 1, 2021, which is within 30 days of the Plan's adoption. The District's Plan, including the tables presented in Appendix G, will be provided to the California Department of Water Resources in electronic format. The District will make the Plan, WSCP, and Reduce Reliance on the Delta addended appendix to the 2015-2020 Plan available online at https://www.acwd.org. Due to the current COVID-19 pandemic, the District will not make a physical hard copy available at its headquarters for public review as per best management practices during non-pandemic years.

The District will periodically review its UWMP and WSCP to ensure that it accurately reflects the District's water management activities. Changes will be adopted and incorporated into the plan via amendments or other appropriate means as set forth in the Water Code.

1.4 REPORT FORMAT AND ORGANIZATION

This UWMP provides an update of the elements contained in the District's Integrated Resources Planning Study, and discusses the status of projects, programs, and studies in water supply planning, water conservation, and recycled water that were recommended as part of the IRP.

Chapter 1: Introduction – This chapter provides an overview of the Urban Water Management Planning Act requirements, the preparation and organization of this report, and background information on the District.

Chapter 2: Past, Current & Future Water Use – This chapter provides an overview of historical and current water use in the District, as well as a summary of future projected water demands.

Chapter 3: Sources of Supply – This chapter provides a summary of the District's sources of supply and their availability, as well as an overview of the management of these supplies.

Chapter 4: Groundwater – This chapter describes the Niles Cone Groundwater Basin, the District's reliance on it as a source of water supply, and the District's policy and activities for managing it.

Chapter 5: Desalination – This chapter describes the Newark Desalination Facility.

Chapter 6: Water Reuse – This chapter describes the Union Sanitary District's wastewater system (which serves the District service area), and the opportunities for water reuse.

Chapter 7: Demand Management – This chapter provides an overview of the District's demand management strategy and a summary of the implementation of the District's water conservation programs

Chapter 8: Water Conservation Bill of 2009 (SBX7-7) – This chapter provides a review of the SBX7-7 legislation regarding water use targets and the District's approach for compliance.

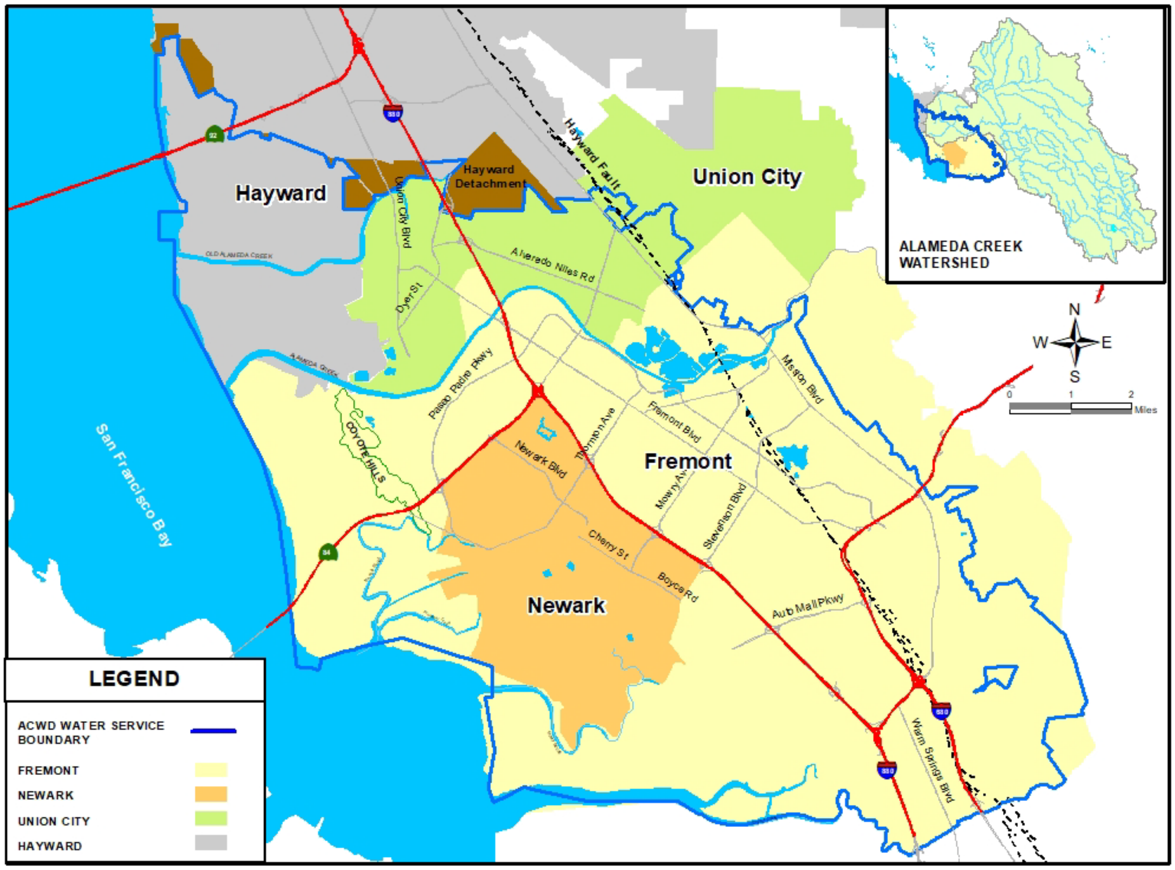
Chapter 9: Water Supply Strategy – This chapter summarizes the planning criteria utilized by the District in developing the District's water supply strategy (as part of the IRP process), followed by a summary of the recommended water supply strategy for the District and the implementation status of key IRP programs. This chapter also presents analyses of anticipated water supply availability under normal 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.

Chapter 10: Water Shortage Contingency Plan – This chapter provides the District's water shortage contingency plan, as required under the Urban Water Management Planning Act. This contingency plan includes scenarios for shortages of up to and greater than 50%.

1.5 DISTRICT BACKGROUND

The Alameda County Water District is a retail water purveyor with a service area of approximately 105 square miles generally encompassing the Cities of Fremont, Newark, and Union City (Figure 1-1). The District was established in 1914 under the California County Water District Act and is governed by a five-member Board of Directors. It was originally created to protect the groundwater basin, conserve the waters of the Alameda Creek Watershed and develop supplemental water supplies, primarily for agricultural use. In 1930, urban distribution became an added function of the District. Today, the District provides water primarily to urban customers: approximately 67% of supplies are used by residential customers, with the balance (approximately 33%) utilized by commercial, industrial, institutional, and large landscape customers. The total distribution system water use (including non-revenue water) was approximately 38,500 Acre-Feet (AF) in fiscal year 2019-2020.

Figure 1-1
District Boundary



The Niles Cone Groundwater Basin was the principal source of water supply for the District until 1962. Up to that time, groundwater use by the District and numerous private pumpers exceeded recharge, and this imbalance permitted saltwater from the Bay to intrude into the basin, severely limiting its use. In 1962, the District was the first state contractor to receive water from the State Water Project (SWP). The District's SWP supply was originally used solely to recharge the groundwater basin. As a result, groundwater levels rose and prevented additional saltwater intrusion. However, certain areas within the groundwater basin remain brackish due to past years of saltwater intrusion.

Today, the District's primary sources of supply come from: the Bay-Delta (via the SWP); the San Francisco Regional Water System (SFPUC RWS); and local supplies including groundwater from the Niles Cone Groundwater Basin and surface water from the Lake Del Valle.

1.6 SERVICE AREA DESCRIPTION AND POPULATION PROJECTIONS

The District's jurisdictional boundary includes the City of Fremont, the City of Union City, the City of Newark, and the southern portion of the City of Hayward. The District has the authority to provide retail water service within its jurisdictional boundary, except for the areas that were detached to the City of Hayward. However, currently, the District provides retail water service predominantly within the Cities of Fremont, Union City, and Newark. Through existing agreements, the District does provide water service to a small number of parcels within the City of Hayward, and likewise the City of Hayward provides water service to some parcels within the District boundary. The District manages the Niles Cone Groundwater Basin within its entire jurisdictional boundary and also retains jurisdictional authority of the Niles Cone Groundwater Basin within the areas that were detached to the City of Hayward.

As part of the San Francisco Bay Area, the District provides retail water service primarily to the Cities of Fremont, Newark, and Union City ("Tri-Cities") and is home to a population of approximately 357,000. As mentioned previously, the District's retail water service area is not conterminous to the entire District boundary. For the purposes of the UWMP, as the population of customers within the City of Hayward receiving water service from the District is so few in number compared to the overall District service area population, the UWMP will reference the water service area population of the Tri-Cities. As indicated in Table 1-3, the projections provided by the Association of Bay Area Governments/Metropolitan Transportation Commission (ABAG/MTC) indicate that the population in the service area may grow to nearly 450,000 by the year 2045.

Table 1-3
Current and Projected Population in the District's Service Area
(Sources: 2020 values from California Department of Finance; 2025-2045 values modified from draft ABAG/MTC Plan Bay Area, 2050)

City	Year					
	2020	2025	2030	2035	2040	2045
Fremont	234,220	-	-	-	-	-
Newark	48,966	-	-	-	-	-
Union City	73,637	-	-	-	-	-
Total	356,823	362,400	371,100	379,000	387,000	442,100

Numerous high-tech, biotech, and other industries are located in the service area. The Tri-Cities are also home to numerous retail and commercial businesses that support the local and surrounding Bay Area communities. The 2019-2020 assessed valuation (land, improvements, and personal property) of the Tri-Cities area was over $75 billion.

The District's service area is located approximately 20 miles southeast of San Francisco on the southeastern shores of the San Francisco Bay. The District is bounded by San Francisco Bay on the west, by the hills of the Diablo Range on the east, by the District boundary to the north and by Coyote Creek Slough to the south. The western portion of the District area (adjacent to San Francisco Bay) consists primarily of salt evaporation ponds and saltwater marshes. These ponds and marshes extend from one to four miles inland and cover an area of approximately 35 square miles.

Most of the District area is relatively flat with an average elevation of approximately 20-50 feet above mean sea level (MSL). The highest elevations (1,500 feet MSL) occur on the eastern boundary of the District, along the easterly slopes of the Diablo Range. In addition, elevations in the Coyote Hills, located adjacent to the salt evaporation ponds are up to 300 feet MSL.

The District is in the San Francisco Bay Hydrologic Region as defined by the California Department of Water Resources. The mean annual precipitation within the District is geographically variable due to the Diablo Range on the eastern boundary of the District. The precipitation in the area is highly seasonal with over 75% of the rainfall occurring in the winter months between November and March. Climate data for the District service area is provided in Table 1-4.

Table 1-4
Climate Data for the District Service Area

Climate Data	Monthly Average Data				Annual
	Nov - Mar	Apr - June	July - Aug	Sept - Oct	
Evapotranspiration (in)	1.9 "	5.3 "	5.8 "	3.8 "	44.7 "
Rainfall (in)	2.4 "	0.7 "	0 "	0.4 "	15.1 "
Temperature (˚F)	50.8°	59.8°	64.8°	62.6°	57.4° (avg.)
Avg. Maximum Daily Temperature (˚F)	62.1°	70.9°	76.4°	75.8°	69°

Note: Data represents period of record for CIMIS Station #171 (Union City), January 2011 through December 2020.

1.7 REGIONAL INTEGRATED PLANNING

District water supply planning is coordinated with other agencies throughout the Bay Area region. Examples of the District's participation in regional integrated planning include the following:

Bay Area Integrated Regional Water Management Plan - Water Quality and Water Supply Element: The District participates with a diverse group of water supply, water quality, wastewater, stormwater, flood management, watershed and habitat agencies, local governments, environmental groups, business groups, and other interested parties to develop a Bay Area Integrated Regional Water Management Plan (BAIRWMP). The purpose of this Bay Area planning effort is to (1) facilitate regional cooperation in water management planning, and (2) foster coordination, collaboration, and communication among the participating agencies to achieve greater efficiencies, enhance public services, and build public support for vital plans and projects. The BAIRWMP was completed in 2006 and updated in 2013 and 2019.

Alameda Creek Watershed Planning: The District participates in stakeholder-based Alameda Creek Watershed management planning efforts including: (1) the Arroyo de la Laguna Agency Collaborative, a collective of north watershed cities and agencies working in the region watershed (2) the Alameda Creek Watershed Forum, headed by the Alameda County Resource Conservation District (ACRCD) and includes agencies, cities, and NGOs; (3) the Alameda Creek Fisheries Restoration Workgroup, which is focused on restoring steelhead trout, a federally listed threatened species, to the Alameda Creek Watershed; and (4) the Alameda Creek Fisheries Restoration Workgroup Monitoring Subcommittee which is a subcommittee of the Alameda Creek Fisheries Restoration Workgroup that is focused on fish population and habitat monitoring within the Alameda Creek watershed.

1.8 URBAN WATER MANAGEMENT PLAN CHECKLIST

In order to ensure compliance with the Urban Water Management Planning Act, and to provide a guide for review of this UWMP update, a checklist of all required components of the UWMP, and their location in this document, is provided in Table 1-5. This checklist is consistent with the “Urban Water Management Plan Guidebook 2020” (DWR, April 2021).

Table 1-5
2020 Urban Water Management Plan Checklist, organized by Water Code (CWC) section

CWC Section	UWMP Requirement Source: DWR 2021 UWMP Guidebook for Urban Water Suppliers	Subject	UWMP Location (Column for Agency Use)
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	**Sect. 8.1**
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	**Sect. 8.1**
10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	**Sect. 8.2**
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	**Sect. 8.1 and 8.2**
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	**Sect. 1.3 and Sect. 10.12, Appendix I**
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	**Sect. 8.2, Appendix G**
10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	**Chapters 3 and 7**
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	**Sect. 1.2**
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	**Sect. 1.2, 1.3, 10.12, Appendix I**
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	**Sect. 9.2**
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	**Sect. 1.2, Appendix I**
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	**Not Applicable**
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	**Sect. 1.3 and Sect. 10.12, Appendix I**
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	**Chapters 1, 3, 7, 9, 10**

CWC Section	UWMP Requirement Source: DWR 2021 UWMP Guidebook for Urban Water Suppliers	Subject	UWMP Location (Column for Agency Use)
10631(a)	Describe the water supplier service area.	System Description	**Sect. 1.6**
10631(a)	Describe the climate of the service area of the supplier.	System Description	**Sect. 1.6**
10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	**Sect. 1.6**
10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	**Sect. 2.5**
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	**Sect. 1.6**
10631(a)	Describe the land uses within the service area.	System Description	**Sect. 1.6 and Sect. 2.2**
10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	**Sect. 9.3**
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	**Sect. 3.2**
10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	**Sect. 9.3 and 9.4**
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	**Sect. 9.4**
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	**Sect. 3.3 and 3.5**
10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	**Chapter 9**
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	**Sect. 4.2 and 4.3**
10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	**Sect 4.1**
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	**Sect. 4.1**
10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	**Sect. 4.1**
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	**Sect. 4.5**
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	**Sect. 9.3**

CWC Section	UWMP Requirement Source: DWR 2021 UWMP Guidebook for Urban Water Suppliers	Subject	UWMP Location (Column for Agency Use)
10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	**Sect.9.2**
10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	**Sect. 2.3 and 2.4**
10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	**Appendix H**
10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	**Not Applicable**
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	**Sect. 2.5**
10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	**Sect. 2.4 and 2.5**
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	**Chapter 7**
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	**Sect. 9.5**
10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	**Sect. 5.5 and 9.2**
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	**Sect. 3.2**
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	**Sect. 2.5**
10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	**Sect. 3.5 and Appendix G**
10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	**Sect. 10.4**
10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	**Sect. 10.4**
10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	**Sect. 10.1**
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	**Sect. 10.2**
10632(a)(2)(A)	Provide the written decision- making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	**Sect. 10.2**
10632(a)(2)(B)	Provide data and methodology to evaluate the supplier’s water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	**Sect. 10.1**

CWC Section	UWMP Requirement Source: DWR 2021 UWMP Guidebook for Urban Water Suppliers	Subject	UWMP Location (Column for Agency Use)
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	**Sect. 10.3**
10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	**Not Applicable**
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	**Sect. 10.4**
10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	**Sect. 10.4**
10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	**Sect. 10.4**
10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	**Sect. 10.6**
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	**Sect. 10.4**
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	**Sect. 10.5**
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	**Sect. 10.5**
10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	**Sect. 10.6 and Appendix D**
10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	**Sect. 10.7**
10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	**Sect. 10.7**
10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	**Sect. 10.7**
10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	**Sect. 10.8**
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	**Sect. 10.8**
10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	**Sect. 10.8**

CWC Section	UWMP Requirement Source: DWR 2021 UWMP Guidebook for Urban Water Suppliers	Subject	UWMP Location (Column for Agency Use)
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	**Sect. 10.9**
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	**Sect. 10.11**
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	**Sect. 10.12**
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)	**Sect. 6.3**
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)	**Sect. 6.4**
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	**Sect. 6.4**
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)	**Sect. 6.5 and Appendix G**
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)	**Sect. 9.2**
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)	**Sect. 6.5**
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	**Sect. 6.5**
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	**Sect. 3.4**
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	**Sect. 9.3**
10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	**Sect. 9.4**
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	**Sect. 9.4**
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	**Sect. 9.4**
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	**Sect. 9.4**

CWC Section	**UWMP Requirement** **Source: DWR 2021 UWMP Guidebook for Urban Water Suppliers**	**Subject**	**UWMP Location (Column for Agency Use)**
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	**Sect. 9.3**
10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	**Sect. 9.1, 9.3, and 9.4**
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	**Sect. 1.3 and 10.12, and Appendix I**
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	**Sect. 1.2 and 1.3, and Appendix I**
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	**Sect. 1.3 and Sect. 10.12, Appendix I**
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	**Sect. 1.3 and Sect. 10.12, Appendix I**
10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	**Sect. 1.3 and 10.12, and Appendix F**
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	**Sect. 1.3 and Sect. 10.12, Appendix I**
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	**Sect. 1.3 and Sect. 10.12, Appendix I**
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	**Sect. 1.3 and Sect. 10.12, Appendix I**
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	**Sect. 1.3 and Sect. 10.12, Appendix I**
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	**Sect. 1.3 and Sect. 10.12, Appendix I**
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	**Sect. 1.3 and Sect. 10.12, Appendix I**

CHAPTER 2 PAST, CURRENT, AND FUTURE WATER USE

2.1 WATER USE OVERVIEW

This chapter provides an overview of historic, current, and projected future water use in the District. This chapter also describes usage by water use categories.

2.2 WATER USE CATEGORIES

Water use in the District service area is divided into two categories: 1) distribution system use, and 2) groundwater system use. The distribution system use includes all water uses supplied by the District's treatment and production facilities, and this use is further subdivided into the categories of single family residential (SFR), multi-family residential (MFR), commercial, industrial, institutional, landscape, and other use.

Groundwater system use includes private (non-District) groundwater pumping (primarily for industrial, agricultural, and municipal landscape irrigation uses), the District's Aquifer Reclamation Program (ARP) pumping, and saline groundwater outflow to San Francisco Bay. The ARP pumping is an ongoing District program to pump saline groundwater out of the aquifer system and replace it with fresh water recharged at the District's groundwater recharge facilities. Saline groundwater outflow to San Francisco Bay represents the groundwater outflow required to maintain a bayward groundwater flow direction to prevent saltwater intrusion into the local aquifer system and to flush saline groundwater (from historical saltwater intrusion) back to San Francisco Bay.

The District's groundwater system use is not anticipated to change significantly in the future. Therefore, the following discussions of water use are focused on the District's distribution system water use.

2.3 HISTORICAL AND CURRENT WATER USE

Table 2-1 provides a summary of the last ten years of water use within the District. Table 2-2 provides a summary of the existing and forecast water accounts by customer classification in the District service area. Figure 2-1 provides a summary of water consumption by customer classification. As indicated in Figure 2-1, residential water use comprises approximately 67% of District water use, with the remaining 33% used by commercial, industrial, dedicated landscape, and institutional customers.

In the years prior to 2010, the District had observed declining demand due to a prevailing economic downturn, successive dry year conditions, and statewide water use efficiency campaigns. Water consumption trends were increasing between 2010 and 2013 when the District experienced a substantive reduction in water demand during the 2014-2016 drought years with only a moderate demand rebound during the subsequent years up to 2020, as many of our customers' behavioral changes and water use efficiency efforts have remained permanent. Since the previous UWMP (2015-2020 UWMP), the District's near and mid-term anticipated levels of new demands have been redeveloped and reforecast using an econometric model, as presented in the District's 2020 Water Efficiency Master Plan. Figure 2-2 provides a summary of the trends in per capita water use in the service area from 1990 to 2020.

Table 2-1
District Past and Current Water Use (Acre-Feet)

Water Use Category	***Fiscal Year***									
	10-11	***11-12***	***12-13***	***13-14***	***14-15***	***15-16***	***16-17***	***17-18***	***18-19***	***19-20***
Distribution System										
Single Family Residential	21,800	21,700	23,200	21,600	16,600	14,400	17,400	17,200	17,100	17,700
Multi-Family Residential	7,500	7,600	8,200	8,100	7,100	6,900	7,100	7,300	7,200	7,500
Commercial	4,700	3,800	5,000	5,000	4,600	4,400	4,700	4,900	4,800	4,700
Industrial	2,500	2,600	2,500	2,300	2,200	2,100	2,200	2,300	2,300	2,300
Institutional	1,700	1,900	2,000	1,800	1,300	1,000	1,300	1,400	1,400	1,300
Landscape	4,900	6,400	5,700	5,200	3,600	2,800	3,500	4,600	4,500	5,100
Other	200	100	200	200	200	200	200	200	200	100
Total Consumption	43,300	44,100	46,800	44,200	35,600	31,800	36,400	37,900	37,500	38,700
Non-Revenue Water	4,100	4,200	2,000	2,400	2,800	4,500	2,600	3,600	4,000	4,700
Distribution System Total	**47,400**	**48,300**	**48,800**	**46,600**	**38,400**	**36,300**	**39,000**	**41,500**	**41,500**	**43,400**
Groundwater System										
Private Groundwater	2,000	2,600	1,900	2,000	2,000	2,000	1,600	1,800	1,500	1,700
Groundwater Reclamation										
-ARP Pumping	11,300	12,000	11,000	11,400	11,200	11,900	11,500	10,900	10,700	12,100
-Saline Outflow	6,100	4,700	3,600	300	2,200	4,900	8,500	7,400	7,700	6,300
Groundwater System Total	**19,400**	**19,300**	**16,500**	**13,700**	**15,400**	**18,800**	**21,600**	**20,100**	**19,900**	**20,100**
Grand Total	***66,800***	***67,600***	***65,300***	***60,300***	***53,800***	***55,100***	***60,600***	***61,600***	***61,400***	***63,500***

Notes:

(1) Annual consumption is based on units billed during the Fiscal Year (July 1 to June 30). The District uses a bi-monthly billing cycle.

(2) All values rounded to the nearest 100 AF; total consumption values may not equal sum of individual components.

(3) Multi-Family Residential, Commercial, Industrial, and Institutional categories do not include dedicated landscape irrigation water use within these categories.

(4) Landscape water use includes all dedicated landscape accounts for Multi-Family Residential, Commercial, Industrial, and Institutional customers.

(5) Distribution System Total represents total water production, as reported in the District's Annual Survey Reports on Groundwater Conditions.

(6) Gross Non-Revenue Water is the difference between Distribution System Total and Total Measured Consumption, and includes distribution system losses; it is not the AWWA calculation for Distribution System Losses in Appendix H.

(7) Groundwater System demands are based on annual reported values in the District's Annual Survey Reports on Groundwater Conditions.

(8) Groundwater Reclamation demands represent groundwater system demands to protect and reclaim the groundwater system from saltwater intrusion.

(9) Groundwater System demands do not include "Other Outflows" as reported in the District's Annual Survey Reports on Groundwater Conditions.

Table 2-2
District Water Accounts by Customer Classification
(Number of Accounts)

Water Use Category	*Historical (Fiscal Year)*						*Projected*				
	14 - 15	*15-16*	*16-17*	*17-18*	*18-19*	*19-20*	*2025*	*2030*	*2035*	*2040*	*2045*
Single Family Residential	72,101	72,307	72,840	73,266	73,771	74,149	74,129	74,129	74,129	74,129	74,129
Multi-Family Residential	2,551	2,747	3,069	3,506	3,968	4,291	4,464	4,765	5,044	5,321	7,250
Commercial	3,832	3,885	3,912	3,930	3,956	4,018	4,241	4,444	4,618	4,777	6,478
Industrial	1,184	1,186	1,187	1,186	1,186	1,192	1,118	1,071	1,092	1,130	1,532
Institutional	715	718	726	728	733	738	747	765	781	798	911
Landscape	2,338	2,383	2,420	2,453	2,487	2,542	2,589	2,673	2,768	2,866	3,663
Other	286	326	362	364	390	393	399	408	417	426	487
Grand Total	**83,007**	**83,552**	**84,516**	**85,433**	**86,491**	**87,323**	**87,687**	**88,256**	**88,849**	**89,446**	**94,450**

Notes:
(1) Number of historical accounts represents accounts at endpoint of fiscal year (June 30).
(2) All category totals include 'fire-line' accounts within each customer class; 'fire-line' accounts are dedicated accounts for fire-suppression systems.
(3) "Other" accounts include temporary hydrant meters.
(4) Multi-Family Residential, Commercial, Industrial, and Institutional categories do not include dedicated landscape irrigation accounts within these categories.
(5) Landscape includes all dedicated landscape accounts for Multi-Family Residential, Commercial, Industrial, and Institutional customers.

Estimates of projected future accounts are based on the forecast development units (housing and non-residential building area) and the current ratios of accounts per development unit as developed in the District's 2020 Water Efficiency Master Plan (WEMP).

Figure 2-1
Relative Water Consumption by Customer Classification, FY 2019/20

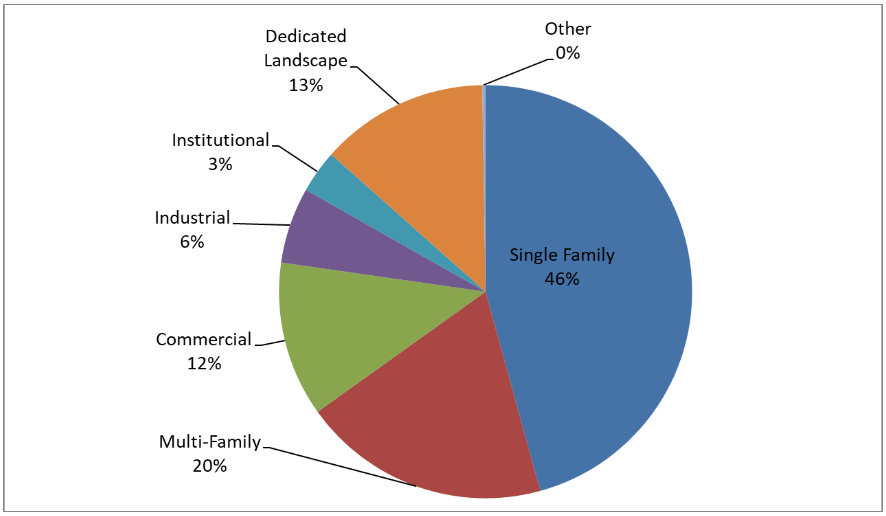
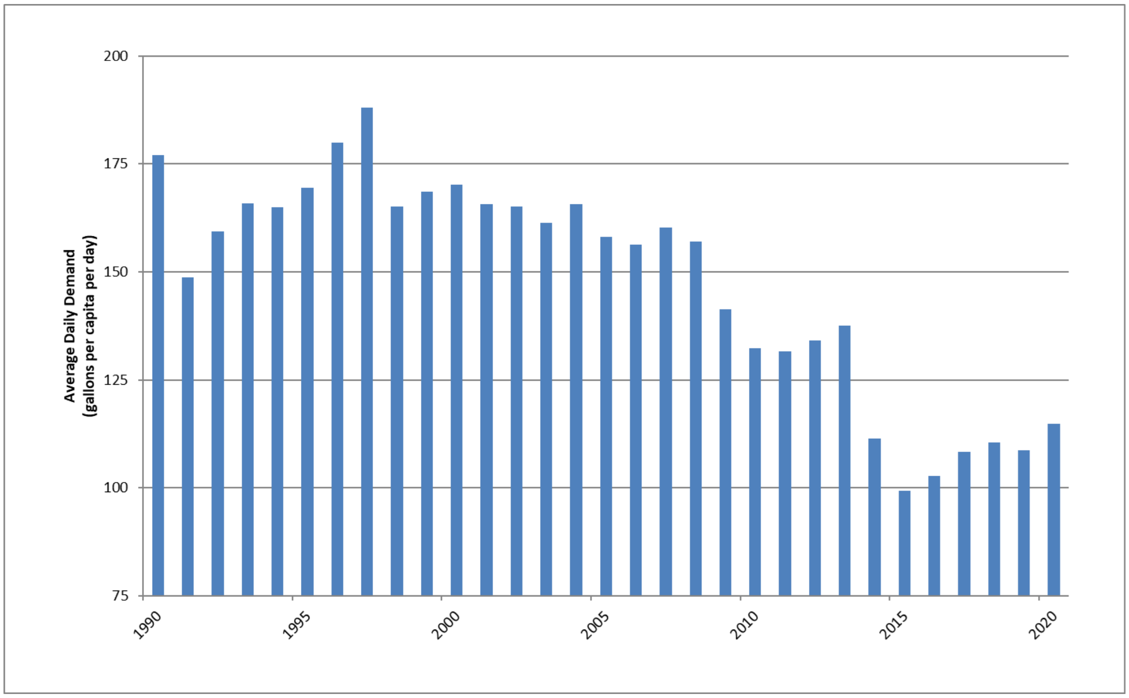


Figure 2-2
Water Use Trends - Per Capita Water Use:
Distribution System and Private Groundwater Pumping



2.4 PROJECTED FUTURE WATER DEMANDS

District planning for water supplies and water production facilities begins with a detailed water demand forecast. Prior to preparation of this UWMP, the District conducted a detailed update to its forecast as part of its Water Efficiency Master Plan (WEMP), which was developed for the District by Maddaus Water Management using an econometric model. The updated forecast reflects the most current land use planning information, water use trends, economic projections, survey data on current and future water use collected from the District's single family residential customers, regional population and jobs projections, policies affecting water utilization, and water use efficiency from plumbing code changes. This approach is a widely accepted and proven technique used for District-wide demand forecasting, is consistent with the California Water Code requirements for urban water management planning, and serves as the basis for this UWMP update.

The demand forecast is consistent with City general plans through 2030 for the City of Fremont, through 2035 for the City of Newark, and through 2040 for the City of Union City. The forecast incorporates draft Association of Bay Area Governments / Metropolitan Transportation Commission (ABAG/MTC) Plan Bay Area 2050 projections for population and employment assumptions and compresses the timeline so that the full 2050 ABAG/MTC projection is included in the District's 2045 forecast. To avoid overly aggressive forecasts within the UWMP 20-year regulatory planning horizon, the District prefers to align long-term regional forecasts with historical demonstrated growth rates for the 20-year regulatory planning horizon, and then include any additional regional housing projections from ABAG/MTC in the 5-year increment beyond the 20-year regulatory planning horizon. For the 2020 UWMP, the District compressed the complete ABAG/MTC 2050 numbers into year 2045 to achieve multiple objectives: 1) demonstrate District awareness of regional planning; 2) use regional planning numbers to support water supply assessments and other California Environmental Quality Act (CEQA) needs; 3) align UWMP with published regional planning numbers when engaging with public discourse surrounding ABAG and Regional Housing Needs Allocation (RHNA) forecasts; 4) support the establishment of appropriate development fees; and 5) support other long-range planning efforts. District staff met with planning and economic planning staff from each of the cities served to review these assumptions and obtain concurrence on the District's approach.

The demand forecast used in the 2020 UWMP is substantially reduced from the demand forecast published previously in the 2015 UWMP. The reduction is due to more efficient plumbing code standards, more rigorous in-District analysis of the plumbing code within the demand forecast (approximately 5 million gallons per day [mgd] of passive water use efficiency savings in the 25-year planning horizon of the 2020 UWMP compared to only approximately 1.8 mgd previously estimated in the 25-year planning horizon of the 2015 UWMP), lower per dwelling unit consumption for high density future housing developments (with the assumed average persons per household value steadily decreasing from 3.1 people per household in 2020 to the SF Bay Area average by 2045, or 2.8 people per household), and a permanent post-drought water use efficiency ethic apparent in the consumption data after the most recent statewide drought 2012-2016 (estimated to be approximately 1 mgd of additional permanent active water use efficiency savings compared to the 2013 pre-drought consumption patterns). All the Plan Bay Area 2050 ABAG/MTC regional housing growth is projected to be high-density housing development.

2.5 INCLUSION OF FUTURE WATER USE EFFICIENCY SAVINGS IN DEMAND FORECASTING

The District's forecast includes projected demand reductions from the ongoing implementation of *programmatic* and *natural* water use efficiency. Programmatic water use efficiency (also known as *active* water use efficiency) is the savings achieved through implementation of the District's water use efficiency programs. This includes savings from actions such as providing financial incentives for customers to replace turf with drought-tolerant landscaping, as well as savings resulting from public education campaigns such as encouraging customers to seasonally adjust their irrigation systems to prevent overwatering. These savings are a direct result of both District and customer actions. The District was also an early signatory to the Memorandum of Understanding (MOU) on Urban Water Conservation through the California Urban Water Conservation Council (CUWCC) in 1991, now known as the California Water Efficiency Partnership (CalWEP). While that MOU has since expired, the District continues its commitment to implement all cost-effective best management practices with water use efficiency potential; a complete description of the District's water use efficiency program is provided in Chapter 7.

Natural water use efficiency (also known as *passive* water use efficiency) is the savings expected to result from regulatory and other non-programmatic actions. It is called "natural" because these savings do not require special action on the part of the District or customers. For example, when an old toilet or showerhead is in need of replacement due to age or a remodel, the replacement devices will conform to current, higher-efficiency standards. City policies such as "retrofit on resale" can also significantly increase natural water use efficiency as they require the upgrade of old, inefficient toilets, to modern standards when a property is sold. Natural water use efficiency savings reflected in this forecast include regulatory changes from: California Civil Code section 11.02.155; Titles 20 and 24 of the California Code of Regulations related to water conservation appliances and point of installation requirements; 2015 updates to the California Plumbing Code for water efficiency standards; updates to the Code of Federal Regulations, Title 10, Chapter II, Subchapter D, Part 430, Subpart C, 430.32(g)(3) related to water factor standards.

Table 2-3 shows the projected future savings due to natural water use efficiency and programmatic water use efficiency; a further discussion of these savings assumptions is provided in Chapter 9.

Table 2-3
Projected Future Water Use Efficiency Savings (AF/yr)

	2025	2030	2035	2040	2045
Natural Water Use Efficiency Savings	(1,110)	(2,179)	(3,173)	(3,933)	(5,570)
Programmatic Water Use Efficiency Savings	(724)	(1,236)	(1,583)	(1,855)	(2,022)

Effect of Drought on Water Demands

Historically, dry periods have impacted water demands in several ways. Because approximately 35% of the District's demand comes from landscape irrigation, dry periods tend to increase demands as low rainfall and higher temperatures result in increased evapotranspiration requirements for landscaping. However, when dry periods extend in length or intensity and become designated as drought, public awareness campaigns at local, regional, and state level have typically reduced demands due to customer awareness and social consciousness. District customers have a proven history of high awareness of drought and responsible water usage during dry periods.

In extreme dry periods, the District may set either a voluntary or even mandatory water use reduction target under the District's Water Shortage Contingency Plan (as discussed in Chapter 10). These restrictions have historically resulted in large, temporary demand reductions as customers curtail non-essential water use and implement lasting conservation measures. After past drought periods, the temporary reductions have returned gradually to pre-drought levels, taking upwards of five years. However, as demonstrated during past droughts, District customers, like California residents on the whole, have also implemented permanent demand reductions during the drought which extend beyond the end of the drought and have lasting effects on water demands. These demand reductions occur as a result of accelerated implementation of water use efficiency measures during the drought due to heightened customer awareness.

As an example, during the 1987-1992 drought, District customers reduced overall water use by approximately 20% as the result of both voluntary efforts and mandatory restrictions imposed by the District, with a lasting 5% reduction after the drought ended. During the 2014-2016 drought years, District customers reduced overall water use by 28% relative to baseline demands in 2013. The District experienced unprecedented participation in water use efficiency programs during the 2014-2016 drought years, as well as continued water use efficiency savings from plumbing code requirements, and currently estimates that a permanent 11% demand reduction will last beyond the end of drought, as incorporated into the 2020 Water Efficiency Master Plan (WEMP). However, due to the continued implementation of natural and programmatic water use efficiency, the ability to reduce overall volumetric water use during future droughts by similar levels may be lessened. For planning purposes, the 2020 forecast assumes the 2012-2016 statewide drought ended in 2016, with demand rebound occurring through 2024.

For planning purposes, it is conservatively assumed that, during drought periods, water demands for the District's distribution system customers do not change from those during normal years. However, the groundwater system demands are typically lower in dry years as lower groundwater levels, caused by reduced local recharge and increased reliance on groundwater storage, result in reduced saline groundwater outflows. The District will often minimize ARP pumping as well during dry periods. Summaries of projected demands under single dry year and multiple dry year conditions are provided in Tables 9-3 through 9-8 (Chapter 9).

Low Income Housing Water Demand

The District will be able to meet projected water demands for all customers in its service area through 2045, including the projected water use for single family and multi-family residential housing needed for low-income households. California Water Code (Section 10631.1) requires 2020 UWMPs to include projected water demands for lower income single-family and multi-family residential households to assist water purveyors in complying with the requirements of Government Code Section 65589.7, which requires water purveyors to grant a priority for the provision of service to housing units affordable to lower income households. Health and Safety Code Section 50079.5 defines lower income households for all geographic areas of the state at 80% of area median income or less, adjusted for family size and revised annually.

The District's service area cities (Fremont, Union City, and Newark) have made low income housing development a priority and currently have a combined low income water demand of approximately 10,800 AF/yr in 2020. This baseline low-income demand estimate was derived from US Census data for the Cities of Fremont, Union City, and Newark in a two-step process. First, the District estimated the population-weighted percentage of households in the service area that earn 80% of area median income or less. Second, this percentage was multiplied by the 2020 single and multi-family residential demand projection to estimate the existing baseline low-income water demand for the service area. For 2025-2045 projections, the District used the cumulative future low-income water demand projections for each 5-year increment and added it to the baseline 2020 value. As mentioned previously, the 2020 forecast from the District's Water Efficiency Master Plan (WEMP) incorporates draft ABAG/MTC Plan Bay Area 2050 projections for population and housing assumptions and compresses the timeline so that the full 2050 ABAG/MTC projection is included in the District's 2045 forecast. For forecasting purposes, the District also projects that all future housing in the service area will be high-density housing, with the assumed average persons per household value steadily decreasing from 3.1 people per household in 2020 to the current SF Bay Area average of 2.8 people per household by 2045. Using the assumption that average persons per household is equivalent to family size with regard to new housing units, the District uses the number of new units projection multiplied by the projected family size occupying the new units to estimate the additional residential (single and multi-family) customer demand in the District's service area for each 5-year increment from 2025-2045, and then calculates the portion of low-income customer demand by multiplying these new demands by the percentage of low income households in the service area. The District's projections for single family and multi-family low-income residential water demands, adjusted for family size, are presented in Table 2-4.

Table 2-4
Low Income Residential Demand Projections

Year	*Low Income Residential Demand (AF/yr)*
2020	10,800
2025	11,600
2030	11,900
2035	12,100
2040	12,400
2045	16,300

Notes:

(1) Low Income Residential Demand includes both single-family and multi-family residential demands and includes Non-Revenue Water as developed in the District's 2020 Water Efficiency Master Plan.

Summary of 2020 Water Demand Forecast

The projected future demands in the District's service area are summarized in Figure 2-3 and Table 2-4 (for the years 2020, 2025, 2030, 2035, 2040, and 2045). The District anticipates reduced future demands for water compared to previous forecasts as well as in comparison to demonstrated past levels of actual demand. These reductions in total demand come despite a net increase in population and total housing per City and ABAG projections. As mentioned previously, the 2020 forecast from the District's Water Efficiency Master Plan (WEMP) incorporates draft ABAG/MTC Plan Bay Area 2050 projections for population and housing assumptions and compresses the timeline so that the full 2050 ABAG/MTC projection is included in the District's 2045 forecast. To avoid overly aggressive forecasts within the UWMP 20-year regulatory planning horizon, the District prefers to align long-term regional forecasts with historical demonstrated growth rates for the 20-year regulatory planning horizon, and then include any additional regional housing projections from ABAG/MTC in the 5-year increment beyond of the 20-year regulatory planning horizon. As a result, the shaded triangle in Figure 2-3 represents an "envelope of uncertainty" with regard to the future water demand beyond 2040. This envelope of uncertainty provides a lens through which to assess the potential range of future water demands in the District's service area based on the ABAG/MTC long-term growth projections. The District also anticipates a continued decrease in per-capita water demands due to pronounced water use efficiency effects as well as an increased ratio of high-density to low-density housing (discussed further in Chapter 8). These trends also reflect the continued transition of the local industrial sector from water intensive manufacturing to lower water demand activities.

Figure 2-3
Historical and Projected Distribution System Demands
(with Additional Water Use Efficiency Savings and Non-Revenue Water)

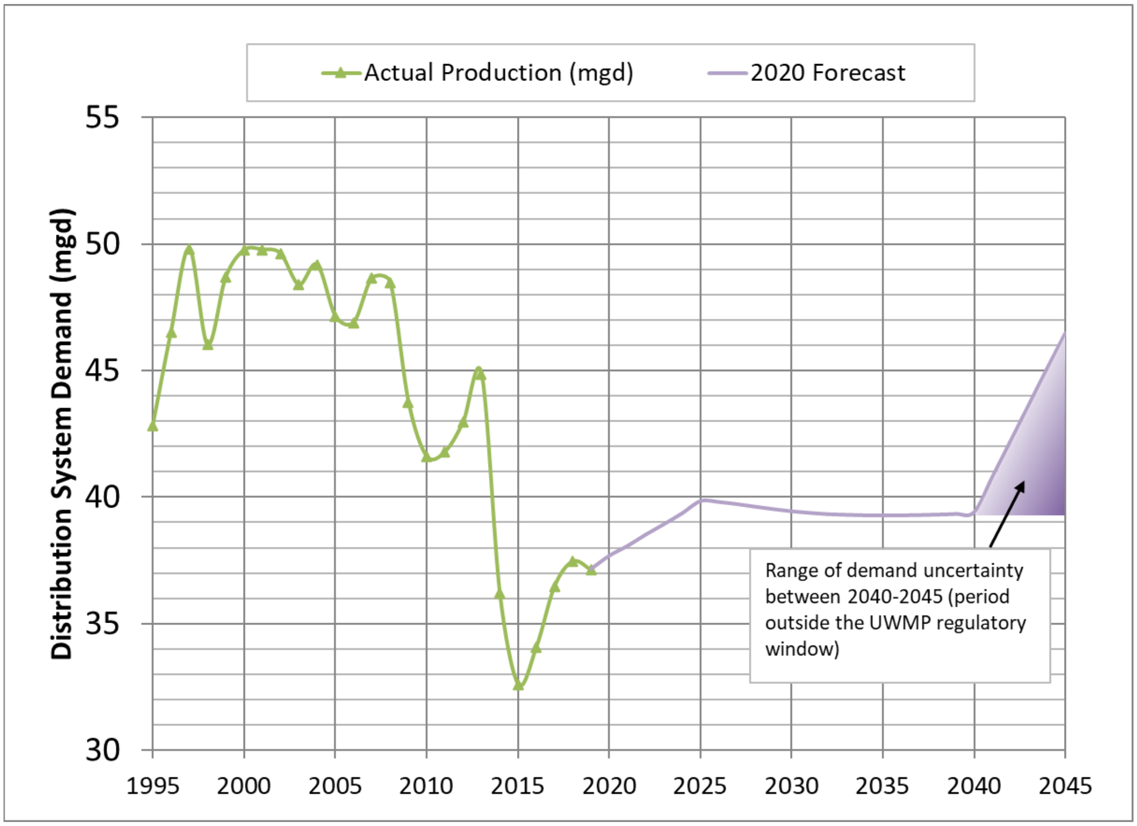


Table 2-5
District Estimated Future Water Demands (AF/yr)

Water Use Category	**Year**				
	2025	**2030**	**2035**	**2040**	**2045**
Distribution System					
Single Family Residential	18,300	17,700	17,100	16,700	16,400
Multi-Family Residential	9,800	10,000	10,200	10,500	14,100
Commercial	6,800	7,000	7,100	7,200	9,700
Industrial	3,200	3,000	3,000	3,100	4,100
Institutional	2,500	2,500	2,600	2,600	3,000
Other	200	200	200	200	200
Total Distribution System Demand (without losses)	**40,900**	**40,400**	**40,200**	**40,300**	**47,600**
Total Distribution System Demand (with losses)	**44,700**	**44,200**	**44,000**	**44,200**	**52,100**
Groundwater System Demand	**16,300**	**16,200**	**16,100**	**16,000**	**15,500**
Grand Total	**61,000**	**60,400**	**60,100**	**60,200**	**67,600**

Notes:

(1) All values rounded to the nearest 100. Total values may not equal sum of individual components due to rounding errors.

(2) Landscape Irrigation included within Multi-Family Residential, Commercial, Industrial, and Institutional categories.

(3) Distribution System Demand categories include adjustments for both natural and programmatic water use efficiency savings (efficiency improvements due to plumbing code enhancements as well as the District's active water use efficiency programming).

(4) Total Distribution System Demand (with losses) includes estimated Non-Revenue Water as calculated in the District's 2020 Water Efficiency Master Plan (WEMP).

(5) The 2020 WEMP uses 365.25 days per year for all calculations, which can differ from other calculations in the UWMP that use 365 days per year.

(6) Groundwater System Demand includes Normal Year annual values for: (1) private pumping (1,900 AF/yr), (2) default ARP pumping (7,000 AF/yr), and (3) saline groundwater outflows that vary for each 5-year increment based on variable groundwater operations as presented in Chapter 9 of the UWMP.

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CHAPTER 3 SOURCES OF SUPPLY

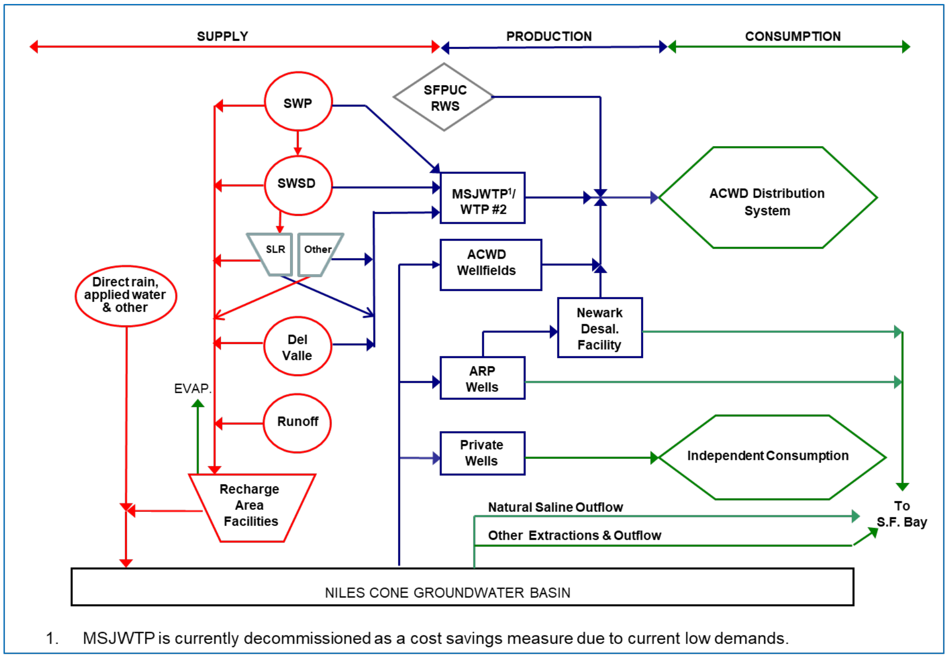
3.1 SOURCES OF SUPPLY OVERVIEW

This chapter provides a summary of the District's sources of supply and their availability, as well as an overview of the management of these supplies and how water quality and climate change may impact future water supply reliability. This chapter also includes an overview of energy-related information tied to water supply. A summary of the District's water supply strategy is provided in Chapter 9 – Water Supply Strategy.

3.2 SOURCES OF SUPPLY AND SUPPLY AVAILABILITY

The District currently has three primary sources of water supply: (1) the State Water Project (SWP), (2) San Francisco Public Utilities Commission Regional Water System (SFPUC RWS), and (3) local supplies. The SWP and RWS supplies are imported into the District service area through the South Bay Aqueduct (SBA) and Hetch Hetchy Aqueduct, respectively. Local supplies include fresh groundwater from the Niles Cone Groundwater Basin, desalinated brackish groundwater from portions of the groundwater basin previously impacted by saltwater intrusion, and surface water from the Del Valle Reservoir. The primary source of recharge for the Niles Cone Groundwater Basin is from percolation of runoff from the Alameda Creek watershed and, to a lesser degree, direct stormwater capture. A portion of the District's SWP supplies are also used for supplemental groundwater recharge when Alameda Creek supplies are insufficient or when groundwater levels fall below critical thresholds. Infiltration of rainfall and applied water also contribute to local groundwater recharge.

Figure 3-1
District Water Supply and Production Schematic



1. MSJWTP is currently decommissioned as a cost savings measure due to current low demands.

Notes:
(1) Definitions of elements included: SWP (State Water Project), SFPUC (San Francisco Public Utilities) RWS (Regional Water System), SWSD (Semitropic Water Storage District), MSJTP (Mission San Jose Treatment Plant), WTP #2 (Water Treatment Plant #2), SLR (San Luis Reservoir), ARP (Aquifer Reclamation Program), and Other (other potential water supplies from exchanges or transfers or other water supply projects).

Before being supplied to District customers via the District's potable water distribution system, the source water supplies are treated to meet and surpass all state and federal drinking water standards.

Figure 3-2
Average Sources of Supply (FY 2010/11-2019/20)
Distribution and Groundwater System Demands

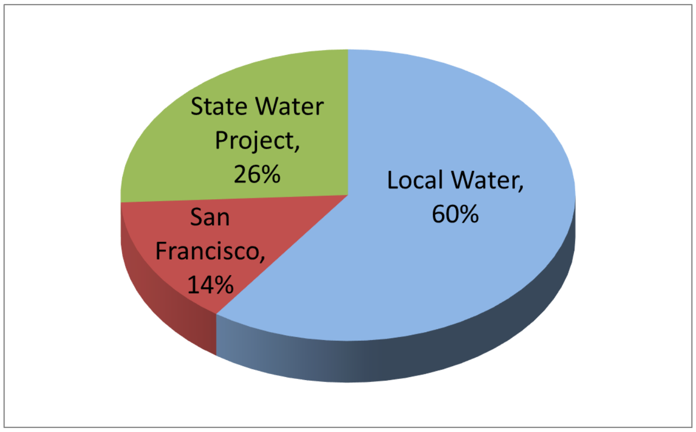
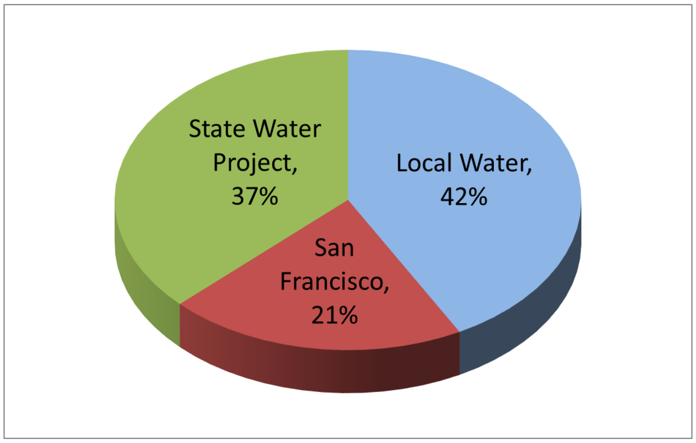


Figure 3-3
Average Sources of Supply (FY 2010/11-2019/20)
Distribution System Demands Only



The District operates two surface water treatment plants[1] that treat SWP and local surface water from Del Valle Reservoir. The Newark Desalination Facility (Desal Facility or NDF) treats brackish groundwater to remove salts and other impurities, and the Blending Facility blends San Francisco water with relatively high hardness groundwater in order to provide a blended supply with lower overall hardness. Figure 3-1 provides a schematic of the District's sources of supply and production facilities. Over the FY 2010/11 - FY 2019/20 period, 26% of the total in-District water demands (distribution system and groundwater system demands) have been met by SWP supplies, 14% from SFPUC RWS supplies and 60% from local supplies. When considering only the distribution system demands (treated water), over the same time period, about 37% of the District's distribution system water supply was from the SWP[2]. Water from the SFPUC RWS provided approximately 21% of the distribution system water supply and local supplies accounted for the balance (about 42%) of the distribution system supplies. Figures 3-2 and 3-3 provide a summary of the District's sources of supply. Table 3-1 provides a summary of the District's historical use of each supply source.

Each of the District's water supply sources is discussed in greater detail below. Table 3-2 provides a summary of the estimated availability of each of these supplies. Tables 3-3 and 3-4 provide a summary of the availability of wholesale water supplies from the SWP and SFPUC RWS.

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[1] The Mission San Jose Treatment Plant is currently decommissioned as a cost savings measure due to current low demands.

[2] Total SWP use includes both water that was treated at a District water treatment plant or used to recharge local aquifers.

Table 3-1
District Historical Water Supply Utilization (AF/yr)

FISCAL YEAR	**SWP supplies used at ACWD facilities**	**Del Valle**	**SFPUC RWS**	**Newark Desal Facility**(2)	**Net Local Groundwater Recharge**(3)	**Recovered from Semitropic GW bank**	**Total In-District Water Supply**	**SWP Supply delivered to Semitropic GW bank**
10-11	14,300	5,900	8,800	6,600	33,600	0	69,200	23,400
11-12	18,300	2,600	9,300	8,900	17,000	0	56,100	5,000
12-13	14,800	5,800	10,000	8,100	12,200	2,000	52,900	7,500
13-14	16,800	1,400	13,100	8,100	12,900	3,000	55,300	0
14-15	9,000	1,200	8,800	8,200	23,300	13,200	63,700	0
15-16	2,300	5,500	6,700	7,600	30,100	13,300	65,500	8,900
16-17	4,900	9,000	6,700	7,800	33,400	3,500	65,300	20,800
17-18	15,300	2,100	8,600	7,100	22,400	0	55,500	7,900
18-19	9,000	4,500	8,800	6,700	31,200	5,000	65,200	6,100
19-20	10,500	5,500	8,800	8,600	20,800	4,400	58,600	7,100

Notes:

(1) All values rounded to the nearest 100. Total values may not equal sum of individual components due to rounding.

(2) Newark Desal Facility supply represents total blended flow. Net annual Desal Facility production rates in excess of 5,100 AF/yr represent facility optimization efforts; the quantity produced above 5,100 AF/yr will have a corresponding reduced production from other local groundwater wells.

(3) Net Local Groundwater Recharge figures do not include Del Valle Reservoir or imported supplies used for recharge, and are less evaporation and other losses.

Table 3-2
Summary of Water Supply Availability for Existing Supplies (AF/yr)

SUPPLY COMPONENT	*Estimated Water Supply Availability*			
	Median Year (1)	*Long-Term Average (2)*	*Maximum Availability (3)*	*Minimum Availability (4)*
Imported Supplies				
State Water Project(5)	20,900	20,800	42,000	3,700
SFPUC RWS(6)	15,400	13,000	15,400	5,000
Local Supplies				
Groundwater Recharge(7)	21,700	20,600	38,300	7,000
Groundwater Storage	N/A	N/A	10,000	0
Del Valle	5,000	5,900	14,900	0
Desalination(8)	5,100	5,100	5,100	5,100
Banking/Transfers				
Semitropic Banking	N/A	N/A	33,400	13,500
TOTAL SUPPLY	***68,100***	***65,400***	***N/A***	***N/A***

Notes:

(1) Median Year values represent the calculated median water supply availability over the 1922-2003 planning hydrology and reflect 2020 operating conditions. Local Groundwater Storage and Semitropic Banking are not included in the Median Year because these supply components are used solely for dry year supplies and not under Median Year conditions.

(2) Long-term Average values represent the calculated average water supply availability based on the 1922-2003 planning hydrology and reflect 2020 operating conditions. Similar to Median Year, Groundwater Storage and Semitropic Banking are not included.

(3) Maximum Availability represents the maximum quantity of supply from each supply component. Imported supplies reflect the District's full contractual amounts. Local supplies maximums are evaluated based on the 1922-2003 planning hydrology and reflect 2020 operating conditions; District has water rights in excess of these values, 30TAF on Arroyo Valle and 40TAF on Alameda Creek. For Groundwater Storage, this assumes that the groundwater basin is within normal operating levels in the beginning of the year. For Semitropic Banking, this is based on the District's contractual return capacity under a 100% SWP allocation. The maximum supply quantities listed above are not summed together because the availability of these individual supplies may not occur under the same year/hydrologic condition.

(4) Minimum Availability represents the minimum quantity of supply from each supply component. These quantities represent the minimum projected supply availability based on the based on the 1922-2003 planning hydrology and reflect 2020 operating conditions. For Groundwater Storage, the minimum quantity assumes that the groundwater basin was at the minimum operating groundwater elevation in the beginning of the year and there is no usable groundwater storage available. For Semitropic Banking, the minimum quantity is based on the District's contractual guaranteed recovery and assumes that only Semitropic "pumpback" capacity is available to return banked water to the District. Similar to maximum values, individual minimum supply quantities may not occur in the same year/hydrologic condition and are not summed together.

(5) SWP availability is based on DWR's 2019 Delivery Capability Report, Future Conditions scenario from the Alternate Reporting tables by agency.

(6) SFPUC RWS availability is based on the District's modified 40% unimpaired flow (UF) dataset from SFPUC.

(7) Groundwater Recharge is calculated as recharge from deep percolation of rainfall and applied water plus recharge at the District's groundwater percolation facilities that is diverted from the Alameda Creek Watershed under the District's Water Rights Permit, less "Other Outflows" as described in the District's annual Groundwater Survey Reports. Groundwater Recharge values do not include recharge from SWP or Del Valle Reservoir supplies.

(8) Desalination supplies are recovered from required Aquifer Recovery Program (ARP) pumping that historically was discharged to the San Francisco Bay.

Table 3-3
District Supply Request and Projected Availability of SWP Supplies (AF/yr)

Supply Request and Projected Availability	***Year***					
	2020	***2025***	***2030***	***2035***	***2040***	***2045***
District Forecast Delivery Request	42,000	42,000	42,000	42,000	42,000	42,000
DWR Projected Supply Availability						
Maximum	42,000	42,000	42,000	42,000	42,000	42,000
Median Year	20,900	20,900	20,900	20,900	20,900	20,900
Single Dry Year	3,700	3,700	3,700	3,700	3,700	3,700
Multiple Dry Year						
-Year 1	3,900	3,900	3,900	3,900	3,900	3,900
-Year 2	20,900	20,900	20,900	20,900	20,900	20,900
-Year 3	5,300	5,300	5,300	5,300	5,300	5,300
-Year 4	8,400	8,400	8,400	8,400	8,400	8,400
-Year 5	7,300	7,300	7,300	7,300	7,300	7,300

Source: California Department of Water Resources, 2019 State Water Project Delivery Capability Report

Notes:
(1) SWP availability assumptions for 2020-2045 are based on DWR's Future Conditions Scenario from the Alternate Reporting Tables in the 2019 State Water Project Delivery Capability Report.

Table 3-4
District Supply Request and Projected Availability of San Francisco Public Utilities Commission's Regional Water System Supplies (AF/yr)

Supply Request and Projected Availability	***Year***					
	2020	***2025***	***2030***	***2035***	***2040***	***2045***
District Forecast Delivery Request	15,400	15,400	15,400	15,400	15,400	15,400
SFPUC RWS Projected Supply Availability						
Maximum	15,400	15,400	15,400	15,400	15,400	15,400
Median Year	15,400	15,400	15,400	15,400	15,400	15,400
Single Dry Year	6,100	6,100	6,200	6,200	6,200	7,000
Multiple Dry Year						
-Year 1	6,600	6,600	6,600	6,600	6,600	7,100
-Year 2	6,300	6,300	6,300	6,300	6,300	6,600
-Year 3	5,600	5,700	5,700	5,700	5,800	5,900
-Year 4	5,300	5,300	5,400	5,400	5,400	5,600
-Year 5	5,000	5,100	5,100	5,200	5,200	5,600

Source: SFPUC's 2017 comment letter on Phase 1 of the Bay Delta Plan reflecting reliability under 40% unimpaired flow criteria and modified by the District using the Tier 2 drought allocation formula ("modified 40% UF" dataset).

Notes:
(1) SFPUC RWS projected supply availability values for years 2025-2035 are linearly interpolated between the 2020 and 2040 model runs.

Imported Supplies

2020 Status of Bay-Delta Water Quality Control Plan and Implications for Imported Supplies

Both of the District's imported supplies (SWP and SFPUC RWS) are potentially subject to negative impacts from the ongoing process of the State Water Board to update environmental requirements in the Bay-Delta Water Quality Control Plan (Bay-Delta Plan). The Bay-Delta Plan strives to establish water quality control objectives and flow requirements needed to provide reasonable protection of beneficial uses in the San

Francisco Bay/Sacramento–San Joaquin Delta Estuary and its watershed. The State Water Board is using a phased approach to adopt new requirements that are anticipated to have significant impact on the availability of the District's imported supply.

Phase 1 has already been adopted by the State Water Board and involves updating the Bay-Delta Plan flow objectives for the San Joaquin River and its major tributaries as well as the southern Delta salinity objectives. Phase 2 is under development and would involve updating flow objectives for the Sacramento River and Delta and their major tributaries. On December 12, 2018, through State Water Board Resolution No. 2018-0059, the State Water Board adopted the Phase 1 Plan amendments and Final Supplemental Environmental Document (SED) establishing the Lower San Joaquin River flow objectives and revised southern Delta salinity objectives. On February 25, 2019, the Office of Administrative Law approved the Plan amendments. This plan requires an adaptive range of 30-50 percent of the unimpaired flow (UF) to be maintained from February through June in the Stanislaus, Tuolumne, and Merced Rivers, with a starting point of 40 percent of the UF with minimum flows targets at Vernalis on the San Joaquin River. The establishment of this UF requirement has directly impacted the future reliability of SFPUC RWS and is reflected in this UWMP.

The State Water Board is also developing Phase 2 Plan amendments focused on the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne Rivers), Delta outflows, and interior Delta flows. Staff is recommending an adaptive range of 45-65 percent UF objective with a starting point of 55 percent. Once the State Water Board adopts Phase 2 Plan amendments, the Board will need to conduct hearings to determine, consistent with water rights, various water users' responsibilities for meeting the objectives in both Phase 1 and 2. At this time, the potential impacts of this UF requirement on the SWP are unknown and are therefore not reflected in this UWMP. However, they are anticipated to be significant and are further discussed below in Section 3.5. A discussion of alternative negotiations or "Voluntary Agreements" among affected stakeholders is also presented below.

State Water Project

On November 29, 1961, the District and the California Department of Water Resources (DWR) entered into a contract, entitled "Water Supply Contract Between the State of California Department of Water Resources and Alameda County Water District," for DWR to provide water to the District up to a maximum annual amount of 42,000 acre-feet from the State Water Project (SWP). While the original contract term was set to expire on November 29, 2036, the District and DWR entered into an amendment, entitled "Amendment No. 21 (The Contract Extension Amendment) to Water Supply Contract Between the State of California Department of Water Resources and Alameda County Water District for Continued Service and the Terms and Conditions Thereof," on February 26, 2019, to implement continued service under the contract and which expires no earlier than December 31, 2085. An agency's contracted amount of water with the SWP is referred to as the "Table A" amount of water. The SWP, managed by the DWR, is the largest state-built, multi-purpose water project in the country. The SWP facilities include 36 storage facilities, 30 pumping and generating plants, and approximately 700 miles of canals, tunnels, and pipelines. The water stored in the SWP storage facilities originates from rainfall and snowmelt runoff in Northern and Central California watersheds. The SWP's primary storage facility is Lake Oroville in the Feather River Watershed. Releases from Lake Oroville flow down the Feather River to the Sacramento River, which subsequently flows to the Sacramento-San Joaquin Delta. The SWP diverts water from the Delta through the Banks Pumping Plant which lifts water from the Clifton Court Forebay (in the Delta) to the California Aqueduct and Bethany Reservoir. From Bethany Reservoir, the South Bay Pumping Plant lifts water into the South Bay Aqueduct, which delivers, through various turnouts, SWP supplies to the District and to other Bay Area water agencies in Alameda and Santa Clara Counties.

State Water Project Availability

DWR prepares a biennial report to assist SWP contractors and local planners in assessing the availability of supplies from the SWP. DWR issued its most recent update, the final 2019 State Water Project Delivery Capability Report (DCR), in August 2020. In this update, DWR provided SWP supply estimates for SWP contractors to use in their planning efforts, including for use in their 2020 UWMPs. The 2019 DCR includes DWR's estimates of SWP water supply availability under both existing (2020) and future conditions (2040).

DWR's estimates of SWP deliveries are based on a computer model that simulates monthly operations of the SWP and Central Valley Project (CVP) systems. Key inputs to the model include the facilities included in the system, hydrologic inflows to the system, regulatory and operational constraints on system operations, and contractor demands for SWP water. In conducting its model studies, DWR must make assumptions regarding each of these key inputs.

In the 2019 DCR for its model study under existing conditions, DWR assumed: existing facilities, hydrologic inflows to the model based on 82 years of historical inflows (1922 through 2003), current regulatory and operational constraints including 2018 COA Amendment, 2019 biological opinions and 2020 Incidental Take Permit, and contractor demands at maximum Table A Amounts. The long-term average allocation reported in the 2019 DCR for the existing conditions study provides an estimate of the SWP water supply availability under current conditions.

To evaluate SWP supply availability under future conditions, the 2019 DCR included a model study representing hydrologic and sea level rise conditions in year 2040. The future condition study used all of the same model assumptions as the study under existing conditions, but reflected changes expected to occur from climate change, specifically, projected temperature and precipitation changes centered around 2035 (2020 to 2049) and a 45 cm sea level rise. For the long-term planning purposes of this UWMP, the long-term average allocations reported for the future conditions study from 2019 DCR is the most appropriate estimate of future SWP water supply availability.

This UWMP uses the Future Conditions scenario as developed in DWR's Alternate Reporting tables to estimate SWP supply availability over the full planning horizon. The District elects to assume the more conservative Future Conditions projection for all years modeled in the 2020 UWMP (2020-2045) as it better reflects the potential full stress on the SWP. According to the DWR, the long-term average delivery capability for the District under the Future Conditions scenario is projected to be approximately 50% of Table A, ranging from a minimum of 9% (single dry year) to 100% (single wet year). Contractual amounts are projected to range from 9% to 50% during multiple-dry year periods, and from 49% to 96% in multiple-wet year periods. A summary of the projected SWP supply availability is provided in Table 3-3.

In order to assist the DWR in its water supply planning, the District annually submits projected future use of SWP supplies to DWR under a variety of Table A allocation assumptions. Currently, SWP water that is not used by the District for treatment and delivery to customers in the District's service area is 'banked' in groundwater storage, either locally in the Niles Cone Groundwater Basin or at the Semitropic Groundwater Bank for later use in dry years (see discussion below). Alternatively, the District's SWP water may also be stored as carryover water in the DWR's San Luis Reservoir. Recently, the District has been pursuing opportunities to store surplus Table A in "non-project reservoirs," notably Contra Costa Water District's Los Vaqueros reservoir.

Semitropic Banking of District's SWP Supplies

To address the year-to-year variability of SWP supply, the District's 1995 IRP identified the need to secure storage to improve dry year reliability. Based on this IRP recommendation, the District contracted with

Semitropic Water Storage District for participation in the Semitropic Groundwater Banking Program. The District has secured 150,000 AF of groundwater storage capacity at Semitropic under this program. In wet years, the District delivers its surplus SWP supplies to Semitropic for storage in their groundwater basin. In dry years, the District can recover these supplies through either of two methods: (1) an "in-lieu" exchange whereby the District uses Semitropic's SWP supplies while Semitropic utilizes the previously stored groundwater; or (2) a "pumpback" program where Semitropic directly pumps the stored groundwater into the California Aqueduct. As with storage in the Niles Cone Groundwater Basin, the Semitropic Groundwater Banking Program does not provide a new source of supply for the District. Rather, it provides a means to store the District's unused SWP supplies in wet years for recovery and use during dry years when the delivery of SWP supplies may be significantly curtailed.

On January 31, 2014, DWR announced a 0% Table A allocation for the first time in its 54-year history. Although the allocation was subsequently raised to 5%, this water was not available before September 1, 2014, after the typically high summer demand season. Even during the unprecedented 0% Table A allocation period, the District was able to recover more than 2,000 AF of its Semitropic supplies. Moreover, when Table A deliveries were resumed in September, the Semitropic Groundwater Banking Program returned more water during calendar year 2014 to the District than its contractual commitment. Despite the District's declaration of a water shortage emergency and call for 20% mandatory conservation in 2014, should the State experience a recurrence of this unprecedented event, the District would be able to meet full level of service.

San Francisco Public Utilities Commission's Regional Water System

The District receives water from the City and County of San Francisco Public Utilities Commission's (SFPUC) Regional Water System (RWS). The District maintains an Individual Water Sales Contract with the City and County of San Francisco, as well as a Water Supply Agreement (master agreement) between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County, and Santa Clara County, both of which have a term from July 1, 2009 to June 30, 2034, with two provisions for extension of terms through June 30, 2039 and June 30, 2044. This supply is predominantly from the Central Sierra Nevada, delivered through the Hetch Hetchy aqueducts, but also includes treated water produced by the SFPUC from its local watersheds and facilities in Alameda and San Mateo Counties. The amount of imported water available to the SFPUC's retail and wholesale customers is constrained by hydrology, physical facilities, and the institutional parameters that allocate the water supply of the Tuolumne River. The District receives water from SFPUC at the locations and service connections set forth in Exhibit B of the Water Sales Contract, and the District may use these SFPUC supplies to serve customers within the District service area shown in Exhibit A of the Water Sales Contract.

In order to enhance the ability of the SFPUC RWS to meet identified service goals for water quality, seismic reliability, delivery reliability, and water supply, the SFPUC has undertaken the Water System Improvement Program (WSIP), approved October 31, 2008. The WSIP provides capital improvements aimed at enhancing the SFPUC's ability to meet its water service mission of providing high quality water to customers in a reliable, affordable, and environmentally sustainable manner. Many of the water supply and reliability projects evaluated in the WSIP were originally put forth in the SFPUC's Water Supply Master Plan (2000). As of December 31, 2020, the WSIP was 98.8% complete overall and is scheduled to be completed in May 2023 (SFPUC, SFPUC WSIP Regional Projects Quarterly Report (Q2/FY 2020/21), Feb. 2, 2021).

2009 Water Supply Agreement: The business relationship between San Francisco and its wholesale customers is largely defined by the "Water Supply Agreement between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County and Santa Clara County" entered into in July 2009 (WSA), which was subsequently amended and restated in 2018-2019. The WSA replaced the Settlement Agreement and Master Water Sales Contract that expired June 2009. The WSA addresses water supply, water shortages, and the SFPUC rate setting methodology used for wholesale customers. The WSA has a 25-year term and includes provisions for extension and renewal.

The WSA provides for a 184 mgd "Supply Assurance" to the wholesale customers, subject to reduction in the event of a water shortage due to drought, emergencies, or the malfunctioning or rehabilitation of the RWS. The WSA does not guarantee that SFPUC will meet peak daily or hourly customer demands when usage exceeds the Supply Assurance. The wholesale customers have agreed to the allocation of the 184 mgd Supply Assurance amongst themselves, with each entity's share of the Supply Assurance set forth in Attachment C to the WSA. The Supply Assurance survives termination or expiration of the WSA and the District's Individual Water Sales Contract with the SFPUC.

Individual Supply Guarantee: The WSA is supplemented by an Individual Water Sales Contract. These contracts, which expire in 25 years, provide for a 184 mgd Supply Assurance to the SFPUC's wholesale customers collectively. The District's Individual Supply Guarantee (ISG) is 13.76 mgd (approximately 15,400 AF/year). Although the WSA and accompanying Water Supply Contract expire in 2034, they are perpetual and survive their expiration.

Water Shortage Allocation Plan: In July 2009, in connection with the WSA, the wholesale customers and San Francisco adopted a Water Shortage Allocation Plan (WSAP) to allocate water from the RWS to retail and wholesale customers during system-wide shortages. The WSAP has two tiers:

- The Tier One Plan, which allocates water between San Francisco and the wholesale customers collectively for RWS shortages of less than 20%; and
- The Tier Two Plan, which allocates the collective wholesale customer share among the wholesale customers for shortages of 20%.

The Tier One Plan: The "Tier One Plan" applies only when the SFPUC determines that a system-wide water shortage exists and issues a declaration of a water shortage emergency under California Water Code Section 350. Apart from a declaration, the SFPUC may opt to request voluntary cutbacks to achieve necessary water use reductions during drought periods. For example, during the state-wide 2012-2016 drought, the SFPUC requested, but did not mandate, a 10% system-wide reduction. The Tier One Plan will expire at the end of the term of the WSA in 2034, unless extended by San Francisco and the wholesale customers.

The Tier Two Plan: The wholesale customers have negotiated and adopted the "Tier Two Plan," the second component of the WSAP, which allocates the collective wholesale customer share from the Tier One Plan among each of the 26 wholesale customers. This Tier Two allocation is based on a formula that takes multiple factors into account for each customer including: 1) the ISG, 2) a "Base/Seasonal" use component, and 3) a residential per capita usage adjustment.

The water made available from the SFPUC will be allocated to the individual wholesale customers in proportion to each wholesale customer's Allocation Basis, expressed in millions of gallons per day (mgd), which is the weighted average of the wholesale customer's ISG and the Base/Seasonal use component. An agency's Base/Seasonal component is calculated using the monthly water demands for three consecutive years prior to the onset of the drought. The Base/Seasonal component is accorded twice the weight of the ISG in calculating the Allocation Basis. Minor adjustments to the Allocation Basis are then made based on the resultant per capita amount, to ensure a minimum cutback level, a maximum cutback level, and a sufficient supply for certain wholesale customers.

The Tier Two Plan requires that the Allocation Factors be calculated by BAWSCA each year in preparation for a potential water shortage emergency. As the wholesale customers change their water use characteristics (e.g., increases or decreases in SFPUC purchases and use of other water sources, changes in monthly water use patterns, or changes in residential per capita water use), the Allocation Factor for each wholesale customer will also change. For long-term planning purposes, each wholesale customer has been provided with the Tier Two Allocation Factors calculated by BAWSCA based upon the most recent normal year to determine its share of available RWS supplies. However, actual allocations to each wholesale customer during a future shortage event will be calculated in accordance with the Tier Two Plan at the onset of the shortage.

Per WSA Section 3.11, the Tier One and Tier Two Plans will be used to allocate water from the Regional Water System between Retail and Wholesale Customers during system-wide shortages of 20% or less. For Regional Water System shortages in excess of 20%, San Francisco shall (a) follow the Tier 1 Shortage Plan allocations up to the 20% reduction, (b) meet and discuss how to implement incremental reductions above 20% with the Wholesale Customers, and (c) make a final determination of allocations above the 20% reduction. After the SFPUC has made the final allocation decision, the Wholesale Customers shall be free to challenge the allocation on any applicable legal or equitable basis. For purposes of the 2020 UWMPs, for San Francisco Regional Water System (RWS) shortages in excess of 20%, the allocations among the Wholesale Customers is assumed to be equivalent among them and to equal the drought cutback to Wholesale Customer by the SFPUC.

The Tier Two Plan, which initially expired in 2018, has been extended by the BAWSCA Board of Directors every year since for one additional calendar year. In November 2020, the BAWSCA Board voted to extend the Tier Two Plan through the end of 2021.

San Francisco Public Utilities Commission's Regional Water Supply Availability

SFPUC has provided the District with a water supply reliability dataset that reflects the ability to meet its current full contractual obligation over a planning hydrology period that fully overlaps the SWP planning hydrology. This dataset includes compliance with the Bay-Delta Plan 40% unimpaired flow (UF) criterion. Inclusion of the Bay-Delta Plan UF criterion results in dry year shortages on the SFPUC RWS of 40% to 54%, which far exceed SFPUC's contractual commitment to not exceed a 20% cutback.

BAWSCA assessed SFPUC's 40% UF dataset and determined that the Tier Two Plan allocation formula cannot be applied to cutbacks on the order of those anticipated in the dataset. However, due to other variables not fully assessed in SFPUC's dataset, including apportionment between SFPUC RWS retail and wholesale customers, the District chose to post-process the data according to the Tier Two plan, referred to as the "modified 40% UF" dataset. The intended result is to create a conservatively low water supply availability assumption for use in the 2020-2025 UWMP, which avoids the assumption that SFPUC will meet its contractual obligation to develop system enhancements to meet the 80% reliability commitment within the UWMP planning horizon. How SFPUC will address the anticipated shortfall is yet to be determined and may be addressed through a combination of development of new supplies, storage enhancement, dry-year transfer agreements, renegotiation of the master agreement, and other supply or demand augmentation measures.

The modified 40% UF dataset is acknowledged by the District to be a collection of interdependent operating assumptions which fall within a reasonable margin of error and sufficiently robust for planning purposes. The District considers the data provisional until further analyses and decisions regarding the SFPUC RWS are finalized. A summary of the projected availability of supplies from this source is provided in Table 3-4.

Local Sources

As described above, the District's local sources include fresh groundwater from the Niles Cone Groundwater Basin, brackish groundwater desalination, and surface water supplies from the Del Valle Reservoir. Each of these supplies is described in greater detail below.

Niles Cone Groundwater Basin

The principal source of local supply for the District is the local aquifer system known as the Niles Cone Groundwater Basin (Niles Cone, the Basin). As previously mentioned, the District was formed in 1914 as the first county water district created under the County Water District Law as a result of local farmers' and residents' concerns over declining water levels and water companies exporting water from both Alameda Creek and the Niles Cone to nearby communities, such as Oakland and San Francisco. The fight to counteract these trends intensified over several decades as the District acquired effective institutional, legal, and infrastructure resources to protect the Niles Cone from over-pumping, inadequate replenishment, and saltwater intrusion.

The primary source of recharge for the Niles Cone is local runoff from the Alameda Creek Watershed, which is captured, diverted, and recharged at the District's groundwater recharge facilities. Shortly after its formation in 1914, the District successfully litigated against the Spring Valley Water Company to secure rights to the Alameda Creek Watershed for replenishment of the Niles Cone. In 1920, ACWD began to impound winter flows in Alameda Creek in order to increase groundwater recharge within the Basin. In 1934, ACWD acquired its first recharge pond, the Western Gravel Pit, to increase percolation of Alameda Creek water into the basin. Other ponds would be added later.

The District's water right, referenced in Permit Number 8428, issued on February 19, 1951, pursuant to Application Number 13279, permits the District to divert up to 40,000 acre-feet of water each year from October 1 to June 1. The District diverts water under this permit through various points of diversion along Alameda Creek within the District service area for storage in the Niles Cone Groundwater Basin beneath the District service area; the place of use for this water is a total of 62,900 acres within the boundaries of the District as shown on a map on file with the State Water Resources Control Board. Alameda Creek annual runoff at the U.S. Geological Survey (USGS) Alameda Creek near Niles stream gage (located near the District's recharge facilities) has varied from a recorded minimum of 650 AF/yr in 1960-1961, to a recorded maximum in 1982-1983 of 360,000 AF/yr. Typically, the District diverts only a small portion of the local runoff flowing in Alameda Creek. The majority of local runoff flows downstream through the Alameda Creek Flood Control Channel to San Francisco Bay. To a lesser extent, infiltration of rainfall, applied water, and direct stormwater runoff to the groundwater percolation ponds also provide a local source of recharge for the groundwater basin. The District also uses a portion of its imported SWP supplies for groundwater recharge.

The water quality in the groundwater system is characterized by fresh groundwater in the eastern portion of the groundwater basin transitioning into brackish groundwater in the western portion of the Basin. The brackish groundwater is a result of historical saltwater intrusion from the adjacent San Francisco Bay. Since the 1960's, the District has managed the groundwater basin to prevent additional saltwater intrusion and has been pumping the trapped brackish groundwater back to San Francisco Bay through the District's Aquifer Reclamation Program (ARP).

The Niles Cone has capacity to store water from year to year ("local groundwater storage") however the amount of long-term storage is limited relative to the annual utilization of the Basin. In a majority of years, the District is able to fill the Basin to its natural full condition leaving no room for storage of surplus supplies, whether local runoff or surplus SWP supplies. The Basin is significantly limited on the lower end of storage by the potential for saltwater intrusion. Although local groundwater storage (i.e., groundwater supplies in excess of recharge) provides a short-term source of supply during dry years, it is not a supply that is fully available every year because the groundwater system will require replenishment from freshwater sources, without which saltwater intrusion would occur. Chapter 4 provides additional information about the District's management of the Niles Cone.

Brackish Groundwater Desalination

In 2003, the District commissioned the Newark Desalination Facility (Desal Facility), with a capacity of 5 mgd permeate, or 6 mgd of total treated water production capacity. In 2010, the District expanded this capacity to 10 mgd permeate or 12 mgd total treated water production capacity. This facility utilizes the reverse osmosis process to remove salts and other impurities from the brackish groundwater pumped at the District's ARP wells. Permeate from the Desal Facility is blended with local groundwater and provides a supply for the distribution system demands. Chapter 5 provides additional information on the District's desalination program.

Del Valle Reservoir

The District and Zone 7 Water Agency of the Alameda County Flood Control and Water Conservation District (Zone 7) have equal rights on Arroyo Del Valle to divert water to storage. When the California Department of Water Resources (DWR) constructed Del Valle Dam in the upper Alameda Creek Watershed, those rights were recognized in an agreement between DWR, the District, and Zone 7. Consequently, DWR typically makes a total of 15,000 AF of storage available annually in Del Valle Reservoir for use by the District and Zone 7. The District and Zone 7 equally share this storage capacity, thereby providing 7,500 AF of storage capacity annually to the District. The District's water right to this local supply from the Arroyo Valle tributary to Arroyo De La Laguna, referenced in Permit Number 11320, issued on March 25, 1958, pursuant to Application Number 17003, permits the District to divert up to 60,000 acre-feet of water each year between January 1 and December 31, while meeting certain live-stream flow requirements. The District diverts water under this permit through in-stream storage at Del Valle Reservoir, and the permit requires certain in-stream releases for a portion of the stored water when water stored pursuant to this permit is available in the reservoir. The permit defines the place of use for this water as the entire service area of the SBA.

Local Water Supply Availability

A summary of the estimated water supply availability from the District's local supplies is provided in Table 3-2. As indicated in these tables, the amount of local water supplies available to the District from Del Valle Reservoir and fresh groundwater sources varies widely from year to year, depending primarily on hydrologic conditions and availability of local runoff. In general, desalination of brackish groundwater provides a more reliable water source than other local supplies. However, there may be limitations to this source if groundwater levels are lowered to the extent that a reduction in ARP pumping is required to prevent new saltwater intrusion.

In 2017, the District obtained a Biological Opinion[3] (BiOp) from the National Marine Fisheries Service (NMFS) on proposed fish passage facilities at the District's inflatable rubber dams in the Alameda Creek Flood Control Channel (channel), which is owned by the Army Corps of Engineers (Corps) and operated

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[3] Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens. Fishery Conservation and Management Act Essential Fish Habitat Response for the Joint Lower Alameda Creek Fish Passage Improvements Project in Fremont, California (Corps File No. 2013-00083S, NMFS No: SWR-2013-9696)

by the Alameda County Flood Control District (ACFCD). A BiOp is a document that is the product of formal consultation amongst Federal agencies, in this case NMFS and the Corps. The BiOp states the opinion of NMFS on whether a Federal action, in this case modifications to the channel by the Corps, is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The subject of the BiOp is the Central California Coast (CCC) steelhead (Oncorhynchus mykiss). NMFS consultation also extended to include the interests of other stakeholder groups, including the California Department of Fish and Wildlife (CDFW) and the State Water resources Control Board

The BiOp provides a list of design and operating criteria for the new facilities which, if adhered to, will minimize any impact on steelhead. The criteria include new minimum bypass flow requirements needed at these facilities to support steelhead migration through the Channel. By providing bypass flows the District will forgo some of its local water supply; however, as analyzed in the IS/MND, no significant impact was determined on water supply reliability[4]. The impact of providing these flows was found to result in only small reductions in groundwater levels during locally dry periods but, because the District utilizes such a small portion of total watershed runoff, the lost recharge can be fully “made up” during subsequent wet years.

The bypass flow requirements and corollary impacts on groundwater levels have been incorporated into the modeling analyses of local water supply availability in this UWMP.

3.3 MANAGEMENT AND DISTRIBUTION OF WATER SUPPLIES

With local water and two sources of imported water, the District has the flexibility to change the timing and use of supplies to best meet its water management objectives, which include:

- Maximizing total usable supply
- Maximizing water quality/providing uniform water quality
- Protecting groundwater resources from degradation due to previously intruded saltwater
- Protecting groundwater resources from further saltwater intrusion
- Achieving the above with the lowest possible operating costs

District customers receive water from one or more production sources: The District’s Water Treatment Plant Number 2 (WTP 2), the District’s Blending Facility which blends local groundwater (from the Mowry and Peralta-Tyson Wellfields) with San Francisco Public Utilities Commission Regional Water System (SFPUC RWS) supplies, the Newark Desalination Facility (see Figure 3-4), the SFPUC RWS direct turnouts, and the District’s Mission San Jose Water Treatment Plant (MSJWTP)[5].

Flow from the SBA and releases from Del Valle Reservoir may be diverted into either of the two treatment plants, diverted into Alameda Creek, or both. Depending on the water quality and flow in Alameda Creek, water can also be diverted into percolation ponds for groundwater recharge. SFPUC RWS supplies are either routed to the Blending Facility for blending with local groundwater supplies or, under certain conditions, directly supplied to users.

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[4] Alameda County Water District and Alameda County Flood Control and Water Conservation District Joint Lower Alameda Creek Fish Passage Improvements Initial Study with Mitigated Negative Declaration/Environmental Assessment with Finding of No Significant Impacts. December 2016.

[5] The MSJWTP is currently decommissioned as a cost savings measure due to current low demands.

Figure 3-4
District Water Supply Sources and Production Facilities

Groundwater Management and Protection

Groundwater is an important component of the District's water supply portfolio, as demonstrated in Tables 3-1 and 3-2. Since 1914, the District has actively managed and protected the water in the Niles Cone Groundwater Basin (Niles Cone or Niles Cone Subbasin 2-09.01) and conserved the water of the Alameda Creek Watershed. The District has had a Groundwater Management Policy in place since 1989 (updated in 2001). The Sustainable Groundwater Management Act (SGMA) of 2014 specifically identifies the District as one of 15 agencies that were created by statute to manage groundwater and deemed the exclusive local agency to comply with SGMA. In November 2016, the District's Board of Directors adopted Resolution No. 16-069 to become the Groundwater Sustainability Agency (GSA) for the Niles Cone Subbasin 2-09.01 and in December 2016, the District's Board of Directors adopted Resolution No. 16-075 authorizing the submittal of an Alternative to a Groundwater Sustainability Plan for the Niles Cone Subbasin 2-09.01 (Alternative), which was approved by the California Department of Water Resources (DWR) in July 2019. The District's approved Alternative outlines the District's protection and management activities for the Niles Cone Groundwater Basin designed to ensure a reliable supply of high-quality water that satisfies current and future water needs for owners and operators of private and public wells. Chapter 4 in this UWMP describes the District's groundwater management and protection policy in more detail.

Groundwater Recharge

During wet periods, local runoff from the Alameda Creek Watershed is diverted into the groundwater percolation ponds. When local runoff is not available, water may be released from either Del Valle Reservoir or from the SBA for groundwater recharge. Currently, the District operates two inflatable dams to capture and divert Alameda Creek flow into the percolation ponds. The dams are deflated for protection from debris when creek flow exceeds approximately 1,000 cfs and no off-stream diversions occur during these high flow conditions due to expected high turbidity.

Del Valle Supplies

Typically, the District's water stored in Del Valle Reservoir is used by the fall to maximize the capture of local runoff during the winter and spring seasons. Under normal operations, the District takes delivery of Del Valle Reservoir water in the decreasing order of priority:

- Via the SBA to the District's treatment facilities (MSJWTP[6] and WTP2).
- Via the SBA and released into Alameda Creek at Vallecitos Takeoff for groundwater recharge.
- Via direct release from the reservoir into Arroyo Del Valle, where it flows to Arroyo de la Laguna and eventually into Alameda Creek for groundwater recharge.

State Water Project Water

Water from the SWP (delivered via the SBA) can either be taken at the Vallecitos turnout and discharged to Alameda Creek for groundwater basin recharge or taken at the Alameda-Bayside turnout for delivery to the surface water treatment plants. By October 1 of every year, the District must submit its anticipated requests for monthly water deliveries for the upcoming year. The State confirms the District's request or provides the District with the anticipated percentage allocation by December 1. The estimated percentage delivery is then adjusted during the spring based on estimated runoff.

Blending of SFPUC RWS Supply with Local Groundwater

SFPUC RWS supply can be taken at any of eight takeoff locations throughout the District's distribution system. This water supply is significantly lower in hardness than the District's local groundwater supplies. The District blends the SFPUC RWS supply with higher hardness groundwater at the District's Blending Facility with the objective of providing a uniform water quality with hardness levels similar to those of other sources of supply. Since the Blending Facility has come on-line, most of the SFPUC RWS supply has been taken at the Fremont takeoff connection for direct delivery to the Blending Facility.

3.4 SOURCE WATER QUALITY

As required by law, Drinking Water Source Assessments are conducted to determine the vulnerability of the District's drinking water sources to contamination. As described below, assessments have been completed for all of the District's water sources:

- The San Francisco Public Utilities Commission (SFPUC) conducts watershed sanitary surveys for the Hetch Hetchy source on an annual basis and conducts watershed sanitary surveys for local water sources as well as upcountry non-Hetch Hetchy sources (UNHHS) every five years. The most recent Hetch Hetchy sanitary survey was completed in 2020. The last local sanitary survey was completed in 2016, for the period of 2011-2015, and the last water shed sanitary survey for UNHHS was conducted in 2015. It was found that the SFPUC's watersheds are vulnerable to contaminants associated with wildlife and, to a limited extent, human recreational activity. Historically, the levels of contamination have been very low in the watersheds.
- The State Water Project (SWP) source assessment, which also includes Del Valle Reservoir, was most recently completed in 2017 to evaluate potential vulnerabilities to the District's SWP supplies. This source is most vulnerable to agricultural drainage, wastewater treatment plant discharges, urban runoff, recreational usage of the water, and cattle grazing. In addition, saltwater intrusion in the Delta contributes salt and bromide to the water supply.

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[6] MSJWTP is currently decommissioned as a cost savings measure due to current low demands.

- The District's assessment of local groundwater sources was also completed in 2002. This assessment concluded that local groundwater is most vulnerable to gas stations, known contaminant plumes, confirmed leaking underground fuel tanks, dry cleaners, metal plate/finishing/fabricating, and sewer collection. The potential for saltwater intrusion into the aquifer system is also of concern to the District. The latest sanitary survey of the District's water system was completed in 2018 by the State Board.

Although District raw water sources are vulnerable to potentially contaminating activities, the District's treatment and blending facilities ensure that all potable water delivered by the District meets the strict standards set by state and federal regulatory agencies. In addition, the District's groundwater management program (see Chapter 4) has been developed to protect the local groundwater supplies from contamination. As such, under most future scenarios, it is not anticipated that future changes to source water quality will adversely impact the long-term availability or reliability of these supplies. However, catastrophic events (i.e., levee failures in the Delta resulting in saltwater intrusion impacts on Delta supplies) or other unforeseen circumstances may impact District supplies and their reliability, resulting in water supply shortages. Chapter 10 (Water Shortage Contingency Plan) addresses potential future shortages.

3.5 WATER SUPPLY UNCERTAINTIES

The purpose of this section is to identify factors which may impact current planning assumptions, the significance and magnitude of which are currently unknown. As described below, the potential impacts of climate change are a key uncertainty which may impact all District supplies. In addition, each of the District's supplies face uncertainties which may be unique to the source of supply. A summary of water supply uncertainties facing the District's supplies is provided in Table 3-5 and discussed in greater detail below. This includes a discussion of how climate change may impact the District's supplies, followed by a discussion of additional sources of uncertainty for each source of supply.

Table 3-5
Summary of Potential Future Factors that May Influence District Water Supply Reliability

Supply	Factor		
	Legal & Environmental	**Water Quality**	**Climatic**
Imported Supplies			
• **SWP**	ESA* requirements may constrain Delta pumping Bay Delta Plan flow requirements on the Sacramento River may reduce storage and dry year supply reliability	Potential saltwater intrusion impacts if Delta Levees fail	Supply is dependent on hydrologic conditions Saltwater intrusion impacts due to climate change/sea level rise Blue green algae growth may increase with climate change
• **SFPUC RWS**	ESA and other permitting requirements may require additional reservoir releases Bay Delta Plan flow requirements on the Tuolumne/San Joaquin Rivers may reduce storage and dry year supply reliability	Reduced Hetch Hetchy supply could reduce water quality blending operations	Supply is dependent on hydrologic conditions
Local Supplies			
• **Groundwater Recharge**	ESA requirements may impact groundwater recharge operations Upstream water management activities and/or agreements with upstream agencies may impact supply availability	Upstream water management activities and/or land use activities may impact water quality	Supply is dependent on hydrologic conditions Sea level rise may constrain usable storage of Niles Cone
• **Groundwater Storage**	None anticipated	None anticipated	Supply is dependent on availability of water to store in wet years
• **Del Valle**	ESA requirements may require downstream flow releases	None anticipated	Supply is dependent on hydrologic conditions Blue green algae growth may increase with climate change
• **Desalination**	None anticipated	None anticipated	Supply is dependent on local groundwater conditions
• **Recycled Water**	None anticipated	None anticipated	None anticipated
Banking/Transfers			
• **Semitropic Banking**	Delta pumping constraints may impact ability to recover water through SWP exchanges Sustainable Groundwater Management Act (SGMA) could impact future operations of the bank	Banked groundwater may require treatment	Supply is dependent on availability of water to store in wet years

* Endangered Species Act

State Water Project Supplies

The reliability of the District's SWP supplies will continue to remain uncertain due to the on-going concerns regarding the sustainability of the Delta. These concerns include the Delta ecosystem and potential future environmental regulations, levee stability and the potential for catastrophic failure of these levees, urban encroachment within the Delta, water quality within the Delta due to urban and agricultural discharges, and impacts of climate change with regard to water quality, sea level rise, and the timing, frequency, and magnitude of surplus runoff. In addition, the outcome of multiple regulatory uncertainties and legal challenges will affect the long-term reliability of SWP supplies.

Bay-Delta Water Quality Control Plan / Voluntary Agreement

As discussed previously, the State Water Board is considering Phase 2 Plan amendments focused on the Sacramento River which will impact SWP reliability. The State and several water users are working on an alternative to the Bay-Delta Plan known as the Voluntary Agreement (VA) process. The VA process offers an alternative to the State Water Board staff's 'flow only' approach and opens the door to a combination of flow plus habitat enhancements that could protect public trust resources while providing certainty for water users. If accepted, a VA would replace the UF approach and would become the Program of Implementation for the Plan amendments. It offers a chance to avoid years of hearings and litigation and to instead begin early implementation of VA actions.

The 2019 DCR does not include the any VA assumptions; were it to be accepted it would likely improve reliability for the District.

Delta Conveyance Project

The Delta Conveyance Project (DCP) is a proposed single tunnel project that would connect a new diversion intake along the Sacramento River in the north Delta to the Clifton Court forebay in the south Delta. As part of the new project proposal, DWR initiated planning and environmental review for the DCP to protect the reliability of SWP supplies from the effects of climate change and seismic events, among other risks. DWR's current schedule for the DCP environmental planning and permitting extends through the end of 2024. The DCP would potentially be operational in 2040 following extensive planning, permitting, and construction. While there is widespread support for the DCP, plans are currently in flux and environmental review is ongoing. Additionally, numerous regulatory and legal requirements must be met prior to any construction.

The 2019 DCR does not include this project; were it to be built it would likely improve reliability for the District.

2019 Biological Opinion / 2020 Incidental Take Permit

In late 2019, the U.S. Fish and Wildlife Service (FWS) and NMFS issued a new BiOp for the Long-Term Operation of the CVP and SWP. Reinitiation of consultation on the BiOp began in 2016 to update the prior 2008 and 2009 BiOp and provides Federal Endangered Species Act (ESA) compliance for the CVP and SWP. Additionally, in early 2020, the CDFW issued DWR an Incidental Take Permit (ITP) for the Long-Term Operation of the SWP pursuant to the California Endangered Species Act (CESA) with regards to state-protected longfin smelt and state- and federally-protected delta smelt, winter-run Chinook and spring-run Chinook. Previously, CDFW had issued the SWP an ITP for the state-listed longfin smelt and Consistency Determinations with the 2008 and 2009 BiOps for the state- and federally-listed species, not a separate permit. Some of the operational restrictions in the 2019 BiOp differ from those in the 2020 ITP. Specifically, even though the projects' operations are coordinated, the SWP is subject to additional operational constraints that reduce SWP supplies and create operational conflicts. Both the 2019 BiOp and the 2020 ITP are subject to multiple court challenges. The challenges are raised on several legal grounds, including CESA, California Environmental Quality Act, the Delta Reform Act, Public Trust Doctrine, area of origin statutes, breach of contract, and breach of covenant of good faith and fair dealing. All cases have been coordinated in Sacramento County Superior Court. Litigation over the 2019 BiOp and 2020 ITP will likely take several years. The projects began operating to the new requirements in 2020. Throughout implementation any party may seek preliminary injunctive relief during the litigation, such as that sought by the plaintiffs in the 2019 BiOp cases. It is likely that the 2019 BiOp and 2020 ITP will govern operations until final judicial determinations on the merits are made. Thus, it is unlikely that SWP water supply would increase beyond that resulting from the limitations in the 2019 BiOp and 2020 ITP during this timeframe.

The 2019 DCR includes operating constraints of the 2019 BiOp and 2020 ITP; if the court challenges are successful it could improve reliability for the District.

Coordinated Operations Agreement

Another area of uncertainty with regard to SWP water supply reliability involves the Coordinated Operations Agreement (COA). The COA was originally signed in 1986 and defines how the state and federal water projects share the available water supply and the obligations including senior water right demands, and water quality and environmental flow requirements imposed by regulatory agencies. The agreement calls for periodic review to determine whether updates are needed in light of changed conditions. After completing a joint review process, DWR and the U.S. Bureau of Reclamation agreed to an addendum to the COA in December 2018, to reflect water quality regulations, BiOps, and hydrology updated since the agreement was signed. The COA Addendum includes changes to the percentages for sharing responsibilities for in-basin uses, sharing available export capacity, and the review process. The 1986 Agreement required CVP to meet 75% of the in-basin uses and the SWP to meet 25%. The COA Addendum now distinguishes responsibility based on water year type and CVP responsibilities range from 80% in wet years to 60% in critical years. SWP responsibility ranges from 20% in wet years to 40% in critical years. Additionally, the COA Addendum changed sharing export capacity. Previously, export capacity was shared 50% to CVP and 50% to SWP. The COA Addendum changed this formula to be 65% CVP and 35% SWP during balanced conditions and 60% CVP and 40 % SWP during excess conditions. Overall, based on modeling, this change resulted in an approximately 115,000 AFY average reduction in SWP supplies. Finally, the 2018 COA Addendum updated the review process to require review of the COA Agreement and Addendum every five years. Litigation regarding the COA Addendum environmental review is ongoing. The litigation is thought unlikely to change the negotiated COA Addendum and implementation has already begun; however, a favorable court decision could potentially increase the SWP supplies.

The 2019 DCR includes operating constraints of the COA; if the court challenges are successful it could improve reliability for the District.

Delta Disruption due to Low Water Supply Availability

On January 31, 2014, at the height of the state-wide 2012-2016 drought, DWR announced a 0% Table A allocation for the first time in its 54-year history. Although the allocation was subsequently raised to 5%, this water was not available before September 1, 2014, after the typically high summer demand season. Being situated downstream of the Delta but upstream of the major water storage facilities of the SWP, the District was in a uniquely vulnerable position. Among other factors, this disruption of the SWP created an uncertainty surrounding the District's ability to access remotely stored supplies in Semitropic Groundwater Bank and San Luis Reservoir leading the District to declare a Water Shortage Emergency targeting 20% conservation District-wide, following plans outlined in Chapter 10 of the UWMP (Water Shortage Contingency Plan).

Despite this low allocation, DWR's DCR modeling scenarios still considers the minimum reliability to be approximately 9% in the Future Conditions scenario used for this UWMP, as documented in Table 3-2. The 2014 condition has been described as the result of a rare sequence of extreme hydrology in water year

2013. The unusual hydrologic conditions are not included in the 2019 DCR which only runs through year 2003.[7]

To address this uncertainty, the District has taken a conservative approach to SWP supply availability during periods when Table A allocations are projected to be less than or equal to 10%. Despite assurances from DWR that the 2014 Delta situation is unlikely to repeat itself, the District's 2020-2025 UWMP modeling conservatively limits surface water production to reflect less than or equal quantities produced in 2014 whenever Table A allocation is less than or equal to 10%. Similarly, total SWP volumes returned to the District on an annual basis have been limited to less than or equal to the total quantities returned in 2014 with a 5% Table A allocation, even though the lowest Table A allocations used in the 2020-2025 UWMP modeling from the 2019 DCR Future Conditions scenario are significantly higher than 5% (approximately 9% in both 1977 and 1988).

To emphasize the conservative nature of this assumption, it should be noted that review of 2014 historical SWP deliveries shows that approximately 99% (or 10,326 AF) of previously stored SWP water in San Luis Reservoir was returned to the service area according to the District's preferred schedule, and 138% (or 18,624 AF) of the minimum contractual recovery guarantee volume of 13,500 AF/year of stored water from the Semitropic Water Storage District (SWSD) was returned to the District over the course of 2014, with 11,224 AF (or 83% of the 13,500 AF/year minimum recovery guarantee) returned to the service area and 7,400 AF returned to San Luis Reservoir as backup water available for the subsequent year. However, District concerns linger in regard to potentially unrealistic expectations of water supply accessibility in critical years.

B. F. Sisk Dam Raise and San Luis Reservoir Expansion

U. S. Bureau of Reclamation (Reclamation) and San Luis & Delta Mendota Water Authority (SLDMWA) are proposing to raise Sisk Dam and increase storage capacity in San Luis Reservoir. The proposed 10-foot dam raise is in addition to the ongoing 12-foot raise of Sisk Dam to improve dam safety and would expand San Luis Reservoir storage by 130 TAF. This project is currently undergoing design, environmental planning and permitting. Construction is estimated to complete by 2030 following environmental planning and permitting.

The 2019 DCR does not include this project; were it to be built it would likely improve dry year reliability for the District.

Semitropic Banking Program

The District faces some uncertainty with regard to recovery of water from the Semitropic Banking Program. These uncertainties include: 1) water quality concerns with groundwater from Semitropic that is pumped back into the California Aqueduct; 2) the availability of exchange and/or delivery capacity to deliver water to, or recover water from, Semitropic; and 3) repercussions of the recent Sustainable Groundwater Management Act (SGMA) on the operations of the Banking Program. With regards to the water quality issues, in 2013 Semitropic initiated a Raw Water Processing Facility (RWPF) to capture raw water constituents of concern before the groundwater is pumped into the California Aqueduct. Since initiation in 2013, Semitropic was able to meet or exceed DWR's water quality pump-in criteria, therefore reliability concerns associated with Water Quality have been greatly reduced. It is possible that in the future additional

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[7] SWP delivery estimates from DWR's 2019 SWP Delivery Capability Report are from computer model studies which use 82 years of historical hydrologic inflows from 1922 through 2003. It is anticipated that the hydrologic record used in the DWR model will be extended to include the period through 2014 during the next update of the model, which is expected to be completed prior to the next iteration of the UWMP in 2025.

constituents of concern could be identified and Semitropic may be required to expand or revise its RWPF. With regards to the exchange and delivery capacities needed to both deliver water to and recover dry year supplies from Semitropic, the District has coordinated with Semitropic, DWR, and other Semitropic Banking partners to ensure coordination of the planned use of Semitropic delivery and recovery capacity and the needed exchanges. During the recent drought in 2014, Semitropic demonstrated the ability to return the District's banked supplies even during the temporary 0% Table A allocation. However, the risk remains that, under certain critical dry year conditions, the District may be limited in its ability to recover its contractual recovery capacity from Semitropic. Potential mitigation measures to minimize the risk associated with the constraints in Semitropic dry year recovery may include: 1) re-operation of local and other storage available to the District (i.e. Niles Cone Groundwater Basin, Del Valle Reservoir, San Luis Reservoir) in coordination with recovery from Semitropic; 2) non-project water storage options such as Los Vaqueros Reservoir; and 3) alternative dry year supply programs.

San Francisco Public Utilities Commission's Regional Water System

Other factors that may impact the reliability of RWS supplies include environmental regulations, specifically the adoption of the 2018 Bay-Delta Plan amendment discussed below, and permitting requirements for its Hetch-Hetchy and local watershed facilities and operations.

Adoption of the 2018 Bay-Delta Plan Amendment

Bay-Delta Plan Phase 1: Implications of the Bay-Delta Plan Phase 1 for the SFPUC to comply with a 40% UF requirement on the Tuolumne River is a substantial reduction in dry year reserves on the RWS resulting in significant cutbacks during critical dry years and a failure of the SFPUC to fulfill the level of service goal in the master agreement. The SFPUC is currently engaged in negotiations with state and federal agencies as well as other stakeholders on the Tuolumne River to develop an alternative Voluntary Agreement (VA) that, if successful, would mitigate some of the lost dry year reliability. Even if the SFPUC is successful in obtaining a VA, they will still experience shortfalls greater than agreed to in the master agreement and, therefore, they are looking to develop alternative water supplies to fill any potential gap in supply so that they can meet the legal and contractual obligations to the Wholesale Customers.

In early 2020, the SFPUC began implementation of the Alternative Water Supply Planning Program (AWSP), a program designed to investigate and plan for new water supplies to address future long-term water supply reliability challenges and vulnerabilities on the RWS. Included in the AWSP is a suite of diverse, non-traditional supply projects that, to a great degree, leverage regional partnerships and are designed to meet the water supply needs of the SFPUC Retail and Wholesale Customers through 2045. As of the most recent Alternative Water Supply Planning Quarterly Update, SFPUC has budgeted $264 million over the next ten years to fund water supply projects. Through this program, the SFPUC will conduct feasibility studies and develop an Alternative Water Supply Plan by July 2023 to support the continued development of water supplies to meet future needs.

In December 2018, the State Water Resources Control Board (SWRCB) adopted amendments to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan Amendment) to establish water quality objectives to maintain the health of the Bay-Delta ecosystem. The SWRCB is required by law to regularly review this plan. The adopted Bay-Delta Plan Amendment was developed with the stated goal of increasing salmonid populations in three San Joaquin River tributaries (the Stanislaus, Merced, and Tuolumne Rivers) and the Bay-Delta. The Bay-Delta Plan Amendment requires the release of 30-50% of the “unimpaired flow”[8] on the three tributaries from February through June in every year type. In SFPUC modeling of the new flow standard, it is assumed that the required release is 40% of unimpaired flow.

If the Bay-Delta Plan Amendment is implemented, the SFPUC will be able to meet the projected water demands presented in this UWMP in normal years but would experience supply shortages in single dry years or multiple dry years. Implementation of the Bay-Delta Plan Amendment will require rationing in all single dry years and multiple dry years. The SFPUC has initiated an Alternative Water Supply Planning Program to ensure that San Francisco can meet its Retail and Wholesale Customer water needs, address projected dry years shortages, and limit rationing to a maximum 20 percent system-wide in accordance with adopted SFPUC policies. This program is in early planning stages and is intended to meet future water supply challenges and vulnerabilities such as environmental flow needs and other regulatory changes; earthquakes, disasters, and emergencies; increases in population and employment; and climate change. As the region faces future challenges – both known and unknown – the SFPUC is considering this suite of diverse non-traditional supplies and leveraging regional partnerships to meet Retail and Wholesale Customer needs through 2045.

The SWRCB has stated that it intends to implement the Bay-Delta Plan Amendment on the Tuolumne River by the year 2022, assuming all required approvals are obtained by that time. But implementation of the Plan Amendment is uncertain for multiple reasons.

First, since adoption of the Bay-Delta Plan Amendment, over a dozen lawsuits have been filed in both state and federal courts, challenging the SWRCB’s adoption of the Bay-Delta Plan Amendment, including a legal challenge filed by the federal government, at the request of the U.S. Department of Interior, Bureau of Reclamation. This litigation is in the early stages and there have been no dispositive court rulings as of the writing of this report.

Second, the Bay-Delta Plan Amendment is not self-implementing and does not automatically allocate responsibility for meeting its new flow requirements to the SFPUC or any other water rights holders. Rather, the Bay-Delta Plan Amendment provides a regulatory framework for flow allocation, which must be accomplished by other regulatory and/or adjudicatory proceedings, such as a comprehensive water rights adjudication or, in the case of the Tuolumne River, may be implemented through the water quality certification process set forth in section 401 of the Clean Water Act as part of the Federal Energy Regulatory Commission’s licensing proceedings for the Don Pedro and La Grange hydroelectric projects. It is currently unclear when the license amendment process is expected to be completed. This process and the other regulatory and/or adjudicatory proceedings would likely face legal challenges and have lengthy timelines, and quite possibly could result in a different assignment of flow responsibility (and therefore a different water supply impact on the SFPUC).

Third, in recognition of the obstacles to implementation of the Bay-Delta Plan Amendment, the SWRCB Resolution No. 2018-0059 adopting the Bay-Delta Plan Amendment directed staff to help complete a “Delta watershed-wide agreement, including potential flow measures for the Tuolumne River” by March 1, 2019, and to incorporate such agreements as an “alternative” for a future amendment to the Bay-Delta Plan to be presented to the SWRCB “as early as possible after December 1, 2019.” In accordance with the SWRCB’s instruction, on March 1, 2019, SFPUC, in partnership with other key stakeholders, submitted a proposed

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[8] "Unimpaired flow represents the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds." (Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Dec. 12, 2018) p.17, fn. 14, available at https://www.waterboards.ca.gov/plans_policies/docs/2018wqcp.pdf.)

project description for the Tuolumne River that could be the basis for a voluntary substitute agreement with the SWRCB ("March 1st Proposed Voluntary Agreement"). On March 26, 2019, the Commission adopted Resolution No. 19-0057 to support the SFPUC's participation in the Voluntary Agreement negotiation process. To date, those negotiations are ongoing under the California Natural Resources Agency and the leadership of the Newsom administration.[9]

Additional information on potential factors affecting the RWS reliability is provided in Appendix B.

Local Supplies

In addition to potential climate change impacts, the availability of the District's local supplies may be influenced by a variety of other factors including additional operational and facility modifications to accommodate on-going Alameda Creek fishery restoration efforts (beyond those included in the District's BiOp). Upstream land use, flood control and water supply projects in the Alameda Creek Watershed may also impact the supply and quality of water available at the District's groundwater recharge facilities. There also may be uncertainties regarding the operation of water supply facilities in the Alameda Creek Watershed, including Calaveras and San Antonio Reservoirs and Del Valle Reservoir. Other uncertainties include a previous agreement between the District and the SFPUC to provide water to the District for groundwater recharge during a period when the Niles Cone Groundwater Basin was in overdraft condition and threatened by saltwater intrusion. Similarly, efforts to develop groundwater supplies by adjacent entities may also impact the District's groundwater supply availability. The District is currently working to address these items. However, it is not clear whether or not these issues will ultimately impact the District's local supplies.

Climate Change

Climate change and its impact on California's water resources has become significantly better understood during the past decade. Whereas in 2010 the presumed impacts of climate change were often discussed as manifesting far into the future, it is now accepted that climate change impacts are occurring today, as evidenced by greater weather extremes and the predictable, steady increase in air temperatures and sea-levels. Planning for climate change is a challenge for water managers, in large part because the anticipated future impacts may vary greatly over a range of predicted scenarios. However, the generalized impacts include:

- Reductions in the average annual snowpack due to a rise in the snow line, a shallower snowpack in the low and medium elevation zones, and a shift in snowmelt runoff timing;
- Changes in the timing, intensity, and variability of precipitation, and an increased amount of precipitation falling as rain instead of snow;
- Long-term changes in watershed vegetation and increased incidence of wildfires that could affect water quality and quantity;
- Sea-level rise and an increase in the potential for saltwater intrusion in the Delta and Coastal aquifers such as the Niles Cone;
- Increased water temperatures with accompanying potential adverse effects on some fisheries and water quality;
- Increases in evaporation and transpiration (irrigation need); and
- Changes in urban and agricultural water demand.

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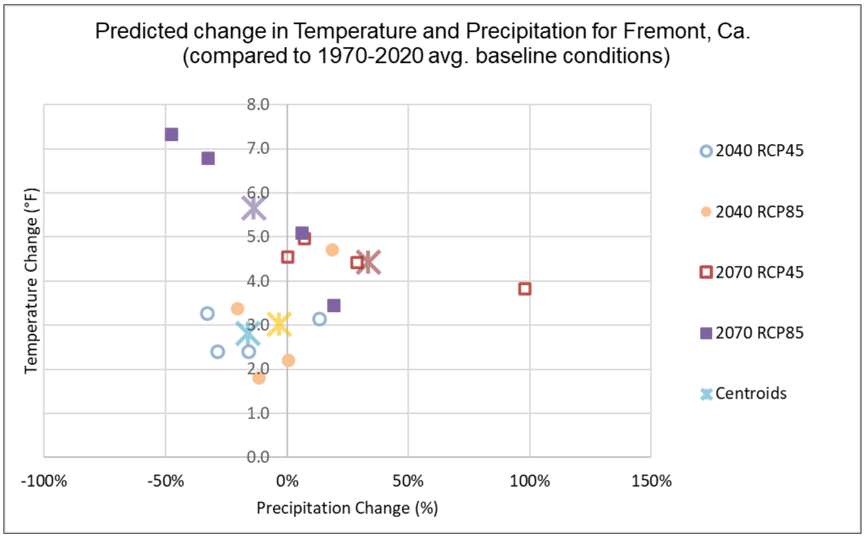
[9] California Natural Resources Agency, "Voluntary Agreements to Improve Habitat and Flow in the Delta and its Watersheds," available at https://files.resources.ca.gov/voluntary-agreements/.

Computer models used to predict future weather patterns are complex, very large scale, and sensitive to several key inputs and assumptions. The Cal-Adapt climate change scenarios use four different climate models to simulate future conditions: HadGEM2-ES, CNRM-CM5, CanESM2, and MIROC5. The first three cover warmer/dry, cooler/wet, and average outcomes, respectively, while the MIROC5 is used for its dissimilarity from the other three to cover a range of outcomes (Source: Cal-Adapt Annual Averages Climate Tool). All models are run over “medium” (RCP 4.5) and “high” (RCP 8.5) emission scenarios for 2040 and 2070. The RCP 4.5 scenario is considered moderate and assumes greenhouse gas emissions begin to decline in 2045, while the RCP 8.5 is a worst-case scenario with emissions rising continuously. These four models are a subset of the 10 available in the Cal-Adapt tool and are recommended by California’s Climate Action Team (CCAT) as a good representation of the range of temperature and precipitation changes observed across all 10 models. Figure 3-5 illustrates the range of climate change impacts that may occur locally over the next 20 to 50 years, with a healthy portion of models predicting that local weather may see a net increase in average precipitation, highlighting the uncertainty around climate change in water supply planning.

Figure 3-5: Range of Predicted Local Weather Change



2040 and 2070 range of predictions reflecting two future emissions scenarios (RCP45 and 85) and four different Climate Models: CanESM2, CNRM-CM5, HadGEM2-ES, MIROC5 (Source: CalAdapt Climate tool)

Climate Change Inclusion – in the UWMP

The impacts of climate change during the 25-year, near-term period contemplated in the UWMP are not as significant as those anticipated to occur later in the century; nonetheless, the UWMP includes the anticipated impacts wherever possible.

The District’s SWP supply reliability data includes climate change impacts on source hydrology and uses a technique that scales the historic planning hydrology with monthly and annual climate change factors derived from climate change studies. The SWP data includes the anticipated effect of rising temperatures on reduced occurrence of precipitation as snow. The SWP data also reflects 45-cm of sea-level rise, which has operational impacts on the use of the Sacramento-San Joaquin River Delta to convey water, resulting in further reduction in supply. The approach used by DWR for the SWP dataset essentially contemplates past weather and assesses how climate change would have changed the weather experienced on a year-to-year basis, either wetter or drier. A shortcoming of this approach is that it does not simulate potential changes in inter-annual weather and does not predict changed frequency, intensity, or duration of future droughts. The SFPUC RWS supply reliability data incorporated in the 2020-2025 UWMP does not include the known impacts of climate change.

The impact of climate change on local supplies is not included in supply reliability analyses of the 2020-2025 UWMP. Local supply modeling is currently limited by the ability to downscale GCM data to the scale of Alameda Creek watershed, as well as the capability of the District's groundwater model to simulate sea-level rise and the potential impacts that it will have on seawater intrusion into the Basin. The District is currently developing new tools to better analyze the impact of projected local climate change conditions on the Niles Cone water budget. As part of the first five-year update of the Alternative (discussed in Section 3.3), the District is upgrading its existing groundwater model to provide a planning tool for ongoing management of the Basin under current and forecasted climate conditions. Upgrading the groundwater model will improve modeling capability to account for sea-level rise, surface water/groundwater interactions, and other new hydrogeologic information will significantly improve its reliability under expected future climate conditions.

Figure 3-6: SGMA Data Viewer illustrating HUC8, the USGS Hydrologic Unit that overlaps the Alameda Creek watershed and can be used to scale historic stream flows data

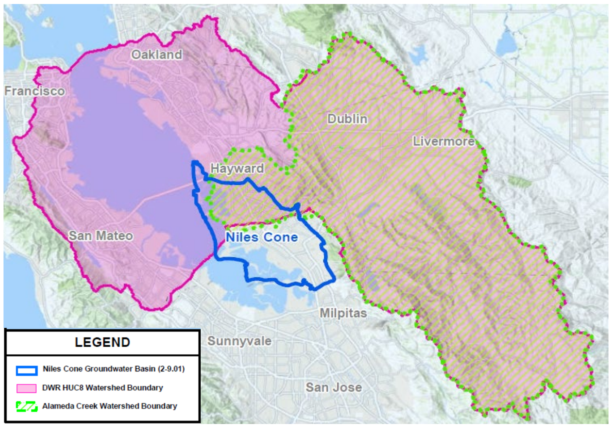
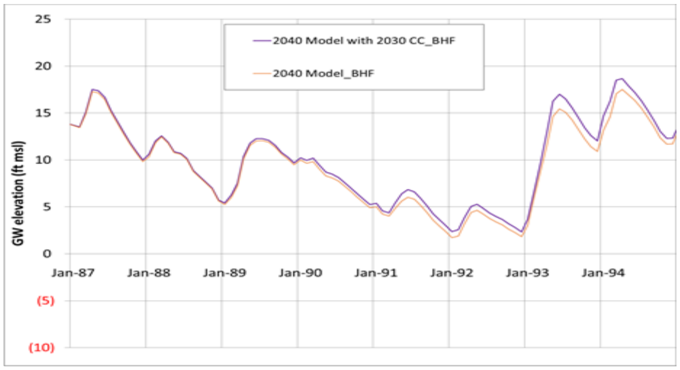


Table 3-6
Summary of Climate Change Inclusion in 2020-2025 UWMP

Element	Inclusion of Climate Change in UWMP	Key Assumptions	Impact on ACWD Reliability
Water Demand	Included in Forecast	Projected average daily air temperatures will increase weather-dependent demand	Marginally increases summer/seasonal demand for water
SWP	Included in all analyses through use of DCR Future Conditions dataset	Climate change hydrology from ensemble of 20 CMIP5 global climate projections selected by the DWR CCTAG; Assumes 45 cm sea level rise	Acknowledged to decrease water supply reliability, however the increment is not known and is far smaller than the impact of new regulations
SFPUC RWS	Not included in modified 40% UF dataset	Watershed and RWS-wide analyses must be conducted by the SFPUC	To be determined
Del Valle Reservoir	Sensitivity Analysis Only	Inflow estimated using Statewide Streamflow Change Factors from DWR SGMA Data Viewer	2030 conditions reflect mildly wetter conditions including during droughts, therefore near-term climate change impacts are not anticipated to increase shortages Sea-level rise impacts on Niles Cone to be determined
Niles Cone and Recharge		Recharge potential estimated from Statewide Streamflow Change Factors from DWR SGMA Data Viewer	

For purposes of this UWMP, District staff reviewed available data through the DWR's SGMA data viewer (Figure 3-6) and found that the near-term climate change scaling factors over the Alameda Creek Watershed suggest the region may become slightly wetter on average, which could increase local water supply. Applying these factors to local groundwater recharge operations even suggests that during the driest of conditions, such as the 1987-1992 multi-year drought, the District could experience more rainfall than occurred in the past due to climate change and enhance groundwater storage over critical dry periods (Figure 3-7). The sensitivity analysis concluded that, on the balance, the near-term effect of climate change is negligible, erring on the side of increased local supply, and is not anticipated to negatively impact local water supply.

Figure 3-7: Sensitivity analysis of Climate Change on local Below Hayward Fault (BHF) groundwater levels during 1987-1992, suggest more water during this critically dry period

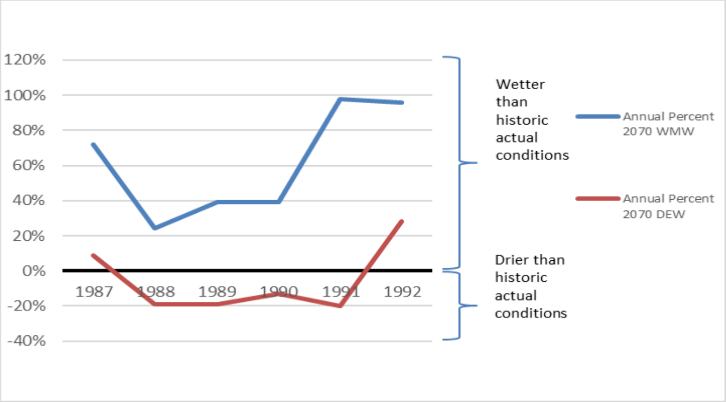


Climate Change inclusion – beyond the UWMP

While the 2020-2025 UWMP incorporates climate change impacts into its future water supply planning to the extent feasible and has determined that no new infrastructure is needed to support water supply reliability for its customers over the next 25 years, the District's long-term water supply planning and capital improvement program must consider investments that extend for 50 years and beyond. In 2025, the District will update the IRP which will include a more robust long-term look at climate change as well as a Climate Change Adaption Plan (CCAP).

Climate change uncertainty becomes greater in the second half of the century with a heightened sensitivity to future policies on addressing carbon emissions. The resulting range of impacts on water supply begin to diverge dramatically, adding greater challenge for water managers as they contemplate supply investments that could address the wide range of potential future realities (Figure 3-8). The District has begun a Climate Risk Assessment as the first step in the development of a more robust CCAP.

Figure 3-8: Range of projected change in local streamflow compared to historic actuals for the 1987-1992 drought



Two forecast models are shown above: "Wetter, Moderate Warming" (WMW) and "Drier, Extreme Warming" (DEW) in 2070. These are the names given to the CNRM-CM5 model running over the RCP 4.5 scenario and HadGEM2-ES model over the RCP 8.5 scenario, respectively. Model descriptions can be found earlier in the chapter (Source: SGMA Data viewer)

Table 3-7
Preliminary Work on District's Climate Risk Assessment

Climate Change Effect	Impact - Water Resources	Initial Considerations for Adaptation Planning
Sea-level rise / Niles Cone	Saltwater intrusion into GW basin	Revisit Groundwater operating rules, evaluate ARP wells that can mitigate new salt intrusion, and increase Above-Hayward Fault aquifer levels to 50'
Sea-level rise / Sacramento-San Joaquin River Delta	Risk of failure / loss of water supply. Saltwater intrusion	Support alternative conveyance
Reduced Sierra Nevada snow pack	Reduced reliability of imported supplies.	Analyze storage and supply options to address increased dry and critical dry year shortfall.
Flashier run-off patterns on Alameda Creek	Reduced windows of opportunity to divert water for recharge	Consider rapid dewatering of RD1 and increased rediversion rate out from Shinn ponds
Warmer weather	Increased peak summer demand	Target conservation programs that reduce weather-dependent demand (turf replacement / cooling towers)
Longer droughts	Increased shortages	Greater demand management, increased storage, Niles Cone reoperation (deeper draw down)
Blue-green Algae / Other Water Quality concerns	Quarry Lakes Management impacts	Explore nutrient management programs, aeration, and algal harvesting
Uncertainty (general)	Potential stranded assets	Board policy to consider “climate ready” criterion for strategic planning (tentatively approved at October 2019 Board Workshop)

Energy Intensity Analysis for District Service Area

Accounting for energy usage is an important aspect of water resources and climate change planning. Per Water Code Section 10631.2 (a), the District estimated the energy intensity per water management processes within its service area. Table 3-8 provides a summary of resulting estimated energy intensity results. Appendix G provides more details of this estimated energy intensity analysis.

Table 3-8
Summary of Energy Intensity Analysis

Water Management Process	Description of Facilities Included	Estimated Energy Intensity	
		(kWh/AF)	(kWh/MG)
Extract and Divert	Includes the District facilities on Alameda Creek that divert raw water to the Quarry Lakes	5	15
Place into Storage	The District does not consider any of its facilities within its operational control and service area to be in this category	0	0
Conveyance	The District does not consider any of its facilities within its operational control and service area to be in this category	0	0
Treatment - net metering *	Includes the District’s Water Treatment Plant 2, Desal Facility, Blending Facility, and Mission San Jose Water Treatment Plant. These processes treat or blend potable water from different sources to provide high-quality potable water prior to supplying the distribution system.	75*	230
Distribution	Includes infrastructure that sends the treated and potable water to the distribution system, such as booster pump stations, booster pumps, and tanks and reservoirs.	489	1500
Total Estimated Energy Intensity (kWh/AF)		56	1732

* Treatment includes offsets from on-site hydropower-generation at Water Treatment Plant 2

The District’s facilities are metered through Pacific Gas and Electric Company (PG&E) and East Bay Community Energy (EBCE). Using the available metered data from calendar year 2020 and water volume data, the District categorized and estimated the amount of energy used for each water management process. Note that the energy intensity for Treatment Process is listed as “net metering” as the District generates a significant amount of renewable hydropower through hydroturbine generators onsite at Water Treatment Plant 2.

The District is currently expanding on its use of renewable energy through implementation of the Clean Energy Program which will implement solar photovoltaic systems at several District facilities and properties. The program will be implemented over several fiscal years under Power Purchase Agreements (PPAs) with a solar developer in order to maximize value to the District’s customers while enhancing the environmental sustainability of the District’s operations. The Clean Energy Program could offset over 1,000 tons of carbon emissions annually, roughly equivalent to the emission of 187 passenger cars being taken off the road annually, and significantly reduce the District’s energy costs over the 25-year life of the program.

CHAPTER 4 GROUNDWATER MANAGEMENT

This chapter describes the Niles Cone Groundwater Basin, the District's reliance on it as a source of water supply, and the District's policy and activities for managing it.

4.1 BACKGROUND

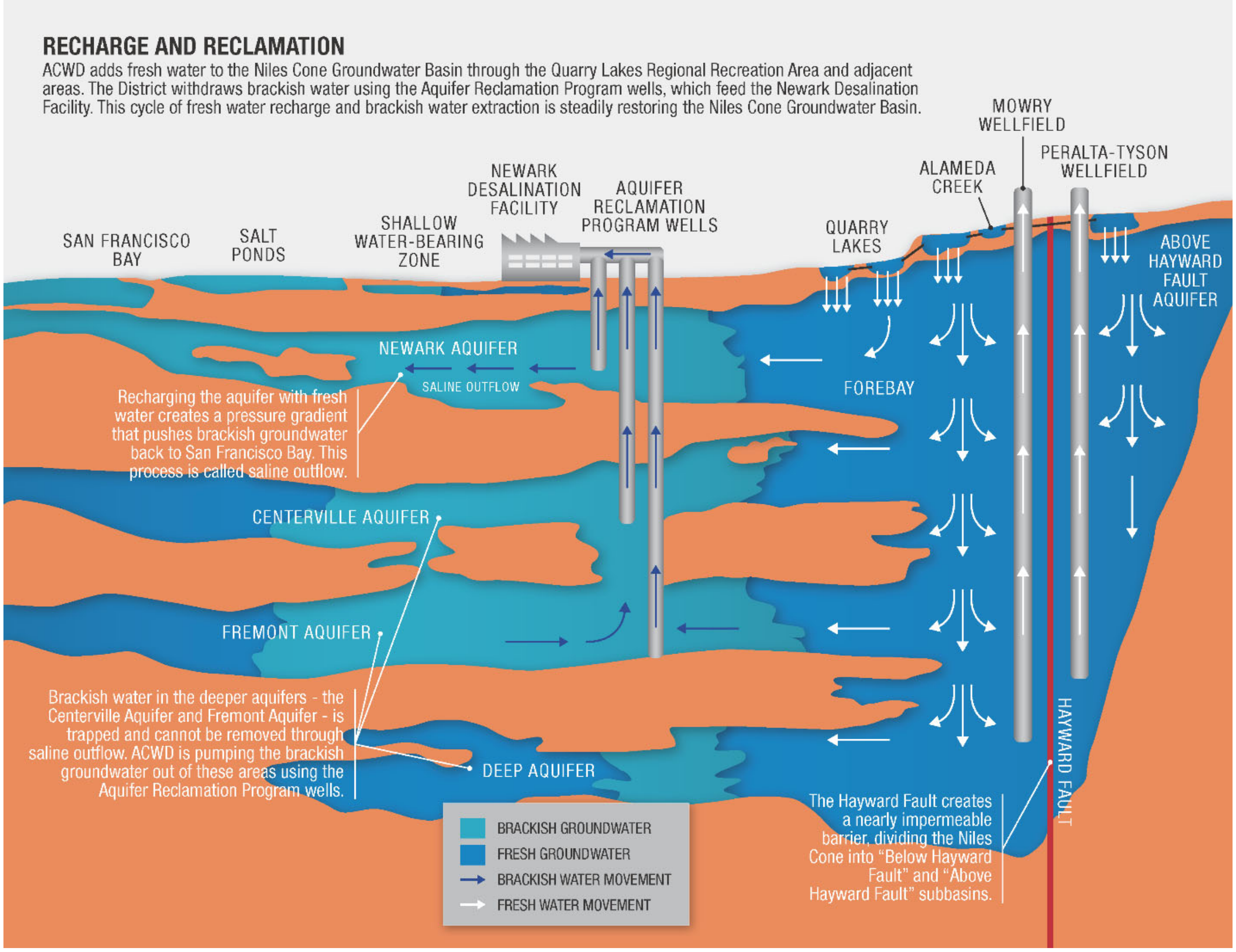
As described in Chapter 3 (Sources of Supply), the Niles Cone Groundwater Basin (Niles Cone or Sub-Basin 2-09.01) provides a significant source of water supply for the District's service area. The Niles Cone is a conjunctively managed basin. Local runoff along with imported water is percolated into the Niles Cone through recharge in Alameda Creek itself and through recharge ponds within Quarry Lakes Regional Recreational Area and adjacent areas. Most recharge of surface water occurs in the wet season, with most groundwater extraction occurring during the dry season, and excess water is stored in the basin during wet years for recovery during dry years when local and imported supplies may be significantly cut back. Because of its importance as a local water supply, the protection of this valuable local resource has long been a high priority for the District. The Niles Cone is sustainably managed by the District and is not an adjudicated basin nor is it considered to be in an "overdraft" or "potentially overdraft" condition by the DWR (source: DWR Bulletin 118 - Update 2003).

Niles Cone Groundwater Basin Hydrogeology

Since 1914, the District has actively managed and protected the water in the Niles Cone and conserved the water of the Alameda Creek Watershed. The Niles Cone Groundwater Basin, a medium priority basin, is also referred to as Niles Cone Sub-basin 2-09.01 by DWR in Bulletin 118 (2016). The Niles Cone was established as the southern portion of the east bay area bounded on the south by the Alameda-Santa Clara County boundary and on the north by the boundary of Alameda County Water District, and southern portions of the City of Hayward. The only detachments in the northern extent of the District's boundary (within the southern portions of the City of Hayward) occurred in 1973, 2000, and 2004, when the District worked cooperatively with the City of Hayward to detach (through the Alameda County Local Agency Formation Commission) properties in order for the City of Hayward to provide water service while ensuring (through agreements) that the District retained authority to manage the groundwater basin (see Figure 4-2).

The Niles Cone is an alluvial aquifer system consisting of unconsolidated gravel, sand, silt, and clay, which is divided by the Hayward Fault. The fault is a relatively impermeable barrier that impedes the flow of groundwater, hence dividing the overall basin into two sub-basins. The portion of the Niles Cone on the east side of the Hayward Fault is generally referred to as the "Above Hayward Fault Sub-basin" (AHF) and the portion on the west side of the Hayward Fault is generally referred to as the "Below Hayward Fault Sub-basin" (BHF). Large differences in water levels on either side of the fault demonstrate the relatively impermeable nature of the fault. Over time, the alluvial/fluvial depositional environment produced thick coarse grain sediments along present day Alameda Creek and also along historic stream channels (now buried). With distance westward, both the thickness and grain size of the aquifers decreases while the intervening clay aquitards become thicker (DWR, 1967). The aquitards appear to be absent just west of the Hayward Fault in the hydrogeologic region called the forebay area. Figure 4-1 provides a cross-section based on a DWR conceptual figure (DWR, 1968).

Figure 4-1
Niles Cone Groundwater Basin Schematic



RECHARGE AND RECLAMATION

ACWD adds fresh water to the Niles Cone Groundwater Basin through the Quarry Lakes Regional Recreation Area and adjacent areas. The District withdraws brackish water using the Aquifer Reclamation Program wells, which feed the Newark Desalination Facility. This cycle of fresh water recharge and brackish water extraction is steadily restoring the Niles Cone Groundwater Basin.

Recharging the aquifer with fresh water creates a pressure gradient that pushes brackish groundwater back to San Francisco Bay. This process is called saline outflow.

Brackish water in the deeper aquifers - the Centerville Aquifer and Fremont Aquifer - is trapped and cannot be removed through saline outflow. ACWD is pumping the brackish groundwater out of these areas using the Aquifer Reclamation Program wells.

The Hayward Fault creates a nearly impermeable barrier, dividing the Niles Cone into "Below Hayward Fault" and "Above Hayward Fault" subbasins.

The AHF sub-basin on the east side of the Hayward Fault is composed of highly permeable sediments referred to as the AHF Aquifer. The BHF sub-basin is composed of a series of relatively flat lying aquifers separated by extensive clay aquitards. The shallowest regional aquifer in the BHF sub-basin, the Newark Aquifer, is an extensive permeable gravel and sand layer between 40 and 140 feet below ground surface (bgs), except in the forebay (inland) area where it begins at the surface. The thickness of the Newark Aquifer ranges from less than 20 feet at the western edge of the basin to more than 140 feet at the Hayward Fault (DWR, 1968). The Newark Aquifer is overlain in most of the sub-basin by a thick layer of silt and clay called the Newark Aquiclude (DWR, 1968). The Newark Aquiclude is absent in the forebay area, allowing direct recharge to the Newark Aquifer from Alameda Creek and the recharge ponds. Within the Newark Aquiclude, discontinuous layers of sand and silt comprise a non-regional hydrogeologic unit known commonly as the shallow water-bearing zone.

An extensive thick clay aquitard separates the Newark Aquifer from the Centerville Aquifer. The Centerville Aquifer, the top of which lies at an average depth of 180 to 200 feet bgs, overlies a thick clay aquitard, which in turn overlies the Fremont Aquifer which exists in the interval of 300 to 390 feet bgs. The Centerville and Fremont Aquifers are considered as one combined aquifer (Centerville-Fremont Aquifer) in some parts of the basin based on lithology and water level data that indicate that they are in good hydrogeologic connection. However, water level and water chemistry results from recently installed wells indicate that, in some areas of the basin, these two aquifers are isolated from each other.

The deepest water-bearing units, referred to collectively as the Deep Aquifers, are present at approximately 400 and 500 feet bgs (and possibly deeper) and are separated from the overlying Fremont Aquifer by a competent regional aquitard. Also, based on the District's lithologic data and DWR (1967), these deep aquifers are both hydraulically separated and connected by the presence or absence of intervening clays dependent on the location in the basin, and extend beyond the limits of the Niles Cone to act as conductive layers for the migration of groundwater out of the basin.

The AHF Aquifer is both unconfined and confined due to the presence of local low permeability layers. The Newark Aquifer is confined in all areas except in the forebay area, where the overlying aquitard is absent. The Centerville-Fremont and Deep Aquifers are both confined.

Groundwater Quality

Groundwater quality in all of the AHF and much of the BHF is acceptable for potable use; however, groundwater quality in certain areas of the BHF aquifers remains degraded by legacy saltwater intrusion (see following discussion). The District regularly monitors the basin for saltwater intrusion (chloride and Total Dissolved Solids) and the results are provided in its annual Groundwater Monitoring Report. The District will continue to voluntarily monitor drinking water and source water supplies.

Saltwater Intrusion

The Niles Cone is a coastal aquifer system hydraulically connected to the Bay and is subject to saltwater intrusion should groundwater levels fall below mean sea level in the Newark Aquifer. The saltwater intrusion was first noticed in the 1920's and occurred due to historical pumping that created chronic overdraft of the basin. Many years of this chronic overdraft caused the groundwater levels in the Newark Aquifer to drop below sea level. This relative elevation difference between the groundwater in the Niles Cone and the saline water from San Francisco Bay caused a landward direction of groundwater flow through the Newark Aquifer and intrusion of saltwater into the groundwater basin. Several decades of saltwater intrusion occurred and saline water migrated as far as the forebay area. The piezometric heads in the deeper aquifers are generally lower than that of the Newark Aquifer, and the aquitards separating the aquifers are thin to absent in the forebay area. As a result, saline water in the forebay area migrated downward from the Newark Aquifer and into the lower aquifers. Also, saline water may have migrated downward from the Newark Aquifer to the deeper aquifers through abandoned and improperly sealed water wells.

Since 1962, when supplemental water was first purchased from the State Water Project (SWP), the District has been engaged in a continuous water replenishment/recharge program in order to sustainably manage the quality and quantity of water in the Niles Cone while balancing and protecting environmental resources. Expansion and improvement of the District's recharge facilities has aided this effort and increased capture of local water for groundwater replenishment. The District's recharge efforts, in addition to the District's use of imported water, have caused water levels to slowly rise above sea level.

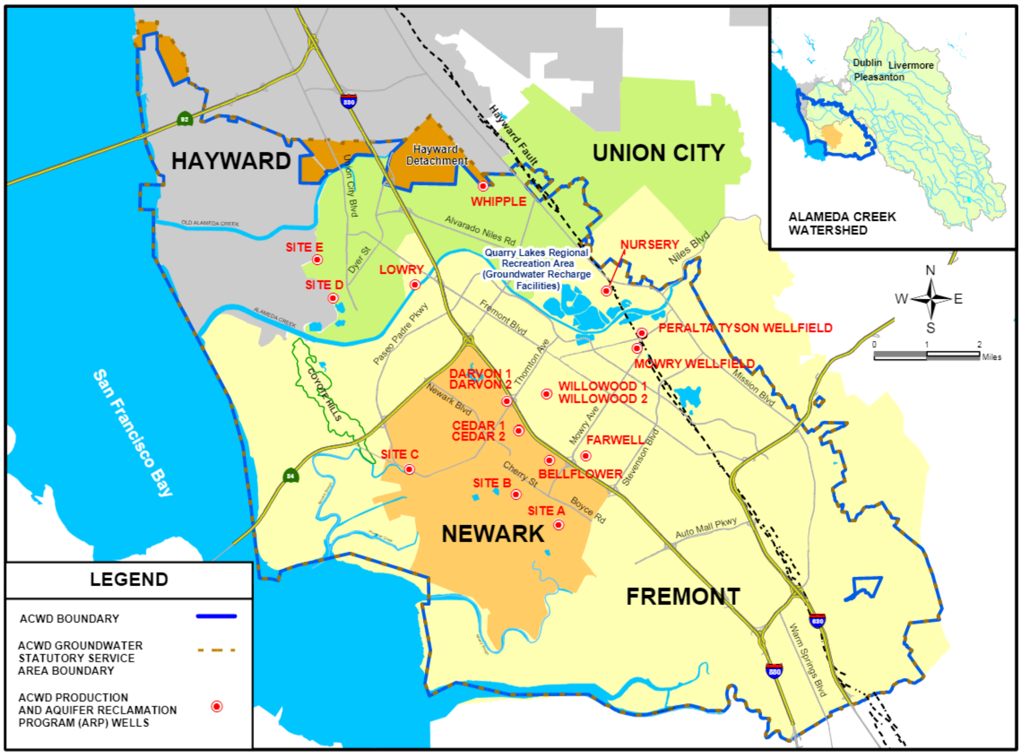
As a result, water levels in the Newark Aquifer were restored to above sea level by 1972 and the hydraulic gradient was returned to its natural bayward direction in the Newark Aquifer. Although there has been substantial improvement in the Niles Cone, a considerable volume of saline water still remains in the aquifers. As described below, the District has also implemented an Aquifer Reclamation Program (ARP) to pump out brackish groundwater from the impacted areas of the aquifer system. Historically, this brackish water has been discharged back to San Francisco Bay through local flood control channels. However, most of it is now treated at the Newark Desalination Facility for potable use.

In order to protect the Niles Cone from further saltwater intrusion, the District's operational goals are to maintain groundwater levels above sea level in the Newark Aquifer system. During critically dry periods the District may temporarily reduce groundwater levels slightly below sea level (as low as 5 feet below mean sea level), in the Newark Aquifer in the forebay area. Groundwater modeling analysis has indicated that temporarily drawing the aquifer down in this inland area can provide additional supply in critically dry years without impacting the integrity of the Basin.

Groundwater Facilities

The District's groundwater management activities include groundwater recharge as well as production. As shown on Figure 4-2, the District's groundwater facilities include production wellfields and groundwater recharge facilities. Currently, 16 wells are available for production; eight of the wells are located in the Peralta-Tyson Wellfield in the AHF aquifer; and the remaining eight wells are located in the Mowry Wellfield in the BHF sub-basin.

Figure 4-2
District Groundwater Facilities



The Niles Cone is recharged through (1) deep percolation of rainfall and applied water, and (2) percolation of water in Alameda Creek received at the District's groundwater recharge facilities. Most of the water for this artificial recharge program is from Alameda Creek Watershed runoff and the remainder is imported supplies released to tributaries of Alameda Creek. Water percolates into the groundwater basin through the stream channel bed and through the District's off-stream recharge ponds. The District utilizes inflatable rubber dams in the channel to divert water from the creek into the ponds.

As described below, the District's Aquifer Reclamation Program, which is designed to remove and control the movement of intruded saline water, has been in operation since 1974. The program facilities consist of eleven wells. These wells also provide the source water for the Newark Desalination Facility. This facility removes salts and other impurities from the brackish groundwater and provides the treated water as a source for the District's distribution system.

Aquifer Reclamation Program

As discussed under Groundwater Quality, the District's aggressive artificial recharge program and its use of imported water in lieu of groundwater have caused water levels to slowly rise above sea level. Thus, further saltwater intrusion has been prevented and saline water in the Newark Aquifer is now flushed towards San Francisco Bay. However, because the Centerville-Fremont and Deep Aquifers are not in direct hydraulic connection with San Francisco Bay, saline water in those deep aquifers cannot be easily flushed back by simply raising groundwater levels. Consequently, there are trapped pockets of saline water in these deeper aquifers.

In 1974, the District initiated its Aquifer Reclamation Program (ARP) to restore water quality in the groundwater basin by removing the saline water trapped in the aquifer system. The District has a total of eleven ARP wells. Brackish groundwater from five of the ARP wells is utilized as the source water for the District's Newark Desalination Facility, with any excess pumped brackish groundwater discharged under a National Pollutant Discharge Elimination System (NPDES) permit to local flood control channels that flow to San Francisco Bay. The quality of groundwater in the basin is improved as recharge water replaces the pumped brackish groundwater and prevents the plume of brackish water from further migrating toward the District's Mowry Wellfield.

Groundwater Elevations

The District actively manages the Niles Cone to prevent groundwater overdraft conditions that could lead to future saltwater intrusion and groundwater overdraft. The Spring/Fall Groundwater Monitoring Program, initiated in 1961, is a semiannual field effort to document the status of wells, obtain water level measurements, and collect water samples. The data collected is summarized in an annual groundwater monitoring report prepared by the District.

The Spring/Fall Groundwater Monitoring Program is a semiannual program since groundwater elevations throughout the basin fluctuate seasonally. The Spring Program is conducted to provide insight into subsurface conditions throughout the District when water levels tend to be at their highest levels. The Fall Program's purpose is to update information on groundwater flow and quality and to provide insight into subsurface conditions when water levels tend to be at their lowest levels. However, the District operates the groundwater facilities to maintain elevation in the Newark Aquifer above sea level with a positive groundwater gradient from the inland area (at the recharge ponds) towards San Francisco Bay. The groundwater elevations in the Centerville/Fremont and Deep Aquifers are generally lower than that of the Newark Aquifer, thereby allowing percolation from the Newark Aquifer to these deeper aquifers. Because the District operates the groundwater basin in a balanced "put and take" mode, groundwater elevations over the past thirty years have remained fairly consistent (within a typical operating range), and there have been no long-term trends that suggest the basin is in overdraft condition.

The District also requires representative water level data on a more frequent basis for decisions on imported water and groundwater recharge. Therefore, frequent water levels are provided from a smaller set of wells; i.e., approximately 50 wells for monthly measurement and 7 for weekly measurement. The District also participates in the California Statewide Groundwater Elevation Monitoring (CASGEM) program. The CASGEM Program was established in response to State Legislation which mandates a statewide monitoring program to track seasonal and long-term groundwater elevation trends in California's groundwater basins. As a Monitoring Entity, the District developed a monitoring plan and regularly submits groundwater level measurements for 26 wells to the DWR's online database in an effort to improve the management of California's groundwater resources.

4.2 GROUNDWATER MANAGEMENT

The District has been managing the Niles Cone pursuant to its statutory authority under the County Water District Law (California Water Code Section 30000 et seq.), the Replenishment Assessment Act of the Alameda County Water District (Chapter 1942 of the Statutes of 1961, as amended in 1970 and 1974), the Alameda County Water District Groundwater Protection Act (California Water Code Section 31142.20 et seq.), as well as, through agreements with the cities of Fremont, Union City, Newark, and Hayward. In addition, Alameda County Water District is identified within the Sustainable Groundwater Management Act as an agency created by statute to manage groundwater and deemed to be the exclusive local agency to comply with the Sustainable Groundwater Management Act (California Water Code Section 10723 et seq.).

The Governor signed the Sustainable Groundwater Management Act (SGMA) into law on September 16, 2014, establishing a new structure for groundwater management, recognizing that groundwater management in California is best accomplished locally. Although the District was already identified as an exclusive agency in SGMA, on November 10, 2016, the District’s Board of Directors adopted Resolution No. 16-069 deciding to become the Groundwater Sustainability Agency (GSA) for the Niles Cone (a medium priority basin). Becoming the GSA for the Niles Cone continues the District’s existing groundwater management under SGMA, in addition to other recognized regulatory authority. SGMA provides various authorities to GSAs to promote sustainable groundwater management including the ability to meter wells and fund and implement groundwater management projects. While many of these authorities have been available to the District for many years under the Replenishment Assessment Act of Alameda County Water District, SGMA provides additional authority that may further the ability to sustainably manage the Niles Cone.

As an exclusive local agency and a GSA, the District submitted an Alternative to a Groundwater Sustainability Plan (Alternative) for the management of the Niles Cone on December 31, 2016. On July 17, 2019, DWR approved the District’s Alternative. DWR evaluated the Alternative and determined that it satisfies the objectives of the Sustainable Groundwater Management Act. DWR’s approval was accompanied by a Statement of Findings Regarding the Approval of the Niles Cone Subbasin Alternative which includes seven recommended actions for the District to incorporate in the Alternative update and is due January 1, 2022. The District’s Alternative and annual reports are on DWR’s SGMA Portal at https://sgma.water.ca.gov/portal/alternative/print/4.

4.3 GROUNDWATER MANAGEMENT AND PROTECTION POLICY

The District’s Groundwater Management Policy (Policy) adopted on January 26, 1989, (prior to Assembly Bill 3030) and as amended on March 22, 2001, was formally adopted by the District’s Board of Directors through Resolution No. 01-021 (prior to Senate Bill 1938). The District developed and adopted a policy instead of a groundwater management plan because it reflects a pre-existing institutional framework for management of groundwater resources in the Niles Cone already established through special acts of the Legislature and other means. The Policy is intended to serve as a guide in the continued development and implementation of programs to manage and protect the Niles Cone and as a nontechnical document to explain the District’s groundwater programs to members of the public. To implement the Policy, two reports are produced annually: Groundwater Monitoring Report and Survey Report on Groundwater Conditions.

A copy of the District’s Groundwater Management Policy is provided in Appendix C.

Groundwater Management Policy Statement

The District's groundwater management policy statement is in part as follows:

> *It is the policy of the Alameda County Water District to efficiently protect and manage the Niles Cone Groundwater Basin to ensure a reliable supply of high quality water that satisfies present and future municipal, industrial, recreational, and agricultural water needs in the ACWD service area. ACWD will develop and implement appropriate programs within the ACWD service area to protect and manage the groundwater basin as a long-term source of water supply for ACWD. ACWD will also actively protect the groundwater basin from activities outside the ACWD service area that may negatively impact the water quality and/or water supply of the basin.*

Policy Objectives

The purpose of the Groundwater Management Policy is to protect and improve the District's groundwater resources for the benefit of both the District's customers and private well owners by taking actions designed to meet the following objectives:

- Increase groundwater replenishment capability.
- Increase the usable storage capacity of the groundwater basin.
- Operate the basin to provide:
    - A reliable water supply to meet baseload and peak distribution system demands,
    - An emergency source of supply, and
    - Reserve storage to augment dry year supplies.
- Protect groundwater quality from degradation from any and all sources including saline water intrusion, wastewater discharges, recycled water use, urban and agricultural runoff, or chemical contamination.
- Improve groundwater quality by:
    - Removing salts and other contaminants from affected areas of the basin, and
    - Improving the water quality of source water used for groundwater recharge.

4.4 GROUNDWATER MANAGEMENT PROGRAMS

The following eight major groundwater management programs have been developed and implemented by the District to achieve the District's Groundwater Management Policy objectives:

- Water Supply Management
- Groundwater Replenishment
- Watershed Protection and Monitoring
- Basin Monitoring
- Wellhead Protection Program
- Aquifer Reclamation Program
- Groundwater Protection Program
- Well Ordinance Administration

A brief summary of each of these programs is provided in Table 4-1. A detailed description of each program is included in the Groundwater Management Policy which is attached in Appendix C. The District's WSCP also provides additional discussion on the Niles Cone Groundwater Basin and the local water supply.

In addition to the programs identified above, the District coordinates with public entities through Agreements and Memoranda of Understandings in the upper Alameda Creek watershed such as Dublin San Ramon Services District – East Bay Municipal Utility District Recycled Water Authority (aka DERWA), Livermore Amador Valley Water Management Agency, the San Francisco Public Utilities Commission, and Zone 7 Water Agency to monitor and mitigate activities in such a way that continue water supply reliability in an environmentally sensitive manner in order to protect the Alameda Creek Watershed, and as a result, the Niles Cone. The District coordinates with the City of Livermore, Alameda County, San Mateo County, Santa Clara County, East Bay Regional Park District, California Department of Water Resources, adjacent cities and other agencies by reviewing and commenting on California Environmental Quality Act documents for development projects that have the potential to affect ACWD's sustainable groundwater management.

The District continues to invest heavily in upgrades of its groundwater recharge facilities to render them in compliance with the Endangered Species Act toward restoration of the Steelhead trout fishery in the Alameda Creek Flood Control Channel. Fish screens have been installed on three pipes that divert water from the channel to recharge ponds, and others are planned for installation over the next few years. To enable upstream fish migration into the upper watershed, one of three inflatable dams that had impounded water for groundwater recharge has been removed, and fish ladders are designated for the two remaining dams. One of the fish ladders was recently completed in early 2019, and construction of the second started in mid-2019. These new facilities are the outcome of coordination between the District and public and regulatory agencies such as the National Marine Fisheries Service, California Department of Fish and Wildlife, the San Francisco Regional Water Quality Control Board, and multi-stakeholder collaborative workgroups within the Alameda Creek watershed. These workgroups continue to monitor and mitigate activities in the watershed.

4.5 GROUNDWATER RECHARGE AND PRODUCTION

Groundwater recharge occurs primarily through percolation at the District’s recharge facilities and natural percolation of rainfall and applied water. Operation of the District’s groundwater recharge facilities ensures adequate replenishment of the groundwater basin, and is part of a basin management framework that includes: a) pressurization of aquifers through managed-aquifer-recharge; b) importation of purchased water for managed aquifer recharge when needed to supplement local water; c) basin-wide groundwater level and water quality monitoring through a network of nearly three hundred wells; d) coordination of managed aquifer recharge and well pumping to ensure piezometric heads are maintained above established minimum levels; e) mitigation of legacy saltwater intrusion by maintaining ‘state of nature’ subsurface saline outflow to San Francisco Bay, and extracting brackish water and converting it for potable use through desalination; f) metering of well pumping (including private wells); and, g) administration of a replenishment assessment program (collecting fees from private pumpers to help pay for groundwater replenishment).

The “production” of groundwater is defined in the Replenishment Assessment Act as the extraction of groundwater by pumping or any other method from shafts, tunnels, wells, excavations, or other sources of groundwater for domestic, irrigation, industrial, or other beneficial uses. Most pumping from the basin is classified as production. Production is categorized as Municipal, Industrial, Non-Municipal Recreation, Agricultural, Municipal Recreation, Aquifer Reclamation, and any other reported pumping as identified in the annual Survey Report on Groundwater Conditions. The District’s groundwater pumping includes pumping at the District’s Peralta-Tyson and Mowry Wellfields, and pumping from the District’s ARP wells. Groundwater supplied to the District’s distribution system comprises of water pumped from the District’s two wellfields and water delivered to the Newark Desalination Facility from certain ARP wells. Saline groundwater outflows represent the groundwater outflows from the Newark Aquifer to San Francisco Bay.

As is typical in coastal groundwater basins, groundwater outflows are required to prevent saltwater intrusion from occurring.

As required by the District's Replenishment Assessment Act, the District meters active wells in the District, and prepares an annual Survey Report on Groundwater Conditions which summarizes the total well production, estimated recharge, and changes in groundwater storage. A summary of groundwater pumping, recharge and change in storage is provided in Table 4-2. As indicated in the table, annual groundwater supply from the District's production wells (Peralta-Tyson and Mowry wellfields) has ranged from 5,200 AF/yr to 12,100 AF/yr over the past ten years. Over the same period, ARP pumping has ranged from 10,700 to 12,100 AF/yr and private groundwater pumping has ranged from 1,500 to 2,600 AF/yr. Annual groundwater recharge has ranged from 13,000 AF to 34,700 AF/yr. ARP pumping varies based on optimized integrated management of District resources from year to year. The long-term average ARP pumping, or "Default ARP pumping" currently needed to protect and reclaim the Niles Cone from past and future salt-water intrusion is 7,000 AF/year.

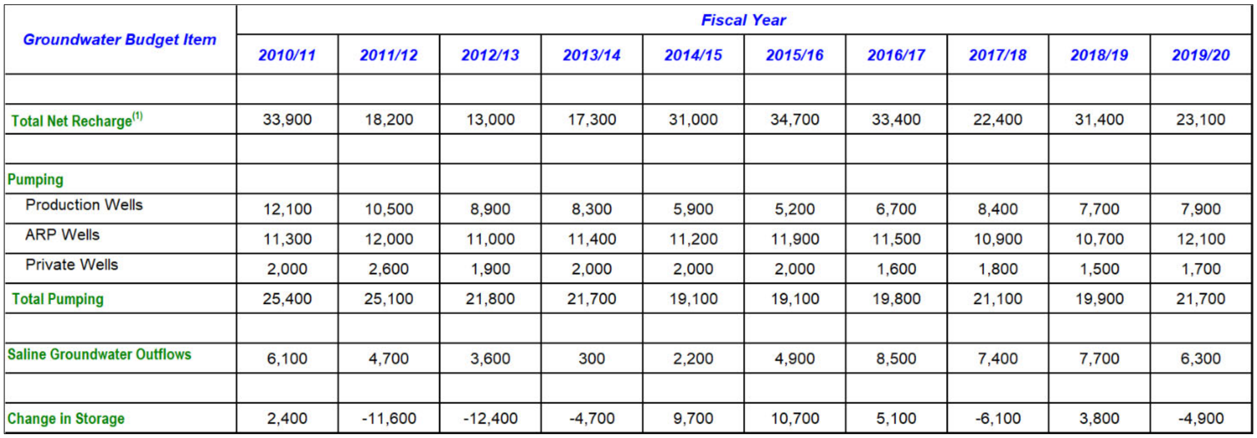
Future Use of Groundwater

As described in the District's Integrated Resources Planning Study, the District will continue to rely on the Niles Cone as a source of supply for the service area. The District will continue to sustainably manage the groundwater basin whereby groundwater pumping and saline outflows are balanced with groundwater recharge. Year to year variations in recharge, pumping, and saline outflows will occur due to variations in local hydrologic conditions and other factors. Therefore, in some years recharge may exceed the sum of pumping and saline outflows resulting in a temporary imbalance. Similarly, in some years pumping and saline outflows may exceed groundwater recharge, also resulting in a temporary imbalance. However, over the long-term, the operation of the basin will be balanced to ensure that the basin is protected from saltwater intrusion and that reclamation of the basin from previous saltwater intrusion continues. It is anticipated that the District's future groundwater pumping will continue to occur at the Mowry Wellfield, Peralta-Tyson Wellfield, and the Aquifer Reclamation Program wells. The District's projected future use of groundwater under normal and dry year conditions is summarized in Chapter 9 – Water Supply Strategy.

Table 4-1
Summary of the District's Groundwater Management Programs

Groundwater Program	Description
Water Supply Management	Planning, managing, and optimizing the District's sources of supply: watershed runoff, SWP water for recharge, SWP water for treatment, SFPUC water for blending, and water banking.
Groundwater Replenishment	Operation of the District's groundwater recharge facilities to optimize 1) capture of local runoff, 2) replacement of water extracted from production and ARP wells, and 3) maintenance of groundwater levels to prevent saltwater intrusion.
Watershed Protection and Monitoring	Assisting in the protection and monitoring of the watershed to optimize the quality of runoff water available for water supply.
Basin Monitoring	Sampling and measuring wells to assess and evaluate 1) groundwater quality, 2) water pressures within the basin, and 3) the direction of groundwater flow.
Wellhead Protection Program	Identify sensitive recharge and groundwater areas, maintain an inventory of potential threats within these areas, assess the vulnerability of source water, and develop management strategies to minimize the potential for groundwater quality impacts.
Aquifer Reclamation Program (ARP)	Pump brackish water from degraded aquifers in order to 1) increase useable basin storage, 2) improve overall water quality, 3) prevent movement of brackish water toward the District production wells, and 4) provide (future) supply augmentation through treatment to potable water standards.
Groundwater Protection Program	Maintain an active role in 1) assisting with the identification of potential groundwater contamination, 2) implementing monitoring systems at hazardous materials storage sites, and 3) providing technical oversight for investigations and cleanups at hazardous materials spill sites.
Well Ordinance Administration	As enforcing agency for the District's Ordinance No. 2010-01 governing construction, repair, or destruction of wells, exploratory wells and other excavations, the District provides inspection services, collects fees, and performs field searches for abandoned wells which could act as a conduit for contamination of groundwater; and coordinates with city development review processes.

Table 4-2
Groundwater Budget for the Niles Cone Groundwater Basin (AF/yr)
(Source: Annual Survey Report on Groundwater Conditions)



Groundwater Budget Item	Fiscal Year									
	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Total Net Recharge[1]	33,900	18,200	13,000	17,300	31,000	34,700	33,400	22,400	31,400	23,100
Pumping										
Production Wells	12,100	10,500	8,900	8,300	5,900	5,200	6,700	8,400	7,700	7,900
ARP Wells	11,300	12,000	11,000	11,400	11,200	11,900	11,500	10,900	10,700	12,100
Private Wells	2,000	2,600	1,900	2,000	2,000	2,000	1,600	1,800	1,500	1,700
Total Pumping	25,400	25,100	21,800	21,700	19,100	19,100	19,800	21,100	19,900	21,700
Saline Groundwater Outflows	6,100	4,700	3,600	300	2,200	4,900	8,500	7,400	7,700	6,300
Change in Storage	2,400	-11,600	-12,400	-4,700	9,700	10,700	5,100	-6,100	3,800	-4,900

Note:

(1) Total Net Recharge is calculated as recharge from deep percolation of rainfall and applied water plus recharge at the District’s groundwater percolation facilities (including recharge of imported water) less the sum of evaporation losses and “Other Outflows” (as described in the District’s annual Groundwater Survey Reports).

CHAPTER 5 DESALINATION

This chapter describes local opportunities for desalination, including the District's Newark Desalination Facility and its associated long-term water supply and water quality benefits.

5.1 DESALINATION FACILITY OVERVIEW

The District owns and operates the Newark Desalination Facility (Desal Facility, see Figures 5-1 and 5-2), which uses a reverse osmosis process (RO) to produce up to 10 mgd of RO permeate. Because RO permeate is so low in minerals, it needs to be blended with a small amount of groundwater, which increases the total blended production from the plant up to 12 mgd. The blending process is important to maintain uniform water hardness, meet drinking water standards, and provide necessary corrosion control within the distribution system and customer homes. The source water for the Desal Facility is brackish groundwater provided by the District's Aquifer Reclamation Program (ARP) wells.

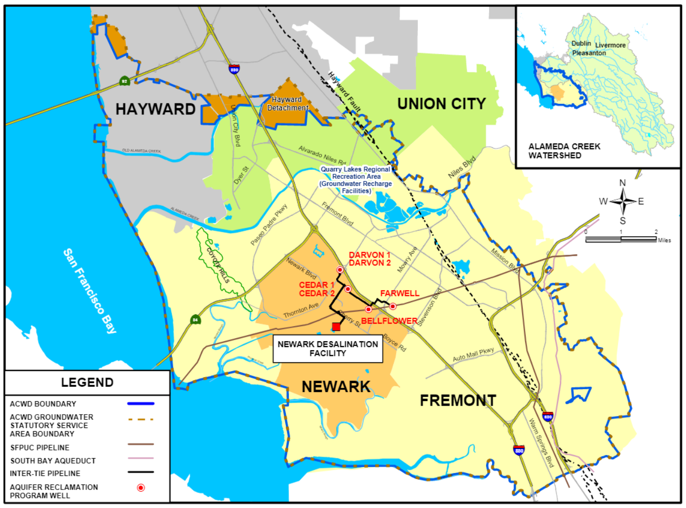
Figure 5-1
The Newark Desalination Facility

The purpose of the ARP is to pump out brackish groundwater that is trapped in portions of the otherwise freshwater Niles Cone Groundwater Basin. The brackish water is the result of saltwater intrusion from the bay after many years of historical overdraft and unbalanced operation of the Niles Cone. Today, the ARP is restoring the aquifers and the Desal Facility is providing the District's customers with high quality, low cost, and highly reliable water supply that is locally controlled.

5.2 AQUIFER RECLAMATION PROGRAM

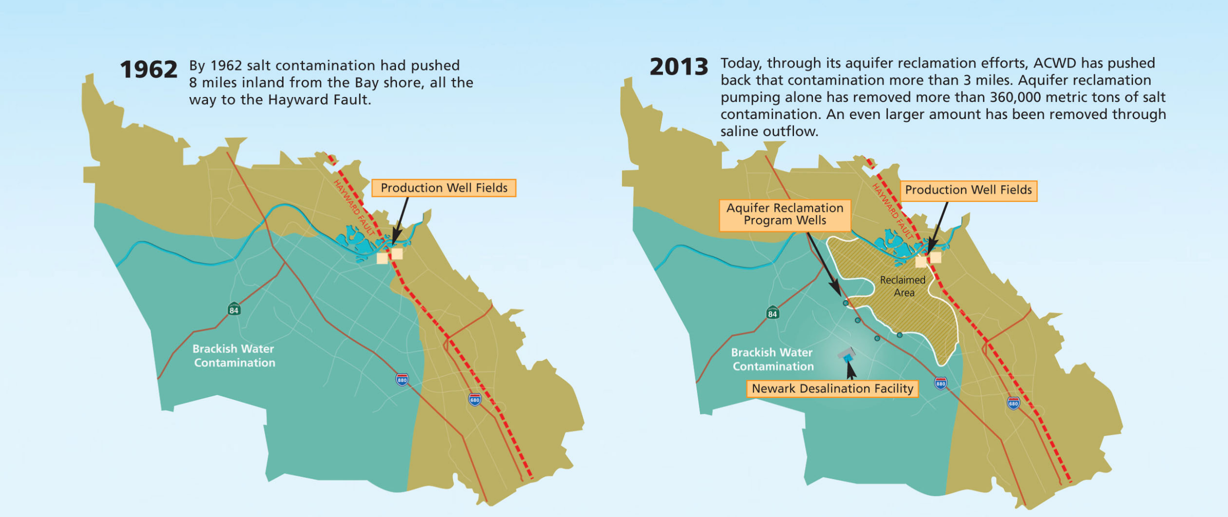
In the early and mid-twentieth century, long before the Desal Facility was commissioned, the groundwater within the Niles Cone Groundwater Basin was drawn far below sea level which resulted in saltwater from the San Francisco Bay being pulled into the aquifer system. Due to efforts made by the District, the saltwater intrusion was halted and reversed in the second half of the twentieth century (Figures 5-3 (a) and 5-3 (b)). Recovery from saltwater intrusion is known to take a long time: decades or even centuries in some cases. The continued recovery of the Niles Cone Groundwater Basin is accelerated with the District's ARP.

Figure 5-2
Map of the Newark Desalination Facility and Other Facilities



The ARP was developed and begun in the 1970s to facilitate the reversal of the impacts of historic saltwater intrusion. For several areas within the Niles Cone Groundwater Basin, especially the deeper confined aquifers, there is no natural outlet for the brackish water. Under the ARP, the "trapped" brackish groundwater that remains from the previous saltwater intrusion is pumped out by groundwater wells. From 1972 to 2003, this brackish groundwater was discharged to San Francisco Bay (Figure 5-4).

Figure 5-3
(a) Areas of the Niles Cone Groundwater Basin impacted by historic saltwater intrusion (1962), and (b) brackish groundwater remaining in the Niles Cone Groundwater Basin (April 2013).



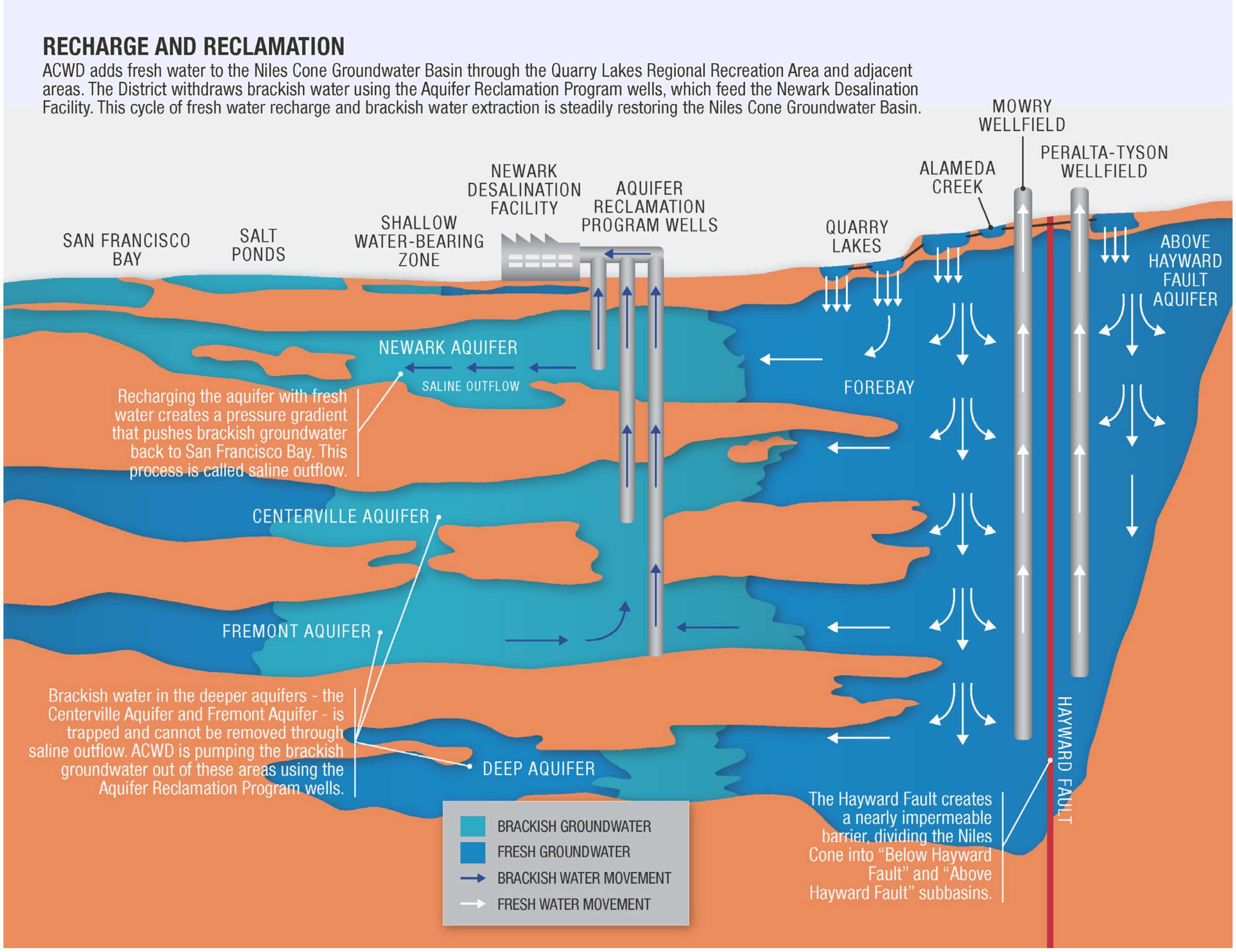
1962 By 1962 salt contamination had pushed 8 miles inland from the Bay shore, all the way to the Hayward Fault.

2013 Today, through its aquifer reclamation efforts, ACWD has pushed back that contamination more than 3 miles. Aquifer reclamation pumping alone has removed more than 360,000 metric tons of salt contamination. An even larger amount has been removed through saline outflow.

Image source: Reliability by Design, Integrated Resources Planning at Alameda County Water District 2014

The District's ARP has targeted 6 to 7 mgd average annual production (approximately 7,000 AF/yr) as an optimal rate for reclaiming the Niles Cone Groundwater Basin since 1972. Every unit of brackish water pumped from the basin must be replaced with an equal amount of freshwater at the District's recharge facilities in Quarry Lakes Regional Recreational Area. Therefore, while the amount of brackish water in the Niles Cone Groundwater Basin is vast, the annual extraction is limited by the sustainable yield of the freshwater recharge available. ARP is an important aspect of the District's Groundwater Management Policy.

Figure 5-4
Recharge and Reclamation



RECHARGE AND RECLAMATION

ACWD adds fresh water to the Niles Cone Groundwater Basin through the Quarry Lakes Regional Recreation Area and adjacent areas. The District withdraws brackish water using the Aquifer Reclamation Program wells, which feed the Newark Desalination Facility. This cycle of fresh water recharge and brackish water extraction is steadily restoring the Niles Cone Groundwater Basin.

Recharging the aquifer with fresh water creates a pressure gradient that pushes brackish groundwater back to San Francisco Bay. This process is called saline outflow.

Brackish water in the deeper aquifers - the Centerville Aquifer and Fremont Aquifer - is trapped and cannot be removed through saline outflow. ACWD is pumping the brackish groundwater out of these areas using the Aquifer Reclamation Program wells.

The Hayward Fault creates a nearly impermeable barrier, dividing the Niles Cone into “Below Hayward Fault” and “Above Hayward Fault” subbasins.

ARP pumping removes brackish groundwater from the Niles Cone Groundwater Basin, creating more storage space for fresh groundwater recharged through the District’s groundwater recharge facilities and other sources. From 1972 to 2003 this brackish groundwater was discharged to the San Francisco Bay.

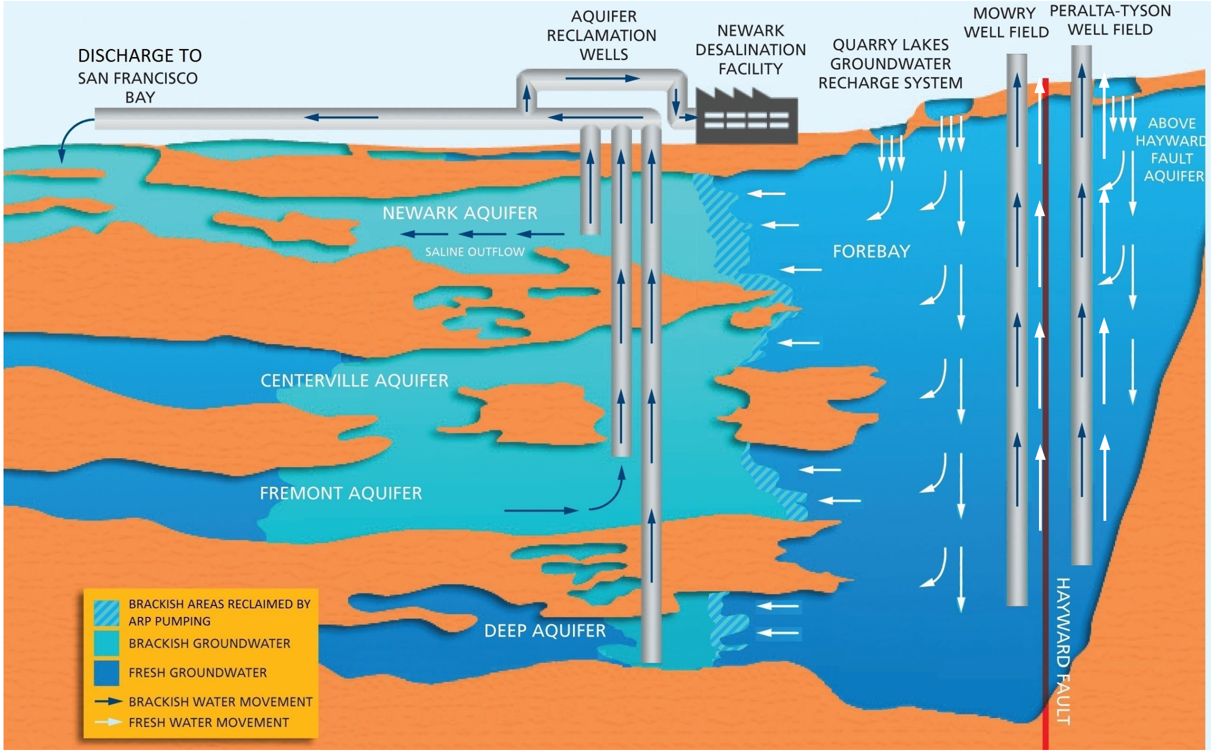
5.3 DESALINATION IN THE DISTRICT’S INTEGRATED RESOURCES PLANNING

As part of the development of the District’s 1995 Integrated Resource Planning (IRP), the District evaluated an extensive list of potential water supply alternatives including both brackish groundwater desalination and bay-water desalination. Brackish groundwater desalination was found to be the preferred option due to substantially lower power requirements and less concentrated brine discharge. Key to the selection of brackish groundwater desalination was the availability of a pre-existing brackish supply from the ARP discharge. The Desal Facility would effectively ‘reclaim’ about 70% of water being discharged to San Francisco Bay and create a high-quality drinking water instead (refer to Figure 5-5). The original IRP recommended building the Desal Facility in two phases, and in subsequent planning the phases were further defined. In Phase I, 6 mgd of final blended product water capacity would be built, and in Phase II the capacity would be increased to 12 mgd.

5.4 CURRENT DESALINATION CAPACITY AND USE

On September 19, 2003, the District dedicated the Desal Facility, the first brackish water desalination facility in northern California (refer to Figure 5-5). The Desal Facility uses reverse osmosis to produce potable water by removing salts and other minerals from brackish groundwater. The Desal Facility, as commissioned in 2003, had an original production capacity of 6 mgd. In 2010, the District completed the Phase 2 expansion of the Desal Facility to double the overall capacity to 12 mgd of final production, its current capacity. The expansion of the Desal Facility capacity to 12 mgd allows additional operational flexibility to use surplus supplies, and to provide peak summer capacity.

Figure 5-5
ARP Discharge Used to Supply Desal Facility



The Desal Facility, with local source water and reliably high-quality produced water, improves both the quality and reliability of the District's water supply. Specific water supply and water quality benefits include:

Improved dry year water supply reliability: The District's 1995 IRP identified potential dry year water supply shortages of up to 50% in 2030 without further action. To improve dry year supply reliability, the District adopted a water management strategy that includes conservation, reclamation, off-site groundwater banking, and desalination. The Desal Facility improves the District's dry year supply reliability by providing a new, locally controlled source of potable supply for the service area.

Improved water system reliability and security: The Desal Facility improves the overall reliability and security of the District's supplies by providing a source of supply west of the Hayward Fault and Calaveras Fault. The District's imported water supplies are conveyed via aqueducts (South Bay Aqueduct and Hetch-Hetchy Aqueduct) that are susceptible to failure due to earthquakes along these faults. The Desal Facility provides the District with increased local production capacity, which is key for the District in the event of temporary loss of imported water supplies or production facilities east of the Hayward Fault due to a seismic event.

Increased water production capacity: In addition to the District's dry year reliability needs, the District's 1995 IRP also identified the need for additional water production capacity to meet peak summer demands. Although both natural and programmatic water conservation have already reduced the District's projected peak demands, the production capacity of the Desal Facility is beneficial in meeting peak demands in the service area. The Desal Facility production capacity also provides additional system redundancy to allow for facility maintenance outages and operational flexibility.

Improved water quality: Because the District's existing potable groundwater supplies are relatively high in hardness, the District blends these groundwater supplies with San Francisco Public Utilities Commission (SFPUC) supplies to reduce the overall hardness and improve water quality. Implementation of the Desal Facility has allowed the District to increase groundwater utilization without requiring additional expensive SFPUC purchases, further improving water quality for the District's customers at a reasonable cost.

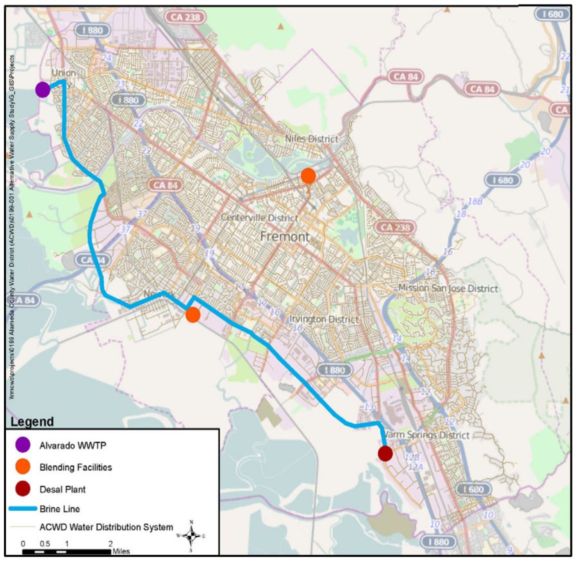
Reduced future reliance on imported supplies: The Desal Facility allows the District to reclaim local, brackish groundwater for potable use, reducing the District's need for additional reliance on imported water supplies from the Delta to meet increasing demands in the service area.

Groundwater basin protection and reclamation: The source water for the Desal Facility is the Niles Cone Groundwater Basin. The ARP is an on-going program in which the District has been removing groundwater impacted by saltwater intrusion in order to restore the Niles Cone Groundwater Basin to freshwater conditions in portions of the Niles Cone Groundwater Basin that have been impacted by saltwater intrusion from San Francisco Bay. Historically, the District has pumped the brackish groundwater out of the basin and discharged it back to San Francisco Bay. However, the Desal Facility now allows the District to utilize this brackish groundwater as a potable supply.

5.5 FUTURE OPPORTUNITIES FOR DESALINATION

The District has continued to evaluate additional desalination opportunities. Because the supply used for a brackish desalination facility is limited by the availability of fresh water to recharge the Niles Cone Groundwater Basin, the current brackish desalination program is effectively at full capacity. In 2014, the District studied opportunities to build bay-water desalination. The study found that bay-water desalination would likely be constrained by restrictions on discharging the brine concentrate, requiring costly infrastructure to take the brine to USD's existing wastewater discharge line (Figure 5-6). Bay-water desalination remains one of the most promising water supply options as far as dry-year reliability and expansion potential, however, at this time the cost remains prohibitively high, estimated at $4,500 per acre-foot compared to approximately $800 for the District's existing Desal Facility supply or approximately $2,200 for the District's most expensive supply from the SFPUC. The District will continue to explore alternative options and technologies which may make this option more realistic.

Figure 5-6
Bay Desalination Concept with Brine Discharge Line



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CHAPTER 6 WATER RECYCLING

This chapter describes the Union Sanitary District's wastewater system (which serves the District's service area), and the opportunities for the use of recycled water in the District service area.

6.1 WATER RECYCLING OVERVIEW

California Water Code defines recycled water (a.k.a. reclaimed water, water reuse) as water which, as a result of treatment, can be put to beneficial use. While not defined as such, it is commonly understood to be water originating as municipal wastewater. Beneficial uses typically include any use that offsets the demand for limited and higher quality potable water supply but can also include enhancing or even creating ecosystems such as providing streamflow augmentation or wetland inflows.

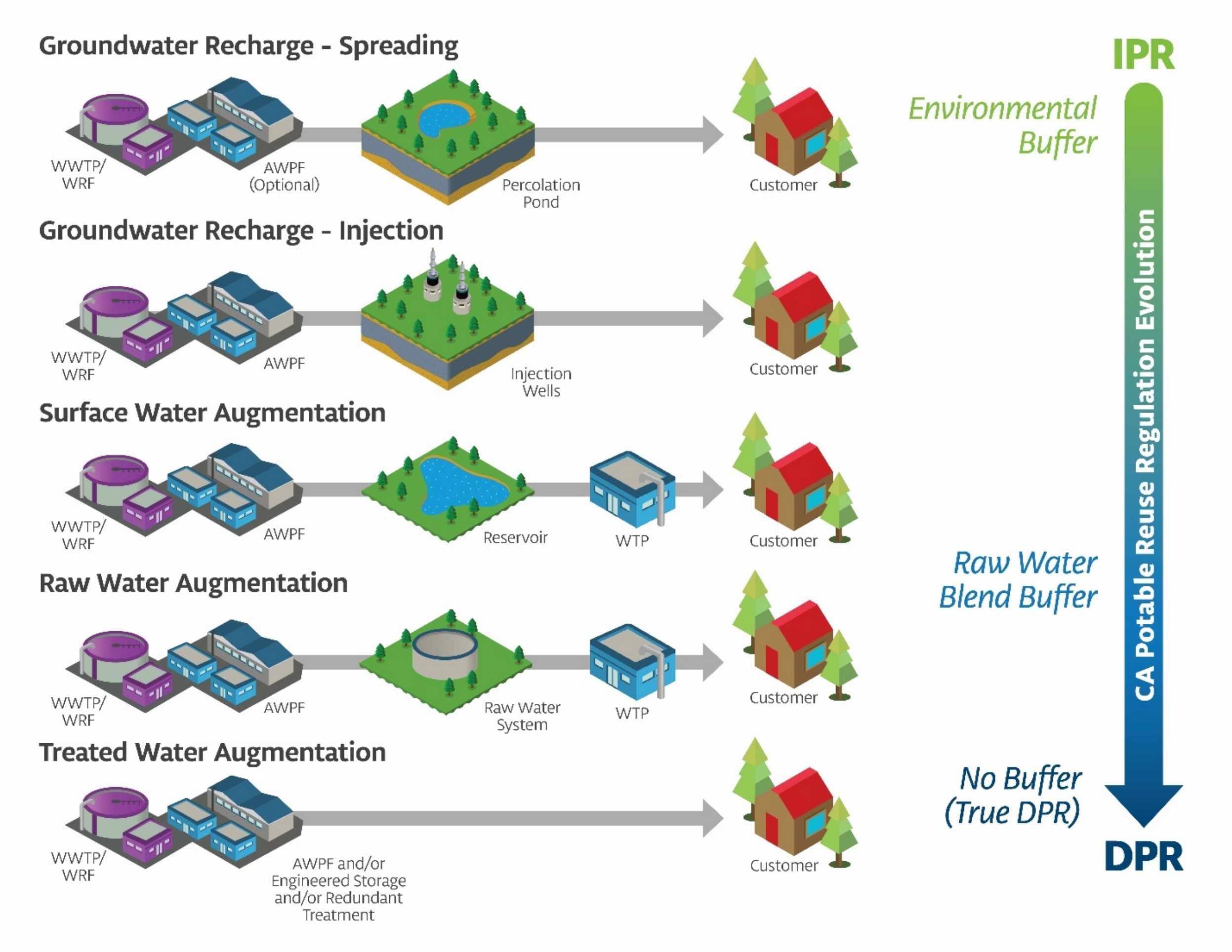
In recent years the interest in and technology needed to develop recycled water have increased dramatically. The following are the most commonly discussed forms of recycled water:

Non-potable use: Historically the term recycled water has meant the use of non-potable water, either secondary or tertiary treated wastewater, that is delivered via a separate distribution system (purple pipe, non-potable system) primarily for landscape irrigation and industrial use. The most commonly thought of example is recycled water used to irrigate an existing golf-course (an "anchor customer"), thereby displacing an existing demand for potable water supply that can then be saved for human consumption. Anchor customers are a critical requirement for a non-potable project to be cost-effective as they provide a large demand at a single location, thereby reducing the extent of the purple pipe system.

Potable Reuse: In recent years there have been significant new developments in the use of advanced treated recycled water for potable purposes. An Advanced Water Treatment Facility (AWTF) includes the use of reverse osmosis (RO) and multiple disinfection barriers to produce water quality that replicates Sierra snow melt. Such technology is currently in use throughout the United States. Potable reuse falls into two further sub-categories:

> *Indirect Potable Reuse (IPR):* AWTF water is used to supplement potable water supplies by either blending into surface water reservoir storage for later treatment at a traditional water treatment facility, or as supplemental recharge of potable groundwater supplies. IPR relies on specified blending ratios with the receiving waters as well as retention time before being produced for consumptive use. California adopted regulations for IPR via groundwater recharge in 2014 and IPR via surface water reservoir augmentation in 2018.
>
> *Direct Potable Reuse (DPR):* AWTF water is used directly as a raw water source to be further treated at a traditional water treatment plant before going to consumptive use or used directly in a potable water supply distribution system. Currently, California is developing regulations for DPR. Figure 6-1 provides a summary of these potable reuse options.

Figure 6-1
Potable Reuse Options
(Source: Draft Purified Water Feasibility Evaluation Report)



Greywater and onsite reuse are typically included under conservation discussions but are in fact water that is recycled on the customer's own premises and are included here for the sake of completeness. *Greywater* (a.k.a. graywater) is the onsite collection of water from bathroom sinks, showers, bathtubs, and clothes washing machines for reuse as irrigation water on the premises. Onsite reuse refers to water that is used, treated, and reused onsite, commonly done by commercial and industrial customers.

6.2 AGENCY COORDINATION

As described below, Union Sanitary District (USD) provides wastewater transport, treatment, and effluent disposal for the Cities of Fremont, Newark, and Union City (encompassing the District service area). In 1993, the District coordinated with USD in the development of a recycled water master plan (1993 Master Plan) which served as the basis for the District's recycled water use planning, as outlined in the District's Integrated Resources Plan (IRP). Since 1993, the District and USD have regularly updated the master plan to reflect changed conditions including current and projected future demand for recycled water, and advances in treatment technology. Past updates were conducted in 2000, 2003, 2010, and 2016. The District, USD, and SFPUC are currently in the process of completing a Purified Water Feasibility Evaluation which is scheduled to be completed in May of 2022.

6.3 WASTEWATER SYSTEM DESCRIPTION

The following provides a description of USD's facilities and operations, as previously summarized in USD's District-Wide Master Plan.

Wastewater Transport

Wastewater generated within the USD service area is collected and conveyed by gravity sewers to three major pump stations. The Irvington Pump Station serves the southern portion of the service area, the Newark Pump Station serves the central portion, and the Alvarado Pump Station serves the northern portion. Wastewater collected in the southern and central areas is transported to the Alvarado Wastewater Treatment Plant (Alvarado WWTP) in Union City via dual 39-inch force mains. The northern drainage area wastewater is pumped directly to the WWTP headworks from the Alvarado Pump Station.

Wastewater Treatment

The Alvarado WWTP uses activated sludge as the biological liquid treatment process to meet the National Pollutant Discharge Elimination System (NPDES) permit requirements for secondary treatment. Additional treatment processes include primary and secondary clarification, and chlorine disinfection. The capacity of the WWTP is 33 mgd.

Solids handling at the WWTP includes sludge thickening, digestion, and dewatering. Sludge thickening is accomplished by gravity thickeners that are equipped with odor scrubbers. After thickening, the sludge is stabilized by anaerobic digestion and dewatered to about 24 percent solids using centrifuges. Most of the dewatered sludge is then transported by truck to EPA-approved land application sites in Sacramento County, (also Solano and Merced Counties) where the stabilized biosolids are incorporated into the soil. USD maintains an annual target of sending 6,300 wet tons of biosolids to a composting facility and further treated to create class A biosolids. The Alvarado WWTP treated and discharged about 26,212 AF of wastewater in 2020.

Effluent Disposal

All wastewater generated within the USD service area, including peak wet weather flows, receives full secondary treatment and is discharged to the East Bay Dischargers Authority's (EBDA) system for disposal in San Francisco Bay. Currently, USD is permitted to discharge to Old Alameda Creek during peak wet weather occurrences when the Alvarado WWTP's flow exceeds the maximum available capacity of the EBDA pipeline. The EBDA system conveys treated effluent for discharge to the San Francisco Bay from several local agencies. The EBDA system consists of approximately 11.5 miles of pipelines ranging in diameter from 48 inches to 96 inches, four pump stations, a dichlorination facility, and a 7-mile outfall into San Francisco Bay. USD's contractual discharge capacity is 42.9 mgd.

A portion of the USD's effluent was diverted from the EBDA pipeline to supply fresh water to the Hayward Marsh, a constructed wetland located just north of the San Mateo Bridge. In 1991, USD assumed responsibility for the Hayward Marsh Project. Located just north of the San Mateo Bridge, the marsh consists of 145 acres of fresh and brackish wetland, with wide-ranging environmental benefits. Before the marsh was restored from abandoned salt ponds, there was no wildlife habitat at the site. Now the marsh is a popular stop for migratory waterfowl and includes a preserve for the endangered Salt Marsh Harvest Mouse. The East Bay Regional Park District (EBRPD), the agency that owns and operates the Hayward Marsh, will discontinue the use of treated effluent at the Hayward Marsh in the near future and explore other nature-based options.

Existing and Projected Dry Weather Flows

The average dry weather flow treated at the Alvarado WWTP in 2020 was approximately 23 mgd. As part of its regular, individual basin master plan updates, USD developed dry weather flow projections. The sum of the latest dry weather flow projection for each of its three basins is 37.4 mgd. These dry weather flow projections were based on a review of existing and planned growth in the service area (based on the cities' General Plans) and were used for the sizing and phasing of future planned wastewater conveyance and treatment facilities.

6.4 CURRENT USES OF RECYCLED WATER

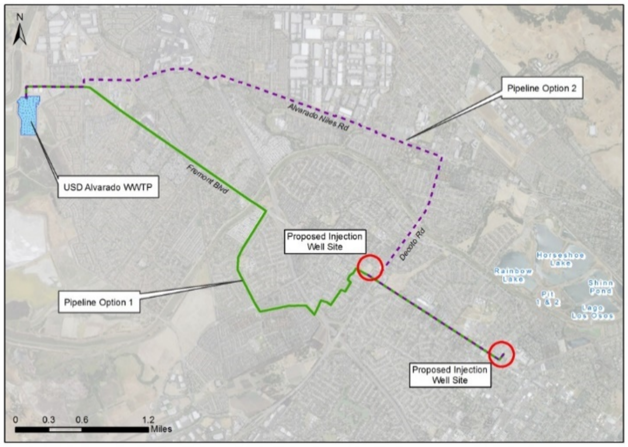
Despite having installed 4.29 miles of "purple pipe" over the past 20 years, there remains no use of recycled water in the District's service area that offsets demand for potable water. As described in Section 6.3, a portion of USD's effluent has historically been provided to the Hayward Marsh Project (located within the District service area) as a fresh water source for the marsh ecosystem, a designated beneficial use of recycled water by the State Water Resources Control Board. However, as described in Section 6.3, EBRPD plans to discontinue the use of treated effluent at the Hayward Marsh and USD confirmed that discharge of final effluent stopped in August 2019 and USD is not likely to discharge to the Hayward Marsh again (USD, personal communication, April 2021).

6.5 FUTURE RECYCLED WATER OPPORTUNITIES

The use of recycled water to offset the demand for potable water is included as part of the District's long-term water supply strategy in the IRP. Developed in 1995, the IRP only contemplated non-potable options as that was the only permitted technology at that time.

Reflecting the repeated findings of low feasibility, the District and USD broadened the focus of the 2016 Feasibility study to include an evaluation of IPR. Specifically, this concept evaluated the potential to take AWTF wastewater from the Alvarado WWTP and inject it into the Niles Cone Groundwater Basin near Quarry Lakes for the purpose of later extraction and potable use (see Figure 6-2). The study found IPR had many advantages over conventional, non-potable recycled water. IPR could create a greater volume of usable supply that is drought-proof, locally controlled, and without restricted uses; IPR would also reduce USD discharges to the San Francisco Bay. Finally, because IPR does not require the extensive parallel distribution system ("purple pipe") needed for a non-potable recycled water project, the cost to develop an IPR supply is dramatically lower.

Figure 6-2
Potential Injection Wells for Recharge of the Niles Cone



During the October 2019 Water Resources Planning Workshop with the Board of Directors, and after evaluating the past studies and the direction of reuse in California, the District's Board agreed with staff's recommendation that the District's water resources planning vision for recycled water would shift toward potable water reuse options.

Accordingly, the District is currently conducting a Purified Water Feasibility Evaluation (PWFE) in partnership with USD and SFPUC. Scheduled to be completed in Fall of 2021, the PWFE is evaluating recycled water for potable reuse options including both IPR and DPR. IPR projects are relatively new in California and public perception and acceptance of potable reuse is still in its very early stages. The current Feasibility Study builds off of the IPR recommendation of the 2016 Feasibility Study and is looking at other potable reuse options, including DPR. While the District is evaluating the cost and feasibility of potable reuse concepts, it currently has no plans to develop a potable reuse project. If a future potable reuse project were to be actively pursued by the District it would be preceded by an extensive public information and awareness campaign.

CHAPTER 7 DEMAND MANAGEMENT

7.1 DEMAND MANAGEMENT OVERVIEW

This chapter provides detailed information about the District's Demand Management Program, also known as and referred to in this chapter as the Water Use Efficiency (WUE) Program (Program). The terms "demand management measure" and "water use efficiency measure" mean essentially the same thing: an intervention such as a toilet rebate that lowers demand. A group of measures implemented collectively is referred to as a program. Although the District's current Program is referred to as a "Conservation" Program, the District is transitioning away from using the term "conservation" to describe its program and measures. Water use efficiency is a more accurate way to describe what a measure does for a customer – measures increase a customer's water use efficiency. Conservation implies that something is given up, therefore, in this document the term "conservation" is reserved for actions or measures taken during a drought or water shortage.

The District's WUE Program has a long history. Originally, the Program came out of the District's Integrated Resource Planning (IRP) process and continues to be evaluated in terms of this process. The original IRP was adopted in 1995, has been reviewed several times since then, and a 30-year IRP update is planned for 2025. The District was also an early signatory to the Memorandum of Understanding (MOU) on Urban Water Conservation through the California Urban Water Conservation Council (CUWCC) in 1991, now known as the California Water Efficiency Partnership (CalWEP). While that MOU has since expired, the District continues its commitment to implement all cost-effective best management practices with water use efficiency potential. The District's WUE Program has enabled the District to meet its SB X7-7 targets. See Chapter 8 for more discussion regarding the District's SB X7-7 targets.

In 2018, the State passed Assembly Bill (AB) 1668 and Senate Bill (SB) 606, collectively known as "Making Conservation a California Way of Life." These bills will establish new water use targets beyond SB X7-7 that the District will need to comply with by 2023. These new water use targets and a planned 30-year IRP update prompted the District to develop a Water Efficiency Master Plan (WEMP) in 2019-2020. The WEMP identifies strategies to meet both short-term and long-term (25 years) water use efficiency goals, including new urban water use reduction targets established by the State.

The District's overarching goal for its WUE Program is to provide all District customers with assistance and a wide variety of resources through rebates, incentives, and technical assistance, so its customers can be as water efficient as possible.

7.2 DEMAND MANAGEMENT STRATEGY

Water use efficiency is an integral part of the District's long term water management strategy. In 2019, the District hired Maddaus Water Management Inc. to develop a WEMP for the District. The WEMP takes inventory of water use efficiency gains achieved to date, identifies what remains to be achieved, and provides a road map to move forward with the District's commitment to water use efficiency. The WEMP is attached in Appendix E. In summary, the water use efficiency analysis included the following steps:

1. Assess water use efficiency gains from past and current measures
2. Examine passive savings expected from recent and new plumbing codes changes
3. Conduct a Community Survey to identify water use efficiency changes customers made during and after the last statewide drought (2012-2016), as well as interests for future water use efficiency measures
4. Carefully screen efficiency measures to determine the ones that are appropriate for identified end-uses in the District

5. Determine what water use efficiency measures to pursue and when
6. Characterize the measures, including participation levels, estimated cost, end uses, water savings, and staffing requirements
7. Under the direction of the District Board priorities, combine the measures into increasingly more aggressive WUE strategies and evaluate the costs and water savings of these strategies
8. Develop projections for demand under different scenarios: with plumbing code changes and under each Strategy
9. Identify a cost-effective WUE strategy to meet District goals
10. Design appropriate delivery mechanisms, including incentives and marketing approaches

The WEMP analysis has provided a foundation for the District's forthcoming IRP Update. Water use efficiency measures will be evaluated at the same level of detail as other supply-side options. In some instances, it may be more cost-effective to implement WUE measures than it would be to secure additional supplies and production/treatment facilities to meet existing and growing demands.

Although DWR's UWMP Guidebook methodology is not designed to consider water use efficiency savings as a 'source of supply,' the District's funding and early adoption of water use efficiency programming was specifically carried out to avoid more costly investments in water supply alternatives. From the District's perspective, therefore, it is also appropriate to calculate water use efficiency savings from an established baseline (prior to implementation of the District's water use efficiency programming) and present the resulting water use efficiency savings as a 'source of supply.' This approach is presented in Figures 7-1 and 7-2. As shown in Figure 7-1, 17% of the District's distribution and groundwater system demands have been met through water use efficiency savings on an average basis over the past 10 fiscal years (FY), FY 2010/11 - FY2019/20. Water use efficiency volumes were calculated as the difference between the SB X7-7 10-year average baseline reporting value of 170 gallons per capita per day (gpcd) as described in Chapter 8 and the 10-year moving average gpcd values for each FY from 2010 through 2019[1].

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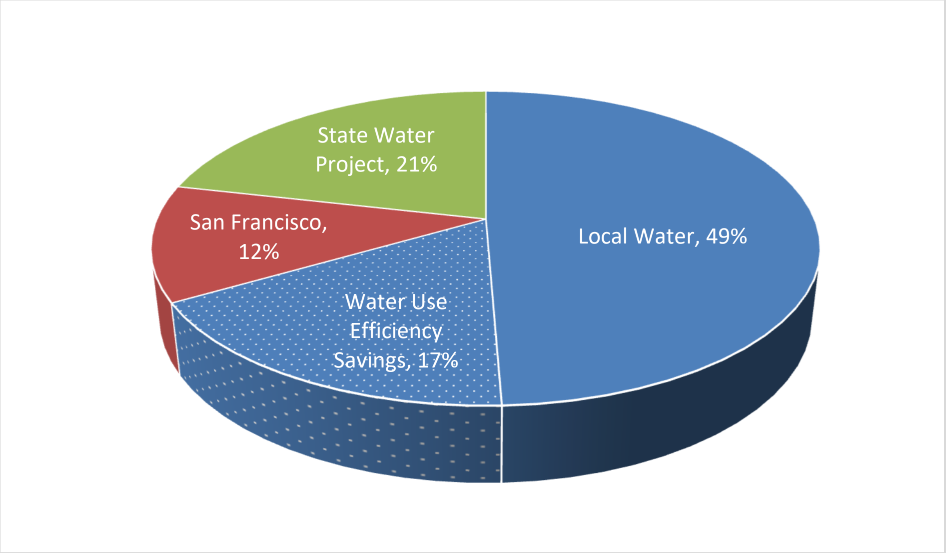
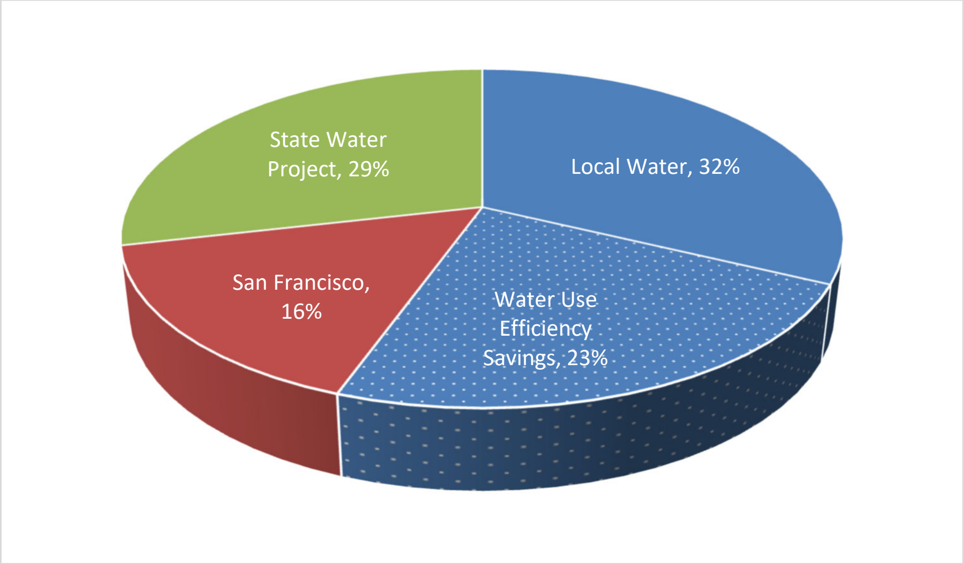
[1] All water use efficiency savings volumes were calculated as the difference between the SBX7-7 baseline of 170 gpcd and the 10-year moving average gpcd rate for the year of interest. Specifically, for the FY10/11 - 19/20, the water use efficiency volumes were calculated as the differences between the SBX7-7 baseline 170 gpcd value from 2004 and the 10-year running gpcd averages from 2010-2020, respectively (averaged between the two calendar years within the fiscal year of interest to get the fiscal year value, i.e. [2010+2011]/2=FY10/11).

Figure 7-1
Average Sources of Supply (FY 2010/11-FY 2019/20) Distribution and Groundwater System Demands



When calculating the impact of water use efficiency savings on the District's distribution system only, 23% of total demand has been met through water use efficiency savings on an average basis over the past 10 fiscal years, as seen in Figure 7-2.

Figure 7-2
Average Sources of Supply (FY 2010/11-FY 2019/20) Distribution System Demands Only



As presented, investments in water use efficiency have significantly decreased the need for additional water supply options. A discussion of the District's water supply strategy and how water use efficiency plays a key role in this strategy is provided in Chapter 9.

7.3 DEMAND MANAGEMENT PROGRAM PLANNING AND PURPOSE

The District has a multi-faceted WUE Program that includes measures targeting all customer categories: residential, business, industrial, institutional, and dedicated landscape accounts. The Program, established out of the original 1995 IRP recommendations, was built on commitments to CUWCC's (now CalWEP) MOU on Urban Water Conservation Best Management Practices (BMPs) and meeting SB X7-7 targets. Moving forward it will be based on a strategy outlined in the WEMP that ensures the District will meet new state targets and maintain water supply reliability. The Program will continue to adapt to the introduction of new technologies and techniques for encouraging water use efficiency in the service area.

In past UWMPs, the District has included submission of data documenting full compliance with the CUWCC MOU. When CUWCC transitioned to CalWEP the MOU expired, and annual reports were no longer required. The District's final CUWCC annual report (2013-2014) as well as the status of BMP implementation were included in the 2015-2020 UWMP.

This section includes a discussion about major drivers of WUE program planning: the District's SB X7-7 targets, the WEMP, and new state Water Use Objectives.

SB X7-7 Compliance

The District has met its 2015 and 2020 SB X7-7 targets. A detailed discussion of the District's SB X7-7 target is provided in Chapter 8. In 2010, the District's 2020 SB X7-7 gpcd target was determined to be 137 gallons, as documented in Chapter 8. With the District's gpcd under 137 gallons and holding steady well under that, the District has already met its SB X7-7 20x2020 target. The District met its targets through customer water use efficiency efforts over the last five years (described in detail in Section 7.4 of this Chapter) – both through more efficient behavioral changes (i.e. reducing over-irrigation) and changing out inefficient fixtures and high water use landscaping. The District supported these efforts through water use efficiency measures that provided education regarding landscape water needs and incentives to change out fixtures and turf.

District customers took action to reduce their water use based on District outreach and water use efficiency measures offered by the District over the past five and ten years which allowed the District to achieve water use reductions well below the SB X7-7 targets. In 2019, the District conducted a statistically valid residential customer survey using a third-party consultant. More information about this survey and the results can be found in the WEMP, Appendix E. The goal of the survey was to learn what changes in customer behavior have occurred and the results of the District's WUE Program (along with the natural replacement of efficient fixtures) over the past five years. The results would indicate how saturated the service area is with efficient fixtures, devices, and water-efficient homes. The results showed that 76% of residential customers made behavior changes to use less water in the last five years. These customers, encouraged by the District, helped the service area achieve the SB X7-7 targets. The survey also determined that over 46% of residential customers have water-efficient devices (showerheads, dishwasher, clothes washer, and/or toilets) many of them receiving a rebate or incentive from the District for these measures. Finally, close to 50% of customers surveyed claim they receive information from the District via newsletter further proving District outreach to promote water efficiency is effective in reaching customers. The survey confirms District customers are very knowledgeable about the District programs and messages which led to increased water use efficiency and helped the District achieve the targets set by SB X7-7.

Overall, each water use efficiency measure described in Section 7.4 of this Chapter helped the District achieve the SB X7-7 target. Many of these measures will continue, along with new measures identified during the Water Efficiency Master Plan development process that address outdoor use and CII use, to ensure the District will achieve future objectives.

Water Efficiency Master Plan

The District is in the process of implementing its Water Efficiency Master Plan. For an in-depth discussion of the WEMP development process, results, and strategy see Appendix E. During the WEMP development process existing water use efficiency measures were evaluated with new and modified measures. The District selected measures to continue and/or eliminate, new measures to adopt, and how long to implement measures. Each measure's water savings, cost-effectiveness, and a measure's ability to meet new state Water Use Objectives were also evaluated. This allowed the District to determine the effectiveness of a measures to reduce current demand or mitigate for water shortage conditions.

The WEMP analysis was completed using the Least Cost Planning Decision Support System Model (DSS Model). The DSS Model is an "end-use" model that breaks down total water production (water demand in the service area) to specific water end uses, such as plumbing fixtures and appliances. The model uses a bottom-up approach that allows for multiple criteria to be considered when estimating future demands, such as the effects of natural fixture replacement, plumbing codes, and conservation efforts. The model enables an accurate assessment of the impact of water efficiency measures on demand and provides a rigorous modeling approach for future demands. Each measure analyzed in the model has several assumptions and inputs including utility cost, administration cost, targets (number of accounts impacted per year), measure length, etc. The DSS Model can quantify the additional demand reduction, if needed in a water shortage, by increasing targets within measures. The DSS Model is a tool the District can use if the District experiences a water shortage and implements a stage within its Water Shortage Contingency Plan, because it can quickly and easily examine the expansion of the WUE Program.

The District approved implementation of a service area-wide Advanced Metering Infrastructure (AMI) project during the WEMP process. AMI provides several benefits for the District including increased operational efficiencies, enhanced customer service, reduced environmental impact, and increased water use efficiency. One of the biggest benefits of AMI is that it takes the District from manually reading customer consumption on a bimonthly basis (monthly for a handful of meters) to near real-time remote access of customer consumption data.

The AMI project, which includes a best-in-class customer web portal to provide customers access to their usage data at any time during their billing cycle, as well as other customer self-service functions, was approved in 2020 and will be implemented from 2021-2023.

AMI will provide a tremendous amount of water consumption data that can be used to analyze customer water use trends, identify leaks and high-water use, target customers for water use efficiency measures, and evaluate the success of these measures. The AMI measure, as analyzed in the WEMP, demonstrates that significant water savings can be achieved through access to detailed (15-minute) water usage information. The AMI project and the accompanying customer portal will be extremely useful as a water use efficiency tool for the District.

The WEMP will be reviewed annually and compared with water use to ensure the strategy is on track to meet water use reduction goals, then identify updates or changes to measure elements and/or the strategy, if it is not on track. This may include amending targets, budgets, staffing, and schedule, to stay on track with the District's water use efficiency needs.

Water Use Objectives

In 2018, California Governor Edmund G. Brown Jr. signed Senate Bill 606 (Hertzberg) and Assembly Bill 1668 (Friedman). These bills provide a framework for implementing new standards to establish "Conservation as a California Way of Life" and better prepare the state for droughts and climate change. The new standards must be adopted by the State Water Board by July 2022 and urban retail water suppliers, like the District, must start reporting on compliance with the water use objective in November 2023.

The two bills go beyond existing SB X7-7 requirements to further strengthen the state's water resiliency in the face of future droughts. Bill provisions include establishing standards for the following:

- Residential indoor use with an initial per person water use standard of 55 gallons per day until 2025, 52.5 gallons per day from 2025 to 2030, and 50 gallons per day beginning in 2030
- Outdoor irrigation (residential and dedicated landscape water meters)
- Performance measures for Commercial, Industrial, and Institutional (CII) water use
- Water loss standards

The WEMP provides a recommended strategy for meeting these new urban water use objectives with measures for all customers types. Please see Appendix E for more information.

7.4 CURRENT DEMAND MANAGEMENT PROGRAM DESCRIPTION

This section describes water use efficiency memberships and partnerships. A summary of key measures for a UWMP are provided in Table 7-1; water conservation activities to date, and over the past five years, are described and then summarized in section 7.13.

Memberships

The District engages with organizations like the Association of California Water Agencies (ACWA), Association of Bay Area Governments (ABAG), California Urban Water Agencies (CUWA), California Water Efficiency Partnership (CalWEP), Alliance for Water Efficiency (AWE), and the Integrated Regional Water Management (IRWM) group. These relationships provide opportunities for the District to collaborate with other agencies on water use efficiency measures, grants, and statewide / local issues.

Partnerships

The District has developed numerous partnerships over the years to help maximize implementation of its WUE Program. Partnerships provide financial, expanded outreach, and program administration benefits and include coordination with water agencies, cities, schools, and other organizations. The District continuously seeks additional partnership opportunities. The District's current partnerships are summarized below; additional information about the measures associated with these partnerships is provided with the measure description later in the section.

Local Cities: The District coordinates with Fremont, Newark, and Union City on several measures as well as customer outreach. The District works closely with each service area city to ensure that its WUE Program is consistent with city ordinances and policies. Recently, the District coordinated with the City of Fremont to provide incentives to replace inefficient toilets at City-owned facilities and community centers and to upgrade the irrigation controllers at several City Parks. These efforts were in support of a comprehensive energy and water savings retrofit program by the City of Fremont. The District continues to look for ways to partner with all cities. Long-established relationships with service area cities help mobilize customers to conserve in times of drought or water shortages.

Local School Districts and Community Colleges: The District works closely with the local school districts and community colleges to promote water use efficiency at their facilities. In the past, the District conducted several water use efficiency surveys, provided water use efficiency recommendations, and provided incentives for urinals and turf removal projects at local school districts and community colleges. Recently, the District provided a free landscape water audit to the California School for the Blind and the California School for the Deaf and provided site managers a report with several water use efficiency improvements they could make to their campuses.

Union Sanitary District (USD): From 2002-2018, the District partnered with USD on several cost-share measures including residential and commercial high-efficiency clothes washer rebates and high-efficiency toilet rebates. The District and USD worked closely for years collaborating on promotional materials, outreach, and rebates to encourage water use efficiency. In 2018, USD ended all cost-sharing partnerships because of the unintended consequences of reduced water flows on sanitation systems during the most recent drought. The District benefited greatly from cost-sharing with USD and remains in coordination on other aspects of District business. Measures continued without cost-share.

Bay Area Water Supply and Conservation Agency (BAWSCA): The District is a member of BAWSCA and participates in several BAWSCA programs including residential landscape classes, the large landscape water use budget program, and rebates for rain barrels and smart sprinkler controllers.

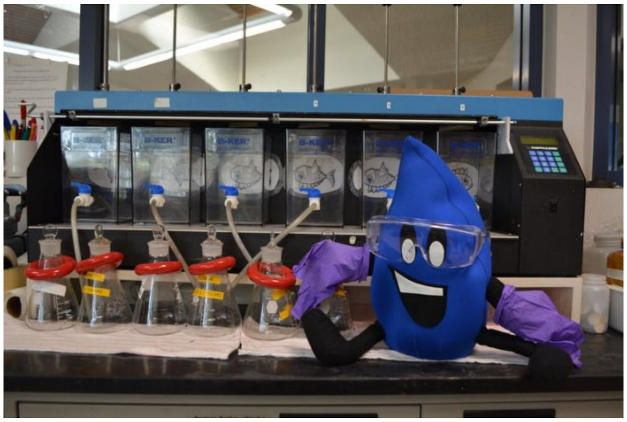
California Water Efficiency Partnership (CalWEP): CalWEP, formerly known as the California Urban Water Conservation Council (CUWCC), is a statewide water use efficiency collaboration network. The District was a founding member of the CUWCC and is now a member of CalWEP. CalWEP provides support, resources, and tools to support water agencies with their water use efficiency efforts. CalWEP also serves as the Professional Certifying Organization (PCO) for the Bay Area Qualified Water Efficient Landscaper (QWEL) Partnership trainings for the District and partnering agencies.

California Youth Energy Services (CYES): For over ten years, the District partnered with the California Youth Energy Services to implement a residential water and energy use survey program, which combines green job training and energy and water savings assistance to the community. In recent years the CYES partnership structure has changed, altering the District's role from funder to promotional partner.

StopWaste/ReScape: The District partners with Alameda County Waste Management Authorities' StopWaste Program and ReScape, formerly known as the Bay-Friendly Coalition, on resource-efficient landscape contractor qualification trainings and co-promotion of turf removal measures. StopWaste has also provided support to service area cities and staff training on complying with the Model Water Efficient Landscape Ordinance (MWELO). The District's Water-Efficient Landscape Demonstration Garden is a Bay-Friendly (now ReScape) certified garden, a designation given to gardens that employ eight gardening principles, which include: landscape locally, landscape for less to the landfill, nurture the soil, conserve water and energy, protect water and air quality, sequester carbon, and create wildlife habitat. The Demonstration Garden was updated between 2013-2016 and received a grant from Bay-Friendly (now ReScape) for that project. It has been a lecture stop on tours of Bay Area gardens that meet and exceed the eight gardening principles standards. The District has also signed a pledge to employ these principles for all landscape areas at District owned facilities. The District continues to collaborate with StopWaste/ReScape on public outreach campaigns to educate customers about environmentally sound landscaping practices, including water efficient landscaping.

Alameda County Green Business Program: The District works with businesses who want to be certified as a green business through the Alameda County's Green Business Program. The District uses this as an opportunity to conduct water use efficiency surveys for businesses. The Green Business Program educates businesses on water use efficiency and other resource management techniques.

Environmental Protection Agency (EPA) WaterSense Program Partner: The District supports WaterSense by choosing WaterSense labeled products as an eligibility requirement for water use efficiency device rebates. Each year the District reports activity to WaterSense and participates in Fix a Leak Week and other EPA WaterSense promotional outreach campaigns. In 2018, the District hosted Flo, the WaterSense Water Savings Superhero, at the District's "A Day Without Water" event and tour of the Newark Desalination Facility.



AmeriCorps Civic Spark Program: The District partnered with the Local Government Commission for the AmeriCorps Civic Spark Program during the 2017-2018 and 2018-2019 service years. The Civic Spark Program aims to serve local governments as they address community resilience needs in climate related fields, while providing career development for participating fellows. The District hosted two fellows during each service year. Fellows worked to build WUE Program capacity and prepare the District to meet new urban water use objectives set by the state.

Local Ecology & Agriculture Fremont (LEAF): LEAF is a public community garden and an educational center for regenerative agriculture practices and sustainable living for Tri-City residents. The District works with LEAF to co-host workshops (e.g., rainwater harvesting) and co-promote programs. In 2019, the District's Civic Spark Fellows hosted a volunteer event at LEAF's Stone Garden. The Fellows gathered cardboard from local businesses and shops to sheet mulch a large portion of the property to improve soil health.

7.5 DEMAND MANAGEMENT MEASURE DESCRIPTIONS

Water Code Section 10631 (e) requires a water supplier to provide a description, within their Urban Water Management Plan, of each demand management measure implemented over the past five years. Measure categories in Table 7-1 are pursuant to Water Code Section 10631 (B) and UWMP Guidebook Section 9.2.

Table 7-1
Summary of District Water Use Efficiency Measures

Measure	District Summary
Water Waste Prevention	• Water Waste Prevention Ordinance in effect at all times (addressing new development and existing users) (see Appendix D for full ordinance) • Drought Ordinance implemented during water shortage emergencies • Water waste reported from community is followed up with a notification from District staff.
Metering with Commodity Rates	• All accounts are metered, and customers charged by volume of use • Dedicated landscape meters are required per Model Water Efficient Landscape Ordinance (MWELO) requirements. • Dedicated landscape meters are required per Model Water Efficient Landscape Ordinance (MWELO) requirements. • Large Meter Replacement Program based on meter age and size (3” to 8” meters) targeting the replacement of large old meters that may need repair in anticipation of AMI. • Test top 25 revenue meters on annual basis • Small meter bench testing continues and is performed for new shipments of meters • Feasibility study conducted to separate landscape use from mixed use meters • AMI will upgrade all ACWD meters to more accurate and precise meters and AMI portal will increase customer water use awareness.
Retail Conservation Pricing	• Currently using uniform rate structure where revenue from volumetric charge is > 66% of total revenue • Alternative conservation rate structures have been evaluated in the past, but none are currently under evaluation • Will implement a stage (drought) rate structure when necessary, with larger rate adjustments in more severe drought stages • Each customer’s average annual use is compared to the average annual use of other customers within their same lot size group and displayed on bill to entice conservation.
Water Loss Control*	• Participated in the CA-NV American Water Works Association (AWWA) Water Loss Technical Assistance Program in 2016 • The District performs a validated AWWA Water Loss Audit and submits to Department of Water Resources (DWR) annually. Most recent audit can be found in Appendix H. • Water Audit Data Validity score was 60 in most recent audit • Leak Detection and Notification measure • Pilot program is currently in place to proactively detect leaks prior to them surfacing using 50 acoustic hydrant nodes. Nodes are affixed to fire hydrants in a particular area of the distribution system to monitor for leaks. The performance results of the pilot may lead to larger areas of the distribution system being proactively monitored using this technology. • The District received grant funding to conduct a component analysis in 2021-2022 • AMI will result in higher meter accuracy and early leak detection when implemented • District actively pursuing ways to address the distribution water loss standard in development by the State Water Board.
WUE Program Staffing Support	• Water Conservation Supervisor position is staffed • Two Water Conservation Specialists positions are staffed • One to four temporary staff supported the Water Use Efficiency Program between 2015 –2020, until an additional Water Conservation Specialist I was hired in October 2020. • Program staffing was evaluated as part of WEMP
Other: Measures implemented in the last 5 years	• Single Family Residential Smart Sprinkler Controller Instant Rebate • WaterSmart Home Water Use Reports transitioning to AMI • Transitioned Landscape Water Use Reports to online landscape water use budgets with WaterFluence • Qualified Water Efficient Landscaper (QWEL) trainings via BayQWEL • Water Savings Assistance Partnership Program (income qualified) • Revamped the Water-Efficient Landscape Demonstration Garden with Bay-Friendly Grant
WUE Measures and Public Outreach	• Please see narrative descriptions below

*For more information regarding distribution system losses please see Chapter 2 of this plan.

The following section describes the measures that were included in the District's Water Use Efficiency Program for the past five years. The measures are broken out into five categories: residential measures; commercial, industrial, and institutional measures; landscape measures; school education measures; and public outreach measures.

7.6 RESIDENTIAL MEASURES

Residential water use accounts for approximately 65% of total water use in the District's service area. The District has a variety of residential water use efficiency measures that target both indoor and outdoor residential water use. Each measure is initially and continually evaluated for cost-effectiveness. Measures include providing customers with free devices and tools, incentives, education, technical information, and support. A summary of conservation activities to date and over the past five years for each of these measures is listed in section 7.13.

Residential High-Efficiency Clothes Washer Rebates

The District began offering residential customers rebates for high-efficiency clothes washers in 1997. Only the most water and energy efficient clothes washers on the market were eligible for a rebate. The purpose of the measure was both to encourage customers to purchase high-efficiency clothes washers and to encourage manufacturers to develop and market these washers. The District partnered with other water agencies, USD, and Pacific Gas & Electric Company (PG&E) to offer these rebates. When PG&E terminated their incentive, the District reevaluated the measure and determined that it was no longer cost-effective, so the measure was ended in 2016.

Residential Water-efficient Device Distribution

Water Conservation Kits: In 1997, the District initiated an aggressive measure to market and distribute free water efficient devices to residential customers living in pre-1992 homes (i.e., homes built prior to the implementation of laws requiring the use of low flow plumbing fixtures). Free Water Conservation Kits, which include a high-quality low-flow showerhead, kitchen and bathroom faucet aerators, leak detection tablets, flapper valves, efficiency information, and device installation instructions are offered through the District's newsletter, website, flyers, direct mailings, and events. These free water efficient fixtures are also provided to qualifying multi-family complexes. The District also developed a program to market and distribute free Water Conservation Kits to townhouse and condominium owners in the Tri-Cities area. Water Conservation Kits were sent to customers that requested a Fix a Leak Kit during the COVID-19 pandemic. To learn more, please see the Fix a Leak Kit description.

Fix a Leak Kits: The District offers Fix a Leak Kits to residential customers to assist them in finding and fixing leaks in their homes. These free kits include toilet leak detection dye tablets, a toilet flapper, information about how to read their water meter and finding and fixing leaks around the house, and the California Water Efficiency Partnership's Practical Plumbing Handbook. During the COVID-19 pandemic, if customers requested a Fix a Leak Kit, the District instead sent them an email with helpful tips on finding and fixing leaks and mailed them a Water Conservation Kit directly from a fulfillment house to minimize in-person contact.

Single Family and Multi-Family Residential High-Efficiency Toilet Rebate

From 2014 through 2019, the District offered toilet rebates to all residential customers. The measure began during the last statewide drought (2012-2016), which created an immediate need to reduce residential water use. The District determined that replacing the remaining 3.5 (or greater) gallon per flush toilets was cost-effective, especially with State grant funds awarded to the District to support the measure. The measure was administered through BAWSCA, however large-scale multi-family toilet retrofit projects were handled on a case-by-case basis. The large-scale multi-family building toilet retrofit activity increased between 2018-2019 due to the implementation of Senate Bill 407, which required all noncompliant plumbing fixtures in multi-family residential properties to be replaced by January 1, 2019.

Residential Surveys

Multi-Family Residential Water Use Efficiency Surveys: The District offers a multi-family residential survey measure where staff conduct onsite reviews of water use practices and fixtures, check for leaks, and provide recommendations for improving water use efficiency (both indoor and outdoor). Free water conservation kits and/or individual devices are provided on an as-needed basis. The District also offers surveys through the CYES water and energy audit program (measure described below).

Partnership with California Youth Energy Services: Beginning in 2009, the District partnered with Rising Sun Center for Opportunity through their CYES program to hire youth/students each summer to conduct water and energy audits within its service area. The audits are conducted by youth/students ages 15-22 and offered to residential and multi-family residential customers. During each audit, the auditors collect water and energy consumption information and provide residents with tips and tools for improving water use efficiency. Efficient devices, including showerheads, bathroom sink aerators, and kitchen sink aerators were installed, when needed. The program has since expanded throughout East Bay area, but CYES still serves the District's service area customers each summer.

Water Savings Assistance Partnership Program (Income Qualified)

In FY 2013/14 and FY 2014/15, the District implemented a limited-term Water Savings Assistance Program for income qualified homeowners. The measure was limited in scope as it targeted homeowners and was not available to renters or multi-family customers. The program provided valuable information to inform an expanded pilot program launched in FY 2019/20. The Water Savings Assistance Partnership Program provides income-qualified residents with water use surveys, water conservation education, leak checks, water device installations, and toilet retrofits, in addition to the energy saving measures being installed as part of the PG&E's Energy Savings Assistance (ESA) Program. All services are provided at no cost to the customer. Services are performed by Richard Heath and Associates Inc. (RHA), the ESA Program Administrator. The District will continue this measure in FY 2020/21.

Residential High Water Use Notification

WaterSmart Home Water Use Reports: In 2014, the District began offering WaterSmart Home Water Use Reports. Through this measure, every residential customer received an initial home water use report evaluating their water use compared to homes with similar characteristics (household size and irrigable landscape area). After the initial report, any District customer could elect to continue to receive these reports, whereas the top ten percent of water users within each cohort (similar household size and lot size) were automatically opted in to continue to receive these reports. Customers had the option to receive reports via mail or email. A web portal provided information about their water use and customized recommendations for reducing water use. In 2015, the District expanded the measure to reach the top twenty percent of water users within each cohort. This measure was very effective during the last drought but was discontinued in FY 2016/17. From 2004-2010, prior to the WaterSmart Home Water Use Reports, the District implemented the Single Family Residential High Water Use Notification Program measure, which targeted the top two percent of water users or about 1,000 customers. Customers in the top two percent for water consumption for their lot size were sent high water use alert letters. When implemented, AMI and the AMI customer portal will provide many of the same benefits of both the WaterSmart Home Water Use Reports and Single Family Residential High Water Use Notifications.

Residential Leak Detection and Notification

Leak detection is an on-going component of the District's typical bi-monthly meter reading program. If abnormally high water consumption is detected during a meter reading event, the customer is notified via a door hanger or in person. Meter readers carry leak detection dye tablets, which are provided to the customers that are home, along with instructions for identifying leaks. For billing purposes, the meter reader enters a leak report code indicating that the abnormal read may be the result of a leak at the residence. During the COVID-19 pandemic, the District prioritized the safety of its customers and employees. Meter readers did not leave door hangers at customer doors. Instead, if a leak is suspected, customers are contacted via phone, email, or mail. When implemented, AMI and the AMI portal will provide better leak detection tools for both customers and the District.

Residential Seasonal Landscape Irrigation Reminders

Residential landscape irrigation represents one of the single largest uses of water in the District's service area and thus, is an opportunity for one of the largest sources of water savings through improved efficiency. In 1998, the District implemented a measure to provide residential customers with landscape irrigation guidelines. As part of this measure, the District provides seasonal notices through postcards, newsletters, and/or the web site for adjusting irrigation schedules depending on the season. These seasonal notices are provided in the fall (to indicate that watering times should be reduced by 50% compared to the summer schedule), in the winter (to indicate that sprinkler systems should be turned off), and in the spring (to provide maintenance and efficient watering tips). Landscape workshops and the District's participation in the EPA WaterSense "Sprinkler Spruce Up" campaign are all coordinated around seasonal irrigation adjustments and provide additional reminders for customers.

Residential Landscape Workshops, Landscape Events, and Garden Tours

The District regularly hosts and co-hosts residential landscape workshops/classes and supports garden tours in its service area. A spring and fall workshop series, of two classes each season, is offered through a partnership with BAWSCA. Topics have included efficient irrigation, water efficient design elements, rainwater harvesting, low water use plants, and lawn alternatives. The District also partners with groups that coordinate tours of gardens that showcase water efficient gardening practices, such as the "Bringing Back the Natives" garden tour, which features gardening with native plants that are adapted to the climate and require less water. The District updated its Water-Efficient Landscape Demonstration Garden, which is located at District Headquarters, between 2013-2016. The garden serves as an education tool to showcase what residential and commercial customers can do with their landscape to reduce water use. The District has also co-hosted with StopWaste, "Lawn to Garden" parties where a District customer elects to convert their lawn to a water efficient garden with the help of friends and neighbors, while also providing an opportunity for their neighbors to learn how to do a project themselves. Many of these events were put on hold due to the COVID-19 pandemic, but the landscape workshops and "Bringing Back the Natives" garden tour transitioned to online platforms. Participation in these events increased when they transitioned online so some online classes will likely continue after the pandemic. Video recordings of the landscape workshops hosted via Zoom have been uploaded to YouTube, providing an accessible learning repository for customers.

"Water-Wise Gardening in the Bay Area" Online Tool (www.bayareagardening.org)

In partnership with BAWSCA and other water agencies, the District helped develop an online tool containing images of gardens around the Bay Area that employ water efficient landscaping techniques. It includes a searchable plant database and information about gardening techniques, irrigation scheduling and maintenance.

Residential Rain Barrel Rebates

In 2014, the District began offering rebates for rain barrels to all customers. Rain barrels reduce potable water use by storing rainwater during a storm that can be used for irrigation during dry periods. Rain barrels can also help moderate flooding during storm events and reduce urban runoff. Customers can purchase any rain barrel, and the District will issue a rebate if its capacity is 50 gallons or more and it is installed properly. This measure is administered, in part, by BAWSCA.

Residential Water-Efficient Landscape Rebates (Turf Removal)

The District launched its turf removal incentive measure in early 2011. The purpose of the measure is to reduce outdoor water use and demonstrate that climate appropriate landscapes can be beautiful and more attractive that non-native lawns. Significant water savings can be achieved by replacing large non-functional turf areas with low water use plants. In addition, these savings reduce peak summer water demand. Customers renovating non-functional turf areas receive a rebate based on the square footage of turf removed and replaced with low water use plants and pervious landscaping material. The rebate is available to all customers with landscaped areas that include lawn. The single-family residential measure was briefly put-on hold when the state offered its own rebate but has since restarted.

Single Family Residential Smart Sprinkler Controller Instant Rebates

This measure provides residential customers an instant rebate when purchasing a smart irrigation controller manufactured by Rachio Inc. The controller uses local or onsite weather information to determine an appropriate irrigation schedule. The District began this measure in April 2020. Since the measure launched, hundreds of customers in the District's service area have taken advantage of the instant rebate and are now managing their landscape water use efficiently. This measure is administered, in part, by BAWSCA.

7.7 COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL MEASURES

A significant part of the District's water use efficiency effort is directed at the business community. Commercial, Industrial, and Institutional (Commercial) customers present important opportunities for water use efficiency measures. The District's commercial customers account for approximately 22% of total water use in the service area. Commercial measures include incentives for installing water efficient fixtures and landscaping, as well as water use efficiency surveys. See section 7.13 for measure activity numbers.

Commercial water use monitoring and efficiency, especially for commercial customers with dedicated meters, is a high priority for the District, and will continue to be under new state Water Use Objectives and performance measures. Measures that encourage water use efficiency improvements both indoor and outdoor from these customers are listed in this section.

Commercial Water Use Efficiency Surveys and Green Business Certification

The District's commercial survey measure is tailored to meet the specific needs of our customers. The survey measure targets hotels, restaurants, and other commercial, industrial, and institutional facilities with high indoor water use (e.g., restrooms, laundry, food preparation/clean up, cooling systems, water purification systems, and other industrial processes). Some surveys are coordinated through a partnership with the Alameda County Green Business Certification program. Most surveys are conducted by in-house water use efficiency staff, while larger commercial and industrial surveys have been conducted by consultants. On-site surveys include a comprehensive review of existing water use, identification of areas for improvement, and water use efficiency recommendations provided to the customer. These recommendations include an analysis of potential water and cost savings, as well as a payback analysis. Free water efficient devices and follow-up assistance are offered to participating commercial customers. District staff developed a process that enabled the District to continue offering commercial water use efficiency surveys virtually during the COVID-19 pandemic.

The District participated in a pilot water use efficiency survey measure with BAWSCA in 2019. Several hotels in the District's service area were contacted and asked to fill out an online self-audit form. Hotels that participated received tailored advice for increasing water use efficiency at their site. Participating hotels were featured on the District's website in May 2019 for Water Awareness Month, when the District recognizes water-efficient focused businesses in the service area.

Commercial High Efficiency Toilet (HET) and Urinal (HEU) Rebates and Waterless Urinal Installation at Local Schools

Since 2000, the District has provided rebates to commercial customers that replace high use non-efficient toilets and urinals with efficient toilets and urinals (including waterless). The purpose of this measure is to maximize water savings by targeting District commercial customers, such as restaurants and gas stations, that have high water savings potential when their older, non-efficient toilets are replaced with efficient models. The current measure requires the installation of WaterSense labeled ultra-high efficient toilets that have been Maximum Performance (MaP) Premium certified, ensuring the replacement toilets are validated by a third-party for performance and water savings. The rebate is marketed through the commercial water use efficiency survey measure, the Green Business Certification, and other commercial measures. USD provided cost-share for this measure until 2019. In FY 2016/17, as part of a citywide water and energy savings project, the District provided a rebate for over 30 toilet and 50 urinal replacements that were eligible at City of Fremont facilities and community centers.

In 2008-2009, the District partnered with local school districts to replace urinals with waterless urinals throughout school facilities. Rebates were provided in partnership with USD for over 36 schools and facilities. The District continues to partner with schools to identify opportunities to upgrade urinals and other water using fixtures and devices.

Commercial High Efficiency Clothes Washer Rebates

For over 20 years, the District has offered rebates for qualifying high efficiency commercial clothes washing machines. Participants include laundromats and apartment complexes with on-site laundry facilities. Efficient clothes washers save both water and energy.

Spray and Rinse Valve Installation

The District participated in a statewide grant program that partnered with water agencies and their energy providers (i.e. Pacific Gas & Electric Company) to install water and energy efficient spray valve nozzles in service area restaurants. These spray valves were installed at no cost to the restaurants. This measure was co-funded by the California Public Utilities Commission and local water agencies.

Commercial Custom Water and Energy Efficient Equipment Incentives

The District has partnered with Pacific Gas & Electric Company to provide customized incentives for businesses and organizations to upgrade inefficient equipment with water and energy efficient equipment, such as dishwashing systems, ozone laundry systems, connectionless food steamers, etc. Incentives are based on estimated water savings. Sites must be pre-qualified through the commercial water use efficiency survey measure. This measure can be customized based on the unique needs of a business.

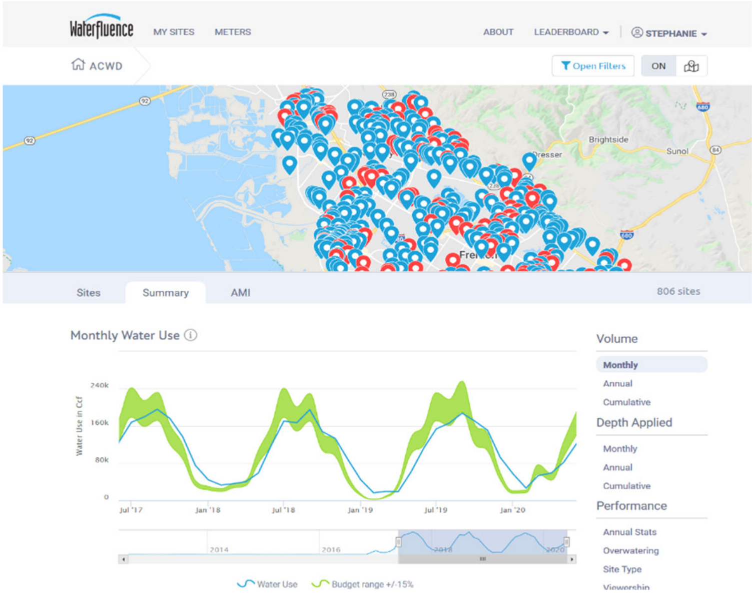
7.8 LANDSCAPE MEASURES

Landscape water use accounts for over 30%[2] of the total water use in the District's service area. The District has developed measures including incentives, landscape budgets, and surveys that promote efficient landscape water use, as recommended in the 1995 Integrated Resource Plan and now the WEMP. See section 7.13 for measure activity numbers.

Measures that address residential landscape water use will help the District achieve the efficient outdoor residential water use standard that will be used to calculate new State mandated Water Use Objectives.

Dedicated Landscape Partnership (DLP)

The District has over 2,540 dedicated landscape (DL) or irrigation accounts at multi-family, commercial, industrial, and institutional sites. Water use at sites with dedicated landscape meters make up 13% of total water use in the District's service area. All service area cities implement the Model Water Efficient Landscape Ordinance (MWELO) thereby requiring DL meters be installed at certain thresholds. To ensure that these sites are irrigated efficiently, the District initiated a water budget and survey measure in 1999.



<u>Landscape Water Use Reports</u>: In 1999, the District ranked customers with DL accounts according to water use. Accounts with the highest consumption were offered a free landscape survey to determine landscaped areas (turf and non-turf). Information from these surveys was entered into an application that created individual reports comparing actual water use with calculated landscape water needs at each site. In 2011-2012, the District further expanded the measure to include all DL accounts with consumption. Several interns were hired to digitize landscape areas in GIS for all the additional sites. Reports were issued annually to customers and their landscape contractors. Starting in 2017, AmeriCorps Civic Spark fellows updated the landscape area measurements in GIS. Identifying the landscape area served by DL accounts will be important for compliance with future state Water Use Objectives. In early 2020, the District piloted an existing online

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[2] Based on the assumption that indoor use is approximately equal to the minimum use in the winter in CY 2019.

service, through BAWSCA, called WaterFluence. This is a new online version of what the District has provided in the past through hard copy mailed reports. The new online report compares actual irrigation water use to a budget benchmark based on site-specific characteristics and real-time weather. The online platform offers a new budget every billing cycle and landscape maps with customizable areas. Through this measure, the District can quantify landscape area measurements for DL customers and track when sites are over/under their unique water budget. WaterFluence is compatible with AMI for real-time landscape irrigation budgets and water management. Over 800 landscape sites are in WaterFluence. The 500 largest sites with the highest water use can be viewed by customers and their landscape contractors, and the remaining 300 sites can be monitored by the District. Ongoing efforts to support this program include identifying the landscape contractors associated with a site and reviewing, identifying, and updating the landscape area measurements at sites served by DL meters. This measure will benefit from near real-time AMI data and the District may expand it to more sites in the future.

City Park Landscape Water Use Reports: Since 2001/2002, the District has used GIS to identify turf and non-turf areas and match parcels to meter numbers for large municipal parks in the service area. The District provides park landscape water use budget reports for the cities of Fremont, Newark, and Union City.

Landscape Conservation Business of the Year Awards: The District recognizes those Dedicated Landscape Partners that remain within their annual water budget through a “Water Conservation Business of the Year” awards measure. These recipients are recognized for their achievements every May, during the District’s outreach efforts for Water Awareness Month.

Landscape Audits: Through the landscape water use reports and water budget measure, sites that are consistently over budget are identified and offered onsite landscape water use efficiency surveys. Surveys include an evaluation of current and past usage, a review of landscape area measurements, a walkthrough of the irrigation system to identify maintenance issues and inefficiencies, and an assessment of landscape characteristics. Findings and recommendations are provided at the end of the survey, followed by a report that summarizes this information. Recommendations may include participation in the District’s other landscape measures, such the “smart” irrigation controller measure or the turf removal measure. Some surveys are conducted by in-house staff, but the District hires a consultant to conduct audits for larger sites with complex irrigation systems. In person landscape audits were put on hold during the COVID-19 pandemic, but sites could get on a waitlist for a survey when it was considered safe to continue these.

Workshops, Trainings, and Certifications for Landscape Contractors

The District partners with various organizations, including BAWSCA, ReScape, CalWEP, irrigation supply manufacturers/distributors, and other interested parties to provide landscape water use efficiency training geared toward landscape contractors. In 2020, the District partnered with 10 other Bay Area water agencies and CalWEP to begin offering Bay Area Qualified Water Efficient Landscaper (BayQWEL) trainings. BayQWEL provides education on water efficient and sustainable landscape practices, including water management and irrigation scheduling. QWEL is an EPA WaterSense labeled Professional Certification Program for irrigation system audits. The District hosted its first course in March 2020. Unfortunately, the District cancelled the two remaining in-person BayQWEL trainings to protect participants from the spread of COVID-19. Since then, CalWEP has transitioned the training and certification to an online platform. Participants that were impacted by the District's QWEL training cancellation received priority in signing up for virtual classes to ensure they could continue pursuing certification. The virtual trainings have received positive feedback and may be continued.

Water Efficient Landscape Rebates (Turf Removal)

As described under the Residential Measures section, the District provides rebates to single-family residential, multi-family residential, and commercial customers for removing turf. The rebate is based on the square footage of turf removed and replaced with low water use landscaping.

Weather-Based Irrigation Controller Rebates

The District provides rebates to large landscape customers who install weather-based irrigation controllers, also known as "Smart Controllers." Smart Controllers use weather data and site information to automatically adjust irrigation scheduling and are effective tools for reducing landscape water use. More efficient watering means less waste, reduced run-off, and healthier plants. The District began this measure in 2010. Measure implementation was modeled after a pilot offered to all customers as part of a statewide grant funded program. During the COVID-19 pandemic, this measure successfully transitioned to a streamlined virtual rebate verification process.

California Irrigation Management Information System (CIMIS)

CIMIS, operational since 1982, is a repository of climate data collected from computerized weather stations located throughout California. CIMIS helps agricultural growers and landscape managers administering parks, golf courses, and other landscapes to develop water budgets for determining when to irrigate and how much water to apply. The primary use of the CIMIS system is to provide information for improving water and energy management through efficient irrigation practices. CIMIS was developed by the California Department of Water Resources and the University of California at Davis. Access to CIMIS is free, and the system operates 24 hours a day, every day of the year, except during maintenance hours. There has been a CIMIS station in the District's service area since 2000. The District, the Department of Water Resources, and Union City joined forces to open a station at Town Estates Park in Union City. Union

City CIMIS Station #171 meets all the conditions needed to provide accurate weather information. This station provides the weather data used in various programs at the District.

7.9 OTHER WATER USE EFFICIENCY MEASURES

Water Waste Reporting and Ordinances

The District has a water waste reporting form on its website where anyone who identifies a water waste situation occurring in the service area can report it. District staff will follow up with a notification to the individual that is reportedly wasting water. In 2008, the District's Board adopted an ordinance that prohibits the wasteful use of water. The District's Ordinance is in place at all times and is only superseded by a more stringent ordinance initiated through a Water Shortage Emergency Declaration. The Ordinance provides a mechanism to enforce against water waste in the District's service area.

Advanced Metering Infrastructure (AMI) (coming soon)

Over the last five years, District staff attended conferences, interviewed other water agencies, and created a business case for AMI implementation. The District approved the AMI project in 2020 and implementation is anticipated to be complete by the end of 2023. With the capability of offering near real-time data, AMI will enable customers to view water usage at any time during the billing cycle and identify leaks through the AMI Customer Portal. The implementation of AMI and the use of the AMI Customer Portal will result in water savings from early leak detection and customer behavior changes from increased water use awareness.

7.10 SCHOOL EDUCATION MEASURES

The District's school education program is a Clair A. Hill award winning program reaching students each year through innovative, hands-on programs, classroom presentations, and assemblies. It was established prior to 1991 and has been used as a model by other water agencies. The school education program includes the following:

School Assembly Program: During the school year, the District sponsored a water use efficiency school assembly program for schools in its service area. The District contracts with ZunZun, a third-party vendor, to provide the water education school assembly program. The program stresses the various facets of water use efficiency through the use of music, storytelling, and drama and is appropriate for kindergarten through 6th grade. In response to school closures due to the COVID-19 pandemic, the school assembly program was modified in April 2020 and quickly transitioned from on-site, in-person assemblies to online distance learning. The program was delivered to teachers and their classrooms using asynchronous and synchronous platforms. The third-party vendor offered their online distance learning options to teachers in schools by informing them that assemblies were available via live streamed performances or pre-recorded videos using video conferencing platforms (Zoom and Google). The assemblies were available to be conducted online and support viewership by an entire school or a singular classroom. In addition, water science kits were created featuring hands-on materials to reinforce water education, containing a packet of poppy seeds, worksheets and school supplies. The kits were made available to schools and distributed at the request of teachers. In addition, the District promoted its water education programming to the general public by offering a monthly online live water themed music and movement session “Wednesday Water Workouts” featuring ZunZun.


WaterClips Student Video Contest: During the 2019-2020 school year, the District launched a video contest for Tri-City students in grades 6-12 to creatively engage them in addressing water issues. Student entries consisted of 30 second videos focused on one of three water related themes: A Day Without Water, The Value of Water, or Say Goodbye to Single Use Water Bottles and Drink Tap Water. Students competed as an individual entry or as a team, for prizes of up to $500, in two separate groups: grades 6-8 and 9-12. The District hosted an awards ceremony for students, teachers, and their families and gave scholarships to both groups of students placing first, second, or third, as ranked by a panel of prominent community members serving as judges. Teachers were also given classroom scholarships for sponsoring winning student videos in both groups. The winning student videos were shown on the District's website, YouTube channel, and social media pages, as well as public service announcements on a local television station.

Groundwater Awareness Week: During the 2016 to 2019 school years in March, the District contacted area high schools to schedule in-classroom presentations, featuring an interactive groundwater model. A District staff person conducted the presentation and operated a tabletop groundwater model to demonstrate to students the flow, properties, and distribution of groundwater. Students learned about the Niles Cone Groundwater Basin, its vital role in meeting the water supply needs of the Tri-City area, protection and conservation of this drinking water source, and the extensive monitoring program to mitigate saltwater intrusion into the basin. District staff also explained how the Alameda Creek watershed is used to recharge the aquifers of the Niles Cone Groundwater Basin. The groundwater model demonstrated the extraction of water from the basin by simulating the pumping of wells to illustrate production capability.


Water Awareness Month: Each year in May, the District has served as a sponsor of the Alameda County Science and Engineering Fair and hosted the fair's "Excellence in Water Research" winners. Students in 6th through 12th grades conduct original hands-on research and compete for local recognition, plus the opportunity to move on to the Intel International Science and Engineering Fair. Sponsored by water and wastewater agencies in the East Bay, the award recognizes outstanding student projects related to water, wastewater, or recycled water. Scientists and engineers judge the projects, giving students the chance to meet and talk with working professionals in the water industry. Winners and their teachers received cash awards and recognition at the fair and in their local community.

Distance Learning Educational Resources: In April 2020, the District implemented a distance learning educational resource page on its website featuring lessons, materials and tools educators and parents could access online, to teach students about water. The educational resources were generated and created internally by District staff, partnering agencies, and other water focused entities. Lessons are formatted in videos and PDFs that can be easily shared with students.

Educational Resource Materials: The District provides resource materials for teachers to use in teaching about water supply and water use efficiency. These materials include workbooks, lesson plans, curriculum guides, brochures, pamphlets, videos, posters, maps, games, stickers, pencils, rulers, and magnets. All materials are provided to schools and teachers upon request. In response to school closures due to the COVID-19 pandemic, the District distributed school supplies and water-efficiency activity sheets to multiple school sites during meal service times. The District created a series of videos "The Water Workshop" for students and teachers to conduct water-themed experiments based on Next Generation Science Standards requirements and water concepts.

Tours: The District offers tours of the District's facilities to local schools. These tours include visits to our water treatment and groundwater recharge facilities. All tours are led by District staff. In 2019 - 2020, we hosted tours for students, parents and teachers from the FIRST® LEGO® League. The FIRST LEGO League Challenge is an international competition organized by FIRST for elementary and middle school students. Each year in August, FIRST LEGO League Challenge teams are introduced to a scientific and real-world challenge to focus on. Students toured our facilities to gain a better understanding about water treatment, operations, and distribution for application to their FIRST LEGO League Challenge projects.

Other: Students who participate in District sponsored activities are encouraged to visit our home page (http://www.acwd.org), which includes educational material and water use efficiency material. In addition, the District participates in Water Awareness Month and provides teachers with free water conservation lesson plans developed by the California Water Awareness Campaign. The District also sponsors a mini-grant program for local teachers, conducts free educational workshops (Project WET, etc.), and encourages student groups to meet and consult with water conservation staff on special projects they have for school and/or extra-curricular activities (Girl/Boy scouts, etc.)

7.11 PUBLIC OUTREACH MEASURES

The District's public information program was established prior to 1991. The public information program includes the following:

Demonstration garden: The District maintains a Water-efficient Landscape Demonstration Garden, as already described in this section. The garden has interpretive signage which describes water efficient elements and plants. The garden was renovated in 2013-2016 to provide both residential and commercial customers inspiration for their landscapes, as well as stormwater capture. The District's garden is Bay-friendly (ReScape) certified, a designation given to gardens that employ the eight Bay-friendly Gardening Principles, which include: landscape locally, landscape for less to the landfill, nurture the soil, conserve water and energy, protect water and air quality, sequester carbon, and create wildlife habitat. The District's garden has been a stop on tours of Bay Area gardens that meet and/or exceed Bay-Friendly Gardening standards, which include water use efficiency. During tours, staff discusses water use efficiency, District programs, and the use of climate appropriate plants with visitors. The District has also assisted Union City with the development of a demonstration garden at their City offices, provided a grant to help establish a water efficient landscape at Ohlone College's "Green" Newark Campus, and assisted East Bay Regional Park District with an installation of a water efficient garden at Quarry Lakes.

The Aqueduct Newsletter: The District's newsletter is mailed to every physical address in Fremont, Newark, and Union City up to three times per year. The newsletter includes information about water use efficiency, the water supply outlook, statewide regulations, leak detection, water quality, water rates, and other District related information. Water use efficiency messaging is also included on District bills.

New Customer Packet: All new District customers receive a packet that includes information on water use efficiency and leak detection.

Brochures: The District has a wide variety of water use efficiency brochures on topics such as leak detection, water efficient devices and measures, irrigation guidelines, and water efficient landscaping.

Previous Use Shown on Bill: The customer's consumption from the previous year is provided on all customer billing statements for comparison to their current use, and each customer's average annual use is compared to the average annual use of other customers within their same lot size group.

Community Events: The District celebrated Imagine a Day Without Water in 2016 and 2018 with events open to the public. In 2016, nearly 100 people participated in an all-day event featuring guided tours of our Water Treatment Plant II and its operation. In 2018, the District held an open house and tours of the Newark Desalination Facility with nearly 600 people in attendance. In addition, during 2015, 2017, and 2019, the District participated in the Niles Canyon Stroll & Roll as an event sponsor and hosted a booth featuring a water conservation themed photo station, information, and giveaways. Event attendance for each year of this event is 10,000 people. In 2020, public health orders placed mandatory restrictions on public gatherings due to the COVID-19 pandemic. The District responded to restrictions by modifying its annual in-person public outreach event. Revising its approach to in-person events, instead, the District hosted a virtual tour of its nearly completed $78 million fish passage project. More than 700 attendees viewed the online tour to learn about the project's construction, collaboration with other agency partners and environmental stewardship and impact.

Internet Home Page: The District maintains a home page on the Internet (http://www.acwd.org) with links to various information including, water use efficiency rebates, water saving kits, leak detection, water efficient landscaping, and a form for reporting water waste.

Social Media: The District utilizes social media to regularly inform the public about a variety of District topics, including: water use efficiency tips, water quality, groundwater, water supply reliability, infrastructure improvements, main cleaning, rates, and District meeting and workshop dates.

The District currently offers over 35 water use efficiency measures, with something for every customer, ranging from residential kits to public outreach and events. Analyzing and quantifying the impacts of these measures assist the District in determining ways to reduce demand and mitigate water shortage conditions in the Water Shortage Contingency Plan.

The WEMP examines the feasibility of expanding water use efficiency measures to assist the District with water resource planning, demand management, and meeting new State Water Use Objectives. New measures planned for implementation in the next five years, as determined by WEMP modeling are:

1. Fixture Retrofit on Resale or Water Account Change
2. Residential Outdoor Water Surveys
3. Leak Repair & Plumbing Emergency Assistance
4. Advanced Metering Infrastructure (Portal)

These new measures along with modifications to existing measures (adding new technology, expanding eligibility, and increasing targets) will ensure the District is able to meet future customer demands and new urban Water Use Objectives determined by the State.

7.12 CONSERVATION ACCOMPLISHMENTS AND FUTURE PLANS

The District has successfully worked with other water agencies on large scale water use efficiency programs and has actively pursued grant opportunities. Approximately $2.7 million in grant funding has been awarded to the District for water use efficiency programs since 2001. In the last five years, the District has leveraged partnerships with BAWSCA, CalWEP, and PG&E to successfully launch a Smart Sprinkler Controller Instant Rebate, online landscape water use budgets, QWEL trainings, and the Water Savings Assistance Partnership Program, respectively. The District continues to seek out additional opportunities to expand partnerships and obtain more funding and/or cost-share funding to support the Water Use Efficiency Program.

In 2010, the District received the Clair A. Hill Award for excellence in water management and innovation from the Association of California Water Agencies. In 2015, the District received the Silicon Valley Water Conservation Award under the Water Utility category for its income qualified Water Savings Assistance Program.

District water use efficiency staff will continue to identify and utilize new technologies to maximize program effectiveness, collaborate with other agencies and learn from shared experiences, and participate in regional and statewide water use efficiency programming initiatives.

7.13 DETAILED WATER USE EFFICIENCY PROGRAM ACTIVITY TABLES

Table 7-2
Residential Measures

Measure/Activity	Activity Numbers/Description
Residential High- Efficiency Clothes Washer Rebate	Washer Rebates Issued: 35,861
Residential Low-Flow Device Distribution	Water Conservation Kits Distributed: 25,071 Leak Detection "Fix a Leak" Kits Distributed: 322
Single Family and Multi-Family Residential High Efficiency Toilet Rebate	Rebates Issued: 4,822
Multi-Family Residential Water Use Efficiency Surveys	Multi-family Units Surveyed: 10,218
Partnership with California Youth Energy Services (CYES)	Single Family and Multi-Family Units Surveyed: 4,453. Note: Multi-family homes served by CYES measure also included in Multi-Family Residential Water Use Efficiency Surveys above
Water Savings Assistance for Income-Qualified Customers	Homes Surveyed: 240 Ultra-High Efficiency Toilets (UHET) Installed: 280 Shower Heads Installed: 329 Faucet Aerators Installed: 523 Toilet Repairs:177
Residential High Water Use Notification	WaterSmart Home Water Use Reports: Measure targeted the top 20% of water users or about 19,000 customers annually. This measure was in effect from 2014-17. Single Family High Water Use Notices: Measure targeted the top 2% of water users or about 1,000 customers. This measure was in effect from 2004 through 2010.
Residential Leak Detection and Notification	Leak Notices (door hangers left by meter readers): ~880 per year
Residential Seasonal Irrigation Reminder	Irrigation reminders are sent on a seasonal basis to single-family residential customers to update them on current landscape irrigation requirements. Reminders are sent via postcards, social media, and/or bill messages each year since 1998.
Residential Landscape Workshops, Landscape Events, and Garden Tours	Partner with Bay Area Water Supply and Conservation Agency (BAWSCA) and Bay-Friendly Gardening to provide workshops to residential customers on efficient water use in the landscape throughout the spring and fall. Topics include efficient irrigation, water efficient design elements, low water use plants, rainwater harvesting, and lawn alternatives. In the past ten years 40 workshops were held and were attended by 1,405 people. In 2020, some landscape events and workshops were offered virtually. In addition, the District sponsors and promotes local garden tours including the Bringing Back the Natives Garden Tour. The District participates in local landscaping events including StopWaste sheet mulching parties and garden supply store vendor events. The District updated its Water-Efficient Landscape Demonstration Garden between 2013-2016, which is located at District Headquarters. The garden serves as an education tool to showcase what residential and commercial customers can do with their landscape to be more efficient.
"Water-Wise Gardening in the Bay Area" Online Tool	District referred customers to this web tool as a resource for water efficient landscaping projects.
Residential Rain Barrel Rebate	Rebates Issued: 285
Single -Family Residential Water Efficient Landscape Rebate (Turf Removal)	Square Feet of Turf Removed: 364,663 Sites: 327
Single -Family Residential Smart Sprinkler Controller Instant Rebate	Incentives Redeemed: 93

Table 7-3
Commercial, Industrial, and Institutional Measures

Measure/Activity	Activity Numbers/Description
Commercial Water Use Efficiency Survey and Green Business Certification	Surveys Conducted: 731
Commercial High Efficiency Toilet (HET) and Urinal (HEU) Rebate and Waterless Urinal Installation at Local Schools	HET/HEU Rebates Issued: 791
Commercial High Efficiency Clothes Washer Rebate	Rebates Issued: over 300
Spray and Rinse Valve Installation	Spray Valves Installed: over 570
Commercial Custom Water and Energy Efficient Equipment Incentives	Incentives Offered: 1

Table 7-4
Large Landscape Measures

Measure/Activity	Activity Numbers/Description
Landscape Water Use Reports	There are currently over 800 sites (representing approximately 1600 accounts) receiving reports which represents the majority of dedicated landscape water consumption. 500+ sites receive full access to an online water budget report tool, WaterFluence, that compares the site's water use to a customized water budget each billing cycle. 300 additional sites are monitored by the District. The District has been providing these reports to customers for over 20 years.
City Parks Landscape Water Use Reports	City parks in Fremont (44), Newark (12), and Union City (35) are included in the measure for a total of 91 parks. Reports are provided annually.
Landscape Conservation Business of the Year Awards	Awards provided to customers who met their landscape water use budgets. In 2020, 323 sites were eligible to receive the award.
Landscape Audits	Audits Completed:198
Workshops, Trainings, and Certifications for Landscape Contractors	Partner with Bay-Friendly, BAWSCA, Irrigation supply manufacturers/distributors, Bay Area Qualified Water Efficient Landscaper (QWEL) via California Water Efficiency Partnership (CalWEP), and other interested organizations to provide landscape water use efficiency training and certification programs in the service area and region.
Water Efficient Landscape Rebate (Commercial, Industrial, and Institutional and Multi-Family Customers)	Square Feet of Turf Removed: 440,524 Sites: 41
Weather-Based Irrigation Controller Rebate	Controllers Installed: 229
California Irrigation Management Information System (CIMIS)	Partner with DWR and Union City to host a CIMIS station at a park in Union City. The station provides climate data that is used for measures such as the landscape water budget measure. The District maintains the station on a monthly basis.

Table 7-5
Public Information and School Measures

Measure/Activity	Activity Numbers/Description
School Education	Measures that educate students in the service area to better equip them for understanding and practicing water use efficiency techniques. Measure includes assembly programs, student video contests, free online educational resources, classroom giveaways, facility tours, and special activities. The District sponsored assembly programs reaches approximately 16,000 students annually.
Avenues for Public Outreach	District website, Aqueduct newsletter, social media, bill messages, postcards, brochures, mailings, email blasts, community newsletters, newspaper advertisements, press releases, community meetings, and participation at community events.
Customer Service and Conservation Material Distribution	Address customer questions about water conservation in person, via phone or email. Email and/or mail materials and resources to assist customers in achieving water use efficiency goals.
The District's Water Efficient Landscape Demonstration Garden	The District's ReScape (previously Bay-Friendly) rated Water Efficient Landscape Demonstration Garden is a great resource for customers interested in water-efficient gardening techniques. The garden demonstrates both commercial and residential water efficient garden ideas and includes plant labels and educational signage. The garden is also used as a venue for water-efficient landscaping classes.

Table 7-6
Other Water Use Efficiency Activities at the District

Measure/Activity	Activity Numbers/Description
System Leak Detection, Repair, and Water Loss Auditing	Evaluate the distribution system for leaks and make necessary repairs to the system. The District submits a validated water loss audit to the State annually, per the requirements of SB555, to monitor the District’s distribution system water loss and identify system improvements.
Metering and Advanced Metering Infrastructure	All District accounts are metered. The District approved the Advanced Metering Infrastructure (AMI) project in 2020. With the capability of offering near real-time data, AMI will enable customers to view water usage at any time during the billing cycle and monitor use to more quickly identify the possibility of leaks.
Billing	All District accounts are billed based on the amount of water used.
Water Waste Reporting	Water Waste Reports: 2,455 Courtesy Notices: 2,298
State Reporting and Compliance	The District adheres to all state program/activity reporting requirements, such as monthly reporting to the State Water Resource Control Board.
Partnerships	The District maintains strong partnerships with organizations like the Green Business Network, California Urban Water Agencies (CUWA), Local Ecology Agriculture Fremont (LEAF), CalWEP, BAWSCA, StopWaste, and neighboring water agencies through coordination and information sharing.

CHAPTER 8 WATER CONSERVATION BILL OF 2009 (SB X7-7)

The Water Conservation Bill of 2009 (SB X7-7) requires a statewide 20% reduction in urban per capita water use by 2020. It requires that urban water retail suppliers determine baseline water use and set reduction targets according to specified requirements and requires agricultural water suppliers to prepare plans and implement efficient water management practices.

On June 9, 2011, the District held a public hearing to consider and adopt the method for determining the District's water use targets under SB X7-7, including obtaining community input regarding the District's implementation plan and considering the economic impacts, if any, for implementing that plan.

As set out in SB X7-7, the Department of Water Resources (DWR) adopted an alternative "Method 4" for setting targets through a public process. Method 4 was released in October 2010, revised February 2011, and deemed "provisional" until December 31, 2014. It was revisited by the Urban Stakeholder Committee (Committee) established by DWR. The Committee reviewed the existing Method 4 in 2014 and recommended that DWR not make any revisions. Therefore, Method 4 is unchanged since the 2010 UWMP. DWR, in consultation with the California Urban Water Conservation Council (CUWCC), also developed standardized technical methodologies and criteria for calculating per capita water use, baseline use, population and other analytical metrics. DWR also convened a representative Commercial, Industrial and Institutional (CII) Task Force to develop standard metrics and best management practices (BMPs) for CII water use. Their final report was issued to the Legislature on October 21, 2013.

As required under SB X7-7, urban retail water suppliers, including the District, must determine their base per capita water use and develop water use reduction targets using one of four specified methods:

Option 1: 80% of baseline per capita daily water use

Option 2: Sum of specified performance standards

Option 3: 95% of DWR Hydrologic Region target

Option 4: A flexible alternative designed by DWR to adjust for local circumstances

In the 2010 UWMP, which was adopted by the District's Board of Directors on June 9, 2011, the District selected Method 4 for its compliance target. It was determined that between District customers' ongoing and anticipated future efforts to improve water use efficiency, the District would be able to meet both the 2015 and 2020 compliance targets. For the 2015 UWMP, DWR developed new standardized methodologies for calculating both baseline use and the Method 4 target, which the District adopted and used in the 2015 UWMP.

The purpose of this chapter is to document the District's compliance with SB X7-7, including setting baseline water use, target determinations, compliance with the 2015 interim target, and compliance with the 2020 per capita water use targets as outlined in the water use reduction plan.

8.1 BASELINE AND TARGET DETERMINATION

Beginning with the 2010 UWMP, SB X7-7 (CWC §10608.20 (e)) requires each urban retail water supplier to include the following in its UWMP:

- Baseline daily per capita water use —how much water is used within the supplier's distribution system area on a per capita basis. It is determined using water use and population estimates from a defined range of years.

- Urban water use target —the planned daily per capita water use in 2020 within the supplier's distribution system area, taking into account current and planned water conservation practices.
- 2015 Interim urban water use target compliance - verify whether or not the supplier's daily per capita water use in 2015 is in compliance with the interim target, a value halfway between the baseline and 2020 target year.

In 2015 and 2020, each water supplier is required to determine the compliance daily per capita water use to assess progress toward meeting interim and 2020 urban water use targets. Determining and tracking use levels and targets will support the goal of reducing the state's per capita urban water consumption by 20%. This section provides documentation on the District's determination of these numbers and the supporting information that they are based on.

Process Overview

The Water Conservation Bill of 2009 describes the overall process by which a water supplier complies with the requirements. It specifically identifies three methods for establishing an urban water use target and requires DWR to develop a fourth. Additionally, it requires DWR to develop technical methodologies for consistent implementation of the Water Conservation Bill of 2009 requirements. These technical methodologies and the fourth target method were developed in close consultation with the Urban Stakeholders Committee (USC) during spring and summer 2010. Target methods are the four options an urban water supplier has to determine its urban water use target. They are referred to as Target Method 1, Target Method 2, etc. These methods identify specific steps water suppliers will follow to establish targets. Each urban water supplier (or regional alliance) must use one of the four target methods to perform the required calculations. Technical methodologies are procedures and guidance for conducting some of the specific steps identified in the target methods. There are nine technical methodologies. Multiple methodologies may be needed for completion of a target method calculation.

The Water Conservation Bill of 2009 provides flexibility in how an urban water supplier determines the baseline and target numbers for its water service area. It also indicates that water suppliers can cooperatively determine and report progress toward achieving these targets through a regional alliance. A water supplier may determine the targets on a fiscal year or calendar year basis but must clearly state in its UWMP the basis for its reporting.

Although the legislation provides flexibility in how an individual or group of water suppliers approaches baseline and target compliance, it also requires method and methodology consistency over time. Therefore, technical methods and methodologies used by a water supplier to determine use levels and develop targets in 2010 are to be the same as those used in 2015 and 2020. A water supplier may select a different Target Method in its 2015 UWMP, but not in any amended 2015 UWMPs or in the 2020 UWMP. A water supplier has the opportunity to modify its target method during the implementation period, but any changes must be retroactive, as described in Technical Methodology 9: Regional Compliance.

Baseline Periods

Two baseline periods are to be determined during the calculation of the base daily per capita water use. The legislation provides some flexibility as to what actual periods of time are used to establish these baselines. This accounts for short-term water demand variations resulting from weather influences, as well as acknowledging the advances of water suppliers that have already begun using recycled water to reduce potable demands. The two baseline periods are:

- 10- to 15-year base period: This is a 10-year or 15-year continuous period used to calculate baseline per capita water use.

- 5-year base period: This is a continuous 5-year period used to determine whether the 2020 per capita water use target meets the legislation's minimum water use reduction requirements of at least a 5 % reduction per capita water use.

If the urban retail water supplier's base daily per capita water use calculated using the 5-year base period is 100 gallons per capita per day (GPCD) or less, then the urban water supplier is exempt from the 5% minimum required reduction. It must document in subsequent UWMPs in 2015 and 2020 that it has maintained the 100 GPCD compliance level of water use.

Meeting Water Conservation Bill of 2009 Requirements

There are four overall steps a water supplier completes to meet the 2010 UWMP requirements identified in the Water Conservation Bill of 2009:

- Step 1: Determine Base Daily Per Capita Water Use
- Step 2: Determine Urban Water Use Target
- Step 3: Compare Urban Water Use Target to the 5-year Baseline
- Step 4: Determine Interim Urban Water Use Target

Each of these steps and its application to the District service area is described below.

Step 1: Determine Base Daily Per Capita Water Use

Gross Water Use

The Water Conservation Bill of 2009 requires each urban retail water supplier to include in its UWMP an estimate of base daily per capita water use. Base daily per capita water use, measured in GPCD, is established for an initial period of time, which is referred to as the 10- to 15-year base period.

The District delivers water to its customers in two ways. The first is through a conventional potable distribution system. All points of entry to this distribution system are metered (Figure 3-4). The second is through recharge of the local aquifer for extraction by privately-owned groundwater wells. All private wells are individually metered and billed quarterly by District staff in accordance with the District's Replenishment Assessment Act. Gross Water Use is a combination of these two demands and is reflected in Table 8-1.

Estimating Service Area Population

As described in Chapter 1, section 1.5, the District service area encompasses the cities of Fremont, Newark and Union City (Figure 1-1). The District is a Category 1 Water Supplier as defined in Methodology 2 and relies on the 2010 US Census data and California Department of Finance (CA DoF) for population estimates. For the 2015-2020 UWMP, the District recalculated its baseline water demand using the population estimates from the full US Census data that became available in 2011. This recalculated baseline remains the most current estimate, as US Census data through year 2020 is not yet available. These figures are reflected in Table 8-1.

Calculating Base Daily Per Capita Water Use

The District does not currently have a recycled water supply that offsets potable water use; therefore, the base daily per capita water use is simply an average of the annual gross water divided by the estimated population. The District has identified its base daily per capita usage, by the ten-year period between January 1, 1995, and December 31, 2004 (see Table 8-1).

Step 2: Determine Urban Water Use Target

The water supplier has four different methods for determining the urban water use target:

Method 1: 80% of Base Daily Per Capita Water Use

Method 1 is the simplest approach and defines the water use target as 80% of the baseline value, or (0.8 x 170 GPCD) = 136 GPCD.

Table 8-1
District Data for Analysis and Compliance with SB X7-7

Calendar Year	Population Est.	Gross Water Use (Ac-Ft / year)			Annual Daily per Capita Water Use (GPCD)	Base Daily per Capita Water Use (10 yr Average)	Base Daily per Capita Water Use (5 yr Average)
		District Production Facilities	Private Well Pumping	Total Gross Water			
1995	278,200	47,958	4,823	52,781	169		
1996	280,812	52,115	4,501	56,616	180		
1997	286,734	55,797	4,580	60,377	188		
1998	295,661	51,549	3,158	54,707	165		
1999	304,006	54,532	2,845	57,377	168		
2000	312,753	55,727	3,901	59,628	170		
2001	316,401	55,751	2,984	58,735	166		
2002	319,589	55,574	3,540	59,114	165		
2003	319,048	54,204	3,466	57,670	161		
2004	317,523	55,082	3,846	58,928	166	170	
2005	316,780	52,815	3,290	56,105	158	169	
2006	316,304	52,526	2,864	55,390	156	166	
2007	317,739	54,497	2,577	57,074	160	164	160
2008	320,468	54,302	2,081	56,383	157	163	160
2009	323,043	49,018	2,129	51,147	141	160	155
2010	325,741	46,596	1,709	48,305	132	156	149
2011	329,596	46,810	1,764	48,574	132	153	145
2012	333,994	48,140	2,033	50,173	134	150	139
2013	337,400	50,250	1,759	52,009	138	147	135
2014	341,649	40,555	2,106	42,661	111	142	129
2015	345,656	36,519	1,935	38,454	99	136	123
2016	348,113	38,162	1,874	40,036	103	131	117
2017	350,649	40,866	1,671	42,537	108	126	112
2018	352,602	41,954	1,689	43,643	110	121	106
2019	355,229	41,576	1,670	43,246	109	118	106
2020	356,823	44,322	1,569	45,891	115	116	109

Method 2: Performance Standards

Method 2 is the most complex approach and defines the target per capita demand as the sum of defined performance standards for indoor residential, landscape and commercial, industrial, and institutional (CII) Water Use. This method accounts for local conditions through its consideration of actual local weather conditions and customer landscaping, however, the data required to confirm these standards is extensive and far beyond what is typically available to water agencies. The District was able to analyze Method 2 in the 2010 UWMP based mostly on available data but was heavily reliant on assumptions. Given the complexity and cost of collecting the necessary data to fully comply with Method 2, the District decided not to select this option.

The results of the 2010 analysis have been reproduced in this report (Table 8-2) but have not been updated to reflect the revised population data; they are included here for sake of completeness.

Table 8-2
2010 UWMP Results of District's Method 2 Analysis (1)

Calendar year	Residential Indoor Target (GPCD)	CII Target (GPCD)	Estimated Landscape Demand (2) (GPCD)	Annual Target (GPCD)
2010	63	38	51	151
2015	59	36	50	145
2020	55	34	49	137

Notes:
(1) 2010 UWMP Figures in this table do not reflect revised population data published since the 2010 UWMP; values are included for completeness of reporting on all Method Target options.
(2) An additional 0.4 GPCD is typically used per year for fire-lines and temporary hydrant meters supporting construction activities. SB X7-7 does not stipulate that these demands can be added into the annual target and have therefore been omitted from this table.

Method 3: 95% of Regional Target

Method 3 relies on regional targets defined for specific hydrologic regions of the State of California. The District falls inside of the San Francisco Bay Region which has defined a baseline of 157 GPCD and 2020 target of 131 GPCD x 95% or 124 GPCD.

This target is notably lower than all other targets for the District. The San Francisco Bay Region (Region) on whole encompasses mostly cooler and wetter micro-climates than that of the District service area, as illustrated by the Region's average annual precipitation of 21.4", 16% greater than the District service area average of 18.4". This regional target does not sufficiently account for the efficient and reasonable use of water for landscape demands in the southeasterly portion of the Region (i.e., District service area), and therefore is not considered by the District.

Method 4: DWR Methodology

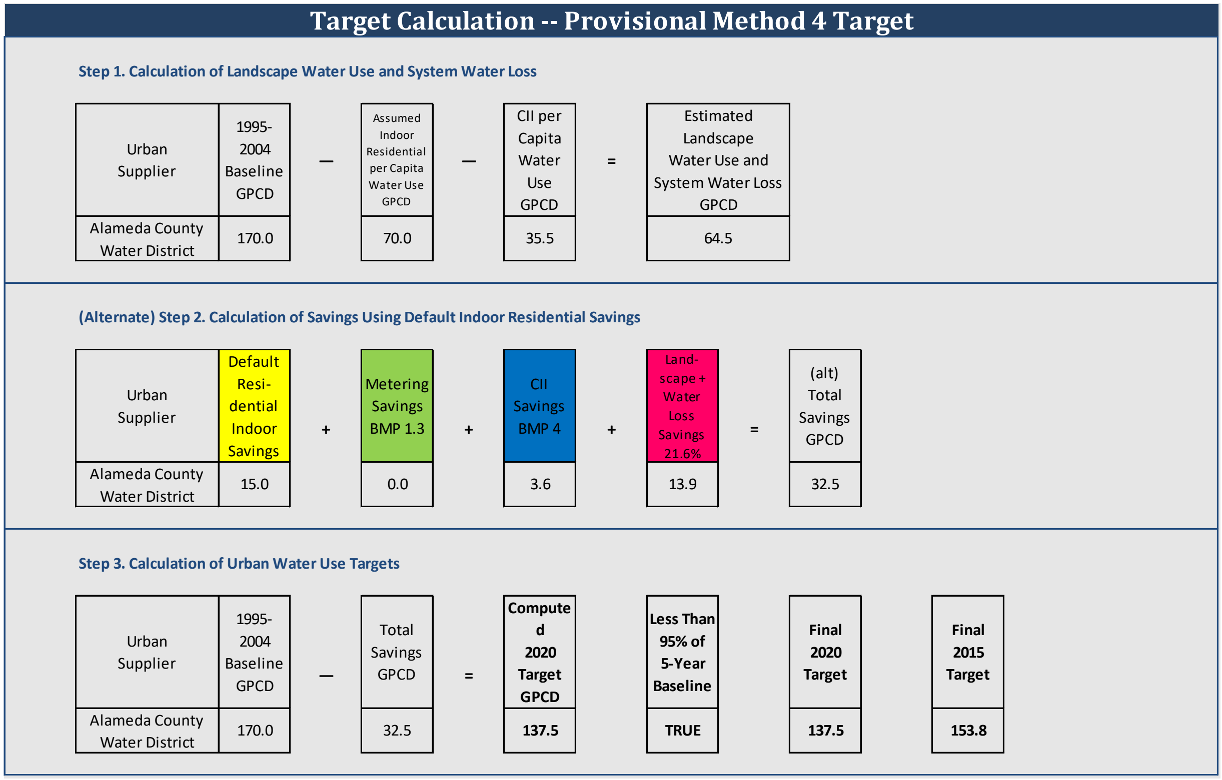
Target Method 4 was developed by DWR under direction from the State legislature. It was deemed provisional in the 2010 UWMP, and the Water Code provided DWR the opportunity to update it prior to December 31, 2014. Even though Method 4 was deemed to be provisional, Method 4 was an appropriate target method for water suppliers to select. DWR elected not to update Method 4, and it has therefore remained unchanged since the 2010 UWMP.

Method 4 assumes savings between the baseline period and 2020 from the metering of unmetered water connections and the achievement of conservation measures in residential indoor, CII and Landscape water use, water loss and other non-revenue water. DWR developed a spreadsheet calculator for use by individual agencies to determine their target. The calculator incorporates savings assumptions developed from a study of 52 randomly selected water suppliers in California with a variety of climatic and demographic characteristics. For the 2015 UWMP, DWR updated the calculator and further simplified the inputs, and these updates have been carried forward into the 2020 UWMP. A summary of Method 4 input data is listed in Table 8-3, and Figure 8-1 shows the Method 4 target calculated by the DWR spreadsheet tool.

Table 8-3
Method 4 Specific Inputs for the District

Input	District Selection	Details
Baseline period	Jan. 1, 1995 to Dec. 31, 2004	District selection
Baseline Water Use GPCD	170 GPCD	See Table 8-1
Population in Midpoint Year	304,006	Ca. DoF estimate, Table 8-1
CII Consumption in Midpoint Year	12,097 AF/yr	Billed CII consumption in 1999 without adjustment for water-loss
Number of unmetered Connections in Midpoint Year	0	District does not have unmetered connections

Figure 8-1
Method 4 Target Calculated by DWR Spreadsheet Tool Assuming Default Savings



Target Calculation -- Provisional Method 4 Target

Step 1. Calculation of Landscape Water Use and System Water Loss

Urban Supplier	1995-2004 Baseline GPCD	—	Assumed Indoor Residential per Capita Water Use GPCD	—	CII per Capita Water Use GPCD	=	Estimated Landscape Water Use and System Water Loss GPCD
Alameda County Water District	170.0		70.0		35.5		64.5

(Alternate) Step 2. Calculation of Savings Using Default Indoor Residential Savings

Urban Supplier	Default Resi-dential Indoor Savings	+	Metering Savings BMP 1.3	+	CII Savings BMP 4	+	Land-scape + Water Loss Savings 21.6%	=	(alt) Total Savings GPCD
Alameda County Water District	15.0		0.0		3.6		13.9		32.5

Step 3. Calculation of Urban Water Use Targets

Urban Supplier	1995-2004 Baseline GPCD	—	Total Savings GPCD	=	**Computed 2020 Target GPCD**	**Less Than 95% of 5-Year Baseline**	**Final 2020 Target**	**Final 2015 Target**
Alameda County Water District	170.0		32.5		**137.5**	**TRUE**	**137.5**	**153.8**

Target Selection

The results of the four target method calculations are summarized in Table 8-4. The District elected to use Target Method 4 in 2010. The District re-evaluated the target selection prior to the adoption of the District's

UWMP update in 2015, and given this election in 2015, the District is now required to use Target Method 4 in the 2020 UWMP.

Table 8-4
District Target Compliance

	GPCD	Assumption
Baseline	170	Sec. 10608.20: Highest 10-yr average ending no earlier than Dec 31, 2004
Method 1 Target	136	80% of baseline
Method 2 Target	137	Sum of performance guidelines (Estimated value from 2010 UWMP, not updated)
Method 3 Target	124	95% of regional 131 GPCD
Method 4 Target *	138	Default Method 4 calculation provided by DWR
Alternative Minimum / 95% of 5-yr baseline	152	Sec. 10608.22: 95% of '03-'07 Average 160 GPCD. Selected target must be less than this figure.

* Selected Method

Step 3: Confirm Urban Water Use Target

In order to confirm that the District's selected water use target meets a minimum reduction established by statute, the District's selected target must be less than 95% of 5-year baseline demand ending no earlier than 12/31/2007. The District's selected 5-Year Base Period is CY 2003 through 2007, with a base daily per capita water use of 160 GPCD (see Tables 8-1 and 8-4). The target minimum 95% of 160 GPCD is 152, which is greater than any of the Method 1 through 4 targets calculated (Table 8-4).

Step 4: Determine Interim Water Use Target

Table 8-5 provides a summary of the baseline, 2015, and 2020 daily per capita water use targets, per the Method 4 approach, discussed above.

Table 8-5
District Selected Water Use Target from Method 4

Calendar year	Population Estimate	Annual Target (GPCD)	Actual	SBX7-7 Status
Baseline		170		
2015	345,656	154	99	In Compliance
2020	356,823	138	115	In Compliance

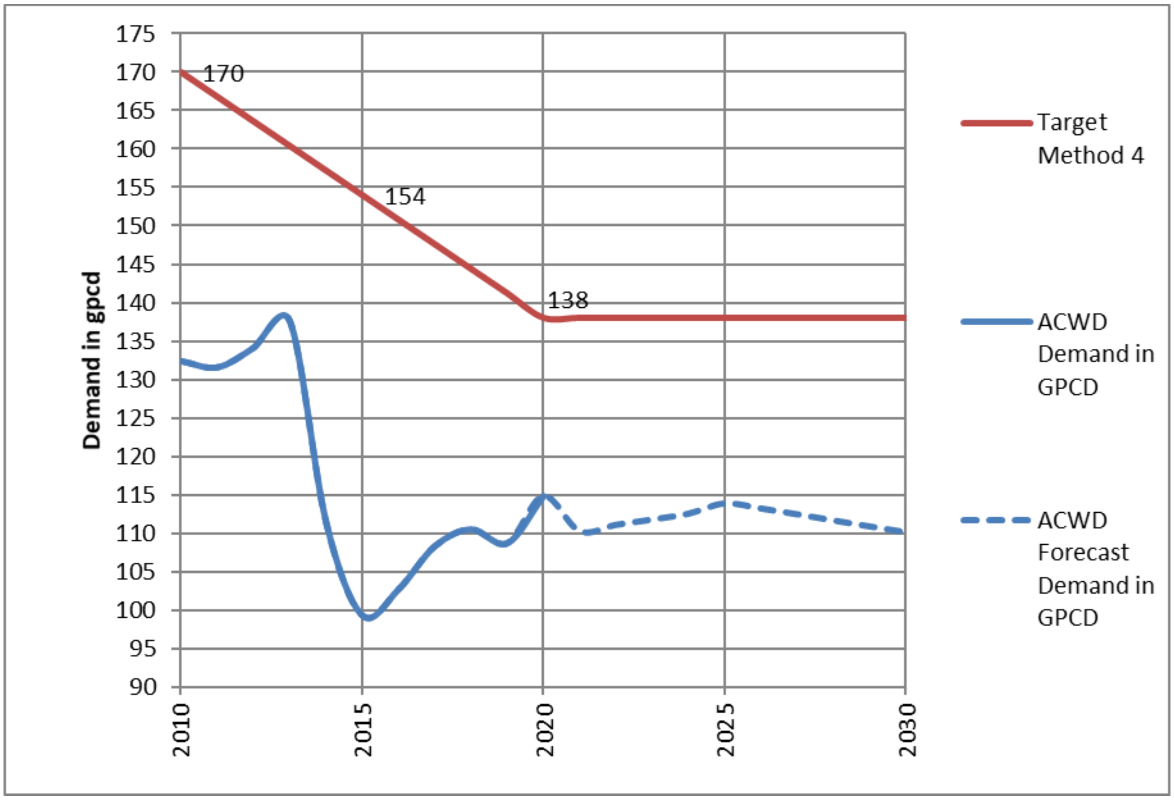
8.2 COMPLIANCE WITH SB X7-7 WATER USE TARGETS

The District is required to determine 2020 compliance with the SB X7-7 daily per capita urban water use targets as calculated by the approved Method 4. As can be seen in Table 8-5, the District has met the 2020 target and has therefore complied with the requirements of The Water Conservation Bill of 2009 (SB X7-7). The following provides a comparison of the District's water demand forecast with the water use targets.

Comparison of water use targets to projected demands

The District's projected water demands are provided in Chapter 2 of this UWMP Update. In order to compare the projected water demands with the SB X7-7 targets, the projected distribution system demands, combined with the private groundwater pumping demands, are divided by the population forecasts. The results of this comparison are shown on Figure 8-2. As shown on the figure, the District's projected per capita water use is below the SB X7-7 target for 2020 and beyond. Therefore, based on current actual consumption and forecasted demand for water, the District is currently meeting the 2020 compliance target and is projected to continue to meet these targets for the foreseeable future.

Figure 8-2
District Forecast Daily Per Capita Usage Compared to SB X7-7 Method 4 Thresholds



Economic Impacts Analyses

Water Code Section 10608.26 requires that urban retail water suppliers consider potential economic impacts of the implementation plan for complying with SB X7-7. As described above, the District has complied with the 2020 SB X7-7 water use target, and no additional water reduction measures beyond the water conservation programs that had been previously planned by the District were required during the implementation period. Therefore, the District can report that there were no additional economic impacts beyond those previously contemplated as a result of the District's compliance with SB X7-7, nor was there any disproportionate burden placed on any customer sector. In addition, compliance with SB X7-7 water use targets did not require that the District's existing customers undertake changes in product formulation, operations, or equipment that would reduce process water use.

Looking Beyond SB X7-7: Water Conservation Legislation of 2018 (AB 1668 and SB 606)

On April 7, 2017, the state of California released the "Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16" Final Framework Report (State Framework Report). The State Framework Report, which built upon Governor Brown's call for new long-term water use efficiency requirements in Executive Order (EOs) B-37-16, provided the state's proposed approach for implementing new long-term water use efficiency requirements. A key element of the report proposed new urban water use objectives (targets) for urban water suppliers that go beyond existing SB X7-7 requirements and are based on strengthened standards for indoor residential per capita use, outdoor irrigation, commercial, industrial and institutional (CII) water use, and water loss. On May 17, 2018, the California Legislature adopted Assembly Bill 1668 (Friedman) and Senate Bill 606 (Hertzberg) to implement these new, long-term water use efficiency requirements. The legislation requires each urban retail water supplier to calculate and report an urban water use objective, which is an estimate of aggregate efficient water use for the previous year based on the adopted water use efficiency standards, by January 1, 2024, and by January 1 every year thereafter, and to compare actual water use to the objective for the prior year by the same date.

In 2019, the District embarked on a Water Efficiency Master Plan (WEMP) development process to revisit previous analysis and conduct a comprehensive review of its water use efficiency program. One of the drivers for this process was to ensure the District would be in a good position to meet these new state regulations. The WEMP, completed in 2021, will direct the District’s water use efficiency program for the next five years (2021-2025), provides a foundation for water supply planning out to 2050, and includes a recommended strategy for meeting the new urban water use objectives. Chapter 7, Demand Management, discusses the District’s current and future water use efficiency program and includes more information about the WEMP.

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CHAPTER 9 WATER SUPPLY STRATEGY

The District's 1995 Integrated Resources Plan (IRP) recommended a water supply strategy to meet the District's planning policy objectives for water supply reliability, costs, water quality, environmental protection, and risk. Included in the District's water supply strategy are programs for additional conservation, recycled water, brackish groundwater desalination, and water banking/transfers. This chapter summarizes the planning criteria utilized by the District in developing the District's water supply strategy as part of the IRP process, followed by a summary of the recommended water supply strategy for the District, and the implementation status of key IRP recommended programs. This chapter also includes a detailed discussion of water supply availability under a normal water year, single dry year, and multiple dry year conditions, as well as a Drought Risk Assessment (DRA) that evaluates the District's water supply reliability under severe drought conditions lasting for the next five consecutive years.

The District is preparing to update the 1995 IRP as it nears the end of its 30-year planning horizon. In addition to periodic IRP Reviews over the years, the District's Water Resources staff in 2020 initiated a series of public workshops with the Board of Directors to evaluate the changing state of affairs in California water management, recent legislative actions resulting in new water supply planning regulatory requirements, and lessons learned from the 2012-2016[1] statewide drought during which the Governor of the State of California issued a statewide mandate for 20% conservation.

9.1 PLANNING CRITERIA

The IRP utilized the following planning criteria in the formulation and evaluation of potential water supply strategies:

Costs: In addition to avoiding rate shocks, key IRP objectives related to costs are to 1) minimize resource costs, and 2) maintain low average customer bills.

Reliability: The District intends to maintain a high level of service reliability for its current and future customers. The IRP's primary focus was long-term water supply reliability because the District has internal standards to address short-term reliability issues (e.g., storage and peak-day capacity standards) and contingency plans for supply disruptions. Through public and stakeholder input during the 1995 IRP process, the District determined that a shortage of greater than 10% in 1 out of every 30 years is unacceptable. Likewise, frequent small shortages have also been deemed unacceptable. Hence, resource strategies that result in shortages of greater than 10% or chronic shortages were not considered. During the 2020 Water Resources workshops, the District's Board maintained that the 10% shortage criterion should still be analyzed but also added an interim shortage criterion of 20% based on the Governor's drought mandate, actual conservation achieved by the District's customers during the drought, and because it is more in line with current shortage goals amongst neighboring water agencies in the San Francisco Bay Region.

Water Quality: In addition to maximizing the health-related treated water quality, non-regulatory aesthetics standards are also extremely important to District customers. The District's IRP water quality objectives

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[1] The California Department of Water Resources references the last major drought as starting in 2012 and continuing through 2016. The State declared a drought emergency and implemented drought response actions from 2014-2017, declaring the end of the drought in April 2017. The District declared a water shortage emergency in 2014 and rescinded the declaration in 2016 when supplies were sufficient to meet demands for the current year, as well as a hypothetical extended three-year dry period.

include avoiding sudden changes in water taste or appearance. One determinant of taste is hardness, expressed as mg/L, or parts per million (ppm) as calcium carbonate ($CaCO_3$). A key criterion used in the IRP process was to provide greater uniformity of water quality by targeting specific hardness levels and limiting the maximum monthly hardness.

Environmental Impacts: The District's planning objective was to avoid or mitigate environmental impacts. For a resource option to be considered viable, appropriate mitigation needs to be provided such that any significant environmental impacts are reduced to levels that are less than significant.

Local Control: The District's imported supplies have always been hampered by uncertainties, and therefore the District determined that local control of future resources is desirable. Factors considered in evaluating local control include:

1. The number of entities involved in developing or acquiring the supply options;
2. The firmness of the District's water rights or contractual allocations;
3. The amount of water that the District would have to share with other contractors; and
4. Whether state or federal agencies are involved in allocating water deliveries.

Risk: The last key planning objective was to minimize risks due to future uncertainty. These risks include:

- *Financial risk:* The likelihood of spending more money than expected or spending money unnecessarily. This rating is affected by factors such as the ratio of fixed to variable cost, construction and permitting lead times and resource size. For example, resources with high capital cost are more financially risky than resources characterized by variable costs.
- *Water quality regulatory risk:* The likelihood of being unable to comply with future health-related water quality regulations. Even though the cost of treatment needed to comply with current standards is included for all source options, some sources have an inherently higher risk of not meeting future standards with existing treatment facilities.
- *Availability risk:* The likelihood that a supply source is not available due to external legal or regulatory changes or uncertainties in the quantity of supply provided or saved. For example, agricultural transfers may be risky because of contractual and through-Delta delivery issues.

During the Water Resources Planning workshops of 2020, the District's Board also approved the following criterion to be used for interim planning analyses and evaluations until the 2025 IPR update can formally consider them for adoption:

- *Climate Readiness:* Can a concept stand up to the known/anticipated impacts of climate change?
- *Resiliency:* Does a concept reduce risk of severe disruption due to earthquakes?
- *Enhanced Flexibility:* Does a project add some form of flexibility or function that the District does not currently have? Is it "future ready"?

9.2 WATER SUPPLY STRATEGY AND IMPLEMENTATION STATUS

As part of the District's IRP process, the District evaluated a wide range of water supply and water conservation options. These options were packaged into nine alternative water supply strategies, each of which was evaluated against the District's planning objectives (described above). The recommended water supply strategy, chosen because it best met the District's objectives, included desalination, recycled water, conservation, groundwater management and off-site banking/transfers. Table 9-1 provides a summary of the key projects incorporated in the District's water supply strategy and their current implementation status followed by a discussion in greater detail below.

Table 9-1
District Water Supply Strategy and Implementation Status

IRP Component	2000	2010	2020	2030	Implementation Status
Conservation	Package 2 (IRP)	Package 2 (IRP)	Package 2 (IRP)	Package 2 (IRP)	All cost-effective BMPs are being implemented. New programs focused on landscape irrigation in place.
Desalination (mgd)	3	8			Phase 1 Desal (5 mgd permeate) completed and in operation in 2003. Phase 2 (10 mgd permeate) completed and operational in 2010.
Off-Site Storage/Banking Capacity (in 1,000s of AF)	65	95	100	140	Secured 150,000 AF of off-site banking storage capacity at Semitropic Groundwater Banking Program.
Groundwater Management **(Min. Inland GW Elev., ft mean sea-level)**	1	-5	-5	-5	Completed the Quarry Lakes rehabilitation project to enhance groundwater recharge capacity (1996).
Recycled Water	---	---	Phase 1, timing is dependent on project needs, future recycled water customers and funding availability.		District/USD Recycled Water Feasibility Study to be completed in 2021.

Desalination

As described in Chapter 5, the IRP recommended developing a brackish groundwater desalination facility which would provide a new production facility to maximize use of local water supply by removing salts and other minerals from brackish (slightly salty) groundwater in the western portion of the groundwater basin.

The source water for the desalination facility comes from a series of wells that remove brackish water from the western portion of the Niles Cone Groundwater Basin. This program, called the Aquifer Reclamation Program (ARP), began in 1972 and was developed to stop the spread of brackish water already in the groundwater basin and to reclaim the aquifers of the basin for future potable use. Every year, the District was pumping billions of gallons of brackish water out of the basin and discharging it to the San Francisco Bay (Bay). With the start-up of the Newark Desalination Facility (Desal Facility) in 2003, a portion of that brackish groundwater being pumped and discharged to the Bay began to be reclaimed and treated for subsequent potable use. This represented a new source of supply as the brackish groundwater pumping through the ARP is an essential program to reclaim the Niles Cone Groundwater Basin and to protect the District's potable Mowry Wellfield.

The District completed construction of the first phase (5 mgd permeate production capacity or 6 mgd blended product water) of the Desalination Facility in 2003. In 2010 the Phase 2 expansion of the Desal Facility was completed, providing a total treatment capacity of 10 mgd permeate (or 12 mgd blended product water). The District was awarded a $2.8 million grant from the California Department of Water Resources (DWR) for this expansion. The Newark Desalination Facility utilizes state-of-the-art reverse osmosis technology to convert brackish water to potable water. This process forces water under pressure across a semi-permeable membrane. The membrane allows water molecules to pass through but stops dissolved minerals such as salts and iron. The water produced by the Desalination Facility is so nearly pure that it needs to be blended with a small amount of groundwater in order to add some minerals back into the final product and to achieve a more consistent aesthetic water quality.

Recycled Water

The 1995 IRP included a potential recycled water program, to provide between 1,600 and 3,000 AF/yr of non-potable supply for appropriate uses (e.g. landscape irrigation and industrial process water). As described in Chapter 6 of this report, the source of recycled water will likely be from a joint project with the District and Union Sanitary District (USD). As an interim supply, another potential source is the purchase of recycled water from the South Bay Water Recycling Program. Recycled water distribution pipelines are separate from the District's existing potable distribution system and, therefore, would not adversely affect existing potable supply operations. The volume of recycled water produced would be the same in drought years as in normal years, thus providing what is called a "firm source of supply." Demand for recycled water for irrigation purposes is highest in the summer months, therefore, in addition to increasing total water supply, recycled water also helps to meet peak monthly and daily production capacity needs.

In 2010, the District and USD completed the District/USD Recycled Water Feasibility Study Update. This study identified two potential recycled water projects with a potential combined supply of up to 2,500 AF/yr. However, most of this supply would be to meet future demands from land use projects (including a golf course) that, as of 2020, have not yet been developed and are in various stages of the planning process. In addition, because of changing economic conditions, the current drought, and other factors, the existing and projected water demands in the District service area are significantly lower than previously forecast. Because of the low projected demands over the UWMP planning horizon and the uncertainty of future developments that could use recycled water, recycled water is not included in the 25-year planning horizon of the water supply-demand comparisons provided in this UWMP.

Recycled water remains the most likely "next source" of water supply for the District should existing supplies either become insufficiently reliable or local development and corresponding demand for water increase substantially beyond what is currently planned. Accordingly, the District continues to evaluate its potential future development. In 2016, the District and USD studied an alternate form of Recycled Water, Indirect Potable Reuse (IPR), which is the Full Advanced Treatment (FAT) of wastewater to standards suitable for human consumption. To further protect human health and safety, IPR would be used as a recharge source for the Niles Cone Groundwater Basin where it would go through further dilution and natural filtration before being used as a water supply. IPR offers several benefits including (a) its uses are not limited to specific and uncertain future developments (e.g. a golf course), and (b) it does not require a costly, parallel distribution system ("purple pipe") and therefore is less expensive. The District and USD are presently revisiting this study to evaluate if there is even greater potential for enhancing water supply, including a regional water sharing concept together with the SFPUC.

Demand Management

As discussed in Chapter 7, demand management is a key component of the District's long-term water supply and management strategy. The 1995 IRP recommended a program including components to reduce both indoor and outdoor use for all customer groups within the District's service area and with a focus on reducing peak summer demands and, in doing so, the need for additional production and storage facilities. A summary of the District's water conservation program is presented in Chapter 7, and the District's target water use and SBX7-7 compliance strategy is provided in Chapter 8.

The 1995 IRP estimated that the total long-term savings from District sponsored conservation measures would range from approximately 1,600 AF/yr to 4,900 AF/yr. Due to increased public acceptance of conservation and advances in technology, the District estimates that as of 2020, IRP demand management programs, along with plumbing code changes, have resulted in 23,800 AF of ongoing conservation.

In 2019 the District initiated a Water Efficiency Master Plan (WEMP) to study the saturation of high-efficiency devices in the District, evaluate new technology options, and estimate the remaining potential for future savings. The WEMP estimates and lays out plans to achieve an additional 1,860 AF/yr by 2040.

Groundwater Management

Since 1914, the District has actively managed and protected the water in the Niles Cone and conserved the water of the Alameda Creek Watershed. As explained in Chapter 4, the District has been managing the Niles Cone pursuant to its statutory authority (e.g., County Water District Law, the Replenishment Assessment Act of the Alameda County Water District, the Sustainable Groundwater Management Act, etc.), as well as, through agreements with the cities of Fremont, Newark, Union City, and Hayward.

As stipulated in the District's Groundwater Management Policy, it is the policy of the District to efficiently protect and manage the Niles Cone Groundwater Basin to ensure a reliable supply of high-quality water that satisfies present and future municipal, industrial, recreational, and agricultural water needs in the District service area (see Chapter 4 for a more detailed discussion of local groundwater management). In order to protect the Basin from saltwater intrusion, the District's operational goals are to maintain groundwater levels above sea-level in the Newark Aquifer system (the upper aquifer which is hydraulically connected to San Francisco Bay). However, during critically dry periods, the District may temporarily reduce groundwater levels slightly below sea-level (as low as 5 feet below mean-sea-level), in the Newark Aquifer in the Forebay (inland) area. Detailed modeling analysis has indicated that temporarily drawing the aquifer down in this inland area could provide additional supply in critically dry years without impacting the integrity of the Basin. This analysis assumes that (1) there are no new parties pumping from the Basin, and (2) that groundwater outflows from the Basin are not increased due to increased pumping in adjacent groundwater basins that are hydraulically connected with the Niles Cone Groundwater Basin. Sea-level rise may change the amount or duration of time that the groundwater levels can be lowered. Beginning in 2020, the District is developing new analytic tools to analyze the long-term implication of sea-level rise on this dry year operation.

A key component of the District's management of the Niles Cone Groundwater Basin is the capability to recharge the groundwater system through the District's groundwater percolation ponds. In order to maintain the recharge capacity at these ponds, the District completed a rehabilitation of these percolation ponds in 1997. Under an agreement with the East Bay Regional Park District, the Quarry Lakes rehabilitation project also allowed for joint use of these percolation ponds for recreation and wildlife purposes.

Off-Site Banking and Transfers/Exchanges

Even with new programs for water conservation, recycled water, and desalination, the District identified the need for additional supplies during dry and critically dry years. In 1999, the District completed an evaluation of a wide range of alternatives to meet our dry year water needs. The report identified the potential methods to secure dry year supplies through both off-site banking and transfers/exchanges.

Off-site storage involves storing excess District SWP supplies during wet and normal years, for use during dry years. Because the District has limited local storage in the Niles Cone Groundwater Basin, storage needs to take place at off-site surface reservoirs or groundwater basins. The 1995 IRP shows a total need of 100,000 AF of off-site storage capacity by the year 2020, and 140,000 AF by the year 2030. To meet these goals, in 1997 the District secured 50,000 AF of storage capacity at the Semitropic Groundwater Banking Program and in 2001 secured an additional 100,000 AF, for a total combined storage capacity of 150,000 AF. As of February 2021, the District has approximately 135,000 AF of water stored in the Semitropic Groundwater Banking Program.

A key limitation to the Semitropic Banking Program is the capacity to return water to the District during dry years. Under the District's water banking agreements with Semitropic, the amount of return (or "take" capacity) from the program is based on the total amount of storage capacity. In order to secure sufficient "take" capacity, the District secured more storage at Semitropic than was originally recommended in the IRP, as noted above. Through continued IRP analyses, however, the District has identified and is currently implementing storage management options that utilize this surplus storage in non-drought years to optimize all of the District's water supplies and contribute to keeping costs lower without sacrificing dry-year reliability.

The successful operation of returning Semitropic supplies to the District for use in dry years requires coordination amongst State and regional water agencies and is subject to limitations including Delta pumping restrictions and other factors. During the most critical droughts (e.g. 1977 conditions), the District may still not have adequate take capacity from the Semitropic Banking Program to meet all in-District water demands. During the recent drought, in 2014 Semitropic was able to return more banked supplies than the District's "take" capacity; however, poor Delta water quality conditions prevented the water from being transferred through the Delta, significantly contributing to the water shortage emergency declaration. Conditions such as these are not hydrologic (water supply) and are addressed in Chapter 10 Water Shortage Contingency Plan.

Another option to meet dry year water supply needs is for the District to enter into exchange agreements for dry year supplies or to purchase raw water supplies in dry years. Typically, these options would involve purchasing Delta water supplies from an entity which could temporarily use a local groundwater supply in-lieu of surface water supplies provided to the District. The District currently participates with the Department of Water Resources and State Water Contractors on an annual basis to evaluate potential water transfer opportunities. In 2014, the District experienced a water supply emergency and initiated a cooperative agreement with Contra Costa Water District that provided for the use of Los Vaqueros Reservoir for a one-time storage and exchange/transfer of 5,000 AF of water utilized by the District during the summer of 2014 to meet demands, which were reduced by 20% system-wide due to customer conservation efforts. In 2020, the District participated for the first time in the Dry Year Transfer Program (DYTP) managed by the State Water Contractors. Through the DYTP pool, the District received a total of 1,179 AF of transfer water, including carriage losses, which was made available for delivery during the SWP July-September transfer window.

Updates to the District's Integrated Resources Plan

A key recommendation in the District's 1995 IRP Study was that the implementation status and planning assumptions be reviewed frequently. In 2006, the District completed the 2006 IRP Update Review, which confirmed the overall water supply strategy recommended in the 1995 IRP. In 2014 the District published an updated study “Reliability by Design” which further refined direction and implementation of IRP recommendations moving forward. During the most recent 2014-2016 drought, and the District has been able to test many of the components of the IRP including critical dry year operations of the Semitropic groundwater bank and customers’ ability to achieve a 20% demand reduction under a water shortage contingency plan. The next update to the District’s IRP is anticipated for 2025.

While intermediate IRP reviews have provided direction and clarity for near-term refinements in implementation, the cumulative effect of 25 years of changing attitudes toward water management, human behavior, and reliability of the District’s existing supplies do call for wholistic revisit to long range planning. Accordingly, the District will undergo a major update to the IRP beginning in 2023, with implementation beginning in 2025. The 2025 IRP will also address many of the current uncertainties that the District faces with its existing supplies as well as several initiatives including participation in Los Vaqueros Reservoir Expansion project and a Delta conveyance project.

9.3 WATER SUPPLY AND DEMAND COMPARISONS

The District has completed its analysis of the projected water supply availability and demands under average year, single dry year, and multiple dry year conditions. While Chapter 3 provides information on the water supply availability for each of the District’s supplies individually, this chapter provides the results of the District’s computer simulations that analyze the District’s water supply portfolio’s ability to meet demand in aggregate over the entire planning hydrology. As described in Chapter 3, the planning hydrology refers to the specific hydrologic sequence of water years 1922 through 2003 but assumes current day water supply infrastructure and demand. The extended simulation over the planning hydrology provides the District insights on how to optimally manage our water supplies as well as performance results during extended dry periods. The results of these analyses are presented in Tables 9-2 through 9-8.

As indicated in Table 9-2, under normal year water supply conditions, the District will have sufficient supplies to meet projected future water demands, as adjusted for estimated future water use efficiency savings. This analysis also indicates that during these hydrologic conditions, the District would have sufficient supplies available (in excess of the projected demands) for placing into groundwater storage (locally or at the off-site Semitropic Groundwater Bank) for later use in the service area in dry years. However, as demand in the District service area continues to grow through the year 2045, the amount of projected supply available for dry year banking will be reduced.

Table 9-2
Projected Normal Year Water Supply and Demand Comparison (AF/yr)

SUPPLY/DEMAND	*Year*					
	2020	***2025***	***2030***	***2035***	***2040***	***2045***
SUPPLY COMPONENT						
Imported Supplies						
- State Water Project	20,900	20,900	20,900	20,900	20,900	20,900
- San Luis Reservoir CO	0	0	0	0	0	0
- SFPUC RWS	15,400	15,400	15,400	15,400	15,400	15,400
Total Imported Supplies	**36,300**	**36,300**	**36,300**	**36,300**	**36,300**	**36,300**
Local Supplies						
- Groundwater Recharge	21,700	21,800	21,800	21,900	21,900	21,800
- Groundwater Storage	N/A	N/A	N/A	N/A	N/A	N/A
- Del Valle	5,000	5,000	5,000	5,000	5,000	5,000
- Desalination	5,100	5,100	5,100	5,100	5,100	5,100
- Recycled Water	0	0	0	0	0	0
Total Local Supplies	**31,800**	**31,900**	**31,900**	**32,000**	**32,000**	**31,900**
Banking/Transfers						
- Semitropic Banking	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL SUPPLY	***68,100***	***68,200***	***68,200***	***68,300***	***68,300***	***68,200***
DEMAND COMPONENT						
- Distribution System Demand	42,200	44,600	44,200	44,000	44,100	52,100
- Groundwater System Demand	16,400	16,300	16,200	16,100	16,000	15,500
TOTAL DEMAND	***58,600***	***60,900***	***60,400***	***60,100***	***60,100***	***67,600***
SUPPLY & DEMAND COMPARISON						
- Supply Totals	68,100	68,200	68,200	68,300	68,300	68,200
- Demand Totals	58,600	60,900	60,400	60,100	60,100	67,600
- Difference	9,500	7,300	7,800	8,200	8,200	600
- Difference as % of Supply	14%	11%	11%	12%	12%	1%
- Difference as % of Demand	16%	12%	13%	14%	14%	1%

Notes:
(1) Normal Year values represent the calculated median water supply availability over the 1922-2003 planning hydrology.
(2) Distribution System Demand incorporates future water use efficiency savings from plumbing code changes and water use efficiency programs, as well as the expected permanent demand reduction resulting from the most recent drought, as discussed in Chapter 2.
(3) Groundwater System Demand includes: (1) required Aquifer Reclamation Program (ARP) groundwater production, (2) private groundwater pumping, (3) saline groundwater outflows, and (4) discharge from the Newark Desalination Facility associated with desalination production beyond the required ARP groundwater production. Since significant components of the Groundwater System Demand exhibit lag times of more than one year, for Normal Year Conditions the long-term average over 1922-2003 planning hydrology is reported.
(4) Desalination supplies are recovered from required Aquifer Recovery Program (ARP) pumping that historically was discharged to San Francisco Bay. Thus, the available “new” supplies due to Desalination are restricted by the amount of required ARP pumping that was determined in the District’s Integrated Resources Plan, factoring in the recovery rate of the Newark Desalination Facility (Desal Facility). The District expanded the Desal Facility blended product water capacity from 6 mgd to 12 mgd in the year 2010.
(5) Under Normal Year conditions, the District does not anticipate utilizing Groundwater Storage (groundwater use in excess of recharge) or Semitropic Banking supplies; therefore, they are listed above as not applicable, “N/A”. These supplies would be used under dry year conditions when imported and local supply availability would be reduced.
(6) SWP availability is based on DWR's 2019 Delivery Capability Report, Future Conditions scenario from the Alternate Reporting tables by agency.
(7) SFPUC RWS supply availability is based the District's modified 40% unimpaired flow dataset from SFPUC.

Table 9-3 provides a summary of the supply availability under the most severe single-year drought in the planning hydrology, occurring in 1977. This drought year represents the projected minimum water supply availability considering all of the District’s water supplies in combination. Under this dry year scenario, the District’s SWP supplies would be cut back by approximately 90%, and the District would need to rely on local and off-site groundwater storage to help make up for this shortfall. Under near-term conditions, the District would incur no additional supply shortfall under a repeat of 1977 conditions. However, under future projected levels of demand, the District can expect to incur shortages of up to 18% under this scenario. In the event that there is insufficient local groundwater storage or that the District is unable to recover its full contractual amount from the Semitropic Groundwater Banking Program, the District would look to secure additional supplies through a DWR drought water bank or similar water purchase/transfer program. In addition, the District would also likely implement the water shortage contingency plan described in Chapter 10 of this UWMP as was done in 2014.

Tables 9-4 through 9-8 provide summaries of the projected supply availabilities under a long-term (5-year) drought for 2021-2025, 2026-2030, 2031-2035, 2036-2040, and 2041-2045 demand conditions. This multiple year drought sequence is based on the supply availability under the most severe 5-year period in the planning hydrology, occurring between 1988 and 1992. The results from these analyses are similar to the single dry year analyses and find that under current and projected future demands, the District could withstand a repeat of the 1988-1992 conditions without any additional shortages (Table 9-4). However, after demand completes its rebounds after the recent drought and with future demand growth, the District can expect to have interim year shortages of up to 16% under this scenario. As with the single dry year condition, both local groundwater storage and off-site groundwater storage in Semitropic will play key roles in offsetting shortfalls in the District's other local and imported supplies.

Table 9-3
Projected Single Dry Year Water Supply and Demand Comparison (AF/yr)

SUPPLY/DEMAND	*Year*					
	2020	*2025*	*2030*	*2035*	*2040*	*2045*
SUPPLY COMPONENT						
Imported Supplies						
- State Water Project	3,700	3,700	3,700	3,700	3,700	3,700
- San Luis Reservoir CO	0	0	0	0	0	0
- SFPUC RWS	6,100	6,100	6,200	6,200	6,200	7,000
Total Imported Supplies	**9,800**	**9,800**	**9,900**	**9,900**	**9,900**	**10,700**
Local Supplies						
- Groundwater Recharge	14,200	14,200	14,200	14,200	14,300	13,000
- Groundwater Storage	10,000	10,000	10,000	10,000	10,000	10,000
- Del Valle	0	0	0	0	0	0
- Desalination	5,100	5,100	5,100	5,100	5,100	5,100
- Recycled Water	0	0	0	0	0	0
Total Local Supplies	**29,300**	**29,300**	**29,300**	**29,300**	**29,400**	**28,100**
Banking/Transfers						
- Semitropic Banking	13,500	13,500	13,500	13,500	13,500	13,500
TOTAL SUPPLY	***52,600***	***52,600***	***52,700***	***52,700***	***52,800***	***52,300***
DEMAND COMPONENT						
- Distribution System Demand	42,200	44,600	44,200	44,000	44,100	52,100
- Groundwater System Demand	13,700	13,600	13,500	13,400	13,300	11,800
TOTAL DEMAND	***55,900***	***58,200***	***57,700***	***57,400***	***57,400***	***63,900***
SUPPLY & DEMAND COMPARISON						
- Supply Totals	52,600	52,600	52,700	52,700	52,800	52,300
- Demand Totals	55,900	58,200	57,700	57,400	57,400	63,900
- Difference	-3,300	-5,600	-5,000	-4,700	-4,600	-11,600
- Difference as % of Supply	-6%	-11%	-9%	-9%	-9%	-22%
- Difference as % of Demand	-6%	-10%	-9%	-8%	-8%	-18%

Notes:

(1) Single Dry Year conditions are based on the projected supply availability under 1977 drought conditions.

(2) Distribution System Demand incorporates future water use efficiency savings from plumbing code changes and water use efficiency programs, as well as the expected permanent demand reduction resulting from the most recent drought, as discussed in Chapter 2.

(3) Groundwater System Demand includes: (1) required ARP groundwater production, (2) private groundwater pumping, and (3) saline groundwater outflows, and (4) discharge from the Newark Desalination Facility associated with desalination production beyond the required ARP groundwater production. Under dry year conditions, the District's Groundwater System Demand may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

(4) Desalination supplies are recovered from required Aquifer Recovery Program (ARP) pumping that historically was discharged to San Francisco Bay. Thus, the available "new" supplies due to Desalination are restricted by the amount of required ARP pumping that was determined in the District's Integrated Resources Plan, factoring in the recovery rate of the Newark Desalination Facility (Desal Facility). The District expanded the Desal Facility blended product water capacity from 6 mgd to 12 mgd in the year 2010.

(5) State Water Project allocations shown above assume 1977 hydrologic conditions, as provided in DWR's 2019 Delivery Capability Report, Future Conditions scenario from the Alternate Reporting tables by agency.

(6) SFPUC RWS supply availability shown above assumes 1977 hydrologic conditions and is based on the District's modified 40% unimpaired flow dataset from SFPUC.

Table 9-4
Projected Multiple Dry Year Period Water Supply and Demand Comparison for 2021-2025 (AF/yr)

SUPPLY/DEMAND	*Year*				
	2021	*2022*	*2023*	*2024*	*2025*
SUPPLY COMPONENT					
Imported Supplies					
- State Water Project	3,900	20,900	5,300	8,400	7,300
- San Luis Reservoir CO	5,900	0	0	0	0
- SFPUC RWS	6,600	6,300	5,700	5,300	5,100
Total Imported Supplies	**16,400**	**27,200**	**11,000**	**13,700**	**12,400**
Local Supplies					
- Groundwater Recharge	16,100	11,900	15,900	13,400	20,000
- Groundwater Storage	10,000	N/A	9,900	4,800	200
- Del Valle	300	500	100	4,600	5,100
- Desalination	5,100	5,100	5,100	5,100	5,100
- Recycled Water	0	0	0	0	0
Total Local Supplies	**31,500**	**17,500**	**31,000**	**27,900**	**30,400**
Banking/Transfers					
- Semitropic Banking	13,500	21,600	13,500	14,500	13,900
TOTAL SUPPLY	***61,400***	***66,300***	***55,500***	***56,100***	***56,700***
DEMAND COMPONENT					
- Distribution System Demand	42,700	43,200	43,600	44,100	44,600
- Groundwater System Demand	14,300	14,900	13,500	11,900	11,500
TOTAL DEMAND	***57,000***	***58,100***	***57,100***	***56,000***	***56,100***
SUPPLY & DEMAND COMPARISON					
- Supply Totals	61,400	66,300	55,500	56,100	56,700
- Demand Totals	57,000	58,100	57,100	56,000	56,100
- Difference	4,400	8,200	-1,600	100	600
- Difference as % of Supply	7%	12%	-3%	0%	1%
- Difference as % of Demand	8%	14%	-3%	0%	1%

Notes:

(1) Multiple Dry Year conditions are based on the projected supply availability under 1988-92 drought conditions.

(2) Distribution System Demand incorporates future water use efficiency savings from plumbing code changes and water use efficiency programs, as well as the expected permanent demand reduction resulting from the most recent drought, as discussed in Chapter 2.

(3) Groundwater System Demand includes: (1) required Aquifer Reclamation Program (ARP) groundwater production, (2) private groundwater pumping, (3) saline groundwater outflows, and (4) discharge from the Newark Desalination Facility associated with desalination production beyond the required ARP groundwater production. Under dry year conditions, the District's Groundwater System Demand may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

(4) Desalination supplies are recovered from required Aquifer Recovery Program (ARP) pumping that historically was discharged to San Francisco Bay. Thus, the available "new" supplies due to Desalination are restricted by the amount of required ARP pumping that was determined in the District's Integrated Resources Plan, factoring in the recovery rate of the Newark Desalination Facility (Desal Facility). The District expanded the Desal Facility blended product water capacity from 6 mgd to 12 mgd in the year 2010.

(5) State Water Project allocations shown above assume 1988-92 hydrologic conditions, as provided in DWR's 2019 Delivery Capability Report, Future Conditions scenario from the Alternate Reporting tables by agency.

(6) SFPUC RWS supply availability shown above assumes 1988-92 hydrologic conditions and is based on the District's modified 40% unimpaired flow dataset from SFPUC.

(7) Use of groundwater storage in 2022 is shown as not applicable, "N/A" because the groundwater basin undergoes slight re-filling under 1989 hydrologic conditions.

Table 9-5
Projected Multiple Dry Year Period Water Supply and Demand Comparison for 2026-2030 (AF/yr)

SUPPLY/DEMAND	*Year*				
	2026	*2027*	*2028*	*2029*	*2030*
SUPPLY COMPONENT					
Imported Supplies					
- State Water Project	3,900	20,900	5,300	8,400	7,300
- San Luis Reservoir CO	4,400	0	0	0	0
- SFPUC RWS	6,600	6,300	5,700	5,300	5,100
Total Imported Supplies	**14,900**	**27,200**	**11,000**	**13,700**	**12,400**
Local Supplies					
- Groundwater Recharge	16,100	12,100	15,900	13,600	20,000
- Groundwater Storage	10,000	N/A	9,900	5,600	200
- Del Valle	300	500	100	4,600	5,100
- Desalination	5,100	5,100	5,100	5,100	5,100
- Recycled Water	0	0	0	0	0
Total Local Supplies	**31,500**	**17,700**	**31,000**	**28,900**	**30,400**
Banking/Transfers					
- Semitropic Banking	13,500	21,600	13,500	14,500	13,900
TOTAL SUPPLY	***59,900***	***66,500***	***55,500***	***57,100***	***56,700***
DEMAND COMPONENT					
- Distribution System Demand	44,600	44,500	44,400	44,300	44,200
- Groundwater System Demand	14,200	14,800	13,400	11,700	11,400
TOTAL DEMAND	***58,800***	***59,300***	***57,800***	***56,000***	***55,600***
SUPPLY & DEMAND COMPARISON					
- Supply Totals	59,900	66,500	55,500	57,100	56,700
- Demand Totals	58,800	59,300	57,800	56,000	55,600
- Difference	1,100	7,200	-2,300	1,100	1,100
- Difference as % of Supply	2%	11%	-4%	2%	2%
- Difference as % of Demand	2%	12%	-4%	2%	2%

Notes:

(1) Multiple Dry Year conditions are based on the projected supply availability under 1988-92 drought conditions.

(2) Distribution System Demand incorporates future water use efficiency savings from plumbing code changes and water use efficiency programs, as well as the expected permanent demand reduction resulting from the most recent drought, as discussed in Chapter 2.

(3) Groundwater System Demand includes: (1) required Aquifer Reclamation Program (ARP) groundwater production, (2) private groundwater pumping, (3) saline groundwater outflows, and (4) discharge from the Newark Desalination Facility associated with desalination production beyond the required ARP groundwater production. Under dry year conditions, the District's Groundwater System Demand may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

(4) Desalination supplies are recovered from required Aquifer Recovery Program (ARP) pumping that historically was discharged to San Francisco Bay. Thus, the available "new" supplies due to Desalination are restricted by the amount of required ARP pumping that was determined in the District's Integrated Resources Plan, factoring in the recovery rate of the Newark Desalination Facility (Desal Facility). The District expanded the Desal Facility blended product water capacity from 6 mgd to 12 mgd in the year 2010.

(5) State Water Project allocations shown above assume 1988-92 hydrologic conditions, as provided in DWR's 2019 Delivery Capability Report, Future Conditions scenario from the Alternate Reporting tables by agency.

(6) SFPUC RWS supply availability shown above assumes 1988-92 hydrologic conditions and is based on the District's modified 40% unimpaired flow dataset from SFPUC.

(7) Use of groundwater storage in 2027 is shown as not applicable, "N/A" because the groundwater basin undergoes slight re-filling under 1989 hydrologic conditions.

Table 9-6
Projected Multiple Dry Year Period Water Supply and Demand Comparison for 2031-2035 (AF/yr)

SUPPLY/DEMAND	*Year*				
	2031	*2032*	*2033*	*2034*	*2035*
SUPPLY COMPONENT					
Imported Supplies					
- State Water Project	3,900	20,900	5,300	8,400	7,300
- San Luis Reservoir CO	2,800	0	0	0	0
- SFPUC RWS	6,600	6,300	5,700	5,400	5,200
Total Imported Supplies	**13,300**	**27,200**	**11,000**	**13,800**	**12,500**
Local Supplies					
- Groundwater Recharge	16,000	12,300	15,800	13,700	20,000
- Groundwater Storage	10,000	N/A	10,000	6,500	100
- Del Valle	300	500	100	4,600	5,100
- Desalination	5,100	5,100	5,100	5,100	5,100
- Recycled Water	0	0	0	0	0
Total Local Supplies	**31,400**	**17,900**	**31,000**	**29,900**	**30,300**
Banking/Transfers					
- Semitropic Banking	13,500	21,600	13,500	14,500	13,900
TOTAL SUPPLY	***58,200***	***66,700***	***55,500***	***58,200***	***56,700***
DEMAND COMPONENT					
- Distribution System Demand	44,100	44,100	44,000	44,000	44,000
- Groundwater System Demand	14,100	14,800	13,200	11,700	11,300
TOTAL DEMAND	***58,200***	***58,900***	***57,200***	***55,700***	***55,300***
SUPPLY & DEMAND COMPARISON					
- Supply Totals	58,200	66,700	55,500	58,200	56,700
- Demand Totals	58,200	58,900	57,200	55,700	55,300
- Difference	0	7,800	-1,700	2,500	1,400
- Difference as % of Supply	0%	12%	-3%	4%	2%
- Difference as % of Demand	0%	13%	-3%	4%	3%

Notes:

(1) Multiple Dry Year conditions are based on the projected supply availability under 1988-92 drought conditions.

(2) Distribution System Demand incorporates future water use efficiency savings from plumbing code changes and water use efficiency programs, as well as the expected permanent demand reduction resulting from the most recent drought, as discussed in Chapter 2.

(3) Groundwater System Demand includes: (1) required Aquifer Reclamation Program (ARP) groundwater production, (2) private groundwater pumping, (3) saline groundwater outflows, and (4) discharge from the Newark Desalination Facility associated with desalination production beyond the required ARP groundwater production. Under dry year conditions, the District's Groundwater System Demand may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

(4) Desalination supplies are recovered from required Aquifer Recovery Program (ARP) pumping that historically was discharged to San Francisco Bay. Thus, the available "new" supplies due to Desalination are restricted by the amount of required ARP pumping that was determined in the District's Integrated Resources Plan, factoring in the recovery rate of the Newark Desalination Facility (Desal Facility). The District expanded the Desal Facility blended product water capacity from 6 mgd to 12 mgd in the year 2010.

(5) State Water Project allocations shown above assume 1988-92 hydrologic conditions, as provided in DWR's 2019 Delivery Capability Report, Future Conditions scenario from the Alternate Reporting tables by agency.

(6) SFPUC RWS supply availability shown above assumes 1988-92 hydrologic conditions and is based on the District's modified 40% unimpaired flow dataset from SFPUC.

(7) Use of groundwater storage in 2032 is shown as not applicable, "N/A" because the groundwater basin undergoes slight re-filling under 1989 hydrologic conditions.

Table 9-7
Projected Multiple Dry Year Period Water Supply and Demand Comparison for 2036-2040 (AF/yr)

SUPPLY/DEMAND	***Year***				
	2036	***2037***	***2038***	***2039***	***2040***
SUPPLY COMPONENT					
Imported Supplies					
- State Water Project	3,900	20,900	5,300	8,400	7,300
- San Luis Reservoir CO	1,300	0	0	0	0
- SFPUC RWS	6,600	6,300	5,800	5,400	5,200
Total Imported Supplies	**11,800**	**27,200**	**11,100**	**13,800**	**12,500**
Local Supplies					
- Groundwater Recharge	16,000	12,500	15,700	13,800	19,900
- Groundwater Storage	10,000	N/A	10,000	7,300	N/A
- Del Valle	300	500	100	4,600	5,100
- Desalination	5,100	5,100	5,100	5,100	5,100
- Recycled Water	0	0	0	0	0
Total Local Supplies	**31,400**	**18,100**	**30,900**	**30,800**	**30,100**
Banking/Transfers					
- Semitropic Banking	13,500	21,600	13,500	14,500	13,900
TOTAL SUPPLY	***56,700***	***66,900***	***55,500***	***59,100***	***56,500***
DEMAND COMPONENT					
- Distribution System Demand	44,000	44,000	44,000	44,100	44,100
- Groundwater System Demand	14,000	14,300	13,000	11,400	10,700
TOTAL DEMAND	***58,000***	***58,300***	***57,000***	***55,500***	***54,800***
SUPPLY & DEMAND COMPARISON					
- Supply Totals	56,700	66,900	55,500	59,100	56,500
- Demand Totals	58,000	58,300	57,000	55,500	54,800
- Difference	-1,300	8,600	-1,500	3,600	1,700
- Difference as % of Supply	-2%	13%	-3%	6%	3%
- Difference as % of Demand	-2%	15%	-3%	6%	3%

Notes:

(1) Multiple Dry Year conditions are based on the projected supply availability under 1988-92 drought conditions.

(2) Distribution System Demand incorporates future water use efficiency savings from plumbing code changes and water use efficiency programs, as well as the expected permanent demand reduction resulting from the most recent drought, as discussed in Chapter 2.

(3) Groundwater System Demand includes: (1) required Aquifer Reclamation Program (ARP) groundwater production, (2) private groundwater pumping, (3) saline groundwater outflows, and (4) discharge from the Newark Desalination Facility associated with desalination production beyond the required ARP groundwater production. Under dry year conditions, the District's Groundwater System Demand may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

(4) Desalination supplies are recovered from required Aquifer Recovery Program (ARP) pumping that historically was discharged to San Francisco Bay. Thus, the available "new" supplies due to Desalination are restricted by the amount of required ARP pumping that was determined in the District's Integrated Resources Plan, factoring in the recovery rate of the Newark Desalination Facility (Desal Facility). The District expanded the Desal Facility blended product water capacity from 6 mgd to 12 mgd in the year 2010.

(5) State Water Project allocations shown above assume 1988-92 hydrologic conditions, as provided in DWR's 2019 Delivery Capability Report, Future Conditions scenario from the Alternate Reporting tables by agency.

(6) SFPUC RWS supply availability shown above assumes 1988-92 hydrologic conditions and is based on the District's modified 40% unimpaired flow dataset from SFPUC.

(7) Use of groundwater storage in years 2037 and 2040 is shown as not applicable, "N/A" because the groundwater basin undergoes slight re-filling under 1989 and 1992 hydrologic conditions in the modeling scenarios.

Table 9-8
Projected Multiple Dry Year Period Water Supply and Demand Comparison for 2041-2045 (AF/yr)

SUPPLY/DEMAND	*Year*				
	2041	*2042*	*2043*	*2044*	*2045*
SUPPLY COMPONENT					
Imported Supplies					
- State Water Project	3,900	20,900	5,300	8,400	7,300
- San Luis Reservoir CO	0	0	0	0	0
- SFPUC RWS	6,700	6,400	5,900	5,600	5,600
Total Imported Supplies	**10,600**	**27,300**	**11,200**	**14,000**	**12,900**
Local Supplies					
- Groundwater Recharge	15,800	13,100	15,200	14,000	18,900
- Groundwater Storage	10,000	N/A	10,000	8,300	N/A
- Del Valle	300	500	100	4,600	5,100
- Desalination	5,100	5,100	5,100	5,100	5,100
- Recycled Water	0	0	0	0	0
Total Local Supplies	**31,200**	**18,700**	**30,400**	**32,000**	**29,100**
Banking/Transfers					
- Semitropic Banking	13,500	21,600	13,500	14,500	9,200
TOTAL SUPPLY	***55,300***	***67,600***	***55,100***	***60,500***	***51,200***
DEMAND COMPONENT					
- Distribution System Demand	45,700	47,300	48,900	50,500	52,100
- Groundwater System Demand	13,400	13,200	11,600	9,700	8,900
TOTAL DEMAND	***59,100***	***60,500***	***60,500***	***60,200***	***61,000***
SUPPLY & DEMAND COMPARISON					
- Supply Totals	55,300	67,600	55,100	60,500	51,200
- Demand Totals	59,100	60,500	60,500	60,200	61,000
- Difference	-3,800	7,100	-5,400	300	-9,800
- Difference as % of Supply	-7%	11%	-10%	0%	-19%
- Difference as % of Demand	-6%	12%	-9%	0%	-16%

Notes:

(1) Multiple Dry Year conditions are based on the projected supply availability under 1988-92 drought conditions.

(2) Distribution System Demand incorporates future water use efficiency savings from plumbing code changes and water use efficiency programs, as well as the expected permanent demand reduction resulting from the most recent drought, as discussed in Chapter 2.

(3) Groundwater System Demand includes: (1) required Aquifer Reclamation Program (ARP) groundwater production, (2) private groundwater pumping, (3) saline groundwater outflows, and (4) discharge from the Newark Desalination Facility associated with desalination production beyond the required ARP groundwater production. Under dry year conditions, the District's Groundwater System Demand may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

(4) Desalination supplies are recovered from required Aquifer Recovery Program (ARP) pumping that historically was discharged to San Francisco Bay. Thus, the available "new" supplies due to Desalination are restricted by the amount of required ARP pumping that was determined in the District's Integrated Resources Plan, factoring in the recovery rate of the Newark Desalination Facility (Desal Facility). The District expanded the Desal Facility blended product water capacity from 6 mgd to 12 mgd in the year 2010.

(5) State Water Project allocations shown above assume 1988-92 hydrologic conditions, as provided in DWR's 2019 Delivery Capability Report, Future Conditions scenario from the Alternate Reporting tables by agency.

(6) SFPUC RWS supply availability shown above assumes 1988-92 hydrologic conditions and is based on the District's modified 40% unimpaired flow dataset from SFPUC.

(7) Use of groundwater storage in years 2042 and 2045 is shown as not applicable, "N/A" because the groundwater basin undergoes slight re-filling under 1989 and 1992 hydrologic conditions in the modeling scenarios.

9.4 DROUGHT RISK ASSESSMENT

Pursuant to the California Water Code (CWC) Section 10635(b), the District has included a Drought Risk Assessment (DRA) as part of its 2020-2025 UWMP. The purpose of the DRA is to evaluate the District's risk under a severe drought condition lasting for the next five consecutive years considering water supplies during stressed hydrologic conditions and anticipated variations in demand.

CWC Section 10612 requires the DRA to be based on the driest five-year historical sequence of record for the agency's water supply while considering anticipated changes due to climate change, new regulations, and other locally applicable criteria. The District's driest five-consecutive-year historical sequence on record is the period from 1988-1992, as determined from the District's Integrated Resources Planning Model (IRPM) and discussed in more detail below.

The DRA is also designed to be modified or updated on an interim cycle, if necessary, and is considered to be a stand-alone document outside of the 2020-2025 UWMP. Therefore, the District may choose to modify the DRA as more information becomes available, supplies or uses change, or in the event of unforeseen circumstances.

The DRA is organized into sub-sections that describe the following key elements:

- Data and methods used
- Basis for the supply shortage conditions
- Determination of the reliability of each source
- Comparison of total water supplies and uses during the five-year drought

Data and Methods Used

The DRA requires projections of gross water use data and water supply data by source to evaluate the risk of a water supply shortage over the next five years under the driest five-consecutive-year historical drought sequence.

For gross water use data projections shown in Table 9-9, the District used its most current monthly demand forecast for 2021, which included an estimated adjustment for the ongoing COVID-19 pandemic impacts that increased water consumption throughout the service area in 2020 by approximately 5%, an estimate of increased consumption due to repeated dry year conditions, and includes distribution system losses as estimated from the difference between monthly production volumes and billing data from calendar year 2020. The gross water use projections for 2022-2025 were taken from the District's Water Use Efficiency Master Plan (WEMP), which forecasts future demands based on an econometric model that includes historical consumption patterns, post-drought recovery, economic factors, population growth, rate increases, water use efficiency from plumbing code and active water use efficiency programs, weather (rainfall and temperature), and climate change predictions. The WEMP also includes distribution system water loss or 'non-revenue' water in the demand projections, which was included in each monthly gross water use total. Since the WEMP demand forecast provides projections by customer class on an annual basis only, the monthly gross usage volumes were estimated using the monthly usage pattern from calendar year 2019, the most recent year of District data unaffected by the COVID-19 pandemic.

Table 9-9
Water Use Worksheet Based on DWR's Optional Planning Tool (Volumes in AF)

Historic and Actual Water Use													
	M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**	**TOTAL**
2016	2,473	2,417	2,555	2,711	3,292	3,797	4,151	4,143	3,932	3,443	2,663	2,588	38,164
2017	2,511	2,234	2,568	2,697	3,873	4,192	4,481	4,429	4,150	4,013	2,936	2,784	40,868
2018	2,622	2,524	2,640	2,804	3,818	4,253	4,587	4,526	4,199	3,961	3,346	2,676	41,956
2019	2,599	2,301	2,555	2,915	3,608	4,162	4,484	4,620	4,203	4,053	3,466	2,610	41,577
2020 Customer Water Use Subtotal	2,481	2,469	2,573	2,878	3,434	3,990	4,271	4,231	3,948	3,586	3,178	2,802	39,804
2020 Distribution System Water Loss	108	314	565	219	504	423	473	550	329	604	181	212	4,520
2020 Total Gross Water Use	2,589	2,783	3,139	3,097	3,938	4,413	4,744	4,781	4,277	4,190	3,358	3,014	44,324
Water Use for Five Consecutive Years													
	M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**	**TOTAL**
Change from 2020	206	-240	0	0	0	0	0	0	0	0	0	0	-34
2021 Gross Water Use	2,795	2,543	3,139	3,097	3,938	4,413	4,744	4,781	4,277	4,190	3,358	3,014	44,290
Change from 2021	(185)	(11)	(542)	(74)	(297)	(217)	(212)	(118)	265	(41)	256	70	-1,105
2022 Gross Water Use	2,610	2,532	2,597	3,023	3,641	4,197	4,532	4,663	4,542	4,149	3,614	3,084	43,184
Change from 2022	28	28	29	33	39	45	48	49	48	44	38	33	462
2023 Gross Water Use	2,638	2,560	2,625	3,056	3,680	4,241	4,580	4,712	4,590	4,193	3,653	3,118	43,646
Change from 2023	30	29	30	35	41	47	50	51	50	46	40	35	483
2024 Gross Water Use	2,668	2,589	2,655	3,091	3,721	4,288	4,630	4,763	4,640	4,239	3,693	3,152	44,129
Change from 2024	32	31	32	38	45	52	57	58	57	52	45	38	535
2025 Gross Water Use	2,699	2,620	2,687	3,128	3,766	4,340	4,687	4,821	4,697	4,290	3,738	3,190	44,665

In terms of water supply projection data, the District currently has three primary sources of water supply: (1) the State Water Project (SWP), (2) the San Francisco Public Utilities Commission's (SFPUC) Regional Water System (RWS), and (3) local supplies. The SWP and SFPUC supplies are imported into the District service area through the South Bay Aqueduct and Hetch Hetchy Aqueduct, respectively. Local supplies include fresh groundwater from the Niles Cone Groundwater Basin (Niles Cone), desalinated brackish groundwater from portions of the groundwater basin previously impacted by saltwater intrusion, and surface water from the Del Valle Reservoir. For the District's modeling purposes and for inclusion in the DRA, both the SWP supply and the local supplies have various subcategories that must be broken out further, as these subcategories have specific contractual or operational constraints that affect water supply availability independently. For the DRA, the District's general SWP supply source can be broken into the following subcategories: State Water Project, San Luis Carryover, and Semitropic Banking. Similarly, the District's general "local supplies" source can be broken out into the following subcategories: Groundwater Recharge, Groundwater Storage, Del Valle, and Desalination. The District's SPFUC RWS supply is its own single category. Lastly, no water supply transfers or exchanges are considered in this DRA because the District only pursues such supplemental supplies on an interim basis depending on price and availability, and are not considered dependable sources of supply.

As recommended in DWR's Guidebook, the District has chosen to evaluate water supply availability on a monthly time-step in the DRA. To do this, the District relies on several modeling tools: 1) the Production Optimization Model; 2) the Integrated Resources Planning Model (IRPM); and 3) the DRA Integrated Resources Planning Model (DRA Model). The District's Production Optimization Model uses a multi-variable optimization software that incorporates contractual water supply availability, relevant water quality, infrastructure, facility, and distribution system constraints, groundwater level constraints, and water supply costs to generate an optimal monthly production schedule for a predetermined monthly demand pattern. This production schedule is then used as monthly production input for either the IRPM or the DRA Model. The IRPM is an Excel-based spreadsheet model that represents the District's most comprehensive water supply planning tool. It can simulate water supply availability and utilization for any demand level or levels over the District's full 82-year planning hydrology from 1922-2003[2]. Within the IRPM, monthly water supply balances and monthly utilization are calculated based on historical hydrologic conditions, contractual availability of water supplies, relevant infrastructure capacity, and regulatory constraints such as environmental flows and water rights restrictions. Notably, the District's conjunctive use groundwater basin is simulated in the IRPM by daily head-driven equations that incorporate all mass balance inputs and outputs, enabling reliable calculations of groundwater recharge and storage volumes on daily, monthly, or annual time-steps. To explain how the IRPM is used in simple terms, the IRPM takes any set of water demand and water supply assumptions, and then models these assumptions over the 82-year planning hydrology as if the historical hydrology from 1922-2003 was going to repeat itself. The DRA Model is a smaller, targeted version of the District's larger IRPM and is specifically used to generate the monthly water supply availability data used in the DRA. The DRA Model targets the driest five-consecutive-year sequence from 1988-1992, as required for the DRA analysis. Specifically, the historic condition for 1988 is used to forecast the water supply availability for the first year 2021, the historic condition for 1989 is used to forecast the water supply availability for the second year 2022, and so on up to year 2025. In addition, the DRA Model incorporates the January 1, 2021, initial conditions, such as groundwater storage volumes, groundwater level elevations, and stored water reserved or banked outside of the service area, so that the DRA Model's simulated year of 1988 begins identically to the actual 2021 calendar year. The DRA Model also uses the monthly projected 2021-2025 gross water uses as the inputs for the 1988-1992 monthly demands.

The District's modeling tools allow for a highly realistic comparison of monthly patterns of gross water use and water supply availability; however, the modeling output is only as reliable as the modeling input assumptions. By adjusting the 2021 gross water use to reflect similar COVID-19 impacts to 2020 as well as similar dry year conditions, and by relying on the District's most recent Water Efficiency Master Plan for 2022-2025 gross water use projections, the gross water use data inputs for the DRA are considered to be as robust as possible. Similarly, the District used conservative projections for water supply availability, as discussed in detail in the 'Determination of the Reliability of Each Source' section of the DRA. As a result, the District assumes that the uncertainties within the DRA analysis will err on the conservative side, with the incorporated uncertainties more likely to predict water supply shortages than surpluses.

Table 9-10 provides supporting information on the water supply source data used in the DRA. Table 9-11 provides the monthly water supply availability for the 2021-2025 DRA period based on DWR's Optional Planning Tool.

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[2] Notably, the District's planning hydrology is identical to DWR's historical planning hydrology as presented in DWR's final 2019 State Water Project (SWP) Delivery Capability Report (DCR).

Table 9-10
Supporting Information on Water Supply Source Data for the DRA

Supply Source	Water Supply Availability Data Source	Description of Data Source Methodology
Source 1: State Water Project	DWR's final 2019 State Water Project Delivery Capability Report (DCR), Future Conditions scenario from the Alternate Reporting tables by agency	• Data represents DWR's best estimate of SWP supply based on a computer model (CalSim 2) that simulates monthly operations of the SWP and Central Valley Project systems. • Key inputs to the model include the facilities included in the system, hydrologic inflows to the system, regulatory and operational constraints on system operations, and contractor demands for SWP water. • The Future Conditions scenario also reflects changes expected to occur from climate change, with projected temperature and precipitation changes centered around 2035 (2020 to 2049) and a 45 cm sea level rise. • The DRA Model then calculates the monthly SWP supply availabilty. • The DRA Model calculation for SWP supply availability in 1988 is a special case discussed in the 'Reliability of Each Water Supply Source' section of the DRA.
Source 2: San Luis Carryover	District's DRA Model based on its Integrated Resources Planning Model (IRPM)	• The DRA Model simulates monthly San Luis Carryover quantity and availability based on year-end excess surface water within the model. However, the DRA Model only provides a rough simulation of Article 56 Carryover water as it relates to total surface water supply; the model does not fully capture the District's common practice of carrying over San Luis Reservoir balances in almost all years.
Source 3: Semitropic Banking	District's DRA Model based on its Integrated Resources Planning Model (IRPM)	• The DRA Model simulates the monthly quantity and availability of SWP-originated water stored in Semitropic based on contractual storage and recovery agreements, as well as initial storage volumes.
Source 4: San Francisco Public Utilities Commission's Regional Water System	SFPUC's 40% unimpaired flow dataset as modified by the District	• Data represents the District's best estimate of SFPUC RWS supply based on SFPUC's contractual obligations to retail and wholesale customers. • The DRA Model then calculates the monthly RWS supply availabilty.
Source 5: Groundwater Recharge	District's DRA Model based on its Integrated Resources Planning Model (IRPM)	• Monthly Groundwater Recharge availability is calculated in the DRA Model as recharge from deep percolation of rainfall and applied water plus recharge at the District's groundwater percolation facilities from Alameda Creek Watershed supplies diverted under the District's Water Rights Permit, less "Other Outflows" as described in the District's annual Groundwater Survey Reports. • Groundwater Recharge calculations do not include recharge from SWP or Del Valle Reservoir supplies.
Source 6: Groundwater Storage	District's DRA Model based on its Integrated Resources Planning Model (IRPM)	• Monthly Groundwater Storage availability is calculated in the DRA Model as Total Groundwater Demand (the District's groundwater production facility pumping plus private well pumping less "Saline Outflow" to the San Francisco Bay) less the Total Recharge (groundwater percolation of rainfall, applied water, recharge from SWP and Del Valle Reservoir supplies, and "Other Outflows" as described in the District's annual Groundwater Survey Reports). • The District conservatively uses groundwater availability assumptions of only 10,000 AF/year of dry year storage from the District's conjunctive use groundwater management program.
Source 7: Del Valle Reservoir	District's DRA Model based on its Integrated Resources Planning Model (IRPM)	• The DRA Model simulates Del Valle Reservoir availability based on historical runoff capture due to local hydrology and includes surface water reservoir evaporation as well as environmental release requirements.
Source 8: Desalination	District's DRA Model based on its Integrated Resources Planning Model (IRPM)	• The District's Production Optimization Model was used to optimize monthly Desalination production within the DRA Model to fall within the conservative long-term sustainable yield assumptions of 5,100 AF/year while simultaneously carrying out salt management objectives as part of the District's Aquifer Reclamation Program.

Table 9-11
Water Supply Worksheet Based on DWR's Optional Planning Tool (Volumes in AF)

Supply Source	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Total
Source 1: State Water Project													
2021 (1st year)	3,882	0	0	0	0	0	0	0	0	0	0	0	3,882
2022 (2nd year)	3,932	3,565	3,904	3,525	3,990	2,018	0	0	0	0	0	0	20,934
2023 (3rd year)	666	602	0	1,341	2,283	381	0	0	0	0	0	0	5,274
2024 (4th year)	3,990	1,172	0	0	3,238	0	0	0	0	0	0	0	8,400
2025 (5th year)	2,349	964	0	0	0	2,668	1,303	0	0	0	0	0	7,284
Source 2: San Luis Carryover													
2021 (1st year)	0	0	0	0	0	0	0	0	0	0	0	0	0
2022 (2nd year)	0	0	0	0	0	0	0	0	0	0	0	0	0
2023 (3rd year)	0	0	0	0	0	0	0	0	0	0	0	0	0
2024 (4th year)	0	0	0	0	0	0	0	0	0	0	0	0	0
2025 (5th year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Source 3: Semitropic Banking													
2021 (1st year)	38	1,682	0	967	999	967	1,332	1,332	1,289	1,998	1,565	1,332	13,500
2022 (2nd year)	0	0	0	0	0	1,843	3,990	2,283	2,210	1,998	1,565	3,990	17,879
2023 (3rd year)	0	0	0	0	0	1,828	2,283	2,283	2,210	1,998	1,565	1,332	13,500
2024 (4th year)	0	0	0	0	31	2,790	2,283	2,283	2,210	1,998	1,565	1,332	14,492
2025 (5th year)	0	0	0	0	0	0	2,687	3,990	2,292	1,998	1,565	1,332	13,863
Source 4: San Francisco Regional Water System													
2021 (1st year)	767	617	957	800	1,105	1,749	394	402	881	797	718	271	9,460
2022 (2nd year)	114	162	723	152	135	194	222	238	235	209	239	256	2,880
2023 (3rd year)	406	220	890	211	555	761	709	529	776	662	213	232	6,163
2024 (4th year)	125	171	729	162	121	198	234	257	253	218	251	265	2,983
2025 (5th year)	138	182	726	167	130	206	242	266	260	226	256	269	3,068
Source 5: Groundwater Recharge[1]													
2021 (1st year)	1,064	2,034	2,253	1,657	1,549	1,104	999	1,025	722	697	866	1,508	15,480
2022 (2nd year)	-8	709	1,858	1,772	1,124	785	667	1,882	1,658	1,524	1,328	-774	12,526
2023 (3rd year)	2,705	2,526	2,137	1,332	1,296	1,175	751	664	640	631	663	1,192	15,712
2024 (4th year)	-1,198	1,861	4,192	1,171	940	1,300	1,300	869	667	702	749	906	13,460
2025 (5th year)	943	3,597	4,029	2,671	1,705	96	309	342	1,500	1,087	1,087	2,808	20,175
Source 6: Groundwater Storage[2]													
2021 (1st year)	-2,369	-1,284	654	535	1,132	1,383	2,853	2,790	2,090	1,219	740	256	10,000
2022 (2nd year)	-1,054	-1,575	-3,425	-2,005	-787	179	579	1,187	1,328	1,136	1,140	138	-3,159
2023 (3rd year)	-639	-233	126	741	214	746	1,555	1,931	1,623	1,378	1,685	650	9,777
2024 (4th year)	100	-357	-1,891	-180	-754	582	1,486	1,606	1,121	1,745	1,505	886	5,848
2025 (5th year)	-431	-1,896	-1,992	-783	154	974	722	792	1,193	1,350	1,164	-1,002	244
Source 7: Del Valle													
2021 (1st year)	0	0	0	0	0	0	0	0	0	0	0	0	0
2022 (2nd year)	0	0	0	0	0	0	0	0	0	0	0	0	0
2023 (3rd year)	0	0	0	82	0	0	0	0	0	0	0	0	82
2024 (4th year)	0	0	0	1,565	0	0	0	0	0	0	0	0	1,565
2025 (5th year)	0	104	0	1,565	2,283	0	0	0	0	0	0	0	3,953
Source 8: Desalination													
2021 (1st year)	435	681	425	411	425	411	425	425	411	425	627	0	5,100
2022 (2nd year)	671	384	702	411	425	411	425	425	411	425	411	0	5,100
2023 (3rd year)	459	658	425	411	425	411	425	425	411	425	627	0	5,100
2024 (4th year)	656	384	718	411	425	411	425	425	411	425	411	0	5,100
2025 (5th year)	587	397	773	411	425	411	425	425	411	425	411	0	5,100

Notes:

(1) Negative monthly values for Groundwater Recharge represent greater saline outflow to the San Francisco Bay than recharge to the Niles Cone from basin percolation, direct runoff, and applied water.

(2) Negative monthly values for Groundwater Storage are representative of mass balance equations that reflect optimal production schemes from the District's Production Optimization Model. Since the Niles Cone is managed based on annual sustainable yield targets, the monthly availability of groundwater is highly flexible, allowing stored water to be available in any month depending on demands.

Basis for the Supply Shortage Conditions

The District’s diverse portfolio is designed in part to help mitigate dry year shortages. Each of the District’s water supply sources has unique dry-year reliability properties and therefore stress years do not necessarily align. This variability is due to each supplies’ unique (a) hydrologic region of the state, (b) storage and dry year design reliability, (c) regulatory requirements under different year types, (d) access and conveyance challenges in dry years, and (e) prior year operations. Therefore, the DRA must consider the net reliability of all supplies in combination. To select the driest five-consecutive-year drought sequence reflective of the lowest water supply availability for the District, the DRA relies on output from the IRPM over the full 1922-2003 historical planning hydrology. Specifically, the District calculated the aggregate sum of all water supply availability for each year and then identified the lowest five-year average, which corresponded to the period 1988-1992. This 1988-1992 period therefore represents the supply shortage conditions used for the DRA analysis corresponding to the next five years, 2021-2025.

Reliability of Each Water Supply Source

The DRA reliability assessment involves characterizing the expected quantity of each water supply source for each year of the five-consecutive-year drought, as shown above in Table 9-11. However, to more fully characterize the potential uncertainties regarding the District's multiple supply sources, the following information has been provided on (1) the State Water Project (SWP), (2) San Francisco Public Utilities Commission's (SFPUC) Regional Water System (RWS), and (3) local supplies.

State Water Project Supply Reliability

SWP supply projections for 2021-2025 were taken from DWR's final 2019 State Water Project Delivery Capability Report (DCR). Specifically, the District used the Future Conditions scenario as developed in DWR's Alternate Reporting tables to estimate SWP supply availability over the DRA period from 2021-2025. The District elected to assume the more conservative Future Conditions projection for all years modeled in the DRA as it better reflects future climate change impacts and the potential full stress on the SWP, especially since the consequences of the Bay Delta Water Quality Control Plan (BDWQCP) on water supply availability have yet to be determined. According to DWR, the long-term average delivery capability for the District under the Future Conditions scenario is projected to be approximately 50% of Table A, ranging from a minimum of 9% (single dry year) to 100% (single wet year). Contractual amounts are projected to range from 9% to 50% during multiple-dry year periods and from 49% to 96% in multiple-wet year periods.

Additionally, the District has taken a conservative approach to SWP supply reliability during periods when Table A allocations are projected to be less than or equal to 10%. On January 31, 2014, at the height of the state-wide 2012-2016 drought, DWR declared a 0% Table A allocation. Although the allocation was subsequently raised to 5% in 2014, this water was not available before September 1, 2014, after the typically high summer demand season. Being situated downstream of the Sacramento-San Joaquin Delta (Delta) but upstream of the major water storage facilities of the SWP, the District was in a uniquely vulnerable position. Among other factors, this disruption of the SWP created an uncertainty surrounding the District's ability to access remotely stored supplies in the Semitropic Groundwater Storage District's groundwater banking program (Semitropic Banking) and San Luis Reservoir and led the District to declare a Water Shortage Emergency targeting 20% conservation District-wide, following plans outlined in the Water Shortage Contingency Plan. In reviewing 2014 deliveries in hindsight, approximately 99% or 10,326 AF of previously stored SWP water in San Luis Reservoir was returned to the service area according to the District's preferred schedule, and 138% or 18,624 AF of the minimum contractual recovery guarantee volume of 13,500 AF/year of stored water from the Semitropic Water Storage District (SWSD) was returned to the District, with 11,224 AF (or 83% of the 13,500 AF/year minimum recovery guarantee) returned to the service area and 7,400 AF returned to San Luis Reservoir as backup water available for the subsequent year. Despite assurances from DWR that the 2014 Delta situation is unlikely to repeat itself, the DRA Model conservatively limits surface water production to reflect less than or equal quantities of surface water produced in 2014 whenever Table A allocation is less than or equal to 10%. Similarly, total SWP volumes returned to the District on an annual basis have been limited to less than or equal to the total quantities returned in 2014 with a 5% Table A allocation, even though the lowest Table A allocation used in the DRA Model from the 2019 DCR Future Conditions scenario is 9% in 1988.

SWP water stored in the Semitropic Banking Program is subject to contractual availability and infrastructure capacity constraints. It is assumed that Semitropic supplies will be available for return in proportion to the estimated SWP allocation according to the pumpback and entitlement exchange availability stipulated in the District's contractual agreements with Semitropic. At a minimum, in all year types, the District has a minimum guaranteed volume of 13,500 AF for return to the service area. The District's Semitropic

SWP water stored in the Semitropic Banking Program is subject to contractual availability and infrastructure capacity constraints. It is assumed that Semitropic supplies will be available for return in proportion to the estimated SWP allocation according to the pumpback and entitlement exchange availability stipulated in the District's contractual agreements with Semitropic. At a minimum, in all year types, the District has a minimum guaranteed volume of 13,500 AF for return to the service area. The District's Semitropic contractual recovery potential ranges from a minimum 13,500 AF/year at a 14.2% Table A allocation or less up to 33,450 AF/year at a 100% Table A allocation.

The availability of San Luis Carryover water, also known as Article 56(c) water, is directly tied to annual SWP allocations as well as the District's outstanding balance of SWP stored water. Specifically, San Luis Carryover water availability is directly dependent on the District's prior-year usage of SWP water and is subject to the District's contractual agreements with DWR governing its participation in the state project.

San Francisco Public Utilities Commission's Regional Water System Supply Reliability

SFPUC supply projections included in the 2021-2025 DRA analysis were based upon the "Water Supply Agreement between the City and County of San Francisco and Wholesale Customers in Alameda County, San Mateo County and Santa Clara County" entered in July 2009 (WSA), and which was subsequently amended and restated in 2018-2019. The WSA provides for a 184 mgd "Supply Assurance" to the wholesale customers, subject to reduction in the event of a water shortage due to drought, emergencies, or the malfunctioning or rehabilitation of the SFPUC RWS. The WSA is supplemented by an Individual Water Sales Contract. These contracts provide for a 184 mgd Supply Assurance to the SFPUC's wholesale customers collectively. In July 2009, in connection with the WSA, the wholesale customers and SFPUC also adopted a Water Shortage Allocation Plan (WSAP) to allocate water from the RWS to retail and wholesale customers during system-wide shortages. The WSAP has two tiers, the "Tier One Plan," which allocates water between SFPUC and the wholesale customers collectively for RWS shortages of less than 20%; and the "Tier Two Plan," which allocates the collective wholesale customer share among the wholesale customers of 20%. The District's Individual Supply Guarantee (ISG) is 13.76 mgd (approximately 15,400 AF/year).

Additionally, SFPUC has provided the District with a water supply reliability dataset[3] that reflects the ability to meet its current full contractual obligation over a planning hydrology period that fully overlaps the SWP planning hydrology. This dataset includes compliance with the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan (Bay-Delta Plan) 40% unimpaired flow (UF) requirement. Although there remain ongoing uncertainties associated with legal challenges and the development of Voluntary Agreements regarding the adopted Bay-Delta Plan amendments, the District has incorporated the 40% UF criterion into its DRA Model for SFPUC RWS supply availability. Lastly, the DRA Model incorporates the "Tier Two" water supply shortage criteria for wholesaler customers to further refine water supply availability for the five-year-consecutive drought sequence. The net result is the District's "modified 40% UF" dataset, a conservatively low SFPUC RWS water supply availability assumption used in the DRA analysis. It should also be noted that the SFPUC RWS supply reliability data, as provided by SFPUC, does not include the known impacts of climate change.

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[3] SFPUC's 2017 comment letter on Phase 1 of the Bay Delta Plan reflecting reliability under 40% unimpaired flow criteria, entitled "Comments to the Draft Substitute Environmental Document in Support of Potential Changes to the Bay-Delta Plan."

Local Supply Reliability

The amount of local water supplies available to the District from Del Valle Reservoir and fresh groundwater sources varies widely from year to year, depending primarily on hydrologic conditions and availability of local runoff. Del Valle Reservoir and local runoff supply availability is estimated from the local historical hydrologic record which extends from 1872 through the present. In the DRA Model, the historical hydrology during the 1988-1992 drought is used to estimate supply availability.

In general, desalination of brackish groundwater provides a more reliable water source than other local supplies. However, there may be limitations to this source if groundwater levels are lowered to the extent that a reduction in Aquifer Reclamation Program (ARP) pumping is required to prevent new saltwater intrusion. The District's conjunctive use program allows for the temporary drawdown of the Niles Cone during droughts, as low as 5 feet below mean sea level in the Newark Aquifer forebay indicator well. Groundwater level criteria and storage criteria based on the District's conjunctive use management of the Niles Cone are built into the DRA Model as described in the "Data and Methods" section of the DRA.

In addition to groundwater well production used to supply the District's potable distribution system and to support the District's ARP, the local groundwater basin also supports demands for private well owners ("private pumping") and saline outflows to the San Francisco Bay. These additional demands on the groundwater system are collectively termed "Total Groundwater Demands" and are subtracted from the Total Recharge that enters the groundwater basin, which is comprised of groundwater percolation of rainfall, applied water, recharge from SWP and Del Valle Reservoir supplies, and "Other Outflows" as described in the District's annual Groundwater Survey Reports. Using this methodology, the District conservatively uses groundwater availability assumptions of only 10,000 AF/year of dry year storage from the District's conjunctive use groundwater management program as well as only 5,100 AF/year of brackish groundwater desalination. This management practice is further described in the District's most recent annual Survey Report on Groundwater Conditions and the District's Sustainable Groundwater Management Act (SGMA) Annual Report.

The impact of climate change on local supplies is not included in supply reliability analyses of the DRA. Local supply modeling is currently limited by the ability to downscale GCM data to the scale of Alameda Creek watershed, as well as the capability of the District's groundwater model to simulate sea-level rise and the potential impacts that it will have on seawater intrusion into the Basin. The District is currently developing new tools to better analyze the impact of projected local climate change conditions on the Niles Cone water budget. As part of the first five-year update of its Alternative to a Groundwater Sustainability Plan under SGMA, the District is upgrading its existing groundwater model to provide a planning tool for ongoing management of the Basin under current and forecasted climate conditions. Upgrading the groundwater model will improve modeling capability to account for sea-level rise, surface water/groundwater interactions, and other new hydrogeologic information will significantly improve its reliability under expected future climate conditions.

Additional information on SWP, SFPUC, and local supply reliability can be found in Chapter 3 and Appendix B of the UWMP.

Comparison of Total Water Supplies and Uses During the Five-year Drought

The District's DRA analysis is presented in Table 9-12 and provides a comparison of its total water supply (Table 9-11) and gross water use (Table 9-9) on a monthly time-step. Tables 9-9, 9-11, and 9-12 are all based on DWR's optional Planning Tool and have an identical methodology to DWR's new Submittal Table

7-5. However, it should be noted that Table 9-11 in the DRA and the Submittal Table 7-5 in Appendix G of the 2020-2025 UWMP differ slightly from Table 9-4 and Submittal Table 7-4 in Appendix G, as the DRA Table 9-11 and the Submittal Table 7-5 include ongoing COVID-19 pandemic impacts in the 2021 demand projection on the water use side and their own water supply modeling (the DRA Model) reflective of actual water supply storage conditions as of January 1, 2021.

The District's DRA reveals that its supply capabilities are expected to exceed its projected water use for the next five years, from 2021-2025, under a repeat of a five-consecutive-year drought based on the driest five-year historical drought sequence for the District's water supply. As detailed in Chapter 10 of the UWMP, the District has in place a robust Water Shortage Contingency Plan (WSCP) and comprehensive shortage response planning that includes demand reduction measures and supply augmentation actions. This WSCP could also be triggered in case of more frequent or severe drought. However, since the District's DRA shows a potential surplus in all months and in all years for the period from 2021 to 2025, no water service reliability concern is anticipated, and no shortfall mitigation measures are expected to be exercised over the next five years. The District will periodically revisit its representation of both individual supply sources and of the gross water use estimated for each year and will revise its DRA if needed.

Table 9-12
5-year Drought Risk Assessment Based on DWR's Optional Planning Tool (Volumes in AF)

2021	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Total
Gross Water Use [Use Worksheet]	2,795	2,543	3,139	3,097	3,938	4,413	4,744	4,781	4,277	4,190	3,358	3,014	44,290
Total Supplies [Supply Worksheet]	3,817	3,731	4,289	4,371	5,210	5,614	6,003	5,974	5,394	5,136	4,517	3,367	57,422
Surplus/Shortfall w/o WSCP Action	1,022	1,188	1,150	1,274	1,272	1,201	1,259	1,193	1,117	946	1,158	353	13,132
Planned WSCP Actions (use reduction and supply augmentation)													
WSCP - supply augmentation benefit													0
WSCP - use reduction savings benefit													0
Revised Surplus/(shortfall)	1,022	1,188	1,150	1,274	1,272	1,201	1,259	1,193	1,117	946	1,158	353	13,132
Resulting % Use Reduction from WSCP action	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2022	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Total
Gross Water Use [Use Worksheet]	2,610	2,532	2,597	3,023	3,641	4,197	4,532	4,663	4,542	4,149	3,614	3,084	43,184
Total Supplies [Supply Worksheet]	3,656	3,245	3,762	3,854	4,886	5,429	5,883	6,015	5,842	5,293	4,684	3,610	56,159
Surplus/Shortfall w/o WSCP Action	1,046	712	1,165	832	1,245	1,233	1,351	1,352	1,300	1,144	1,069	526	12,975
Planned WSCP Actions (use reduction and supply augmentation)													
WSCP - supply augmentation benefit													0
WSCP - use reduction savings benefit													0
Revised Surplus/(shortfall)	1,046	712	1,165	832	1,245	1,233	1,351	1,352	1,300	1,144	1,069	526	12,975
Resulting % Use Reduction from WSCP action	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2023	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Total
Gross Water Use [Use Worksheet]	2,638	2,560	2,625	3,056	3,680	4,241	4,580	4,712	4,590	4,193	3,653	3,118	43,646
Total Supplies [Supply Worksheet]	3,597	3,773	3,578	4,119	4,773	5,302	5,723	5,832	5,659	5,093	4,754	3,406	55,607
Surplus/Shortfall w/o WSCP Action	959	1,213	952	1,063	1,093	1,061	1,143	1,121	1,069	900	1,101	288	11,961
Planned WSCP Actions (use reduction and supply augmentation)													
WSCP - supply augmentation benefit													0
WSCP - use reduction savings benefit													0
Revised Surplus/(shortfall)	959	1,213	952	1,063	1,093	1,061	1,143	1,121	1,069	900	1,101	288	11,961
Resulting % Use Reduction from WSCP action	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

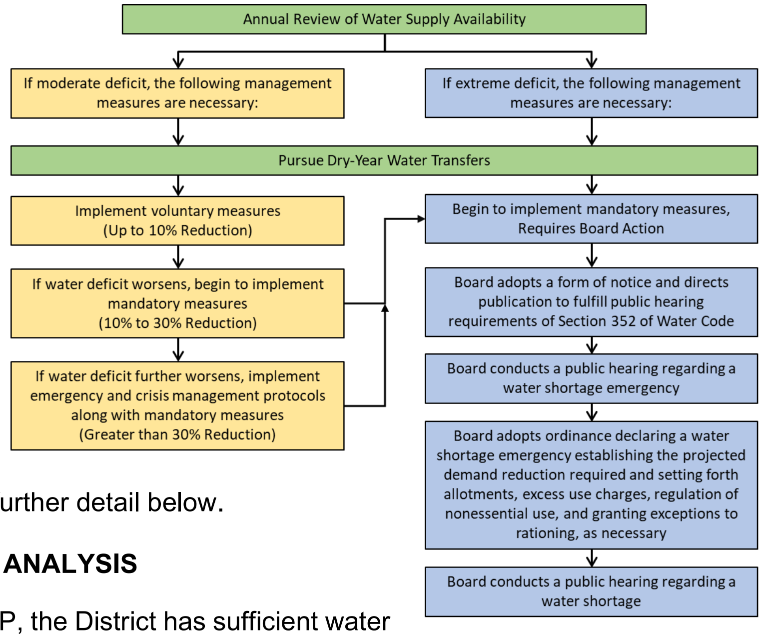
2024	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Total
Gross Water Use [Use Worksheet]	2,668	2,589	2,655	3,091	3,721	4,288	4,630	4,763	4,640	4,239	3,693	3,152	44,129
Total Supplies [Supply Worksheet]	3,672	3,231	3,748	3,129	4,001	5,280	5,728	5,440	4,662	5,087	4,482	3,389	51,848
Surplus/Shortfall w/o WSCP Action	1,004	642	1,093	38	280	992	1,098	677	21	848	788	237	7,719
Planned WSCP Actions (use reduction and supply augmentation)													
WSCP - supply augmentation benefit													0
WSCP - use reduction savings benefit													0
Revised Surplus/(shortfall)	1,004	642	1,093	38	280	992	1,098	677	21	848	788	237	7,719
Resulting % Use Reduction from WSCP action	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2025	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Total
Gross Water Use [Use Worksheet]	2,699	2,620	2,687	3,128	3,766	4,340	4,687	4,821	4,697	4,290	3,738	3,190	44,665
Total Supplies [Supply Worksheet]	3,586	3,348	3,535	4,031	4,697	4,355	5,688	5,815	5,655	5,086	4,483	3,408	53,687
Surplus/Shortfall w/o WSCP Action	887	728	848	903	931	15	1,001	994	958	795	746	217	9,022
Planned WSCP Actions (use reduction and supply augmentation)													
WSCP - supply augmentation benefit													0
WSCP - use reduction savings benefit													0
Revised Surplus/(shortfall)	887	728	848	903	931	15	1,001	994	958	795	746	217	9,022
Resulting % Use Reduction from WSCP action	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

CHAPTER 10 WATER SHORTAGE CONTINGENCY PLAN

This document provides the Alameda County Water District's (the District or ACWD) Water Shortage Contingency Plan (WSCP), as required under the Urban Water Management Planning Act. Beginning in 2020, the WSCP is required to be a separately prepared and adopted Plan by the District and to be included in the 2020-2025 UWMP. While shortages and disruptions can come in many forms, the purpose of the WSCP is to detail the generalized actions that the District would take in an actual emergency under various degrees of severity. The general steps followed in such an emergency are outlined in Figure 10-1 and described in further detail below.

Figure 10-1
Water Shortage Contingency Plan



10.1 WATER SUPPLY RELIABILITY ANALYSIS

As documented in Chapter 9 of the UWMP, the District has sufficient water supplies to meet the normal year demands for both today's and tomorrow's customers, but deficiencies (shortages) can occur as a result of dry winter weather or from an extended interruption of imported supplies. The District's diverse water supply portfolio draws on supplies from multiple hydrologic regions of California and helps mitigate these impacts through optimization of integrated management centered on maintaining appropriate local storage in the Niles Cone Groundwater Basin (Niles Cone). It is anticipated that these integrated operations will experience supply shortfalls of 10% to 20% for single, critically dry or extended, multiple dry year periods on predictably recurrent intervals based on historic hydrology as well as modelled future hydrology including the near-term effects of climate change.

Under normal circumstances the Niles Cone provides the storage capacity needed to protect against short-term water supply deficiencies or disruptions. The Newark Aquifer, the upper aquifer of the Niles Cone, is subject to saltwater intrusion if inland groundwater levels drop and remain below sea-level for a prolonged period. Therefore, to protect the Niles Cone and the freshwater supplies it contains, the District manages all its water supplies every year to maintain target levels in the aquifer. This practice helps mitigate the risk of overdependence on imported supplies from the Delta, one of the most vulnerable links in the District's water supply system. It also allows the Niles Cone groundwater level to be used as the key indicator of the health of the entire water supply portfolio; any potential supply shortfall or other water supply emergencies will eventually appear in the form of lower water levels in the Newark Aquifer.

Depending on the projected groundwater levels, the District will take actions to protect local groundwater. Typical actions the District will take to maintain appropriate levels include: (1) maximizing the import of additional water for artificial recharge of the groundwater basin; (2) reducing use of local groundwater; and, (3) maximizing use of imported supplies. The ability of the District to maintain groundwater levels after these incremental actions have been taken will indicate the potential stage of water supply shortfall and correlated level of reductions the District may need to achieve, as further discussed in Section 10.3.

In addition to anticipated droughts, the potential exists for catastrophic interruptions of imported or local water supplies that could result in significantly greater shortages and the District may be required to declare a water shortage emergency. A catastrophic loss of supply or access to supply could come from any number of foreseeable or unforeseeable events. Frequently identified factors that could contribute to a severe disruption of water supply include:

- Regulatory Action that reduces or curtails delivery of water
- Extreme hydrology
- Failure of the Sacramento-San Joaquin Delta or other critical infrastructure
- Large magnitude earthquake affecting multiple sources of supply and transmission
- Malevolent event — Intentional sabotage of distribution system infrastructure
- Significant water quality impact to imported water supply impacting its suitability for the District's uses.

In such an event, the District will enact its WSCP at the appropriate level needed to address the water supply shortage in stages of up to and in-excess of 50%.

10.2 ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES

Pursuant to CWC Section 10632(a)(2), the District must include in its WSCP the procedures used for conducting an annual Water Supply and Demand Assessment (WSDA, "annual assessment"). The WSDA is a determination of the near-term outlook for supplies and demands and how a perceived shortage may relate to WSCP shortage stage response actions in the current calendar year. This determination is based on information available to the District at the time of the analysis. Starting in 2022, the WSDA will be due by July 1 of every year. CWC Section 10632.1 states: "An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later." The WSDA and related reporting are to be conducted based on the supplier's procedures described in the WSCP.

Data and Methodologies for the WSDA

The WSDA determination will be based on considerations of available core water supplies, unconstrained water demand, planned water use, infrastructure conditions, and any other locally applicable factors deemed relevant by the District. The balance between projected core water supplies and anticipated unconstrained demand will be used to determine what, if any, shortage stage is expected under the WSCP framework. CWC Section10632(a)(2)(B)(ii) requires the WSDA to determine "current year available supply, considering hydrological and regulatory conditions in the current year and one dry year." The WSDA will include two separate estimations of the District's annual water supply and unconstrained demand using 1) current year conditions, and 2) assumed dry year conditions. Accordingly, the WSDA's shortage analysis will present separate sets of findings for the current year and dry year scenarios.

Evaluation Criteria for the WSDA

The District will rely on its existing water supply modeling and reporting processes to complete the annual WSDA requirements. All WSDA evaluation criteria will be based on the current year anticipated water supply shortage determination from the WSDA. If a shortage is identified for the current year conditions, then the procedures outlined in the District's WSCP for that level of shortage will be followed. Otherwise, no actions will be triggered.

Water Supply for the WSDA

The District's sources of supply include water from the State Water Project (SWP), the San Francisco Public Utilities Commission (SFPUC), the local Niles Cone Groundwater Basin, inflow to Lake Del Valle (LDV) under the District's water right, water deliveries from the Semitropic Water Storage District (SWSD) pursuant to the District's water storage banking agreements, as well as other temporary purchase agreements such as the Dry Year Transfer Program available through the State Water Contractors (SWC). For the current year, allocation of each supply will be determined based upon existing contractual quantities and up-to-date allocations as of the month of WSDA preparation. For the subsequent year, allocation quantities for each supply will reference the single critical dry year water supply as reported in the most current UWMP, as these water supply availabilities represent the single driest year of record.

Unconstrained Customer Demand for the WSDA

For the current year, the District's WSDA modeling will use the most recent reported production demands for the months preceding the month of WSDA preparation. For the remainder of the current year as well as for the subsequent dry year, the District will rely on its most recent two-year Demand Projection, which incorporates the previous three calendar years of reported production data and makes additional projection adjustments for recent demand factors such as weather, growth, water use efficiency, and drought rebound (as applicable), as well as any other influencing factors, such as the Alameda County Shelter-in-Place Orders in response to the COVID-19 pandemic, as needed. The District's demand projection methodology will use sound engineering judgement in the development of future Demand Projections, and the specifics will likely vary from year-to-year depending on current conditions and trends in historical data.

Planned Water Use for Current Year and Subsequent Dry Year for the WSDA

For planned water use data for the current year, the WSDA modeling input will use the most recent data of reported water deliveries prior to the month of WSDA preparation, as well as the most up-to-date projections of contractually available water supplies for the remainder of the current year. For the subsequent dry year, the WSDA modeling will rely on data for the single critical dry year from the most current UWMP for single dry year water supply, as these conditions represent the single driest year of record.

Infrastructure Considerations for the WSDA

The District's WSDA modeling will use a model that implicitly considers infrastructure, distribution, and storage system constraints to determine overall water supply utilization and production at each water production facility based on specified demand levels. The output from the WSDA modeling will include 1) optimal monthly production schedules for a two-year forecasting period, and 2) anticipated monthly groundwater levels for a two-year forecasting period.

Decision-Making Process for the WSDA

During or before the month of May, the District's staff will present a completed WSDA for approval by District's Board of Directors or by the Board's authorized designee with expressly delegated authority for approval of WSDA determinations. This presentation to the decision-making body will include a request that the approval of the WSDA determination also appropriately triggers any recommended specific shortage response actions resulting from the assessment. Upon approval, the District's staff will then formally submit the WSDA to the California Department of Water Resources by July 1.

10.3 SIX STANDARD WATER SHORTAGE LEVELS

As required under Water Code Section 10632(a)(3) the District's WSCP conforms to six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages, and greater than 50 percent shortage. These shortage levels also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, or other potential emergencies.

In the event of a water supply shortfall, the first priority is given to assuring public health and safety needs are able to be met. Once those goals are established, the District first looks toward reductions in outdoor use, followed by residential indoor use, and finally commercial indoor use. Table 10-1 shows a typical sensitivity analysis for demand reduction by 'end-use' category and by drought stage, reflecting the estimated billed water consumption under projected CY 2040 demand.

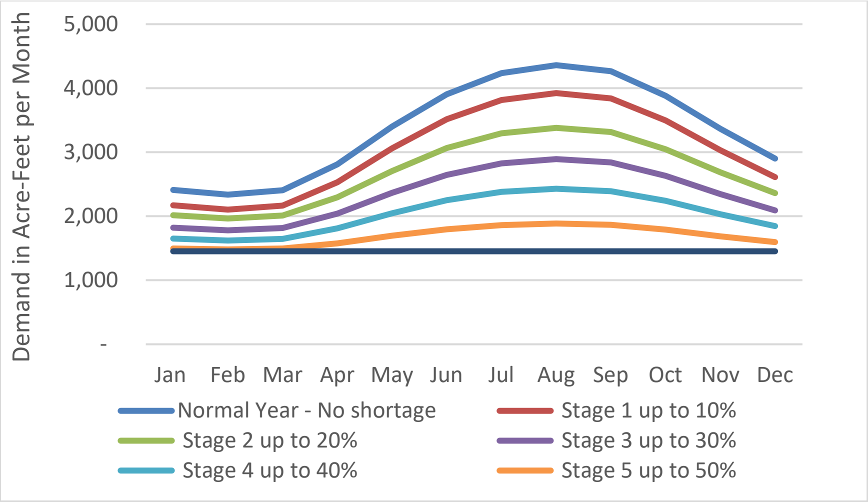
Table 10-1
Example Application of WSCP Drought Stage for 2040 Demands

	Base Demand	**Stage 1**		**Stage 2**		**Stage 3**		**Stage 4**		**Stage 5**		**Stage 6**	
Level of Supply Shortage	none	Up to 10%		Up to 20%		Up to 30%		Up to 40%		Up to 50%		Greater than 50%	
Required conservation by end use	N/A	%	Acre Feet	%	Acre Feet	%	Acre Feet	%	Acre Feet	%	Acre Feet	%	Acre Feet
Residential[1]	19,600	10%	1,960	15%	2,940	25%	4,820	25%	4,820	28%	5,490	35%	6,860
Business & Industrial[1]	6,400	10%	640	15%	960	18%	1,150	18%	1,150	18%	1,150	20%	1,280
Institutional[1]	400	10%	40	15%	60	18%	70	18%	70	18%	70	20%	80
Outdoor	15,900	10%	1,590	30%	4,690	40%	6,420	70%	11,050	90%	14,310	100%	15,900
Total Demand (AF)	*42,300*	*38,100*		*33,700*		*29,800*		*25,200*		*21,300*		*18,200*	
Required net reduction	*N/A*	4,200		8,600		12,500		17,100		21,000		24,100	
Net Reduction	*0%*	*10%*		*20%*		*30%*		*40%*		*50%*		*57%*	
Equivalent Demand in gpcd[2]	*107*	*96*		*85*		*75*		*64*		*54*		*46*	
Equivalent Residential Demand in gpcd[2]	*50*	*45*		*42*		*37*		*37*		*36*		*32*	

Notes:
All customer 2040 projected water use rounded to nearest 100 AF for sums; all end use subcategories rounded to the nearest 10 AF.
(1) Estimated Indoor use, does not include water use for seasonal outdoor
(2) Includes 9.7% unaccounted for water loss.

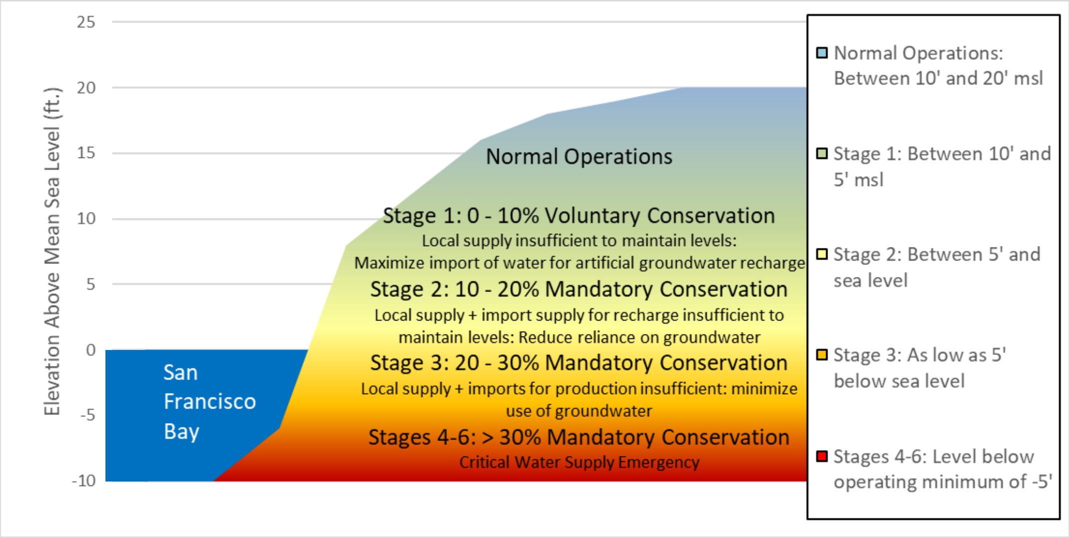
The result of these six stages is a gradual 'flattening' of the seasonal demand for water as illustrated in Figure 10-2. In normal years, seasonal water use has a bell-shaped curve associated with it, increasing in the summer or "peak irrigation" season. As the stages increase from one to six, the water use pattern "flattens" as outdoor use becomes further restricted. What remains is the essential water use.

Figure 10-2
Example Application of WSCP Drought Stage for 2040 Demands



The Water Code requires the District to define these shortage levels based on water supply and groundwater conditions. As discussed in Section 10.1, the Niles Cone is typically used as the indicator of health for the entire integrated system. Under anticipated drought-induced shortages, the level of shortage corresponds loosely to groundwater levels in the Niles Cone. Figure 10-3 summarizes the water supply conditions associated with groundwater levels as well as the approximate stage of water shortage and associated management measures taken. However, due to the complexity of the District's integrated water supply system and the interdependence of many operations, local groundwater conditions may not be the only indicator of a healthy water supply. Accordingly, groundwater levels do not necessarily indicate the need to trigger the WSCP as may be the case for a solely groundwater-dependent agency. Similarly, a catastrophic event that impacts imported supplies could result in declaration of a water shortage emergency even if local groundwater levels are robust.

Figure 10-3
Water Shortage Response Based on Local Groundwater Levels



10.4 SHORTAGE RESPONSE ACTIONS

The following is a discussion of options that the District can utilize to offset the impacts of water supply shortages.

Supply Augmentation

As described in Section 10.1 Water Supply Reliability Analysis, the District attempts to manage all of its water supplies to maintain target levels in the Niles Cone. Locally appropriate groundwater supply augmentation and operational changes to achieve this includes the following: maximizing imported supply for treatment and delivery, maximizing imported supply to supplement recharge of the Niles Cone, and the recovery of offsite banked water. These actions are all aspects of normal water supply management during shortages as discussed in Chapter 9.

In a severe water shortage emergency, the District may consider temporary additional drawdown of the Niles Cone to even lower than 5 feet below mean sea level to meet short-term demands. Any drawdown past 5 feet below mean sea level would constitute supply augmentation as this water supply is not considered normal water supply management during shortages.

In addition to these actions the District also pursues supplemental water through dry-year water transfers but does not rely on them as a means of meeting reliability thresholds.

Demand reduction

In the event of a water shortage emergency, the District will first determine the amount of demand reduction necessary to responsibly manage the water supply under current and foreseeable conditions. The District will then enact a program that will include actions required by each customer group. The Water Shortage Contingency Plan for each stage of shortage, illustrated in Table 10-1, are described in Tables 10-2a through 10-2f.

Table 10-2a
Stage 1 (Voluntary) Water Shortage Contingency Plan
Minimal Shortage (Up to 10%)

Stage Description

Begin voluntary conservation request for all customers, indoor, and outdoor use.

Estimated Residential Indoor GPCD: 45

District Actions

- Request voluntary water conservation.
- Initiate public information campaign regarding water supply shortages; explain other water shortage stages and forecast potential future action.
- Engage and inform local governments, community groups, and other stakeholders.
- Develop a "Drought Resource Center" on the District's website.
- Prepare and disseminate educational brochures, bill inserts/messages, newsletters, and other drought outreach materials.
- Send technical information to specific customer types regarding ways to save water.
- Attend community events/meetings to provide information.
- Evaluate need for implementation of Stage Rates; initiate a Proposition 218 process, if needed.
- Add additional actions, as needed, to coordinate with any State regulations/requirements.

Customer Actions

All Customers

- Implement voluntary water use reductions (water use efficiency improvements and behavior changes).
- Utilize the District's AMI customer portal to track usage.
- Identify and prevent any wasteful uses of water.
- Identify additional water use efficiency opportunities.

Residential

- Participate in the District's water use efficiency programs to increase efficiency of homes.

Business/Industrial, Cities/Schools

- Educate employees to reduce water use at work.
- Participate in the District's water use efficiency programs to increase efficiency of facilities.
- Research water use efficiency improvements and potential reuse options.
- Improve industrial process efficiencies (e.g., cooling towers, etc.).

Enforcement

- Educational letters, mailers, calls, and emails.
- Accelerate water waste tracking, monitoring and enforcement using existing water waste ordinance (Appendix D of the 2020 UWMP).
- Use AMI to track overall usage trends to ensure reductions are occurring and accelerate high use and leak notifications and alerts.

Table 10-2b
Stage 2 (Mandatory) Water Shortage Contingency Plan
Moderate Shortage (Up to 20%)

Stage Description

Begin mandatory conservation request and enforcement; focus enforcement on outdoor use and eliminating water waste; encourage adoption of water efficient landscaping.

Estimated Residential Indoor GPCD 42

District Actions

Implement all actions in Stage 1 plus some or all of the following, as necessary to meet the District's reduction target:

- Adopt and enforce a Water Shortage Emergency Ordinance (WSE Ordinance) banning wasteful uses of water and limiting other uses. Prohibitions and restrictions will include existing prohibitions such as:
  - prohibiting excessive run-off from irrigation and other activities,
  - prohibiting the use of a hose without a shut-off nozzle,
  - requiring that leaks are fixed as soon as practicable,
- plus additional prohibitions and restrictions (depending on the conservation reduction target) such as:
  - prohibiting hosing down paved surfaces,
  - prohibiting the use of non-recirculating water features[1],
  - prohibiting draining and then refilling pools,
  - restricting landscape water use (e.g., limiting the number of days per week customers can irrigate, and/or time of day, and/or only allowing irrigation on specific days).
- Consider setting allocations/budgets and/or restrictions by customer type and/or water use type (e.g., landscape meters).
- Request consumer water use reductions at prescribed levels.
- Initiate Proposition 218 process if not done previously and consider implementation of the applicable Stage Rate.
- Consider additional fines or surcharges for excessive water users.
- Accelerate the public information campaign.
- Coordinate drought actions and programs with service area cities.
- Encourage the use of a drought budget (based on ET) for landscape watering.
- Cross-train District staff to interact with and inform the public, especially on leak detection and irrigation issues.
- Conduct water audit program to increase the efficiency of District operations to ensure adequate supply and minimize losses.
- Minimize hydrant flushing.
- Expand outdoor water use efficiency programs – use AMI to target appropriate customers for these programs: water-efficient landscape rebates (to remove lawns), weather-based irrigation controllers, encouraging the application of mulch and compost in landscapes.
- Add additional actions, as needed, to comply with State regulations/requirements.

Customer Actions

Implement all actions in Stage 1 plus:

All Customers

- Adhere to WSE Ordinance, allocations/budgets, or other use reduction requests; request an exception if hardship or a health and safety issue arises.
- Implement all practical water use efficiency changes at home and at work – for example: replace old inefficient fixtures and devices.
- Do not drain and refill pools except where a health and safety issue exists.
- Implement the use of water recapture/rain catchment systems, if feasible.

Commercial/Industrial, Cities/Schools

- Utilize a drought budget (based on ET) for landscape watering.

Enforcement

All actions in Stage 1 plus:

- Educational letters, mailers, calls, and emails; site visits if necessary, with warnings.
- Use AMI to identify excessive users that may be in violation of WSE Ordinance restrictions/prohibitions.
- Possible termination of water service and/or fines if not in compliance with WSE Ordinance.
- If water shut-off, pay reconnection fee and other fines to reinstate service.

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[1] See Section 10.11 SPECIAL WATER FEATURE DISTINCTION

Table 10-2c
Stage 3 (Mandatory) Water Shortage Contingency Plan
Severe Shortage (Up to 30%)

Stage Description

Intensify mandatory conservation. Most reductions will be from irrigation limits and other outdoor use limits, some additional reduction for indoor residential, less impact on businesses. Really push customers to adopt water efficient landscaping. Well maintained lawns are stressed/look brown but can survive until winter rains, water efficient landscapes and trees should remain healthy.

Estimated Residential Indoor GPCD: 37

District Actions

Implement all actions in Stages 1 and 2 plus some or all of the following, as necessary to meet the District's reduction target:

- Adopt Base Consumption Allowance for each customer class and establish excessive use/overage charges, fines and/or penalties.
- Advise area planning staffs of possible short-term (temporary) inability to supply new developments/annexations due to shortages to existing customers and/or require new developments to implement extreme (but proven) water use efficiency measures.
- Expand the District's water audit and leak detection program.
- Only essential outdoor water use at District facilities.
- Flush mains in emergency situations only.
- Fire hydrant flow testing in critical situations only.
- Intensify outreach for outdoor water use efficiency programs targeting lawns and other high water use plants in favor of water efficient landscapes.
- Add additional actions, as needed, to comply with State regulations/requirements.

Customer Actions

Implement all actions in Stages 1 and 2 plus:

All Customers

- Make additional behavior changes to further reduce indoor use (shorten or skip showers, flush toilets sparingly "let it mellow").
- Further limit landscape watering, only irrigate with drip or low flow/efficient systems, no overspray type irrigation allowed, except where an exception has been granted; encourage hand watering only.
- Turn off all water features.
- Cover all pools.

Commercial/Industrial, Cities/Schools

- Conduct an internal audit of all water use and provide a summary of findings that identifies non-efficient uses/equipment, opportunities for on-site water reuse, and demonstrates efforts to improve efficiencies.
- For restaurants/food service facilities, serve water on request only.
- For hotels/hospitality businesses, provide guests the option to not have their linens laundered.

Enforcement

- All actions in Stages 1 and 2 plus:
- Use of AMI to monitor allocations and compliance with the Base Consumption Allowances.
- Send warnings to customers over their allowance and bill for overages.

Table 10-2d
Stage 4 (Mandatory) Water Shortage Contingency Plan
Critical Shortage (Up to 40%)

Stage Description

Severely dry conditions, no lawn irrigation allowed but minimal irrigation for trees and native plants is allowed to keep them alive.

Estimated Residential Indoor GPCD: 37

District Actions

Implement all actions in Stage 1, 2, and 3 plus some or all of the following, as necessary to meet the District's reduction target:

Intensify all District actions.

- Net zero water demand increase by new developments during the water shortage.
- Revisit WSE Ordinance, allowances, etc. for modification to meet reduction targets.
- Add additional actions, as needed, to comply with State regulations/requirements.

Customer Actions

Implement all actions in Stage 1, 2, and 3 plus:

All Customers

- Severely limit landscape watering to no more than one day per week in the hottest part of the summer using drip only or hand watering, to preserve trees and native plants. Encourage irrigation from water reuse/rain catchment systems only.
- No car washing unless water is from a reuse or rain catchment system.
- Monitor water meters for spikes in use to avoid fines and penalties for excessive use.
- Pools covered and refilled with tank truck services only if health and safety concerns.
- No use of potable water for street cleaning.
- Intensify water reuse

Enforcement

All actions in Stage 1, 2, and 3 plus:

- Intensify use of AMI for monitoring excessive use.
- Augment water waste and excessive use monitoring with water waste patrols.

Table 10-2e
Stage 5 (Mandatory) Water Shortage Contingency Plan
Critical Shortage (Up to 50%)

Stage Description

No irrigation. All outdoor use is for health and safety only. Moratorium on development. Additional quality of life adjustments for extreme conditions.

Estimated Residential Indoor GPCD: 36

District Actions

Implement all actions in Stage 1, 2, 3, and 4 plus some or all of the following, as necessary to meet the District's reduction target:

- Intensify all District actions.
- By Ordinance, no potable water can be used by landscape meters.
- No new developments, new water service connections or expanded services unless health and safety issue.
- Revisit WSE Ordinance, allowances, etc. for modification to meet reduction targets.
- Add additional actions, as needed, to comply with State regulations/requirements.

Customer Actions

Implement all actions in Stage 1, 2, 3, and 4 plus:

All Customers

- No landscape watering.
- No car washing.
- Water reuse / rain catchment for flushing toilets only.

Enforcement

- Continue and intensify all actions in Stage 1, 2, 3, and 4.

Table 10-2f
Stage 6 (Mandatory) Water Shortage Contingency Plan
Critical Shortage (Greater than 50%)

Stage Description
Severe emergency – only essential use allowed. Many connections are compromised. District will likely need to repair and fix mains. All customers extremely impacted - some are without any water, or water is limited in duration/time available, and may need to be delivered in trucks. This stage impacts businesses the most. **Estimated Residential Indoor GPCD:** 32
District Actions Implement all actions in Stage 1, 2 3, 4, and 5 plus some or all of the following, as necessary to meet the District's reduction target: Intensify all District actions. • Consider water service shut offs and rolling "dry" periods (limited service). • Revisit WSE Ordinance, allowances, etc. for modification to meet reduction targets. • Add additional actions, as needed, to comply with State regulations/requirements.
Customer Actions Implement all actions in Stage 1, 2, 3, 4, and 5 plus: **All Customers** • Only essential uses of water for health and safety.
Enforcement • Continue and intensify all actions in Stage 1, 2, 3, 4, and 5, if needed. • In extreme emergency operations mode so some enforcement actions may not be relevant at this point.

Operational changes

The District may intentionally operate the Niles Cone at lower elevations during a drought in order to reduce the subsurface outflow of water to the San Francisco Bay aquifer.

A blending facility which blends softer San Francisco Regional Water System supplies with harder groundwater has been in operation since 1992. This facility helps the District achieve its hardness goals by creating an equalized level of taste and hardness for all District customers. However, under severe drought or emergency situations when sufficient San Francisco supplies are not available, the hardness criteria may be relaxed and additional, higher hardness groundwater may be utilized.

In a severe drought or water shortage emergency, as documented in the District's Integrated Resources Planning Study, the District may allow the Niles Cone's groundwater elevation to be temporarily drawn down more than 5 feet below mean sea level.

Additional Mandatory Restrictions

As included in Tables 10-2a to 10-2f, all stages of the WSCP include mandatory restrictions on certain non-essential or wasteful uses of water.

Emergency Response Plan

Drought is an expected condition in the State of California, and the District anticipates shortages of up to 20% based on historic hydrology as well as modelled future hydrology including the near-term effects of climate change. Shortfalls above 20% are considered to be those associated with a catastrophic loss of supply or access to supply stemming from any number of foreseen emergencies, though most commonly assumed a maximum probability earthquake on any number of critical faults crossing the District's water supply sources or system. In the event of a catastrophe, the District will enact the appropriate measures from its Emergency Response Plan (Jacobs and ELWELL Consulting Group, 2020) to address the specific occurrence.

Seismic Risk Assessment and Mitigation Plan

The Hayward Fault runs through the District service area, and seismologists say there is a 31 percent chance of an earthquake of at least magnitude 6.7 along the fault in the next 30 years. The Calaveras and San Andreas faults, as well as other known and suspected fault systems, are also nearby and could cause damaging quakes in the District service area. Damage from an earthquake has the potential to rupture water lines and cut off electrical power, in turn creating the possibility of water service disruption and water contamination.

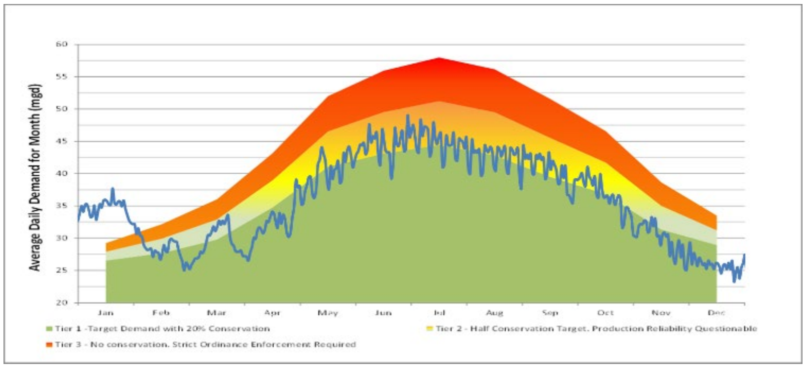
The District has taken, and continues to take, actions to minimize the impacts of a large earthquake on its system in accordance with its 2008 Seismic Vulnerability Assessment and related studies and planning. Such actions include:

- Maintaining water supply, production, and storage facilities on both sides of the Hayward Fault.
- Strengthening water mains that cross the Hayward Fault to withstand a major earthquake.
- Installing special valves and flexible tubing at fault crossings to create emergency bypass functionality in the event of a rupture.
- Installing isolation valves in case of a water main failure or water contamination
- Seismic retrofitting of storage tanks and reservoirs as well as connections piping.
- Invested in mobile and stationary generators that can produce enough electricity to continue 75% of average water production during an extended power outage.
- Establishing emergency reliability partnerships and linked piping to our neighboring water systems.
- Investing millions in funding annually in the renewal, replacement, and seismic improvements to, aging and vulnerable water mains and water storage facilities in accordance with its Main Renewal and Seismic Upgrades Program.

Additional information on the District's preparation ahead of an emergency can be found in the "Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan" (Tetra Tech, 2017) as provided on the City of Newark's website.

Shortage Response Action Effectiveness

Figure 10-4: Daily Demand Monitoring during 2014 Stage 2 Declaration



After declaration of a water shortage emergency in March 2014, daily water demand (blue) was monitored to ensure that target 20% conservation goal was being achieved appropriately during each season of the year.

The efficacy of a WSCP is unknown until it is enacted as only then can monitoring be completed to confirm whether the target reductions have been achieved. Monitoring (as described in Section 10.9) was conducted continuously during the District's most recent water shortage emergency, 2014-2016, and proved that the District's Stage 2 shortage ordinance was highly successful in providing direction for customers on how to conserve as well as achieving the target 20% reduction in the specific end-use categories. Figure 10-4 provides a summary of the daily demand monitoring that occurred during the 2014 Stage 2 declaration.

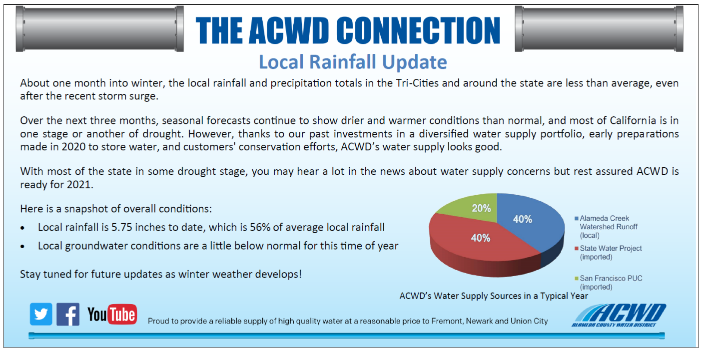
Larger level shortages, such as Stages 4, 5, and 6, are indicative of more severe conditions where compliance will have far greater significance. The District's planned AMI program will provide vastly expanded near real-time monitoring and enforcement capability and build off of the techniques proven successful in 2014. AMI will enable staff to evaluate and propose modifications to water-use restrictions and prohibitions quickly, further ensuring the protection of water supplies and therefore, the public's health and safety.

As indicated under section 10.4.1 Supply Augmentation, the District does not rely on additional supply augmentation measures to reduce the gap between supply and demand beyond the normal management actions designed for shortages, described in Chapter 9. In the event of an extreme shortage, the District can access supplies in the Niles Cone at greater depths than five feet below mean sea level. Analyses during the 2014 – 2016 drought suggest that under an extreme emergency, the District can safely count on 5,000 AF of additional supply. This action has an associated risk of modest salt intrusion to the Niles Cone from the Bay Aquifer and is balanced by reliable access to banked surpluses in the Central Valley groundwater bank that can be retrieved and used to replenish the Niles cone after the emergency.

10.5 COMMUNICATION PROTOCOLS

Communication with the District's customers is a critical component of responsible water management in all years, and the District utilizes a wide variety of media platforms and communication tools to achieve these goals. During normal years, when no water shortage is anticipated, the minimum communications include the following:

Stage 0: Normal years



THE ACWD CONNECTION

Local Rainfall Update

About one month into winter, the local rainfall and precipitation totals in the Tri-Cities and around the state are less than average, even after the recent storm surge.

Over the next three months, seasonal forecasts continue to show drier and warmer conditions than normal, and most of California is in one stage or another of drought. However, thanks to our past investments in a diversified water supply portfolio, early preparations made in 2020 to store water, and customers' conservation efforts, ACWD's water supply looks good.

With most of the state in some drought stage, you may hear a lot in the news about water supply concerns but rest assured ACWD is ready for 2021.

Here is a snapshot of overall conditions:

- Local rainfall is 5.75 inches to date, which is 56% of average local rainfall
- Local groundwater conditions are a little below normal for this time of year

Stay tuned for future updates as winter weather develops!

ACWD's Water Supply Sources in a Typical Year

Proud to provide a reliable supply of high quality water at a reasonable price to Fremont, Newark and Union City

- Beginning mid-winter, monthly updates are provided to the Board committee on projected demand and water supply availability for the coming year during public meetings and are published in monthly Board Reports.
- Regular water supply updates are published in the ACWD Aqueduct newsletter, the local newspaper, and on the District's website and social media sites.
- The District will complete and submit its annual water supply and demand assessment (WSDA) reporting to DWR by July 1.
- The District publishes its WSDA as part of the San Francisco Bay Area Regional Reliability Partners webpage on water supply conditions for the region. (https://bayareareliability.com/supply_conditions)

Stage 1: <10%

- All normal year communications, enhanced to include a call for 10% voluntary conservation
- Evaluate need for implementation of Stage Rates; initiate a Proposition 218 process if needed

Stages 2 and 3: 10% – 30%

- All normal year communications
- Initiate Proposition 218 process if not done previously and consider implementation of the applicable Stage Rate
- Outreach to city managers, Parks and Recreation, Public Works departments, Tri-City school districts
- Presentations and briefings with key stakeholders, chambers of commerce, civic, community, senior and faith-based organizations, and local, regional, and state government elected officials and entities.
- Public Meeting – Declaration of Water Shortage Emergency and Adoption of Ordinance
- Separate public meeting to enact Stage Rates, if not already in place.
- Enhanced public outreach to support emergency conservation and education needs of drought Stage plans. Enhanced public outreach may include:
    - Postcard mailers, bill messages, bill inserts, fact sheets, news releases, and District-hosted community meetings
    - Coordinated regional messaging on radio, print, social media, and television working with San Francisco Bay Area Regional Reliability Partners, Bay Area Water Supply and Conservation Agency members, and area partners

Stages 4, 5, and 6: > 30%

Shortages of this magnitude fall well outside of anticipated shortages and are only anticipated to occur as a result of a local or regional crisis.

- All previous stage communication
- Emergency communications protocol as appropriate

10.6 COMPLIANCE AND ENFORCEMENT

Prior to adoption of a Water Shortage Emergency (WSE) Ordinance, the District will send out letters/mailers, contact customers via phone, email, and social media channels, as well as or through the AMI customer portal, once that is active for all customers, to notify customers about the water supply shortage. Customer service will be trained to address customer inquiries about the water shortage and District actions, including potential escalation of actions if the water supply shortage becomes more severe. The District may also initiate water waste patrols or use AMI to identify potential water waste situations, such as high-water use and leaks alerts.

Once a stage is triggered that requires adoption of a WSE Ordinance, compliance and enforcement of prohibitions and restrictions in the Ordinance will include the following:

- Written Warnings: If the District determines that a customer is using water in violation of its WSE Ordinance, the District will send a written warning to the customer that identifies the wasteful use of water that violates the mandatory restrictions on water use, requests that the customer stop such wasteful use, informs the customer about the process for applying for an exception from the requirements of the WSE Ordinance, and informs the customer that failure to comply with its WSE Ordinance may result in the termination of service.
- On-site Notifications: The District may, after issuing a written warning, and if the customer does not request an exception, conduct a follow-up visit in order to ascertain whether wasteful use of water is still occurring. In the event that continued waste of water that violates the mandatory

restrictions on water use is observed, and no exception has been granted, the District will make reasonable efforts to notify an adult residing at the property if a residential account or an adult working on the property if a non-residential account, and will issue a second written warning by onsite notification of wasteful water use and the customer will be charged the field service visit charge established in the District's Rate and Fee Schedule.

- Termination of Water Service: In the event that District personnel observe continued waste of water that violates the mandatory restrictions on water use occurring at a customer's premises more than 48 hours after the on-site notification, it shall be deemed to be a willful violation of the mandatory restrictions on water use, and the General Manager may authorize termination of water service.
- Restoring Water Service: The reconnection charge established in the District's Rate and Fee Schedule must be paid before the District will restore service. In addition, the customer must have stopped the wasteful use of water and have paid all charges owed to the District under its WSE Ordinance and all other rates and fees owed, before the District will restore water service.

Additional fines and/or penalties may be established for violation of the mandatory restrictions on water use. These additional fines/penalties could be based on duration of the violation, volume of water wasted or used in violation of the WSE Ordinance, or other means to establish the level of the fines and/or penalties.

A violation of the WSE Ordinance will be considered a misdemeanor, per California Water Code Section 31029, which states that "after the publication or posting of any ordinance as provided in Section 31027 [as provided on the California Water Boards State Water Resources Control Board's website at https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=31027], it is a misdemeanor for any person to use or apply water received from the District contrary to or in violation of the restriction or prohibition, until the ordinance has been repealed or the emergency or threatened emergency has ceased, and, upon conviction thereof, that person shall be punished by imprisonment in the county jail for not more than 30 days or by fine of not more than six hundred dollars ($600), or by both the fine and imprisonment."

Consideration of written applications for exceptions regarding the mandatory restrictions on water use set forth in the District's WSE Ordinance may include the following steps:

- A customer may submit a written application for an exception to the mandatory restrictions on water use to the District's Drought Management Coordinator or designee. The application must include a description of the proposed water use and estimated duration and quantity of water use (e.g., gallons per day), and a description of the reason an exception is requested.
- The Drought Management Coordinator or designee will consider each application for an exception to the mandatory restrictions on water use based on the criteria established for residential and non-residential customers. If the criteria are satisfied, the Drought Management Coordinator or designee may grant exceptions for reasons that may include health and safety, benefits and/or needs of water to be used, potential adverse economic impacts, implementation complexities/issues, and mitigation measures/offsets.
- A customer may appeal a denial of an application by submitting a written appeal to the General Manager on the District's form and include the reasons why the customer disagrees with the denial.

The District is currently at the beginning of a 5-year project to convert 100% of meters to AMI. Once full AMI is enabled, staff will have new monitoring and enforcement tools at its disposal. This section maybe updated accordingly.

cannot be satisfied without depleting the water supply to the extent that there would be insufficient water for human consumption, sanitation, and fire protection. As part of the communication protocols outlined in the WSCP, the District shall coordinate with all cities within the Service District for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

The District has the legal authority to implement and enforce a water shortage emergency and response as described in Water Code sections 31026-31029 and Water Code sections 350 et seq. In the event of a water shortage emergency that requires a mandatory level of conservation, the District will enact an ordinance declaring an emergency including the appropriate stage shortage and adopt water use restrictions, prohibitions, and exclusions deemed necessary to achieve the level of conservation required by the emergency. The District last took this action in March 2014 when the District's Board enacted Ordinance No. 2014-01 as provided in Attachment 1 to this WSCP.

10.8 FINANCIAL CONSEQUENCES OF WSCP

Water shortages can have significant impacts on the District's financial stability. Water revenues represent about 74% of overall District revenue, and approximately 66% water revenues are from consumption charges. The remaining 34% of water revenues are from meter service charges and are considered fixed revenues. Meanwhile, about 74% of the District's costs are fixed. In addition to lower water sales volume, a prolonged drought could also result in increases in water supply, water use efficiency programming, customer outreach, and enforcement costs.

In 2019, the Board adopted Water Shortage Emergency Stage Rates ("stage rates") to ensure the District receives sufficient revenues to cover its cost of providing water service when consumption decreases due to a water shortage emergency, such as a drought. Stage rates would be applied to the water consumption charge. Stage rates are not intended to increase a customer's water bill. Instead, under stage rates, customers would see roughly the same water bill if they reduce their water consumption by the requested amount during the water shortage emergency. The District has not implemented stage rates because there has not been a water shortage emergency since adoption in 2019. Should the Board declare an emergency due to a water shortage, the District could implement the stage rate at the designated level/stage to mitigate the expected revenue shortfall due the lower water demands at that stage. Stage rates will need to be readopted in subsequent water rates processes.

The District also maintains two cash reserves that can be utilized to fund unexpected fluctuations in revenues and expenditures to further mitigate potential financial impacts of a water shortage emergency. One of the reserves is the Rate Stabilization Reserve, which has been established to tie more specifically to the revenue losses. This designated reserve is maintained at an amount equal to six months of variable water sales – defined as the difference in revenue that would result from using the lowest water usage year versus the most recent or typical year based on current commodity rates. The purpose of this reserve is to moderate the need for rate increases from lower water demand and the reserve fund may be designated to address revenue shortfalls until either the stage rates are implemented, or the District can complete a rates process. The second cash reserve is a $10 million Emergency Reserve to cover expenses, if needed. Specifically, the $10 million level was calculated as the additional amount of funds needed to purchase water in a year of adverse water conditions. The potential negative impacts on revenues from a water shortage emergency may cause the District to take certain measures to manage costs, as it did during the last drought period, such as reducing operating expenses, delaying payment toward unfunded liabilities, and deferring capital projects.

10.9 MONITORING AND REPORTING

The District monitors water use in two ways: total water production at each of the District's production facilities is monitored daily and monthly by the Operations Department, and billed consumption is monitored monthly through the Finance Department. Detailed end water use analyses are conducted monthly by the Water Resources Department. The District reads each customer's water meter and provides a water bill (with consumption information) on a bi-monthly basis. In 2021, the District will start replacing all customer meters with AMI meters. The project is expected to be completed by the end of 2023. Upon completion, the District will have the ability to monitor near real-time water usage and will have a variety of tools that can be used to enforce WSE Ordinance requirements. The AMI system includes software that will allow the District to set allocations for its customers and receive notifications / alerts when customers are over their allocation.

10.10 WSCP REFINEMENT PROCEDURES

As discussed in Section 10.4.7, the efficacy of a WSCP is unknown until it is enacted as only then can monitoring be completed to confirm whether the target reductions have been achieved. The District's emergency ordinance was tested and validated as a viable plan to address a Stage 2 water shortage emergency in 2014-2016 during a drought; however, larger, catastrophic level shortages remain untested and will be far more critical. One of the benefits of the District's planned AMI program is the capability to conduct near real-time monitoring and enforcement which will enable staff to evaluate and propose modifications to water-use restrictions and prohibitions quickly, further ensuring the protection of water supplies and as a direct result, the public's health and safety. The WSCP is a dynamic tool that is subject to refinement as needed to address water shortage emergencies and to allow the District to continue to provide water service in a manner consistent with applicable laws.

10.11 SPECIAL WATER FEATURE DISTINCTION

For the purposes of the District's Water Shortage Contingency Plan, the term "water features" shall be defined as any ponds, lakes, waterfalls, and fountains that are artificially supplied with water and do not provide a utilitarian service. The term "water features" shall not include swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

10.12 PLAN ADOPTION, SUBMITTAL, AND AVAILABILITY

Section 10642 of the Urban Water Management Planning Act requires urban water suppliers to make the Plan and the Water Shortage Contingency Plan (WSCP) available for public review and hold a public hearing prior to adopting the Plan and WSCP. The Plan also includes an appendix that meets the requirements of the Delta Plan Policy WR P1, "Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance" ("Reduce Reliance on the Delta"; California Code of Regulations, Title 23, section 5003); this appendix is also a new appendix to the 2015-2020 Plan. The Reduce Reliance on the Delta appendix is addended to the 2015-2020 Plan. The Draft Plan, WSCP, and the Reduce Reliance on the Delta addended appendix to the 2015-2020 Plan were made available for public review and comment beginning on April 23, 2021. In order to encourage the active involvement of diverse social, cultural, and economic elements of the population within the District's service area, including both residential and non-residential customers, the District made copies of the Draft Plan available on the District's website. Comments were received through May 13, 2021. A public hearing for the Plan, SBX7-7 compliance, WSCP, and the Reduce Reliance on the Delta addended appendix to the 2015-2020 Plan was held on May 13, 2021. Notice of the public hearing was provided to the County of Alameda, the County of Santa Clara; the Cities of Fremont, Newark, Union City, Hayward, Milpitas, and San Jose; the California Department of Water Resources; SWC; BAWSCA; Zone 7 Water Agency; Santa Clara Valley Water District; East Bay

Regional Park District; USD; SFPUC; and Semitropic Water Storage District on April 28, 2021. The notice of the public hearing was sent to East Bay Municipal Utility District on April 29, 2021. Two notices of the public hearing were also published in the local newspapers (The Argus and The Tri-City Voice) at least once a week for two successive weeks prior to the public hearing. The Plan, SBX7-7 compliance, the WSCP, and the Reduce Reliance on the Delta addended appendix to the 2015-2020 Plan were adopted on May 13, 2021 by the District's Board of Directors Resolution No. 21-021 (reference Appendix F of the 2020 UWMP).

As per the requirements in Water Code sections 10644(a), 10645(a), and 10645(b), a copy of the District's Plan, WSCP, and the Reduce Reliance on the Delta addended appendix to the 2015-2020 Plan will be provided to the following entities: the California Department of Water Resources, the California State Library, Alameda County, and the Cities of Fremont, Newark, Union City, and Hayward on or before July 1, 2021, which is within 30 days of the Plan's adoption. The District's Plan, including the tables presented in Appendix G of the 2020 UWMP, will be provided to the California Department of Water Resources in electronic format. The District will make the Plan, WSCP, and Reduce Reliance on the Delta addended appendix to the 2015-2020 Plan available online at https://www.acwd.org. Due to the current COVID-19 pandemic, the District will not make a physical hard copy available at its headquarters for public review as per best management practices during non-pandemic years.

The District will periodically review its UWMP and WSCP to ensure that it accurately reflects the District's water management activities. Changes will be adopted and incorporated into the plan via amendments or other appropriate means as set forth in the Water Code.

ATTACHMENT 1

ORDINANCE NO. 2014-01

AN ORDINANCE OF ALAMEDA COUNTY WATER DISTRICT DECLARING A WATER SHORTAGE EMERGENCY AND ADOPTING WATER USE REGULATIONS, RESTRICTIONS AND GUIDELINES FOR THE WATER SHORTAGE EMERGENCY.

BE IT ORDAINED by the Board of Directors of ALAMEDA COUNTY WATER DISTRICT as follows:

SECTION 1. DECLARATION OF A WATER SHORTAGE EMERGENCY.

The Board of Directors finds and declares as follows:

(a) The District's primary sources of supplies include: imported water from the State Water Project (40%); imported water from the San Francisco Public Utilities Commission (SFPUC) Regional Water System (20%); and local supplies originating from rainfall and runoff from the Alameda Creek Watershed (40%).

(b) On January 17, 2014, Edmund G. Brown, Governor of California, proclaimed a State of Emergency to exist in the State of California due to severe drought conditions.

(c) On January 31, 2014, the California Department of Water Resources (DWR) announced that the 2014 State Water Project (SWP) allocation for all SWP Contractors is zero percent (0%) of the Contractors' contractual maximum SWP allocations due to the exceptionally dry conditions.

(d) Locally, Calendar Year 2013 was the driest year on record with only 23% of the long-term average precipitation, impacting local surface water and groundwater supplies.

(e) Additional findings supporting the actions in this Ordinance are set forth in the staff report for this Ordinance and the March 13, 2014 staff presentation to the Alameda County Water District Board of Directors which are incorporated into this Ordinance by this reference.

(f) On February 13, 2014, at a properly noticed regular Board meeting, the Board considered whether to declare that a water shortage emergency condition exists within the water service area of the District, and decided to hold a public hearing in March 2014 on this issue and to provide District customers an opportunity to be heard to protest against the declaration and to present their needs to the Board of Directors.

(g) Notice of the public hearing was published pursuant to law one time at least seven days prior to the date of the public hearing in The Argus, a newspaper of general circulation, printed and published within the water service area of the District.

(h) The full text of this Ordinance was published in The Argus at least five days prior to the date of the public hearing.

(i) The full text of this Ordinance was posted in the office of the District and posted on the District's website at least five days prior to the public hearing.

(j) At the public hearing all persons present were given an opportunity to be heard and all persons desiring to be heard were heard.

(k) The public hearing was called, noticed and held in all respects as required by law.

(l) This Board heard and has considered each protest against the water shortage emergency declaration and all comments presented at the public hearing.

(m) The Board of Directors declares that a water shortage emergency condition exists and prevails within the water service area of this District. The water shortage exists by reason of the fact that the ordinary demands and requirements of the water consumers in the Alameda County Water District service area cannot be met and satisfied by the water supplies now available to the District without depleting the water supply or diminishing its quality to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

SECTION 2. PURPOSE AND AUTHORITY.

The purpose of this Ordinance is to conserve the water supply of the District for the greatest public benefit with particular regard to public health, fire protection and domestic use; to conserve water by reducing and restricting nonessential water use that if continued would constitute waste; and to the extent necessary by reason of drought and the existing water shortage emergency condition, to reduce water use fairly and equitably. This Ordinance is adopted pursuant to the District's authority under Sections 350 et seq. and 31026 et seq. of the California Water Code.

The water supply of the District includes water from the District's distribution system, as well as groundwater from the Niles Cone Groundwater Basin, which the District manages and regulates pursuant to its authority under the Replenishment Assessment Act of the Alameda County Water District, Chapter 1942 of the Statutes of 1961. The Niles Cone Groundwater Basin is an essential component of the District's water supply and must be conserved during this water shortage emergency. This Ordinance applies to all water from the District's water distribution system and to all wells, public and private, within the District's service boundary that produce water from the Niles Cone Groundwater Basin.

SECTION 3. EFFECT OF ORDINANCE.

This Ordinance shall take effect immediately, shall supersede and control over any other ordinance or regulation of the District in conflict herewith, and shall remain in effect until the Board of Directors declares that the water shortage emergency has ended.

SECTION 4. WATER USE LIMITATIONS.

(a) Mandatory Restrictions on Water Use.

During the water shortage emergency condition, and to preserve the water supply for the greatest public benefit with particular regard to domestic use, sanitation, and fire protection, the following uses of water are prohibited:

(1) Use of water in violation of ACWD Ordinance No. 2008-01 Prohibiting Wasteful Use of Water;

(2) Use of water for the irrigation of lawns or other landscaped areas on consecutive days. With the exception of Item (3) below, landscape irrigation cannot be more frequent than:

- One day per week for the period of April 1 through May 31;
- Two days per week for the period of June 1 through September 30;
- One day per week for the period of October 1 through November 30.
- One day per week for the period of December 1 through March 31. Landscape irrigation during this period should be avoided except during an extended dry period. During this period landscape irrigation while it is raining is prohibited.

This section does not apply to the following categories of use:

- Watering or irrigating by use of a hand-held bucket or similar container.
- Watering for very short periods of time for the express purpose of adjusting or repairing an irrigation system.
- Maintenance of existing landscape necessary for fire protection.
- Maintenance of existing landscape for soil erosion control.
- Maintenance of plant materials identified to be rare or essential to the well-being of protected species.
- Maintenance of turf at sports fields, playing fields, and other active recreation use areas within public parks, school grounds, golf course greens, and day care centers, provided that such irrigation does not exceed 3 days per week for the period of June 1through September 30 and 2 days per week for the period of October 1 through May 31. Landscape irrigation during the period of December 1 through March 31 should be avoided except during an extended dry period.
- Actively irrigated environmental mitigation projects.
- Maintenance of vegetation, including fruit trees and shrubs, intended for consumption.

Increasing the frequency and/or duration of irrigation run times to offset the above restrictions on days of allowable irrigation is contrary to the purpose of this Ordinance, and is therefore prohibited.

(3) Use of water for the irrigation of new landscape installed after January 1, 2014 cannot be more frequent than three times per week throughout the year, provided that all of the following conditions are met:

   a. The newly installed landscape replaces turf grass that was regularly maintained and irrigated.
   b. The new landscape consists solely of drought tolerant plants and is consistent with the requirements for drought tolerant landscaping established in the District's Turf Replacement Program.
   c. The new landscape is irrigated solely by drip irrigation, or another low-volume irrigation type such as micro-spray, micro-jet or micro-bubbler where no emitter produces more than 2 gallons of water per hour, or by hose equipped with a quick-acting positive shutoff nozzle.
   d. Mulch is used around the new landscaping to minimize evaporative losses.

(4) Use of water for lawn or garden watering, or any other landscape irrigation, in a manner which results in excessive ponding, flooding and/or excessive runoff in gutters or other waterways, patios, driveways, walks or streets;

(5) Use of water for washing sidewalks, walkways, driveways, patios, parking lots, tennis courts or other hard-surfaced areas;

(6) Use of hoses for any purpose, including washing cars, boats, trailers or other vehicles and machinery, without a quick-acting positive shutoff nozzle;

(7) The use of water for cleaning building or mobile home exteriors, including windows, except for the preparation of such exterior surfaces for the purpose of repair or repainting (only allowed with the use of a pressurized washing device equipped with a quick-acting positive shutoff nozzle);

(8) The draining and refilling of all existing swimming pools, except for protection of public health and safety;

(9) Use of single pass cooling systems in new (non-residential) connections ;

(10) Use of non-recirculating systems in new conveyer car wash and commercial laundry systems;

(11) Use of non-recycling decorative water fountains.

Depending on the continued severity of the drought and water shortage emergency, the District may update this Ordinance to impose additional water use restrictions as conditions warrant. Any updates to this Ordinance will be adopted pursuant to the District's authority under Sections 350 et seq. and 31026 et seq. of the California Water Code.

(b) Enforcement of Restrictions.

(1) Written Warning: If the District determines that a customer is using water in violation of this Ordinance, the District will send a written warning to the customer that lists the name and address of the person on the account, identifies the wasteful use of water that violates the mandatory restrictions on water use, requests that the customer

stop such wasteful use, informs the customer about the process for applying for an exception from the requirements of this Ordinance, and informs the customer that failure to comply with this Ordinance may result in the termination of service.

(2) On-site Notification: The District may, after issuing a written warning, and if the customer does not request an exception, conduct a follow-up visit in order to ascertain whether wasteful use of water is still occurring. In the event that continued waste of water that violates the mandatory restrictions on water use is observed, and no exception has been granted, the District will make reasonable efforts to notify an adult residing at the property if a residential account or an adult working on the property if a non-residential account, and will issue a second written warning by on-site notification of wasteful water use and the customer will be charged the field service visit charge established in the District's Rate and Fee Schedule, Section 3A. This second written warning will include all the information included in the first written warning and will be hand delivered to the adult on the premises or posted on the premises.

(3) Termination of Water Service: In the event that District personnel observe continued waste of water that violates the mandatory restrictions on water use occurring at a customer's premises more than 48 hours after the on-site notification, it shall be deemed to be a willful violation of the mandatory restrictions on water use, and the General Manager may authorize termination of water service.

(4) Restoring Water Service: The reconnection charge established in the District's Rate and Fee Schedule, Section 3E must be paid before the District will restore service. In addition, the customer must have stopped the wasteful use of water and have paid all charges owed to the District under this Ordinance, and all other rates and fees owed, before the District will restore water service.

(c) Violation is a Misdemeanor.

Pursuant to California Water Code Section 31029, use of water in violation of the restrictions on water use set forth in Section 4 of this Ordinance is a misdemeanor.

SECTION 5. WATER USE GUIDELINES.

During the water shortage emergency condition, customers are urged to adhere to the following guidelines to conserve the limited water supply available:

(1) Use water for beneficial purposes in a manner which minimizes the use of water, and repair leaks as soon as possible.

(2) Replace non-conserving plumbing fixtures (e.g. toilets, showerheads, faucets, clothes washers) with newer, water efficient models.

(3) Reduce indoor water use by taking the following actions:
    a. Turn off the tap while brushing teeth, shaving, and washing hands
    b. Run dishwashers and washing machines with full loads only
    c. Take shorter showers

(4) Landscape Guidelines:

Irrigate early in the morning (before 10:00 a.m.), to minimize evaporation.

Installation of new landscaping should utilize best known irrigation and horticultural practices for efficient water use.

Existing systems should be evaluated and repaired to minimize evaporation.

Use drought tolerant plant species wherever possible for replacement and at all new landscape installations. Installation of non-drought tolerant landscaping, including turf, should be avoided.

Use non-potable water from rain water capture and/or graywater for landscape irrigation. Graywater should not be used in vegetable gardens where food is a root crop or touches the ground surface. Regulations for the design and construction of graywater systems can be found in Chapter 16A of the California Plumbing Code. Most graywater systems also require permits from the local cities.

(5) Use non-potable water for construction purposes unless it is not appropriate and/or not available. If reclaimed water is used, the proposed conditions of use must meet the requirements of the San Francisco Bay Regional Water Quality Control Board.

(6) Non-residential customers should utilize systems which recycle water when possible.

(7) Restaurants should serve water to customers only when requested.

SECTION 6. APPLICATION PROCEDURE FOR EXCEPTIONS.

Consideration of written applications for exceptions regarding the mandatory restrictions on water use set forth in Section 4 shall be as follows:

(a) A customer may submit a written application for an exception to the mandatory restrictions on water use to the District's Drought Management Coordinator or designee. The application must be on the District's form and must include the customer name, account number(s), a description of the proposed water use and estimated duration and quantity of water use (e.g., gallons per day), and a description of the reason an exception is requested.

(b) The Drought Management Coordinator or designee will consider each application for an exception to the mandatory restrictions on water use based on the criteria established for residential and nor-residential customers. If the criteria is satisfied, the Drought Management Coordinator or designee may grant exceptions for reasons that include benefits and/or needs of water to be used, potential adverse economic impacts, implementation complexities/issues, and mitigation measures/offsets.

(c) A customer may appeal a denial of an application by submitting a written appeal to the General Manager on the District's form and include the reasons why the customer disagrees with the denial.

SECTION 7. EXEMPTION FROM CEQA.

The District Board of Directors finds that the actions taken in this Ordinance are exempt from provisions of the California Environmental Quality Act of 1970 because they are immediate actions necessary to prevent or mitigate an emergency, as described in section 15269(c), and to assume the maintenance, restoration, or enhancement of a natural resource, as described in section 15307, of the Guidelines promulgated under said Act.

SECTION 8. SEVERABILITY.

If any provision of this Ordinance is held to be invalid or unenforceable, that holding will not affect the remainder of the Ordinance, which shall remain in full force and effect.

SECTION 9. PUBLICATION AND POSTING OF ORDINANCE.

The Board of Directors direct that the full text of this Ordinance be published in The Argus and that a certified copy of the full text of this Ordinance be posted in the Office of the District and on the District's website within ten days from the date this Ordinance is adopted and identifying how each Director voted on this Ordinance.

PASSED AND ADOPTED this 13th day of March, 2014, by the following vote:

AYES: Directors Koller, Gunther, Huang, and Sethy

NOES: Director Weed

ABSENT: None

/s/ PAUL S. SETHY
Paul S. Sethy, President
Board of Directors
Alameda County Water District

ATTEST:

/s/ ANDREW WARREN
Andrew Warren, Assistant District Secretary
Alameda County Water District

APPROVED AS TO FORM:

/s/ PATRICK T. MIYAKI
Patrick T. Miyaki, Attorney
Alameda County Water District

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REFERENCES

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APPENDIX A
Water Supply Contracts

APPENDIX A-1
State Water Project Contract

APPENDIX A-2
San Francisco Regional Water Supply Contract

(note: Complete State Water Project Supply Contract is available on DWR website:
http://www.swpao.water.ca.gov/wsc/index.cfm)

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

WATER SUPPLY CONTRACT
BETWEEN

THE STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

AND

ALAMEDA COUNTY WATER DISTRICT

Disclaimer: This document integrates Alameda County Water District's State Water Project water supply contract with the many amendments to the contract entered into since 1961. It is intended only to provide a convenient reference source, and the Department of Water Resources is unable to provide assurances that this integrated version accurately represents the original documents. For legal purposes, or when precise accuracy is required, users should direct their attention to original source documents rather than this integrated version.

(as of May 28, 2003)

IN WITNESS WHEREOF, the parties hereto have executed this contract on the date first above written.

Approved as to legal form
and sufficiency:

Chief Counsel (Acting)
Department of Water Resources

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

By B. Abbott Goldberg
Acting Director

ALAMEDA COUNTY WATER DISTRICT

By Manuel J. Bernardo
Manuel J. Bernardo, President

Phyllis J. Kettering
Countersigned:
Phyllis J. Kettering, Secretary

APPROVED AS TO TERMS
AND CONDITIONS:

M. P. Whitfield, General
Manager and Chief Engineer
Alameda County Water District

APPROVED AS TO FORM:

Morris Hyman, Attorney
Alameda County Water District

APPENDIX A

TABLE A

AS SHOWN IN THE CONTRACT
BETWEEN
THE STATE OF CALIFORNIA
THE DEPARTMENT OF WATER RESOURCES AND
ALAMEDA COUNTY WATER DISTRICT
AND
AMENDMENT NO. 20

TABLE A
ANNUAL AMOUNTS OF WATER TO BE MADE AVAILABLE FOR DELIVERY TO ALAMEDA COUNTY WATER DISTRICT

<As shown in the original Contract>

Year	Total Annual Amount In Acre-feet
1	16,900
2	17,600
3	18,100
4	18,800
5	19,400
6	14,300
7	15,000
8	15,500
9	16,200
10	17,000
11	17,900
12	18,800
13	19,600
14	20,500
15	21,300
16	22,200
17	23,100
18	23,900
19	24,800
20	26,000
21	27,200
22	28,400
23	29,600
24	30,800
25	32,100
26	33,300
27	34,500
28	35,700
29	36,900
30	38,400
31	39,900
32	41,400
33	42,000
and each succeeding year thereafter, for the term of this contract:	42,000

TABLE A
ANNUAL AMOUNTS OF WATER TO BE MADE AVAILABLE FOR DELIVERY TO ALAMEDA COUNTY WATER DISTRICT DISTRICT

<As shown in Amendment No. 20>

Year	Total Annual Amount In Acre-feet
1962	16,900
1963	17,600
1964	18,100
1965	18,800
1966	19,400
1967	14,300
1968	15,000
1969	15,500
1970	16,200
1971	17,000
1972	17,900
1973	18,800
1974	19,600
1975	20,500
1976	21,300
1977	22,200
1978	23,100
1979	23,900
1980	24,800
1981	26,000
1982	27,200
1983	28,400
1984	29,600
1985	30,800
1986	32,100
1987	33,300
1988	34,500
1989	35,700
1990	36,900
1991	38,400
1992	39,900
1993	41,400
1994	42,000
and each succeeding year thereafter, for the term of this contract:	42,000

In any year, the amounts designated in this Table A shall not be interpreted to mean that the State is able to deliver those amounts in all years. Article 58 describes the State's process for providing current information for project delivery capability.

ALAMEDA COUNTY WATER DISTRICT

AGREEMENT #3653 A

WATER SALES CONTRACT

This Contract dated as of July 1, 2009, is entered into by and between the City and County of San Francisco ("San Francisco") and Alameda County Water District ("Customer')

RECITALS

San Francisco and the Customer have entered into a Water Supply Agreement (WSA'), which sets forth the terms and conditions under which San Francisco will continue to furnish water for domestic and other municipal purposes to Customer and to other Wholesale Customers The WSA contemplates that San Francisco and each individual Wholesale Customer will enter into an individual contract describing the location or locations at which water will be delivered to each customer by the San Francisco Public Utilities Commission ("SFPUC"), the customer's service area within which water so delivered is to be sold, and other provisions unique to the individual purchaser This Water Sales Contract is the individual contract contemplated by the WSA

AGREEMENTS OF THE PARTIES

1 Incorporation of the WSA

The terms and conditions of the WSA are incorporated into this Contract as if set forth in full herein

2 Term

Unless explicitly provided to the contrary in Article 9 of the WSA, the term of this Contract shall be identical to that provided in Section 2 01 of the WSA

3 Service Area

Water delivered by San Francisco to the Customer may be used or sold within the service area shown on the map designated Exhibit A attached hereto Except as provided in Section 3 03 of the WSA, Customer shall not deliver or sell any water provided by San Francisco outside of this area without the prior written consent of the General Manager of the SFPUC

4 Location and Description of Service Connections

Sale and delivery of water to Customer will be made through a connection or connections to the SFPUC Regional Water System at the location or locations listed, with the applicable present account number, service location, service size, and meter size shown on Exhibit B attached hereto

5 Interties With Other Systems

Customer maintains interties with neighboring water systems at the location or locations and with the connection size(s) as shown on Exhibit C attached hereto

6 Billing and Payment

San Francisco shall compute the amounts of water delivered and bill Customer therefor on a monthly basis The bill shall show the separate components of the charge (e g , service, consumption demand) Customer shall pay the amount due within thirty (30) days after receipt of the bill

If Customer disputes the accuracy of any portion of the water bill it shall (a) notify the General Manager of the SFPUC in writing of the specific nature of the dispute and (b) pay the undisputed portion of the bill within thirty (30) days after receipt Customer shall meet with the General Manager of the SFPUC or a delegate to discuss the disputed portion of the bill

7 Minimum Water Delivery Levels

San Francisco will deliver and Customer will pay for a minimum annual supply of 7 648 MGD

IN WITNESS WHEREOF, the parties hereto have executed this Contract, to become effective upon the effectiveness of the WSA, by their duly authorized representatives.

CITY AND COUNTY OF SAN FRANCISCO
Acting by and through its Public Utilities Commission

By: ____________________
Edward Harrington
General Manager

Date: June 24, 2009

Approved by Commission Resolution No. 09-0069,
adopted April 28, 2009

Michael Housh
____
Michael Housh
Secretary to Commission

Approved as to form:

DENNIS J. HERRERA
City Attorney

By: ____________________
Joshua D. Milstein
Deputy City Attorney

ALAMEDA COUNTY WATER DISTRICT

By: ____________________
Name: Paul Piraino
Title: General Manager

Date: June 11, 2009

Approved by Resolution No. 09-033, adopted
June 11, 2009

ATTEST:

Gina Markov
____
Secretary

APPROVED AS TO FORM:

____
Legal Counsel

APPENDIX B
Water Supply Uncertainty: Supplemental Information

Factors Affecting the Reliability of The San Francisco Public Utilities Commission Regional Water System

APPENDIX B
FACTORS AFFECTING THE RELIABILITY OF THE SAN FRANCISCO PUBLIC UTILITIES COMMISSION REGIONAL WATER SYSTEM
(source: Bay Area Water Supply and Conservation Agency, 2021)

Description of BAWSCA

BAWSCA provides regional water reliability planning and conservation programming for the benefit of its 26 member agencies that purchase wholesale water supplies from the San Francisco Public Utilities Commission (SFPUC). Collectively, the BAWSCA member agencies deliver water to over 1.8 million residents and nearly 40,000 commercial, industrial and institutional accounts in Alameda, San Mateo and Santa Clara Counties.

BAWSCA also represents the collective interests of these wholesale water customers on all significant technical, financial, and policy matters related to the operation and improvement of the SFPUC's Regional Water System (RWS).

BAWSCA's role in the development of the 2020 Urban Water Management Plan (UWMP) updates is to work with its member agencies and the SFPUC to seek consistency among UWMP documents.

Regional Water Demand and Conservation Projections

In June 2020, BAWSCA completed the Regional Water Demand and Conservation Projections Report (Demand Study).[1] The goal of the Demand Study was to develop transparent, defensible, and uniform demand and conservation savings projections for each Wholesale Customer using a common methodology to support both regional and individual agency planning efforts and compliance with the new statewide water efficiency targets required by Assembly Bill (AB) 1668 and Senate Bill (SB) 606.

Through the Demand Study process, BAWSCA and the Wholesale Customers (1) quantified the total average-year water demand for each BAWSCA member agency through 2045, (2) quantified passive and active conservation water savings potential for each individual Wholesale Customer through 2045, and (3) identified 24 conservation programs with high water savings potential and/or member agency interest. Implementation of these conservation measures, along with passive conservation, is anticipated to yield an additional 37.3 MGD of water savings by 2045. Based on the revised water demand projections, the identified water conservation savings, increased development and use of other local supplies by the Wholesale Customers, and other actions, the collective purchases of the BAWSCA member agencies from the SFPUC are projected to stay below 184 MGD through 2045.

As part of the Demand Study, each Wholesale Customer was provided with a demand model that can be used to support ongoing demand and conservation planning efforts, including UWMP preparation.

Long-Term Reliable Water Supply Strategy

BAWSCA's Long-Term Reliable Water Supply Strategy (Strategy), completed in February 2015, quantified the water supply reliability needs of the BAWSCA member agencies through 2040, identified the water supply management projects and/or programs (projects) that could be developed to meet those needs, and prepared an implementation plan for the Strategy's recommendations.

When the 2015 Demand Study concluded it was determined that while there is no longer a regional normal year supply shortfall, there was a regional drought year supply shortfall of up to 43 MGD. In addition, key findings from the Strategy's project evaluation analysis included:

- Water transfers represent a high priority element of the Strategy.

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[1] Phase III Final Report: http://bawsca.org/uploads/pdf/BAWSCA_Regional_Water_Demand_and_Conservation%20Projections%20Report_Final.pdf

- Desalination potentially provides substantial yield, but its high effective costs and intensive permitting requirements make it a less attractive drought year supply alternative.
- Other potential regional projects provide tangible, though limited, benefit in reducing dry-year shortfalls given the small average yields in drought years.

Since 2015, BAWSCA has completed a comprehensive update of demand projections and engaged in significant efforts to improve regional reliability and reduce the dry-year water supply shortfall.

Water Transfers. BAWSCA successfully facilitated two transfers of portions of Individual Supply Guarantee (ISG) between BAWSCA agencies in 2017 and 2018. Such transfers benefit all BAWSCA agencies by maximizing use of existing supplies. BAWSCA is currently working on an amendment to the Water Supply Agreement between the SFPUC and BAWSCA agencies to establish a mechanism by which member agencies that have an ISG may participate in expedited transfers of a portion of ISG and a portion of a Minimum Annual Purchase Requirement. In 2019, BAWSCA participated in a pilot water transfer that, while ultimately unsuccessful, surfaced important lessons learned and produced interagency agreements that will serve as a foundation for future transfers. BAWSCA is currently engaged in the Bay Area Regional Reliability Partnership[2] (BARR), a partnership among eight Bay Area water utilities (including the SFPUC, Alameda County Water District, BAWSCA, Contra Costa Water District, Santa Clara Valley Water District) to identify opportunities to move water across the region as efficiently as possible, particularly during times of drought and emergencies.

Regional Projects. Since 2015, BAWSCA has coordinated with local and State agencies on regional projects with potential dry-year water supply benefits for BAWSCA's agencies. These efforts include storage projects, indirect/direct water reuse projects, and studies to evaluate the capacity and potential for various conveyance systems to bring new supplies to the region.

BAWSCA continues to implement the Strategy recommendations in coordination with BAWSCA member agencies. Strategy implementation will be adaptively managed to account for changing conditions and to ensure that the goals of the Strategy are met in an efficient and cost-effective manner. On an annual basis, BAWSCA will reevaluate Strategy recommendations and results in conjunction with development of the BAWSCA's FY 2021-22 Work Plan. In this way, actions can be modified to accommodate changing conditions and new developments.

Making Conservation a Way of Life Strategic Plan

Following the 2014-2016 drought, the State of California (State) developed the "Making Water Conservation a California Way of Life" framework to address the long-term water use efficiency requirements called for in executive orders issued by Governor Brown. In May of 2018, AB 1668 and SB 606 (collectively referred to as the efficiency legislation) went into effect, which built upon the executive orders implementing new urban water use objectives for urban retail water suppliers.

BAWSCA led its member agencies in a multi-year effort to develop and implement a strategy to meet these new legislative requirements. BAWSCA's Making Conservation a Way of Life Strategic Plan (Strategic Plan) provided a detailed roadmap for member agencies to improve water efficiency. BAWSCA implementing the following elements of the Strategic Plan:

- Conducted an assessment of the agencies' current practices and water industry best practices for three components of the efficiency legislation that, based on a preliminary review, present the greatest level of uncertainty and potential risk to the BAWSCA agencies. The three components were:
    1. Development of outdoor water use budgets in a manner that incorporates landscape area, local climate, and new satellite imagery data.
    2. Commercial, Industrial, and Institutional water use performance measures.

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[2] https://www.bayareareliability.com/

    3. Water loss requirements.

- Organized an Advanced Metering Infrastructure symposium to enable information exchange, including case studies, implementation strategies, and data analysis techniques.
- Initiated a regional CII audit pilot program, which BAWSCA aims to complete in 2021.[3]
- Implemented a regional program for water loss control to help BAWSCA agencies comply with regulatory requirements and implement cost-effective water loss interventions.
- Engaged with the SFPUC to audit meter testing and calibration practices for SFPUC's meters at BAWSCA agency turnouts.

Finally, BAWSCA's Demand Study developed water demand and conservation projections through 2045 for each BAWSCA agency. These projects are designed to provide valuable insights on long-term water demand patterns and conservation savings potential to support regional efforts, such as implementation of BAWSCA's Long-Term Reliable Water Supply Strategy.

Tier Two Drought Allocations

The Wholesale Customers have negotiated and adopted the Tier Two Plan, referenced above, which allocates the collective Wholesale Customer share from the Tier One Plan among each of the 26 Wholesale Customers. These Tier Two allocations are based on a formula that takes into account multiple factors for each Wholesale Customer including:

- Individual Supply Guarantee;
- Seasonal use of all available water supplies; and
- Residential per capita use.

The water made available to the Wholesale Customers collectively will be allocated among them in proportion to each Wholesale Customer's Allocation Basis, expressed in millions of gallons per day (mgd), which in turn is the weighted average of two components. The first component is the Wholesale Customer's Individual Supply Guarantee, as stated in the WSA, and is fixed. The second component, the Base/Seasonal Component, is variable and is calculated using the monthly water use for three consecutive years prior to the onset of the drought for each of the Wholesale Customers for all available water supplies. The second component is accorded twice the weight of the first, fixed component in calculating the Allocation Basis. Minor adjustments to the Allocation Basis are then made to ensure a minimum cutback level, a maximum cutback level, and a sufficient supply for certain Wholesale Customers.

The Allocation Basis is used in a fraction, as numerator, over the sum of all Wholesale Customers' Allocation Bases to determine each Wholesale Customer's Allocation Factor. The final shortage allocation for each Wholesale Customer is determined by multiplying the amount of water available to the Wholesale Customers' collectively under the Tier One Plan, by the Wholesale Customer's Allocation Factor.

The Tier Two Plan requires that the Allocation Factors be calculated by BAWSCA each year in preparation for a potential water shortage emergency. As the Wholesale Customers change their water use characteristics (e.g., increases or decreases in SFPUC purchases and use of other water sources, changes in monthly water use patterns, or changes in residential per capita water use), the Allocation Factor for each Wholesale Customer will also change. However, for long-term planning purposes, each Wholesale Customer shall use as its Allocation Factor, the value identified in the Tier Two Plan when adopted.

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[3] Efforts on the CII audit pilot program stalled in March 2020 due to the COVID 19 pandemic and related shelter-in-place orders.

Per WSA Section 3.11, the Tier One and Tier Two Plans will be used to allocate water from the Regional Water System between Retail and Wholesale Customers during system-wide shortages of 20% or less. For Regional Water System shortages in excess of 20%, San Francisco shall (a) follow the Tier 1 Shortage Plan allocations up to the 20% reduction, (b) meet and discuss how to implement incremental reductions above 20% with the Wholesale Customers, and (c) make a final determination of allocations above the 20% reduction. After the SFPUC has made the final allocation decision, the Wholesale Customers shall be free to challenge the allocation on any applicable legal or equitable basis. For purposes of the 2020 UWMPs, for San Francisco Regional Water System (RWS) shortages in excess of 20%, the allocations among the Wholesale Customers is assumed to be equivalent among them and to equal the drought cutback to Wholesale Customer by the SFPUC.

The Tier Two Plan, which initially expired in 2018, has been extended by the BAWSCA Board of Directors every year since for one additional calendar year. In November 2020, the BAWSCA Board voted to extend the Tier Two Plan through the end of 2021.

SFPUC's Efforts to Develop of Alternative Water Supplies

With the adoption of the Bay-Delta Plan Phase 1 (Bay-Delta Plan) by the State Water Resources Control Board in December of 2018, coupled with the uncertainties associated with litigation and the development of Voluntary Agreements that, if successful, would provide an alternative to the 40% unimpaired flow requirement that is required by the Bay-Delta Plan, BAWSCA redoubled its efforts to ensure that the SFPUC took necessary action to develop alternative water supplies such that they would be in place to fill any potential gap in supply by implementation of the Bay-Delta Plan and that the SFPUC would be able to meet its legal and contractual obligations to its Wholesale Customers.

In 2019, BAWSCA held numerous meetings with the SFPUC encouraging them to develop a division within their organization whose chief mission was to spearhead alternative water supply development. On June 25, 2019, BAWSCA provided a written and oral statement to the Commissioners urging the SFPUC to focus on developing new sources of supply in a manner similar to how it addressed the implementation of the Water System Improvement Program (WSIP). BAWSCA urged that a new water supply program was called for, with clear objectives, persistent focus, a dedicated team, adequate funding, and a plan for successful execution. The SFPUC Commission supported BAWSCA's recommendation and directed staff to undertake such an approach.

In early 2020, the SFPUC began implementation of the Alternative Water Supply Planning Program (AWSP), a program designed to investigate and plan for new water supplies to address future long-term water supply reliability challenges and vulnerabilities on the RWS.

Included in the AWSP is a suite of diverse, non-traditional supply projects that, to a great degree, leverage regional partnerships and are designed to meet the water supply needs of the SFPUC Retail and Wholesale Customers through 2045. As of the most recent Alternative Water Supply Planning Quarterly Update, SFPUC has budgeted $264 million over the next ten years to fund water supply projects. BAWSCA is heavily engaged with the SFPUC on its AWSS efforts.

BAWSCA Conservation Programs

BAWSCA manages a Regional Water Conservation Program comprised of several programs and initiatives that support and augment member agencies' and customers' efforts to use water more efficiently. These efforts extend limited water supplies that are available to meet both current and future water needs; increase drought reliability of the existing water system; and save money for both the member agencies and their customers.

The implementation of the Regional Water Conservation Program builds upon both the Water Conservation Implementation Plan (WCIP, completed in September 2009) and the Regional Demand and Conservation Projections Project (Demand Study, completed in June of 2020). These efforts include both Core Programs (implemented regionally throughout the BAWSCA service area) and Subscription

Programs (funded by individual member agencies that elect to participate and implement them within their respective service areas).

BAWSCA's Core Conservation Programs include organizing classes open to the public on topics such as water efficient landscape education and water-wise gardening, assistance related to automated metering infrastructure, and other associated programs that work to promote smart water use and practices. BAWSCA's Subscription Programs include numerous rebate programs, educational programs that can be offered to area schools, technical assistance to member agencies in evaluating water loss, and programs to train and certify contractors employed to install water efficient landscape. In total, BAWSCA offers 22 programs to its member agencies and that number continues to grow over time.

Each fiscal year, BAWSCA prepares an Annual Water Conservation Report that documents how all of BAWSCA's 26 member agencies have benefitted from the Core Conservation Programs. Additionally, the report highlights how all 26 member agencies participate in one or more of the Subscription Programs offered by BAWSCA, such as rebates, water loss management and large landscape audits. The Demand Study indicates that through a combination of active and passive conservation, 37.3 MGD will be conserved by BAWSCA's member agencies by 2045.

(source: San Francisco Public Utilities Commission, March 14, 2017, SFPUC Analysis of Proposed Changes to Tuolumne River Flow Criteria as included in the 2017 DRAFT SUBSTITUTE ENVIRONMENTAL DOCUMENT IN SUPPORT OF POTENTIAL CHANGES TO THE WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY-SACRAMENTO/SAN JOAQUIN DELTA ESTUARY; SAN JOAQUIN RIVER FLOWS AND SOUTHERN DELTA WATER QUALITY)

Table 2 – Comparison of SFPUC RWS Annual Water Supply Delivery Capability for the SED Alternatives at an Annual Demand of 265 MGD

SFPUC Fiscal Year (July-June)	Base Case			20% UF at La Grange			30% UF at La Grange			40% UF at La Grange			50% UF at La Grange		
	TAF/yr	MGD	Rationing (% of Total)	TAF/yr	MGD	Rationing (% of Total)	TAF/yr	MGD	Rationing (% of Total)	TAF/yr	MGD	Rationing (% of Total)	TAF/yr	MGD	Rationing (% of Total)
FY20-21	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY21-22	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY22-23	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY23-24	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY24-25	297	265	0%	238	212	20%	209	186	30%	179	160	40%	91	82	69%
FY25-26	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY26-27	297	265	0%	297	265	0%	297	265	0%	297	265	0%	91	82	69%
FY27-28	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY28-29	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY29-30	297	265	0%	297	265	0%	209	186	30%	179	160	40%	91	82	69%
FY30-31	297	265	0%	238	212	20%	209	186	30%	179	160	40%	91	82	69%
FY31-32	267	238	10%	209	186	30%	179	160	40%	135	121	54%	91	82	69%
FY32-33	297	265	0%	297	265	0%	297	265	0%	297	265	0%	91	82	69%
FY33-34	297	265	0%	297	265	0%	297	265	0%	179	160	40%	91	82	69%
FY34-35	297	265	0%	238	212	20%	179	160	40%	179	160	40%	91	82	69%
FY35-36	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY36-37	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY37-38	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY38-39	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY39-40	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY40-41	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY41-42	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY42-43	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY43-44	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY44-45	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY45-46	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY46-47	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY47-48	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY48-49	297	265	0%	297	265	0%	209	186	30%	179	160	40%	91	82	69%
FY49-50	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY50-51	297	265	0%	297	265	0%	297	265	0%	297	265	0%	91	82	69%
FY51-52	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY52-53	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY53-54	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY54-55	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY55-56	297	265	0%	297	265	0%	209	186	30%	179	160	40%	91	82	69%
FY56-57	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY57-58	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY58-59	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY59-60	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY60-61	297	265	0%	238	212	20%	209	186	30%	179	160	40%	91	82	69%
FY61-62	267	238	10%	209	186	30%	179	160	40%	135	121	54%	91	82	69%
FY62-63	297	265	0%	297	265	0%	297	265	0%	179	160	40%	91	82	69%
FY63-64	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY64-65	297	265	0%	297	265	0%	297	265	0%	179	160	40%	91	82	69%
FY65-66	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY66-67	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY67-68	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY68-69	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY69-70	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY70-71	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY71-72	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY72-73	297	265	0%	297	265	0%	209	186	30%	179	160	40%	91	82	69%
FY73-74	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY74-75	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY75-76	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY76-77	267	238	10%	238	212	20%	209	186	30%	179	160	40%	91	82	69%
FY77-78	238	212	20%	209	186	30%	179	160	40%	135	121	54%	91	82	69%
FY78-79	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY79-80	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY80-81	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY81-82	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY82-83	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY83-84	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY84-85	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY85-86	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY86-87	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY87-88	297	265	0%	238	212	20%	209	186	30%	179	160	40%	91	82	69%
FY88-89	267	238	10%	209	186	30%	179	160	40%	135	121	54%	91	82	69%
FY89-90	267	238	10%	238	212	20%	179	160	40%	135	121	54%	91	82	69%
FY90-91	238	212	20%	209	186	30%	179	160	40%	135	121	54%	91	82	69%
FY91-92	238	212	20%	209	186	30%	179	160	40%	135	121	54%	91	82	69%
FY92-93	238	212	20%	179	160	40%	150	134	49%	135	121	54%	91	82	69%
FY93-94	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY94-95	297	265	0%	238	212	20%	209	186	30%	135	121	54%	91	82	69%
FY95-96	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY96-97	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY97-98	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY98-99	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY99-00	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY00-01	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY01-02	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY02-03	297	265	0%	297	265	0%	297	265	0%	297	265	0%	91	82	69%
FY03-04	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY04-05	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY05-06	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY06-07	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY07-08	267	238	10%	238	212	20%	209	186	30%	179	160	40%	91	82	69%
FY08-09	297	265	0%	297	265	0%	297	265	0%	179	160	40%	91	82	69%
FY09-10	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%
FY10-11	297	265	0%	297	265	0%	297	265	0%	297	265	0%	297	265	0%

Yellow highlights indicate that water provided to the RWS includes supply from of the Westside Basin conjunctive use groundwater project.

Red highlights indicate that water supply rationing is implemented. The years in which rationing occurs also include use of the Westside Basin groundwater project.

APPENDIX C
District Groundwater Management Policy

ALAMEDA COUNTY WATER DISTRICT

GROUNDWATER MANAGEMENT POLICY

(Adopted January 26, 1989)
(Amended March 22, 2001)

TABLE OF CONTENTS

GROUNDWATER MANAGEMENT POLICY
ADOPTED JANUARY 26, 1989

Amended March 22, 2001

BACKGROUND

The Alameda County Water District (ACWD) was created by a vote of area residents in December 1913, thereby becoming the first water district in California to be formed under the County Water District Act enacted earlier that year. It is governed by a five-member board of directors, elected at large.

In the years preceding the vote, local farmers and residents had become concerned about water companies and agencies exporting water from both Alameda Creek and local groundwater to nearby communities such as Oakland and San Francisco. The result of these exports was that the groundwater table was falling at a rapid rate. The voters hoped, in establishing ACWD, to regain control over local water supplies, to protect the underground water in the Niles Cone Groundwater Basin, and to conserve the waters of Alameda Creek.

ACWD now has several sources of supply, including water purchased from the State Water Project (via the South Bay Aqueduct) and the San Francisco Public Utilities Commission (via the Hetch Hetchy aqueduct system). But groundwater remains an important component of its supply, currently furnishing 35% of the water ACWD distributes. In dry years, groundwater has contributed over 60% of the supply. Thus, conservation and preservation of the groundwater basin continues to be a vitally important program for ACWD.

AUTHORIZATION

This Groundwater Management Policy is based on the statutory authority granted to ACWD under the County Water District Law (commencing with Section 30000 of the Water Code); the Replenishment Assessment Act of the Alameda County Water District (Section 4, Chapter 1942 of the Statutes of 1961, as amended in 1970 and 1973), which grants additional powers to ACWD to prevent pollution, contamination, or diminution in quality of the groundwater supply; local well ordinances (Fremont No. 950, as amended; Newark No. 136; and Union City No. 109-73); agreements with other agencies; and local hazardous materials ordinances.

POLICY STATEMENT

It is the policy of the Alameda County Water District to efficiently protect and manage the Niles Cone Groundwater Basin to ensure a reliable supply of high quality water that satisfies present and future municipal, industrial, recreational, and agricultural water needs in the ACWD service area. ACWD will develop and implement appropriate programs within the ACWD service area to protect and manage the groundwater basin as a long-term source of water supply for ACWD. ACWD will also actively protect the groundwater basin from activities outside the ACWD service area that may negatively impact the water quality and/or water supply of the basin.

OBJECTIVES

The purpose of this policy is to protect and improve ACWD's groundwater resources for the benefit of both ACWD's customers and private well owners by taking actions designed to meet the following objectives:

- Increase groundwater replenishment capability.
- Increase the usable storage capacity of the groundwater basin.
- Operate the basin to provide: (1) a reliable water supply to meet baseload and peak distribution system demands, (2) an emergency source of supply, and (3) reserve storage to augment dry year supplies.
- Protect groundwater quality from degradation from any and all sources including: saline

water intrusion, wastewater discharges, recycled water use, urban and agricultural runoff, or chemical contamination.

- Improve groundwater quality by (1) removing salts and other contaminants from affected areas of the basin, and (2) improving the water quality of source water used for groundwater recharge.

The specific groundwater management programs that have been developed and implemented by ACWD to achieve these policy objectives are listed in Table 1and are described in greater detail in Attachment 1 to this Policy.

This Policy is intended to serve as a guide to ACWD management in the continued development and implementation of programs to manage and protect ACWD water resources and as a nontechnical document to explain ACWD groundwater programs to members of the public. This Policy is not intended to create legal rights in any person or organization, or to impose legal obligations on ACWD. It may be amended or repealed by the Board of Directors at any time.

TABLE 1 - SUMMARY OF ACWD GROUNDWATER MANAGEMENT PROGRAMS

Groundwater Program	Description
Water Supply Management	Planning, managing, and optimizing ACWD's sources of supply: watershed runoff, SWP water for recharge, SWP water for treatment, SFPUC water for blending, and water banking.
Groundwater Replenishment	Operation of ACWD groundwater recharge facilities to optimize 1) capture of local runoff, 2) replacement of water extracted from production and ARP wells, and 3) maintenance of groundwater levels to prevent salt water intrusion.
Watershed Protection and Monitoring	Assisting in the protection and monitoring of the watershed to optimize the quality of runoff water available for ACWD water supply.
Basin Monitoring	Sampling and measuring wells to assess and evaluate 1) groundwater quality, 2) water pressures within the basin, and 3) the direction of groundwater flow.
Wellhead Protection Program	Identify sensitive recharge and groundwater areas, maintain an inventory of potential threats within these areas, assess the vulnerability of source water, and develop management strategies to minimize the potential for groundwater quality impacts.
Aquifer Reclamation Program	Pump brackish water from degraded aquifers in order to 1) increase useable basin storage, 2) improve overall water quality, 3) prevent movement of brackish water toward ACWD production wells, and 4) provide (future) supply augmentation through treatment to potable water standards.
Groundwater Protection Program	Maintain an active role in 1) assisting with the identification of potential groundwater contamination, 2) implementing monitoring systems at hazardous materials storage sites, and 3) providing technical oversight for investigations and cleanups at hazardous materials spill sites.
Well Ordinance Administration	As enforcing agency for municipal ordinances governing construction, repair, or destruction of wells, ACWD provides inspection services, collects fees, and performs field searches for abandoned wells which could act as a conduit for contamination of groundwater.

ATTACHMENT 1

ACWD GROUNDWATER MANAGEMENT PROGRAMS

(March 22, 2001)

Eight major groundwater management programs have been developed and implemented by ACWD to achieve the objectives identified in ACWD's Groundwater Management Policy:

- Water Supply Management
- Groundwater Replenishment
- Watershed Protection and Monitoring
- Basin Monitoring
- Wellhead Protection Program
- Aquifer Reclamation Program
- Groundwater Protection Program
- Well Ordinance Administration

Water Supply Management

______ACWD has three primary sources of water: (1) runoff from the Alameda Creek Watershed, (2) treated surface water purchased from the San Francisco Public Utilities Commission (SFPUC) and delivered through the Hetch Hetchy aqueduct system, and (3) untreated surface water purchased from the State Water Project (SWP) and delivered through the South Bay Aqueduct. Alameda Creek watershed runoff and imported water from the State Water Project are used for replenishment of the Niles Cone Groundwater Basin.

The groundwater basin is used conjunctively with surface water supplies. Generally, surface water production facilities are operated throughout the year to meet distribution system demands. Groundwater production facilities are operated to meet a portion of the base load demand and to meet peak and emergency demands. A desalination facility is planned to be operational in 2002 to treat some of the brackish groundwater currently being discharged to the San Francisco Bay from the Aquifer Reclamation Program wells (see Aquifer Reclamation Program section) and produce a new source of high quality water.

ACWD conducts an annual survey of groundwater conditions to determine the amount of imported water needed to maintain groundwater levels within an acceptable range and to determine a replenishment assessment rate. Groundwater levels are also used to trigger dry year water management response programs, including additional water conservation and utilization of off-site water banking and/or exchange programs.

Owners of wells who pump water from the groundwater basin are required to pay a replenishment assessment to reimburse ACWD for a portion of the cost of imported water used to recharge the depleted groundwater basin and to help offset ACWD's groundwater basin operations and management costs. Currently, the owners or operators of 234 wells receive annual registration forms as part of the replenishment assessment program.

Reclaimed wastewater is a potential alternative source of supply for ACWD. ACWD will cooperate with the Union Sanitary District to explore appropriate and beneficial uses of reclaimed wastewater within ACWD's service area in locations where there is very little risk of percolation into the aquifers used for potable water production.

Groundwater Replenishment

ACWD utilizes sections of the Alameda Creek Flood Control Channel behind three inflatable rubber dams and recharge ponds (abandoned quarry pits) to store and percolate water into the aquifers of the Niles Cone Groundwater Basin. The groundwater replenishment program serves two major roles:

(1) Replenishment of groundwater extracted to meet local demands and to replace brackish water extracted as part of the Aquifer Reclamation Program.

(2) Maintenance of groundwater flow toward San Francisco Bay, in order to prevent future saline water intrusion from the bay and to displace brackish water remaining from historic saline water intrusion.

Through ACWD's long range Capital Improvement Program, a major portion of the recharge ponds below (i.e., west of) the Hayward Fault were rehabilitated in 1997 and 1998 and resulted in greater storage capacity within the ponds and increased the rate at which water is recharged to replace water pumped from the groundwater basin.

Recharge facilities are operated to maximize the capture of local runoff. The operating criteria for the recharge facilities and the groundwater basin are continuously evaluated to optimize the use of these resources.

Watershed Protection and Monitoring

ACWD plays a major role in coordinating and communicating with other state and local agencies to influence policy decisions related to activities within the watershed of Alameda Creek which could have a negative effect on ACWD water supplies and the groundwater basin. This includes review of environmental impact reports, technical evaluation of National Pollutant Discharge Elimination System (NPDES) permits, emergency response to surface spills, participation in watershed planning and technical committees, and participation in planning studies for expansion of wastewater export facilities in the Livermore-Amador Valley.

As part of ACWD's watershed protection program, ACWD will require (to the extent

ACWD has legal authority to do so) and in all cases will request that lead agencies for future development projects within the Upper Alameda Creek Watershed that may affect water quality in Alameda Creek determine the extent and significance of those impacts, and will request such lead agencies to require adequate mitigation of any significant impacts to Alameda Creek and ACWD. Specific mitigation measures will depend on the particular features of individual projects including their location, size, volume of water applied and/or discharged, and the physical/chemical/biological composition of such water. Mitigation may include either or both implementation of on-site source control measures or contributions to off-site mitigation projects, such as reimbursement of a portion of ACWD's cost of constructing and operating a demineralization facility. The goal of whatever mitigation measures are employed is to prevent individual project or cumulative effects of development (or other projects within the Alameda Creek Watershed) from adversely changing the quality of groundwater in the Niles Cone Groundwater Basin.

ACWD is working in coordination with other agencies to implement a watershed monitoring program consisting of sampling surface water, measuring water quality parameters, and estimating water flow rates at key locations in the watershed. ACWD also patrols Alameda Creek performing visual inspections and collecting samples for water quality analysis. ACWD has constructed and maintains an automated monitoring station located adjacent to Alameda Creek at the west end of Niles Canyon which provides continuous information and signals an alarm to ACWD when there are significant changes in water flow or quality that may affect the operation of ACWD's recharge facilities.

Basin Monitoring

The District performs weekly water level measurements of representative wells in each major aquifer to monitor changes in groundwater levels. A more comprehensive monitoring program consisting of sampling and measuring water levels is performed in the spring and fall of each year to assess the groundwater quality, water pressures within the basin, and direction of groundwater flow. Production wells are monitored regularly for a wide variety of water quality parameters specified by state and federal regulations. The groundwater recharge area is monitored daily for water level fluctuations to track percolation rates and to schedule water imports.

Because of development, many privately owned water wells that ACWD has utilized in the past for monitoring basin water levels and saline water intrusion have been destroyed. Since these wells are critical to the management of ACWD's groundwater basin, replacement monitoring wells have been included in the Capital Improvement Program. From 1997 through 1999, 32 monitoring wells have been installed as part of the Monitoring Well Construction Project. A total of approximately 60 wells are expected to be installed by 2007 to provide additional geologic information, to replace destroyed wells, and to improve water sample and water level data acquisition through efficiently located and appropriately designed wells.

Wellhead Protection Program

The 1986 Amendments to the Safe Drinking Water Act require each state to establish a Wellhead Protection Program which "protects the wellhead areas of all public water systems from contaminants that may have adverse human health effects." California is relying on local agencies to plan and implement this program. ACWD has initiated the identification of surface and recharge areas vulnerable to contamination for the protection of ACWD's groundwater facilities. The program also includes the identification of potential contaminant sources, development of management practices to reduce the contamination risk, identification of areas to be monitored, and preparation of a contingency/emergency response plan in the event of a contamination incident. As an example of a management practice, ACWD has worked with the City of Fremont to require a “Do Not Pollute” decal at each storm drain inlet within a development adjacent to the recharge facilities and has mailed a stormwater runoff public education brochure to all houses on streets with storm drains that discharge directly into a recharge pond.

The groundwater portion of the Source Water Assessment Program (SWAP) that is now being required by the California Department of Health Services (DHS) has a similar focus to that of the Wellhead Protection Program. SWAP requires the identification of sensitive surface water and groundwater areas, an inventory of potential threats within those areas, and an assessment of source vulnerability. The primary difference between the programs is that the Wellhead Protection Program additionally identifies management strategies to minimize the potential for groundwater quality impacts. Because of the overlap between these programs, development of the programs will be closely coordinated. Since DHS is requiring a SWAP for all new sources of water, a “pilot” SWAP is currently being prepared for Aquifer Reclamation Program wells that will serve as supply wells for ACWD’s future desalination facility. This pilot SWAP will serve as a model for developing a SWAP for all ACWD facilities in the future.

Both of these programs are expected to benefit from the results of the American Water Works Association Research Foundation project being jointly conducted by ACWD and the Lawrence Livermore National Laboratory. The project, titled “Predicting Water Quality Changes from Artificial Recharge Sources to Nearby Wellfields,” began in the spring of 1997 and is expected to be completed in 2001. The scope of work includes the characterization and evaluation of groundwater flowing between the percolation ponds and ACWD’s production wells using isotopic tracers, age-dating techniques, and production and monitoring well sampling. A major objective of the study is determining groundwater and chemical travel times within the fastest flow paths between the recharge facilities and the production wells.

ACWD's efforts in developing a Wellhead Protection Program and maintaining a strong public education program have been recognized as a Groundwater Guardian Affiliate by the Groundwater Foundation, a private non-profit educational organization that is dedicated to educating the public about the conservation and protection of groundwater. The Groundwater Guardian Affiliate designation is awarded to entities at the regional level that work to promote shared responsibility for groundwater protection.

Aquifer Reclamation Program

The goal of this program is to remove entrapped saline water from degraded portions of aquifers in the Niles Cone Groundwater Basin in order to increase usable basin storage, to improve overall water quality, and to prevent the movement of this saline water toward production wells. Pumped water from a combination of nine Aquifer Reclamation Program (ARP) wells is discharged to flood control channels in accordance with a NPDES permit issued by the Regional Water Quality Control Board. Operation of this program depends on the annual availability of water supplies to replace the water that is pumped out of the aquifers. In the future, some of the wells used in this program will be converted to supply water to the brackish groundwater desalination facility planned for Newark to supplement ACWD's drinking water supply.

Five other wells are being evaluated as possible additions to the Aquifer Reclamation Program. These wells are former Salinity Barrier Project wells. The Salinity Barrier Project (SBP) was initiated in the late 1970's by ACWD in cooperation with the Department of Water Resources. The plan was to install 14 extraction wells strategically located to create an alignment just inland of the salt evaporator ponds, running parallel along the entire stretch of ACWD's shoreline. Simultaneous pumping of the wells would create a trough along the alignment to prevent inland migration of saline water originating from the bay and evaporator ponds during drought periods. In addition to preventing new sea water intrusion, SBP operation was planned as a potential augmentation of the Aquifer Reclamation Program during non-drought periods for mitigating historic sea water intrusion in the interior part of the basin. By the late 1980's, five of the fourteen wells were constructed. However, the project was postponed pending further evaluation.

In the course of comprehensive water supply and facilities planning in the 1990's, ACWD determined that operation of the basin below sea level during drought periods is no longer a necessary or desirable strategy relative to other water supply options that have since become available to ACWD. Because the basin is not likely to be operated significantly below sea level during drought periods, SBP is not needed to prevent new sea water intrusion. Although ACWD's groundwater basin strategy no longer includes a salt water barrier, groundwater modeling indicates that pumping these wells may help to improve water quality in the inland portions of the groundwater basin (which is the goal of the Aquifer Reclamation Program), especially if they are pumped during wet periods with high piezometric head. More groundwater modeling work is needed to determine whether their contribution to water quality improvement would justify their activation.

Groundwater Protection Program

ACWD takes an active role in (1) assisting regulatory agencies and industry in identifying sources of potential groundwater contamination, (2) implementing monitoring systems at hazardous materials storage sites, and (3) providing technical oversight for the investigation and cleanup operations at Leaking Underground Fuel Tank (LUFT) and Spills, Leaks, Investigation, and Cleanup (SLIC) sites to assure the protection of the groundwater basin. Coordination with federal, state, county, and city agencies similarly involved is a key to the success of this program. This program's objectives are to protect the basin from future water quality degradation by ensuring that existing tanks have not leaked and that future chemical releases are quickly identified and controlled.

Since 1988, ACWD informally provided assistance to the California Regional Water Quality Control Board - San Francisco Bay Region (Regional Board) in overseeing the investigation and remediation at LUFT and SLIC sites. In order to memorialize the terms of this participation and to further strengthen the coordination between the Regional Board and ACWD, the agencies entered into a Cooperative Agreement on June 27, 1996. ACWD entered into similar Cooperative Agreements with the Cities of Fremont, Newark, and Union City on March 25, 1997, June 26, 1997, and August 12, 1997 to further strengthen the interagency coordination and cost-effective implementation of groundwater protection within the cities. ACWD also entered into an agreement with the City of Hayward on July 27, 2000 to work cooperatively on sites which threaten or affect water quality in the portion of the City of Hayward that is within ACWD's service area (Hayward Detachment areas).

Well Ordinance Administration

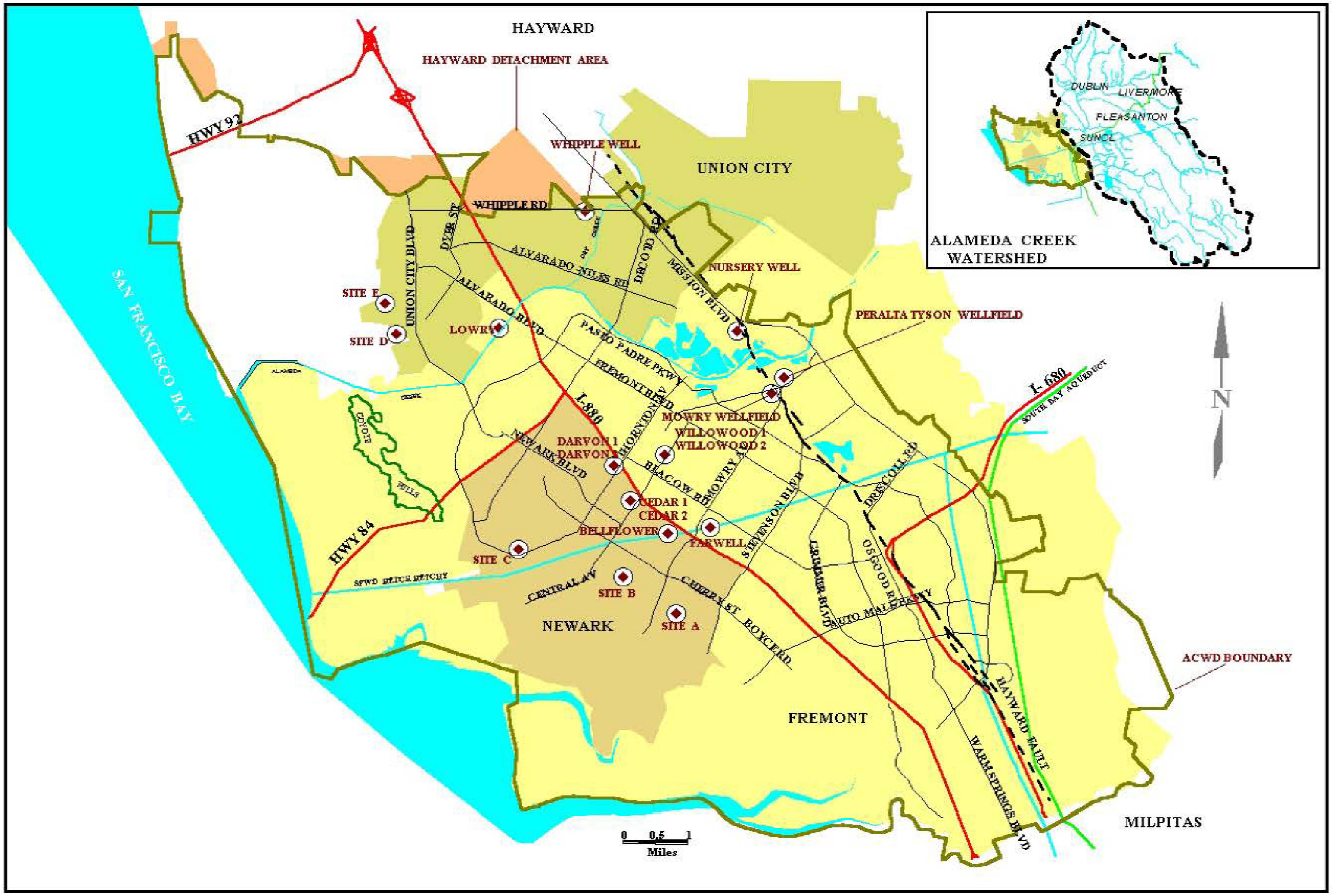
Ordinances to regulate the construction, repair, reconstruction, destruction or abandonment of wells with the boundaries of the Cities of Fremont, Newark, and Union City were adopted by each city (City of Fremont Ordinance No. 950 on June 26, 1973, as amended by Ordinance No. 963 on October 16, 1973; City of Newark Ordinance No. 136 on July 12, 1973; and City of Union City Ordinance No. 109-73 on June 18, 1973). The purpose of the ordinances is:

> "to provide for the construction, repair, reconstruction, and destruction of wells, including cathodic protection wells and exploratory holes, to the end

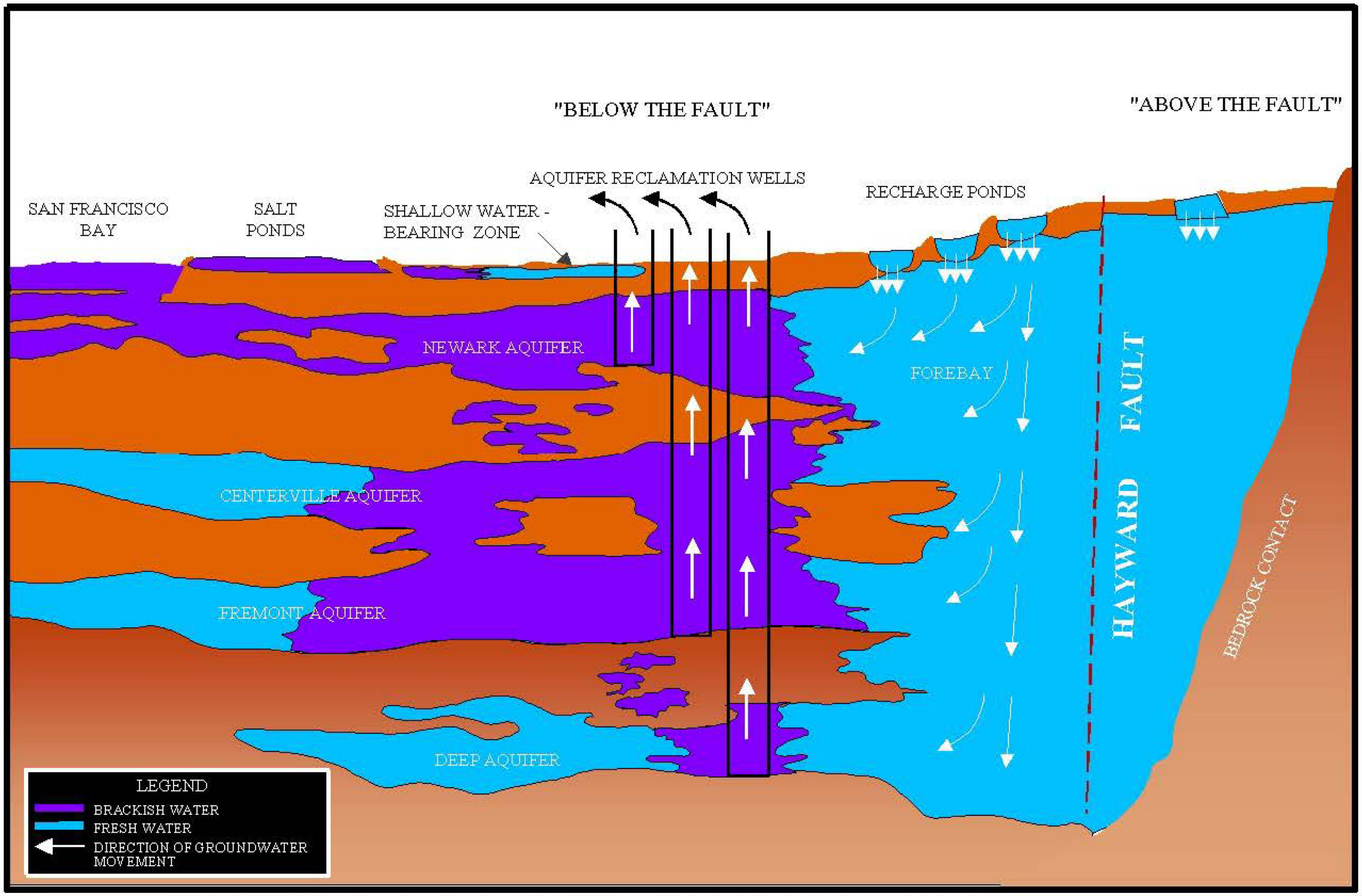
> that the groundwater found wholly or partially within the area of the [cities] will not be polluted or contaminated and that water obtained from water wells will be suitable for the beneficial uses intended and will not jeopardize the health, safety or welfare of the people of the said city, and for the destruction of abandoned wells or wells found to be public nuisances, including cathodic protection wells and exploratory holes, to the end that such wells will not cause pollution or contamination of groundwater or otherwise jeopardize the health, safety or welfare of the people of the said city."

Each of the ordinances designates ACWD as the enforcing agency as defined by the Department of Water Resources and requires that a written permit be obtained from ACWD prior to conducting any of the work described above in each of the cities. By separate resolutions on January 10, 1974, ACWD agreed to implement the city ordinances and authorized the collection of fees to defray the expenses of enforcing them (Resolution No. 74-002 to implement Ordinance No. 950 as amended by Ordinance No. 963 of the City of Fremont; Resolution No. 74-003 to implement Ordinance No. 136 of the City of Newark; Resolution No. 74-004 to implement Ordinance No. 109-73 of the City of Newark). ACWD has also worked with the City of Hayward to amend the City Well Ordinance to require ACWD's approval prior to the construction, operation, or destruction of wells in Hayward Detachment areas.

ACWD has developed a well destruction program in cooperation with the cities. When land use changes are proposed, the cities require the property owners or developers to obtain a letter from ACWD indicating whether wells are located within the boundaries of the development. This process gives ACWD the opportunity to conduct a record and field search for wells before development occurs. If wells are located within the development, the city and appropriate parties are notified. The destruction of abandoned wells then become a condition for approval of the proposed development or land use change by the city building or planning departments. ACWD also maintains a process to insure that abandoned wells are properly destroyed before water service improvements are accepted.



ATTACHMENT 2 - ALAMEDA COUNTY WATER DISTRICT GROUNDWATER FACILITIES



ATTACHMENT 3 - NILES CONE GROUNDWATER BASIN SCHEMATIC

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APPENDIX D
Water Waste Ordinance

ORDINANCE NO. 2008-01

AN ORDINANCE OF THE BOARD OF DIRECTORS OF ALAMEDA COUNTY WATER DISTRICT PROHIBITING WASTEFUL USE OF WATER, PURSUANT TO WATER CODE SECTION 375

A. REGULATIONS AND RESTRICTIONS ON WATER USE

It is hereby declared by the Board of Directors that, in order to conserve the District's water supply for the greatest public benefit, reduce the quantity of water used by the District's customers, and maintain the District's commitment to implementing cost effective Best Management Practices (BMPs) as a signatory to the Memorandum of Understanding (MOU) on Urban Water Conservation, it is necessary that wasteful use of water be eliminated. Customers of the District shall observe the following regulations and restrictions on water use:

1. Residential customers shall not:

   a. Use water for lawn or garden watering, or any other irrigation, in a manner which results in excessive flooding or excessive runoff in gutters or other waterways, patios, driveways, walks or streets;

   b. Use water for washing sidewalks, walkways, driveways, patios, parking lots, tennis courts or other hard-surfaced areas in a manner which results in excessive runoff or waste;

   c. Use water for washing cars, boats, trailers or other vehicles and machinery in a manner which results in excessive runoff or waste. Hoses should be equipped with shutoff nozzles.

2. Nonresidential customers shall not:

   a. Use single pass cooling systems in new connections;

   b. Use non-recirculating systems in new conveyer car wash and commercial laundry systems;

   c. Use non-recycling decorative water fountains;

   d. Use water for lawn or garden watering, or any other irrigation, in a manner which results in excessive flooding or runoff in gutters or other waterways, patios, driveways, walks or streets;

   e. Use water for washing sidewalks, walkways, driveways, patios, parking lots, tennis courts or other hard-surfaced areas in a manner which results in excessive runoff or waste.

3. All Customers Shall:

   a. Reduce other interior or exterior water uses to minimize or eliminate excessive runoffs or waste; and

   b. Repair leaks as soon as practicable.

B. EXCEPTIONS

Consideration of written applications for exceptions regarding regulations and restrictions on water use set forth in this Ordinance shall be as follows:

1. Written applications for exceptions shall be accepted, and may be granted, by the Manager of Customer Service or designee.

2. Denials of applications may be appealed in writing to the General Manager;

3. Grounds for granting such exceptions are:

   a. Failure to do so would cause an unnecessary and undue hardship to the Applicant, including but not limited to, adverse economic impacts, such as loss of production or jobs; or

   b. Failure to do so would cause a condition affecting the health, sanitation, fire protection or safety of the Applicant or the public.

C. ENFORCEMENT

1. If the District determines that a customer is using water in violation of this Ordinance, the District will send a written warning to the customer that identifies the wasteful use of water, requests that the customer stop such wasteful use, informs the customer about the process for applying for an exception from the requirements of this Ordinance, and informs the customer that failure to comply with this Ordinance may result in the termination of service.

2. The District may, after issuing a written warning, and if the customer does not request an exception, conduct a follow-up visit in order to ascertain whether wasteful use of water is still occurring. In the event that continued waste of water is observed, and no exception has been granted, the District will issue a second written warning by on-site notification of wasteful water use and the

customer will be charged for the follow-up visit consistent with the field service visit charge in the District’s Rate and Fee Schedule, Section 3A.

3. In the event that District personnel observe excessive water use occurring at a customer’s premises in violation of the regulations and restrictions on water use set forth in this Ordinance more than 48 hours after the on-site notification, the General Manager may authorize termination of water service.

4. The charge for restoring service shall be consistent with the reconnection charge in District’s Rate and Fee Schedule, Section 3E. The customer must have stopped the wasteful use of water and have paid all charges owed to the District under this Ordinance before the District will restore water service.

This Ordinance shall become effective and be enforced as of June 6, 2008.

The District Secretary shall cause a copy of this ordinance to be published in a newspaper of general circulation in the District.

PASSED AND ADOPTED THIS 5th day of June, 2008, by the following vote:

AYES: Directors Huang, Koller, Lampert, and Weed

NOES: None

ABSENT: Director Gunther

/s/ JOHN H. WEED
John H. Weed, President
Board of Directors
Alameda County Water District

ATTEST:

/s/ GINA MARKOU
Gina Markou, District Secretary
Alameda County Water District

APPROVED AS TO FORM:

/s/ RAY MCDEVITT
Ray McDevitt, Attorney
Alameda County Water District

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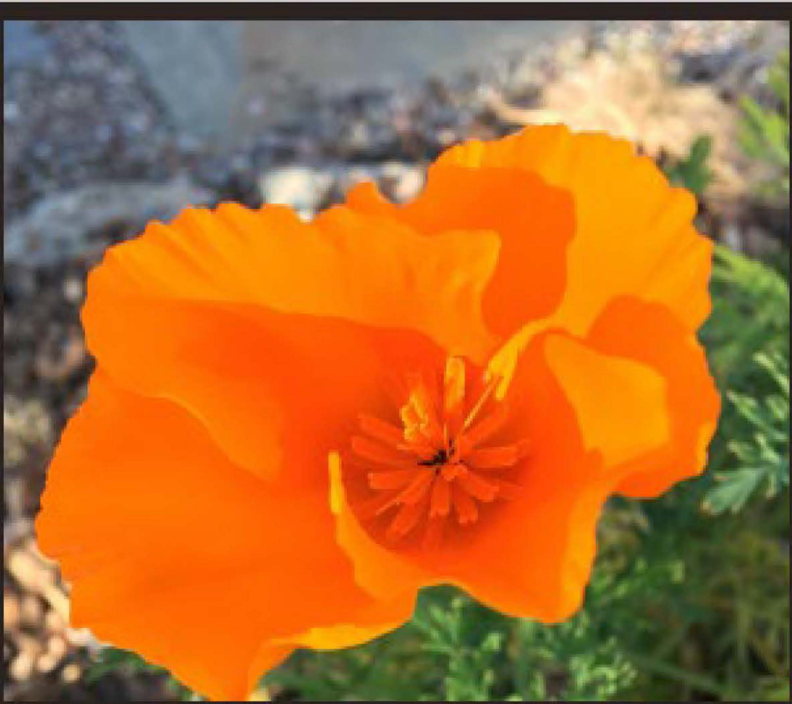
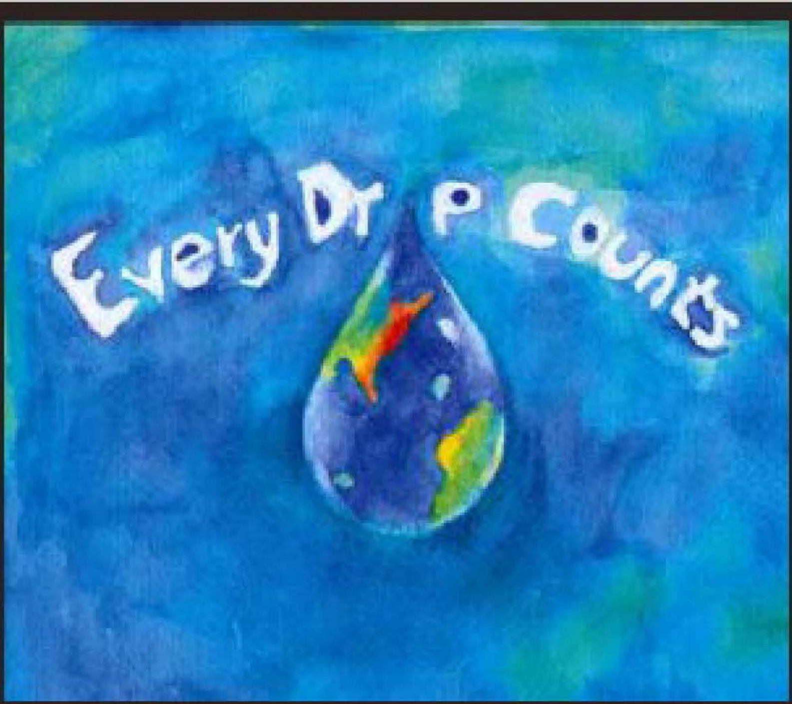
APPENDIX E
Water Efficiency Master Plan





ACWD
ALAMEDA COUNTY WATER DISTRICT

FINAL

WATER EFFICIENCY MASTER PLAN 2020/2021

Prepared by :
MADDAUS
WATER
MANAGEMENT INC.

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LIST OF ABBREVIATIONS AND ACRONYMS

AB	Assembly Bill
AB 1668	Water Conservation Legislation
ABAG	Association of Bay Area Governments
acct	Account
ACWD	Alameda County Water District
AF	Acre-Feet
AFY	Acre-Feet per Year
AMI	Advanced Metering Infrastructure
AWWA	American Water Works Association
AWWARF	American Water Works Association Research Foundation
BMP	Best Management Practice
BUS	Business
BUSLDS	Business Landscape
CalWEP	California Water Efficiency Partnership
CCF	Hundred Cubic Feet
CEC	California Energy Commission
CIMIS	California Irrigation Management Information System
COM	Commercial
CII	Commercial, Industrial, and Institutional
CUWA	California Urban Water Agencies
CUWCC	California Urban Water Conservation Council
CYES	California Youth Energy Services
DSS Model	Decision Support System Model Developed by MWM for the Water Efficiency Master Plan
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utility District
EBPP	Electronic Bill Payment and Presentment
EO	Executive Order
ETo	Evapotranspiration
FY	Fiscal Year
GIS	Geographic Information System
GPCD	Gallons per Capita per Day
GPDA	Gallons per Day per Account
gpd	Gallons per Day
gpf	Gallons per Flush
gpm	Gallons per Minute
HET	High Efficiency Toilet
HEU	High Efficiency urinal
HOT	Help on Tap Customer Assistance Program
IE	Irrigation Efficiency
IND	Industrial
INDLDS	Industrial Landscape
INSTLDS	Institutional and Other Landscape
INS	Institutional
IRP	Integrated Resources Planning
LEAF	Local Ecology Agriculture Fremont
MAWA	Maximum Applied Water Allowance
MF/MFR	Multifamily/Multifamily Residential
MGD	Million Gallons per Day

MTC	Metropolitan Transportation Commission
MWELO	Model Water Efficient Landscape Ordinance
MWM	Maddaus Water Management
OTHER	Institutional and Other
Plan	Water Efficiency Master Plan
psi	Pounds per Square Inch
PV	Present Value
QUEL	Bay Area Qualified Water Efficient Landscaper
RELDS	Multifamily Landscape
RES	Residential
REUWS	Residential End Uses of Water Study
RFP	Request for Proposals
SB	Senate Bill
SB 606	Water Conservation Legislation
SB X7-7	Water Conservation Act of 2009
SF	Single Family
SFPUC	San Francisco Public Utilities Commission
SFR	Single Family Residential
SWP	State Water Project
SWRCB	State Water Resources Control Board
ULFT	Ultra-Low Flush Toilet
UHET	Ultra-High Efficiency Toilet
UWMP	Urban Water Management Plan
WBIC	Weather-Based Irrigation Controller
WSE	Water Shortage Emergency
WUE	Water Use Efficiency

COMMON TERMINOLOGY

- **AMI** – Advanced Metering Infrastructure, a network of smart meters that can take frequent readings (hourly or more often) and provide almost real-time water use data to customers.
- **Conservation vs. Water Use Efficiency** – Alameda County Water District is moving away from using "Conservation" as a term in favor of "Water Use Efficiency" when describing its ongoing program to help customers reduce water use. Although Alameda County Water District's current program is referred to as a conservation program, that will change with the implementation of this Water Efficiency Master Plan. Both terms describe actions that reduce water use, but water use efficiency is a more accurate way to describe what measures do for a customer – measures increase a customer's water use efficiency, allowing them to do more with less without giving up anything or changing their behaviors and habits. Conservation encompasses behavioral changes to reduce water use; those behavioral changes may involve quality of life changes to temporarily save water (e.g., capturing water in a bucket from the shower to flush a toilet), particularly during a drought.
- **Measure** – Refers to an action that delivers water use efficiency (e.g., toilet retrofits). These actions also may be referred to as a "program," but for this report we are using "measure" to describe these actions.
- **Program** – Refers to a group of measures initiated collectively to achieve water use efficiency in the service area.
- **Strategy** – Refers to an approach for developing a Water Use Efficiency Program.

EXECUTIVE SUMMARY

Introduction

For over 40 years, Alameda County Water District (ACWD) has embraced water use efficiency by offering water use efficiency programs and services to all service area customers. Two major events occurred in the early 90s that shaped ACWD's Water Use Efficiency Program into what it is today:

- In 1991, ACWD was a founding member of the California Urban Water Conservation Council (CUWCC), now known as the California Water Efficiency Partnership (CalWEP)[1]. CUWCC established an Urban Water Conservation Memorandum of Understanding that ACWD, along with other founding water agencies, signed and therefore committed to make water use efficiency services accessible to all customers through the implementation of cost-effective water use efficiency best management practices (BMPs). Since that time, ACWD's Water Use Efficiency Program has included BMPs that aggressively reduce both indoor and outdoor water use, such as toilet and clothes washer rebates, large landscape surveys and water budgets, commercial audits, and public education and outreach.
- In 1995, ACWD developed its first Integrated Resources Plan (IRP). The IRP process looks broadly at the options available for matching water supplies and customer demands. Water use efficiency measures[2] are identified in the process as a way to reduce demand and even delay or eliminate the need for additional supply.

ACWD's Water Use Efficiency Program has morphed over the years to incorporate new technologies and techniques for encouraging water use efficiency in the service area. It has served ACWD and its customers well, resulting in nearly 26% of ACWD's current demand (as compared to 1995 demands) being met through customer water use efficiency (Figure ES-1).

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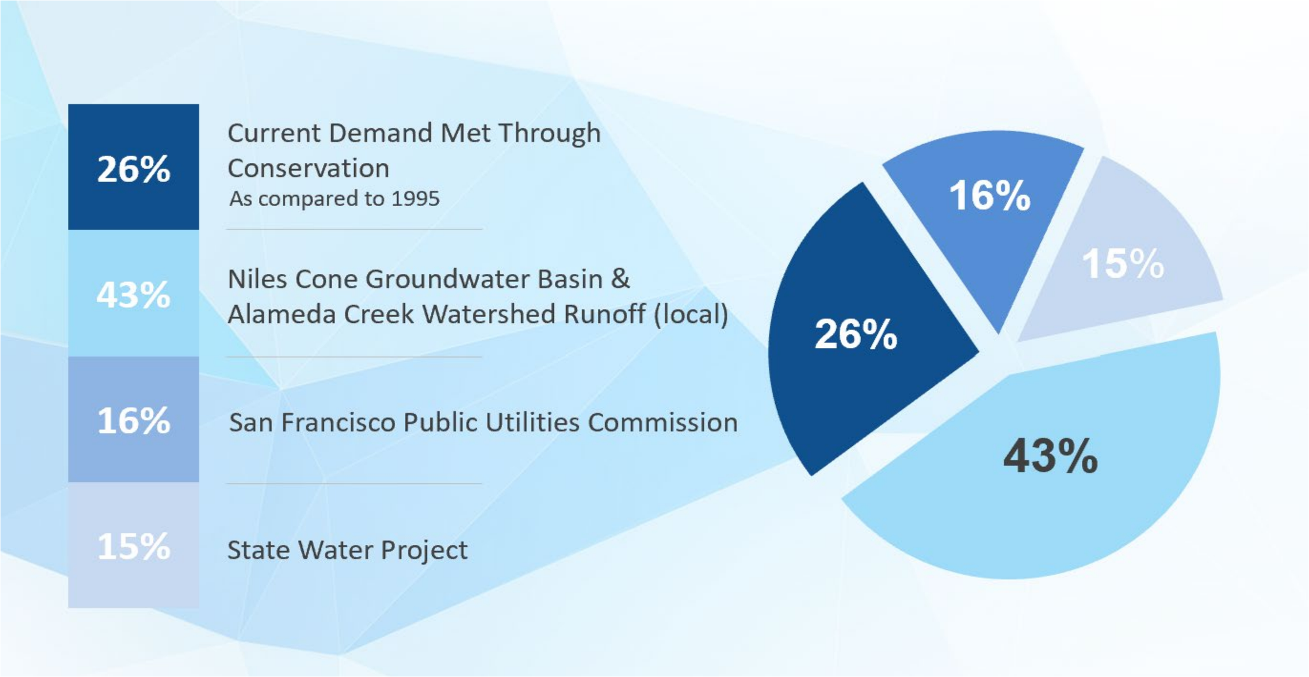
[1] CUWCC restructured and refocused at the end of 2016 to allow for a new organization, CalWEP, to form in its place. CUWCC was a quasi-regulatory organization, but with new state requirements serving the same purpose, that regulatory role was no longer needed to move water use efficiency forward in California. CalWEP has the same expertise and leadership as CUWCC, but is now focused on supporting water agencies with water use efficiency tools and programs to help them meet new state targets.

[2] Though "demand management measure" and "water conservation measure" are not terms used in this report, it may be relevant to readers who are more familiar with the terms to understand that these are essentially the same as the term "water use efficiency measure." In this report, "measure" is used to refer to a water use efficiency intervention such as a toilet rebate. A measure can also be referred to as a "program" or "strategy." However, in this Plan, "program" refers to ACWD's Water Use Efficiency Program, which includes a group of measures implemented collectively and other programmatic elements, and "strategy" refers to an approach for developing and grouping measures into a "Program."

Figure ES-1. Average Sources of Supply



While ACWD’s Water Use Efficiency Program has been very successful, recent developments are surfacing that are related to water supply uncertainty and new state regulations governing water use. Additionally, ACWD’s Board of Directors (Board) became interested in pursuing an Advanced Metering Infrastructure (AMI) system. These developments prompted ACWD to conduct a more thorough analysis of its service area water use and water use efficiency potential, and to initiate a Water Efficiency Master Planning process. This Water Efficiency Master Plan (Plan) summarizes that planning process and resulting recommendations.

The Plan takes inventory of water use efficiency gains achieved to date, identifies what remains to be achieved, and provides a roadmap to move forward with ACWD’s commitment to water use efficiency. It does this through a comprehensive review of historical and current water use, water use efficiency program participation data, and input from the community through a professional survey, which identified saturation of high efficiency fixtures, water use efficiency actions and behaviors, and customer interests. The Plan then identifies a strategy to meet ACWD’s short-term water use efficiency goals and provides a foundation for identifying strategies to meet long-term water supply needs.

Plan Development Approach

ACWD hired Maddaus Water Management Inc. (MWM) to conduct the technical analysis to support the Water Efficiency Master Plan. MWM has 25 years of experience in water use efficiency analytics for water agencies and was ACWD’s consultant on the original 1995 IRP.

ACWD specifically directed MWM to complete the following:

1. Assess water use efficiency gains from past and current programs
2. Examine passive savings expected from recent and new plumbing codes changes

3. Conduct a Community Survey to identify water use efficiency changes customers made during and after the last major statewide drought (2012-2016[3]), as well as interests for future water use efficiency measures
4. Assist ACWD in determining water use efficiency measures it should continue, new measures it should pursue, and when
5. Estimate the costs and water savings of these measures
6. Under the direction of ACWD Board priorities, combine the measures into increasingly more aggressive Strategies and evaluate the costs and water savings of these Strategies
7. Develop projections for demand under different scenarios: with plumbing code changes and under each strategy

Water Use Efficiency Strategy Overview

Through the identification and prioritization of water use efficiency measures into strategies, ACWD's Water Efficiency Master Plan enables ACWD to be "future ready" to address customer demand under both short-term and long-term water supply scenarios, identify attainable water use efficiency goals achievable under each strategy, and understand the cost to achieve those goals.

The draft Strategies were presented to the ACWD Board at a workshop in April 2020, scheduled to be discussed again at a Board meeting in March 2021, then scheduled for approval by the Board in April 2021. The Board recommended that for the short term (next 5 years) ACWD pursue Strategy "B," an approach that includes a suite of cost-effective water use efficiency measures that will ensure ACWD meets short-term water needs in its service area. Strategy B combines new measures with existing measures and is expected to result in a cumulative savings of 44,644 acre-feet (AF) of water over 31 years (2020 to 2050).

The foundation for developing water use efficiency strategies was four-fold: (1) survey the community to identify saturation of water efficiency measures, permanent demand reduction from the drought, and customer water use efficiency interests; (2) evaluate current and potential future water use efficiency measures using a set of applicable criteria; (3) quantify the costs and water savings of these measures; and (4) combine the measures into increasingly aggressive strategies, governed by ACWD Board priorities, which the ACWD Board expressed at a Water Resources Planning Workshop in July 2019. In fact, the Board's priorities guided the entire Plan development process.

The process to develop Strategy B, and other strategies that were analyzed, included reviewing water use efficiency measures using the Least Cost Planning Decision Support System Model (DSS Model), developed by MWM. A screening of more than 100 measures, directed at existing customers and new development, was conducted utilizing the methodology presented in the American Water Works Association Manual of Practice, *M52 Water Conservation Programs – A Planning Manual* (AWWA, 2017).

The Recommended Strategy includes measures required by law plus more customer-centric, extended measures for outdoor efficiency (e.g., residential and commercial, industrial, and institutional [CII] outdoor water surveys, online landscape water budgets, irrigation and landscape incentives). In addition, this strategy includes measures for surveys and rebates for commercial properties (CII water survey and CII water-efficient technology rebates) and incentives to install high efficiency fixtures in both residential and commercial properties. The model used for the analysis includes a total of 26 measures; Strategy B includes 16 of these measures. Measures

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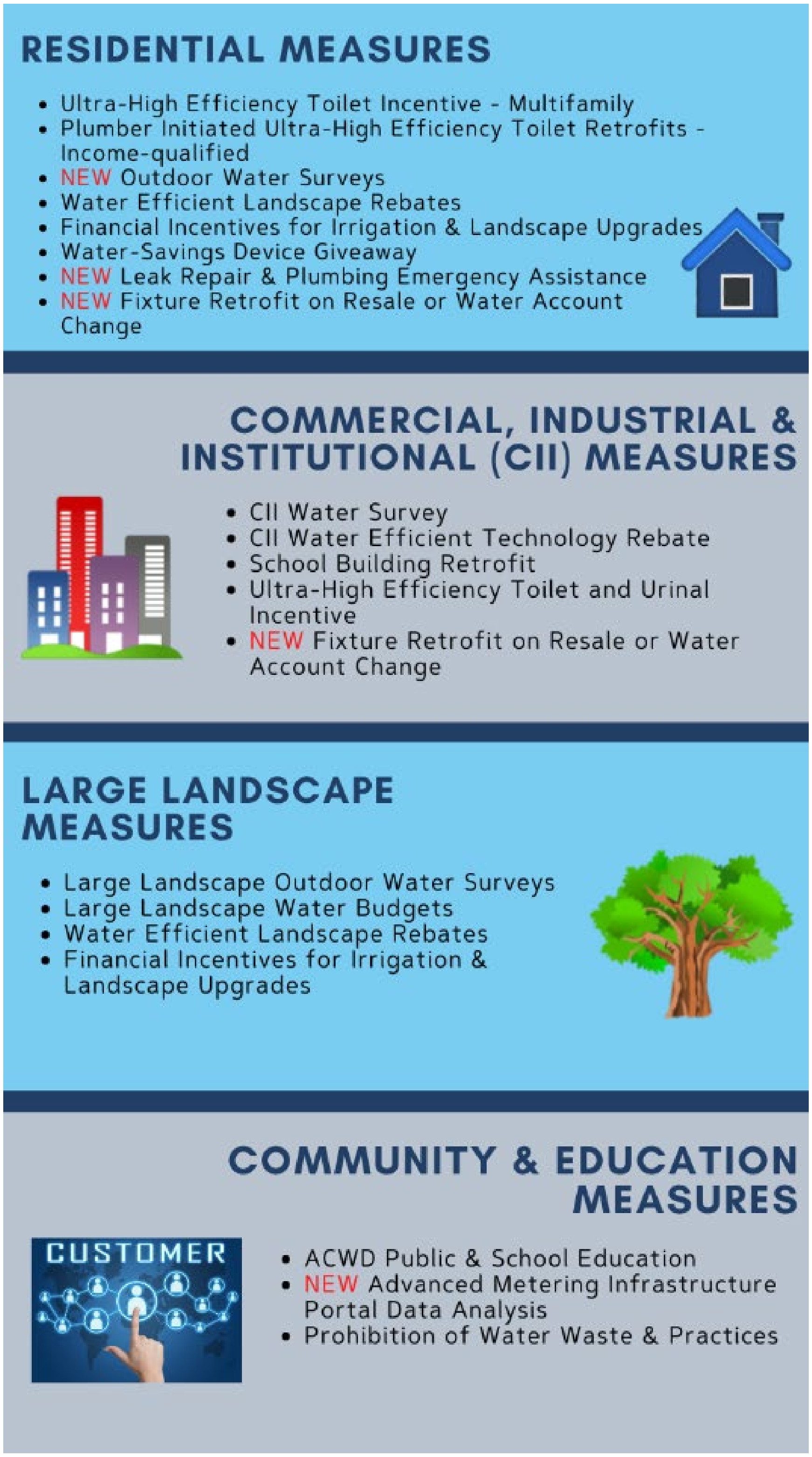
[3] The California Department of Water Resources (DWR) references the last major drought as starting in 2012 and continuing through 2016. The state declared a drought emergency and implemented drought response actions from 2014-2017, declaring the end of the drought in April 2017. ACWD declared a water shortage emergency in 2014 and rescinded the declaration in 2016 when supplies were sufficient to meet demands for the current year, as well as a hypothetical extended three-year dry period.

that were incorporated into Strategy B are listed in Figure ES-2. Measures analyzed and incorporated into a strategy are described in more detail in Appendix E.

Figure ES-2. Alameda County Water District Strategy B Measures



RESIDENTIAL MEASURES

- Ultra-High Efficiency Toilet Incentive - Multifamily
- Plumber Initiated Ultra-High Efficiency Toilet Retrofits - Income-qualified
- NEW Outdoor Water Surveys
- Water Efficient Landscape Rebates
- Financial Incentives for Irrigation & Landscape Upgrades
- Water-Savings Device Giveaway
- NEW Leak Repair & Plumbing Emergency Assistance
- NEW Fixture Retrofit on Resale or Water Account Change

COMMERCIAL, INDUSTRIAL & INSTITUTIONAL (CII) MEASURES

- CII Water Survey
- CII Water Efficient Technology Rebate
- School Building Retrofit
- Ultra-High Efficiency Toilet and Urinal Incentive
- NEW Fixture Retrofit on Resale or Water Account Change

LARGE LANDSCAPE MEASURES

- Large Landscape Outdoor Water Surveys
- Large Landscape Water Budgets
- Water Efficient Landscape Rebates
- Financial Incentives for Irrigation & Landscape Upgrades

COMMUNITY & EDUCATION MEASURES

- ACWD Public & School Education
- NEW Advanced Metering Infrastructure Portal Data Analysis
- Prohibition of Water Waste & Practices

This Plan also was developed to support the future intentions of the state of California. After the last major statewide drought (2012-2016), the California Legislature adopted a framework centered on "Making Water Conservation a California Way of Life"[4] to help the state better prepare for droughts and climate change by establishing statewide water efficiency standards. Assembly Bill (AB) 1668 and Senate Bill (SB) 606, along with related regulations currently under development, will have profound effects on water providers like ACWD over the coming years. Regulations will set indoor and outdoor water use goals, annual water budgets, and documented preparation for long-term droughts. By adhering to Strategy "B," ACWD will be in a good position to meet the state of California's current and future requirements and objectives.

The benefits of the strategy recommended under this Plan include the following:

- A short-term, 5-year plan that provides a cost-effective means to meet water demands with a foundation for establishing water use efficiency goals out to 2050
- An expansion of existing efforts to meet state-mandated targets and aggregate water use objectives, with flexibility to adapt to elements not known at the time this Plan was developed
- Improved accessibility of water use efficiency services for lower income customers in ACWD's service area
- Measures that integrate well with ACWD's AMI project
- Support for customer interests and taking advantage of regional partnerships

The following figure presents historical and projected acre-feet per year (AFY) use, with million gallons per day (MGD) on the 2nd axis, for Strategy "B." Plumbing code elements include current local, state, and federal standards for retrofits of items such as toilets, showerheads, faucets, and pre-rinse spray valves.

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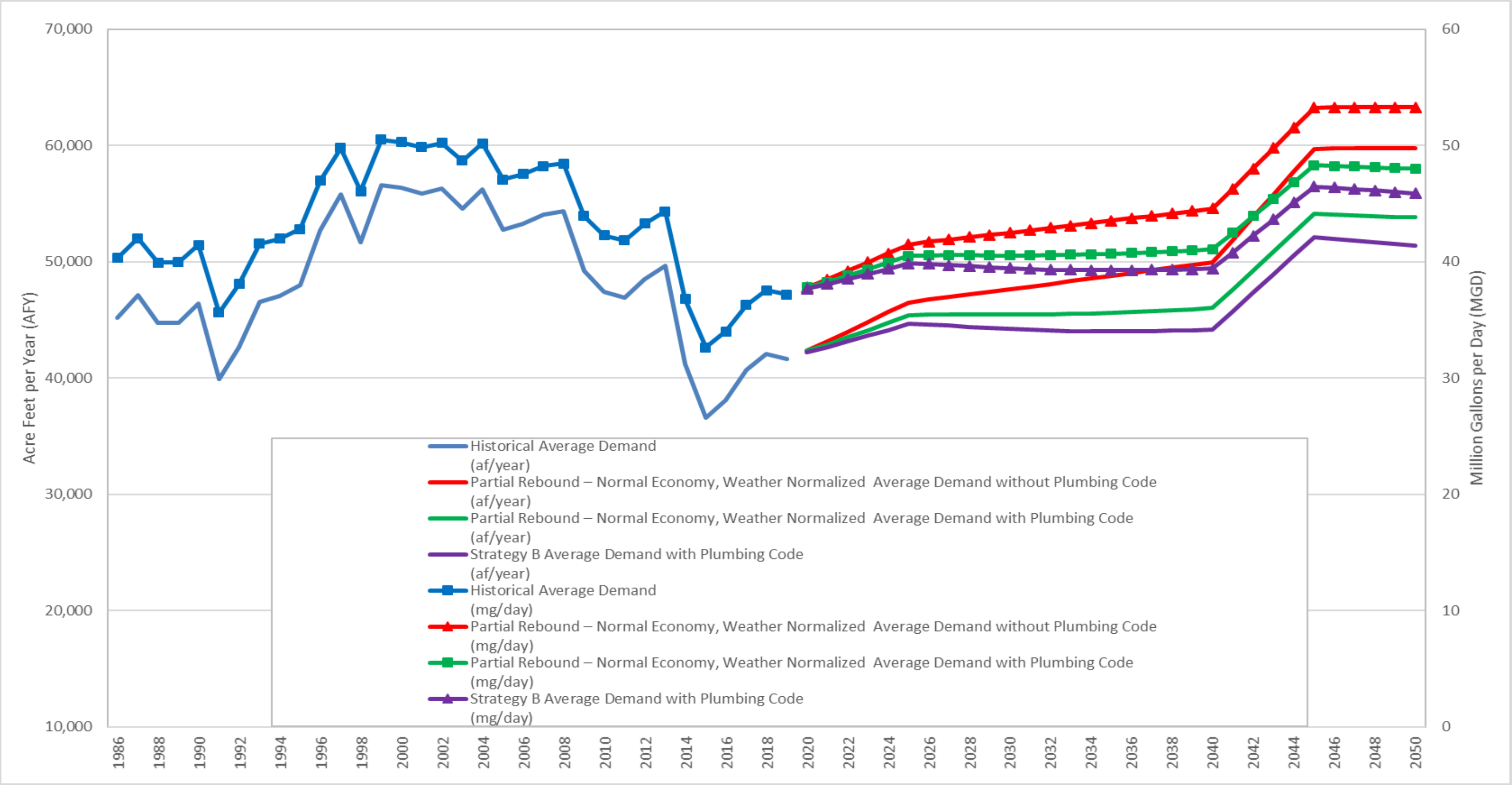
[4] California Department of Water Resources, et al. (2017). *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16*, accessed April 2021: https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/executive_orders.html

Figure ES-3. Alameda County Water District Historical and Projected Demand



Note: The sharp uptick near the end of the demand forecasting period is due to ACWD's assumption of a slower near-term growth rate (to 2040), based on historical growth rates, then accelerated growth between 2040-2045 to include all Association of Bay Area Government/Metropolitan Transportation Commission (ABAG/MTC) projected growth (draft) within the analysis. More information regarding these assumptions is in Section 3.1.

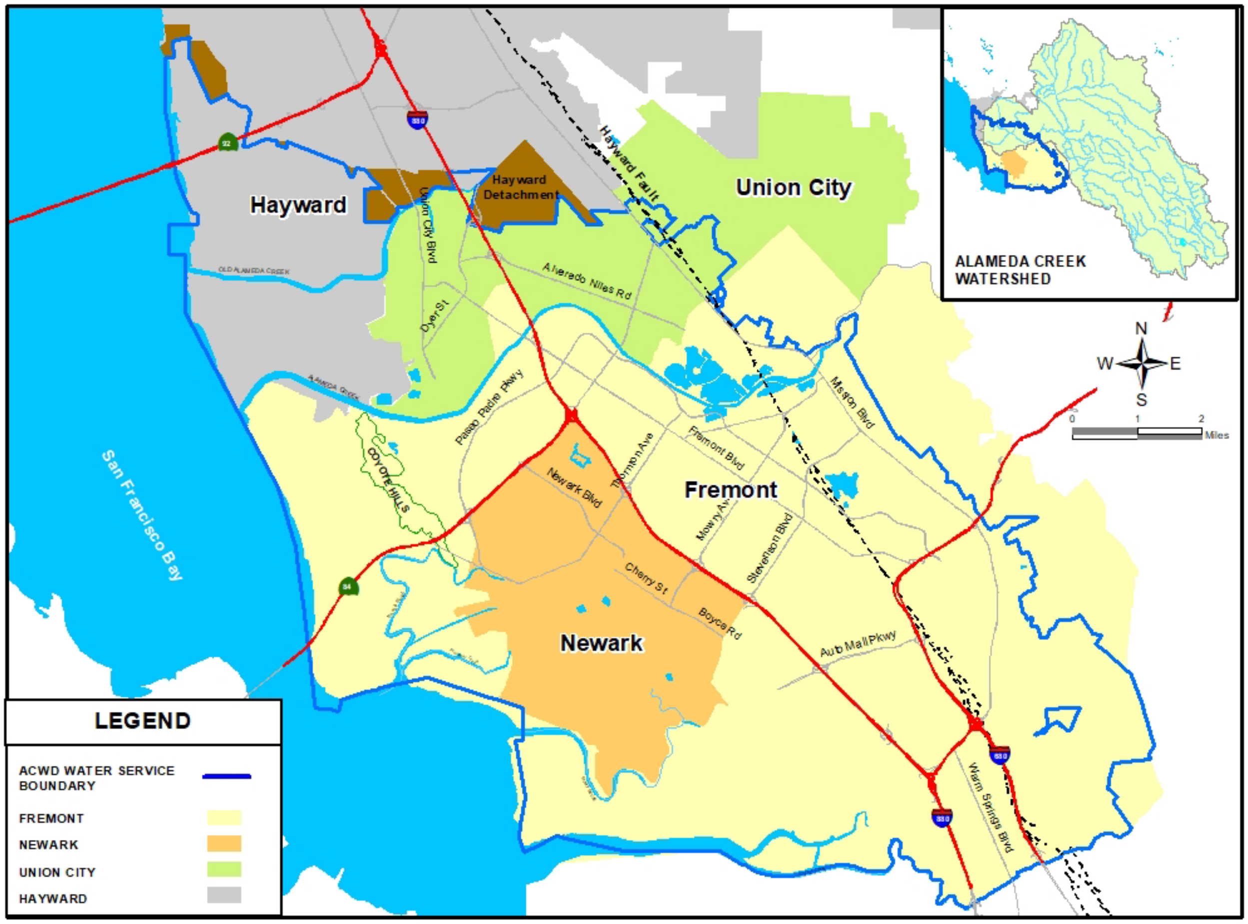
Strategy B has an average annual implementation cost, including administrative costs, of approximately $1,403,000 for the 31-year analysis period. This total includes all direct ACWD costs to implement the measures. The program is intended to be flexible and structured in a "menu/toolbox" format to allow individual measures to change both in how and when they are implemented. This flexible format will allow adaptation to new or best-available technology and adoption of changes that make sense from a cost/savings perspective. Costs will also change if grants or other cost-sharing partnerships are available.

1 INTRODUCTION

1.1 Alameda County Water District

The Alameda County Water District (ACWD) is a retail water provider located in the San Francisco Bay Area with a service area of approximately 100 square miles generally encompassing the City of Fremont, the City of Newark, and the City of Union City (Figure 1-1). ACWD serves businesses, industrial users, and more than 357,000 residents in these cities through 86,878 active connections (excluding fire lines), 78,403 of which serve residential customers. ACWD has approximately 236 employees and is governed by a publicly elected five-member Board of Directors. ACWD was founded in 1914, making it the first public water agency created under California's County Water District Law, adopted in 1913. The map below shows the ACWD service area.

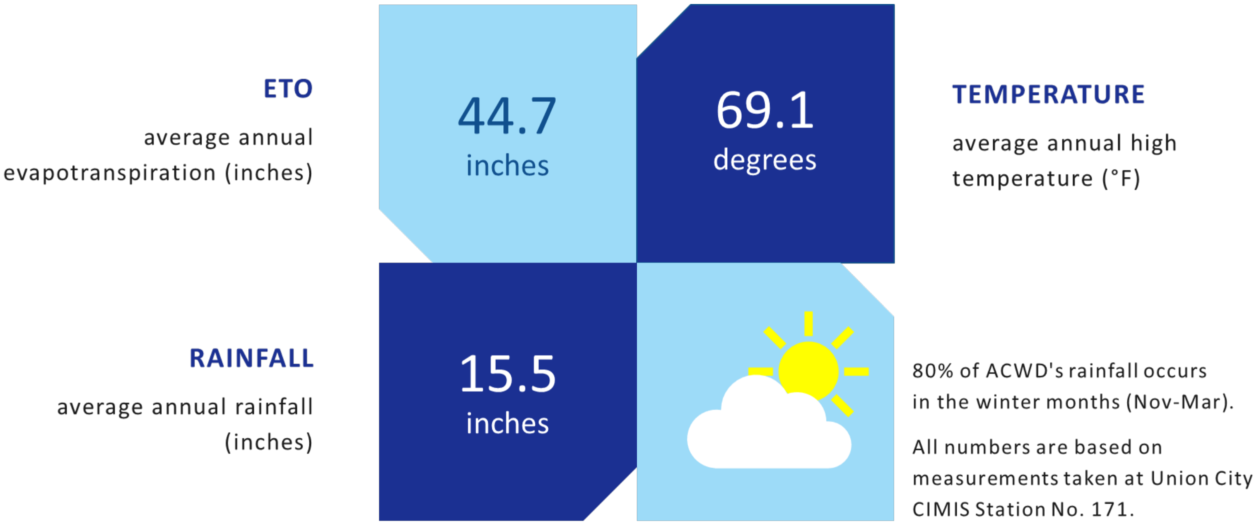
Figure 1-1. Alameda County Water District Boundary Map



Climate

ACWD's service area climate is characterized as a summer-dry, Mediterranean climate, which is temperate and generally very mild. Figure 1-2 provides additional information about the climate, which drives water use in the service area. All the precipitation in the area occurs outside the summer months when landscapes are irrigated most. If climate change, as predicted, produces hotter summers and delayed precipitation (drier falls), irrigation will increase and continue for a longer period into the fall. Water use efficiency measures that address outdoor water use will become even more critical for ACWD. The recommended strategy in this Plan contains many measures that focus on outdoor water use to address these potential impacts.

Figure 1-2. Alameda County Water District Weather Averages

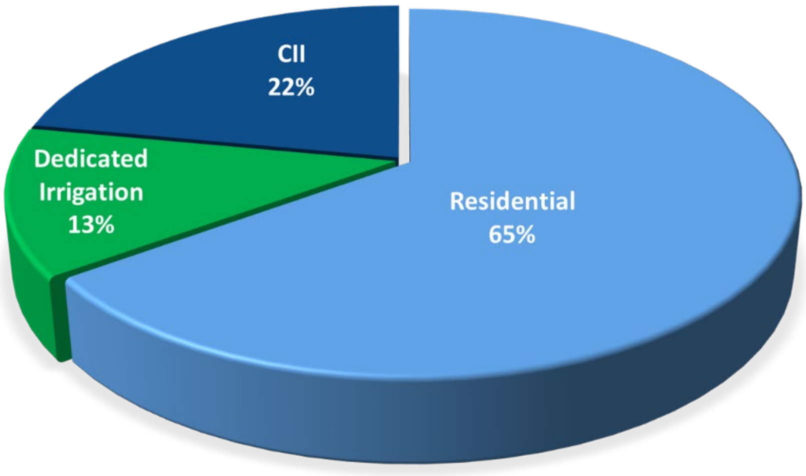


Note: The numbers in the figure above are based on 10-year averages by water year (October 1, 2010 – September 30, 2020) except for average annual high temperature ("TEMPERATURE") which is an average of daily max temperatures in 2019. Source data: California Irrigation Management Information System (CIMIS) Station No. 171 Union City.

Demographics

ACWD's service area is mostly residential, but ACWD does serve water to businesses and industrial customers. ACWD water use by customer type is provided below in Figure 1-3.

Figure 1-3. ACWD Water Use Percentage by Customer Type



The following three figures provide information regarding ACWD's service area demographics[5] by city. Fremont is the largest city in the area with a population of 235,700, Union City has a population of 74,700 and Newark has 47,200 residents (all rounded to the nearest hundred). All three cities have very diverse communities with over 70% of households with incomes greater than $75,000 per year. However, each city has significant populations with household incomes below the low-income threshold of $65,500 (Figure 1-6). The low-income threshold is based on the income guidelines for ACWD's Help on Tap (HOT) customer assistance program. The

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[5] U.S. Census Bureau. American Community Survey 5-Year Estimates web pages. https://data.census.gov/cedsci/

HOT income guidelines are based on the greater of 50% Area Median Income (used for households with up to 3 people) or 250% of the Federal Poverty Level (used for households with 4 or more people).

Over the last seven years ACWD has implemented several water use efficiency measures and rates assistance programs that provide support to these communities. Demographics included here are very helpful for determining which measures make sense to implement in the community as well as measure marketing and outreach strategies.

Figure 1-4. ACWD Service Area Ethnicity, 2019

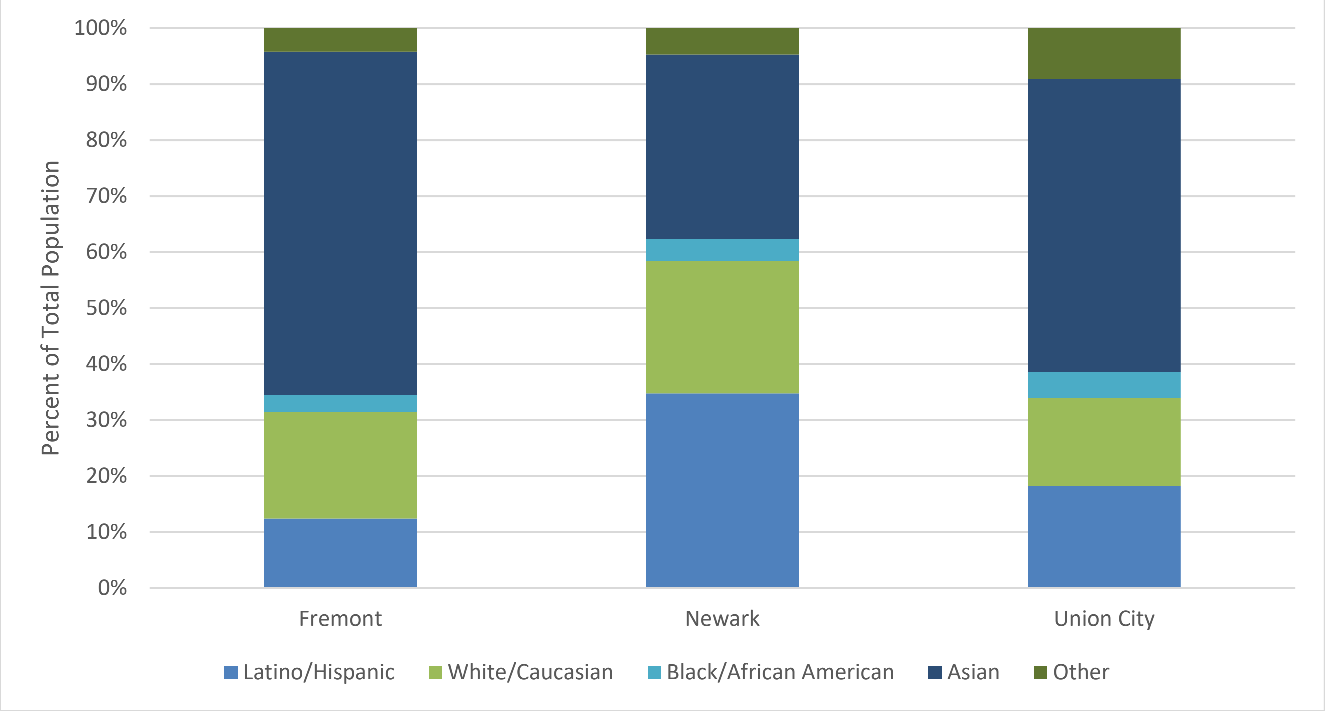


Figure 1-5. ACWD Service Area Age Group, 2019

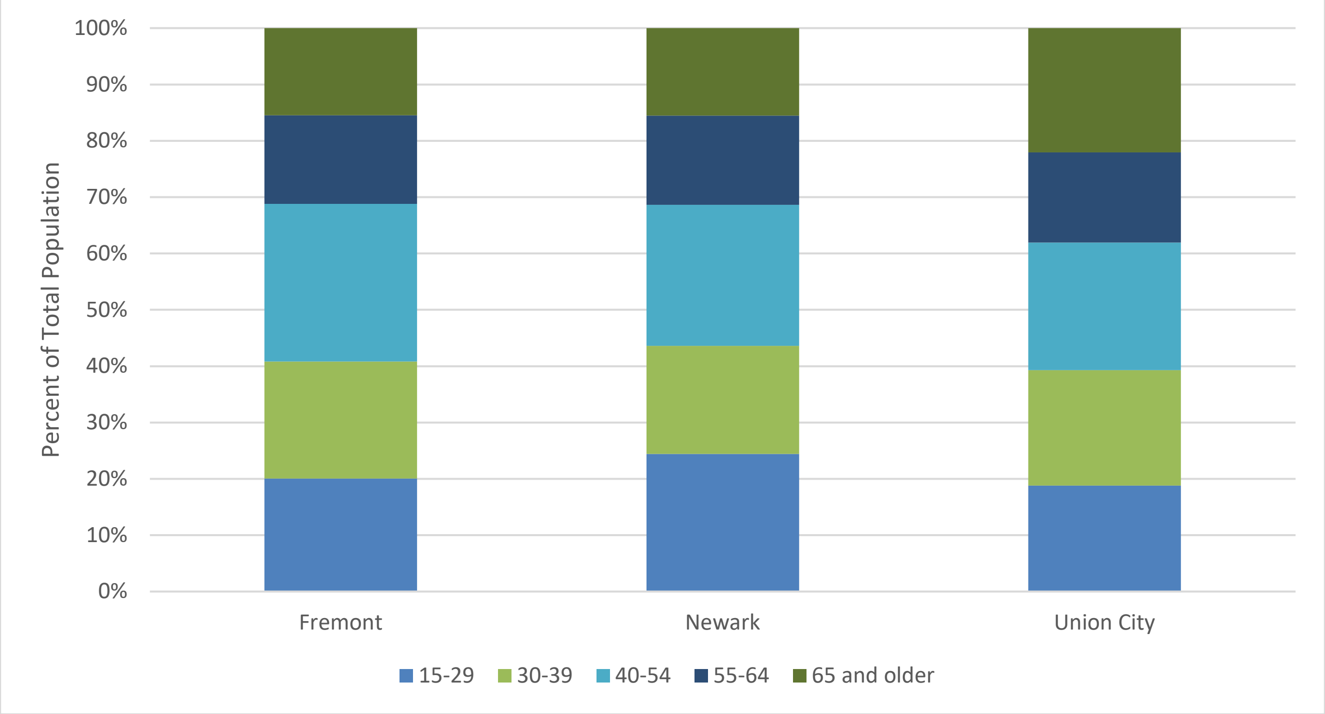
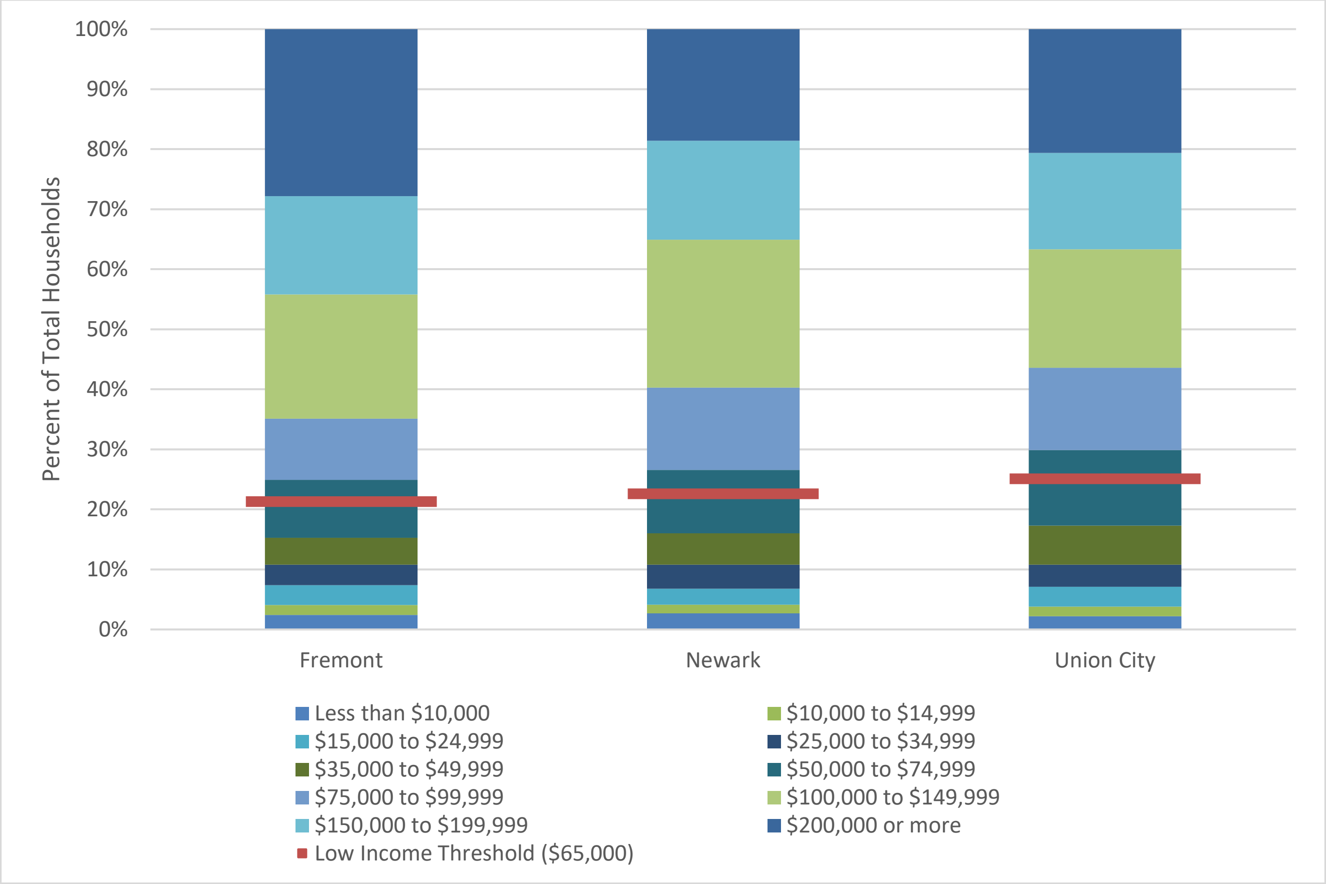


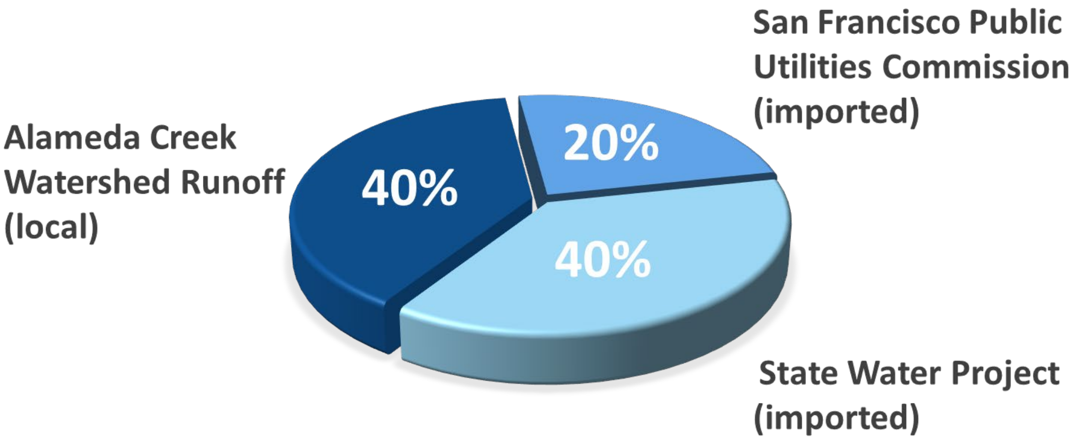
Figure 1-6. ACWD Service Area Household Income, 2019



System Supplies

For more than 100 years, ACWD has fulfilled its mission to provide a reliable supply of high-quality water at a reasonable price through a broad portfolio of water sources (Figure 1-7): runoff from the Alameda Creek Watershed; the local groundwater basin that ACWD continually recharges; desalinated water produced from the brackish water pumped by ACWD's Aquifer Reclamation Program wells, which is considered part of ACWD's local water source; the State Water Project (SWP); and the San Francisco Public Utilities Commission (SFPUC) water system. Supply percentages are rounded to the nearest tenth. This graph does not include the calculation for ACWD's current demand (as compared to 1995 demands) being met through customer water use efficiency as Figure ES-1 does. This diversification of sources has served ACWD and its customers well, but as ACWD's service area population grows, water supply uncertainties loom on the horizon, and droughts linger, customer water use efficiency continues to be an increasingly critical part of maintaining water supply reliability.

Figure 1-7. Average Sources of Supply, Distribution System Only



1.2 ACWD's Water Use Efficiency Program

Throughout the last 40 or more years, ACWD has demonstrated leadership in the field of water use efficiency. ACWD established its Water Use Efficiency (WUE) Program in 1977. ACWD was also a founding member of the California Urban Water Conservation Council (CUWCC), established in 1991, now known as the California Water Efficiency Partnership (CalWEP).

In 1995, ACWD developed an Integrated Resources Plan (IRP). Working with the community, ACWD comprehensively analyzed the long-term water needs of the Tri-City area and identified the most efficient ways to meet them. Through this process, ACWD regarded water use efficiency an equally important supply augmentation option as its other supply sources. At the time, this was a more innovative approach compared to previous planning efforts, as it focused on more than just providing additional water; it looked at the costs and benefits of dozens of approaches to match water supply to water demand, including water use efficiency. It established that water use efficiency programs can do more than reduce demand; they also can delay or eliminate the need for additional supplies and create efficiencies with existing supplies.

Several water use efficiency options or "packages" were identified out of the IRP planning process. ACWD chose to implement the package that was both cost-effective and focused on reducing outdoor water use and peak demand. The robust, comprehensive Water Use Efficiency Program ACWD offers its customers today developed from this IRP process.

The Water Use Efficiency Program that started from the IRP process has adjusted as needed to accommodate new technology, new implementation methods, and a changing marketplace. However, several things have stayed the same throughout the last 25 years: (1) all customers are provided water use efficiency services; (2) there are a variety of mechanisms to deliver these services: incentives, giveaways, technical support, and education; and (3) there is a heavy focus on outdoor water use efficiency.

ACWD has won several awards for innovation for its programs over the years. ACWD also was one of the first agencies in California to implement a Geographic Information System-based (GIS-based) landscape water budget program for landscape accounts, a residential high water use program to target over-irrigation, and a water efficient home upgrade program for income-qualified customers.

In 2010, ACWD received the Clair A. Hill Award for excellence in water management and innovation from the Association of California Water Agencies. As the honored recipient, ACWD was privileged to administer the Clair A. Hill Scholarship for the 2011-2012 academic year. Offered in the name of water leader Clair A. Hill, this $5,000 scholarship was awarded to a qualified student in a water resources-related field of study. In 2015, ACWD received the Silicon Valley Water Conservation Award under the Water Utility category for its Water Savings

Assistance Program targeting lower income customers. That same year, ACWD nominated a service area student, Akhil Dua, under the Water Champion category, for a turf removal project he spearheaded as a hopeful Eagle Scout, in partnership with the City of Union City. He also received an award that year for his efforts.

When ACWD began developing this Plan, ACWD's WUE Program offered rebates for both indoor and outdoor water-efficient fixtures, devices and other water use efficiency measures, free devices and other incentives, technical assistance (audits) and information, school assemblies, and outreach; ACWD also was considering a service area-wide AMI implementation project.

Figure 1-7 lists all the measures that were part of ACWD's Water Use Efficiency Program when this Plan was developed. While this Plan contains some high-level discussion of ACWD's past and current water use efficiency measures, the Demand Management chapter in ACWD's latest Urban Water Management Plan (UWMP)[6,7] contains more details regarding specific measures and past participation levels.

Figure 1-8. Alameda County Water District's 2020 Water Use Efficiency Program

ACWD's 2020 Water Use Efficiency Program

Large Landscape Customers

- *"Smart" weather-based irrigation controller rebates*
- *Water-efficient landscape rebates*
- *Landscape water use budgets (online service)*
- *Awards and recognition for efficient water use*
- *Landscape and irrigation surveys*

Commercial, Industrial, and Institutional

- *High efficiency clothes washer rebates*
- *Water use efficiency surveys (indoor and outdoor assessment)*
- *High efficiency toilet and urinal rebates*
- *Free water-efficient devices*

Residential Customers

- *High efficiency toilet rebates (MFR only)*
- *"Smart" weather-based irrigation controller rebates*
- *Free water saver kits and water-efficient devices: faucet aerators, showerheads, hose nozzles*
- *Rain barrel rebates*
- *Water-efficient landscape rebates*
- *Water savings assistance for low-income customers*

All Customers

- *Water use efficiency customer service*
- *Educational materials: water-wise gardening online tool, tips, and technical information*
- *Water use efficiency outreach: events, newsletters, newspaper ads/articles, ACWD website, Point of Sale information*
- *Water-efficient landscape/landscaper training workshops*
- *Water-efficient landscape demonstration garden*
- *Water waste monitoring/ordinance enforcement*

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[6] Alameda County Water District. (2016). *Urban Water Management Plan 2015-2020.*

[7] Ibid. (2021). *Urban Water Management Plan 2020-2025.* Pending completion in July 2021. See the Alameda County Water District website for more information: https://www.acwd.org/365/Urban-Water-Management-Plan.

Outdoor Water Use Efficiency

ACWD offers many measures that address outdoor water use efficiency, several of which are available to all customers (see Figure 1-8). Outdoor use has been a focus of ACWD's program since the 1995 IRP. ACWD was one of the first agencies in California to implement a GIS-based landscape water budget measure for its landscape accounts. It started in 2000, with over 800 sites (representing approximately 1,600 accounts) receiving reports each year. ACWD was also a leader in implementing a GIS-based residential high-water use notification and assistance measure, similar to popular "home water use" reporting measures currently being run by other agencies. ACWD's program started in 2004 and ran through 2014 with over 1,000 of the highest water user customers contacted each year. That measure was initiated to target over-irrigation but was also successful in identifying other water use efficiency opportunities, such as large families that could benefit from clothes washer rebates. Those measures transitioned to online services within the last several years and will be updated and expanded upon with new online tools available through AMI.

Public Education and Outreach

ACWD has a comprehensive public outreach program. ACWD has offered water education school assemblies for local schools for over 20 years and distributes educational materials to teachers to adapt to their curriculum. ACWD uses numerous other channels for outreach to customers, such as a newsletter that is sent out to all addresses in the service area several times per year, a website that is regularly updated, and a weekly item in the local newspaper. ACWD is active on social media and hosts numerous community events, many of which went virtual during the COVID-19 pandemic. ACWD also provides customers with water use efficiency tips and technical information. These outreach avenues are listed with ACWD's 2020 Water Use Efficiency Program information in Figure 1-8. Examples of local and regional outreach initiatives can be found in Appendix I.

Water Waste Ordinance

In 2008, ACWD's Board adopted an ordinance that prohibits the wasteful use of water. The Ordinance can be found on ACWD's website.[8] ACWD's Ordinance is in place at all times and is only superseded by a more stringent ordinance initiated through a Water Shortage Emergency Declaration. The Ordinance provides a mechanism to enforce against water waste in the ACWD community. ACWD has a water waste reporting form on its website where any citizen who identifies a water waste situation occurring in the service area can report it. ACWD's water use efficiency team follows up with a notification to the individual that is reportedly wasting water. ACWD receives an average of 55 water waste reports per year.

Water Efficiency in Building Codes and Standards

ACWD regularly coordinates with its service area cities on items that relate to water use efficiency. ACWD provides WUE recommendations for new developments with efficiency standards that go beyond code. These recommendations can be found on ACWD's website.[9] The document is updated regularly to ensure that the most water-efficient fixtures are included in the recommendation. ACWD coordinated with both the City of Fremont and the City of Union City on the development of and updates to their Climate Action Plans by providing data and input on water use efficiency elements. ACWD supports the implementation of the California Model Water Efficient Ordinance (MWELO)[10] and SB 407[11] by providing incentives and technical support to customers

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[8] https://www.acwd.org/wwordinance

[9] https://www.acwd.org/conserve

[10] California Department of Water Resources. (2015). *Model Water Efficient Landscape Ordinance*. https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Model-Water-Efficient-Landscape-Ordinance

[11] California State Legislature. Senate Bill 407 (Padilla), October 11, 2009. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200920100SB407

who are required to comply with these laws. ACWD also supports service area city adoption of CALGreen[12] standards.

Promote Water Efficient Products and Services

ACWD is a promotional partner of the U.S. Environmental Protection Agency WaterSense[13] (WaterSense) program. As a promotional partner, ACWD promotes WaterSense labeled products and services. The WaterSense program helps ACWD direct its customers to water-efficient products and services that have been tested and certified through a rigorous process, to ensure that ACWD's customers are getting the best products with the highest water use efficiency performance. ACWD promotes products and services that are not WaterSense certified if a certification for those items and services is not yet available. However, the WaterSense program is fairly comprehensive and covers toilets, urinals, faucet aerators, showerheads, landscape contractor workshops and certifications, weather-based irrigation controllers, and sprinkler bodies. Other WaterSense promotional partnership activities include co-promotion of WaterSense outreach campaigns such as "Fix a Leak Week."

Metering Practices

All ACWD connections are metered and billed based on the volume of water used. ACWD is pursuing a full-service AMI program which will continue ACWD's practice of metering all connections while also providing ACWD, and all its customers through a customer portal, detailed water use data in up to 15-minute increments. ACWD will be able to identify leaks and over-irrigation, as well as target customers for water use efficiency programs that make the most sense for them. More details regarding ACWD's AMI project and the measure savings are provided in Section 1.5 and Appendix E, respectively.

Rate Structures and Billing Practices

ACWD currently has a uniform rate structure,[14] which means that each unit of water (CCF) is charged at the same rate. One unit is equivalent to 100 cubic feet or 748 gallons of water. The more water that a customer uses the higher their bill. ACWD also has a fixed charge that covers a portion of the fixed costs of operating the water system, which includes meter reading, customer service, service line and water main maintenance and renewal, and other infrastructure costs. However, most of the revenue that ACWD collects from customers is from the commodity or volumetric charge, which is the per unit of use charge described above.

With an upcoming AMI deployment project, ACWD will provide its customers with direct access to their water usage. The AMI customer portal will be integrated with the online billing and payment system to ensure customers can make a connection between their water use and the cost of that water. Making this connection is critical for encouraging customers to use water more efficiently. ACWD periodically conducts an analysis to ensure water rates accurately reflect the cost of water service. ACWD also uses outside expert consultants to ensure that its rates are properly determined.

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[12] California Green (CALGreen) Building Standards 2019 Code, effective January 1, 2020. https://www.dgs.ca.gov/BSC/Resources/Page-Content/Building-Standards-Commission-Resources-List-Folder/CALGreen#@ViewBag.JumpTo

[13] https://www.epa.gov/watersense

[14] www.acwd.org/rates

1.3 Water Use Efficiency Program Success

Over the last 25 years, ACWD's Water Use Efficiency Program has been extremely successful and is estimated to have saved over 21,600[15] acre-feet (AF) through the implementation of water use efficiency measures. ACWD and its customers have met or exceeded nearly all goals set in 1995. State-imposed targets for water use efficiency for 2020 also have been met, as described below. Per capita water demand has dropped more than 30% during that same period. So, while the population in the service area has grown, investments in IRP strategies including water use efficiency have allowed ACWD to avoid or defer capital projects. Additionally, as of 2019 ACWD's total systemwide water use was 16% below year 2013 water use; 2013 was the year used as a baseline for drought response analysis by the state. This means ACWD's customers have successfully maintained a significant portion of the water use reductions they initiated during the last drought.

ACWD has utilized a suite of benchmarks to assess its Water Use Efficiency Program implementation and effectiveness. These include metrics on how water saved compares with IRP targets through annual assessments of supplies and demands, gallons per capita per day (GPCD) monitoring, reporting on BMPs per ACWD's membership in CUWCC (no longer required but ACWD continues to implement and track BMPs), and annual assessments of compliance with state-imposed water use efficiency targets – Senate Bill X7-7 (SB X7-7)[16] per capita water use goals. ACWD then reports this status through its UWMP every five years.

SB X7-7, also known as 20x2020, was adopted by the state in 2009 and required water agencies to set and report on water efficiency targets in their UWMPs. This state action effectively rendered the prescriptive BMP reporting process through CUWCC obsolete, as now agencies were obligated to report their GPCD water use efficiency gains directly to the state. This change eventually led to the dismantling of CUWCC as a quasi-regulatory agency and the creation of CalWEP. CalWEP's current role is to support water agencies by identifying programs and tools to help agencies in the state of California achieve water use efficiency and comply with state regulations.

In 2010, ACWD's 2020 SB X7-7 GPCD target was determined to be 137 gallons, as documented in the 2010-2015 UWMP and restated in the 2015-2020 UWMP. With ACWD's GPCD holding steady well under 137 gallons as of the development of this Plan, ACWD has already met its SB X7-7 20x2020 target. ACWD's target is identified as the dashed yellow line in Figure 1-9.

ACWD also tracks performance metrics related to participation in indoor and outdoor measures. ACWD tracks the number of rebates and incentives awarded, giveaways provided, technical assistance program participation (number of surveys), education program for schools (number of students and classes participating), and public attendance at events and workshops (homeowner landscaping workshops and landscape contractor certification training workshops). While ACWD tracks all water use efficiency measures, it is actively working to streamline this process through the development of a water use efficiency measure tracking database. This database will contain past activities data as well as current data. The database will tie in with a new AMI system and eventually allow customers to apply for all ACWD programs online, reducing the manual processing and reporting burden on ACWD's conservation staff.

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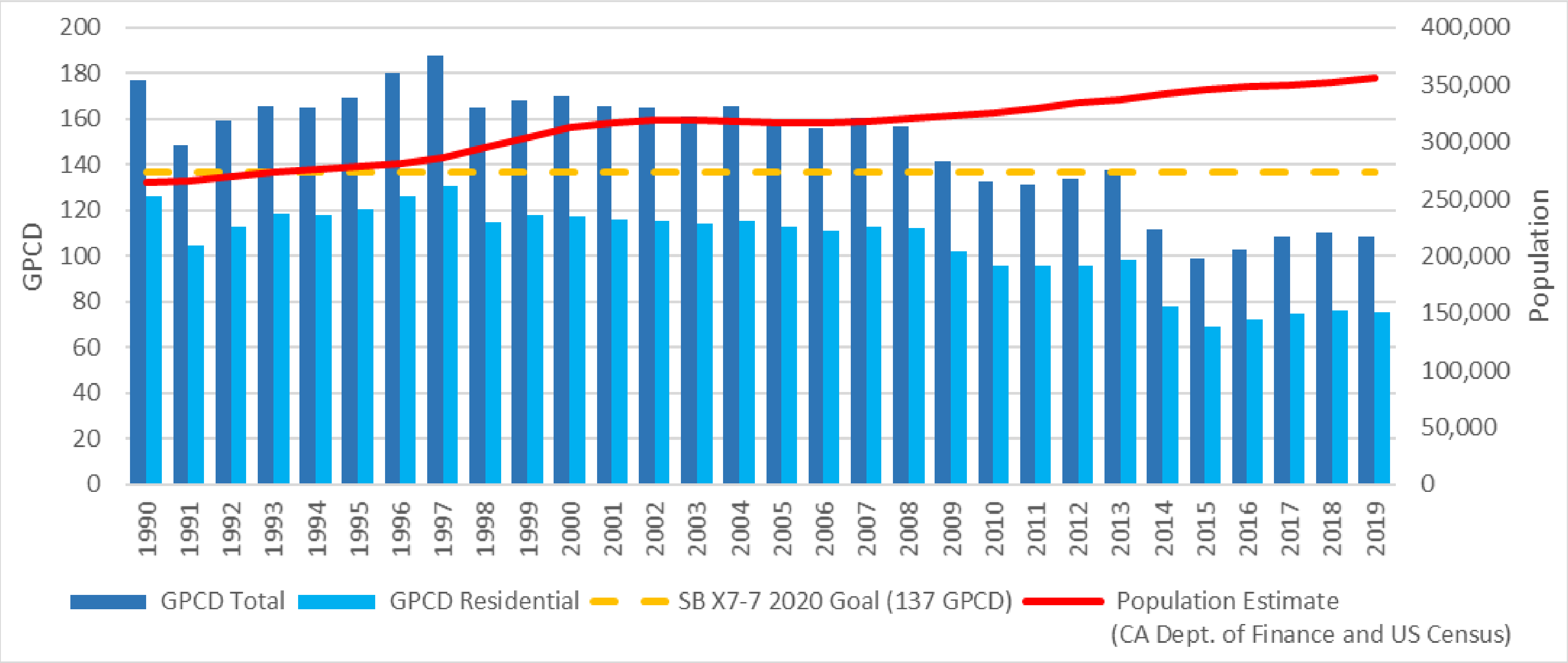
[15] This estimate is based on the difference between ACWD's SB X7-7 (see the next SB X7-7 footnote) baseline monthly per capita water use, a 10-year average by month for 1995-2004, and the current (2020) 10-year monthly moving average, with monthly values combined into an annual savings number.

[16] SB X7-7, also known as the Water Conservation Act of 2009, was a significant amendment introduced after the drought of 2007-2009 and because of the California governor's call for a statewide 20% reduction in urban water use by the year 2020. See the California Department of Water Resources' SB X7-7 website for more information, accessed April 2021: https://water.ca.gov/Programs/Water-Use-And-Efficiency/SB-X7-7

Figure 1-9. Gallons Per Capita Per Day and Population



These past WUE successes have dramatically improved ACWD's water supply reliability, even as deliveries from the Delta have grown more uncertain. However, there is more water supply uncertainty on the horizon for ACWD. While water use efficiency has allowed ACWD to stretch its supplies even during the most severe drought conditions, ACWD did have some challenges during the last extended state drought from 2012-2016.

1.4 ACWD Drought Response

In early 2014, ACWD had to quickly initiate drought actions, also known as Water Shortage Contingency Planning, when two of its three main sources of supplies were impacted by dry conditions and other extenuating circumstances.

On January 17, 2014, Governor Edmund G. Brown, Jr. declared a drought state of emergency and directed state officials to take all necessary actions in response. ACWD immediately followed with a voluntary request to its customers to cut back by 20%. Shortly after that, ACWD made that request mandatory as its State Water Project supply was reduced to an unprecedented 0%. In March 2014, ACWD declared a Water Shortage Emergency (WSE). ACWD's Board adopted a WSE Ordinance that primarily focused on outdoor water use restrictions. In July 2014, ACWD adopted a drought surcharge for excessive use, as the state issued restrictions on water use that were very similar to what ACWD already had in place. The state also began requiring water agencies to report monthly on water use and drought actions.

In April 2015, the state, not seeing enough of a reduction in water use statewide, established mandatory restrictions. Responsibility for enforcement of those restrictions was placed on water agencies. ACWD's state-mandated cutback was 16%, which was based on a state formula that used residential GPCD. By that time, ACWD had already achieved a 20% demand reduction. The state's action and the media storm that followed produced an additional 8% plus reduction by ACWD's customers – reducing demand well below the state requirement.

ACWD's quick and early success with demand reductions can be attributed to its WSE Ordinance, which required that customers reduce irrigation to two (2) days per week during the summer and one (1) day per week during the spring and fall. No irrigation was allowed during the winter months unless there was an extended (over two weeks) dry period, and no irrigation was allowed if it rained.

Many residents stopped watering their lawns altogether, and as of the approval of this Plan,

A BRIEF HISTORY OF RECENT DROUGHT IN
ALAMEDA COUNTY WATER DISTRICT

JAN 17, 2014
Governor proclaims drought emergency. ACWD requests 20% voluntary reduction.

JAN 31, 2014
Unprecedented State Water Project allocation of zero.

Lake Oroville 2014, California Department of Water Resources

MAR 13, 2014
ACWD declares a Water Shortage Emergency (WSE).

JULY 15, 2014
State Water Resources Control Board (SWRCB) adopts statewide emergency conservation regulations.

Alameda Creek, ACWD Photo Library, Stephanie Penn

END OF 2014
ACWD successfully achieves 20% plus reductions.

APR 1, 2015
Governor directs first ever Statewide Mandatory Water Reductions. ACWD's target reduction is 16%.

END OF 2015
ACWD achieves close to 30% reduction in usage.

Water-efficient landscape conversion project, ACWD Photo Library, Stephanie Penn

MAY 2016
SWRCB adopts new regulation which allows agencies to demonstrate they have adequate water supplies.

JUNE 2016
ACWD submits alternative and findings that eliminates its mandatory reduction and rescinds its WSE Ordinance.

APR 7, 2017
Governor Brown lifts the drought emergency.

END OF 2017
Monthly reporting requirements and prohibitions on wasteful water use expire.

Quarry Lakes, ACWD Photo Library, Frank Jahn much of that demand has yet to return. ACWD analyzed responses collected from the Community Survey conducted for this Plan. (See Appendix G for more information about the survey.) The analysis indicated that there is permanent demand reduction from customers who modified their landscape to a water-efficient landscape. The permanent reduction is estimated to be 1 MGD. Another 2.75 MGD of the drought-induced outdoor water use reduction is expected to return over the next five years (2020-2024). There is more discussion on this in Section 3 of this Plan.

The State Water Resources Control Board (SWRCB) updated its emergency regulation in May 2016. The update allowed water suppliers to self-certify as to whether they had sufficient supplies based on a hypothetical extended dry-year period mirroring the past three years, with assumed demand as an average of 2013 and 2014 actual demands. ACWD's self-certification analysis resulted in sufficient supplies, eliminating ACWD's state-mandated reduction. In June 2016, ACWD rescinded its WSE Ordinance. ACWD’s monthly reporting to SWRCB continued even after the regulation mandating it expired in November 2017.

The drought presented some unprecedented challenges for ACWD. ACWD had to make quick and deliberate decisions to reduce demand. Part of ACWD’s success in reducing demands can be attributed to ACWD’s WUE program and customer outreach for the program. If ACWD had not already had a robust and comprehensive WUE program and outreach channels, demand reductions would have been much more challenging. For example, ACWD had a water-efficient landscape rebate program that encouraged many customers to permanently replace their landscape with a more climate-appropriate and water-efficient landscape. Providing customers with this incentive during the drought was a critical part of demand reduction success.

Despite successes with ACWD’s Water Use Efficiency Program and drought response, ACWD saw a need to revisit previous analysis and conduct a comprehensive review of its WUE Program, as outlined in ACWD’s 2018 Strategic Plan. The Strategic Plan identifies future supply and demand uncertainties such as the Bay Delta Water Quality Control Plan, climate change impacts, and future droughts, as well as impending state regulations (“Making Water Conservation a California Way of Life”) and the implementation of AMI.

ACWD needed to develop a strategy that could govern implementation of the WUE program in the short term (5 years) and provide a roadmap for the next 25 years that would align with ACWD’s long-term planning projects. Thus, ACWD embarked on a Plan development process.

1.5 Water Efficiency Master Plan Purpose & Drivers

The Water Efficiency Master Plan will direct ACWD’s WUE program for the next five years (2021-2025) and will provide a foundation for water supply planning out to 2050. The Plan presents an overview of ACWD’s past and current water use or baseline use, projected future use with population growth and drought rebound, and an evaluation of remaining water use efficiency potential, with recommended water use efficiency strategies for the short term, as well as considerations and direction for the long term. The Plan is guided by the AWWA Manual of Practice *M52 – AWWA Water Conservation Programs – A Planning Manual (AWWA, 2017)*.

When ACWD began analysis for this Plan, it was interested in gaining a better understanding of what water use changes its customers made during the last drought, which actions resulted in permanent savings, and which actions were temporary changes that may contribute to a rebound in water use in the future. Typically, after a drought there is a slow but steady “rebound” effect, where some customer behavioral changes fade and reset to pre-drought behaviors. However, there tends to be a permanent downward shift in overall water consumption, attributed to both permanent behavioral changes (“conservation ethic”) and permanent water use efficiency actions, such as

ACWD’s Specific Plan Objectives

- Engage the community in identifying past water use efficiency actions and customer interests
- Develop an assessment of past Water Use Efficiency Program efforts, current and projected water use, and conservation potential
- Determine the best strategy for the Water Use Efficiency Program for the short term and provide a foundation for the long term

removing older fixtures in favor of efficient models and removing turf in favor of water-efficient landscaping. In retrospect, the trend is clear, but identifying where temporary behavior ends and permanent change begins has always been challenging for water resources planning when projecting future water demand. Engaging the community in this analysis through a Community Survey was critical to making assumptions about drought rebound potential and projected future water demand.

ACWD also recognized that there had been a substantial shift in the challenges and drivers for water management – in part because of the recent drought, but also because of other water supply uncertainties, the onslaught of new technology such as AMI, and the need to comply with developing water use efficiency regulations. This Plan, and its associated analyses, was needed to identify short-term WUE actions that could ensure water supply reliability, keep demands low, and be "drought ready," while also providing guidance regarding water use efficiency's role under long-term water supply planning scenarios. ACWD also wanted to make sure it was on track to meet new state Water Conservation Legislation, of which many elements were yet to be determined. In addition, ACWD wanted to gain a better understanding of the impact of AMI from a water use efficiency perspective – its savings potential and measures that would benefit from the technology.

Analysis conducted for the Plan took all of this into consideration, identifying WUE Strategies at increasing cost and savings levels to address ACWD's current and future demand management needs. The first strategy is modeled after ACWD's current program but trimmed down to demonstrate the bare minimum ACWD should implement to keep on track with initial IRP planning objectives. It includes measures that are cost effective when compared to ACWD's current cost of production. The second strategy is an expanded version of the first strategy with more measures than ACWD's current program. It includes measures that are cost effective when compared to the Fiscal Year (FY) 2025/26 cost of SFPUC water supply, ACWD's most expensive source of water. The third strategy includes all measures in the first two strategies plus additional measures that establish codes and regulations for new and existing development and rates changes. It includes measures that are cost effective when compared to the potential cost of new supplies.

As mentioned above, there are several major water management drivers for this Plan. These drivers were all identified in ACWD's 2018 Strategic Plan through its objectives and identified actions.

ACWD Strategic Plan

In 2018, ACWD established its 5-year strategic goals which provided a roadmap for carrying out ACWD's core mission. Those goals are as follows:

1. Maintain and improve the cost effectiveness and value of ACWD services
2. Sustain a reliable, high quality water supply for ACWD customers
3. Improve ACWD's financial stability and transparency
4. Improve workforce recruitment, maintain retention, and enhance employee engagement
5. Promote clear and open communications, outreach, and engagement with customers and communities

ACWD's Water Use Efficiency Program ties in with several of these goals and was specifically called out in Strategic Plan Goal 2**:** Sustain a reliable, high quality water supply for ACWD customers; objective 2.3: Evaluate New and Innovative Water Management Concepts. This objective declares that ACWD should develop and implement a Water Efficiency Master Plan to leverage the benefits of AMI and address changing water use efficiency regulations. The Plan is also tied into objective 2.4: Plan for Future Water Supplies, as it informs ACWD's major planning objectives: the demand forecast update, the UWMP, and a full IRP update planned for 2023-2025.

Advanced Metering Infrastructure (AMI)

Several years before this planning process was initiated, ACWD's Board began seriously considering implementation of a service area-wide AMI deployment project. AMI provides several benefits for ACWD including increased operational efficiencies, enhanced customer service, reduced environmental impact, and increased water use efficiency. One of the biggest changes of AMI is that it takes ACWD from manually reading customer consumption on a bimonthly basis (monthly for a handful of meters) to near real-time remote access of customer consumption data.

The AMI project was approved by the Board of Directors just as this Plan was in its final stages of completion. The project includes a best-in-class customer web portal to provide customers access to their usage data at any time during their billing cycle that will be integrated with existing systems that provide additional customer self-service functions.

AMI will provide a tremendous amount of water consumption data that can be used to analyze customer water use trends, identify leaks and high-water use, target customers for water use efficiency measures, and evaluate the success of these measures. The AMI measure, as analyzed in this Plan, demonstrates that significant water savings can be achieved through access to detailed (15-minute) water usage information. All WUE strategies in this Plan include AMI Portal Data Analysis as a water use efficiency measure.

New State Legislation

In 2018, California Governor Edmund G. Brown Jr. signed AB 1668 (Friedman)[17] and SB 606 (Hertzberg).[18] These bills provide a framework for implementing new standards to establish "Making Water Conservation a California Way of Life" and better prepare the state for droughts and climate change. The new standards must be in place by July 2022.

The two bills go beyond existing SB X7-7 requirements to further strengthen the state's water resiliency in the face of future droughts. Bill provisions include establishing standards for the following:[19]

- Residential indoor use with an initial per person water use standard of 55 gallons per day (gpd) until 2025, 52.5 gallons from 2025 to 2030, and 50 gallons beginning in 2030
- Outdoor irrigation (residential and dedicated landscape water meters)
- Performance measures for CII water use
- Water loss standards

This Plan provides a recommended strategy for meeting these new standards with measures for all customer types. The strategy anticipates what the standards may be, based on the best available information at the time this Plan was developed.

Water Supply Uncertainty

ACWD is facing many uncertainties about the reliability of its water sources and what its water needs will be in the future. Decisions over the next five years related to the Bay-Delta Water Quality Control Plan will be the most critical. The outcome of those decisions, and other supply uncertainties explained in this section, will help determine if ACWD needs to develop new water supplies. Increased water use efficiency can help offset or delay development of expensive new sources.

Some of the challenges to ACWD's water supply include the following:

Bay-Delta Water Quality Control Plan and Increasing Delta Flow Requirements – The SWRCB is in the process of establishing enhanced flow requirements for rivers flowing into and through the Sacramento-San Joaquin

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[17] Ibid. Assembly Bill 1668 (Friedman), May 31, 2018. http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB1668

[18] Senate Bill 606 (Hertzberg), May 31, 2018. http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB606

[19] https://www.ca.gov/archive/gov39/2018/05/31/governor-brown-signs-legislation-establishing-statewide-water-efficiency-goals/index.html

River Delta (Delta) under the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan. The plan calls for unimpaired flows during winter and spring months for rivers flowing into the Delta. These new flow requirements will directly offset the available supply for ACWD to import from both the SWP and SFPUC.

These impacts will be felt in normal years but will also significantly deplete the surpluses needed to fill ACWD's off-site groundwater bank in Semitropic. ACWD contracted with the Semitropic water bank in the 1990s for the purpose of storing wet year surpluses for use during dry years, a practice known as "conjunctive use" management. Water use efficiency measures increase the availability of surpluses for banking in Semitropic.

Local Fisheries Restoration Flow Requirements – Together with a team of non-governmental organizations and local, state, and federal government agencies, ACWD is working toward reestablishing a native steelhead fishery on Alameda Creek. ACWD has committed to providing additional stream flows needed to enhance migration success for steelhead and other salmonids.

Climate Change – The issue of climate change has become an important factor in water resources planning in California and is frequently considered in water management and water use efficiency planning, though the extent and precise effects of climate change remain uncertain. ACWD's climate change analyses find that the known and anticipated effects of climate change will have significant impacts on our water supplies and our operations. Anticipated impacts include, but are not limited to, reductions in annual snowpack, changes in precipitation, sea-level rise, saltwater intrusion in the Delta and ACWD's coastal aquifer, and increased temperature-dependent water demands. The SWP is anticipated to have operational challenges in the Delta stemming from sea level rise as a result of climate change, reducing the ability and quantity of water it is able to deliver. Reduction in snowpack and earlier snow melt in the Sierra Nevada mountain range poses a threat to both the SWP and SFPUC supplies. Sea-level rise will also reduce ACWD's freshwater storage in the Niles Cone groundwater basin.

The result of enhanced flow requirements in the Delta and on Alameda Creek combined with the anticipated impacts of climate change lead to a significant reduction in ACWD's water supply reliability. This Plan is the first step in many planning processes ACWD will pursue in the near future to address these uncertainties. The information in this Plan will provide the foundation for an upcoming Water Supply Master Planning process, as it provides a demand forecast with projected savings from water use efficiency measures for ACWD. The model used for this Plan's analysis provides water use efficiency savings estimates for individual measures, which can be modified to identify additional water savings potential if measure targets are increased. More information about water use efficiency measures and targets can be found in Section 5.

AWWA G480 Standard

ACWD intends for this Plan and its WUE strategy to comply with the American Water Works Association G480 Water Conservation Program Operation and Management Standard (G480 Standard). The G480 Standard is defined on the AWWA web page as follows:

> *The G480-13 Water Conservation Program Operation and Management Standard (G480 Standard) is a voluntary standard that can be adopted by water providers at their own discretion. The G480 Standard describes the critical elements of an effective water conservation program and encompasses activities undertaken by a utility within its own operations to improve water use on the supply side through distribution system management and on the demand side through customer billing and education practices. A conservation program meeting this standard has the potential to impact all water users.*[20]

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[20] American Water Works Association. G480 Standard and AWE Leaderboard web page, accessed April 2021: https://www.allianceforwaterefficiency.org/resources/topic/g480-standard-and-awe-leaderboard

All elements of the AWWA G480 Standard are included in this Plan. Achieving this standard puts ACWD in a position to be recognized as a leader in water use efficiency on the Alliance for Water Efficiency's G480 Leaderboard.

1.6 Water Efficiency Master Plan Approach

In 2019, ACWD hired MWM through a Request for Proposals (RFP) process to conduct the analysis associated with the development of the Plan. MWM utilized its proprietary Least Cost Planning Decision Support System Model (DSS Model) to evaluate current and potential water use efficiency measures. The DSS Model is a software tool that assists water planners with evaluating alternative water use efficiency program options. It prepares long-range water demand projections and quantifies the demand reduction effects of selected measures, along with the effects of plumbing codes and appliance standards.[21] The approach used for this project is summarized herein. Detailed information about each step in the process is included in subsequent sections of this Plan.

ACWD worked closely with MWM to compile extensive historical data on the region, agency, water use efficiency measures, production, consumption, weather, and various census data points. Together, these formed the foundation for the DSS Model used for this project. ACWD's project team utilized the template data collection workbook provided by MWM to compile and verify data. The project team at MWM verified and tested data against historical records to ensure accuracy and logic as the DSS Model was developed. A Community Survey was conducted to further refine the model inputs. The survey asked questions that were geared toward identifying customer actions during the drought, the current level of efficiency of customer water using fixtures, and interests in water use efficiency measures. More detailed information about the DSS Model can be found in Appendix B of this Plan, including a description of the assumptions, analysis, and methodology used. More details about the Community Survey and how it was used in the model are included in Appendix G.

MWM reviewed existing ACWD practices and procedures to create a comprehensive list of water use efficiency measures currently in place. Based on the analysis of current water use patterns, and taking into account characteristics of the service area, a list of more than 100 potential water use efficiency measures was compiled and reviewed by ACWD staff in a measure screening workshop with MWM. The MWM team also reviewed relevant literature and practices of other agencies to determine potential measures that could be implemented by ACWD. MWM used its master potential measures database and followed the process outlined in the AWWA Manual of Practice *M52 – Water Conservation Programs – A Planning Manual*.

ACWD then received the Measure Screening Template and began screening the water use efficiency measures. ACWD developed screening criteria which included water savings potential, account saturation, equitability, community and social acceptance, and feasibility of implementation related to cost and staffing, as well as other criteria as outlined in Section 5.1. The list was then compared to input from customers through a Community Survey (Appendix G), other online customer surveys, and Board workshops and meetings; customer interests played a major role in identifying water use efficiency measures that were analyzed for this Plan.

During the measure screening process, 26 measures were selected for further detailed economic analysis. The evaluation included measures directed at existing accounts as well as new development (i.e., measures that would encourage and/or require new residential and business customers to be more water efficient).

Assumptions and results for measures evaluated and selected for incorporation into Strategies are described in this Plan. Based on a preliminary analysis of the individual measures, three Strategies (Strategies A, B and C)

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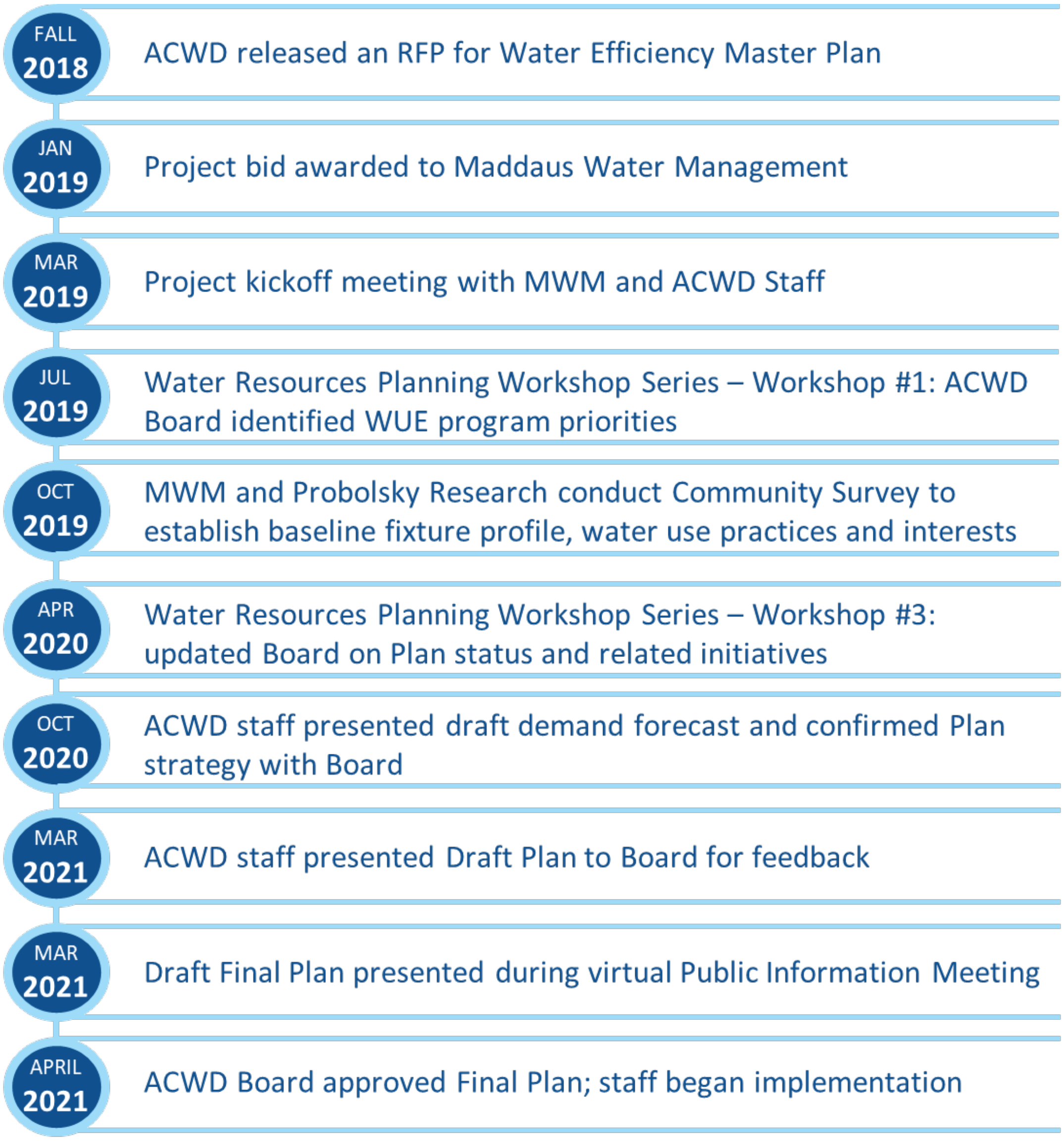
[21] The DSS Model is an "end-use" model that breaks down total water production (water demand in the service area) to specific water end uses, such as plumbing fixtures and appliance uses. It uses a bottom-up approach that allows for multiple criteria to be considered when estimating future demands,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

were developed by MWM with input from ACWD staff. Each of the three Strategies were evaluated to determine the net effect of running multiple measures together over the 31-year period of analysis (2020–2050).

Using the DSS Model, projections of future water demand, with and without plumbing code as well as with and without active water use efficiency programs, were made for ACWD's water service area for every year in the 31-year analysis period. Water savings, costs, and benefit-cost evaluations were performed on the selected measures.

Throughout the planning process, ACWD and MWM met more than 20 times, primarily in an effort to complete the DSS Model, which is robust for each of the 26 measures modeled. In the model, ACWD identified fixture costs, applicable customer classes, time period of implementation, measure life, administrative costs, end uses, end-use savings per replacement, and a target number or percentage of accounts per program year based on current staffing level capacities and assumed customer interest. Following DSS Model completion and approval of Strategy B as the recommended approach for implementation for the next five years, the Draft and Final Water Efficiency Master Plans were prepared. Figure 1-10 provides an overview of the Plan development timeline.

Figure 1-10. Water Efficiency Master Plan Development – Major Project Milestones



The Final Plan projects long-range demands, identifies attainable water use efficiency goals, and proposes strategies to meet these goals. It systematically evaluates and quantifies a short-term water use efficiency strategy for the service area while providing a foundation, or “toolbox,” that enables ACWD to pursue a long-term strategy. In other words, it is “future ready” with the capacity to initiate a long-term potential strategy, if needed. It serves as a guide for future water use efficiency investments and activities. It also includes a functional implementation plan for ACWD to establish and administer cost-effective water use efficiency measures.

ACWD will use this Plan and its robust analysis in future water supply planning documents. The Plan will be used immediately to prepare the Water Use Efficiency (Demand Management Measures) chapter in its 2020-2025 UWMP. The Plan will also start ACWD on a path for compliance with AB 1668 and SB 606 “Making Water Conservation a California Way of Life” legislation (signed on May 31, 2018) by documenting water use efficiency measures that address end uses subject to new state standards. While the Final Plan was developed to align with new state legislation, full details on these requirements were not yet available when the Plan was finalized. When detailed guidance is available, this Plan may need to be modified to include additional actions.

2 HISTORICAL AND CURRENT WATER USE

This section presents information about the data collection process, historical production, and customer category consumption data.

2.1 Information Review and Data Collection Methods

Data relevant to this effort was collected, reviewed, and entered into ACWD's Data Collection Workbook. To help streamline the process, MWM initially entered data from readily available sources, like the 2015 UWMP, into the Excel Data Collection Workbook prior to sending the file to ACWD staff for updating and review.

Several iterations of data review by both ACWD staff and MWM followed including confirmation of the number and types of customers within ACWD's service area. Data from each customer category was analyzed separately. Monthly production data[22] from 1986-2019 was also reviewed. MWM and ACWD staff decided to use the data from 2019 to derive typical non-drought average water use per account per day because there was a full year of data to work with and it was furthest from the last drought.

Based on ACWD's water billing system, residential water use was broken down into single family and multifamily categories. MWM used historical monthly billing data (obtained from bimonthly reading cycles) to segregate indoor and outdoor water use by customer type. Non-residential categories of use were analyzed separately. Average daily commercial, industrial, and institutional water use was expressed on a gallons-per-account or gallons-per-employee basis.

Figure 2-1 presents data topics and data items that were requested, gathered, and stored in ACWD's Data Collection Workbook. Items were tracked in a checklist in a robust data Excel file kept by MWM and ACWD.

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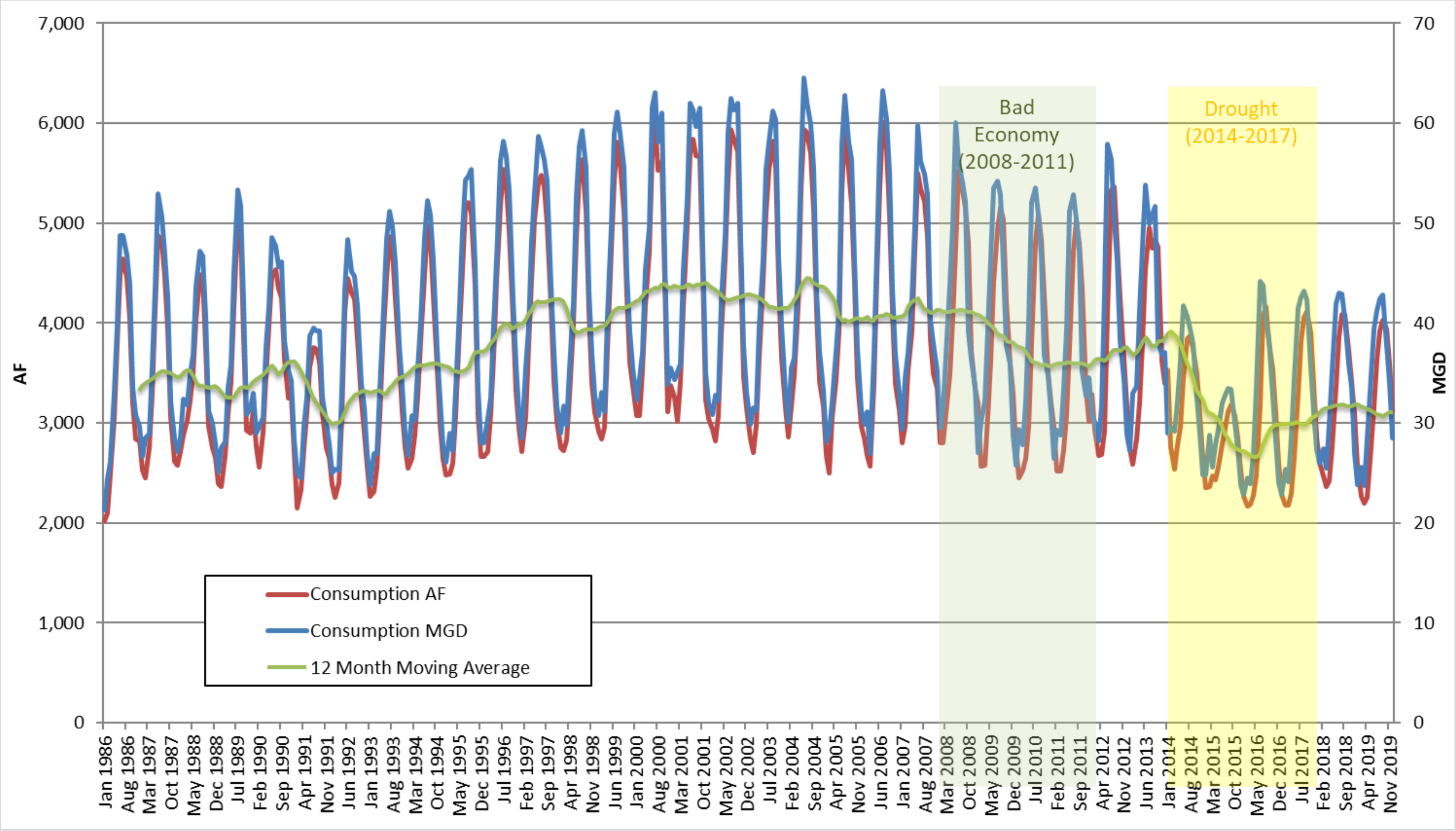
[22] Production data did not include private pumping production data, and consumption did not include billed well consumption data. While this data was not included in the Plan analysis, ACWD will continue to monitor this use outside of the DSS Model for potential water use efficiency gains, which would primarily apply to outdoor water use. However, any potential water use efficiency gains from measures addressing this use are known to be less than 1% of total water use.

Figure 2-1. Data Collection Workbook Topics and Items Requested

2.2 ACWD Past and Current Consumption Data

Figure 2-2 illustrates historical monthly total consumption from 1986 through 2019. Consumption data was measured at the customer meters. ACWD's water use decreased during the 2008-2011 recession and then again during the historic state of California multi-year drought (2012-2016) which has influenced ACWD water consumption from 2014 through this Plan's baseline year of 2019.

Figure 2-2. Alameda County Water District Historical Consumption



Note: This graph's x-axis only shows every 7 months; however, every month of the year is shown in the graph.

ACWD has several types of water users with 86,878 active connections (excluding fire lines), all of which are metered. For this analysis, current and projected user categories are classified as follows:

- Residential
- Multifamily
- Business
- Industrial
- Institutional and Other
- Business Landscape
- Multifamily Landscape
- Industrial Landscape
- Institutional and Other Landscape

Figure 2-3 presents the water use profile of the average annual billed metered consumption of the various user categories based on bimonthly water use and account data from post-drought year 2019. This is used to derive average per account per day water use.

Figure 2-3. Average Consumption by User Category

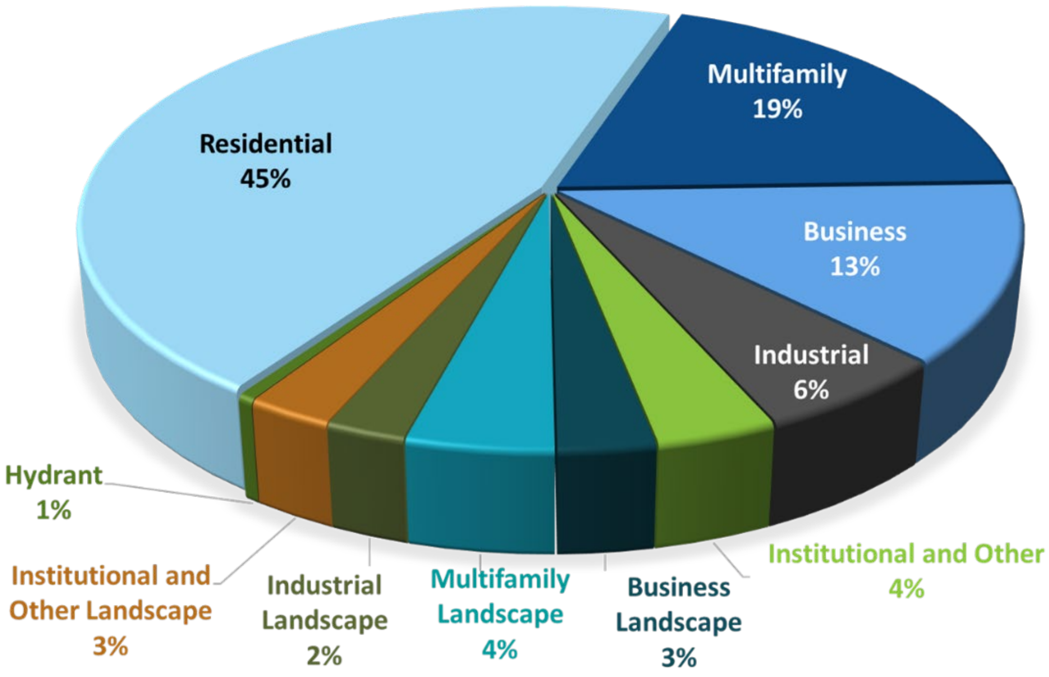
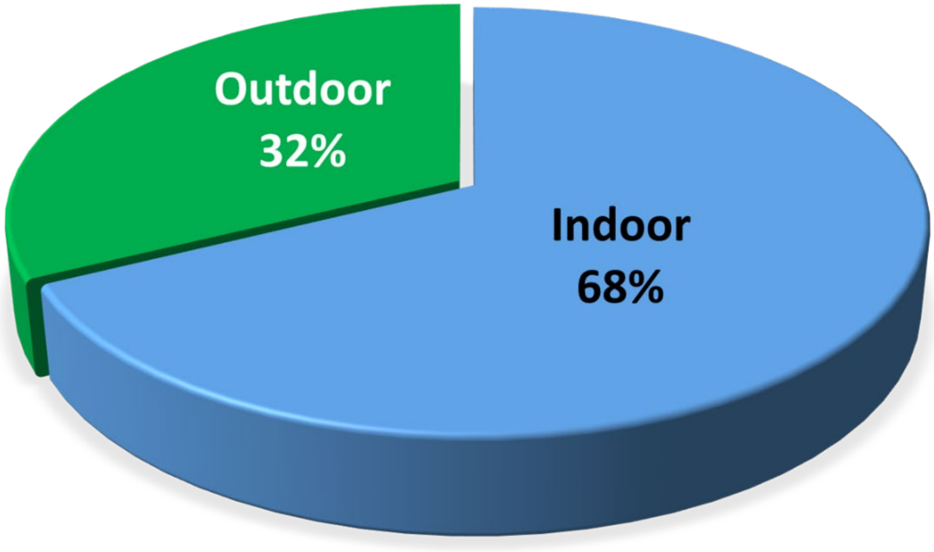


Figure 2-4 displays the breakdown of water use into indoor and outdoor components based on the assumption that indoor use is approximately equal to the minimum use in the winter. Year 2019 water use was selected for this profile, representing post-drought conditions. While there may be minimal landscape watering in the winter, or leakage from irrigation systems, it is assumed that this is minor – less than 5-10% of the average winter water use.

Figure 2-4. Water System Indoor versus Outdoor Overall Water Use



3 DEMAND FORECAST WITH AND WITHOUT PLUMBING CODE SAVINGS

This section presents baseline water demands with and without the plumbing code, including details regarding the national and state plumbing codes and the DSS Model, which is used to prepare a long-range, detailed demand forecast (see DSS Model overview in Appendix B). This section also includes a discussion about the demand forecasting approach and the how the Community Survey (Appendix G) was utilized to further refine the baseline.

3.1 Projected Baseline Demand

The assumptions having the most dramatic effect on future demands are: (1) the natural replacement rate of fixtures; (2) the method for projecting residential and commercial future use; and (3) the percent of estimated real water losses. Baseline customer category water use was determined using 2019 post-drought historical monthly water use (from bimonthly billing data). Appendix C contains a detailed summary of the key assumptions used for developing projected baseline demands, including the population and employment projection basis used in ACWD's DSS Model.

Demand Forecasting Approach

Baseline demand was developed based on an increase in residential population and employment numbers reflected in early draft data obtained from Association of Bay Area Governments/Metropolitan Transportation Commission (ABAG/MTC) from their Draft Blueprint Growth Pattern (Blueprint), a technical study developed for use in preparing the Plan Bay Area 2050.[23] ACWD wanted to incorporate the most recent data available into its demand forecast which would also be included in its UWMP. The Final Blueprint Growth Pattern was released December 2020, and the supporting data only made available in Late January, after this Plan's analysis had been completed. The Final Blueprint Growth Pattern to be included in Plan Bay Area 2050 adjusted housing projections downward by approximately 3%.

The Blueprint provided household numbers, which ACWD converted to population using appropriate household size numbers (i.e., average persons per household), reflective of the high-density development anticipated in the Plan. ACWD also reduced the growth rate of new housing assumed in the Blueprint over the near term (2020 to 2040) to one that is more consistent with the demonstrated pace of redevelopment in the Tri-City area over the past decade. This created a slower near-term population growth rate than both the Blueprint (draft and final numbers) and the service area city general plan projections which all contain linear growth rate projections. Historically, actual growth has been lower than what has been contained in these planning documents. Finally, ACWD assumed accelerated growth between 2040-2045 to include all the remaining Blueprint projected growth (draft). This resulted in a sharp uptick near the end of the demand forecasting period.

This is a somewhat nontraditional approach compared to traditional linear forecasting, but linear forecasts tend to be too high and create the false impression that new supplies will be required sooner than actually needed. This nontraditional approach allows time to "true" up the growth every five years in the UWMP, which prevents premature planning of expensive supply augmentation projects. In other words, it provides time to see whether the growth will materialize. At the same time, this approach demonstrates awareness of regional planning, provides the ability to complete Water Supply Assessments as most proposed development is included in the resulting demands, provides published regional planning numbers for reference, and supports establishment of

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[23] Association of Bay Area Governments/Metropolitan Transportation Commission (ABAG/MTC). (2020). Plan Bay Area 2050, Technical Appendix: Draft Blueprint Growth Pattern, released July 2020. https://www.planbayarea.org/

appropriate development fees, because all the projected numbers are included. This approach was shared with service area cities and was accepted as a reasonable approach for the UWMP.

The final Blueprint growth data released in December 2020 reflects a reduction in total housing units between 2015-2050 compared to their previous growth numbers. The impact to this Plan's analysis is a 3% reduction in demand, with and without water use efficiency savings by 2045 through 2050. However, ABAG's revised growth rate is still higher than what ACWD utilized in its forecast between 2020-2040, as the reduction doesn't materialize until after 2040. ACWD is still confident that the forecast used for this Plan and UWMP is appropriate for the analyses. The near-term demand is more realistic than ABAG/MTC's and the error lies in the range of uncertainty, after 2040. Additionally, forecast information will be revisited and revised during the next UWMP and the Water Supply Master Planning processes.

This Plan's approach differed from previous ACWD demand forecasting. In the past, ACWD used vacant land inventories combined with general and specific plan zoning information to develop projections which were verified with City land-use planners and ABAG forecasts. Today ACWD's service area is largely built-out and has entered a new phase of redevelopment, a process of intensifying land and water use, with corresponding offsets from displaced water demands in the process. Further complicating the process has been a move toward regional planning and transit-oriented development, led by ABAG/MTC, which places growth targets on regions such as the Tri-City to develop high density housing and employment centers near transportation hubs. These plans lead and inform city land-use planning processes and are more generalized in location. ACWD decided to move forward with the approach in this study and for the 2020-2025 UWMP because it is a more appropriate model for forecasting based on regional growth data inputs.

More discussion on the demand forecasting approach, both the current and past approaches, can be found in ACWD's past and current UWMPs.

Post-Drought Demand Rebound Analysis

Baseline demand was modified to reflect potential additional post-drought demand rebound. ACWD staff analyzed the results of the Community Survey that was developed for the project. Responses regarding outdoor use, specifically those related to landscape changes, were extensively reviewed to determine permanent demand reductions versus temporary changes. The survey included questions regarding whether customers let their lawns die during the last drought, and if they did, whether they have taken action since the end of the drought. Actions included replacing dead lawn with new lawn or converting dead lawn to water-efficient landscaping. If they indicated that their lawn is still dead, they were asked to identify their intention for the future – again, whether they would reinstall new lawn or opt for water-efficient landscaping. Through this analysis, ACWD found an estimated 1 MGD of permanent demand reduction (i.e., use that will not return) and 2.75 MGD that may return over the next five years (2020-2024) if customers follow through with their intentions. This informed the demand rebound that went into the DSS Model. Survey questions relevant to this analysis are contained in Appendix G.

3.2 Estimated Plumbing Code Savings

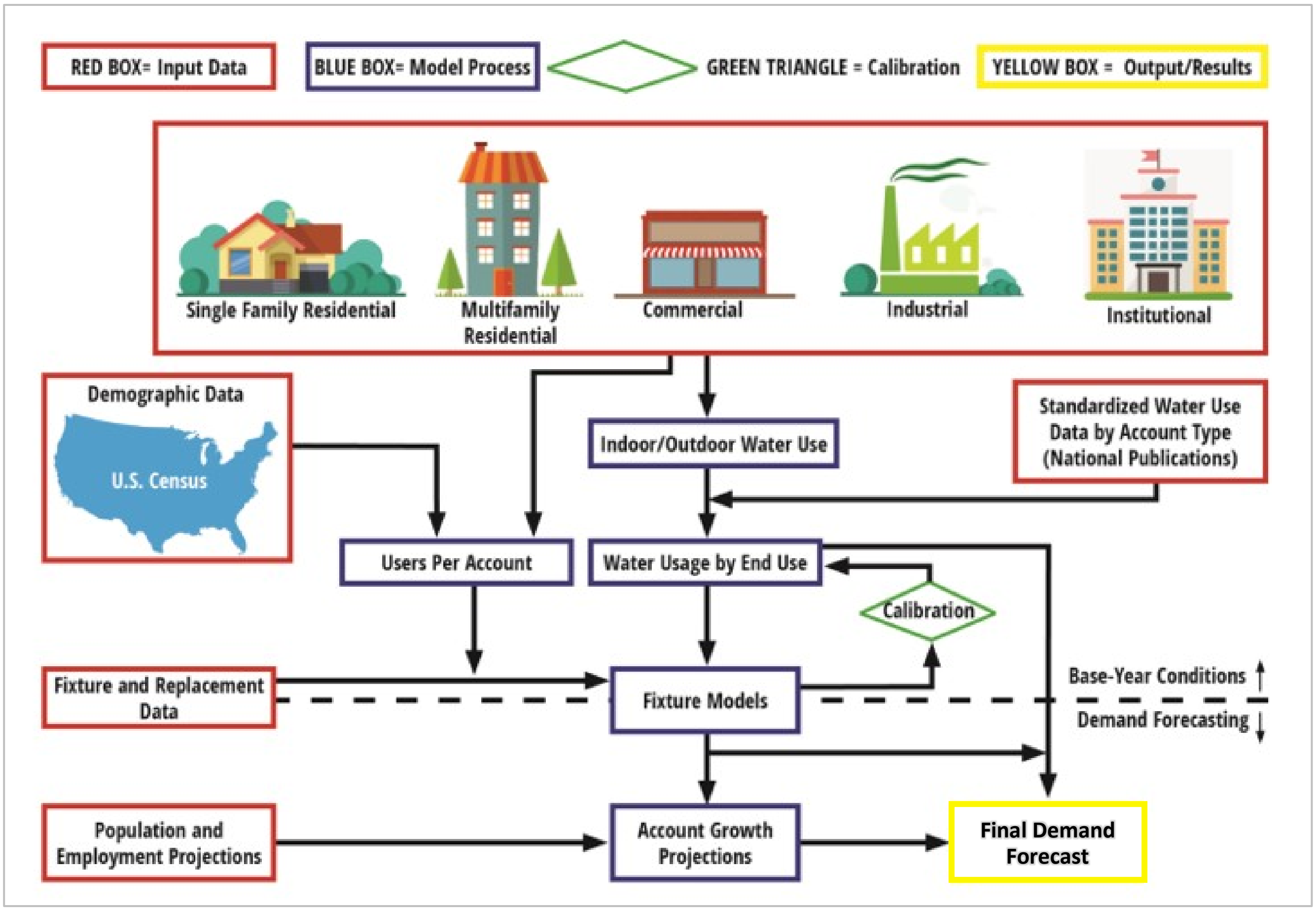
In the codes and standards portion of the DSS Model, specific fixture end-use type (point of use fixture or appliance), average water use, and lifetime are compiled to forecast service area water fixture use. Additionally, state and national plumbing codes and appliance standards for toilets, urinals, showers, and clothes washers are modeled by customer category. This approach yields two distinct demand forecasts related to plumbing code savings: (1) with plumbing codes and (2) without plumbing codes. Plumbing code measures are independent of any water use efficiency program and are based on customers following applicable local, state, and federal laws, building codes, and ordinances.

Plumbing code-related water savings are considered "passive" and reliable long-term savings and can be depended upon over time to help reduce overall system water demand. In contrast, water savings are considered "active" if a specific action unrelated to the implementation of codes and standards is taken by ACWD to accomplish water use efficiency measure savings (e.g., offering turf removal rebates). The DSS Model incorporates the following items as a "code," meaning that the savings are assumed to occur and therefore are "passive" savings:

- The Federal Energy Policy Act of 1992 (amended in 2005)
- California Code of Regulations Title 20 California State Law (Assembly Bill 715)
- California State Law Senate Bill 407
- 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations
- 2019 CALGreen Code (effective January 1, 2020)

Figure 3-1 conceptually describes how plumbing codes using "fixture models" are incorporated into the flow of information in the DSS Model. The demand forecast, including plumbing code savings, further assumes no active involvement by ACWD, and that the costs of purchasing and installing replacement equipment (and new equipment in new construction) are borne solely by the customers, occurring at no ACWD expense.

Figure 3-1. DSS Model Overview Used to Make Water Demand Forecast



The inverse of the fixture life is the natural replacement rate expressed as a percent (i.e., 10 years is a rate of 10% per year). Further information about plumbing codes and standards, passive water savings, fixture replacement and estimates, and additional assumptions and corresponding resources used in the DSS Model to determine projected demands with plumbing codes can be found in Appendix C.

Community Survey

In 2019, ACWD conducted a Community Survey to obtain fixture saturation information. The survey results contributed both qualitative and quantitative inputs to the DSS Model. This further increased the accuracy of ACWD's assessment of water use efficiency measures by determining the saturation of low-flow fixtures and devices, the level of adoption of other water use efficiency measures, the water use efficiency potential in the service area, and an assessment of water fixture demographics and program participation.

Furthermore, the Community Survey results played a role in plumbing code calculation in the DSS Model by utilizing real saturation data that was gathered during the survey. MWM incorporated the survey results with U.S. Census data, ACWD historical conservation data, and assumed natural replacement rate per fixture to determine the current level of water-efficient fixtures and devices installed within ACWD's service area. This included toilets, urinals, showers, faucets, and clothes washers. The survey data can be found in Appendix G.

Plumbing Code Savings Compared to Previous ACWD Estimates

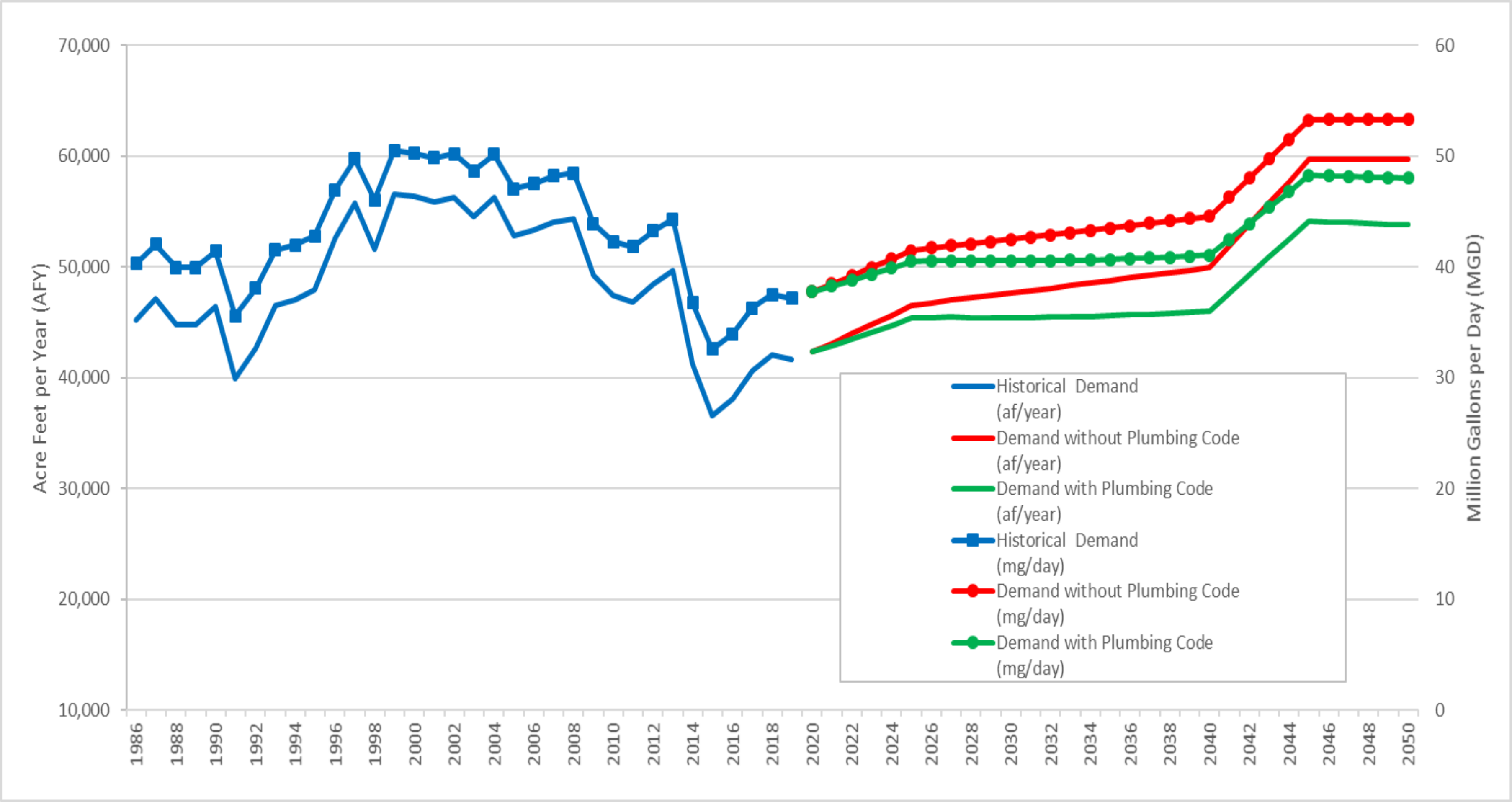
Estimated savings from the plumbing code increased significantly compared to the estimated savings from the last ACWD demand forecast. This was due to more efficient plumbing code standards adopted during the last drought and a more rigorous analysis of the plumbing code performed by the DSS Model. More information about the differences between plumbing code savings calculations in the past and current demand forecast are included in the latest UWMP.

Table 3-1 shows the water system demands for ACWD in acre-feet in 5-year increments over the 31-year modeling period (2020-2050). Figure 3-2 illustrates demands in graphical format. Both the table and the figure include historical (baseline) demand as well as demand with and without plumbing code.

Table 3-1. Alameda County Water District Water System Demands for Years 2020-2050

AFY/MGD	2020	2025	2030	2035	2040	2045	2050
Baseline Demands	42,354 AFY 38 MGD	46,500 AFY 41 MGD	47,628 AFY 42 MGD	48,785 AFY 44 MGD	49,966 AFY 45 MGD	59,691 AFY 53 MGD	59,735 AFY 53 MGD
Plumbing Code Savings	0 AFY 0 MGD	1,111 AFY 1 MGD	2,180 AFY 2 MGD	3,175 AFY 3 MGD	3,935 AFY 4 MGD	5,574 AFY 5 MGD	5,926 AFY 5 MGD
Demands with Plumbing Code Savings	42,354 AFY 38 MGD	45,389 AFY 40 MGD	45,448 AFY 41 MGD	45,610 AFY 41 MGD	46,031 AFY 41 MGD	54,117 AFY 48 MGD	53,809 AFY 48 MGD

Figure 3-2. Alameda County Water District Water System Demands



The sharp uptick near the end of the demand forecasting period is due to ACWD's assumption of a slower near-term growth rate (to 2040), based on historical growth rates, then accelerated growth between 2040-2045 to include all ABAG/MTC projected growth (draft) within the analysis. More information regarding these assumptions is in Section 3.1.

4 FUTURE STATE WATER USE OBJECTIVES

This section presents information on relevant California state legislation and related water use objectives.

4.1 California Legislation and the Water Use Objectives

California Legislation

- April 7, 2017 – EO B-37-16 "Making Water Conservation a California Way of Life" State Framework Report
- May 17, 2018 – AB 1668 and SB 606 adopted to implement new long-term water use efficiency requirements

On April 7, 2017, the state of California released the "Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16" Final Framework Report[24] (State Framework Report). The State Framework Report, which builds upon Governor Brown's call for new long-term water use efficiency requirements in Executive Order (EO) B-37-16, provided the state's proposed approach for implementing new long-term water conservation requirements. A key element of the report was proposed new water use targets for urban water suppliers that go beyond existing SB X7-7 requirements and are based on strengthened standards for indoor residential per capita use, outdoor irrigation, CII water use, and water loss.

On May 17, 2018, the California Legislature adopted Assembly Bill 1668 (Friedman) and Senate Bill 606 (Hertzberg) to implement these new long-term water use efficiency requirements, including new urban water use objectives for urban water suppliers. This legislation incorporated some key components of the State Framework Report, although some specific elements of the approach for implementing the new water use objectives were changed during the legislative process.

Adopted Legislation and Regulatory Schedule

The legislation requires SWRCB, in coordination with the California Department of Water Resources (DWR), to adopt long-term standards for the efficient use of water. The legislation establishes specified standards for per capita daily indoor residential use. In addition to performance measures for CII water use, and with stakeholder input, the SWRCB will adopt long-term efficiency standards for outdoor water use and water loss through leaks.

The legislation requires each urban retail water supplier to calculate and report an urban water use objective, which is an estimate of aggregate efficient water use for the previous year based on the adopted water use efficiency standards. Urban retail water suppliers will be required to calculate and report urban water use objectives by January 1, 2024, then by January 1 every year thereafter, and to compare actual water use to the objective for the prior year by the same date.

The legislation grants SWRCB the authority to enforce compliance with the urban water use objectives, with enforcement actions ramping up over the first three years of implementation. The legislation also establishes a schedule for state agencies to develop the methodology for implementing the requirements, as presented in Table 4-1.

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[24] California Department of Water Resources, et al. (2017). *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16*, accessed April 2021: https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/executive_orders.html

Table 4-1. Implementation Schedule for AB 1668 and SB 606 Key Requirements

Date	AB 1668/SB 606 Requirement
January 1, 2021	1. DWR recommends to legislature standards for indoor residential water use. Defaults are: 💧 55 GPCD until 2025 💧 52.5 GPCD from 2025 until January 2030 💧 50 GPCD beginning in 2030 2. DWR to provide each urban retail water supplier with data regarding irrigable lands at level of detail sufficient to verify accuracy at the parcel level. Received 1/29/2021.
October 1, 2021	1. DWR to recommend standards for outdoor residential use for adoption by SWRCB: 💧 Incorporate Model Water Efficient Landscape Ordinance (MWELO) principles 💧 Apply to *irrigable lands* 💧 Include provisions for swimming pools, spas, etc. 2. DWR to recommend performance measures for CII water use, which may include: 💧 CII classification system 💧 Minimum size thresholds for converting mixed CII meters to dedicated irrigation meters 💧 Recommendations for CII best management practices 3. DWR to recommend variance provisions for: 💧 Evaporative coolers 💧 Horses and livestock 💧 Seasonal populations 💧 Soil compaction/dust control 💧 Water to sustain wildlife 💧 Water for fire protection 4. DWR to recommend standards for outdoor irrigation of landscape areas with dedicated irrigation meters: 💧 Incorporate MWELO principles
June 30, 2022	1. SWRCB to adopt recommended long-term standards for efficient water use: 💧 Outdoor residential 💧 Outdoor irrigation of landscape with dedicated irrigation meters at CII customer sites 💧 Water loss (consistent with SB 555 [Wolk]) 2. SWRCB to adopt recommended performance measures for CII water use
January 1, 2024	1. Urban water supplier shall calculate its urban water use objective and its actual water use for previous calendar or fiscal year: 💧 Efficient indoor residential water use, plus 💧 Efficient outdoor residential water use, plus 💧 Efficient outdoor water use through dedicated irrigation meters at CII customer sites, plus 💧 Efficient water loss, plus 💧 Variances as appropriate

When this Plan was finalized and approved, most of the standards that will dictate ACWD's water use objective were not yet determined. Table 4-2 lists what was known when this Plan was finalized.

Table 4-2. Alameda County Water District's State Objectives Status

Targeted Use	Standard	ACWD Compliance	
Residential Indoor	• 55 GPCD until 2025 • 52.5 GPCD from 2025 until January 2030 • 50 GPCD beginning in 2030	2019 estimated residential indoor GPCD = 51.3	✓
Residential Outdoor	TBD; lots of uncertainty statewide.	Too soon to tell. Measures to address this in the recommended strategy for this Plan.	?
CII Outdoor	Landscape areas associated with CII customers with dedicated landscape meters to be measured and reported on annually.	ACWD has landscape area measurements for dedicated landscape accounts and has established a measure through Waterfluence, LLC for water budgets that will directly address this standard.	✓
	Standard for water budget calculation TBD; lots of uncertainty statewide.	Too soon to tell. Measures to address this in the recommended strategy for this Plan.	?
Water Loss	Required to submit to the state validated water loss audits on October 1 of each year.	ACWD submits annually with most recent for Calendar Year 2019, submitted in 2020.	✓
	Annual water losses and compliance with water loss standards to be reported in UWMP beginning in 2021.	ACWD working to incorporate water loss into the next UWMP.	✓
CII Performance Measures	TBD; lots of uncertainty statewide.	ACWD has included water use efficiency measures for CII customers, and both indoor and outdoor measures in this Plan's recommended strategy. ACWD is implementing an AMI system which will provide opportunities for segmenting, benchmarking, and targeting businesses, and identifying sites with mixed use meters for potential conversion to irrigation meters, if warranted.	✓

ACWD is actively monitoring the state's standards development process through the state's stakeholder process. As more information becomes available, ACWD will set up a process to track state legislation metrics related to the future water use objectives.

5 WATER USE EFFICIENCY MEASURE EVALUATION

This section details the process of determining which water use efficiency measures would be analyzed as part of the project and how they were analyzed in the DSS Model.

5.1 Screening of Water Use Efficiency Measures

The measure screening process for this Plan was designed to address water use efficiency across all relevant customer categories, as ACWD's existing Water Use Efficiency Program has done for the last 25 years. It also was designed to address implementation feasibility, cost effectiveness, interests of ACWD's customers, and ACWD's water savings goals.

The screening process began with an initial list of more than 100 potential water use efficiency measures that were drawn from MWM and ACWD experience; previous planning efforts conducted by MWM through the Bay Area Water Supply and Conservation Agency (BAWSCA) in 2004, 2008, and 2014, in which ACWD participated as a member of BAWSCA; and a review of what measures other water agencies with innovative and effective programs were implementing at the time. With MWM's assistance, ACWD reduced the list to 26 measures to be further evaluated using the DSS Model.

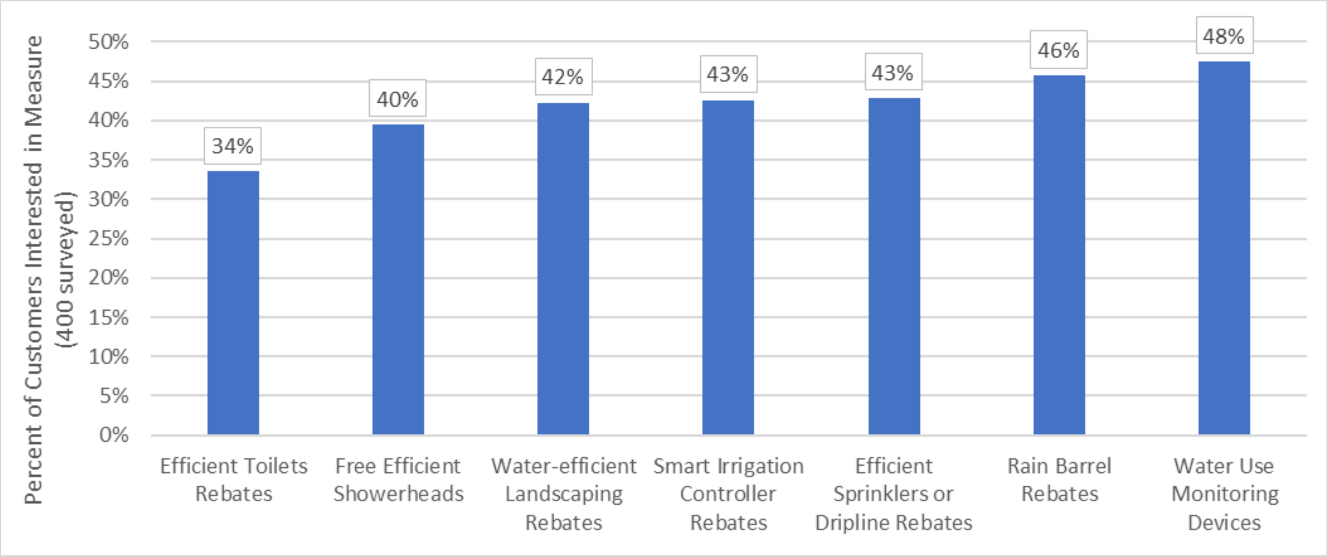
An important step in updating ACWD's Water Use Efficiency Program included identifying new measures that might be appropriate, then including these measures on ACWD's short-list for detailed evaluation (cost effectiveness). The 26 measures identified during the screening process include 13 new measures for ACWD. The remaining 13 measures were already implemented by ACWD. The evaluation process helped establish if ACWD should discontinue any existing measures or continue measures with modifications, and under which strategy these measures best fit.

During the most recent BAWSCA water supply and demand analysis effort (2014), significant stakeholder input was solicited from community members. Numerous work groups (including work groups for both indoor and outdoor measures) were established to evaluate a wide range of needs and rank measures per pre-defined and stakeholder criteria. The measure screening conducted for this Plan benefitted from the community input and coordination during the 2014 BAWSCA project.

When selecting which Water Use Efficiency measures to pursue, regional coordination and community input fosters a holistic approach that serves the greater community.

In addition, the Community Survey that was conducted to gain a better understanding of the saturation of different types of high efficiency fixtures in ACWD's service area also provided community input on the types of measures customers were interested in. Those interests are listed in Figure 5-1.

Figure 5-1. Water Use Efficiency Measure Interest from ACWD Community Survey



During development of this Plan, ACWD also conducted a website survey and hosted a virtual public information meeting, to receive additional comments on the selected measures and the recommended strategy.

ACWD carefully evaluated which measures were the most reasonable and advantageous to implement, as well as which measures were the most relevant for ACWD's service area. ACWD took into consideration factors that were unique to its service area, such as water use characteristics, demographics, and saturation of water saving fixtures as identified through the Community Survey. Screening was both quantitative and qualitative.

During the measure screening, ACWD staff considered the criteria outlined in Figure 5-2 to determine whether a measure should be included in the DSS Model. More details on the measure screening inputs and results can be found in Appendix E.

There is a reasonable limit to how many measures can be feasibly implemented at one time. Customers can be overwhelmed by the available choices, and programs that consist of a large number of measures are historically difficult to implement successfully due to the amount of resources needed. ACWD's modest list of 26 measures was still considered too extensive to implement all at once. The next section discusses how the 26 measures selected for analysis were further evaluated, prioritized, and grouped into water use efficiency "strategies" to prepare for implementation of a successful water use efficiency program.

Figure 5-2. Alameda County Water District Measure Screening Criteria

Measure Screening Criteria

Cost (Total & Per Unit) – Is the total cost to implement the measure reasonable? Is the cost per unit of savings less than the cost per unit for additional water supplies?

Feasibility – Ease of Implementation: If not easy to implement, can it be or is it already administered on a regional level or through a third party that will make it feasible to implement?

Customer Equitability – Does the measure provide water use efficiency services to all customers and demographics (low income accessible)?

Saturation – Is there a need for the measure based on how many customers have already adopted this measure (e.g., clothes washers are fairly saturated so this measure may not be selected)?

Staff Resources – Can existing staff run the measure? If not, would it take a lot of additional staff to run it? Or can existing staff plus other support run the measure?

Legislation – Does the measure provide a greater opportunity to achieve state requirements?

Service Area Match – Is the measure or related technology appropriate for the area's climate, building stock, or lifestyle?

Savings Quantifiable – Are the water savings quantifiable? For example, it is more difficult to determine the amount of water saved as a result of a water wise demonstration garden compared to replacing a grass playing field.

Customer Acceptance – Would customers within the service area be interested in and accepting of the conservation measure as well as willing to implement it? Can be gauged through public input from surveys/workshops.

Water Savings Potential – Does the measure have the potential to save a significant amount of water per account and the ability to confidently quantify savings?

Technology – Is the technology needed to implement the conservation measure, such as an irrigation control device, commercially available and supported by the local service Industry?

Market Influencer – Is the measure a new technology that can turn the whole market toward more efficient products?

5.2 Water Use Efficiency Measures Analyzed

Table 5-1 lists and describes 25 of the 26 measures that were selected for analysis through the measure screening process. A measure called "Billing Report Educational Tool Non-AMI," the 26th measure evaluated, is not included in this table because during Plan development ACWD's Board approved AMI which made this measure irrelevant. Measures are organized by customer category. However, some measures serve more than one customer category, which is noted in the description.

The list of measures includes devices, services, and programs (e.g., such as a new, ultra-high efficiency toilet installed by a contractor or multifamily residential [MFR] customer) that can be used to achieve water savings, as well as methods through which the device, service or program may be implemented.

Table 5-1. Measure Descriptions

Measure Name	Description[1]
Commercial, Industrial, and Institutional	
CII Water Survey	Provide free water surveys to CII customers to evaluate ways for the business or organization to save water and money. The surveys may target large accounts only (e.g., accounts that use more than 5,000 gallons of water per day) such as hotels, restaurants, stores, and schools. Emphasis may be on supporting the top 25 users.
CII Water Efficient Technology (WET) Rebate	Provide rebates to commercial, industrial, and institutional sites to help implement equipment changes that reduce water use. Rebate amount is based on estimated savings (per cubic feet saved annually) up to 50% of the cost of the equipment.
School Building [Survey and] Retrofit	Provide free water surveys and customized rebates for fixture replacements and irrigation upgrades at school sites. Eligible sites may include K-12 schools, colleges, and universities.
Ultra-High Efficiency Toilet Incentive	Provide an incentive for the installation of an ultra-high efficiency toilet (UHET) – toilets flushing 1.1 gallons per flush (gpf) or less to replace toilets flushing at 1.6 gpf or greater. (MFR customers also eligible.)
Large Landscape	
Large Landscape Outdoor Water Surveys	Provide free outdoor water audits to large landscape customers. MFR, CII, and any customers that irrigate large landscapes and are over their reasonable water budget would be eligible, upon request. Those with high water use are targeted and provided a customized report on how to save water. Tied to the Water Budget Program.
Large Landscape [Water Use Budgets] (Waterfluence)	Provide online service that gives feedback on landscape water use (budget vs. actual). Currently provided by Waterfluence, LLC. Available to large landscape customers with a dedicated landscape meter.
Water Efficient Landscape Rebate [Lawn Removal]	Provide a per-square-foot incentive to remove turf and replace it with low water use plants or permeable hardscape. Rebate is based on the square footage of turf removed and capped at an upper limit based on customer category. Available to all customers.
Financial Incentives for Irrigation & Landscape Upgrades	Provide incentives for substantive landscape equipment, materials, retrofits/upgrades. Available to all customers but with different types of equipment/materials and at different incentive levels to reflect differences in customer needs and costs. Financial incentives may include weather-based “smart” irrigation controllers (WBICs), efficient sprinkler nozzles, dripline materials, compost, mulch, rainwater containers, and greywater retrofits.
Require Weather[-based] Adjusting “Smart” Irrigation Controllers and/or Rain Sensors in New Development	Establish requirements for new development customers to install WBICs and/or rain sensors. Might offer training class on how to install and program the device. The WBICs have on-site weather sensors or rely on a signal from a central weather station that modifies irrigation times based on weather inputs at least weekly.

Measure Name	Description[1]
Landscape & Irrigation Codes [MWELO Plan Review/Audits]	Allocate ACWD water use efficiency staff time to assist with MWELO enforcement through plan reviews and/or audits. MWELO establishes specific outdoor water efficiency requirements for new accounts and existing accounts undergoing eligible site renovations.
Residential (SFR and MFR)[2]	
Residential Outdoor Water Surveys	Provide free outdoor water surveys to SFR customers. Targeted toward high water users but available to any customer, upon request. Customers are provided a customized report on how to save water. Can be combined with "Residential Indoor Water Surveys." Could be implemented as a virtual survey to minimize costs. During a survey the surveyor may check for leaks, provide direction on appropriate irrigation scheduling, demonstrate how to set irrigation controllers, provide guidance on plant selection, and offer additional ways to increase outdoor efficiencies (car washing, pool covers, mulch, etc.). Low-cost, general-use, outdoor water use efficiency fixtures may be handed out during the survey. MFR surveys are covered under "Large Landscape Outdoor Water Surveys."
Residential Indoor Water Surveys	Provide free indoor water surveys to residential customers. Targeted toward high water users. Customers are provided a customized report on how to save water. Can be combined with "Residential Outdoor Water Surveys" measure. Could be implemented as a virtual survey to minimize costs. During a survey, the surveyor may check for leaks, check flow rates and volumes of indoor water using fixtures and appliances and offer ways to increase indoor efficiencies. May include give-away of efficient shower heads, aerators, toilet devices.
Residential Water-Savings Devices Giveaway	Purchase high efficiency showerheads and faucet aerators in bulk and distribute to residential customers. Also available for CII customers.
Flowmeter Rebate	Provide rebates for flow measuring devices which inform customers of their water use and provide leak detection and remote shutoff with a smart phone interface. Devices are targeted to residential customers but also can be used for CII, MFR, and irrigation.
Leak Repair & Plumbing Emergency Assistance	Provide leak identification and possible rebates and/or pre-negotiated pricing with approved plumbers to assist customers in locating and repairing leaks.
Multifamily UHET Direct Install	Provide property owners and managers of multifamily housing direct installation of high efficiency toilets.
Multifamily Submetering for Existing Accounts	Provide submeters for individual units in multifamily, master metered townhomes or condos, and mobile home parks.
Developer Financed Zero Footprint New Development	Require developers of new homes (SFR and MFR) to contribute funding toward water use efficiency measures to help generate the water needed to supply their project and require that the site be developed with ultra-efficient fixtures. May also apply to non-residential customers.
Hot Water on Demand Incentive	Provide a rebate to equip homes with efficient hot water recirculating pumps (hot water on demand systems). These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to reduce hot water waiting times by having an on-demand pump on a recirculation line. Can be installed on kitchen sink or bath sink, wherever hot

Measure Name	Description[1]
	water waiting times are more than 1/2 minute. Requires an electrical outlet under the sink, which is not common on older home bathrooms.
Fixture Retrofit on Resale or Water Account Change **[Coordination with Service Area Cities]**	Provide coordination and/or support to service area cities for enforcement of existing code requiring fixture retrofit upon resale or permitted alteration. Take an active role to assist with ensuring compliance, which could include sending letters to new account holders notifying them of the requirements. Random inspections could be conducted by ACWD water use efficiency staff for accounts that do not have evidence of retrofit to promote compliance. (CII applicable, too.)
Plumber Initiated Ultra High Efficiency Toilet Retrofit Program **[Water Savings Assistance for Income-Qualified Customers]**	Provide installation of UHETs by a contractor for income-qualified residential customers. Licensed, pre-qualified contractors solicit customers directly. Customers receive a new UHET installed for free. (Income-qualified customers only.)
Community and Education	
ACWD Public & School Education	Public and school education measure that may include, but is not limited to, many of the following outreach techniques and campaigns (for examples of past campaigns, see Appendix H): • Recognition for Water Savings by Residences & Apartments • Recognition for Water Savings by Businesses • Outdoor Residential focused Public Awareness Information Campaign • Efficient Outdoor Use Education and Training [Landscape Workshops] • Training for Landscape Maintenance Workers (Qualified Water Efficient Landscaper Designation) • Networking with Landscaping Industry • Landscape Water Calculator • Water-Efficient Demonstration Garden • Water Use Efficiency Print Media • Water Use Efficiency Web Site/Social Media • Speakers Bureau/Event Participation • Media Campaigns (e.g., “Use Only What You Need” or “Beat the Peak”) • AMI Customer Portal • Car Wash and Other Coupons or Vouchers for Low-Flow/Water Use Efficiency Items • Shade Tree Program
Water Budget-Based Billing	Develop individualized water budgets for all customers. Water budgets are linked to a rate schedule where rates, per unit of water, increase when a customer goes above their budget, or decrease if they are below their budget. Budgets are based on size of the customer’s irrigated area and average indoor use estimates. These rates have been shown to be effective in reducing landscape irrigation demand (AWWA Research Foundation Reports). Requires a rate study and capable billing software.
AMI Portal Data Analysis	Provide a customer portal for accounts with AMI meters capable of providing continuous consumption data to customers and utility. Portal provides identification and notification of suspected customer leaks as well as improved customer service and enhanced ability to identify water theft. This is planned as part of ACWD’s AMI project.

Measure Name	Description[1]
Prohibition of Water Waste & Practices [Ordinance Enforcement]	Prohibit water waste as defined in an ordinance such as gutter flooding and failure to repair leaks in a timely manner. Residential customers shall not water lawns or gardens resulting in flooding or excessive run off; use water for washing sidewalks, walkways, driveways, or other hard surfaces resulting in excessive run off; or use water for washing cars, trailers, boats, or other vehicles resulting in excessive run off of water. Hoses should be equipped with shut off nozzles. Nonresidential customers shall not use single-pass cooling systems in new connections; use non-recirculating systems in new conveyer car wash and commercial laundry systems; use non-recycling decorative fountains; use water for watering lawns or gardens resulting in flooding or excessive runoff; or use water for washing sidewalks, walkways, driveways, and other hard surfaces in a manner that results in excessive runoff.

[1] The text in brackets [text] is meant to clarify some measures and match to existing ACWD measures with different names.
[2] SFR – single family residential; MFR – multifamily residential.

5.3 Measure Cost and Savings Inputs and Considerations

Major considerations for each measure that drive the overall cost and savings for the measure are as follows:

- **Utility Costs ("Fixture Cost per Device"):** This is the portion of the measure that ACWD pays. The cost may be a rebate or incentive that ACWD provides to cover all or part of the cost of devices and/or fixtures, staff time or, if outsourced, contractor time, if that is the main cost to implement the measure. An appropriate incentive amount is influenced by the customer's cost to implement the measure. The rebate or incentive must be high enough to drive a customer to participate but low enough for it to be cost effective for ACWD to implement. Most measures require some form of customer financial commitment. If the customer financial commitment is too low compared to the incentive, ACWD may run out of funding for the measure quickly. Alternatively, if it is too high ACWD will not achieve targeted participation levels. The DSS model uses Utility Costs based on ACWD's current programs, regional efforts (such as BAWSCA or other agencies), and MWM expertise and research.
- **Administration Costs:** This represents the ongoing effort (staff time) to administer a measure. This includes outreach and other day to day activities to run the measure. This is typically put into the DSS Model as a percentage of the Utility Cost. Startup costs are not included in this calculation. Startup costs are a one-time push to launch a measure. Startup costs and day to day administration costs vary significantly between measures and are dependent on the implementation method; whether the measure is administered in house or through a third party. Implementing a measure through a third party or a partnership agency, such as BAWSCA, can save a considerable amount on startup costs and provides some additional savings on administration costs. Participating in a third party administered program has saved ACWD significant staff resources. However, the largest cost savings is in the startup costs, as third-party programs still require in-house administration to cut rebate checks and/or follow up with incomplete applications. The DSS model uses customized ACWD administration costs based on staff input from real world experience implementing measures. Staff costs in the DSS Model are based on average salary range for a Water Use Efficiency Specialist I/II, with fringe and overhead.
- **Targets:** This is the number of accounts/customers targeted annually for participation in the measure. Higher targets equal higher savings provided the measure does not reach a saturation point before meeting the target. Targets are also limited by customer interest, outreach, and staff ability to handle customer interest. Targets in the model are calculated based on past experience for continuing measures, MWM data from other similar agencies for new (to ACWD) measures, level of saturation, and customer interest in the measure. These last two inputs were identified through the Community Survey. Again, staff's ability to handle the number of participants also drives the selected target in the model. A measure that targets 1,000 accounts per year requires staff time to process 1,000 rebates, incentives, or other intervention. The measure target must be considered holistically with other measures, their

staffing requirements, and the availability of staff resources. For existing measures, ACWD assumed existing staff resources of two (2) Water Conservation Specialists and one (1) Water Conservation Supervisor to determine appropriate targets in the DSS Model. However, new measures, especially AMI Portal Data Analysis, will ultimately require more staff to implement the measures effectively.

Other Considerations

ACWD's Community Survey provided good information on SFR customer past actions that reduced both indoor and outdoor use during the last drought. With higher saturation of some measures, targets are intentionally lower. Therefore, water savings potential is lower. For some measures in the DSS Model, the time/duration ("Measure Length") that ACWD intends to implement the measure may also be reduced by this information.

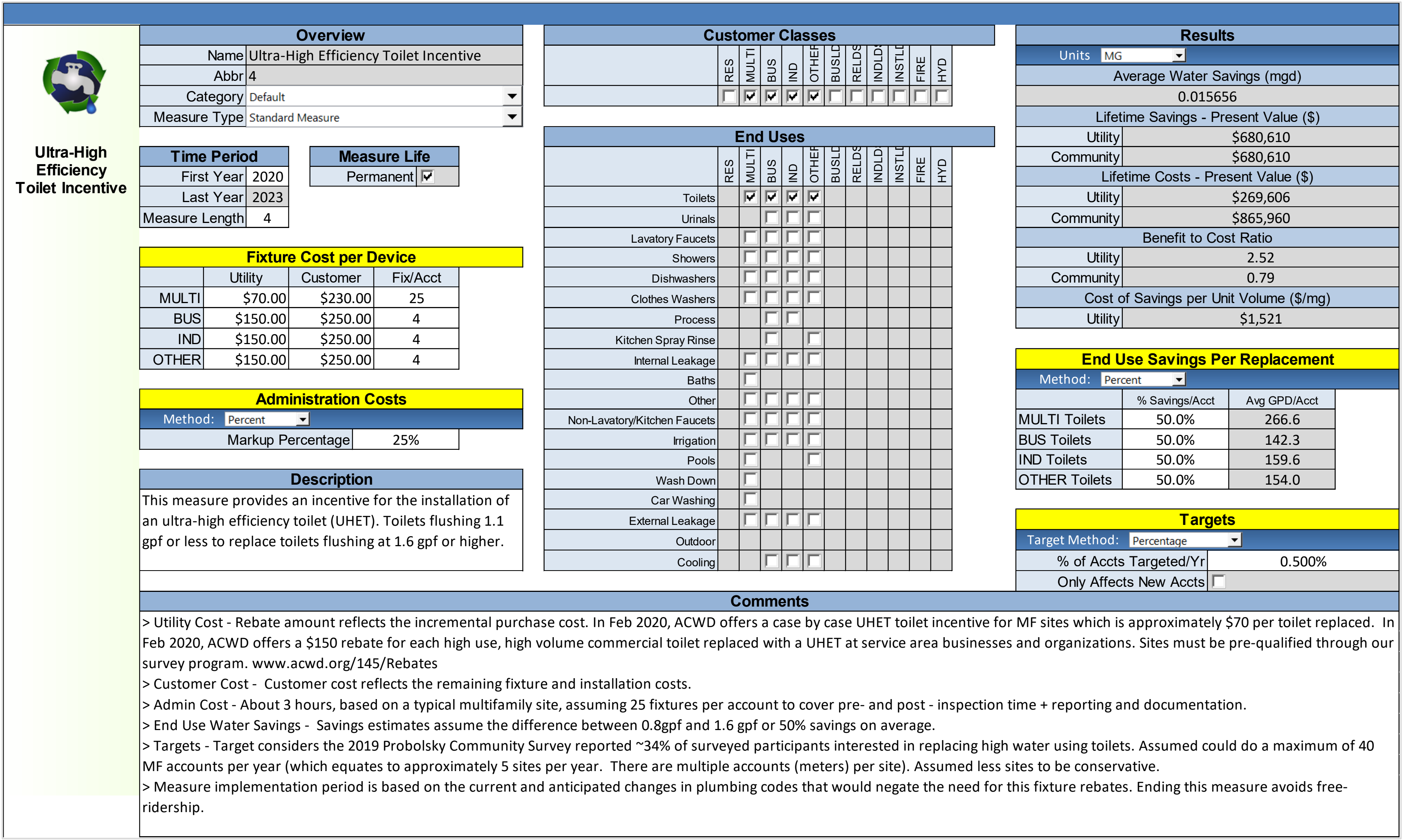
Estimates related to targets and savings, are based on previous experience, chosen implementation methods, projected utility effort, and funds allocated to implement the measure. There is potential for error in these inputs. Ongoing reevaluation of measure success after implementation will be critical.

All 26 measures were extensively reviewed by ACWD staff to determine inputs. Additional research was conducted when MWM baseline research was not representative of ACWD's service area.

- The **Water Efficient Landscape Rebate** measure savings information in the DSS Model ("End Use Savings for Replacement") did not support what ACWD had observed in its service area for past program participants. ACWD conducted its own internal analysis from real customer participation data and found that the savings was much higher than defaults in the DSS Model.
- The **Hot Water on Demand Incentive** measure was extensively studied to make sure the inputs that MWM provided made sense. In this case, the inputs were found to be accurate, but the measure was not included in any of the strategies due to high cost and low savings.
- The **AMI Portal Data Analysis** measure will have a tremendous impact on water use efficiency in the service area. ACWD staff spent additional time researching this measure to ensure it reflected what savings and participation ACWD could expect, especially since there is the potential for double counting savings with other measures, as AMI provides the tools to target customers for other measures.

Figure 5-3 shows a sample measure input screen from the DSS Model. Inputs discussed above are highlighted. Additional information about the DSS Model measure analysis to identify unit costs, water savings, and market penetrations can be found in Appendix D. Actual measure inputs used in the DSS Model to evaluate the water use efficiency measures that were selected for strategies can be found in Appendix E.

Figure 5-3. Sample Input Screen for Measures



Ultra-High Efficiency Toilet Incentive

Overview

Name	Ultra-High Efficiency Toilet Incentive
Abbr	4
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2023
Measure Length	4

Measure Life

Permanent ☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
MULTI	$70.00	$230.00	25
BUS	$150.00	$250.00	4
IND	$150.00	$250.00	4
OTHER	$150.00	$250.00	4

Administration Costs

Method: Percent

Markup Percentage 25%

Description

This measure provides an incentive for the installation of an ultra-high efficiency toilet (UHET). Toilets flushing 1.1 gpf or less to replace toilets flushing at 1.6 gpf or higher.

Customer Classes

RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
☐	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
Toilets		☑	☑	☑	☑						
Urinals			☐	☐	☐						
Lavatory Faucets		☐	☐	☐	☐						
Showers		☐	☐	☐	☐						
Dishwashers		☐	☐	☐	☐						
Clothes Washers		☐	☐	☐	☐						
Process			☐	☐							
Kitchen Spray Rinse			☐		☐						
Internal Leakage		☐	☐	☐	☐						
Baths		☐									
Other		☐	☐	☐	☐						
Non-Lavatory/Kitchen Faucets		☐	☐	☐	☐						
Irrigation		☐	☐	☐	☐						
Pools		☐			☐						
Wash Down		☐									
Car Washing		☐									
External Leakage		☐	☐	☐	☐						
Outdoor											
Cooling			☐	☐	☐						

Results

Units MG

Average Water Savings (mgd)	
0.015656	
Lifetime Savings - Present Value ($)	
Utility	$680,610
Community	$680,610
Lifetime Costs - Present Value ($)	
Utility	$269,606
Community	$865,960
Benefit to Cost Ratio	
Utility	2.52
Community	0.79
Cost of Savings per Unit Volume ($/mg)	
Utility	$1,521

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
MULTI Toilets	50.0%	266.6
BUS Toilets	50.0%	142.3
IND Toilets	50.0%	159.6
OTHER Toilets	50.0%	154.0

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.500%
Only Affects New Accts	☐

Comments

> Utility Cost - Rebate amount reflects the incremental purchase cost. In Feb 2020, ACWD offers a case by case UHET toilet incentive for MF sites which is approximately $70 per toilet replaced. In Feb 2020, ACWD offers a $150 rebate for each high use, high volume commercial toilet replaced with a UHET at service area businesses and organizations. Sites must be pre-qualified through our survey program. www.acwd.org/145/Rebates

> Customer Cost - Customer cost reflects the remaining fixture and installation costs.

> Admin Cost - About 3 hours, based on a typical multifamily site, assuming 25 fixtures per account to cover pre- and post - inspection time + reporting and documentation.

> End Use Water Savings - Savings estimates assume the difference between 0.8gpf and 1.6 gpf or 50% savings on average.

> Targets - Target considers the 2019 Probolsky Community Survey reported ~34% of surveyed participants interested in replacing high water using toilets. Assumed could do a maximum of 40 MF accounts per year (which equates to approximately 5 sites per year. There are multiple accounts (meters) per site). Assumed less sites to be conservative.

> Measure implementation period is based on the current and anticipated changes in plumbing codes that would negate the need for this fixture rebates. Ending this measure avoids free-ridership.

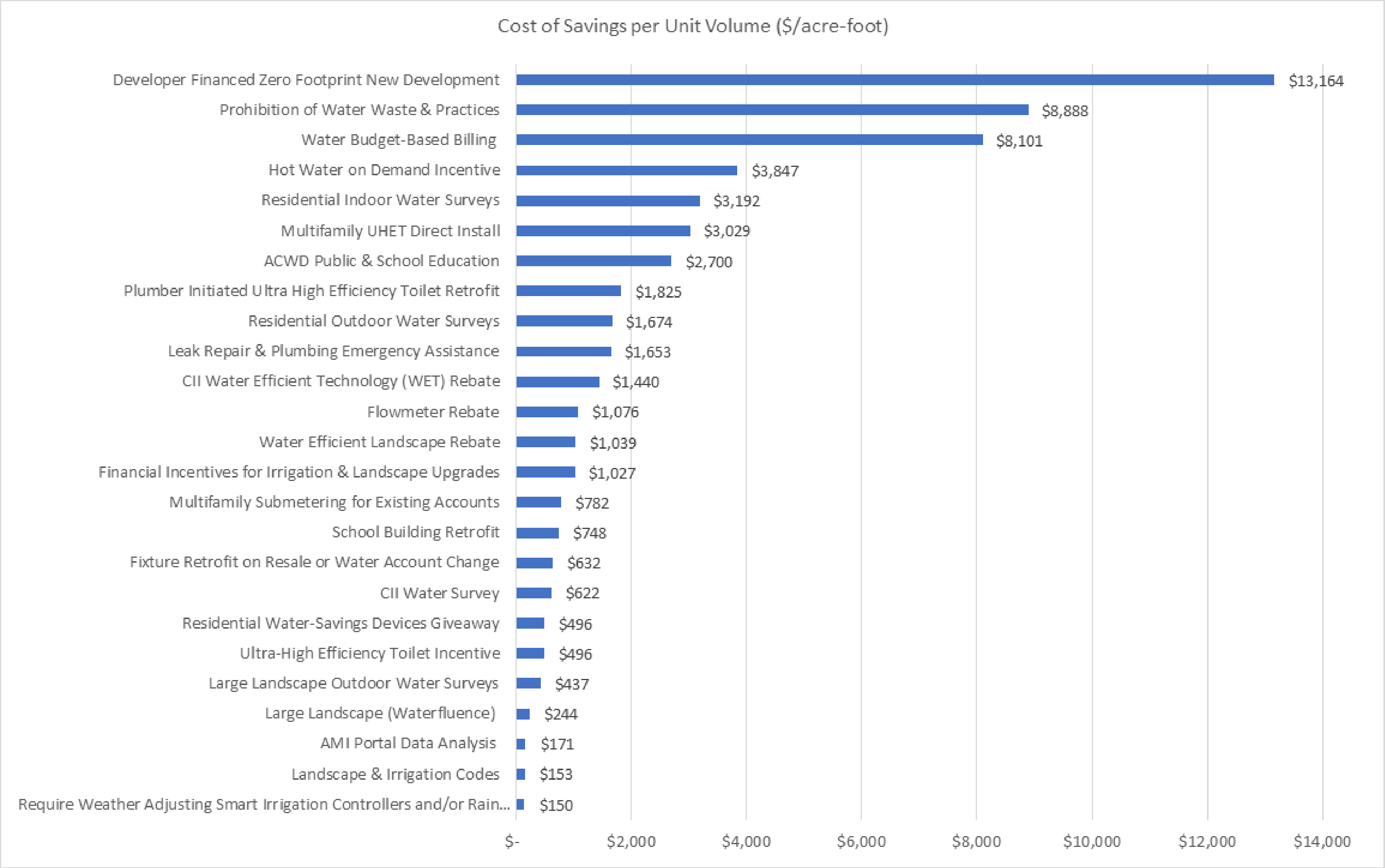
5.4 Comparison of Individual Water Use Efficiency Measures

MWM conducted an economic evaluation of each selected water use efficiency measure using the DSS Model. Appendix F presents detailed results regarding how much water each measure included in a strategy will save by year 2030 (AFY), how much the measure will cost, and the cost of saved water per unit volume if the measure were to be implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use or uses). Dollar savings from reduced water demand was quantified annually and based on avoided costs provided by ACWD. Actual measure design parameter inputs can be found in Appendix E.

While each measure was analyzed independently, it is important to note that very few measures operate independently. For example, higher efficiency indoor fixtures go together with indoor water checkups and public education. It should be noted that the water savings from the "ACWD Public & School Education" measure are not double counted with other water use efficiency measures. As a result, the costs appear significantly higher for this measure compared to other measures due to the very minimal water savings estimated for the cost investment. However, other measures certainly would be less effective or possibly infeasible without an active outreach program. Without ACWD Public & School Education, customers would be unaware of other water use efficiency measures and participation would likely plummet.

With that in mind, Figure 5-4 presents a comparison of each measure's cost of water saved per unit volume.

Figure 5-4. Comparison of Each Measure's Cost (Utility Cost) of Water Saved



6 WATER USE EFFICIENCY STRATEGY EVALUATION

This section provides an overview of the development of three water use efficiency strategies that incorporated analyzed measures, as well as which strategy ACWD has selected to implement for the next five years (Fiscal Years 2020/21-2024/25).

6.1 Board Priorities for Water Use Efficiency Strategies

At an ACWD Board workshop in July 2019, the Board expressed priorities and drivers to staff that helped inform the water use efficiency strategy development process.

The Board expressed the following priorities:

- Cost-effective/cost-based – a low cost per unit of water saved as compared to other supply sources
- Low income supportive/affordability
- Regionally consistent
- Responsive to customer interests
- Maximizes local control – avoids the need to look for alternative supplies that are outside of ACWD's control
- Proactive in helping ACWD meet future state regulations

The following additional criteria were taken into consideration during strategy development:

- Existing water use efficiency measures that still have conservation potential
- Measures that are relatively easy to implement and have proven water savings
- Water use efficiency measures recommended by AWWA, CalWEP (formerly CUWCC), DWR and others
- New and innovative measures
- Measure equitability among customer categories
- Customer demographics

6.2 Water Use Efficiency Strategies

After the measure selection and analysis process, with Board priorities in mind, MWM created strategy concepts. While cost – a low cost per acre-foot saved – was a primary factor, feasibility to implement the strategy and the time at which each measure would need to be introduced to promote water use efficiency were also factors for developing strategies. The strategy concepts MWM created included existing program elements and traditional water use efficiency measures, as well as measures that had not yet been implemented or considered by ACWD. Strategies also addressed water use efficiency across all relevant customer categories.

It should be noted that there are measures that ACWD is obligated to implement under all strategies. ACWD has a responsibility to do whatever it can to address and prevent water waste in its service area. The "Prohibition of Water Waste & Practices" measure has a high cost per unit of water saved but is an important measure to implement to ensure a reliable source of high quality water for the community. The "ACWD Public & School Education" measure also has a high cost per unit saved. Savings for measures that benefit from public outreach are already accounted for under each individual measure so they cannot also be attributed to this measure. However, public outreach is essential to drive customers to participate in measures.

Program strategies are not intended to be prescriptive but rather to be viewed as a toolbox of measures that address the Board's highest priorities and demonstrate the range in savings that could be generated if implemented concurrently.

Strategies were developed to allow for new measures to be incorporated, as new technology is introduced, if the new measure fits within the general construct of the strategy. Each strategy has general goals and objectives that drive it. A new measure would be evaluated in terms of how well it meets those goals and objectives. Later in this section there is more discussion on how this works specific to the recommended strategy.

When strategies were analyzed, any overlap in water savings (and benefits) from individual measures was considered to provide total combined water savings (and benefits). Each strategy is described below.

- **Strategy A: Status Quo "Light" – Minimally Meets 2015-2020 Urban Water Management Plan Objectives.** Strategy A meets ACWD Board's #1 priority but is limited in meeting other Board priorities. It is cost effective, with all measure cost per unit of water saved at or below the current cost of production (exceptions described previously), but it is the bare minimum to meet previous UWMP planning assumptions. Strategy A has limited water use efficiency measures – one to two measures for each customer type and water use category. ACWD would likely need more measures to meet forthcoming state standards. Includes 8 measures.
- **Strategy B: Current ACWD Program "Plus" to Address State Targets.** In addition to existing efforts, Strategy B includes measures that may be required to meet new state targets, with extended measures addressing indoor, outdoor, and commercial efficiency. Includes measures up to the full cost (FY 2025/26) of SFPUC water. Includes 16 measures. **This is the Recommended Strategy; the Board was most interested in this strategy at the April 2020 Board Workshop.**
- **Strategy C: Progressive "Supercharged."** In addition to all measures in Strategy A and B, Strategy C includes measures up to cost of new/alternative supplies. It includes measures that establish codes and regulations, measures that require developers to support water use efficiency in the service area, and rate changes. This strategy takes political will and regulation to establish and enforce. Includes 22 measures.

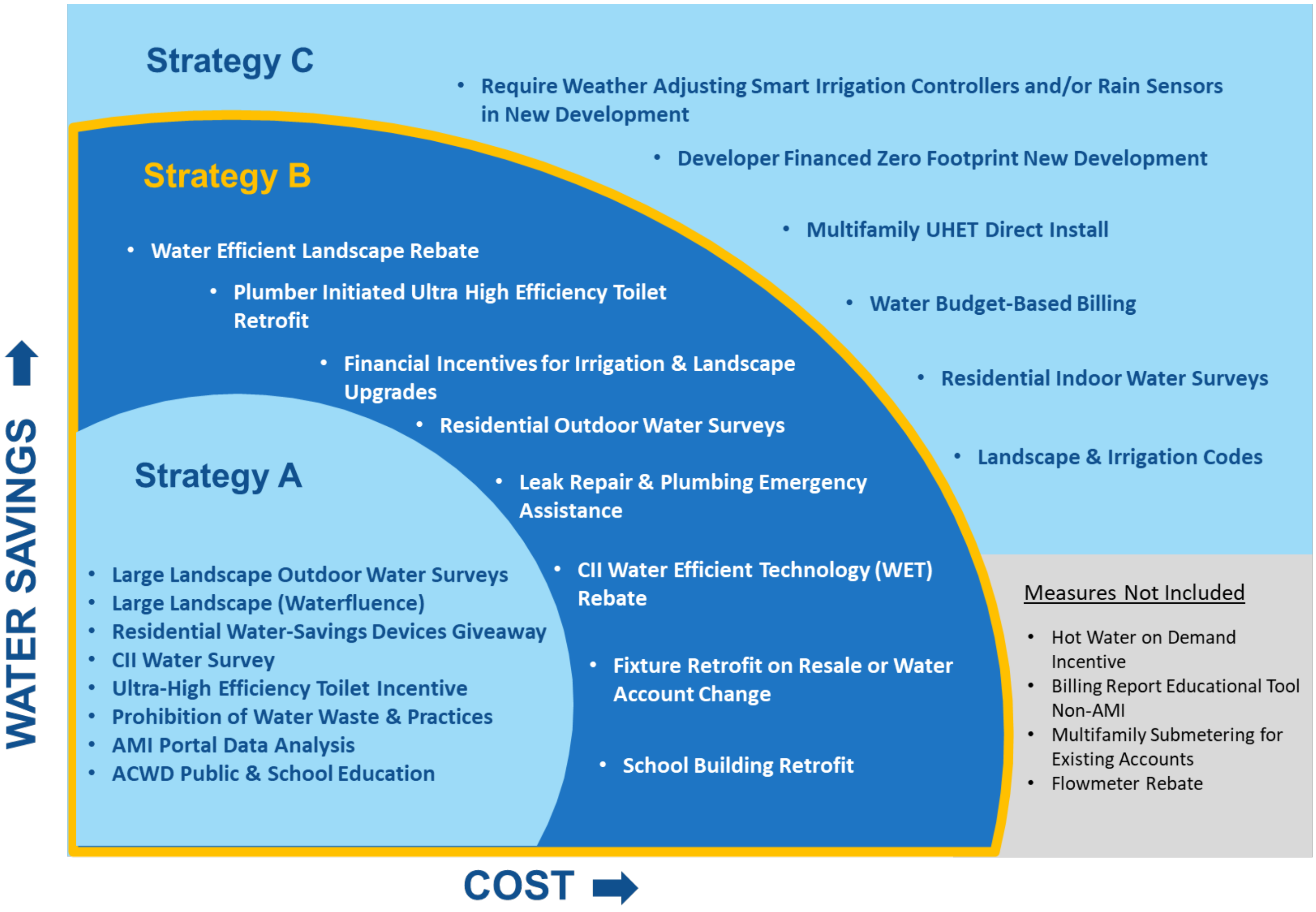
Table 6-1 illustrates how each strategy addresses the primary and secondary Board priorities, as identified at the July 2019 Board Workshop and listed in Section 6.1.

Table 6-1. Board Priorities and Strategy Comparison

Board Priority	Strategy A	Strategy B	Strategy C
#1: Cost-Effective	✓ YES	✓ YES	✓ YES
#2: Cost-Based	✓ YES (lowest)	✓ YES	✓ YES (highest)
#3: Low Income/ Affordability	Partially	✓ YES	✓ YES
#4: Regional Consistency	Partially	✓ YES	✓ YES
#4: Customer Interest	Partially	✓ YES	✓ YES
#4: Local Control	Partially	✓ YES	✓ YES (most)
#4: "Safe Bet" to Meet State Regulations	Partially	✓ YES	✓ YES

Figure 6-1 presents ACWD's water use efficiency measure strategies, indicating which measures were selected and modeled within each strategy.

Figure 6-1. Selected Water Use Efficiency Strategy Measures



Four measures that were selected for further analysis during the measure selection process were not included in any of the strategies:

- **Billing Report Educational Tool Non-AMI** – As mentioned in Section 5.2, this measure was not included in a strategy because AMI was approved during Plan development, making this measure irrelevant.
- **Flowmeter Rebate** – This measure was not included in a strategy because AMI provides the same granular water use information to customers.
- **Hot Water on Demand Incentive** – As discussed in Section 5.3, this measure was not included in a strategy because further analysis by ACWD confirmed MWM's conclusion that it is a high-cost measure with low water savings potential.
- **Multifamily Submetering for Existing Accounts** – This measure was not included in a strategy due to potential high customer costs and implementation challenges. Installations can require extensive re-plumbing and retrofits within and outside of buildings, as well as other public works improvements. Additionally, to achieve any water savings, the user must receive their water usage information. However, ACWD staff intends to study this measure (or alternatives like point-of-use monitoring devices) further, and a similar measure could be incorporated into a strategy in the future.

Strategy Costs and Savings

Table 6-2 compares each water use efficiency strategy's present value of water savings and utility costs, cost of water saved, and benefit-cost ratios, with plumbing code. See Appendix D for a more detailed explanation of present value.

Table 6-2. Comparison of Strategy Estimated Costs, Water Savings, and Benefit-Cost Ratios

Water Use Efficiency Strategy With Plumbing Code	Water Utility Present Value of Water Savings	Water Utility Present Value of Utility Costs	Water Utility Cost of Water Saved ($/AF)	Benefit-Cost Ratio
Strategy A	$31,510,000	$10,581,000	$381/AF	2.98
Strategy B	$50,563,000	$31,006,000	$695/AF	1.63
Strategy C	$62,762,000	$47,958,000	$851/AF	1.31

Notes:

1. *Present value costs and savings are rounded to nearest $1,000.*
2. *Costs include rebates, incentives, and staff time to implement the measures, and include fully burdened salaries that are escalated by inflation and discounted to present value.*
3. *Value of savings are the value of the additional water use efficiency savings above and beyond plumbing code. These savings and the cost per unit of water saved only include additional savings.*
4. *Present value costs and savings are based on a fixed avoided cost of water – estimated annual cost (FY 2030/31) for ACWD "blended" water (Groundwater and SFPUC) of $1,742/AF.*
5. *ACWD conducted its own "Business Case" for the recommended strategy outside of the DSS Model. This analysis used estimated costs for blended water for each year during the analysis period. That data is referenced in Section 6.4.*

All strategies have an average cost per acre-foot saved well under both ACWD's avoided cost of water at $1,742 per AF (which is the fixed avoided cost of water – estimated annual cost [FY 2030/31] for ACWD blended water [Groundwater and SFPUC]) and ACWD's most expensive supply source (SFPUC) of $2,436/AF in FY 2025/26. Additionally, all strategies have a benefit-cost ratio well above 1, which is based on the avoided cost input in the DSS Model. All strategies will reduce per capita water use in a cost-effective manner.

ACWD's Avoided Cost of Water

As discussed, this Plan strives to identify the best strategy for the Water Use Efficiency Program for the short term and provide a foundation for the long term. While ACWD enjoys a highly reliable and diversified portfolio of water supplies today, those supplies are facing challenges and ACWD must continuously evaluate new, alternative supplies.

For long-term planning, and for this Plan's analyses, ACWD uses a blended cost of the most expensive supply (SFPUC)[25] and its least expensive supply (treated groundwater) as a true marginal cost of production. That cost, as mentioned above, is $1,742 per AF. Using a current cost of production for these analyses is not forward looking.

Measures were sorted into strategies based on various supply costs – Strategy A included measures up to the current cost of production ($768/AF), Strategy B included measures up to the cost of SFPUC in FY 2025/26 ($2,436/AF), and Strategy C included all other measures (with exceptions described previously) representing the anticipated high cost to develop new supply. This provided bookends for potential savings achievable through efficiency rather than purchasing more of ACWD's most expensive supply or finding new, even more expensive alternative supply sources.

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[25] ACWD rarely needs to use more than its minimum purchase requirement from the SFPUC system and only anticipates doing so during critically dry years.

Strategy Demand Impacts

Table 6-3 shows ACWD water system demands. Demand is shown in both acre-feet per year and million gallons per day (MGD), in five-year increments, over the 31-year modeling period (years 2020-2050). It includes demand with and without plumbing code and projected demand with plumbing codes and the three water use efficiency strategy scenarios for comparison.

Table 6-3. Alameda County Water District Water System Demands for Years 2020-2050

AFY/MGD	2020	2025	2030	2035	2040	2045	2050
Baseline Demands	42,354 AFY 37.8 MGD	46,500 AFY 41.5 MGD	47,628 AFY 42.5 MGD	48,785 AFY 43.5 MGD	49,966 AFY 44.6 MGD	59,691 AFY 53.3 MGD	59,735 AFY 53.3 MGD
Demands with Plumbing Code Savings	42,354 AFY 37.8 MGD	45,389 AFY 40.5 MGD	45,448 AFY 40.5 MGD	45,610 AFY 40.7 MGD	46,031 AFY 41.1 MGD	54,117 AFY 48.3 MGD	53,809 AFY 48 MGD
Demands with Plumbing Code and Water Use Efficiency Strategy A Savings	42,269 AFY 37.7 MGD	44,910 AFY 40.1 MGD	44,703 AFY 39.9 MGD	44,641 AFY 39.8 MGD	44,877 AFY 40 MGD	52,877 AFY 47.2 MGD	52,291 AFY 46.7 MGD
Demands with Plumbing Code and Water Use Efficiency Strategy B Savings	42,249 AFY 37.7 MGD	44,665 AFY 39.8 MGD	44,211 AFY 39.4 MGD	44,026 AFY 39.3 MGD	44,175 AFY 39.4 MGD	52,094 AFY 46.5 MGD	51,419 AFY 45.9 MGD
Demands with Plumbing Code and Water Use Efficiency Strategy C Savings	42,240 AFY 37.7 MGD	44,580 AFY 39.8 MGD	44,035 AFY 39.3 MGD	43,785 AFY 39.1 MGD	43,857 AFY 39.1 MGD	51,139 AFY 45.6 MGD	50,471 AFY 45 MGD

Figure 6-2 presents projected water demand in AFY and MGD given multiple scenarios. See Section 3.1 for more information regarding demand forecast assumptions.

Plumbing code elements include current local, state, and federal plumbing code standards for retrofits of items such as toilets, urinals, showerheads, faucets, and clothes washers. More information regarding the plumbing code can be found in Appendix C.

Figure 6-2. Alameda County Water District Historical and Forecasted Demand

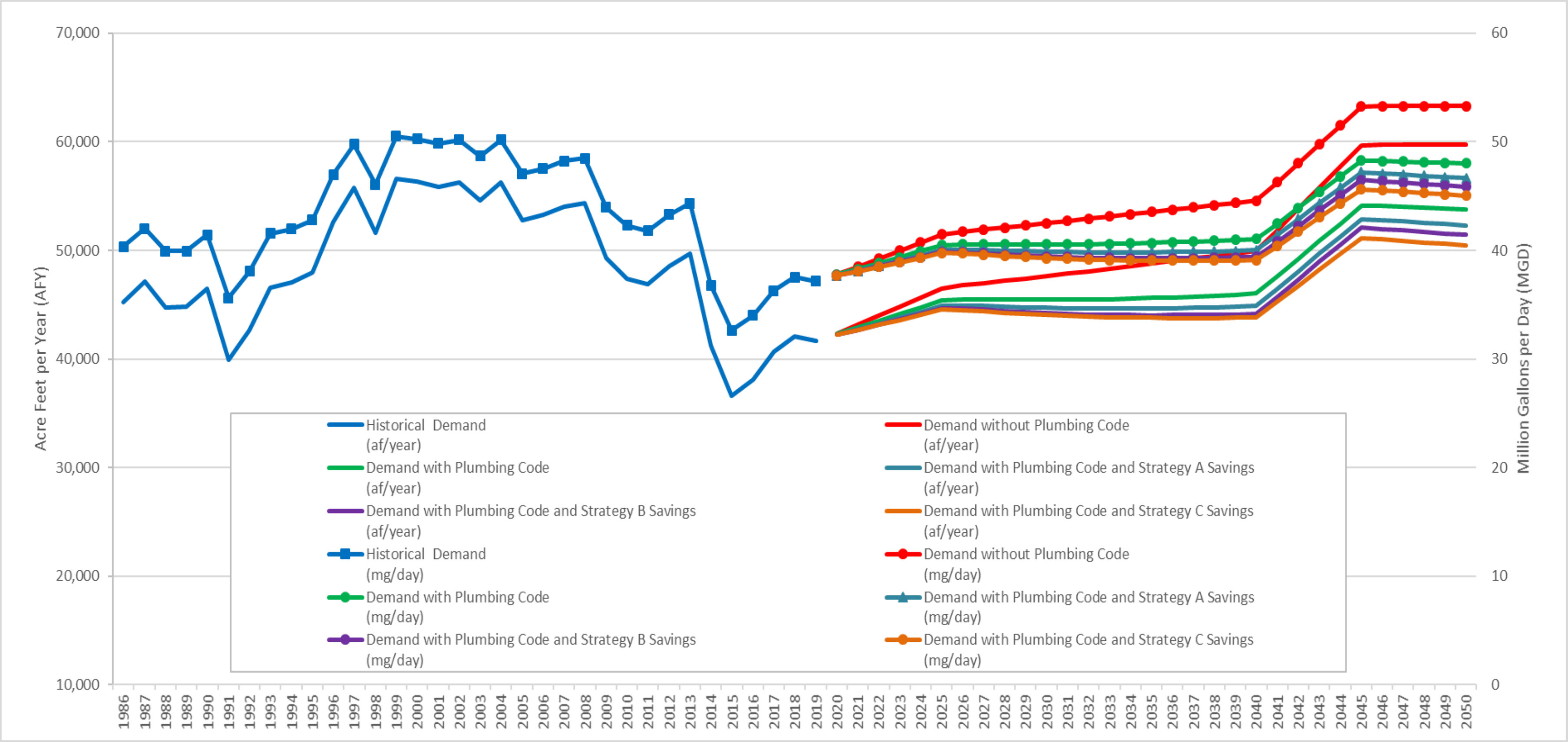
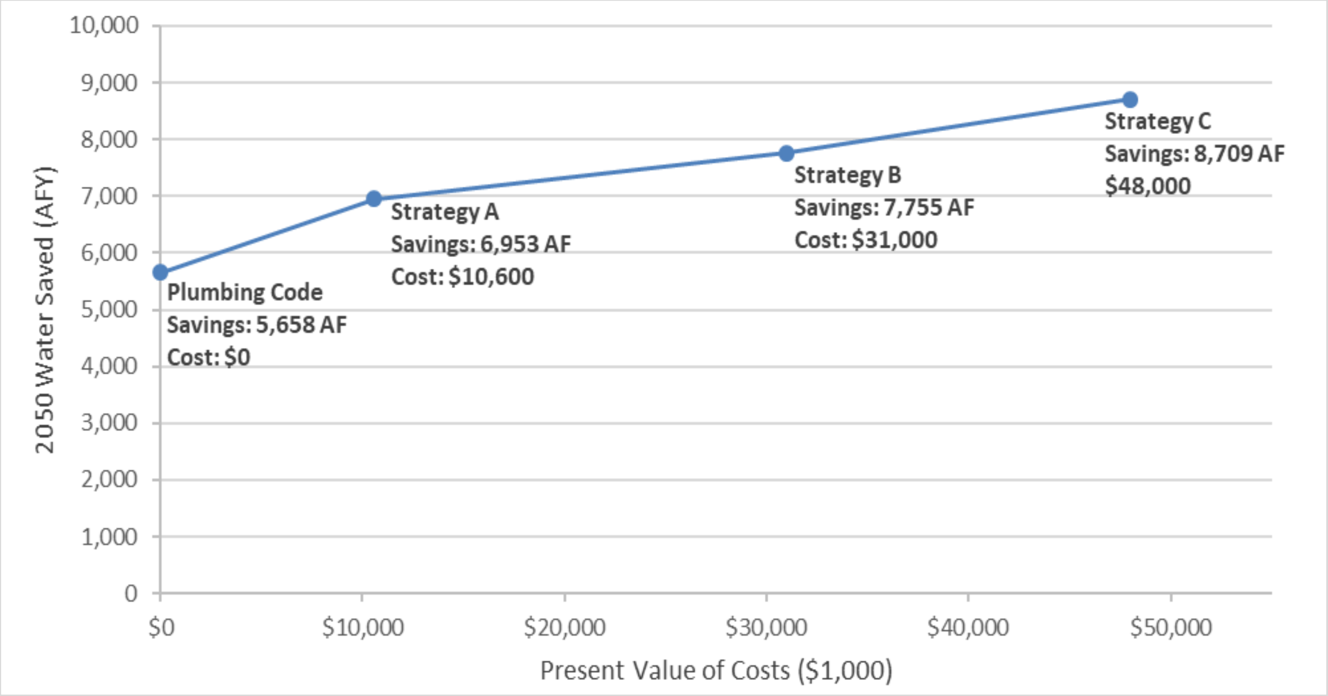


Figure 6-3 illustrates how marginal returns change as more money is spent to achieve water savings in AFY in 2050. A cost-effectiveness curve displays the results of the present value of each strategy's costs versus the cumulative water savings at the end of the planning period. This curve is helpful in determining how far to push the "water use efficiency envelope" as the point of diminishing economic returns is evident. Note that there is a small increase in savings when moving from Strategy B to Strategy C.

Figure 6-3. Present Value of Utility Costs versus Water Saved in 2050



6.3 Estimated Budgets for Water Use Efficiency Strategies

The estimated 3-year (2020-2022) average annual cost to ACWD to implement Strategy A, B, or C, as described in this Plan, is displayed in Table 6-4. The cost includes staff time and expenses (materials, rebates, giveaways, etc.). Opportunities to fund strategies outside of ACWD's water use efficiency budget exist through grant funding and/or cost sharing with other utilities (energy, sewer, or neighboring water utilities).

Table 6-4. Estimated 3-Year Average Annual Costs Per Strategy

Conservation Program With Plumbing Code	Estimated 3-Year (2020-2022) Average Annual Cost
Strategy A	$413,000
Strategy B	$911,000
Strategy C	$936,000

Note: Average 3-year annual costs are rounded to nearest $1,000.

6.4 Recommended Water Use Efficiency Strategy

ACWD's Board, seeing the need for more up-to-date and expansive measures to further reduce demands, has selected Strategy B for the short term (next five years) and will use the analysis included in this Plan to inform ACWD's strategy out to 2050.

Strategy B is the most forward-thinking, comprehensive option because it:

- Achieves the Board's number one priority of cost effectiveness with a weighted average cost per acre-foot saved of $695/AF, which is less than ACWD's avoided cost of water ($1,742/AF).[26]
- Encompasses all other Board priorities.
- Is future-ready and a "safe bet" for addressing forthcoming state legislation.
- Is relatively easy to implement immediately as it has many existing measures and just a few new measures that can be implemented over the next several years.
- Includes measures that provide water use efficiency services to lower income communities.
- Allows ACWD to increase its comfort zone when looking at the difference between supply and demand, especially during dry years, and store water use efficiency as savings during wet years.

Additionally, measures in this strategy are more likely to be deemed eligible for funding and outside partnerships. Strategy B provides the full range of measures, builds goodwill with institutional partners, and provides benefits for all categories of ACWD customers.

Figure 6-4 lists all the measures in Strategy B, including whether each is a new or existing measure, when it will start (if it is new), and when it will end (if applicable).

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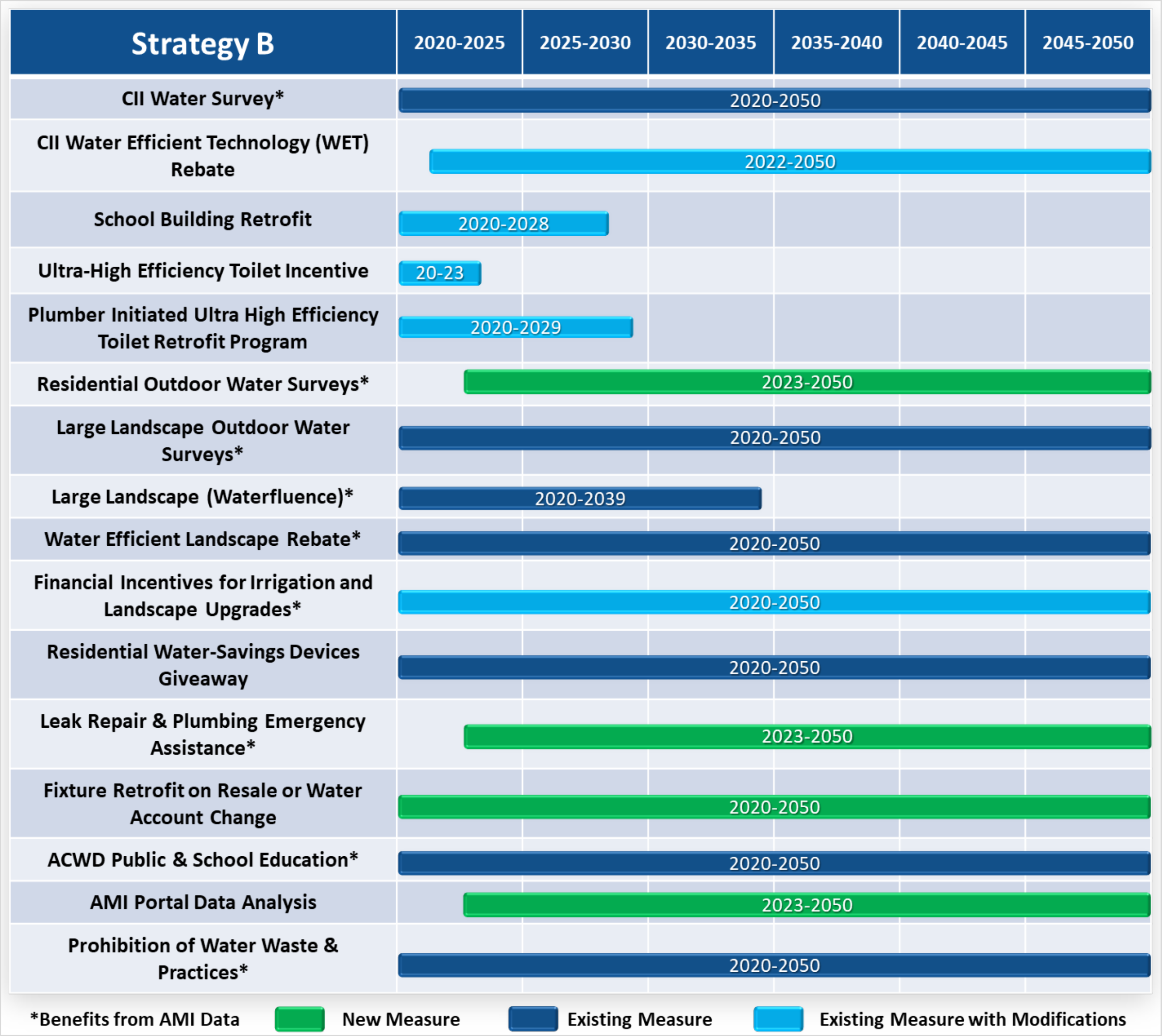
[26] Additional analysis done by ACWD staff demonstrates that the true cost per acre-foot saved is $694/AF and the benefit-cost ratio is 2.59. ACWD staff used anticipated annual increases in SFPUC water over the same period vs. a fixed avoided cost for this business case analysis.

Figure 6-4. Strategy B Measures



Strategy B	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050
CII Water Survey*	■ 2020-2050					
CII Water Efficient Technology (WET) Rebate	🟦 2022-2050					
School Building Retrofit	🟦 2020-2028					
Ultra-High Efficiency Toilet Incentive	🟦 20-23					
Plumber Initiated Ultra High Efficiency Toilet Retrofit Program	🟦 2020-2029					
Residential Outdoor Water Surveys*	🟩 2023-2050					
Large Landscape Outdoor Water Surveys*	■ 2020-2050					
Large Landscape (Waterfluence)*	■ 2020-2039					
Water Efficient Landscape Rebate*	■ 2020-2050					
Financial Incentives for Irrigation and Landscape Upgrades*	🟦 2020-2050					
Residential Water-Savings Devices Giveaway	■ 2020-2050					
Leak Repair & Plumbing Emergency Assistance*	🟩 2023-2050					
Fixture Retrofit on Resale or Water Account Change	🟩 2020-2050					
ACWD Public & School Education*	■ 2020-2050					
AMI Portal Data Analysis	🟩 2023-2050					
Prohibition of Water Waste & Practices*	■ 2020-2050					

*Benefits from AMI Data 🟩 New Measure ■ Existing Measure 🟦 Existing Measure with Modifications

Strategy B is comprised of four (4) new measures and 12 measures that ACWD already implements. New measures include AMI Portal Data Analysis, Leak Repair & Plumbing Emergency Assistance, Fixture Retrofit on Resale, and Residential Outdoor Water Surveys. These measures were selected because they addressed ACWD Board priorities and project objectives/drivers.

Five of the existing measures will require some modifications. Modifications include new eligibility requirements such as providing a rebate for more efficient fixtures and broadening eligibility requirements. For example, toilet rebates will only be available when existing fixtures are replaced with ultra-high efficiency toilets with flush volumes of 1.1 gpf or less. A previous measure provided rebates for 1.28 gpf or less toilets. Some measures will include new devices as part of a group of devices that are eligible for incentives. The School Building Retrofit measure will include incentives for high efficiency sprinklers and dripline equipment, in addition to toilets and weather-based irrigation controllers. Modifications were recommended to increase water savings, expand participation while reducing free riders,[27] and increase adoption of new technologies.

Some existing measures are ending. For example, ACWD will no longer offer individual rebates for high efficiency clothes washers. Due to successful rebate programs and vast improvements in water-efficient technology in clothes washers over the last ten years, most clothes washers in the residential, coin operated, and laundromat settings in ACWD's service area are high efficiency models. However, CII customers may still be eligible to receive an incentive to replace an old clothes washer if it is identified as a water use efficiency improvement during a site survey. This is part of the CII Water Efficient Technology (WET) measure. ACWD will no longer be providing indoor surveys to multifamily sites but will still offer free devices and toilet rebates and will collect data to estimate the water savings achieved through these programs. The surveys are resource intensive and do not provide much additional savings. Existing measures that are continuing unchanged are measures that have proven successful, are easy to continue running, and still have water use efficiency potential.

Not all 16 measures in Strategy B will be implemented throughout the planning horizon. Measure timing is staggered for implementation ease and to address specific needs (legislation requirements) when appropriate. Also, some measures run for a short period of time due to limited conservation potential – most of the toilet measures end within 3-9 years due to anticipated high levels of saturation of efficient fixtures from plumbing code changes at the end of that period. More details about each measure in Strategy B are included in Appendix E.

As mentioned previously, the strategies were developed to allow for new measures to be incorporated as new technology is introduced. Strategy B has the following general goals and objectives that drive it. Any new measures will be evaluated in terms of how well it meets these goals and objectives.

- The measure's cost of water saved is at or below ACWD's avoided cost of water (approximately $1,742/AF) – see section 6.2 for a discussion on this.
- The measure serves one or more of ACWD's Board priorities as listed in Section 6.1.
- The measure is feasible for ACWD to implement with existing ACWD staff resources and budget, or more resources and budget can be made available.
- The measure targets a water end use with water use efficiency potential.
- The measure is proven through studies and is recommended by the industry.
- The measure does not disrupt equitability among customer categories, or it provides water use efficiency to an underserved customer category.

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[27] It is important to note that in water use efficiency program management the "free rider effect" occurs when a customer applies for and receives a rebate on a targeted high efficiency fixture that they would have purchased even without a rebate. In this case, the rebate was not the incentive for their purchase but a "bonus." Rebate measures are designed to target those customers needing financial incentive to install the more efficient fixture.

Figure 6-5 illustrates the decision workflow that will assist staff when evaluating new measures.

Figure 6-5. Decision Workflow for Evaluation of New Water Use Efficiency Measures

Cost

Cost per unit of water savings is at, or below, $1,742/AF to maintain a consistent WUE strategy cost

Board Priorities

Serves one or more of ACWD's Board priorities listed in Section 6.1

Feasibility

Feasible to run with existing resources and budget or more resources and budget can be made available

Savings Potential

Targets a water end use with water use efficiency potential

Industry Standard

Proven through studies and recommended by the water industry

Equitability

Does not disrupt equitability among customer categories or provides water use efficiency to an underserved customer category

The estimated 3-year (2020-2022) average annual cost to ACWD to implement the Recommended Strategy (Strategy B) is approximately $911,000 per year, per Table 6-4. The budget includes staff time and expenses (materials, rebates, giveaways, etc.).

Existing staff resources of two (2) Water Conservation Specialists and one (1) Water Conservation Supervisor are at sufficient levels to run this strategy for the first one to two years. However, new programs such as "AMI Portal Data Analysis" will ultimately require more staff to implement effectively.

Approximately 65% of ACWD's service area water use is associated with residential water use. Consequently, residential water use efficiency measures will produce the most savings under this strategy (as well as other strategies). At around 23% of overall water use, ACWD's service area does not include extensive commercial activity. Therefore, the water use efficiency potential for the commercial sector is not as high. In addition to plumbing code savings, the Recommended Strategy saves an additional 4% of projected demand in 2050.

7 NEXT STEPS AND CONCLUSIONS

Current conditions have encouraged ACWD to choose Strategy B as the Recommended Strategy to implement over the next five years, with the intention to revisit this approach during the development of the Water Supply Master Plan. Strategy B has measures that are clearly defined, as well as water saving objectives and customer target goals that are measurable. ACWD can track quantifiable performance goals at both the measure and overall strategy level during implementation.

7.1 Adaptive Management

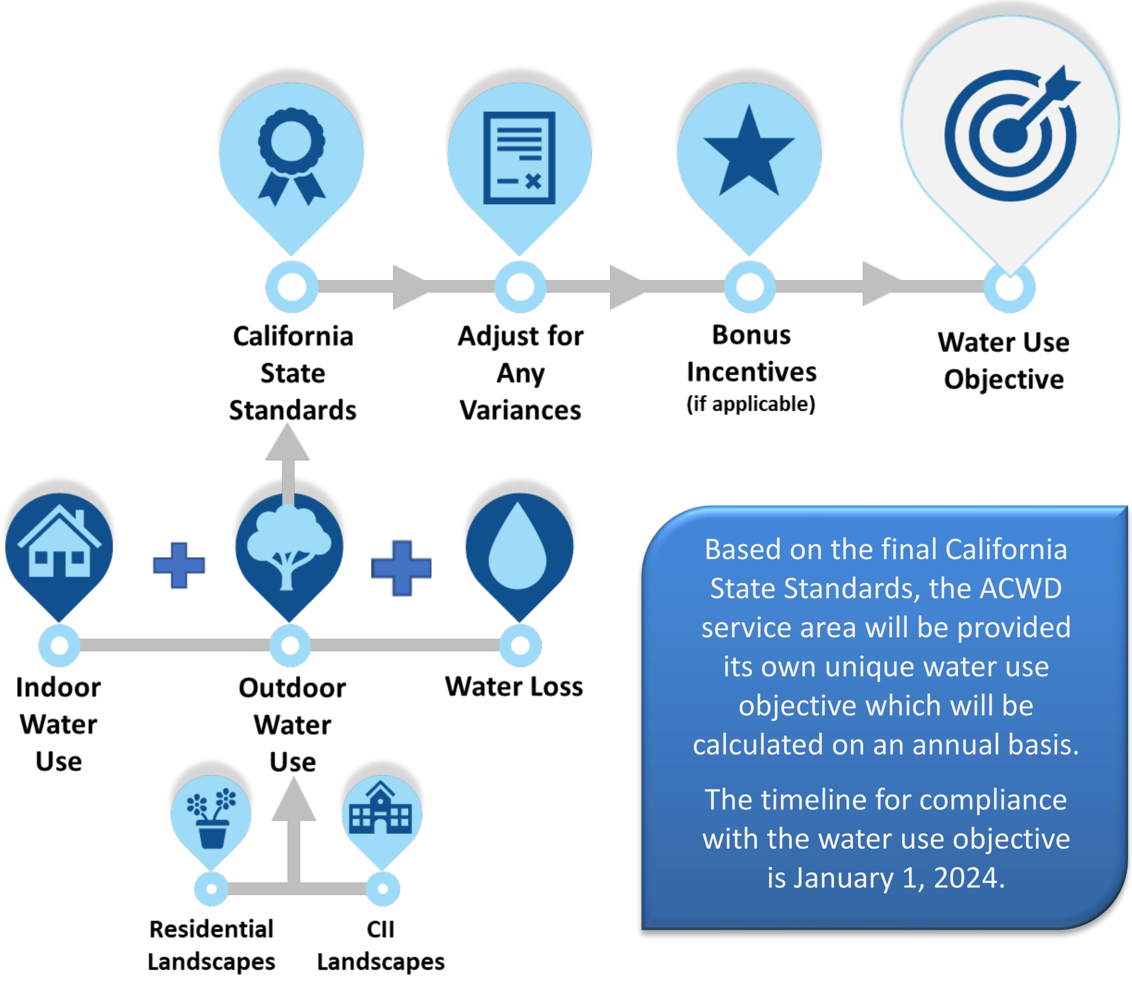
ACWD's approach to developing this Plan included the understanding that the field of water use efficiency program administration is in constant flux, as are water use trends, which are very dynamic in response to changes in population, economy, weather, efficiency of devices, and industry. This Plan has been developed and approved with this in mind.

Strategy B is a WUE Program framework, a starting point, and is meant to be adaptively managed. As mentioned in Section 6, ACWD has developed a method to identify new measures that fit into the strategy. New measures may be added to ACWD's WUE Program to replace existing measures within the Program. ACWD may also alter its strategy by augmenting or scaling back various strategy components and measures to increase efficiency, while continuing to meet strategy objectives. ACWD may adopt better technology or methods of implementation and/or may alter its strategy to meet budget and staffing resource limitations or expansion.

Whether additional measures become necessary would be dependent on several factors, including future water supply restrictions, drought conditions, compliance with the annual aggregate water use objectives as provided by the state, and ACWD's ability to support new innovative measures.

The strategy will be revisited when ACWD updates its Water Supply Master Plan estimated to be completed in 2025. ACWD may even decide to pursue one of the other strategies evaluated in this Plan if its needs are better served through that strategy. Additionally, water use efficiency measures identified in this plan will be modified, if necessary, to align with forthcoming water use standards that will be established in accordance with Assembly Bill 1668 and Senate Bill 606 (see Figure 7-1).

Figure 7-1. State Regulations Timeline and Methodology



Based on the final California State Standards, the ACWD service area will be provided its own unique water use objective which will be calculated on an annual basis.

The timeline for compliance with the water use objective is January 1, 2024.

ACWD can use the DSS model to track progress of ACWD's selected strategy by tracking its impact on demand reductions, along with the strategy's implementation costs and associated budgets.

Ongoing monitoring and reporting of ACWD's water supply status will also be conducted through annual reports and regular five-year updates of ACWD's Urban Water Management Plan. The DSS model can assist ACWD with understanding when to make any changes as described above.

7.2 Implementation

The following list contains actions ACWD will take to ensure successful implementation of Strategy B:

- Review current staff resources in terms of implementing Strategy B and determine if new staff is necessary to adequately support implementation of the strategy. Ensuring adequate staff to administer water use efficiency measures is important so that customer participation in water use efficiency is well-supported and therefore successful. Since both the implementation of this Plan and meeting state mandates are largely driven by voluntary customer changes in equipment and behaviors that need to be permanent (despite drought conditions), strong staffing support in this area will allow for a higher potential success rate.
- Establish a budget for the selected water use efficiency strategy at an average annual cost of approximately $911,000 to cover the cost of implementing the strategy measures. The average annual cost includes administrative costs and staff labor (burdened) but does not include new program startup

costs (staff time to set up all the elements of running a program.) The Water Use Efficiency Program's annual work plan development process will continue to be done in concert with the budget planning process.

- Prioritize measures for implementation, with the highest priority for implementation given to those that contribute the most to meeting water savings goals and can be implemented with relative ease. To launch implementation of the Water Use Efficiency Program, ACWD will consider these key questions to determine measure priorities, budgets, and schedules:
    - What level of support will be required from staff to implement the selected measures – when and how much is needed?
    - Can all or some of the support needed to run a measure be outsourced?
    - Are there economies of scale to partnering with other agencies to run a measure (BAWSCA, CalWEP, etc.)?
    - Is there additional funding available through grants or cost-share to support the measure?
- Develop implementation plans that describe in detail how to implement each measure, including any necessary Board Committee review or Board Meeting action, budget processes, legal processes, Rates and Fees schedule inclusion, outreach planning and materials development.
- Develop outreach and marketing plans as part of each measure's implementation plan. Identify measure and general program outreach techniques that really engage customers. For example, use of actual customer experience testimonials in outreach materials and presentations.
- Determine how to utilize AMI to increase effectiveness of outreach and targeting of customers that would most benefit from a measure.
- Continue to foster partnerships with service area cities; other agencies, utilities, and their representatives; regional and statewide groups; community organizations; industry and other stakeholders to support measure implementation.
- Market water use efficiency measures through accredited program membership lists as a low-cost means to spread the word to other professionals in the water industry (e.g., StopWaste, Master Gardeners, Green Plumbers, WaterSense Partners, Irrigation Association Certified Professionals, Qualified Water Efficient Landscapers, etc.).
- Seek funding sources, such as Proposition 1E[28], 84[29], Cap & Trade[30], the California Department of Water Resources Water-Energy Grant Program,[31] and/or U.S. Bureau of Reclamation funds, to support Plan budget needs. Grant and cost-share funds help balance out the higher cost measures and reduce the overall cost of implementing the water use efficiency strategy.
- Develop and utilize a Water Use Efficiency Database to store, manage, and report on measure participation, costs, and other implementation data. Setting up a method to store and manage this data is important to measure success and identify areas that need improvement.
- Review Plan goals in the DSS Model annually and compare with water use to ensure the strategy is on track to meet water use reduction goals, then identify updates or changes to measure elements and/or

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[28] http://bondaccountability.resources.ca.gov/p1e.aspx

[29] http://bondaccountability.resources.ca.gov/p84.aspx

[30] https://www.edf.org/climate/how-cap-and-trade-works

[31] https://www.water.ca.gov/Work-With-Us/Grants-And-Loans/Water-Energy-Grant-Programs

the strategy, if not on track. This may include amending targets, budgets, staffing, and schedule, or switching to another strategy altogether, to stay on track with ACWD water use efficiency needs.

- Engage in state processes to establish the standards for water use efficiency objectives which are part of the state's implementation of the Water Conservation legislation. ACWD will participate in public workshops and stakeholder workgroups to review state recommendations, evaluate their impact on ACWD, present key information to stakeholders, receive feedback, and submit written comments as needed.

Staffing Needs for Strategy B

As mentioned in Section 6.4, existing staff resources of two (2) Water Conservation Specialists and one (1) Water Conservation Supervisor are sufficient levels for initial implementation of this strategy for the first one to two years (FY20/21–FY21/22). However, with the implementation of AMI, through a Proof of Concept in the spring/summer of 2021, and a full deployment roll out between mid to late 2021 and 2023, it is anticipated that additional staff will be needed to effectively support a successful roll out of AMI, the AMI Portal Data Analysis measure, and associated measures. Several other measures start up in 2023 to address state legislation, including a Residential Outdoor Water Surveys measure; these also may require additional staffing or contracted resources. Staffing needs will continue to be evaluated through the AMI and state legislation implementation periods to identify appropriate needs and timing for consideration of additional staff and/or resources in a holistic manner that takes into account all of ACWD's priorities in future budget processes.

Table 7-1 lists staff estimates to implement Strategy B based on the current measure implementation schedule.

Table 7-1. Estimated Staffing Needs for Strategy B

FTEs	Title	Explanation
1	WC Specialist	Potentially hire between 2021-2023 to support AMI Portal Data Analysis. AMI is expected to be fully deployed by the end of 2023.
1	WC Specialist	Potentially hire between 2023-2024 to support new programs for state legislation objective compliance (CII Water Efficient Technology Rebates, Leak Repair & Plumbing Emergency Assistance, Residential Outdoor Water Surveys – admin support).
2	WC Specialists (or a Contractor*)	Potentially hire between 2023-2024 to support the Residential Outdoor Water Surveys and other measures to ensure state legislation objective compliance.

*Hiring a contractor for the Residential Outdoor Water Surveys may be the best option and will be evaluated when ACWD staff is preparing the implementation plan for this measure in 2023.

Funding Opportunities, Partnerships, and Stakeholder Group Participation

ACWD has received and/or been awarded over $2.7 million in grant and cost-share funding for water use efficiency measures over the past 20 years. ACWD currently has strong partnerships with other regional public agencies, neighboring utilities, and regional stakeholder groups that provide cost-sharing or in-kind program support, such as support for outreach, building customer awareness, and maximizing participation. ACWD will continue to actively pursue future state and federal grants and cost share opportunities as well as maintain these existing partnerships.

Each measure in the recommended water use efficiency strategy has both common and unique funding sources and partnership opportunities, as well as potential implementation obstacles, including legal barriers. In some cases, these matters can be identified in advance, but some cannot.

Partnership and funding sources may include the following:

- ACWD water use efficiency and public outreach budgets
- Existing and new regional, county, and statewide partnerships such as waste management authorities and Green Business Certification organizations
- State and federal grants
- Service area cities
- Local schools/university students or student organizations
- Local community organizations with an interest in water efficiency such as resource conscious gardening groups/advocates and green jobs advocates
- Partnerships with energy and sewer utilities

Tracking and Monitoring

ACWD will continue to track the level of participation in water use efficiency measures to monitor the effectiveness of the water use efficiency strategy. To enhance ACWD's current tracking efforts, a water use efficiency database is in development. This tracking database will filter data for reporting purposes and can be updated and reviewed in real time to reflect overall Water Use Efficiency Program participation and strategy success.

The tracking database will incorporate the following data for existing and new measures:

- Customer information – name, address, account number, customer type (e.g., CII customers)
- Location information – location number, meter information, site address, site type
- Water Use Efficiency (WUE) measure or device – type (including make and model), quantity, unit water savings, date of measure installation, life expectancy
- Cost information – rebate amount, grant information (if applicable), cost-share
- Other documentation or data as appropriate (i.e., survey reports)

These elements will allow ACWD to track and monitor water savings over time for each measure as well as overall WUE Program water savings. ACWD will measure the success of the water use efficiency strategy through quarterly reviews of measure participation data with management and annual reviews of estimated savings with the ACWD Board. Measure tracking will also inform ACWD's annual budget process.

7.3 Conclusions

Through this analysis, the following conclusions were made:

- **Water use efficiency is the least expensive means of addressing ACWD's service area future water demands.** The implementation of Strategy B's water use efficiency measures as identified in this Plan will reduce per capita water use and will enable ACWD to maintain its practice of storing excess water during wet years to close the gap between supply and demand during dry years, as well as defer the need for infrastructure expansion to address future water demands. While some of the water use efficiency measures identified have a significant cost, the cost of not implementing these measures, and instead addressing increased demands through additional purchased water and engineering solutions, is even higher. Furthermore, with climate change, long-term drought, and environmental restrictions on the delivery of imported water, additional water supplies may not be readily available to meet future increases in demands without water use efficiency.
- **This Plan will inform other ACWD planning efforts.** Through the DSS Model analysis, ACWD identified appropriate measures for its service area, details related to implementing each measure (fixture costs, applicable customer classes, period of implementation, measure life, administrative costs, end uses),

reasonable targets, and estimated savings associated with targeted end uses to determine Water Use Efficiency Program savings projections for the next 31 years. This thorough analysis will be used in ACWD's 2020 Urban Water Management Plan demand forecast and will help inform the 2025 Water Supply Master Planning process. In addition, the DSS Model can be used to help identify areas with the most reduction potential to inform development of ACWD's Water Shortage Contingency Plan.

- **This Plan will help ACWD meet new state water use efficiency objectives.** The governor signed SB 606 and AB 1668 into state law to create permanent water use efficiency standards as part of implementing "Making Water Conservation a California Way of Life" legislation. ACWD may be required to meet new mandates and this Plan provides a framework for addressing these new requirements. The Plan is based on what was known at the time it was finalized. ACWD may need to update its water use efficiency strategy to comply with mandates developed in the future.
- **This Plan supports ACWD's AMI Initiative.** Strategy B has numerous measures that will benefit from AMI water use data. Granular water use data will help inform measures that target overirrigation, leaks, and water waste, as well as help ACWD target programs more effectively, improving public outreach and marketing.

In summary, expanding ACWD water use efficiency efforts through the implementation of the recommended Strategy B is a feasible and cost-effective approach to continuing sustainable operations with existing water supplies, supporting other future planning efforts, addressing droughts and other water supply uncertainties, meeting the water use objectives outlined in SB 606 and AB 1668, and fully utilizing ACWD's new AMI initiative.

7.4 Future Analysis

ACWD anticipates that it will continue to use the DSS Model created for this Plan for analysis to support future planning initiatives. As mentioned previously in this Plan, the Water Supply Master Plan is one of those initiatives. During development of the Water Supply Master Plan, ACWD may maximize targets for all measures in the DSS Model to see what a "Strategy E" (E for everything) alternative would look like. This alternative would maximize savings without consideration of staffing or budget limits. However, it would need to consider limits such as saturation of efficient fixtures and customer response. Ramping up targets to maximize water use efficiency would help ACWD identify the true water use efficiency potential and limits of water use efficiency programming (demand hardening) in its service area, which would be useful when looking at water supply limitations down the road. ACWD could also conduct similar analyses that maximize savings for a few measures – those with the greatest water use efficiency potential. In all cases, the economic impact (utility cost and customer cost) of these scenarios would need to be evaluated as well.

ACWD has concerns related to demand hardening from an aggressive WUE Program and how that could impact operations during a severe drought. If service area water use efficiency potential was maxed out, what actions could ACWD take during a drought to reduce water use? While this is a very unlikely scenario in the short term, it could materialize in the long term. ACWD will utilize these DSS Model analyses to plan for future droughts and other water supply uncertainties as it continues to pursue all cost-effective means to reduce demand and serve its mission of providing a reliable source of water to customers in the service area.

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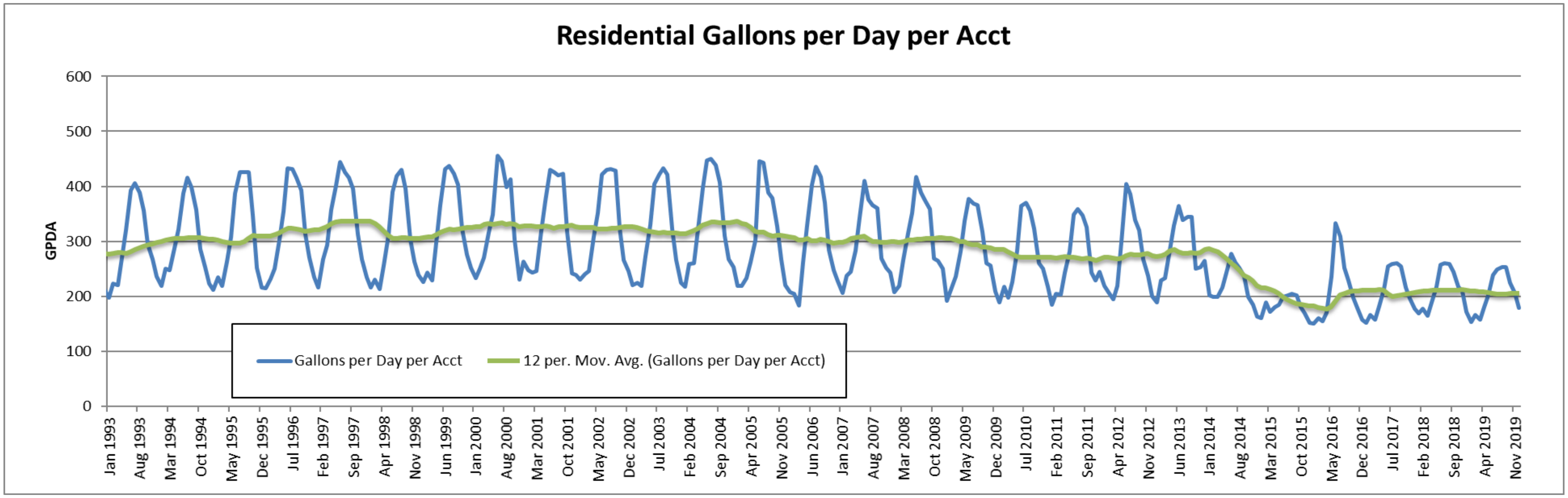
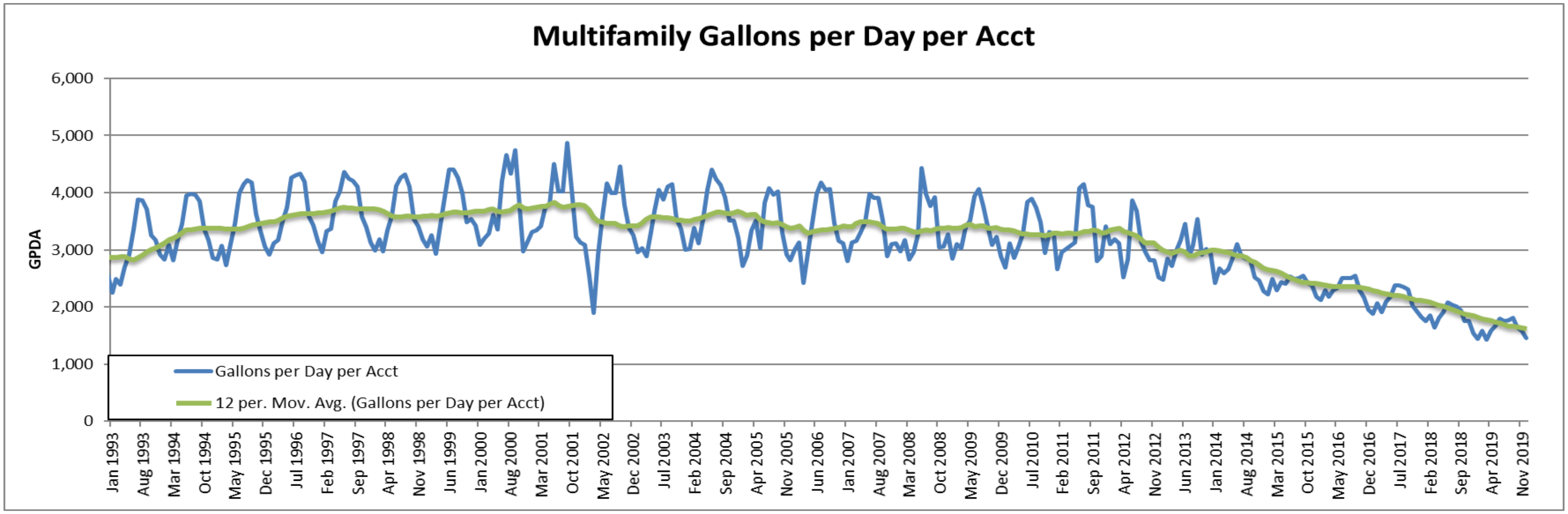
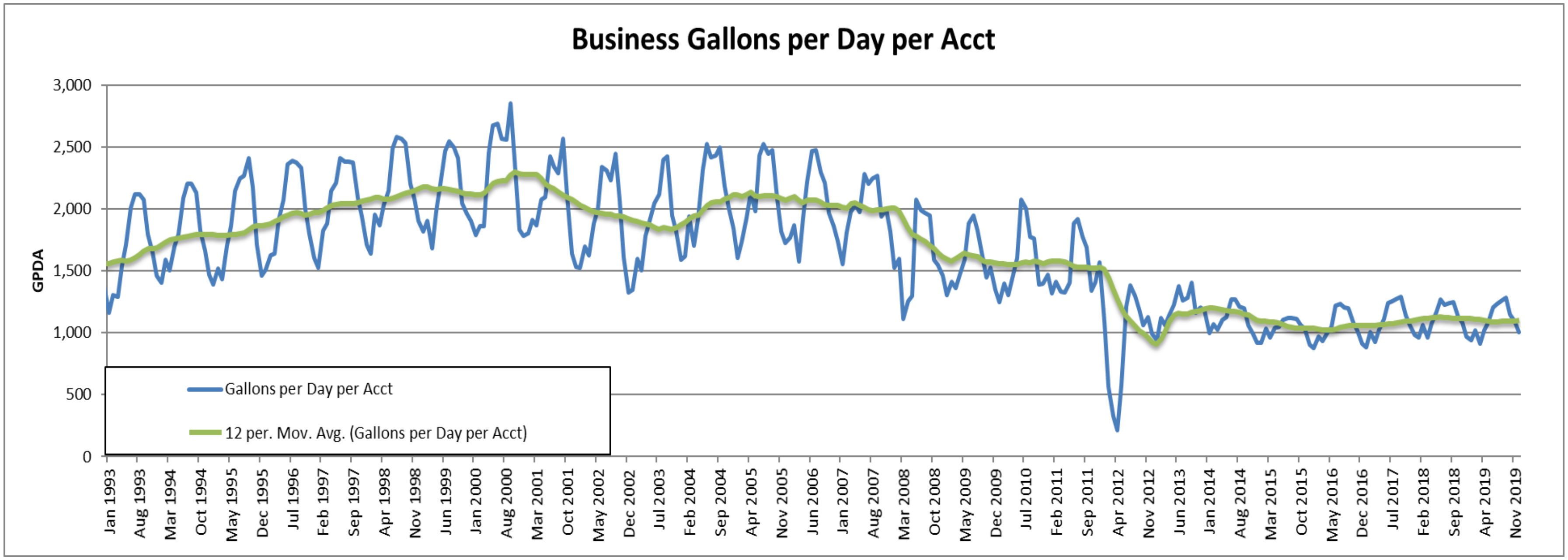
APPENDIX A – HISTORICAL MONTHLY WATER USE PER ACCOUNT TYPE






Business Gallons per Day per Acct
GPDA
3,000
2,500
2,000
1,500
1,000
500
0
Gallons per Day per Acct
12 per. Mov. Avg. (Gallons per Day per Acct)
Jan 1993
Aug 1993
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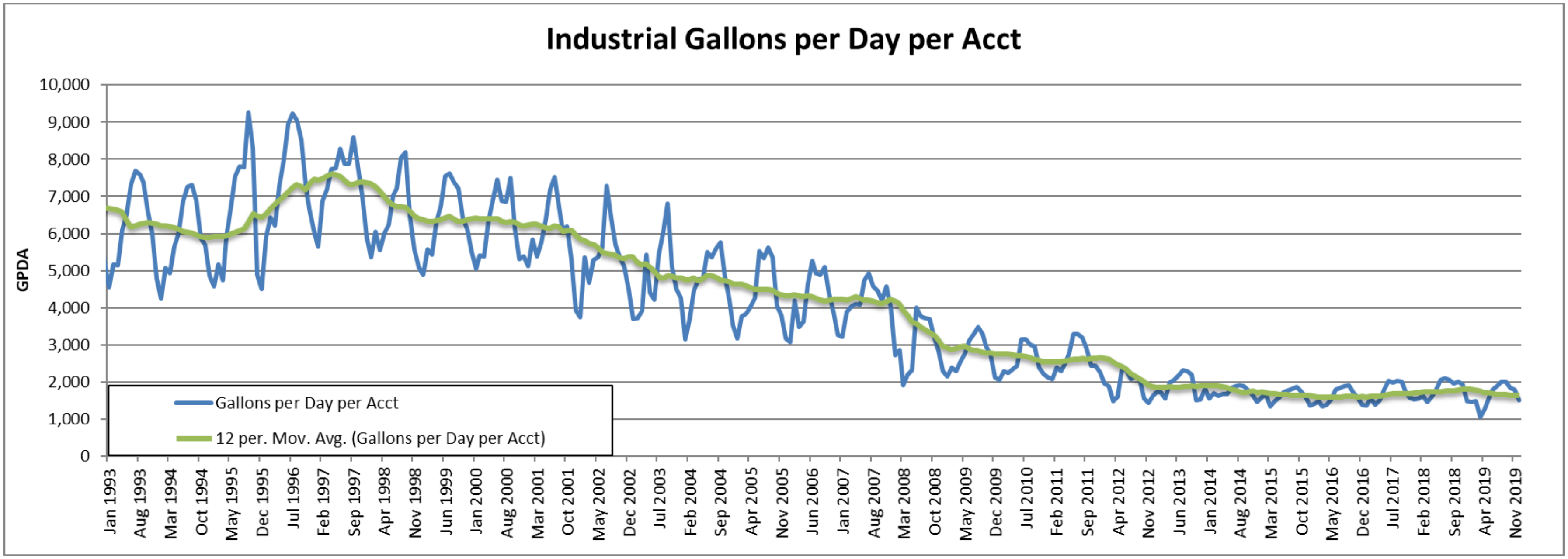
Industrial Gallons per Day per Acct
GPDA
10,000
9,000
8,000
7,000
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4,000
3,000
2,000
1,000
0
Gallons per Day per Acct
12 per. Mov. Avg. (Gallons per Day per Acct)
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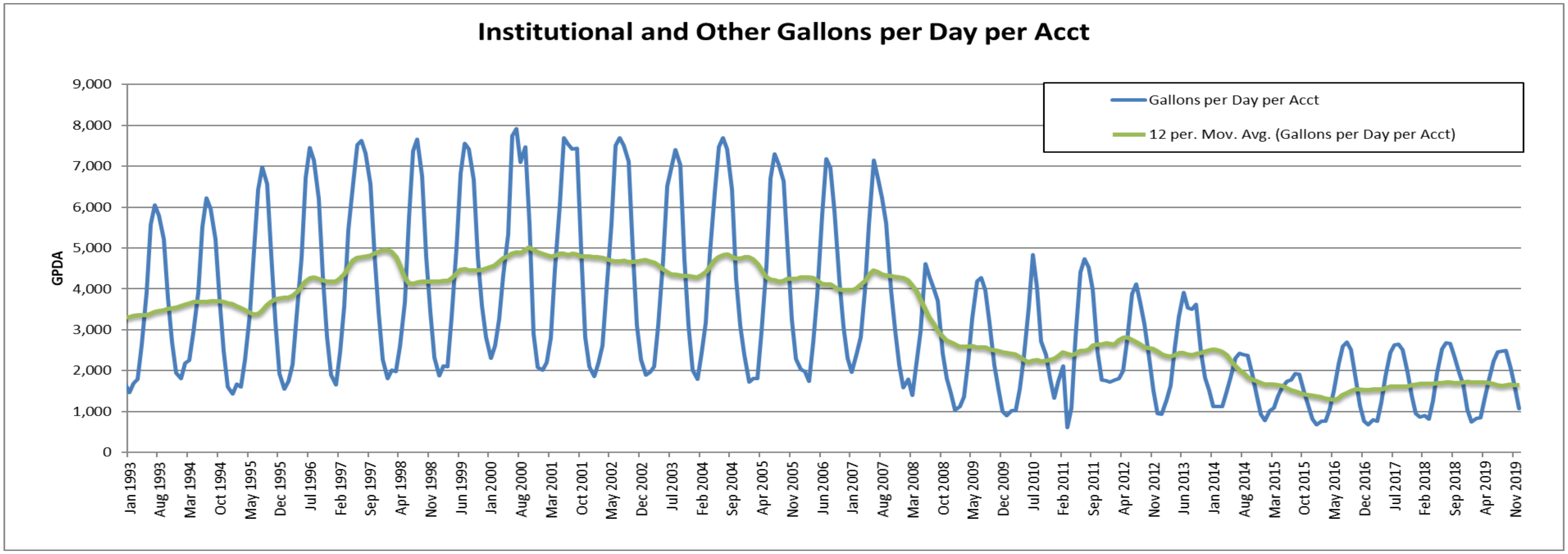
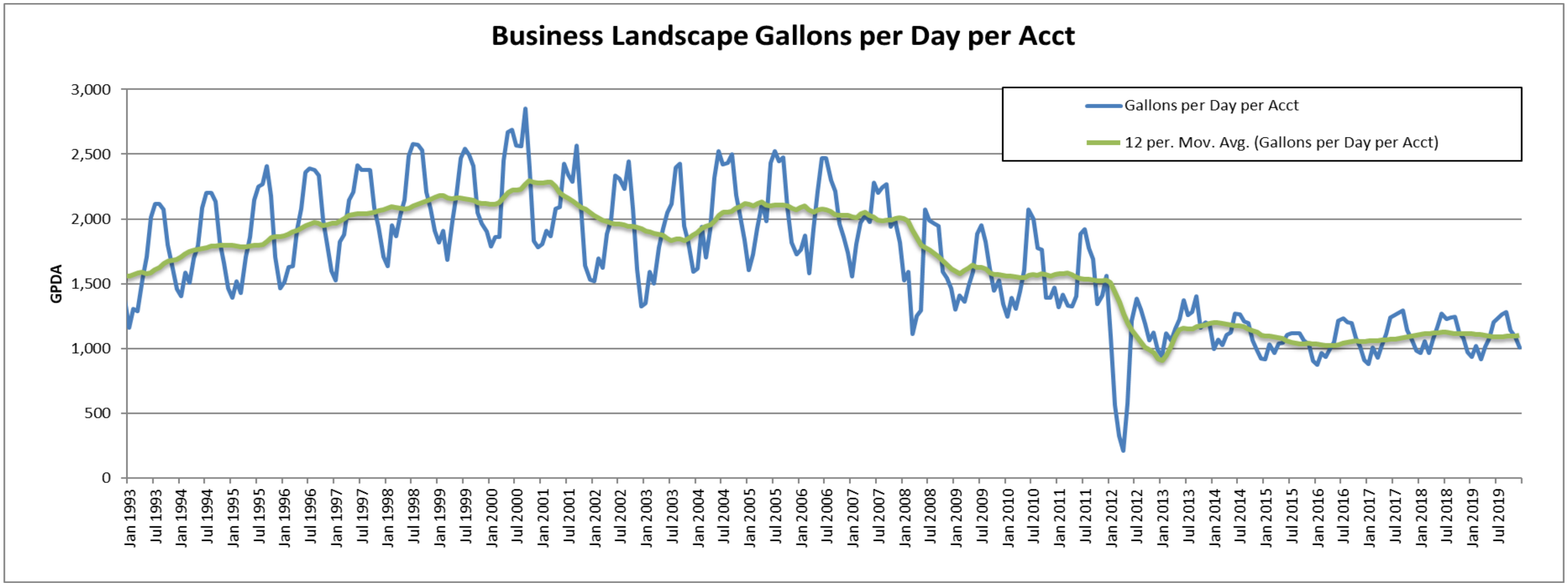
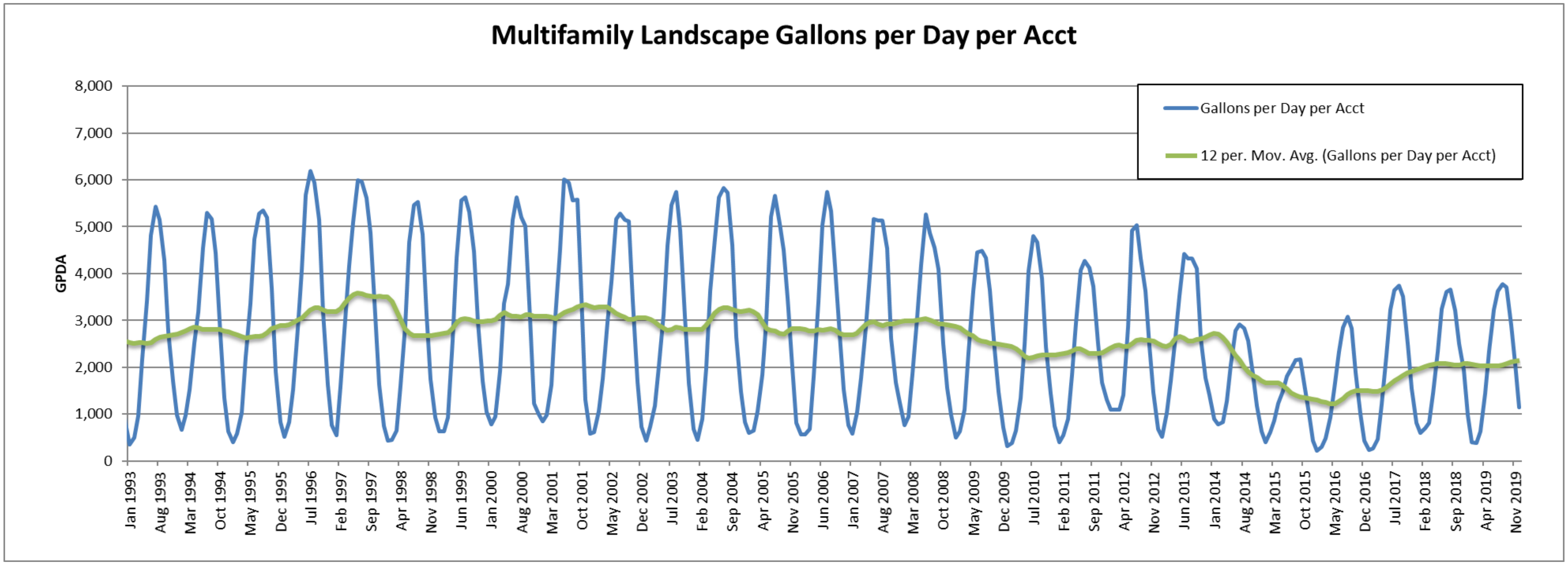


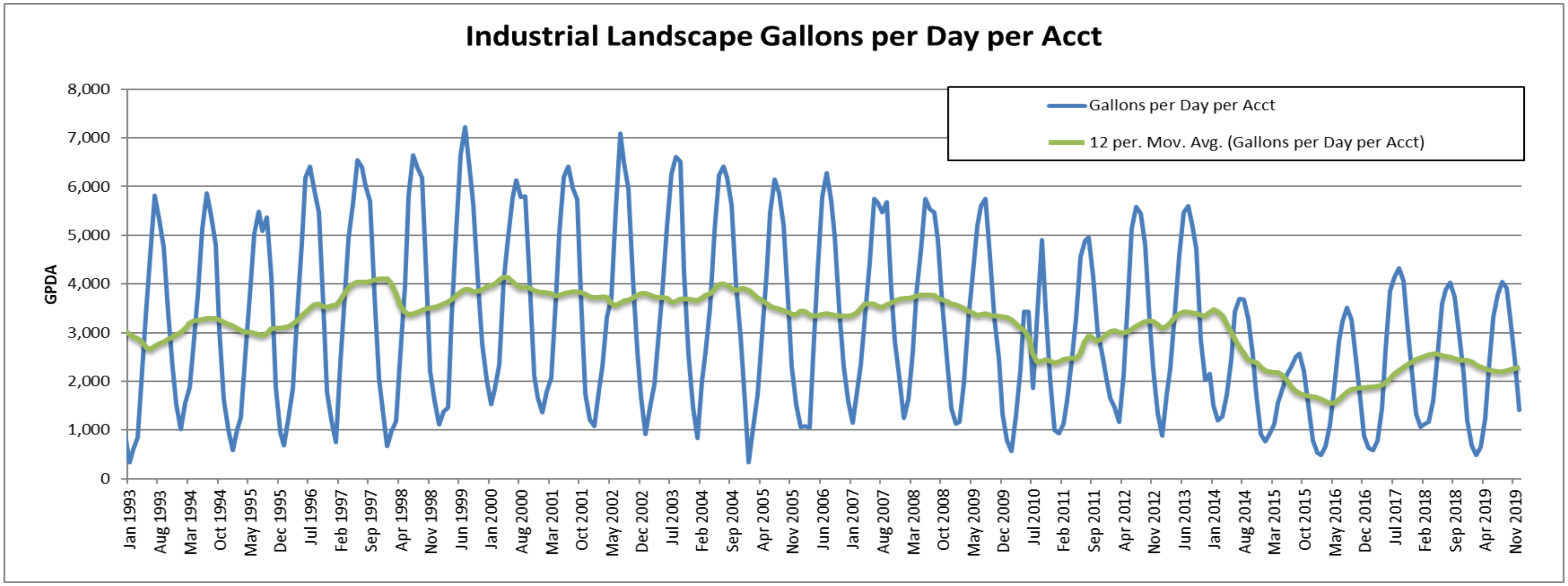
Institutional and Other Gallons per Day per Acct



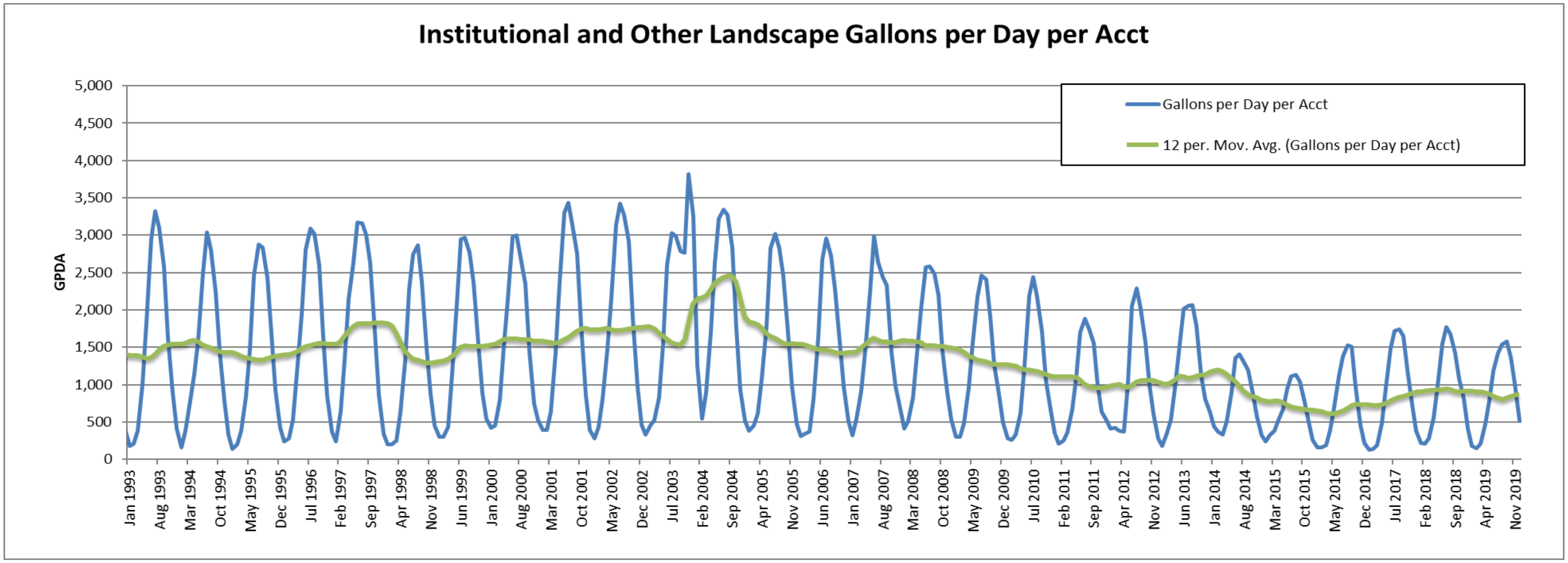
Business Landscape Gallons per Day per Acct



Multifamily Landscape Gallons per Day per Acct



Industrial Landscape Gallons per Day per Acct


Institutional and Other Landscape Gallons per Day per Acct
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2,000
1,500
1,000
500
0
Gallons per Day per Acct
12 per. Mov. Avg. (Gallons per Day per Acct)
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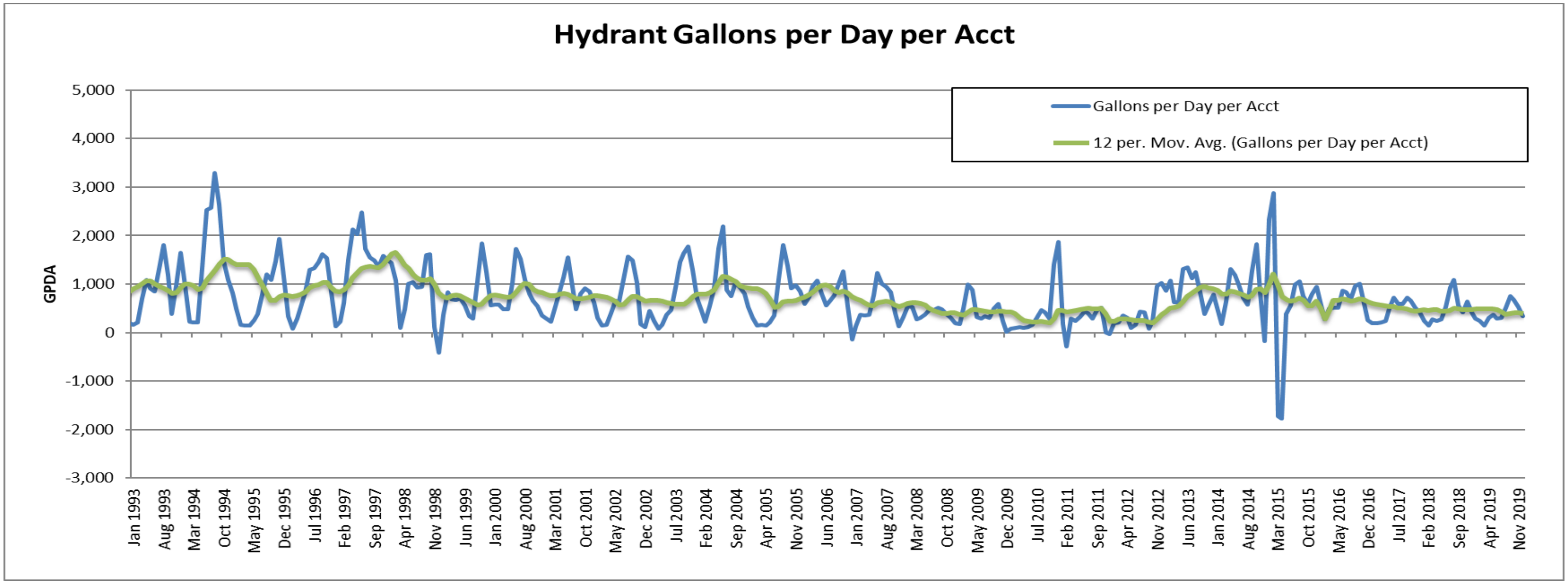
Hydrant Gallons per Day per Acct
GPDA
5,000
4,000
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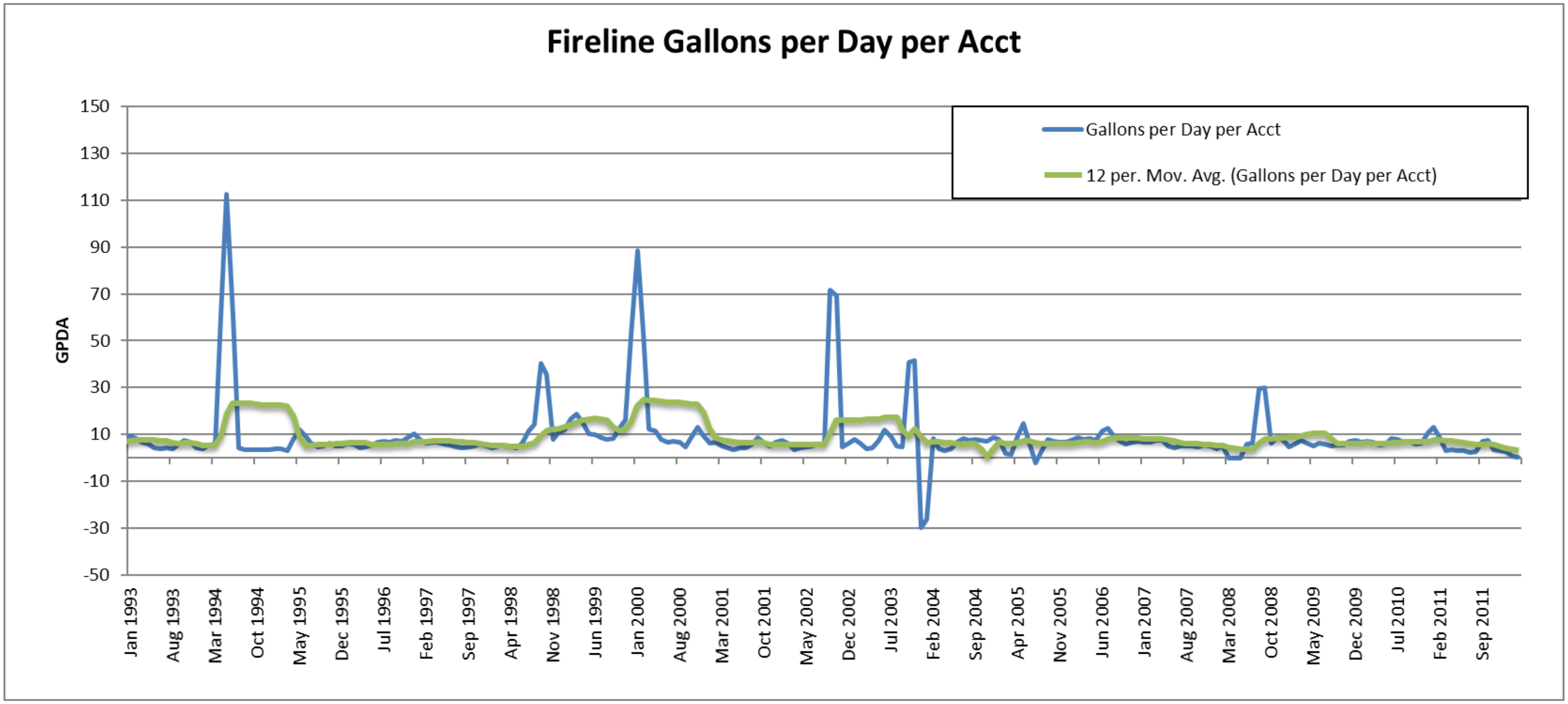


Note: Anomalies in the data can be attributed to implementation of a new billing system in 2012 when Fireline accounts were consolidated into their parent classes (i.e., Business, Residential, Industrial, etc.).

APPENDIX B – DSS MODEL OVERVIEW

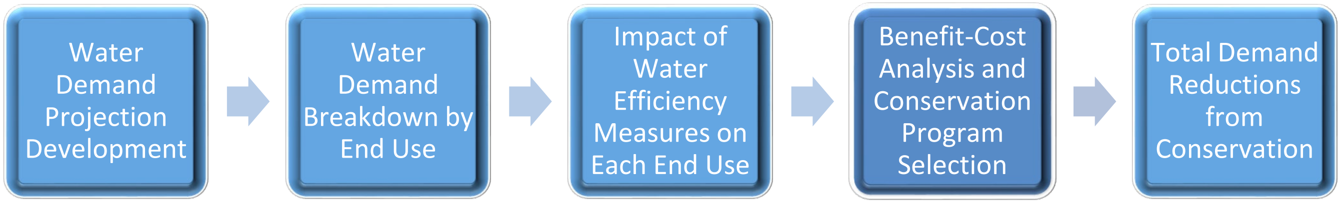


Figure B-1. DSS Model Main Page

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

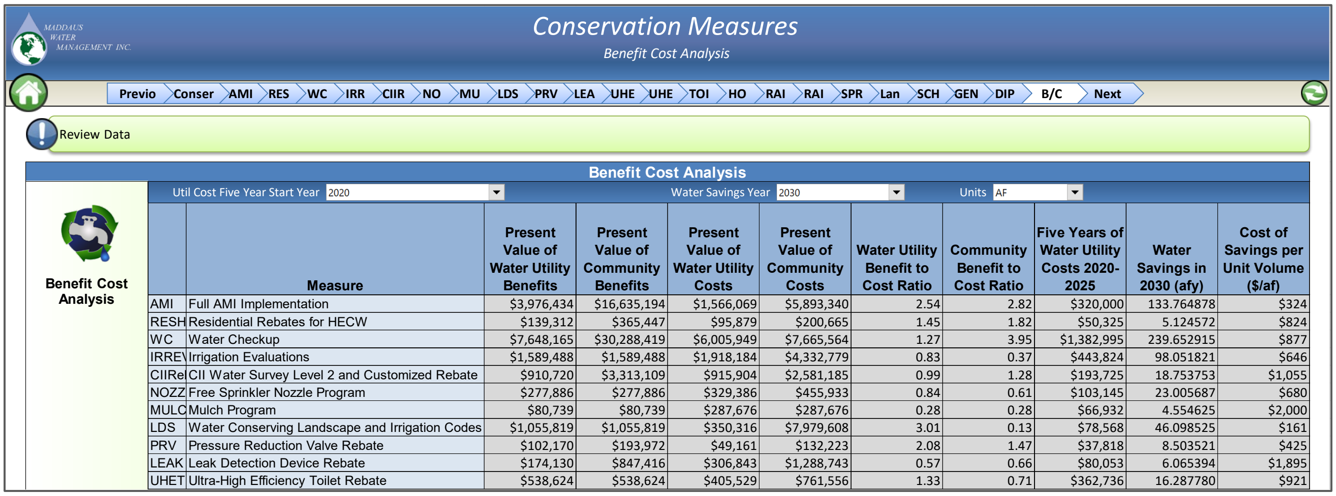
Originally developed in 1999 and continuously updated, the DSS Model is an "end-use" model that breaks down total water production (water demand in the service area) to specific water end uses, such as plumbing fixtures and appliances. The model uses a bottom-up approach that allows for multiple criteria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

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

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

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

Figure B-2. Sample Benefit-Cost Analysis Summary



Conservation Measures

Benefit Cost Analysis

Benefit Cost Analysis

Util Cost Five Year Start Year: 2020

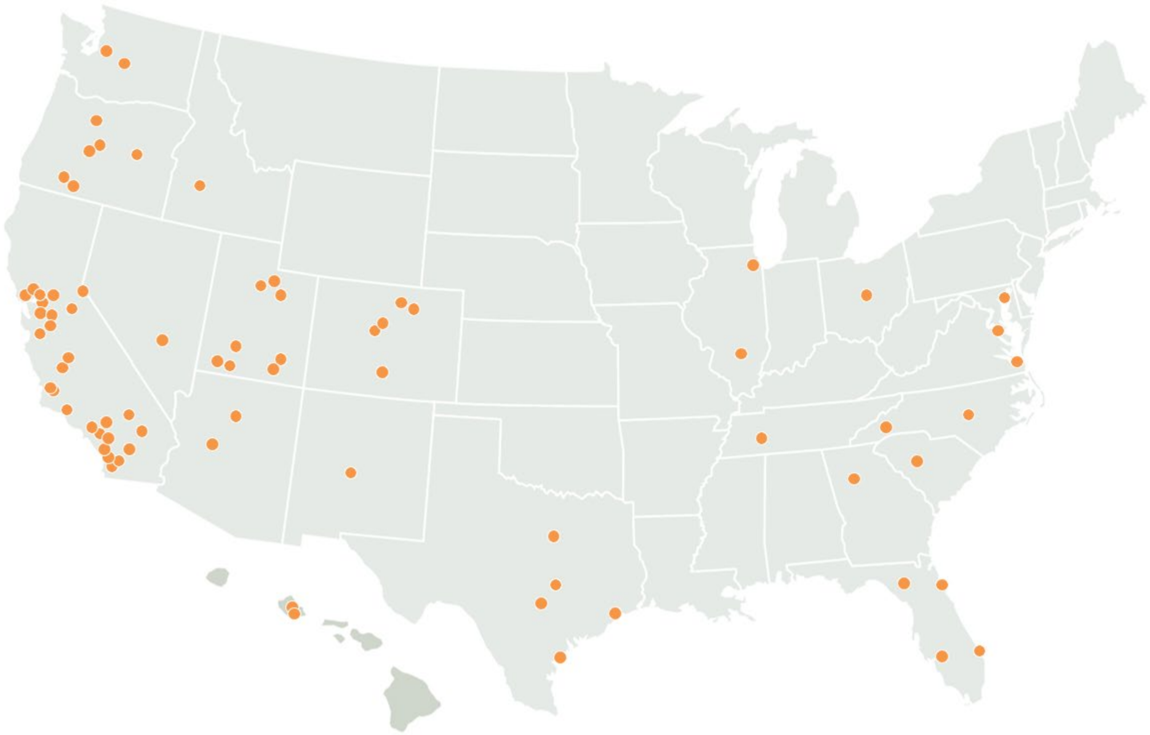
Water Savings Year: 2030

Units: AF

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

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

Figure B-3. DSS Model Analysis Locations in the US



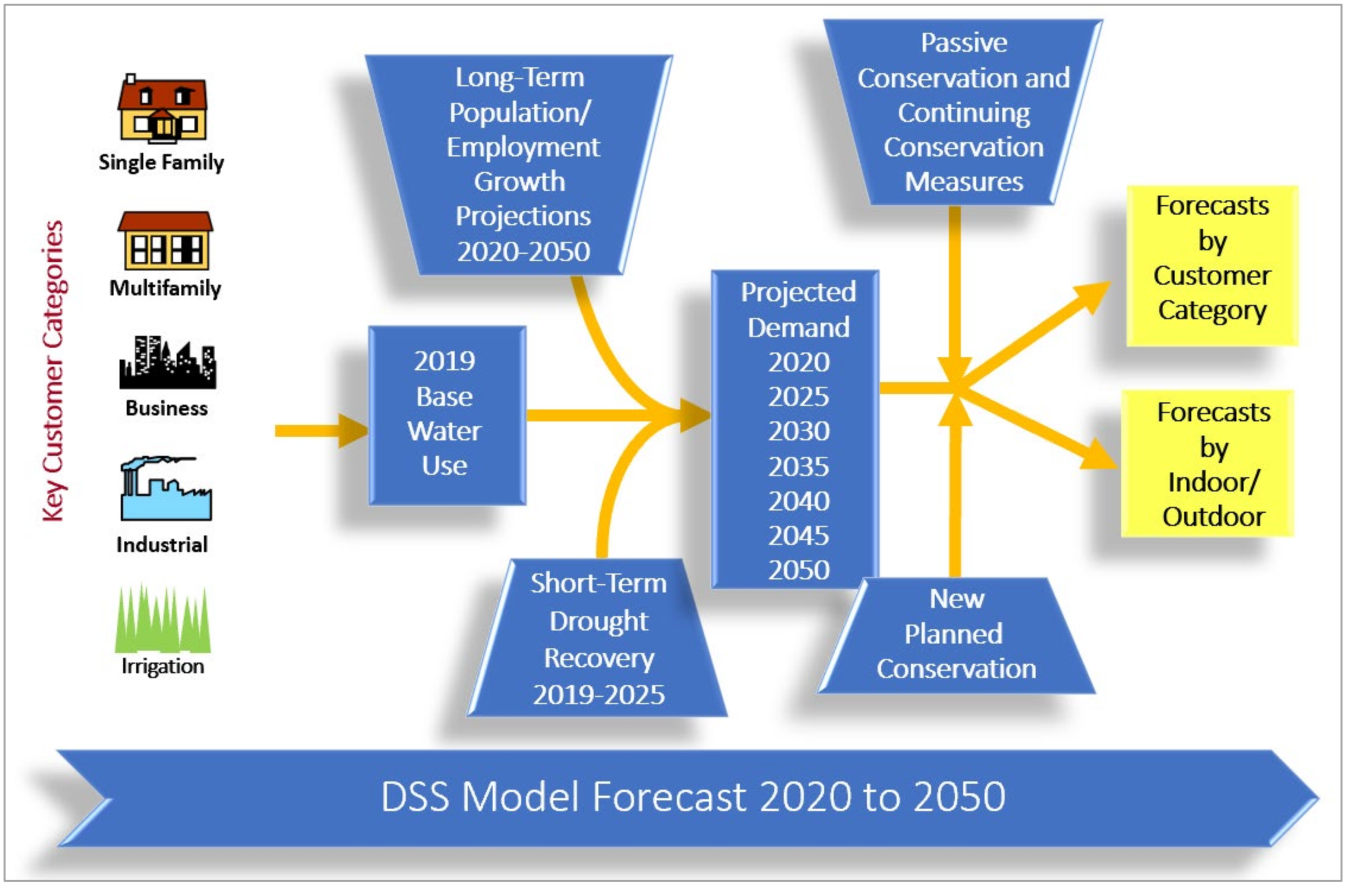
The California Water Efficiency Partnership, or CalWEP (formerly the CUWCC), has peer reviewed and endorsed the model since 2006. It is offered to all CalWEP members for use to estimate water demand, plumbing code, and conservation program savings. ACWD's model is a fully customized version of the DSS Model using service area-specific information.

The DSS Model can use one of the following: (1) a statistical approach to forecast demands (e.g., an econometric model); (2) a forecasted increase in population and employment; (3) predicted future demands; or (4) a demand projection entered into the model from an outside source.

For ACWD, baseline demand was developed based on an increase in residential population and employment based on the latest information from the Association of Bay Area Governments - Plan Bay Area 2050: Regional Growth Forecast, then ACWD staff used the Community Survey (Appendix G) to identify a drought rebound. The survey asked questions about customer landscape changes pre- and post-drought and this was converted into a projected return of 2.75 MGD over 5 years (2020-2025).

The following figure presents the flow of information in the DSS Model Analysis.

Figure B-4. **DSS Model Analysis Flow**



APPENDIX C – DSS MODEL DEMAND ASSUMPTIONS

This appendix presents the methodology used to determine the Alameda County Water District's passive water savings, information regarding national and state plumbing codes, and key inputs and assumptions used in the DSS Model including fixture replacement and estimates. Note: The DSS Model does not assess passive water savings for outdoor use. It focuses on plumbing code change impacts on indoor fixtures. However, ACWD intends to incorporate impacts of outdoor code changes, such as MWELO updates, into future analyses. Past actions that impact outdoor use were assessed through ACWD's Community Survey, which asked questions to identify changes over time to outdoor use based on the change out of turf for more water-efficient plants and the installation of efficient irrigation. This information was used to determine permanent savings from the last drought and to project post-drought demand rebound.

C.1 National Plumbing Code

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

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

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

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

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

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

OR

washer capacity (cubic ft.)/average tub volume

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

C.2 State Plumbing Code

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

C.2.1 California State Law – AB 715

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

C.2.2 California State Laws – SB 407 and SB 837

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

C.2.3 2019 CALGreen and 2015 CA Code of Regulations Title 20 Appliance Efficiency Regulations

Fixture characteristics in the DSS Model are tracked in new accounts, which are subject to the requirements of the 2019 California Green Building Code and 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the California Energy Commission (CEC) on September 1, 2015. The CEC 2015 appliance efficiency standards apply to the following new appliances, if they are sold in California: showerheads, lavatory faucets, kitchen faucets, metering faucets, replacement aerators, wash fountains, tub spout diverters, public lavatory faucets, commercial pre-rinse spray valves, urinals, and toilets. The DSS Model accounts for plumbing code savings due to the effects these standards have on showerheads, faucet aerators, urinals, toilets, and clothes washers.

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

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

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

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

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

C.3 Key Baseline Potable Demand Inputs, Passive Savings Assumptions, and Resources

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

Table C-1. List of Key Assumptions

Parameter	Model Input Value, Assumptions, and Key References
Model Start Year for Analysis	2020
Water Demand Factor Year (Base Year)	2019
Population Projection Source	Plan Bay Area 2050
Employment Projection Source	Plan Bay Area 2050
Avoided Cost of Water	$5,347/MG

Potable Water System Base Year Water Use Profile

Customer Categories	Start Year Accounts	Total Water Use Distribution	Demand Factors (gpd/account)	Indoor Use %	2019 Residential Indoor Water Use (GPCD)
Residential	74,129	45%	212	76%	51
Multifamily	4,274	19%	1,566	86%	47
Business	4,013	13%	1,123	84%	36
Industrial	1,190	6%	1,694	66%	29
Institutional and Other	736	4%	1,706	45%	N/A
Business Landscape	484	3%	2,099	0%	N/A
Multifamily Landscape	706	4%	2,144	0%	N/A
Industrial Landscape	354	2%	2,372	0%	N/A
Institutional and Other Landscape	992	3%	897	0%	N/A
Hydrant	393	0%	409	0%	N/A
Total/Avg	**87,271**	**100%**	**N/A**	**68%**	**N/A**

Table C-2. Key Assumptions Resources

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

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

C.3.1 Fixture Estimates

Determining the current level of efficient fixtures in a service area while evaluating the passive savings in the DSS Model is part of the standard process and is called "initial fixture proportions." As described earlier in Section 3, MWM reconciled water-efficient fixtures and devices installed within the Alameda County Water District service area and estimated the number of outstanding inefficient fixtures.

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

In 2014, the Water Research Foundation updated its 1999 Residential End Uses of Water Study (REUWS). Water utilities, industry regulators, and government planning agencies consider it the industry benchmark for single family home indoor water use. This Plan incorporates recent study results that reflect the change to the water use profile in residential homes including adoption of more water-efficient fixtures over the 15 years that transpired from 1999 to 2014. REUWS results were combined with ACWD historical rebate and billing data to enhance and verify assumptions made for all customer accounts, including saturation levels on the above-mentioned plumbing fixtures. A Community Survey that asked questions to reveal saturation levels of these same fixtures were incorporated into these estimations (see Appendix G).

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

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

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

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

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

APPENDIX D – DSS MODEL MEASURE ANALYSIS, METHODOLOGY, PERSPECTIVES, AND ASSUMPTIONS

This appendix presents an overview of the water reduction methodology, benefit-cost perspectives, present value analysis, and costs and savings assumptions for the measure analysis.

D.1 Water Reduction Methodology

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

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

The potential for error in market penetration goal estimates for each measure can be significant because the estimates are based on previous experience, chosen implementation methods, projected utility effort, and funds allocated to implement the measure. The potential error can be corrected through reevaluation of the measure as the implementation of the measure progresses. For example, if the market penetration required to achieve specific water savings turns out to be different than predicted, adjustments to the implementation efforts can be made. Larger rebates or additional promotions are often used to increase the market penetration. The process is iterative to reflect actual conditions and helps to ensure that market penetration and needed savings are achieved regardless of future variances between estimates and actual conditions.

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

ACWD is constantly examining when a measure might reach saturation. This is also important for assessing demand response limitations in terms drought response. Baseline surveys are the best approach to having the most accurate information on market saturation.

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

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

Present value analysis using present day dollars and a real discount rate of 2.4% is used to discount costs and benefits to the base year. From this analysis, benefit-cost ratios of each measure are computed. When measures are put together in strategies, the model is set up to avoid double counting savings from multiple measures that act on the same end use of water. For example, multiple measures in a strategy may target toilet replacements. The model includes assumptions to apportion water savings between the multiple measures.

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

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

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

The time value of money is explicitly considered. Typically, the costs to save water occur early in the planning period whereas the benefits usually extend to the end of the planning period. A long planning period of over 30 years is often used because costs and benefits that occur beyond these 30 years (beyond the year 2050 in this Plan) have very little influence on the total present value of the costs and benefits. The value of all future costs and benefits is discounted to the first year in the DSS Model (the base year) at the real interest rate of 2.4%. The DSS Model calculates this real interest rate, adjusting the current nominal interest rate (assumed to be approximately 5.47%) by the assumed rate of inflation (3.0%).

The formula to calculate the real interest rate is:

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

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

D.3 Measure Cost and Water Savings Assumptions

Appendix E presents more detail on the assumptions and inputs used in ACWD's DSS Model to evaluate each water use efficiency measure. Assumptions regarding the following variables were made for each measure:

- **Targeted Water User Group End Use** – Water user group (e.g., single family residential) and end use (e.g., indoor or outdoor water use).
- **Utility Unit Cost** – Cost of rebates, incentives, ACWD staff time, and contractors hired to implement measures. The assumed dollar values for the measure unit costs were closely reviewed by staff and are

found to be adequate for each individual measure. The values in most cases are in the range of what is currently offered by other water utilities in the region.

- **Retail Customer Unit Cost** – Cost for implementing measures that is paid by retail customers (i.e., the remainder of a measure's cost that is not covered by a utility rebate or incentive).
- **Utility Administration and Marketing Cost** – The cost to the utility for administering the measure, including consultant contract administration, marketing, and participant tracking. The mark-up is sufficient (in total) to cover water use efficiency team staff time, general expenses, and overhead, but does not include measure startup costs.

Costs are determined for each of the measures based on industry knowledge, past experience, and data provided by ACWD. Costs may include incentive costs, usually determined on a per-participant basis; fixed costs, such as marketing; variable costs, such as the cost to staff the measures and to obtain and maintain equipment. The set-up cost for measure design by staff or consultants, any required pilot testing, and preparation of materials that are used to market the measure are not included in the model because they vary greatly from measure to measure and are hard to capture. Measure costs are estimated each year through 2050. Costs are spread over the time period depending on the length of the implementation period for the measure and estimated voluntary customer participation levels.

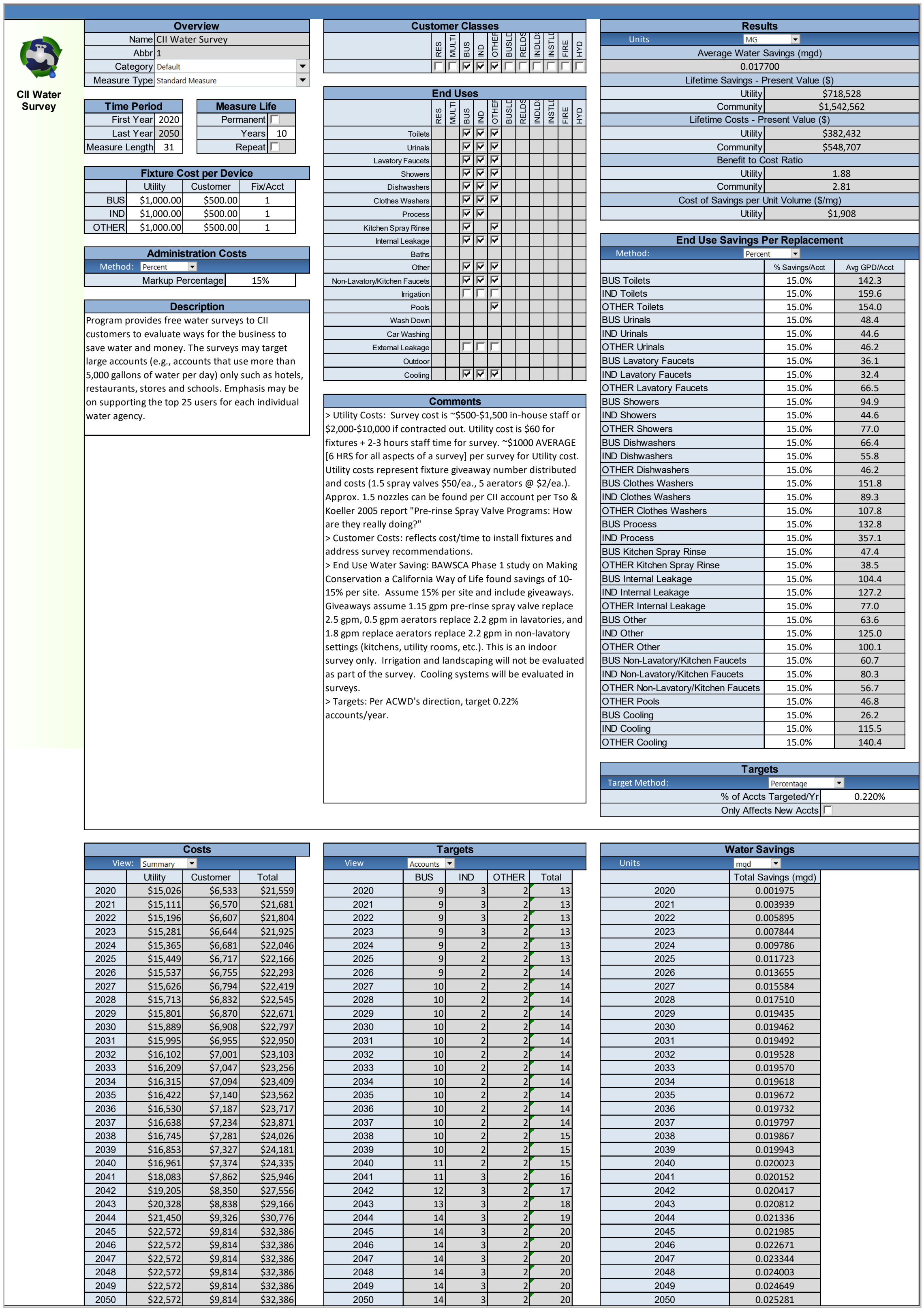
Lost revenue due to reduced water sales is not included as a cost because the water use efficiency measures evaluated herein generally take effect over a long span of time. This span is sufficient to enable timely rate adjustments, if necessary, to meet fixed cost obligations and savings on variable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

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

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

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

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



CII Water Survey

Overview

Name	CII Water Survey
Abbr	1
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2050
Measure Length	31

Measure Life

Permanent	☐
Years	10
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
BUS	$1,000.00	$500.00	1
IND	$1,000.00	$500.00	1
OTHER	$1,000.00	$500.00	1

Administration Costs

Method: Percent

Markup Percentage	15%

Description

Program provides free water surveys to CII customers to evaluate ways for the business to save water and money. The surveys may target large accounts (e.g., accounts that use more than 5,000 gallons of water per day) only such as hotels, restaurants, stores and schools. Emphasis may be on supporting the top 25 users for each individual water agency.

Customer Classes

RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
☐	☐	☑	☑	☑	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
Toilets			☑	☑	☑						
Urinals			☑	☑	☑						
Lavatory Faucets			☑	☑	☑						
Showers			☑	☑	☑						
Dishwashers			☑	☑	☑						
Clothes Washers			☑	☑	☑						
Process			☑	☑							
Kitchen Spray Rinse			☑		☑						
Internal Leakage			☑	☑	☑						
Baths											
Other			☑	☑	☑						
Non-Lavatory/Kitchen Faucets			☑	☑	☑						
Irrigation			☐	☐	☐						
Pools					☑						
Wash Down											
Car Washing											
External Leakage			☐	☐	☐						
Outdoor											
Cooling			☑	☑	☑						

Comments

> Utility Costs: Survey cost is ~$500-$1,500 in-house staff or $2,000-$10,000 if contracted out. Utility cost is $60 for fixtures + 2-3 hours staff time for survey. ~$1000 AVERAGE [6 HRS for all aspects of a survey] per survey for Utility cost. Utility costs represent fixture giveaway number distributed and costs (1.5 spray valves $50/ea., 5 aerators @ $2/ea.). Approx. 1.5 nozzles can be found per CII account per Tso & Koeller 2005 report "Pre-rinse Spray Valve Programs: How are they really doing?"
> Customer Costs: reflects cost/time to install fixtures and address survey recommendations.
> End Use Water Saving: BAWSCA Phase 1 study on Making Conservation a California Way of Life found savings of 10-15% per site. Assume 15% per site and include giveaways. Giveaways assume 1.15 gpm pre-rinse spray valve replace 2.5 gpm, 0.5 gpm aerators replace 2.2 gpm in lavatories, and 1.8 gpm replace aerators replace 2.2 gpm in non-lavatory settings (kitchens, utility rooms, etc.). This is an indoor survey only. Irrigation and landscaping will not be evaluated as part of the survey. Cooling systems will be evaluated in surveys.
> Targets: Per ACWD's direction, target 0.22% accounts/year.

Results

Units: MG

Average Water Savings (mgd)	
0.017700	
Lifetime Savings - Present Value ($)	
Utility	$718,528
Community	$1,542,562
Lifetime Costs - Present Value ($)	
Utility	$382,432
Community	$548,707
Benefit to Cost Ratio	
Utility	1.88
Community	2.81
Cost of Savings per Unit Volume ($/mg)	
Utility	$1,908

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
BUS Toilets	15.0%	142.3
IND Toilets	15.0%	159.6
OTHER Toilets	15.0%	154.0
BUS Urinals	15.0%	48.4
IND Urinals	15.0%	44.6
OTHER Urinals	15.0%	46.2
BUS Lavatory Faucets	15.0%	36.1
IND Lavatory Faucets	15.0%	32.4
OTHER Lavatory Faucets	15.0%	66.5
BUS Showers	15.0%	94.9
IND Showers	15.0%	44.6
OTHER Showers	15.0%	77.0
BUS Dishwashers	15.0%	66.4
IND Dishwashers	15.0%	55.8
OTHER Dishwashers	15.0%	46.2
BUS Clothes Washers	15.0%	151.8
IND Clothes Washers	15.0%	89.3
OTHER Clothes Washers	15.0%	107.8
BUS Process	15.0%	132.8
IND Process	15.0%	357.1
BUS Kitchen Spray Rinse	15.0%	47.4
OTHER Kitchen Spray Rinse	15.0%	38.5
BUS Internal Leakage	15.0%	104.4
IND Internal Leakage	15.0%	127.2
OTHER Internal Leakage	15.0%	77.0
BUS Other	15.0%	63.6
IND Other	15.0%	125.0
OTHER Other	15.0%	100.1
BUS Non-Lavatory/Kitchen Faucets	15.0%	60.7
IND Non-Lavatory/Kitchen Faucets	15.0%	80.3
OTHER Non-Lavatory/Kitchen Faucets	15.0%	56.7
OTHER Pools	15.0%	46.8
BUS Cooling	15.0%	26.2
IND Cooling	15.0%	115.5
OTHER Cooling	15.0%	140.4

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.220%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$15,026	$6,533	$21,559
2021	$15,111	$6,570	$21,681
2022	$15,196	$6,607	$21,804
2023	$15,281	$6,644	$21,925
2024	$15,365	$6,681	$22,046
2025	$15,449	$6,717	$22,166
2026	$15,537	$6,755	$22,293
2027	$15,626	$6,794	$22,419
2028	$15,713	$6,832	$22,545
2029	$15,801	$6,870	$22,671
2030	$15,889	$6,908	$22,797
2031	$15,995	$6,955	$22,950
2032	$16,102	$7,001	$23,103
2033	$16,209	$7,047	$23,256
2034	$16,315	$7,094	$23,409
2035	$16,422	$7,140	$23,562
2036	$16,530	$7,187	$23,717
2037	$16,638	$7,234	$23,871
2038	$16,745	$7,281	$24,026
2039	$16,853	$7,327	$24,181
2040	$16,961	$7,374	$24,335
2041	$18,083	$7,862	$25,946
2042	$19,205	$8,350	$27,556
2043	$20,328	$8,838	$29,166
2044	$21,450	$9,326	$30,776
2045	$22,572	$9,814	$32,386
2046	$22,572	$9,814	$32,386
2047	$22,572	$9,814	$32,386
2048	$22,572	$9,814	$32,386
2049	$22,572	$9,814	$32,386
2050	$22,572	$9,814	$32,386

Targets

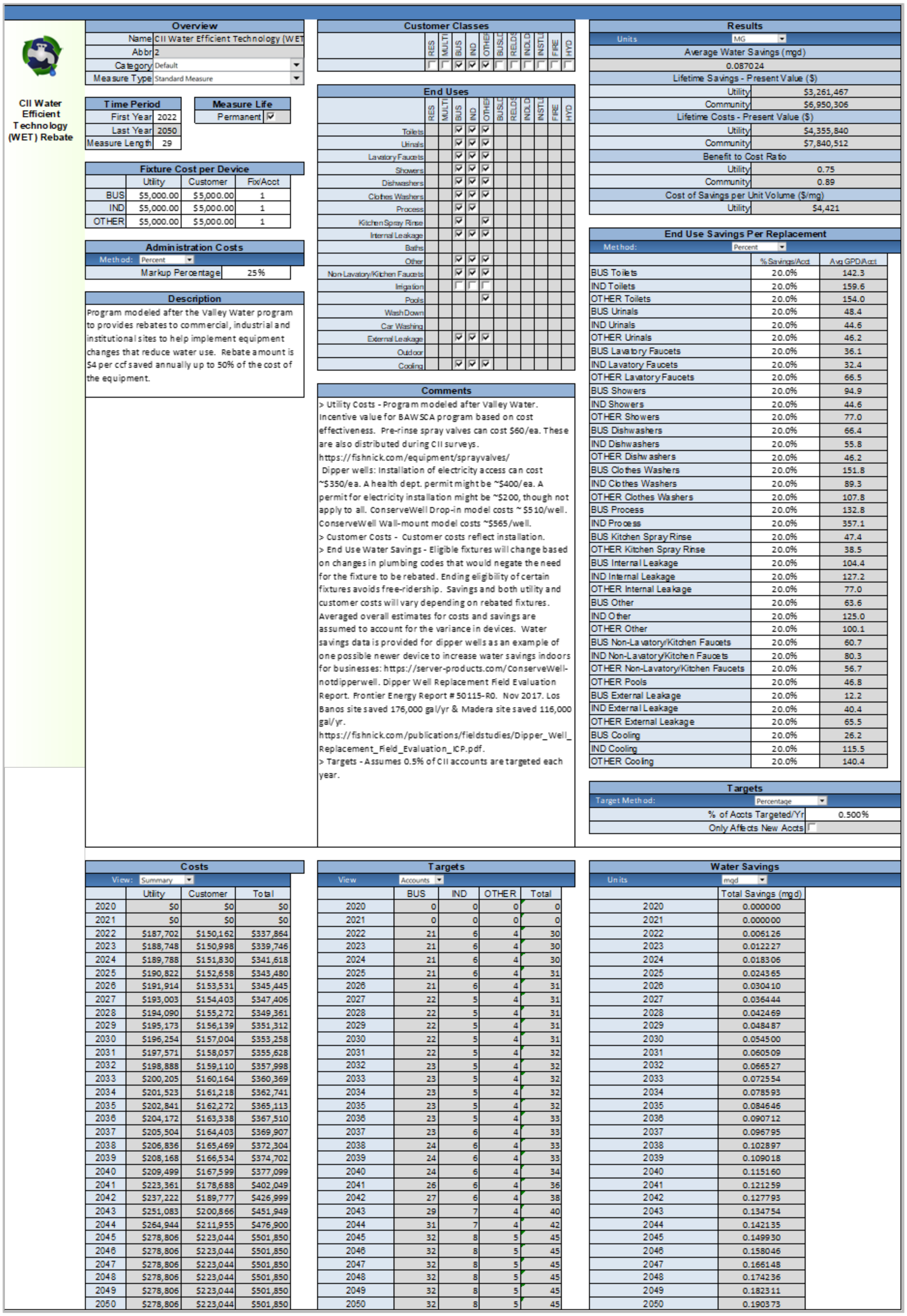
View: Accounts

	BUS	IND	OTHER	Total
2020	9	3	2	13
2021	9	3	2	13
2022	9	3	2	13
2023	9	3	2	13
2024	9	2	2	13
2025	9	2	2	13
2026	9	2	2	14
2027	10	2	2	14
2028	10	2	2	14
2029	10	2	2	14
2030	10	2	2	14
2031	10	2	2	14
2032	10	2	2	14
2033	10	2	2	14
2034	10	2	2	14
2035	10	2	2	14
2036	10	2	2	14
2037	10	2	2	14
2038	10	2	2	15
2039	10	2	2	15
2040	11	2	2	15
2041	11	3	2	16
2042	12	3	2	17
2043	13	3	2	18
2044	14	3	2	19
2045	14	3	2	20
2046	14	3	2	20
2047	14	3	2	20
2048	14	3	2	20
2049	14	3	2	20
2050	14	3	2	20

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.001975
2021	0.003939
2022	0.005895
2023	0.007844
2024	0.009786
2025	0.011723
2026	0.013655
2027	0.015584
2028	0.017510
2029	0.019435
2030	0.019462
2031	0.019492
2032	0.019528
2033	0.019570
2034	0.019618
2035	0.019672
2036	0.019732
2037	0.019797
2038	0.019867
2039	0.019943
2040	0.020023
2041	0.020152
2042	0.020417
2043	0.020812
2044	0.021336
2045	0.021985
2046	0.022671
2047	0.023344
2048	0.024003
2049	0.024649
2050	0.025281



CII Water Efficient Technology (WET) Rebate

Overview

Name	CII Water Efficient Technology (WET
Abbr	2
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2022
Last Year	2050
Measure Length	29

Measure Life

Permanent ☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
BUS	$5,000.00	$5,000.00	1
IND	$5,000.00	$5,000.00	1
OTHER	$5,000.00	$5,000.00	1

Administration Costs

Method: Percent

Markup Percentage	25%

Description

Program modeled after the Valley Water program to provides rebates to commercial, industrial and institutional sites to help implement equipment changes that reduce water use. Rebate amount is $4 per ccf saved annually up to 50% of the cost of the equipment.

Customer Classes

RES	MULTI	BUS	IND	OTHEF	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
☐	☐	☑	☑	☑	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHEF	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
Toilets			☑	☑	☑						
Urinals			☑	☑	☑						
Lavatory Faucets			☑	☑	☑						
Showers			☑	☑	☑						
Dishwashers			☑	☑	☑						
Clothes Washers			☑	☑	☑						
Process			☑	☑							
Kitchen Spray Rinse			☑		☑						
Internal Leakage			☑	☑	☑						
Baths											
Other			☑	☑	☑						
Non-Lavatory/Kitchen Faucets			☑	☑	☑						
Irrigation			☐	☐	☐						
Pools					☑						
Wash Down											
Car Washing											
External Leakage			☑	☑	☑						
Outdoor											
Cooling			☑	☑	☑						

Comments

> Utility Costs - Program modeled after Valley Water. Incentive value for BAWSCA program based on cost effectiveness. Pre-rinse spray valves can cost $60/ea. These are also distributed during CII surveys. https://fishnick.com/equipment/sprayvalves/
 Dipper wells: Installation of electricity access can cost ~$350/ea. A health dept. permit might be ~$400/ea. A permit for electricity installation might be ~$200, though not apply to all. ConserveWell Drop-in model costs ~ $510/well. ConserveWell Wall-mount model costs ~$565/well.
> Customer Costs - Customer costs reflect installation.
> End Use Water Savings - Eligible fixtures will change based on changes in plumbing codes that would negate the need for the fixture to be rebated. Ending eligibility of certain fixtures avoids free-ridership. Savings and both utility and customer costs will vary depending on rebated fixtures. Averaged overall estimates for costs and savings are assumed to account for the variance in devices. Water savings data is provided for dipper wells as an example of one possible newer device to increase water savings indoors for businesses: https://server-products.com/ConserveWell-notdipperwell. Dipper Well Replacement Field Evaluation Report. Frontier Energy Report # 50115-R0. Nov 2017. Los Banos site saved 176,000 gal/yr & Madera site saved 116,000 gal/yr.
https://fishnick.com/publications/fieldstudies/Dipper_Well_Replacement_Field_Evaluation_ICP.pdf.
> Targets - Assumes 0.5% of CII accounts are targeted each year.

Results

Units: MG

Average Water Savings (mgd)	
	0.087024
Lifetime Savings - Present Value ($)	
Utility	$3,261,467
Community	$6,950,306
Lifetime Costs - Present Value ($)	
Utility	$4,355,840
Community	$7,840,512
Benefit to Cost Ratio	
Utility	0.75
Community	0.89
Cost of Savings per Unit Volume ($/mg)	
Utility	$4,421

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
BUS Toilets	20.0%	142.3
IND Toilets	20.0%	159.6
OTHER Toilets	20.0%	154.0
BUS Urinals	20.0%	48.4
IND Urinals	20.0%	44.6
OTHER Urinals	20.0%	46.2
BUS Lavatory Faucets	20.0%	36.1
IND Lavatory Faucets	20.0%	32.4
OTHER Lavatory Faucets	20.0%	66.5
BUS Showers	20.0%	94.9
IND Showers	20.0%	44.6
OTHER Showers	20.0%	77.0
BUS Dishwashers	20.0%	66.4
IND Dishwashers	20.0%	55.8
OTHER Dishwashers	20.0%	46.2
BUS Clothes Washers	20.0%	151.8
IND Clothes Washers	20.0%	89.3
OTHER Clothes Washers	20.0%	107.8
BUS Process	20.0%	132.8
IND Process	20.0%	357.1
BUS Kitchen Spray Rinse	20.0%	47.4
OTHER Kitchen Spray Rinse	20.0%	38.5
BUS Internal Leakage	20.0%	104.4
IND Internal Leakage	20.0%	127.2
OTHER Internal Leakage	20.0%	77.0
BUS Other	20.0%	63.6
IND Other	20.0%	125.0
OTHER Other	20.0%	100.1
BUS Non-Lavatory/Kitchen Faucets	20.0%	60.7
IND Non-Lavatory/Kitchen Faucets	20.0%	80.3
OTHER Non-Lavatory/Kitchen Faucets	20.0%	56.7
OTHER Pools	20.0%	46.8
BUS External Leakage	20.0%	12.2
IND External Leakage	20.0%	40.4
OTHER External Leakage	20.0%	65.5
BUS Cooling	20.0%	26.2
IND Cooling	20.0%	115.5
OTHER Cooling	20.0%	140.4

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.500%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$0	$0	$0
2022	$187,702	$150,162	$337,864
2023	$188,748	$150,998	$339,746
2024	$189,788	$151,830	$341,618
2025	$190,822	$152,658	$343,480
2026	$191,914	$153,531	$345,445
2027	$193,003	$154,403	$347,406
2028	$194,090	$155,272	$349,361
2029	$195,173	$156,139	$351,312
2030	$196,254	$157,004	$353,258
2031	$197,571	$158,057	$355,628
2032	$198,888	$159,110	$357,998
2033	$200,205	$160,164	$360,369
2034	$201,523	$161,218	$362,741
2035	$202,841	$162,272	$365,113
2036	$204,172	$163,338	$367,510
2037	$205,504	$164,403	$369,907
2038	$206,836	$165,469	$372,304
2039	$208,168	$166,534	$374,702
2040	$209,499	$167,599	$377,099
2041	$223,361	$178,688	$402,049
2042	$237,222	$189,777	$426,999
2043	$251,083	$200,866	$451,949
2044	$264,944	$211,955	$476,900
2045	$278,806	$223,044	$501,850
2046	$278,806	$223,044	$501,850
2047	$278,806	$223,044	$501,850
2048	$278,806	$223,044	$501,850
2049	$278,806	$223,044	$501,850
2050	$278,806	$223,044	$501,850

Targets

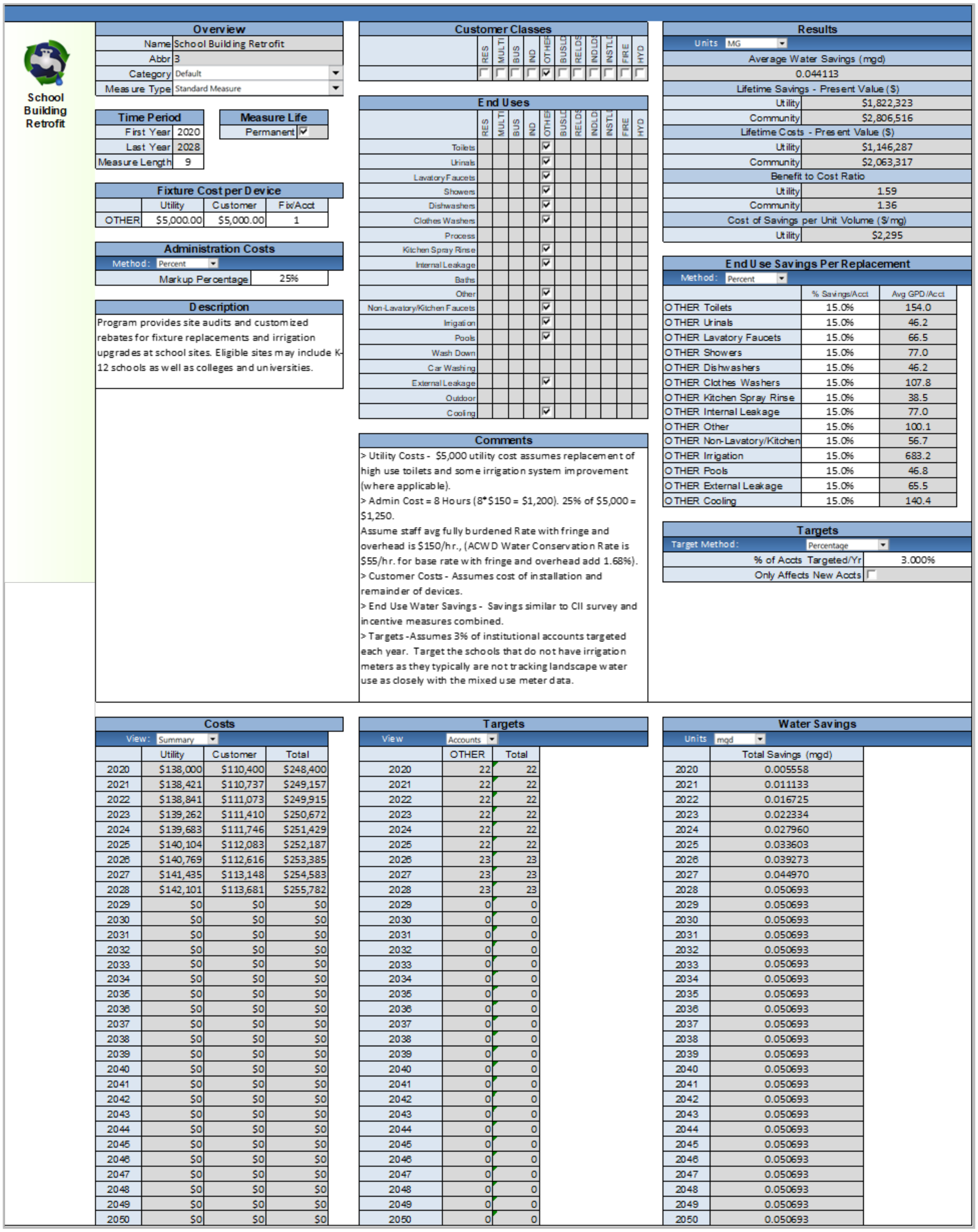
View: Accounts

	BUS	IND	OTHER	Total
2020	0	0	0	0
2021	0	0	0	0
2022	21	6	4	30
2023	21	6	4	30
2024	21	6	4	30
2025	21	6	4	31
2026	21	6	4	31
2027	22	5	4	31
2028	22	5	4	31
2029	22	5	4	31
2030	22	5	4	31
2031	22	5	4	32
2032	23	5	4	32
2033	23	5	4	32
2034	23	5	4	32
2035	23	5	4	32
2036	23	5	4	33
2037	23	6	4	33
2038	24	6	4	33
2039	24	6	4	33
2040	24	6	4	34
2041	26	6	4	36
2042	27	6	4	38
2043	29	7	4	40
2044	31	7	4	42
2045	32	8	5	45
2046	32	8	5	45
2047	32	8	5	45
2048	32	8	5	45
2049	32	8	5	45
2050	32	8	5	45

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.006126
2023	0.012227
2024	0.018306
2025	0.024365
2026	0.030410
2027	0.036444
2028	0.042469
2029	0.048487
2030	0.054500
2031	0.060509
2032	0.066527
2033	0.072554
2034	0.078593
2035	0.084646
2036	0.090712
2037	0.096795
2038	0.102897
2039	0.109018
2040	0.115160
2041	0.121259
2042	0.127793
2043	0.134754
2044	0.142135
2045	0.149930
2046	0.158046
2047	0.166148
2048	0.174236
2049	0.182311
2050	0.190373



School Building Retrofit

Overview

Name	School Building Retrofit
Abbr	3
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2028
Measure Length	9

Measure Life

Permanent ☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
OTHER	$5,000.00	$5,000.00	1

Administration Costs

Method: Percent

Markup Percentage	25%

Description

Program provides site audits and customized rebates for fixture replacements and irrigation upgrades at school sites. Eligible sites may include K-12 schools as well as colleges and universities.

Customer Classes

RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
☐	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
Toilets					☑						
Urinals					☑						
Lavatory Faucets					☑						
Showers					☑						
Dishwashers					☑						
Clothes Washers					☑						
Process											
Kitchen Spray Rinse					☑						
Internal Leakage					☑						
Baths											
Other					☑						
Non-Lavatory/Kitchen Faucets					☑						
Irrigation					☑						
Pools					☑						
Wash Down											
Car Washing											
External Leakage					☑						
Outdoor											
Cooling					☑						

Comments

> Utility Costs - $5,000 utility cost assumes replacement of high use toilets and some irrigation system improvement (where applicable).

> Admin Cost = 8 Hours (8*$150 = $1,200). 25% of $5,000 = $1,250.

Assume staff avg fully burdened Rate with fringe and overhead is $150/hr., (ACWD Water Conservation Rate is $55/hr. for base rate with fringe and overhead add 1.68%).

> Customer Costs - Assumes cost of installation and remainder of devices.

> End Use Water Savings - Savings similar to CII survey and incentive measures combined.

> Targets -Assumes 3% of institutional accounts targeted each year. Target the schools that do not have irrigation meters as they typically are not tracking landscape water use as closely with the mixed use meter data.

Results

Units MG

Average Water Savings (mgd)	
0.044113	
Lifetime Savings - Present Value ($)	
Utility	$1,822,323
Community	$2,806,516
Lifetime Costs - Present Value ($)	
Utility	$1,146,287
Community	$2,063,317
Benefit to Cost Ratio	
Utility	1.59
Community	1.36
Cost of Savings per Unit Volume ($/mg)	
Utility	$2,295

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
OTHER Toilets	15.0%	154.0
OTHER Urinals	15.0%	46.2
OTHER Lavatory Faucets	15.0%	66.5
OTHER Showers	15.0%	77.0
OTHER Dishwashers	15.0%	46.2
OTHER Clothes Washers	15.0%	107.8
OTHER Kitchen Spray Rinse	15.0%	38.5
OTHER Internal Leakage	15.0%	77.0
OTHER Other	15.0%	100.1
OTHER Non-Lavatory/Kitchen	15.0%	56.7
OTHER Irrigation	15.0%	683.2
OTHER Pools	15.0%	46.8
OTHER External Leakage	15.0%	65.5
OTHER Cooling	15.0%	140.4

Targets

Target Method: Percentage

% of Accts Targeted/Yr	3.000%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$138,000	$110,400	$248,400
2021	$138,421	$110,737	$249,157
2022	$138,841	$111,073	$249,915
2023	$139,262	$111,410	$250,672
2024	$139,683	$111,746	$251,429
2025	$140,104	$112,083	$252,187
2026	$140,769	$112,616	$253,385
2027	$141,435	$113,148	$254,583
2028	$142,101	$113,681	$255,782
2029	$0	$0	$0
2030	$0	$0	$0
2031	$0	$0	$0
2032	$0	$0	$0
2033	$0	$0	$0
2034	$0	$0	$0
2035	$0	$0	$0
2036	$0	$0	$0
2037	$0	$0	$0
2038	$0	$0	$0
2039	$0	$0	$0
2040	$0	$0	$0
2041	$0	$0	$0
2042	$0	$0	$0
2043	$0	$0	$0
2044	$0	$0	$0
2045	$0	$0	$0
2046	$0	$0	$0
2047	$0	$0	$0
2048	$0	$0	$0
2049	$0	$0	$0
2050	$0	$0	$0

Targets

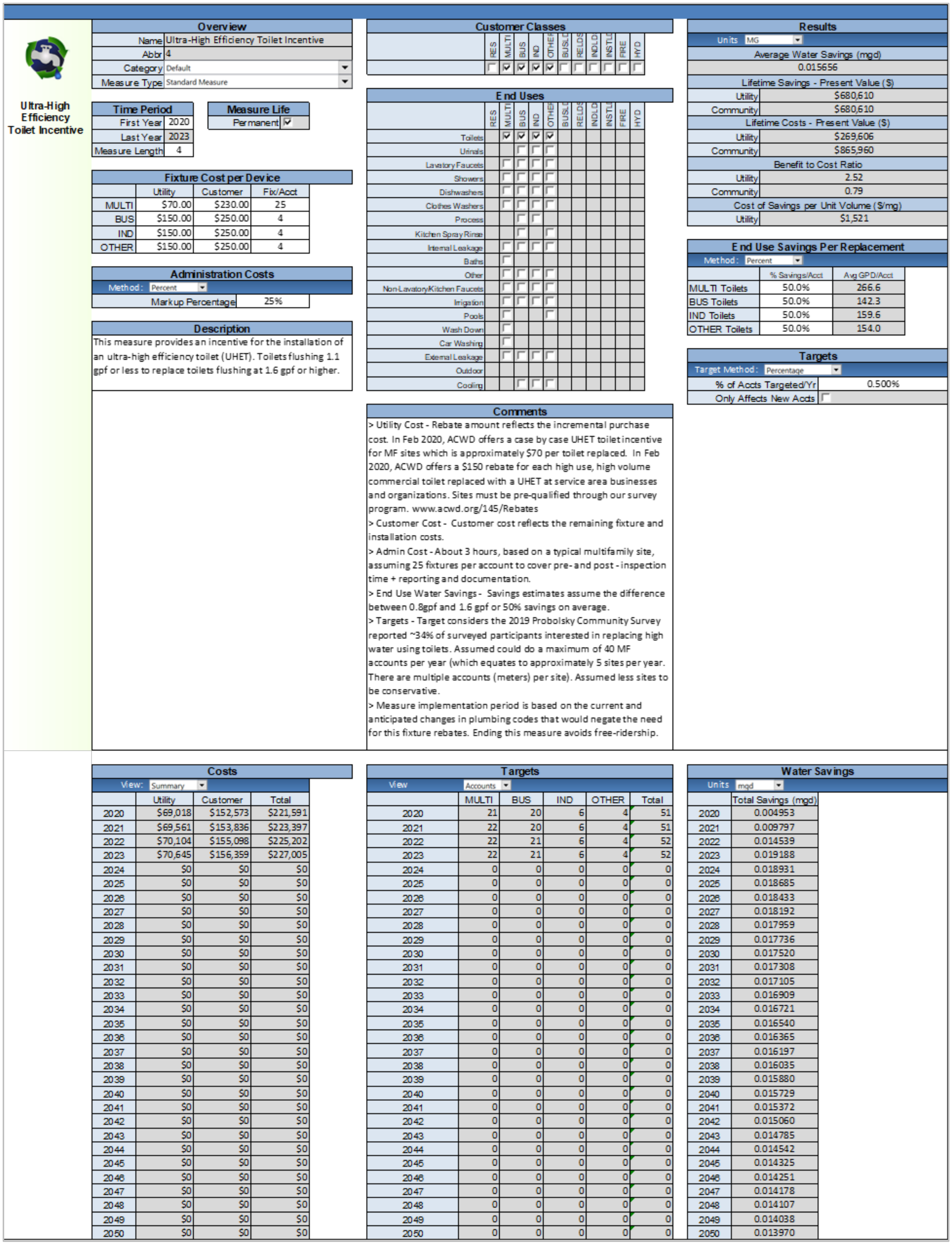
View Accounts

	OTHER	Total
2020	22	22
2021	22	22
2022	22	22
2023	22	22
2024	22	22
2025	22	22
2026	23	23
2027	23	23
2028	23	23
2029	0	0
2030	0	0
2031	0	0
2032	0	0
2033	0	0
2034	0	0
2035	0	0
2036	0	0
2037	0	0
2038	0	0
2039	0	0
2040	0	0
2041	0	0
2042	0	0
2043	0	0
2044	0	0
2045	0	0
2046	0	0
2047	0	0
2048	0	0
2049	0	0
2050	0	0

Water Savings

Units mgd

	Total Savings (mgd)
2020	0.005558
2021	0.011133
2022	0.016725
2023	0.022334
2024	0.027960
2025	0.033603
2026	0.039273
2027	0.044970
2028	0.050693
2029	0.050693
2030	0.050693
2031	0.050693
2032	0.050693
2033	0.050693
2034	0.050693
2035	0.050693
2036	0.050693
2037	0.050693
2038	0.050693
2039	0.050693
2040	0.050693
2041	0.050693
2042	0.050693
2043	0.050693
2044	0.050693
2045	0.050693
2046	0.050693
2047	0.050693
2048	0.050693
2049	0.050693
2050	0.050693



Ultra-High Efficiency Toilet Incentive

Overview

Name	Ultra-High Efficiency Toilet Incentive
Abbr	4
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2023
Measure Length	4

Measure Life

Permanent ☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
MULTI	$70.00	$230.00	25
BUS	$150.00	$250.00	4
IND	$150.00	$250.00	4
OTHER	$150.00	$250.00	4

Administration Costs

Method: Percent

Markup Percentage 25%

Description

This measure provides an incentive for the installation of an ultra-high efficiency toilet (UHET). Toilets flushing 1.1 gpf or less to replace toilets flushing at 1.6 gpf or higher.

Customer Classes

RES	MULTI	BUS	IND	OTHE	BUSL	RELDS	INDLD	INSTL	FIRE	HYD
☐	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHE	BUSL	RELDS	INDLD	INSTL	FIRE	HYD
Toilets		☑	☑	☑	☑						
Urinals			☐	☐	☐						
Lavatory Faucets		☐	☐	☐	☐						
Showers		☐	☐	☐	☐						
Dishwashers		☐	☐	☐	☐						
Clothes Washers		☐	☐	☐	☐						
Process			☐	☐							
Kitchen Spray Rinse			☐		☐						
Internal Leakage		☐	☐	☐	☐						
Baths		☐									
Other		☐	☐	☐	☐						
Non-Lavatory/Kitchen Faucets		☐	☐	☐	☐						
Irrigation		☐	☐	☐	☐						
Pools		☐			☐						
Wash Down		☐									
Car Washing		☐									
External Leakage		☐	☐	☐	☐						
Outdoor											
Cooling			☐	☐	☐						

Comments

> Utility Cost - Rebate amount reflects the incremental purchase cost. In Feb 2020, ACWD offers a case by case UHET toilet incentive for MF sites which is approximately $70 per toilet replaced. In Feb 2020, ACWD offers a $150 rebate for each high use, high volume commercial toilet replaced with a UHET at service area businesses and organizations. Sites must be pre-qualified through our survey program. www.acwd.org/145/Rebates

> Customer Cost - Customer cost reflects the remaining fixture and installation costs.

> Admin Cost - About 3 hours, based on a typical multifamily site, assuming 25 fixtures per account to cover pre- and post - inspection time + reporting and documentation.

> End Use Water Savings - Savings estimates assume the difference between 0.8gpf and 1.6 gpf or 50% savings on average.

> Targets - Target considers the 2019 Probolsky Community Survey reported ~34% of surveyed participants interested in replacing high water using toilets. Assumed could do a maximum of 40 MF accounts per year (which equates to approximately 5 sites per year. There are multiple accounts (meters) per site). Assumed less sites to be conservative.

> Measure implementation period is based on the current and anticipated changes in plumbing codes that would negate the need for this fixture rebates. Ending this measure avoids free-ridership.

Results

Units MG

Average Water Savings (mgd)	
	0.015656
Lifetime Savings - Present Value ($)	
Utility	$680,610
Community	$680,610
Lifetime Costs - Present Value ($)	
Utility	$269,606
Community	$865,960
Benefit to Cost Ratio	
Utility	2.52
Community	0.79
Cost of Savings per Unit Volume ($/mg)	
Utility	$1,521

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
MULTI Toilets	50.0%	266.6
BUS Toilets	50.0%	142.3
IND Toilets	50.0%	159.6
OTHER Toilets	50.0%	154.0

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.500%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$69,018	$152,573	$221,591
2021	$69,561	$153,836	$223,397
2022	$70,104	$155,098	$225,202
2023	$70,645	$156,359	$227,005
2024	$0	$0	$0
2025	$0	$0	$0
2026	$0	$0	$0
2027	$0	$0	$0
2028	$0	$0	$0
2029	$0	$0	$0
2030	$0	$0	$0
2031	$0	$0	$0
2032	$0	$0	$0
2033	$0	$0	$0
2034	$0	$0	$0
2035	$0	$0	$0
2036	$0	$0	$0
2037	$0	$0	$0
2038	$0	$0	$0
2039	$0	$0	$0
2040	$0	$0	$0
2041	$0	$0	$0
2042	$0	$0	$0
2043	$0	$0	$0
2044	$0	$0	$0
2045	$0	$0	$0
2046	$0	$0	$0
2047	$0	$0	$0
2048	$0	$0	$0
2049	$0	$0	$0
2050	$0	$0	$0

Targets

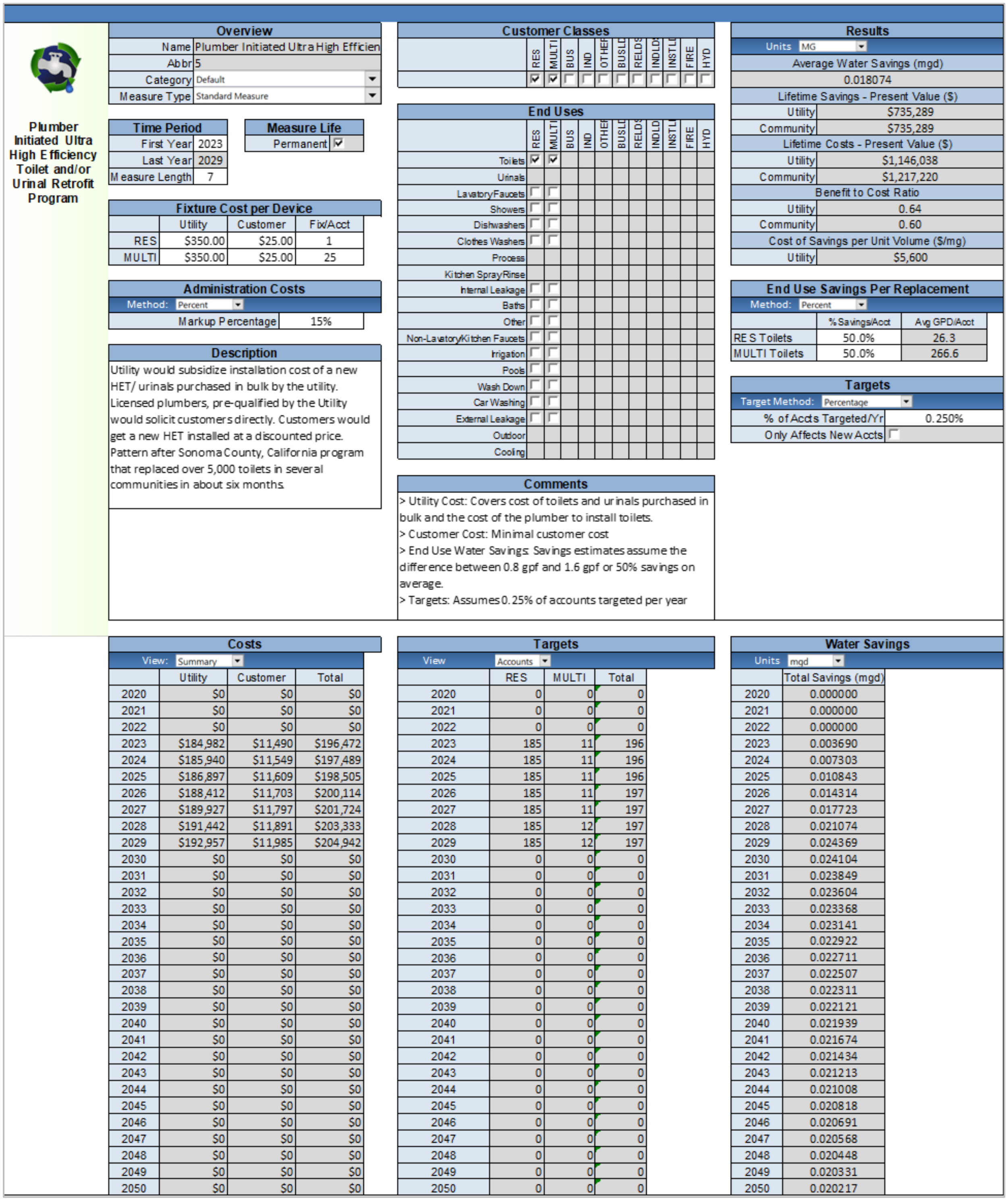
View Accounts

	MULTI	BUS	IND	OTHER	Total
2020	21	20	6	4	51
2021	22	20	6	4	51
2022	22	21	6	4	52
2023	22	21	6	4	52
2024	0	0	0	0	0
2025	0	0	0	0	0
2026	0	0	0	0	0
2027	0	0	0	0	0
2028	0	0	0	0	0
2029	0	0	0	0	0
2030	0	0	0	0	0
2031	0	0	0	0	0
2032	0	0	0	0	0
2033	0	0	0	0	0
2034	0	0	0	0	0
2035	0	0	0	0	0
2036	0	0	0	0	0
2037	0	0	0	0	0
2038	0	0	0	0	0
2039	0	0	0	0	0
2040	0	0	0	0	0
2041	0	0	0	0	0
2042	0	0	0	0	0
2043	0	0	0	0	0
2044	0	0	0	0	0
2045	0	0	0	0	0
2046	0	0	0	0	0
2047	0	0	0	0	0
2048	0	0	0	0	0
2049	0	0	0	0	0
2050	0	0	0	0	0

Water Savings

Units mgd

	Total Savings (mgd)
2020	0.004953
2021	0.009797
2022	0.014539
2023	0.019188
2024	0.018931
2025	0.018685
2026	0.018433
2027	0.018192
2028	0.017959
2029	0.017736
2030	0.017520
2031	0.017308
2032	0.017105
2033	0.016909
2034	0.016721
2035	0.016540
2036	0.016365
2037	0.016197
2038	0.016035
2039	0.015880
2040	0.015729
2041	0.015372
2042	0.015060
2043	0.014785
2044	0.014542
2045	0.014325
2046	0.014251
2047	0.014178
2048	0.014107
2049	0.014038
2050	0.013970



Plumber Initiated Ultra High Efficiency Toilet and/or Urinal Retrofit Program

Overview

Name	Plumber Initiated Ultra High Efficien
Abbr	5
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2023
Last Year	2029
Measure Length	7

Measure Life

Permanent ☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$350.00	$25.00	1
MULTI	$350.00	$25.00	25

Administration Costs

Method: Percent

Markup Percentage	15%

Description

Utility would subsidize installation cost of a new HET/ urinals purchased in bulk by the utility. Licensed plumbers, pre-qualified by the Utility would solicit customers directly. Customers would get a new HET installed at a discounted price. Pattern after Sonoma County, California program that replaced over 5,000 toilets in several communities in about six months.

Customer Classes

RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
Toilets	☑	☑									
Urinals											
LavatoryFaucets	☐	☐									
Showers	☐	☐									
Dishwashers	☐	☐									
Clothes Washers	☐	☐									
Process											
Kitchen SprayRinse											
Internal Leakage	☐	☐									
Baths	☐	☐									
Other	☐	☐									
Non-Lavatory/Kitchen Faucets	☐	☐									
Irrigation	☐	☐									
Pools	☐	☐									
Wash Down	☐	☐									
Car Washing	☐	☐									
External Leakage	☐	☐									
Outdoor											
Cooling											

Comments

> Utility Cost: Covers cost of toilets and urinals purchased in bulk and the cost of the plumber to install toilets.
> Customer Cost: Minimal customer cost
> End Use Water Savings: Savings estimates assume the difference between 0.8 gpf and 1.6 gpf or 50% savings on average.
> Targets: Assumes 0.25% of accounts targeted per year

Results

Units: MG

Average Water Savings (mgd)	
	0.018074
Lifetime Savings - Present Value ($)	
Utility	$735,289
Community	$735,289
Lifetime Costs - Present Value ($)	
Utility	$1,146,038
Community	$1,217,220
Benefit to Cost Ratio	
Utility	0.64
Community	0.60
Cost of Savings per Unit Volume ($/mg)	
Utility	$5,600

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Toilets	50.0%	26.3
MULTI Toilets	50.0%	266.6

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.250%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$0	$0	$0
2022	$0	$0	$0
2023	$184,982	$11,490	$196,472
2024	$185,940	$11,549	$197,489
2025	$186,897	$11,609	$198,505
2026	$188,412	$11,703	$200,114
2027	$189,927	$11,797	$201,724
2028	$191,442	$11,891	$203,333
2029	$192,957	$11,985	$204,942
2030	$0	$0	$0
2031	$0	$0	$0
2032	$0	$0	$0
2033	$0	$0	$0
2034	$0	$0	$0
2035	$0	$0	$0
2036	$0	$0	$0
2037	$0	$0	$0
2038	$0	$0	$0
2039	$0	$0	$0
2040	$0	$0	$0
2041	$0	$0	$0
2042	$0	$0	$0
2043	$0	$0	$0
2044	$0	$0	$0
2045	$0	$0	$0
2046	$0	$0	$0
2047	$0	$0	$0
2048	$0	$0	$0
2049	$0	$0	$0
2050	$0	$0	$0

Targets

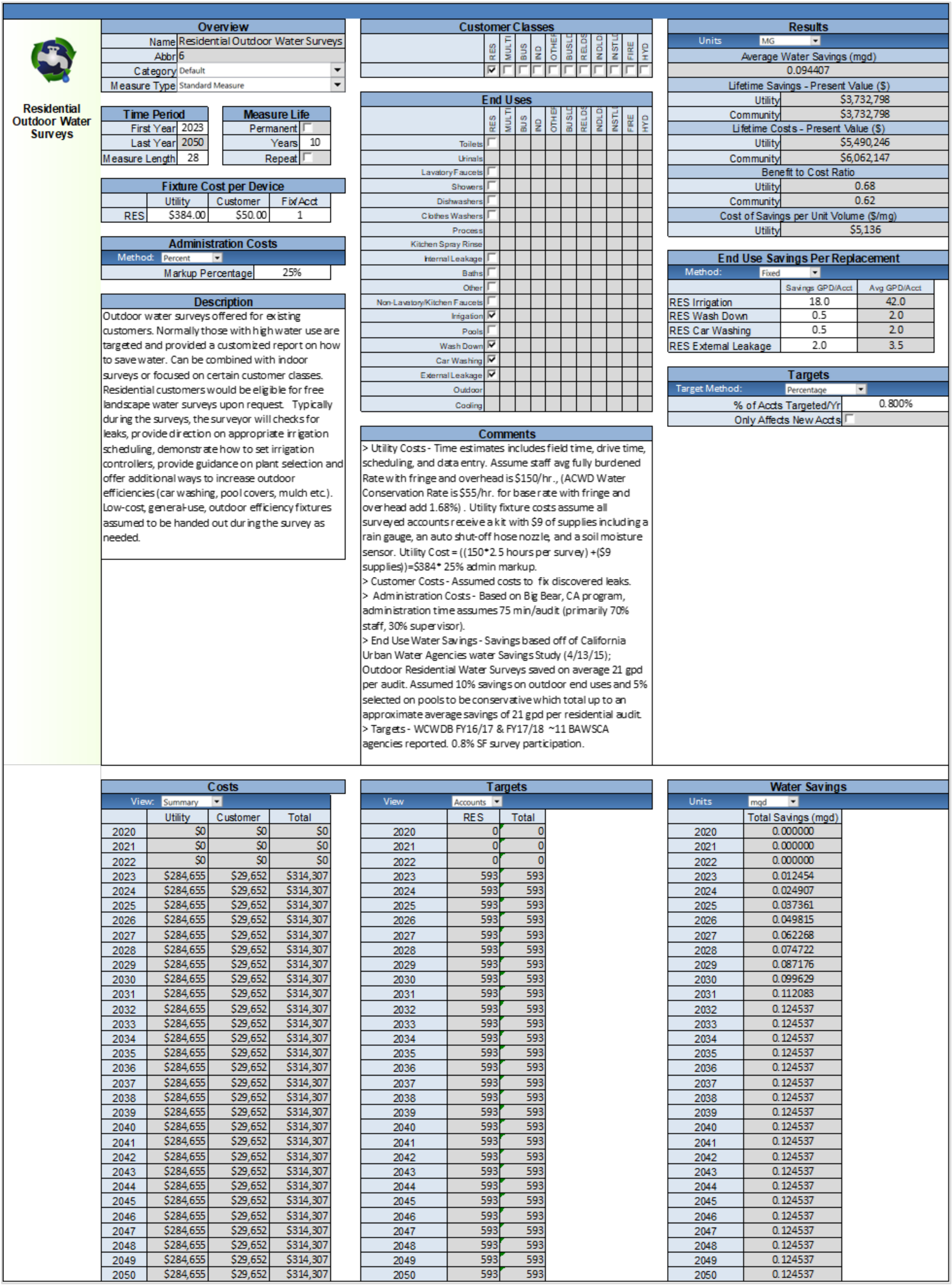
View: Accounts

	RES	MULTI	Total
2020	0	0	0
2021	0	0	0
2022	0	0	0
2023	185	11	196
2024	185	11	196
2025	185	11	196
2026	185	11	197
2027	185	11	197
2028	185	12	197
2029	185	12	197
2030	0	0	0
2031	0	0	0
2032	0	0	0
2033	0	0	0
2034	0	0	0
2035	0	0	0
2036	0	0	0
2037	0	0	0
2038	0	0	0
2039	0	0	0
2040	0	0	0
2041	0	0	0
2042	0	0	0
2043	0	0	0
2044	0	0	0
2045	0	0	0
2046	0	0	0
2047	0	0	0
2048	0	0	0
2049	0	0	0
2050	0	0	0

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.003690
2024	0.007303
2025	0.010843
2026	0.014314
2027	0.017723
2028	0.021074
2029	0.024369
2030	0.024104
2031	0.023849
2032	0.023604
2033	0.023368
2034	0.023141
2035	0.022922
2036	0.022711
2037	0.022507
2038	0.022311
2039	0.022121
2040	0.021939
2041	0.021674
2042	0.021434
2043	0.021213
2044	0.021008
2045	0.020818
2046	0.020691
2047	0.020568
2048	0.020448
2049	0.020331
2050	0.020217



Residential Outdoor Water Surveys

Overview

Name	Residential Outdoor Water Surveys
Abbr	6
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2023
Last Year	2050
Measure Length	28

Measure Life

Permanent	☐
Years	10
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$384.00	$50.00	1

Administration Costs

Method: Percent

Markup Percentage	25%

Description

Outdoor water surveys offered for existing customers. Normally those with high water use are targeted and provided a customized report on how to save water. Can be combined with indoor surveys or focused on certain customer classes. Residential customers would be eligible for free landscape water surveys upon request. Typically during the surveys, the surveyor will checks for leaks, provide direction on appropriate irrigation scheduling, demonstrate how to set irrigation controllers, provide guidance on plant selection and offer additional ways to increase outdoor efficiencies (car washing, pool covers, mulch etc.). Low-cost, general-use, outdoor efficiency fixtures assumed to be handed out during the survey as needed.

Customer Classes

RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
Toilets	☐										
Urinals											
Lavatory Faucets	☐										
Showers	☐										
Dishwashers	☐										
Clothes Washers	☐										
Process											
Kitchen Spray Rinse											
Internal Leakage	☐										
Baths	☐										
Other	☐										
Non-Lavatory/Kitchen Faucets	☐										
Irrigation	☑										
Pools	☐										
Wash Down	☑										
Car Washing	☑										
External Leakage	☑										
Outdoor											
Cooling											

Comments

> Utility Costs - Time estimates includes field time, drive time, scheduling, and data entry. Assume staff avg fully burdened Rate with fringe and overhead is $150/hr., (ACWD Water Conservation Rate is $55/hr. for base rate with fringe and overhead add 1.68%). Utility fixture costs assume all surveyed accounts receive a kit with $9 of supplies including a rain gauge, an auto shut-off hose nozzle, and a soil moisture sensor. Utility Cost = ((150*2.5 hours per survey) +($9 supplies))=$384* 25% admin markup.

> Customer Costs - Assumed costs to fix discovered leaks.

> Administration Costs - Based on Big Bear, CA program, administration time assumes 75 min/audit (primarily 70% staff, 30% supervisor).

> End Use Water Savings - Savings based off of California Urban Water Agencies water Savings Study (4/13/15); Outdoor Residential Water Surveys saved on average 21 gpd per audit. Assumed 10% savings on outdoor end uses and 5% selected on pools to be conservative which total up to an approximate average savings of 21 gpd per residential audit.

> Targets - WCWDB FY16/17 & FY17/18 ~11 BAWSCA agencies reported. 0.8% SF survey participation.

Results

Units: MG

Average Water Savings (mgd)	
0.094407	
Lifetime Savings - Present Value ($)	
Utility	$3,732,798
Community	$3,732,798
Lifetime Costs - Present Value ($)	
Utility	$5,490,246
Community	$6,062,147
Benefit to Cost Ratio	
Utility	0.68
Community	0.62
Cost of Savings per Unit Volume ($/mg)	
Utility	$5,136

End Use Savings Per Replacement

Method: Fixed

	Savings GPD/Acct	Avg GPD/Acct
RES Irrigation	18.0	42.0
RES Wash Down	0.5	2.0
RES Car Washing	0.5	2.0
RES External Leakage	2.0	3.5

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.800%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$0	$0	$0
2022	$0	$0	$0
2023	$284,655	$29,652	$314,307
2024	$284,655	$29,652	$314,307
2025	$284,655	$29,652	$314,307
2026	$284,655	$29,652	$314,307
2027	$284,655	$29,652	$314,307
2028	$284,655	$29,652	$314,307
2029	$284,655	$29,652	$314,307
2030	$284,655	$29,652	$314,307
2031	$284,655	$29,652	$314,307
2032	$284,655	$29,652	$314,307
2033	$284,655	$29,652	$314,307
2034	$284,655	$29,652	$314,307
2035	$284,655	$29,652	$314,307
2036	$284,655	$29,652	$314,307
2037	$284,655	$29,652	$314,307
2038	$284,655	$29,652	$314,307
2039	$284,655	$29,652	$314,307
2040	$284,655	$29,652	$314,307
2041	$284,655	$29,652	$314,307
2042	$284,655	$29,652	$314,307
2043	$284,655	$29,652	$314,307
2044	$284,655	$29,652	$314,307
2045	$284,655	$29,652	$314,307
2046	$284,655	$29,652	$314,307
2047	$284,655	$29,652	$314,307
2048	$284,655	$29,652	$314,307
2049	$284,655	$29,652	$314,307
2050	$284,655	$29,652	$314,307

Targets

View: Accounts

	RES	Total
2020	0	0
2021	0	0
2022	0	0
2023	593	593
2024	593	593
2025	593	593
2026	593	593
2027	593	593
2028	593	593
2029	593	593
2030	593	593
2031	593	593
2032	593	593
2033	593	593
2034	593	593
2035	593	593
2036	593	593
2037	593	593
2038	593	593
2039	593	593
2040	593	593
2041	593	593
2042	593	593
2043	593	593
2044	593	593
2045	593	593
2046	593	593
2047	593	593
2048	593	593
2049	593	593
2050	593	593

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.012454
2024	0.024907
2025	0.037361
2026	0.049815
2027	0.062268
2028	0.074722
2029	0.087176
2030	0.099629
2031	0.112083
2032	0.124537
2033	0.124537
2034	0.124537
2035	0.124537
2036	0.124537
2037	0.124537
2038	0.124537
2039	0.124537
2040	0.124537
2041	0.124537
2042	0.124537
2043	0.124537
2044	0.124537
2045	0.124537
2046	0.124537
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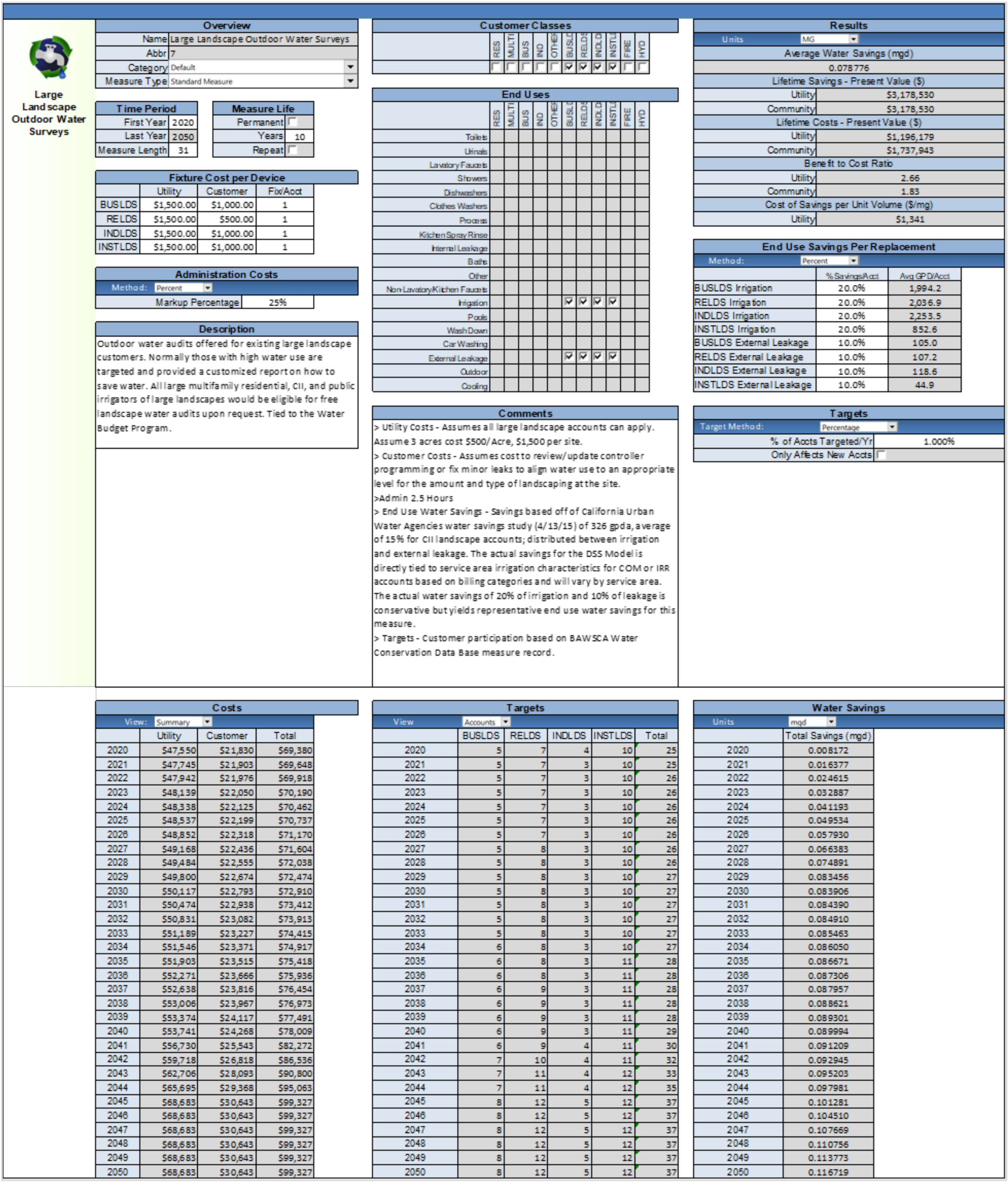
2049	0.124537
2050	0.124537



Large Landscape Outdoor Water Surveys

Overview

Name	Large Landscape Outdoor Water Surveys
Abbr	7
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2050
Measure Length	31

Measure Life

Permanent	☐
Years	10
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
BUSLDS	$1,500.00	$1,000.00	1
RELDS	$1,500.00	$500.00	1
INDLDS	$1,500.00	$1,000.00	1
INSTLDS	$1,500.00	$1,000.00	1

Administration Costs

Method: Percent

Markup Percentage	25%

Description

Outdoor water audits offered for existing large landscape customers. Normally those with high water use are targeted and provided a customized report on how to save water. All large multifamily residential, CII, and public irrigators of large landscapes would be eligible for free landscape water audits upon request. Tied to the Water Budget Program.

Customer Classes

RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
☐	☐	☐	☐	☐	☑	☑	☑	☑	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
Toilets											
Urinals											
Lavatory Faucets											
Showers											
Dishwashers											
Clothes Washers											
Process											
Kitchen Spray Rinse											
Internal Leakage											
Baths											
Other											
Non-Lavatory/Kitchen Faucets											
Irrigation						☑	☑	☑	☑		
Pools											
Wash Down											
Car Washing											
External Leakage						☑	☑	☑	☑		
Outdoor											
Cooling											

Comments

> Utility Costs - Assumes all large landscape accounts can apply. Assume 3 acres cost $500/Acre, $1,500 per site.

> Customer Costs - Assumes cost to review/update controller programming or fix minor leaks to align water use to an appropriate level for the amount and type of landscaping at the site.

>Admin 2.5 Hours

> End Use Water Savings - Savings based off of California Urban Water Agencies water savings study (4/13/15) of 326 gpda, average of 15% for CII landscape accounts; distributed between irrigation and external leakage. The actual savings for the DSS Model is directly tied to service area irrigation characteristics for COM or IRR accounts based on billing categories and will vary by service area. The actual water savings of 20% of irrigation and 10% of leakage is conservative but yields representative end use water savings for this measure.

> Targets - Customer participation based on BAWSCA Water Conservation Data Base measure record.

Results

Units: MG

Average Water Savings (mgd)	
0.078776	
Lifetime Savings - Present Value ($)	
Utility	$3,178,530
Community	$3,178,530
Lifetime Costs - Present Value ($)	
Utility	$1,196,179
Community	$1,737,943
Benefit to Cost Ratio	
Utility	2.66
Community	1.83
Cost of Savings per Unit Volume ($/mg)	
Utility	$1,341

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
BUSLDS Irrigation	20.0%	1,994.2
RELDS Irrigation	20.0%	2,036.9
INDLDS Irrigation	20.0%	2,253.5
INSTLDS Irrigation	20.0%	852.6
BUSLDS External Leakage	10.0%	105.0
RELDS External Leakage	10.0%	107.2
INDLDS External Leakage	10.0%	118.6
INSTLDS External Leakage	10.0%	44.9

Targets

Target Method: Percentage

% of Accts Targeted/Yr	1.000%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$47,550	$21,830	$69,380
2021	$47,745	$21,903	$69,648
2022	$47,942	$21,976	$69,918
2023	$48,139	$22,050	$70,190
2024	$48,338	$22,125	$70,462
2025	$48,537	$22,199	$70,737
2026	$48,852	$22,318	$71,170
2027	$49,168	$22,436	$71,604
2028	$49,484	$22,555	$72,038
2029	$49,800	$22,674	$72,474
2030	$50,117	$22,793	$72,910
2031	$50,474	$22,938	$73,412
2032	$50,831	$23,082	$73,913
2033	$51,189	$23,227	$74,415
2034	$51,546	$23,371	$74,917
2035	$51,903	$23,515	$75,418
2036	$52,271	$23,666	$75,936
2037	$52,638	$23,816	$76,454
2038	$53,006	$23,967	$76,973
2039	$53,374	$24,117	$77,491
2040	$53,741	$24,268	$78,009
2041	$56,730	$25,543	$82,272
2042	$59,718	$26,818	$86,536
2043	$62,706	$28,093	$90,800
2044	$65,695	$29,368	$95,063
2045	$68,683	$30,643	$99,327
2046	$68,683	$30,643	$99,327
2047	$68,683	$30,643	$99,327
2048	$68,683	$30,643	$99,327
2049	$68,683	$30,643	$99,327
2050	$68,683	$30,643	$99,327

Targets

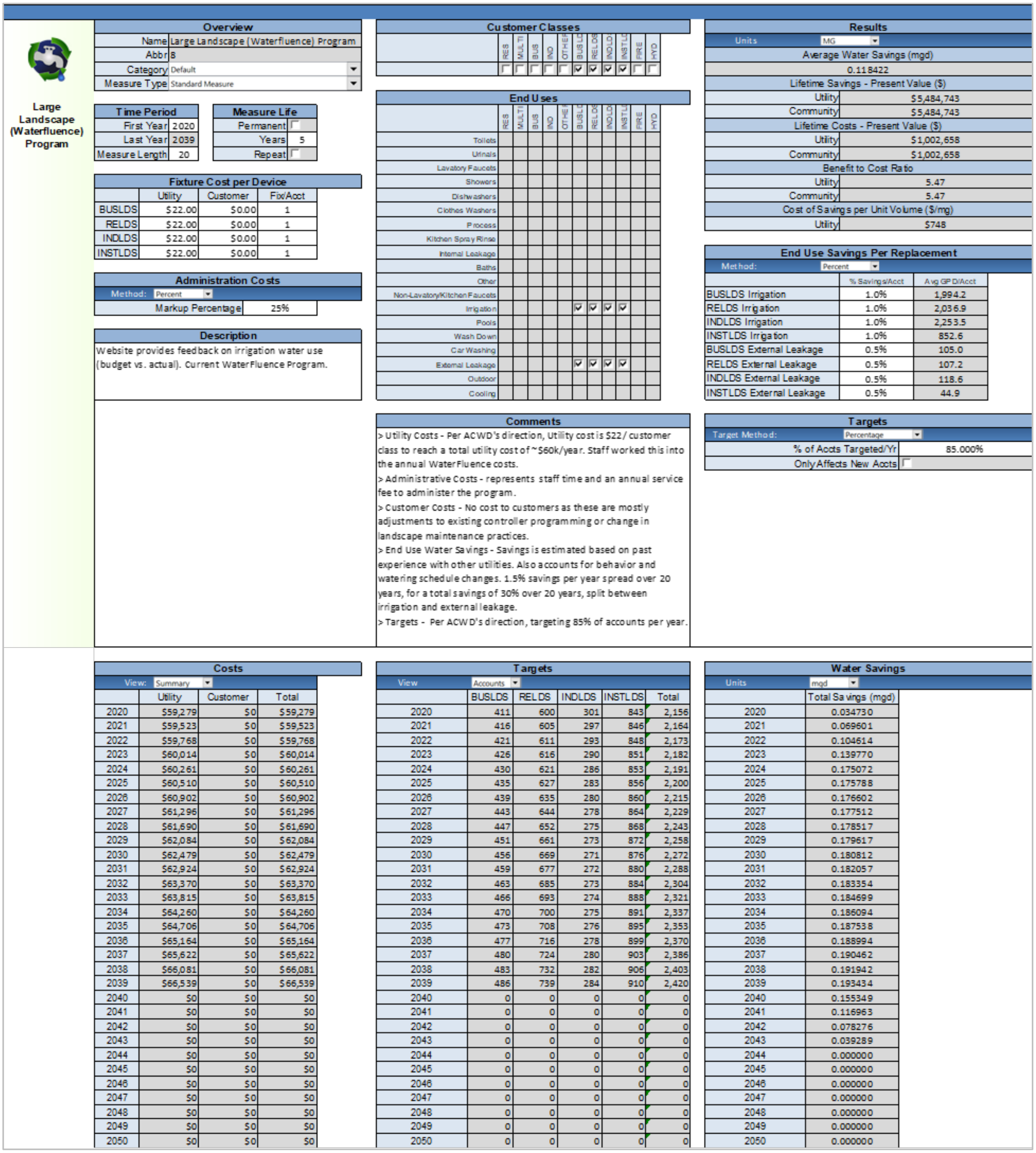
View: Accounts

	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	5	7	4	10	25
2021	5	7	3	10	25
2022	5	7	3	10	26
2023	5	7	3	10	26
2024	5	7	3	10	26
2025	5	7	3	10	26
2026	5	7	3	10	26
2027	5	8	3	10	26
2028	5	8	3	10	26
2029	5	8	3	10	27
2030	5	8	3	10	27
2031	5	8	3	10	27
2032	5	8	3	10	27
2033	5	8	3	10	27
2034	6	8	3	10	27
2035	6	8	3	11	28
2036	6	8	3	11	28
2037	6	9	3	11	28
2038	6	9	3	11	28
2039	6	9	3	11	28
2040	6	9	3	11	29
2041	6	9	4	11	30
2042	7	10	4	11	32
2043	7	11	4	12	33
2044	7	11	4	12	35
2045	8	12	5	12	37
2046	8	12	5	12	37
2047	8	12	5	12	37
2048	8	12	5	12	37
2049	8	12	5	12	37
2050	8	12	5	12	37

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.008172
2021	0.016377
2022	0.024615
2023	0.032887
2024	0.041193
2025	0.049534
2026	0.057930
2027	0.066383
2028	0.074891
2029	0.083456
2030	0.083906
2031	0.084390
2032	0.084910
2033	0.085463
2034	0.086050
2035	0.086671
2036	0.087306
2037	0.087957
2038	0.088621
2039	0.089301
2040	0.089994
2041	0.091209
2042	0.092945
2043	0.095203
2044	0.097981
2045	0.101281
2046	0.104510
2047	0.107669
2048	0.110756
2049	0.113773
2050	0.116719



Large Landscape (Waterfluence) Program

Overview

Name	Large Landscape (Waterfluence) Program
Abbr	8
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2039
Measure Length	20

Measure Life

Permanent	☐
Years	5
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
BUSLDS	$22.00	$0.00	1
RELDS	$22.00	$0.00	1
INDLDS	$22.00	$0.00	1
INSTLDS	$22.00	$0.00	1

Administration Costs

Method: Percent

Markup Percentage	25%

Description

Website provides feedback on irrigation water use (budget vs. actual). Current WaterFluence Program.

Customer Classes

RES	MULTI	BUS	IND	OTHER	BUSLD	RELD	INDLD	INSTLD	FIRE	HYD
☐	☐	☐	☐	☐	☑	☑	☑	☑	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELD	INDLD	INSTLD	FIRE	HYD
Toilets											
Urinals											
Lavatory Faucets											
Showers											
Dishwashers											
Clothes Washers											
Process											
Kitchen Spray Rinse											
Internal Leakage											
Baths											
Other											
Non-Lavatory/Kitchen Faucets											
Irrigation						☑	☑	☑	☑		
Pools											
Wash Down											
Car Washing											
External Leakage						☑	☑	☑	☑		
Outdoor											
Cooling											

Results

Units: MG

Average Water Savings (mgd)	
	0.118422
Lifetime Savings - Present Value ($)	
Utility	$5,484,743
Community	$5,484,743
Lifetime Costs - Present Value ($)	
Utility	$1,002,658
Community	$1,002,658
Benefit to Cost Ratio	
Utility	5.47
Community	5.47
Cost of Savings per Unit Volume ($/mg)	
Utility	$748

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
BUSLDS Irrigation	1.0%	1,994.2
RELDS Irrigation	1.0%	2,036.9
INDLDS Irrigation	1.0%	2,253.5
INSTLDS Irrigation	1.0%	852.6
BUSLDS External Leakage	0.5%	105.0
RELDS External Leakage	0.5%	107.2
INDLDS External Leakage	0.5%	118.6
INSTLDS External Leakage	0.5%	44.9

Comments

> Utility Costs - Per ACWD's direction, Utility cost is $22/ customer class to reach a total utility cost of ~$60k/year. Staff worked this into the annual WaterFluence costs.

> Administrative Costs - represents staff time and an annual service fee to administer the program.

> Customer Costs - No cost to customers as these are mostly adjustments to existing controller programming or change in landscape maintenance practices.

> End Use Water Savings - Savings is estimated based on past experience with other utilities. Also accounts for behavior and watering schedule changes. 1.5% savings per year spread over 20 years, for a total savings of 30% over 20 years, split between irrigation and external leakage.

> Targets - Per ACWD's direction, targeting 85% of accounts per year.

Targets

Target Method: Percentage

% of Accts Targeted/Yr	85.000%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$59,279	$0	$59,279
2021	$59,523	$0	$59,523
2022	$59,768	$0	$59,768
2023	$60,014	$0	$60,014
2024	$60,261	$0	$60,261
2025	$60,510	$0	$60,510
2026	$60,902	$0	$60,902
2027	$61,296	$0	$61,296
2028	$61,690	$0	$61,690
2029	$62,084	$0	$62,084
2030	$62,479	$0	$62,479
2031	$62,924	$0	$62,924
2032	$63,370	$0	$63,370
2033	$63,815	$0	$63,815
2034	$64,260	$0	$64,260
2035	$64,706	$0	$64,706
2036	$65,164	$0	$65,164
2037	$65,622	$0	$65,622
2038	$66,081	$0	$66,081
2039	$66,539	$0	$66,539
2040	$0	$0	$0
2041	$0	$0	$0
2042	$0	$0	$0
2043	$0	$0	$0
2044	$0	$0	$0
2045	$0	$0	$0
2046	$0	$0	$0
2047	$0	$0	$0
2048	$0	$0	$0
2049	$0	$0	$0
2050	$0	$0	$0

Targets

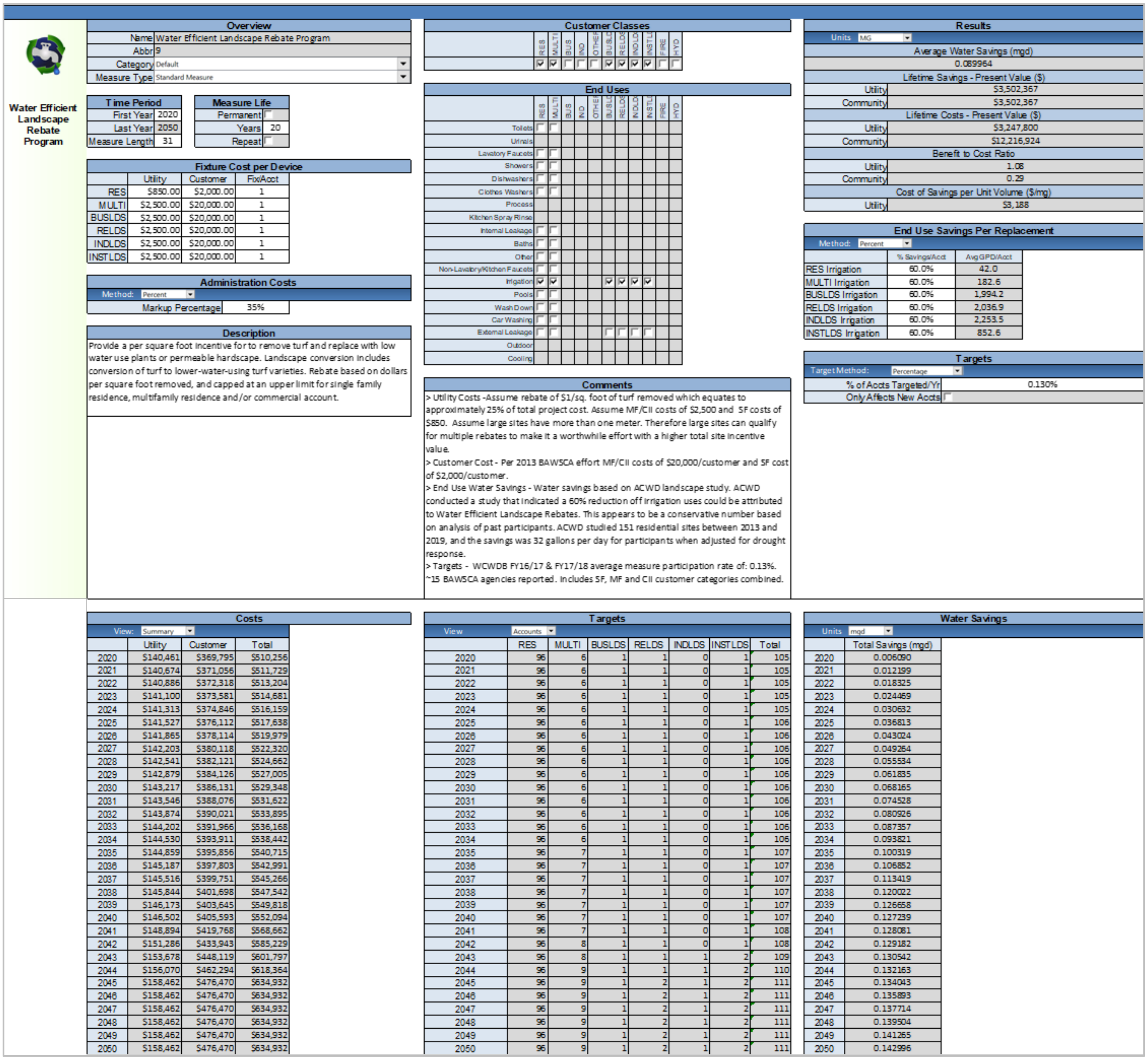
View: Accounts

	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	411	600	301	843	2,156
2021	416	605	297	846	2,164
2022	421	611	293	848	2,173
2023	426	616	290	851	2,182
2024	430	621	286	853	2,191
2025	435	627	283	856	2,200
2026	439	635	280	860	2,215
2027	443	644	278	864	2,229
2028	447	652	275	868	2,243
2029	451	661	273	872	2,258
2030	456	669	271	876	2,272
2031	459	677	272	880	2,288
2032	463	685	273	884	2,304
2033	466	693	274	888	2,321
2034	470	700	275	891	2,337
2035	473	708	276	895	2,353
2036	477	716	278	899	2,370
2037	480	724	280	903	2,386
2038	483	732	282	906	2,403
2039	486	739	284	910	2,420
2040	0	0	0	0	0
2041	0	0	0	0	0
2042	0	0	0	0	0
2043	0	0	0	0	0
2044	0	0	0	0	0
2045	0	0	0	0	0
2046	0	0	0	0	0
2047	0	0	0	0	0
2048	0	0	0	0	0
2049	0	0	0	0	0
2050	0	0	0	0	0

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.034730
2021	0.069601
2022	0.104614
2023	0.139770
2024	0.175072
2025	0.175788
2026	0.176602
2027	0.177512
2028	0.178517
2029	0.179617
2030	0.180812
2031	0.182057
2032	0.183354
2033	0.184699
2034	0.186094
2035	0.187538
2036	0.188994
2037	0.190462
2038	0.191942
2039	0.193434
2040	0.155349
2041	0.116963
2042	0.078276
2043	0.039289
2044	0.000000
2045	0.000000
2046	0.000000
2047	0.000000
2048	0.000000
2049	0.000000
2050	0.000000



Water Efficient Landscape Rebate Program

Overview

Name	Water Efficient Landscape Rebate Program
Abbr	9
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2050
Measure Length	31

Measure Life

Permanent	☐
Years	20
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$850.00	$2,000.00	1
MULTI	$2,500.00	$20,000.00	1
BUSLDS	$2,500.00	$20,000.00	1
RELDS	$2,500.00	$20,000.00	1
INDLDS	$2,500.00	$20,000.00	1
INSTLDS	$2,500.00	$20,000.00	1

Administration Costs

Method: Percent

Markup Percentage: 35%

Description

Provide a per square foot incentive for to remove turf and replace with low water use plants or permeable hardscape. Landscape conversion includes conversion of turf to lower-water-using turf varieties. Rebate based on dollars per square foot removed, and capped at an upper limit for single family residence, multifamily residence and/or commercial account.

Customer Classes

RES	MULTI	BUS	IND	OTHE	BUSLD	RELD	INDLD	INSTL	FIRE	HYD
☑	☑	☐	☐	☐	☑	☑	☑	☑	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHE	BUSLD	RELD	INDLD	INSTL	FIRE	HYD
Toilets	☐	☐									
Urinals											
Lavatory Faucets	☐	☐									
Showers	☐	☐									
Dishwashers	☐	☐									
Clothes Washers	☐	☐									
Process											
Kitchen Spray Rinse											
Internal Leakage	☐	☐									
Baths	☐	☐									
Other	☐	☐									
Non-Lavatory/Kitchen Faucets	☐	☐									
Irrigation	☑	☑				☑	☑	☑	☑		
Pools	☐	☐									
Wash Down	☐	☐									
Car Washing	☐	☐									
External Leakage	☐	☐				☐	☐	☐	☐		
Outdoor											
Cooling											

Comments

> Utility Costs -Assume rebate of $1/sq. foot of turf removed which equates to approximately 25% of total project cost. Assume MF/CII costs of $2,500 and SF costs of $850. Assume large sites have more than one meter. Therefore large sites can qualify for multiple rebates to make it a worthwhile effort with a higher total site incentive value.

> Customer Cost - Per 2013 BAWSCA effort MF/CII costs of $20,000/customer and SF cost of $2,000/customer.

> End Use Water Savings - Water savings based on ACWD landscape study. ACWD conducted a study that indicated a 60% reduction off irrigation uses could be attributed to Water Efficient Landscape Rebates. This appears to be a conservative number based on analysis of past participants. ACWD studied 151 residential sites between 2013 and 2019, and the savings was 32 gallons per day for participants when adjusted for drought response.

> Targets - WCWDB FY16/17 & FY17/18 average measure participation rate of: 0.13%. ~15 BAWSCA agencies reported. Includes SF, MF and CII customer categories combined.

Results

Units: MG

Average Water Savings (mgd)	
	0.089964
Lifetime Savings - Present Value ($)	
Utility	$3,502,367
Community	$3,502,367
Lifetime Costs - Present Value ($)	
Utility	$3,247,800
Community	$12,216,924
Benefit to Cost Ratio	
Utility	1.08
Community	0.29
Cost of Savings per Unit Volume ($/mg)	
Utility	$3,188

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Irrigation	60.0%	42.0
MULTI Irrigation	60.0%	182.6
BUSLDS Irrigation	60.0%	1,994.2
RELDS Irrigation	60.0%	2,036.9
INDLDS Irrigation	60.0%	2,253.5
INSTLDS Irrigation	60.0%	852.6

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.130%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$140,461	$369,795	$510,256
2021	$140,674	$371,056	$511,729
2022	$140,886	$372,318	$513,204
2023	$141,100	$373,581	$514,681
2024	$141,313	$374,846	$516,159
2025	$141,527	$376,112	$517,638
2026	$141,865	$378,114	$519,979
2027	$142,203	$380,118	$522,320
2028	$142,541	$382,121	$524,662
2029	$142,879	$384,126	$527,005
2030	$143,217	$386,131	$529,348
2031	$143,546	$388,076	$531,622
2032	$143,874	$390,021	$533,895
2033	$144,202	$391,966	$536,168
2034	$144,530	$393,911	$538,442
2035	$144,859	$395,856	$540,715
2036	$145,187	$397,803	$542,991
2037	$145,516	$399,751	$545,266
2038	$145,844	$401,698	$547,542
2039	$146,173	$403,645	$549,818
2040	$146,502	$405,593	$552,094
2041	$148,894	$419,768	$568,662
2042	$151,286	$433,943	$585,229
2043	$153,678	$448,119	$601,797
2044	$156,070	$462,294	$618,364
2045	$158,462	$476,470	$634,932
2046	$158,462	$476,470	$634,932
2047	$158,462	$476,470	$634,932
2048	$158,462	$476,470	$634,932
2049	$158,462	$476,470	$634,932
2050	$158,462	$476,470	$634,932

Targets

View: Accounts

	RES	MULTI	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	96	6	1	1	0	1	105
2021	96	6	1	1	0	1	105
2022	96	6	1	1	0	1	105
2023	96	6	1	1	0	1	105
2024	96	6	1	1	0	1	105
2025	96	6	1	1	0	1	106
2026	96	6	1	1	0	1	106
2027	96	6	1	1	0	1	106
2028	96	6	1	1	0	1	106
2029	96	6	1	1	0	1	106
2030	96	6	1	1	0	1	106
2031	96	6	1	1	0	1	106
2032	96	6	1	1	0	1	106
2033	96	6	1	1	0	1	106
2034	96	6	1	1	0	1	106
2035	96	7	1	1	0	1	107
2036	96	7	1	1	0	1	107
2037	96	7	1	1	0	1	107
2038	96	7	1	1	0	1	107
2039	96	7	1	1	0	1	107
2040	96	7	1	1	0	1	107
2041	96	7	1	1	0	1	108
2042	96	8	1	1	0	1	108
2043	96	8	1	1	1	2	109
2044	96	9	1	1	1	2	110
2045	96	9	1	2	1	2	111
2046	96	9	1	2	1	2	111
2047	96	9	1	2	1	2	111
2048	96	9	1	2	1	2	111
2049	96	9	1	2	1	2	111
2050	96	9	1	2	1	2	111

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.006090
2021	0.012199
2022	0.018325
2023	0.024469
2024	0.030632
2025	0.036813
2026	0.043024
2027	0.049264
2028	0.055534
2029	0.061835
2030	0.068165
2031	0.074528
2032	0.080926
2033	0.087357
2034	0.093821
2035	0.100319
2036	0.106852
2037	0.113419
2038	0.120022
2039	0.126658
2040	0.127239
2041	0.128081
2042	0.129182
2043	0.130542
2044	0.132163
2045	0.134043
2046	0.135893
2047	0.137714
2048	0.139504
2049	0.141265
2050	0.142996

Financial Incentives for Irrigation & Landscape Upgrades

Overview

Name	Financial Incentives for Irrigation & Landscape Upgrades
Abbr	10
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2021
Last Year	2050
Measure Length	30

Measure Life

Permanent	☐
Years	10
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$200.00	$100.00	1
MULTI	$500.00	$100.00	1
BUSLDS	$500.00	$500.00	1
RELDS	$500.00	$500.00	1
INDLDS	$500.00	$500.00	1
INSTLDS	$500.00	$500.00	1

Administration Costs

Method: Percent

Markup Percentage	25%

Description

For customers with landscape, provide incentives for substantive landscape retrofits or installation of water efficient equipment upgrades; Rebates can also contribute towards the purchase and installation of water-wise plants, compost, mulch and selected types of irrigation equipment upgrades.

> Rebate for residential accounts and up to 50% more for commercial customers.

> Financial incentives for: WBICs, rotating sprinkler nozzles, rainwater containers (barrels and cisterns), and greywater retrofits

> Landscape conversion and turf removal is not part of this measure.

Customer Classes

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
	☑	☑	☐	☐	☐	☑	☑	☑	☑	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
Toilets	☐	☐									
Urinals											
Lavatory Faucets	☐	☐									
Showers	☐	☐									
Dishwashers	☐	☐									
Clothes Washers	☐	☐									
Process											
Kitchen Spray Rinse											
Internal Leakage	☐	☐									
Baths	☐	☐									
Other	☐	☐									
Non-Lavatory/Kitchen Faucets	☐	☐									
Irrigation	☑	☑				☑	☑	☑	☑		
Pools	☐	☐									
Wash Down	☐	☐									
Car Washing	☐	☐									
External Leakage	☐	☐				☐	☐	☐	☐		
Outdoor											
Cooling											

Comments

> Utility Costs -$200 for SF accounts. $500 utility cost is per non-residential and MFR account. Large sites will have more than one account and qualify for a larger total rebate per site. EBMUD and Valley Water programs offer up to $2,000-$3,000 for residential customers and up to $15,000-$60,000 for commercial customers.

> Customer Costs - Customer costs per account will vary significantly based on devices.

> End Use Water Savings - The water savings are based on the following from the 2018 Landscape Rebate Water Savings Study from Valley Water:

> The annual water savings for replacing timer-based automatic irrigation controllers with weather-based irrigation controllers with rain shut-off devices were statistically significant each year following conversion, incrementally increased each year following conversion, and were on average 9 gal/ft2/yr or an average of 27%

> The annual water savings for replacing old sprinklers with high-efficiency nozzles were 1,243 gal/unit/yr on average. or an average of 15.3%

>Annual savings for replacing old sprinklers with high-efficiency nozzles including pressure regulation and/or check valves were significant in the first year following conversion, saving 1,661 gal/unit/yr on average, or an average of 18%.

> Total average irrigation savings is 20.1%

> Soil moisture sensor savings may be 20% of irrigation use is based on more than 10 California site water use reports conducted over multiple months in years 2015-2017 as provided by Brian Holland www.sustainablewatersavings.com. Studies show a range of 20%-60% savings for trained soil moisture sensor device installation and site management. A lower savings estimate is assumed for layperson usage and non-drought normal planning years. The manufacturer claims device batteries last 10-12 years.

> Targets: 0.5% to keep total utility budget and staff time for this program to reasonable levels.

Results

Units: MG

Average Water Savings (mgd)	
	0.070273
Lifetime Savings - Present Value ($)	
Utility	$2,816,980
Community	$2,816,980
Lifetime Costs - Present Value ($)	
Utility	$2,508,113
Community	$3,503,784
Benefit to Cost Ratio	
Utility	1.12
Community	0.80
Cost of Savings per Unit Volume ($/mg)	
Utility	$3,152

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Irrigation	20.1%	42.0
MULTI Irrigation	20.1%	182.6
BUSLDS Irrigation	20.1%	1,994.2
RELDS Irrigation	20.1%	2,036.9
INDLDS Irrigation	20.1%	2,253.5
INSTLDS Irrigation	20.1%	852.6

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.500%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$114,094	$45,587	$159,681
2022	$114,246	$45,632	$159,877
2023	$114,398	$45,677	$160,075
2024	$114,550	$45,723	$160,272
2025	$114,702	$45,768	$160,470
2026	$114,942	$45,840	$160,783
2027	$115,183	$45,913	$161,096
2028	$115,424	$45,985	$161,409
2029	$115,665	$46,057	$161,722
2030	$115,906	$46,129	$162,035
2031	$116,140	$46,205	$162,345
2032	$116,373	$46,280	$162,654
2033	$116,607	$46,356	$162,963
2034	$116,841	$46,431	$163,273
2035	$117,075	$46,507	$163,582
2036	$117,309	$46,584	$163,892
2037	$117,543	$46,660	$164,203
2038	$117,777	$46,737	$164,514
2039	$118,011	$46,814	$164,825
2040	$118,245	$46,890	$165,135
2041	$119,949	$47,482	$167,430
2042	$121,653	$48,073	$169,726
2043	$123,356	$48,664	$172,021
2044	$125,060	$49,256	$174,316
2045	$126,764	$49,847	$176,611
2046	$126,764	$49,847	$176,611
2047	$126,764	$49,847	$176,611
2048	$126,764	$49,847	$176,611
2049	$126,764	$49,847	$176,611
2050	$126,764	$49,847	$176,611

Targets

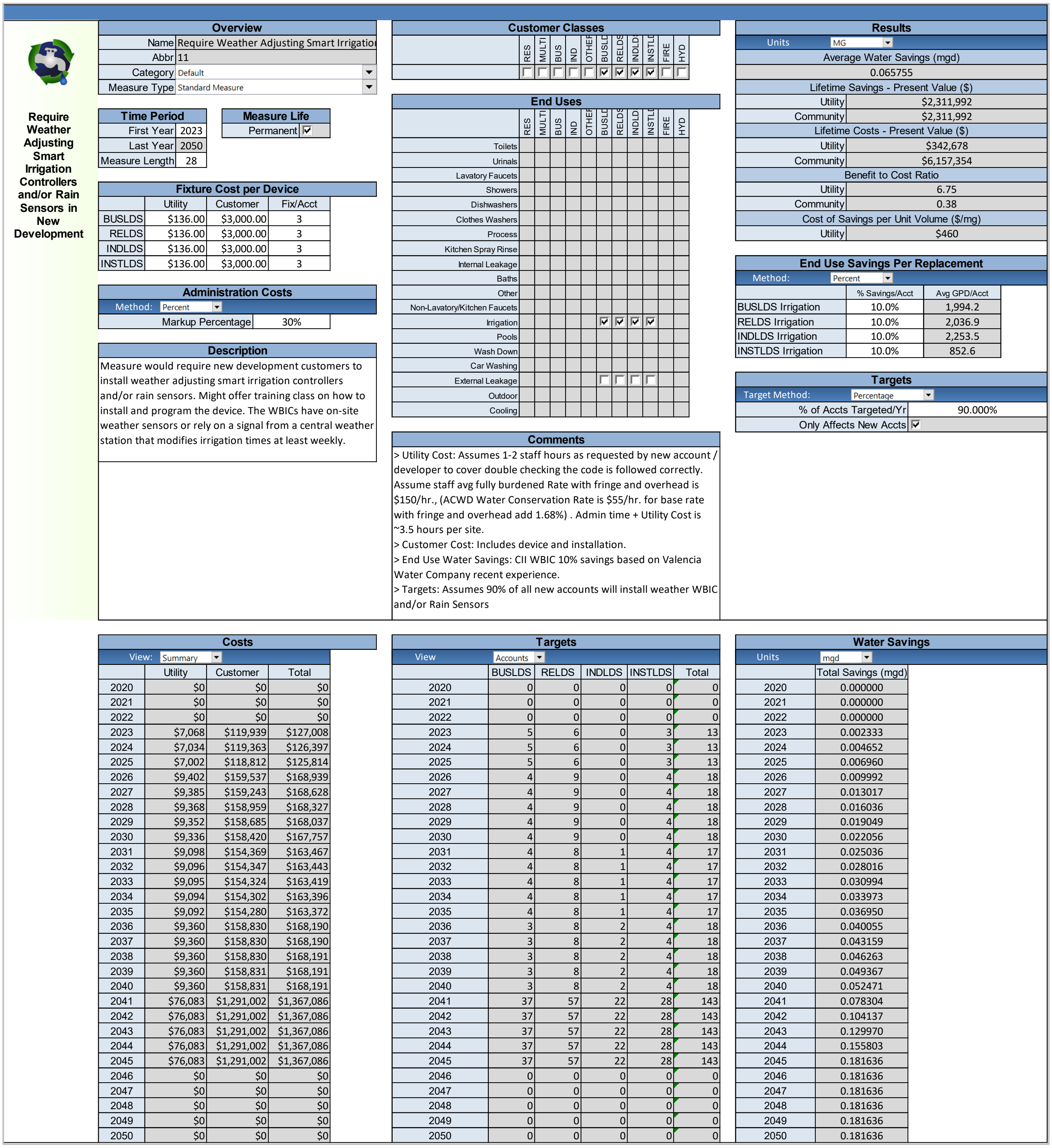
View: Accounts

	RES	MULTI	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	0	0	0	0	0	0	0
2021	371	22	2	4	2	5	405
2022	371	22	2	4	2	5	405
2023	371	22	3	4	2	5	405
2024	371	22	3	4	2	5	406
2025	371	22	3	4	2	5	406
2026	371	23	3	4	2	5	406
2027	371	23	3	4	2	5	407
2028	371	23	3	4	2	5	407
2029	371	24	3	4	2	5	407
2030	371	24	3	4	2	5	408
2031	371	24	3	4	2	5	408
2032	371	24	3	4	2	5	409
2033	371	25	3	4	2	5	409
2034	371	25	3	4	2	5	409
2035	371	25	3	4	2	5	410
2036	371	25	3	4	2	5	410
2037	371	26	3	4	2	5	410
2038	371	26	3	4	2	5	411
2039	371	26	3	4	2	5	411
2040	371	27	3	4	2	5	412
2041	371	29	3	5	2	6	414
2042	371	30	3	5	2	6	417
2043	371	32	3	5	2	6	420
2044	371	34	4	6	2	6	422
2045	371	36	4	6	2	6	425
2046	371	36	4	6	2	6	425
2047	371	36	4	6	2	6	425
2048	371	36	4	6	2	6	425
2049	371	36	4	6	2	6	425
2050	371	36	4	6	2	6	425

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.007870
2022	0.015764
2023	0.023681
2024	0.031621
2025	0.039585
2026	0.047587
2027	0.055628
2028	0.063707
2029	0.071824
2030	0.079980
2031	0.080310
2032	0.080659
2033	0.081028
2034	0.081417
2035	0.081825
2036	0.082240
2037	0.082662
2038	0.083089
2039	0.083523
2040	0.083963
2041	0.084717
2042	0.085787
2043	0.087171
2044	0.088870
2045	0.090884
2046	0.092853
2047	0.094777
2048	0.096657
2049	0.098492
2050	0.100283



Require Weather Adjusting Smart Irrigation Controllers and/or Rain Sensors in New Development

Overview

Name	Require Weather Adjusting Smart Irrigatio
Abbr	11
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2023
Last Year	2050
Measure Length	28

Measure Life

Permanent ☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
BUSLDS	$136.00	$3,000.00	3
RELDS	$136.00	$3,000.00	3
INDLDS	$136.00	$3,000.00	3
INSTLDS	$136.00	$3,000.00	3

Administration Costs

Method: Percent

Markup Percentage	30%

Description

Measure would require new development customers to install weather adjusting smart irrigation controllers and/or rain sensors. Might offer training class on how to install and program the device. The WBICs have on-site weather sensors or rely on a signal from a central weather station that modifies irrigation times at least weekly.

Customer Classes

RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
☐	☐	☐	☐	☐	☑	☑	☑	☑	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
Toilets											
Urinals											
Lavatory Faucets											
Showers											
Dishwashers											
Clothes Washers											
Process											
Kitchen Spray Rinse											
Internal Leakage											
Baths											
Other											
Non-Lavatory/Kitchen Faucets											
Irrigation						☑	☑	☑	☑		
Pools											
Wash Down											
Car Washing											
External Leakage						☐	☐	☐	☐		
Outdoor											
Cooling											

Comments

> Utility Cost: Assumes 1-2 staff hours as requested by new account / developer to cover double checking the code is followed correctly. Assume staff avg fully burdened Rate with fringe and overhead is $150/hr., (ACWD Water Conservation Rate is $55/hr. for base rate with fringe and overhead add 1.68%) . Admin time + Utility Cost is ~3.5 hours per site.

> Customer Cost: Includes device and installation.

> End Use Water Savings: CII WBIC 10% savings based on Valencia Water Company recent experience.

> Targets: Assumes 90% of all new accounts will install weather WBIC and/or Rain Sensors

Results

Units: MG

Average Water Savings (mgd)	
	0.065755
Lifetime Savings - Present Value ($)	
Utility	$2,311,992
Community	$2,311,992
Lifetime Costs - Present Value ($)	
Utility	$342,678
Community	$6,157,354
Benefit to Cost Ratio	
Utility	6.75
Community	0.38
Cost of Savings per Unit Volume ($/mg)	
Utility	$460

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
BUSLDS Irrigation	10.0%	1,994.2
RELDS Irrigation	10.0%	2,036.9
INDLDS Irrigation	10.0%	2,253.5
INSTLDS Irrigation	10.0%	852.6

Targets

Target Method: Percentage

% of Accts Targeted/Yr	90.000%
Only Affects New Accts	☑

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$0	$0	$0
2022	$0	$0	$0
2023	$7,068	$119,939	$127,008
2024	$7,034	$119,363	$126,397
2025	$7,002	$118,812	$125,814
2026	$9,402	$159,537	$168,939
2027	$9,385	$159,243	$168,628
2028	$9,368	$158,959	$168,327
2029	$9,352	$158,685	$168,037
2030	$9,336	$158,420	$167,757
2031	$9,098	$154,369	$163,467
2032	$9,096	$154,347	$163,443
2033	$9,095	$154,324	$163,419
2034	$9,094	$154,302	$163,396
2035	$9,092	$154,280	$163,372
2036	$9,360	$158,830	$168,190
2037	$9,360	$158,830	$168,190
2038	$9,360	$158,830	$168,191
2039	$9,360	$158,831	$168,191
2040	$9,360	$158,831	$168,191
2041	$76,083	$1,291,002	$1,367,086
2042	$76,083	$1,291,002	$1,367,086
2043	$76,083	$1,291,002	$1,367,086
2044	$76,083	$1,291,002	$1,367,086
2045	$76,083	$1,291,002	$1,367,086
2046	$0	$0	$0
2047	$0	$0	$0
2048	$0	$0	$0
2049	$0	$0	$0
2050	$0	$0	$0

Targets

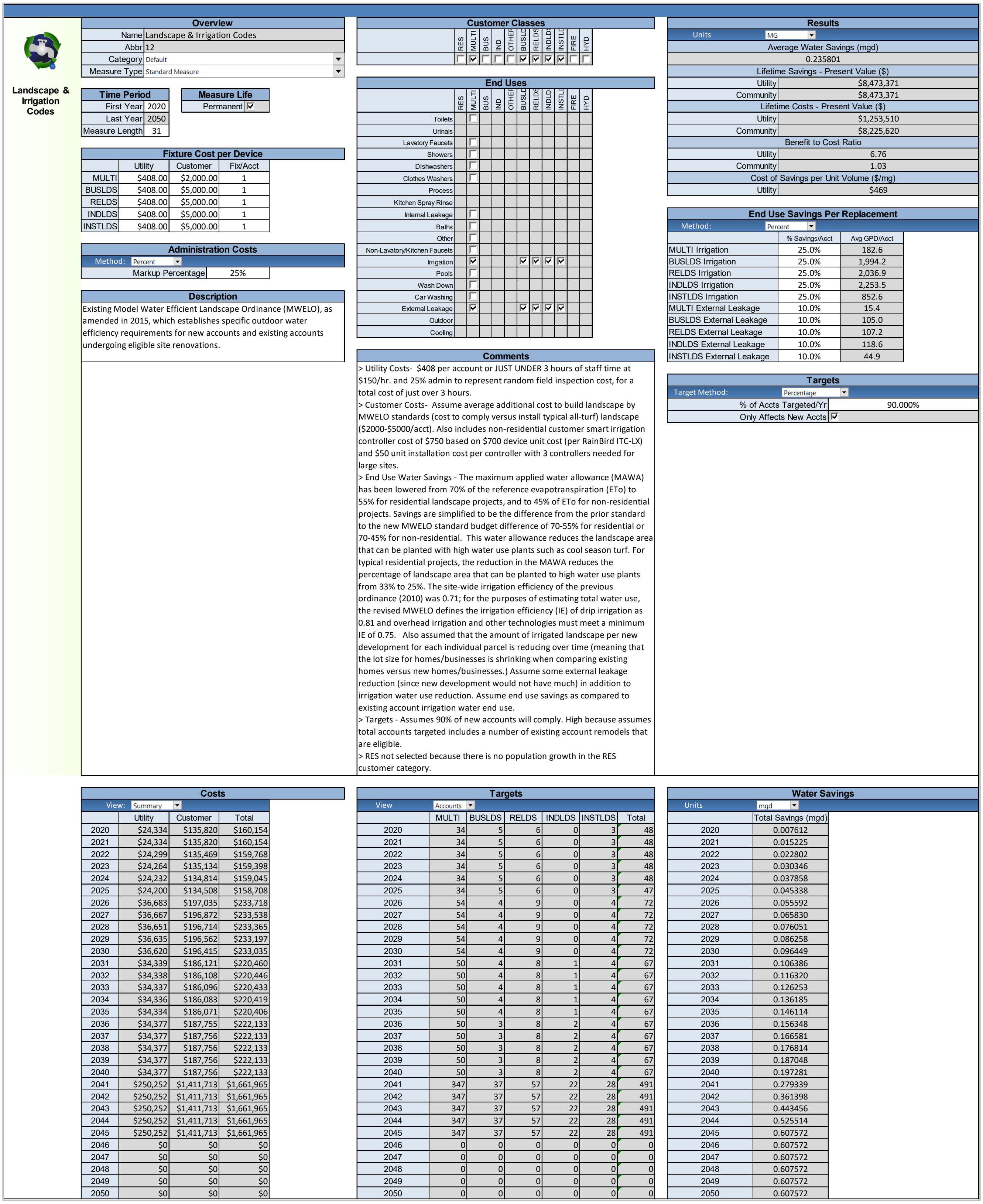
View: Accounts

	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	0	0	0	0	0
2021	0	0	0	0	0
2022	0	0	0	0	0
2023	5	6	0	3	13
2024	5	6	0	3	13
2025	5	6	0	3	13
2026	4	9	0	4	18
2027	4	9	0	4	18
2028	4	9	0	4	18
2029	4	9	0	4	18
2030	4	9	0	4	18
2031	4	8	1	4	17
2032	4	8	1	4	17
2033	4	8	1	4	17
2034	4	8	1	4	17
2035	4	8	1	4	17
2036	3	8	2	4	18
2037	3	8	2	4	18
2038	3	8	2	4	18
2039	3	8	2	4	18
2040	3	8	2	4	18
2041	37	57	22	28	143
2042	37	57	22	28	143
2043	37	57	22	28	143
2044	37	57	22	28	143
2045	37	57	22	28	143
2046	0	0	0	0	0
2047	0	0	0	0	0
2048	0	0	0	0	0
2049	0	0	0	0	0
2050	0	0	0	0	0

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.002333
2024	0.004652
2025	0.006960
2026	0.009992
2027	0.013017
2028	0.016036
2029	0.019049
2030	0.022056
2031	0.025036
2032	0.028016
2033	0.030994
2034	0.033973
2035	0.036950
2036	0.040055
2037	0.043159
2038	0.046263
2039	0.049367
2040	0.052471
2041	0.078304
2042	0.104137
2043	0.129970
2044	0.155803
2045	0.181636
2046	0.181636
2047	0.181636
2048	0.181636
2049	0.181636
2050	0.181636



Landscape & Irrigation Codes

Overview

Name	Landscape & Irrigation Codes
Abbr	12
Category	Default
Measure Type	Standard Measure

Time Period	
First Year	2020
Last Year	2050
Measure Length	31

Measure Life	
Permanent	☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
MULTI	$408.00	$2,000.00	1
BUSLDS	$408.00	$5,000.00	1
RELDS	$408.00	$5,000.00	1
INDLDS	$408.00	$5,000.00	1
INSTLDS	$408.00	$5,000.00	1

Administration Costs

Method:	Percent
Markup Percentage	25%

Description

Existing Model Water Efficient Landscape Ordinance (MWELO), as amended in 2015, which establishes specific outdoor water efficiency requirements for new accounts and existing accounts undergoing eligible site renovations.

Customer Classes

RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
☐	☑	☐	☐	☐	☑	☑	☑	☑	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
Toilets		☐									
Urinals											
Lavatory Faucets		☐									
Showers		☐									
Dishwashers		☐									
Clothes Washers		☐									
Process											
Kitchen Spray Rinse											
Internal Leakage		☐									
Baths		☐									
Other		☐									
Non-Lavatory/Kitchen Faucets		☐									
Irrigation		☑				☑	☑	☑	☑		
Pools		☐									
Wash Down		☐									
Car Washing		☐									
External Leakage		☑				☑	☑	☑	☑		
Outdoor											
Cooling											

Comments

> Utility Costs- $408 per account or JUST UNDER 3 hours of staff time at $150/hr. and 25% admin to represent random field inspection cost, for a total cost of just over 3 hours.

> Customer Costs- Assume average additional cost to build landscape by MWELO standards (cost to comply versus install typical all-turf) landscape ($2000-$5000/acct). Also includes non-residential customer smart irrigation controller cost of $750 based on $700 device unit cost (per RainBird ITC-LX) and $50 unit installation cost per controller with 3 controllers needed for large sites.

> End Use Water Savings - The maximum applied water allowance (MAWA) has been lowered from 70% of the reference evapotranspiration (ETo) to 55% for residential landscape projects, and to 45% of ETo for non-residential projects. Savings are simplified to be the difference from the prior standard to the new MWELO standard budget difference of 70-55% for residential or 70-45% for non-residential. This water allowance reduces the landscape area that can be planted with high water use plants such as cool season turf. For typical residential projects, the reduction in the MAWA reduces the percentage of landscape area that can be planted to high water use plants from 33% to 25%. The site-wide irrigation efficiency of the previous ordinance (2010) was 0.71; for the purposes of estimating total water use, the revised MWELO defines the irrigation efficiency (IE) of drip irrigation as 0.81 and overhead irrigation and other technologies must meet a minimum IE of 0.75. Also assumed that the amount of irrigated landscape per new development for each individual parcel is reducing over time (meaning that the lot size for homes/businesses is shrinking when comparing existing homes versus new homes/businesses.) Assume some external leakage reduction (since new development would not have much) in addition to irrigation water use reduction. Assume end use savings as compared to existing account irrigation water end use.

> Targets - Assumes 90% of new accounts will comply. High because assumes total accounts targeted includes a number of existing account remodels that are eligible.

> RES not selected because there is no population growth in the RES customer category.

Results

Units	MG
Average Water Savings (mgd)	
	0.235801
Lifetime Savings - Present Value ($)	
Utility	$8,473,371
Community	$8,473,371
Lifetime Costs - Present Value ($)	
Utility	$1,253,510
Community	$8,225,620
Benefit to Cost Ratio	
Utility	6.76
Community	1.03
Cost of Savings per Unit Volume ($/mg)	
Utility	$469

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
MULTI Irrigation	25.0%	182.6
BUSLDS Irrigation	25.0%	1,994.2
RELDS Irrigation	25.0%	2,036.9
INDLDS Irrigation	25.0%	2,253.5
INSTLDS Irrigation	25.0%	852.6
MULTI External Leakage	10.0%	15.4
BUSLDS External Leakage	10.0%	105.0
RELDS External Leakage	10.0%	107.2
INDLDS External Leakage	10.0%	118.6
INSTLDS External Leakage	10.0%	44.9

Targets

Target Method:	Percentage
% of Accts Targeted/Yr	90.000%
Only Affects New Accts	☑

Costs

View: Summary

	Utility	Customer	Total
2020	$24,334	$135,820	$160,154
2021	$24,334	$135,820	$160,154
2022	$24,299	$135,469	$159,768
2023	$24,264	$135,134	$159,398
2024	$24,232	$134,814	$159,045
2025	$24,200	$134,508	$158,708
2026	$36,683	$197,035	$233,718
2027	$36,667	$196,872	$233,538
2028	$36,651	$196,714	$233,365
2029	$36,635	$196,562	$233,197
2030	$36,620	$196,415	$233,035
2031	$34,339	$186,121	$220,460
2032	$34,338	$186,108	$220,446
2033	$34,337	$186,096	$220,433
2034	$34,336	$186,083	$220,419
2035	$34,334	$186,071	$220,406
2036	$34,377	$187,755	$222,133
2037	$34,377	$187,756	$222,133
2038	$34,377	$187,756	$222,133
2039	$34,377	$187,756	$222,133
2040	$34,377	$187,756	$222,133
2041	$250,252	$1,411,713	$1,661,965
2042	$250,252	$1,411,713	$1,661,965
2043	$250,252	$1,411,713	$1,661,965
2044	$250,252	$1,411,713	$1,661,965
2045	$250,252	$1,411,713	$1,661,965
2046	$0	$0	$0
2047	$0	$0	$0
2048	$0	$0	$0
2049	$0	$0	$0
2050	$0	$0	$0

Targets

View: Accounts

	MULTI	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	34	5	6	0	3	48
2021	34	5	6	0	3	48
2022	34	5	6	0	3	48
2023	34	5	6	0	3	48
2024	34	5	6	0	3	48
2025	34	5	6	0	3	47
2026	54	4	9	0	4	72
2027	54	4	9	0	4	72
2028	54	4	9	0	4	72
2029	54	4	9	0	4	72
2030	54	4	9	0	4	72
2031	50	4	8	1	4	67
2032	50	4	8	1	4	67
2033	50	4	8	1	4	67
2034	50	4	8	1	4	67
2035	50	4	8	1	4	67
2036	50	3	8	2	4	67
2037	50	3	8	2	4	67
2038	50	3	8	2	4	67
2039	50	3	8	2	4	67
2040	50	3	8	2	4	67
2041	347	37	57	22	28	491
2042	347	37	57	22	28	491
2043	347	37	57	22	28	491
2044	347	37	57	22	28	491
2045	347	37	57	22	28	491
2046	0	0	0	0	0	0
2047	0	0	0	0	0	0
2048	0	0	0	0	0	0
2049	0	0	0	0	0	0
2050	0	0	0	0	0	0

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.007612
2021	0.015225
2022	0.022802
2023	0.030346
2024	0.037858
2025	0.045338
2026	0.055592
2027	0.065830
2028	0.076051
2029	0.086258
2030	0.096449
2031	0.106386
2032	0.116320
2033	0.126253
2034	0.136185
2035	0.146114
2036	0.156348
2037	0.166581
2038	0.176814
2039	0.187048
2040	0.197281
2041	0.279339
2042	0.361398
2043	0.443456
2044	0.525514
2045	0.607572
2046	0.607572
2047	0.607572
2048	0.607572
2049	0.607572
2050	0.607572

Residential Indoor Water Surveys

Overview

Name	Residential Indoor Water Surveys
Abbr	13
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2023
Last Year	2050
Measure Length	28

Measure Life

Permanent	☐
Years	5
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$200.00	$50.00	1
MULTI	$200.00	$50.00	1

Administration Costs

Method: Percent

Markup Percentage	25%

Description

Indoor water surveys for existing residential customers. Target those with high water use and provide a customized report to owner. May include give-away of efficient shower heads, aerators, toilet devices. Could be combined with Residential Outdoor Water Surveys measure.

Customer Classes

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
Toilets	☑	☑									
Urinals											
Lavatory Faucets	☑	☑									
Showers	☑	☑									
Dishwashers	☑	☑									
Clothes Washers	☑	☑									
Process											
Kitchen Spray Rinse											
Internal Leakage	☑	☑									
Baths	☑	☑									
Other	☑	☑									
Non-Lavatory/Kitchen Faucets	☑	☑									
Irrigation	☐	☐									
Pools	☐	☐									
Wash Down	☐	☐									
Car Washing	☐	☐									
External Leakage	☐	☐									
Outdoor											
Cooling											

Comments

> Utility Costs - Utility costs for this measure are primarily staff time. Admin costs/time estimates includes field time, drive time, scheduling, and data entry. Portion 25% to admin in measure design. Giveaway device costs and device rebates as a result of this measure are not included since these are covered in separate measures.

> Customer Costs - Customer costs represent average customer cost to implement any survey suggestions.

> End Use Water Savings - Savings represents average account savings. Savings based off of California Urban Water Agencies water savings study (4/13/15). Approximate 5.8% savings for indoor. Slightly lower value of 5% water savings were selected to account for efficient devices installed during the recent CA drought, and more efficient homes built to CALGreen on the market in the past 5 years.

> Targets - WCWDB FY16/17 & FY17/18 average measure participation rate of: 2.71%. ~11 BAWSCA agencies reported. 0.8% SF survey participation and 4.6% MF survey participation. ACWD Target lowered to 0.8% accounts/year.

Results

Units: MG

Average Water Savings (mgd)	
0.027654	
Lifetime Savings - Present Value ($)	
Utility	$1,123,045
Community	$3,013,575
Lifetime Costs - Present Value ($)	
Utility	$3,067,182
Community	$3,680,618
Benefit to Cost Ratio	
Utility	0.37
Community	0.82
Cost of Savings per Unit Volume ($/mg)	
Utility	$9,795

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Toilets	5.0%	26.3
MULTI Toilets	5.0%	266.6
RES Lavatory Faucets	5.0%	8.1
MULTI Lavatory Faucets	5.0%	90.2
RES Showers	5.0%	35.5
MULTI Showers	5.0%	296.2
RES Dishwashers	5.0%	4.8
MULTI Dishwashers	5.0%	20.2
RES Clothes Washers	5.0%	17.3
MULTI Clothes Washers	5.0%	228.9
RES Internal Leakage	5.0%	22.6
MULTI Internal Leakage	5.0%	161.6
RES Baths	5.0%	6.5
MULTI Baths	5.0%	40.4
RES Other	5.0%	19.4
MULTI Other	5.0%	53.9
RES Non-Lavatory/Kitchen Faucets	5.0%	21.0
MULTI Non-Lavatory/Kitchen Faucets	5.0%	188.5

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.800%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$0	$0	$0
2022	$0	$0	$0
2023	$157,034	$31,407	$188,441
2024	$157,110	$31,422	$188,533
2025	$157,187	$31,437	$188,624
2026	$157,307	$31,461	$188,768
2027	$157,427	$31,485	$188,913
2028	$157,548	$31,510	$189,057
2029	$157,668	$31,534	$189,202
2030	$157,789	$31,558	$189,347
2031	$157,900	$31,580	$189,480
2032	$158,012	$31,602	$189,614
2033	$158,123	$31,625	$189,748
2034	$158,235	$31,647	$189,882
2035	$158,346	$31,669	$190,016
2036	$158,457	$31,691	$190,148
2037	$158,568	$31,714	$190,281
2038	$158,678	$31,736	$190,414
2039	$158,789	$31,758	$190,546
2040	$158,899	$31,780	$190,679
2041	$159,671	$31,934	$191,605
2042	$160,443	$32,089	$192,531
2043	$161,214	$32,243	$193,457
2044	$161,986	$32,397	$194,383
2045	$162,758	$32,552	$195,309
2046	$162,758	$32,552	$195,309
2047	$162,758	$32,552	$195,309
2048	$162,758	$32,552	$195,309
2049	$162,758	$32,552	$195,309
2050	$162,758	$32,552	$195,309

Targets

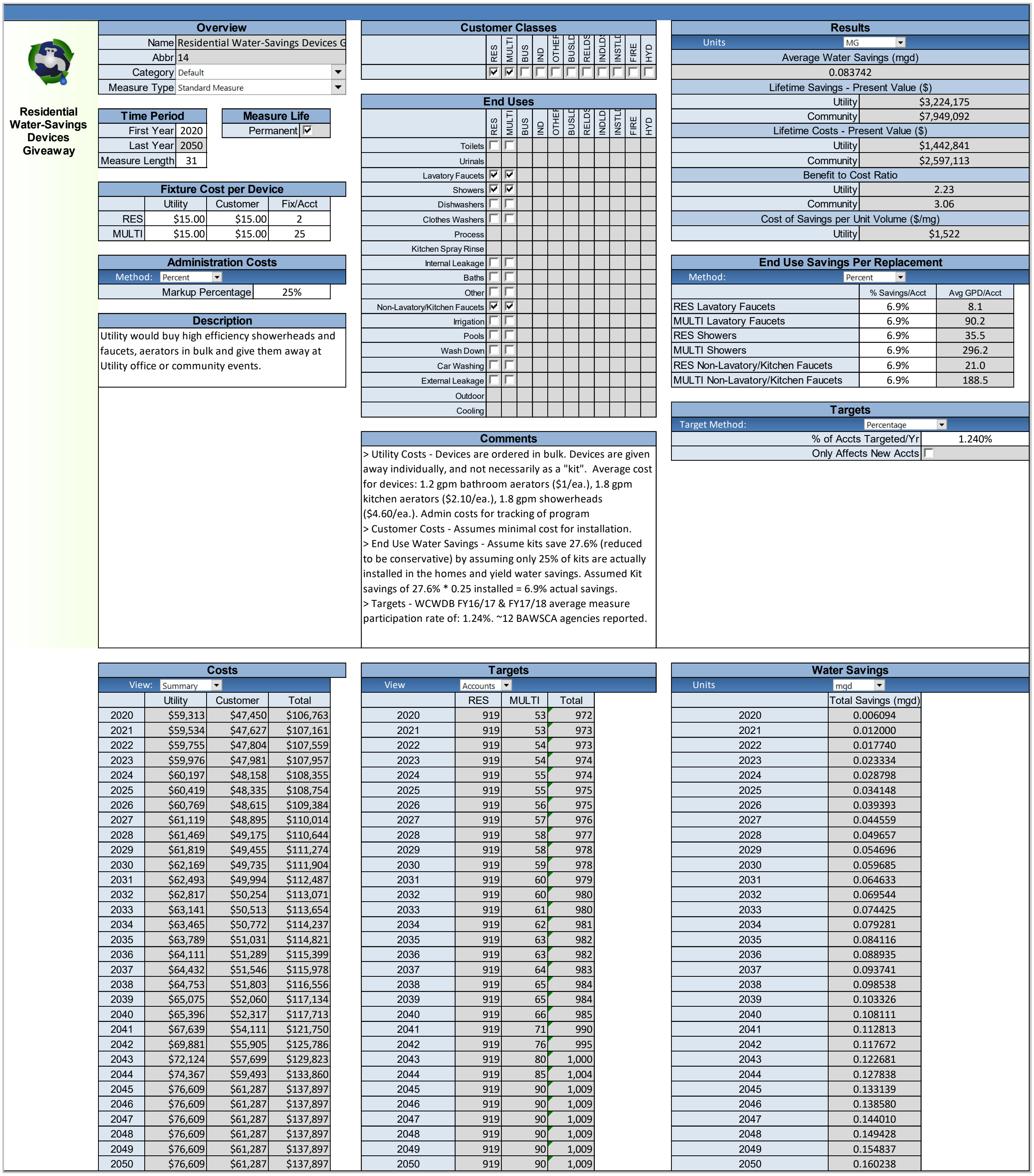
View: Accounts

	RES	MULTI	Total
2020	0	0	0
2021	0	0	0
2022	0	0	0
2023	593	35	628
2024	593	35	628
2025	593	36	629
2026	593	36	629
2027	593	37	630
2028	593	37	630
2029	593	38	631
2030	593	38	631
2031	593	39	632
2032	593	39	632
2033	593	39	632
2034	593	40	633
2035	593	40	633
2036	593	41	634
2037	593	41	634
2038	593	42	635
2039	593	42	635
2040	593	43	636
2041	593	46	639
2042	593	49	642
2043	593	52	645
2044	593	55	648
2045	593	58	651
2046	593	58	651
2047	593	58	651
2048	593	58	651
2049	593	58	651
2050	593	58	651

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.006832
2024	0.013567
2025	0.020210
2026	0.026776
2027	0.033264
2028	0.033096
2029	0.032934
2030	0.032779
2031	0.032621
2032	0.032480
2033	0.032355
2034	0.032245
2035	0.032148
2036	0.032065
2037	0.031994
2038	0.031935
2039	0.031886
2040	0.031846
2041	0.031900
2042	0.032111
2043	0.032474
2044	0.032984
2045	0.033638
2046	0.034176
2047	0.034557
2048	0.034783
2049	0.034855
2050	0.034773



Residential Water-Savings Devices Giveaway

Overview

Name	Residential Water-Savings Devices G
Abbr	14
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2050
Measure Length	31

Measure Life

Permanent	☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$15.00	$15.00	2
MULTI	$15.00	$15.00	25

Administration Costs

Method: Percent

Markup Percentage	25%

Description

Utility would buy high efficiency showerheads and faucets, aerators in bulk and give them away at Utility office or community events.

Customer Classes

RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
Toilets	☐	☐									
Urinals											
Lavatory Faucets	☑	☑									
Showers	☑	☑									
Dishwashers	☐	☐									
Clothes Washers	☐	☐									
Process											
Kitchen Spray Rinse											
Internal Leakage	☐	☐									
Baths	☐	☐									
Other	☐	☐									
Non-Lavatory/Kitchen Faucets	☑	☑									
Irrigation	☐	☐									
Pools	☐	☐									
Wash Down	☐	☐									
Car Washing	☐	☐									
External Leakage	☐	☐									
Outdoor											
Cooling											

Comments

> Utility Costs - Devices are ordered in bulk. Devices are given away individually, and not necessarily as a "kit". Average cost for devices: 1.2 gpm bathroom aerators ($1/ea.), 1.8 gpm kitchen aerators ($2.10/ea.), 1.8 gpm showerheads ($4.60/ea.). Admin costs for tracking of program

> Customer Costs - Assumes minimal cost for installation.

> End Use Water Savings - Assume kits save 27.6% (reduced to be conservative) by assuming only 25% of kits are actually installed in the homes and yield water savings. Assumed Kit savings of 27.6% * 0.25 installed = 6.9% actual savings.

> Targets - WCWDB FY16/17 & FY17/18 average measure participation rate of: 1.24%. ~12 BAWSCA agencies reported.

Results

Units: MG

Average Water Savings (mgd)	
0.083742	
Lifetime Savings - Present Value ($)	
Utility	$3,224,175
Community	$7,949,092
Lifetime Costs - Present Value ($)	
Utility	$1,442,841
Community	$2,597,113
Benefit to Cost Ratio	
Utility	2.23
Community	3.06
Cost of Savings per Unit Volume ($/mg)	
Utility	$1,522

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Lavatory Faucets	6.9%	8.1
MULTI Lavatory Faucets	6.9%	90.2
RES Showers	6.9%	35.5
MULTI Showers	6.9%	296.2
RES Non-Lavatory/Kitchen Faucets	6.9%	21.0
MULTI Non-Lavatory/Kitchen Faucets	6.9%	188.5

Targets

Target Method: Percentage

% of Accts Targeted/Yr	1.240%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$59,313	$47,450	$106,763
2021	$59,534	$47,627	$107,161
2022	$59,755	$47,804	$107,559
2023	$59,976	$47,981	$107,957
2024	$60,197	$48,158	$108,355
2025	$60,419	$48,335	$108,754
2026	$60,769	$48,615	$109,384
2027	$61,119	$48,895	$110,014
2028	$61,469	$49,175	$110,644
2029	$61,819	$49,455	$111,274
2030	$62,169	$49,735	$111,904
2031	$62,493	$49,994	$112,487
2032	$62,817	$50,254	$113,071
2033	$63,141	$50,513	$113,654
2034	$63,465	$50,772	$114,237
2035	$63,789	$51,031	$114,821
2036	$64,111	$51,289	$115,399
2037	$64,432	$51,546	$115,978
2038	$64,753	$51,803	$116,556
2039	$65,075	$52,060	$117,134
2040	$65,396	$52,317	$117,713
2041	$67,639	$54,111	$121,750
2042	$69,881	$55,905	$125,786
2043	$72,124	$57,699	$129,823
2044	$74,367	$59,493	$133,860
2045	$76,609	$61,287	$137,897
2046	$76,609	$61,287	$137,897
2047	$76,609	$61,287	$137,897
2048	$76,609	$61,287	$137,897
2049	$76,609	$61,287	$137,897
2050	$76,609	$61,287	$137,897

Targets

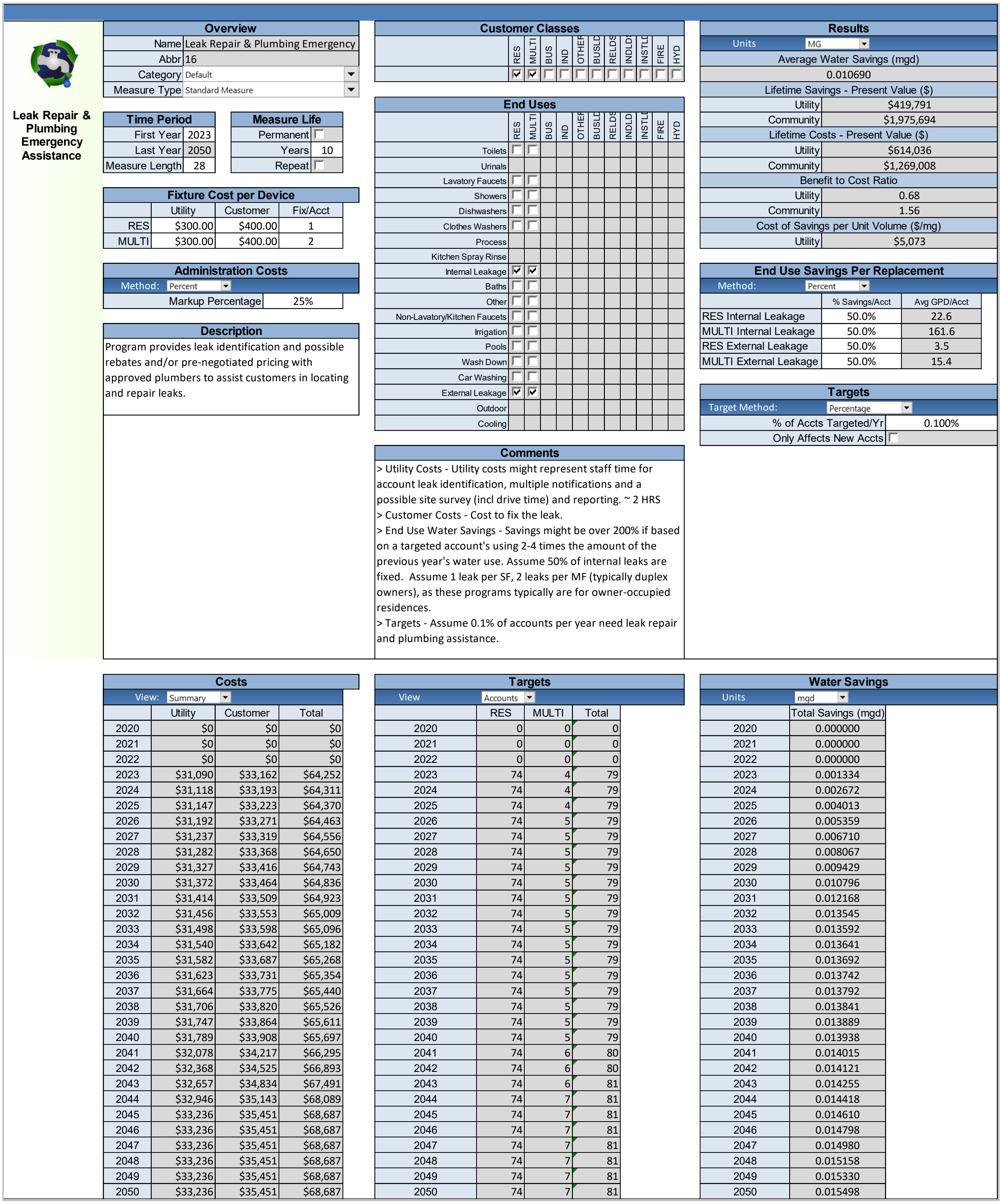
View: Accounts

	RES	MULTI	Total
2020	919	53	972
2021	919	53	973
2022	919	54	973
2023	919	54	974
2024	919	55	974
2025	919	55	975
2026	919	56	975
2027	919	57	976
2028	919	58	977
2029	919	58	978
2030	919	59	978
2031	919	60	979
2032	919	60	980
2033	919	61	980
2034	919	62	981
2035	919	63	982
2036	919	63	982
2037	919	64	983
2038	919	65	984
2039	919	65	984
2040	919	66	985
2041	919	71	990
2042	919	76	995
2043	919	80	1,000
2044	919	85	1,004
2045	919	90	1,009
2046	919	90	1,009
2047	919	90	1,009
2048	919	90	1,009
2049	919	90	1,009
2050	919	90	1,009

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.006094
2021	0.012000
2022	0.017740
2023	0.023334
2024	0.028798
2025	0.034148
2026	0.039393
2027	0.044559
2028	0.049657
2029	0.054696
2030	0.059685
2031	0.064633
2032	0.069544
2033	0.074425
2034	0.079281
2035	0.084116
2036	0.088935
2037	0.093741
2038	0.098538
2039	0.103326
2040	0.108111
2041	0.112813
2042	0.117672
2043	0.122681
2044	0.127838
2045	0.133139
2046	0.138580
2047	0.144010
2048	0.149428
2049	0.154837
2050	0.160238



Leak Repair & Plumbing Emergency Assistance

Overview

Name	Leak Repair & Plumbing Emergency
Abbr	16
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2023
Last Year	2050
Measure Length	28

Measure Life

Permanent	☐
Years	10
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$300.00	$400.00	1
MULTI	$300.00	$400.00	2

Administration Costs

Method: Percent

Markup Percentage	25%

Description

Program provides leak identification and possible rebates and/or pre-negotiated pricing with approved plumbers to assist customers in locating and repair leaks.

Customer Classes

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLDS	INSTLD	FIRE	HYD
	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLDS	INSTLD	FIRE	HYD
Toilets	☐	☐									
Urinals											
Lavatory Faucets	☐	☐									
Showers	☐	☐									
Dishwashers	☐	☐									
Clothes Washers	☐	☐									
Process											
Kitchen Spray Rinse											
Internal Leakage	☑	☑									
Baths	☐	☐									
Other	☐	☐									
Non-Lavatory/Kitchen Faucets	☐	☐									
Irrigation	☐	☐									
Pools	☐	☐									
Wash Down	☐	☐									
Car Washing	☐	☐									
External Leakage	☑	☑									
Outdoor											
Cooling											

Comments

> Utility Costs - Utility costs might represent staff time for account leak identification, multiple notifications and a possible site survey (incl drive time) and reporting. ~ 2 HRS

> Customer Costs - Cost to fix the leak.

> End Use Water Savings - Savings might be over 200% if based on a targeted account's using 2-4 times the amount of the previous year's water use. Assume 50% of internal leaks are fixed. Assume 1 leak per SF, 2 leaks per MF (typically duplex owners), as these programs typically are for owner-occupied residences.

> Targets - Assume 0.1% of accounts per year need leak repair and plumbing assistance.

Results

Units: MG

Average Water Savings (mgd)	
0.010690	
Lifetime Savings - Present Value ($)	
Utility	$419,791
Community	$1,975,694
Lifetime Costs - Present Value ($)	
Utility	$614,036
Community	$1,269,008
Benefit to Cost Ratio	
Utility	0.68
Community	1.56
Cost of Savings per Unit Volume ($/mg)	
Utility	$5,073

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Internal Leakage	50.0%	22.6
MULTI Internal Leakage	50.0%	161.6
RES External Leakage	50.0%	3.5
MULTI External Leakage	50.0%	15.4

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.100%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$0	$0	$0
2022	$0	$0	$0
2023	$31,090	$33,162	$64,252
2024	$31,118	$33,193	$64,311
2025	$31,147	$33,223	$64,370
2026	$31,192	$33,271	$64,463
2027	$31,237	$33,319	$64,556
2028	$31,282	$33,368	$64,650
2029	$31,327	$33,416	$64,743
2030	$31,372	$33,464	$64,836
2031	$31,414	$33,509	$64,923
2032	$31,456	$33,553	$65,009
2033	$31,498	$33,598	$65,096
2034	$31,540	$33,642	$65,182
2035	$31,582	$33,687	$65,268
2036	$31,623	$33,731	$65,354
2037	$31,664	$33,775	$65,440
2038	$31,706	$33,820	$65,526
2039	$31,747	$33,864	$65,611
2040	$31,789	$33,908	$65,697
2041	$32,078	$34,217	$66,295
2042	$32,368	$34,525	$66,893
2043	$32,657	$34,834	$67,491
2044	$32,946	$35,143	$68,089
2045	$33,236	$35,451	$68,687
2046	$33,236	$35,451	$68,687
2047	$33,236	$35,451	$68,687
2048	$33,236	$35,451	$68,687
2049	$33,236	$35,451	$68,687
2050	$33,236	$35,451	$68,687

Targets

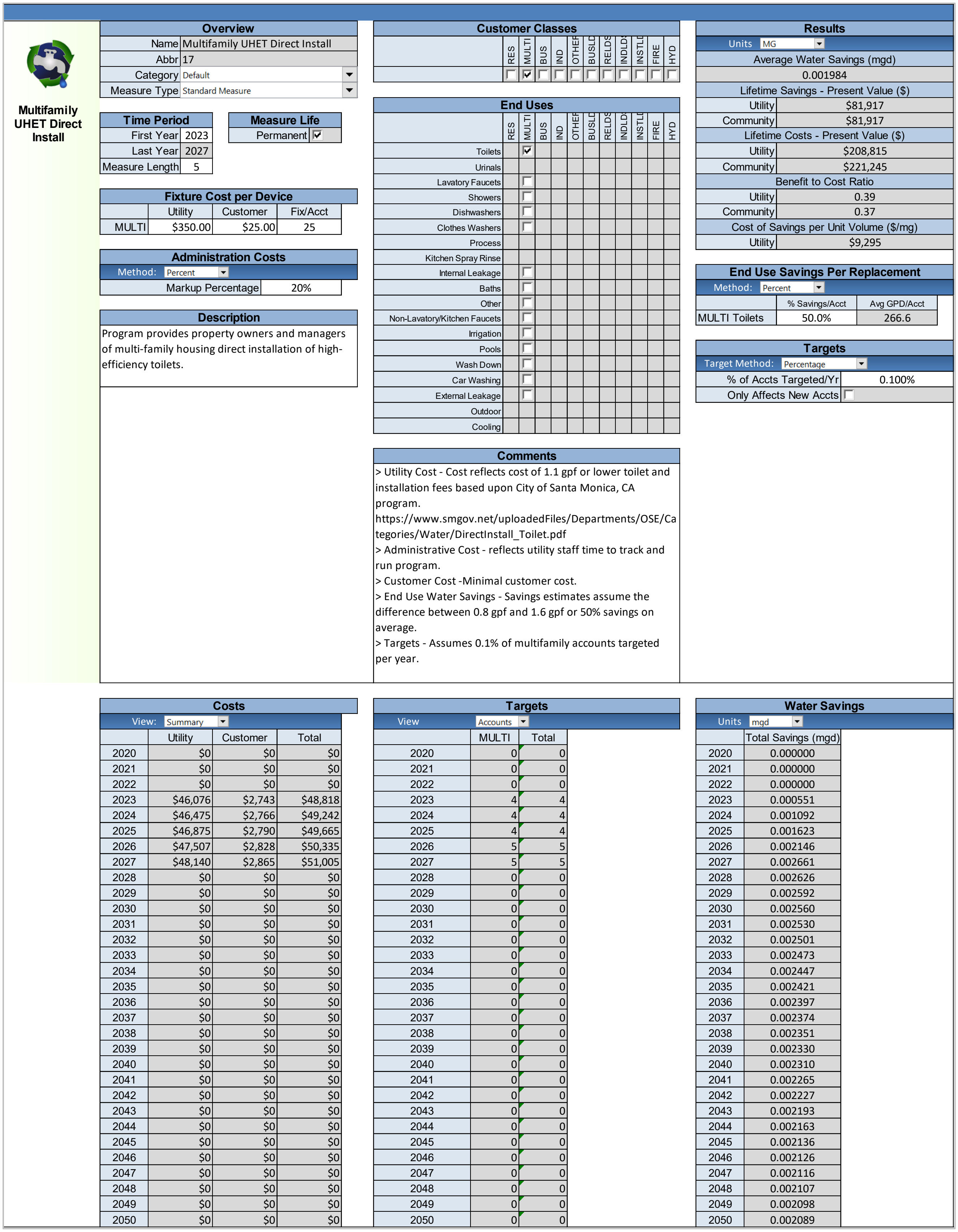
View: Accounts

	RES	MULTI	Total
2020	0	0	0
2021	0	0	0
2022	0	0	0
2023	74	4	79
2024	74	4	79
2025	74	4	79
2026	74	5	79
2027	74	5	79
2028	74	5	79
2029	74	5	79
2030	74	5	79
2031	74	5	79
2032	74	5	79
2033	74	5	79
2034	74	5	79
2035	74	5	79
2036	74	5	79
2037	74	5	79
2038	74	5	79
2039	74	5	79
2040	74	5	79
2041	74	6	80
2042	74	6	80
2043	74	6	81
2044	74	7	81
2045	74	7	81
2046	74	7	81
2047	74	7	81
2048	74	7	81
2049	74	7	81
2050	74	7	81

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.001334
2024	0.002672
2025	0.004013
2026	0.005359
2027	0.006710
2028	0.008067
2029	0.009429
2030	0.010796
2031	0.012168
2032	0.013545
2033	0.013592
2034	0.013641
2035	0.013692
2036	0.013742
2037	0.013792
2038	0.013841
2039	0.013889
2040	0.013938
2041	0.014015
2042	0.014121
2043	0.014255
2044	0.014418
2045	0.014610
2046	0.014798
2047	0.014980
2048	0.015158
2049	0.015330
2050	0.015498



Multifamily UHET Direct Install

Overview

Name	Multifamily UHET Direct Install
Abbr	17
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2023
Last Year	2027
Measure Length	5

Measure Life

Permanent ☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
MULTI	$350.00	$25.00	25

Administration Costs

Method: Percent

Markup Percentage	20%

Description

Program provides property owners and managers of multi-family housing direct installation of high-efficiency toilets.

Customer Classes

RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
Toilets		☑									
Urinals											
Lavatory Faucets		☐									
Showers		☐									
Dishwashers		☐									
Clothes Washers		☐									
Process											
Kitchen Spray Rinse											
Internal Leakage		☐									
Baths		☐									
Other		☐									
Non-Lavatory/Kitchen Faucets		☐									
Irrigation		☐									
Pools		☐									
Wash Down		☐									
Car Washing		☐									
External Leakage		☐									
Outdoor											
Cooling											

Comments

> Utility Cost - Cost reflects cost of 1.1 gpf or lower toilet and installation fees based upon City of Santa Monica, CA program. https://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Water/DirectInstall_Toilet.pdf

> Administrative Cost - reflects utility staff time to track and run program.

> Customer Cost -Minimal customer cost.

> End Use Water Savings - Savings estimates assume the difference between 0.8 gpf and 1.6 gpf or 50% savings on average.

> Targets - Assumes 0.1% of multifamily accounts targeted per year.

Results

Units: MG

Average Water Savings (mgd)	
	0.001984
Lifetime Savings - Present Value ($)	
Utility	$81,917
Community	$81,917
Lifetime Costs - Present Value ($)	
Utility	$208,815
Community	$221,245
Benefit to Cost Ratio	
Utility	0.39
Community	0.37
Cost of Savings per Unit Volume ($/mg)	
Utility	$9,295

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
MULTI Toilets	50.0%	266.6

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.100%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$0	$0	$0
2022	$0	$0	$0
2023	$46,076	$2,743	$48,818
2024	$46,475	$2,766	$49,242
2025	$46,875	$2,790	$49,665
2026	$47,507	$2,828	$50,335
2027	$48,140	$2,865	$51,005
2028	$0	$0	$0
2029	$0	$0	$0
2030	$0	$0	$0
2031	$0	$0	$0
2032	$0	$0	$0
2033	$0	$0	$0
2034	$0	$0	$0
2035	$0	$0	$0
2036	$0	$0	$0
2037	$0	$0	$0
2038	$0	$0	$0
2039	$0	$0	$0
2040	$0	$0	$0
2041	$0	$0	$0
2042	$0	$0	$0
2043	$0	$0	$0
2044	$0	$0	$0
2045	$0	$0	$0
2046	$0	$0	$0
2047	$0	$0	$0
2048	$0	$0	$0
2049	$0	$0	$0
2050	$0	$0	$0

Targets

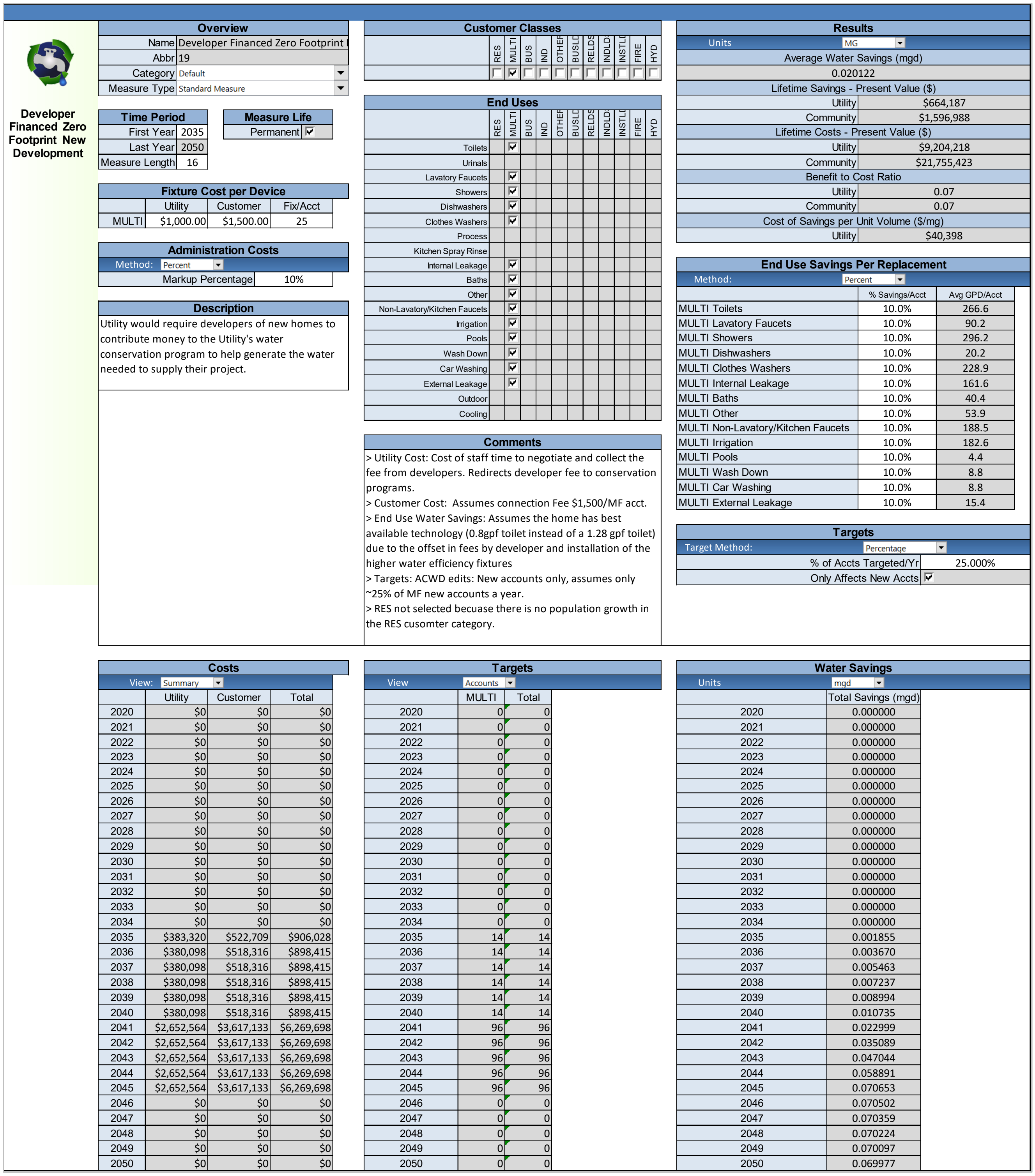
View: Accounts

	MULTI	Total
2020	0	0
2021	0	0
2022	0	0
2023	4	4
2024	4	4
2025	4	4
2026	5	5
2027	5	5
2028	0	0
2029	0	0
2030	0	0
2031	0	0
2032	0	0
2033	0	0
2034	0	0
2035	0	0
2036	0	0
2037	0	0
2038	0	0
2039	0	0
2040	0	0
2041	0	0
2042	0	0
2043	0	0
2044	0	0
2045	0	0
2046	0	0
2047	0	0
2048	0	0
2049	0	0
2050	0	0

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.000551
2024	0.001092
2025	0.001623
2026	0.002146
2027	0.002661
2028	0.002626
2029	0.002592
2030	0.002560
2031	0.002530
2032	0.002501
2033	0.002473
2034	0.002447
2035	0.002421
2036	0.002397
2037	0.002374
2038	0.002351
2039	0.002330
2040	0.002310
2041	0.002265
2042	0.002227
2043	0.002193
2044	0.002163
2045	0.002136
2046	0.002126
2047	0.002116
2048	0.002107
2049	0.002098
2050	0.002089



Developer Financed Zero Footprint New Development

Overview

Name	Developer Financed Zero Footprint
Abbr	19
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2035
Last Year	2050
Measure Length	16

Measure Life

Permanent	☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
MULTI	$1,000.00	$1,500.00	25

Administration Costs

Method: Percent

Markup Percentage	10%

Description

Utility would require developers of new homes to contribute money to the Utility's water conservation program to help generate the water needed to supply their project.

Customer Classes

	RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
	☐	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
Toilets		☑									
Urinals											
Lavatory Faucets		☑									
Showers		☑									
Dishwashers		☑									
Clothes Washers		☑									
Process											
Kitchen Spray Rinse											
Internal Leakage		☑									
Baths		☑									
Other		☑									
Non-Lavatory/Kitchen Faucets		☑									
Irrigation		☑									
Pools		☑									
Wash Down		☑									
Car Washing		☑									
External Leakage		☑									
Outdoor											
Cooling											

Comments

> Utility Cost: Cost of staff time to negotiate and collect the fee from developers. Redirects developer fee to conservation programs.

> Customer Cost: Assumes connection Fee $1,500/MF acct.

> End Use Water Savings: Assumes the home has best available technology (0.8gpf toilet instead of a 1.28 gpf toilet) due to the offset in fees by developer and installation of the higher water efficiency fixtures

> Targets: ACWD edits: New accounts only, assumes only ~25% of MF new accounts a year.

> RES not selected becuase there is no population growth in the RES cusomter category.

Results

Units: MG

Average Water Savings (mgd)	
0.020122	
Lifetime Savings - Present Value ($)	
Utility	$664,187
Community	$1,596,988
Lifetime Costs - Present Value ($)	
Utility	$9,204,218
Community	$21,755,423
Benefit to Cost Ratio	
Utility	0.07
Community	0.07
Cost of Savings per Unit Volume ($/mg)	
Utility	$40,398

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
MULTI Toilets	10.0%	266.6
MULTI Lavatory Faucets	10.0%	90.2
MULTI Showers	10.0%	296.2
MULTI Dishwashers	10.0%	20.2
MULTI Clothes Washers	10.0%	228.9
MULTI Internal Leakage	10.0%	161.6
MULTI Baths	10.0%	40.4
MULTI Other	10.0%	53.9
MULTI Non-Lavatory/Kitchen Faucets	10.0%	188.5
MULTI Irrigation	10.0%	182.6
MULTI Pools	10.0%	4.4
MULTI Wash Down	10.0%	8.8
MULTI Car Washing	10.0%	8.8
MULTI External Leakage	10.0%	15.4

Targets

Target Method: Percentage

% of Accts Targeted/Yr	25.000%
Only Affects New Accts	☑

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$0	$0	$0
2022	$0	$0	$0
2023	$0	$0	$0
2024	$0	$0	$0
2025	$0	$0	$0
2026	$0	$0	$0
2027	$0	$0	$0
2028	$0	$0	$0
2029	$0	$0	$0
2030	$0	$0	$0
2031	$0	$0	$0
2032	$0	$0	$0
2033	$0	$0	$0
2034	$0	$0	$0
2035	$383,320	$522,709	$906,028
2036	$380,098	$518,316	$898,415
2037	$380,098	$518,316	$898,415
2038	$380,098	$518,316	$898,415
2039	$380,098	$518,316	$898,415
2040	$380,098	$518,316	$898,415
2041	$2,652,564	$3,617,133	$6,269,698
2042	$2,652,564	$3,617,133	$6,269,698
2043	$2,652,564	$3,617,133	$6,269,698
2044	$2,652,564	$3,617,133	$6,269,698
2045	$2,652,564	$3,617,133	$6,269,698
2046	$0	$0	$0
2047	$0	$0	$0
2048	$0	$0	$0
2049	$0	$0	$0
2050	$0	$0	$0

Targets

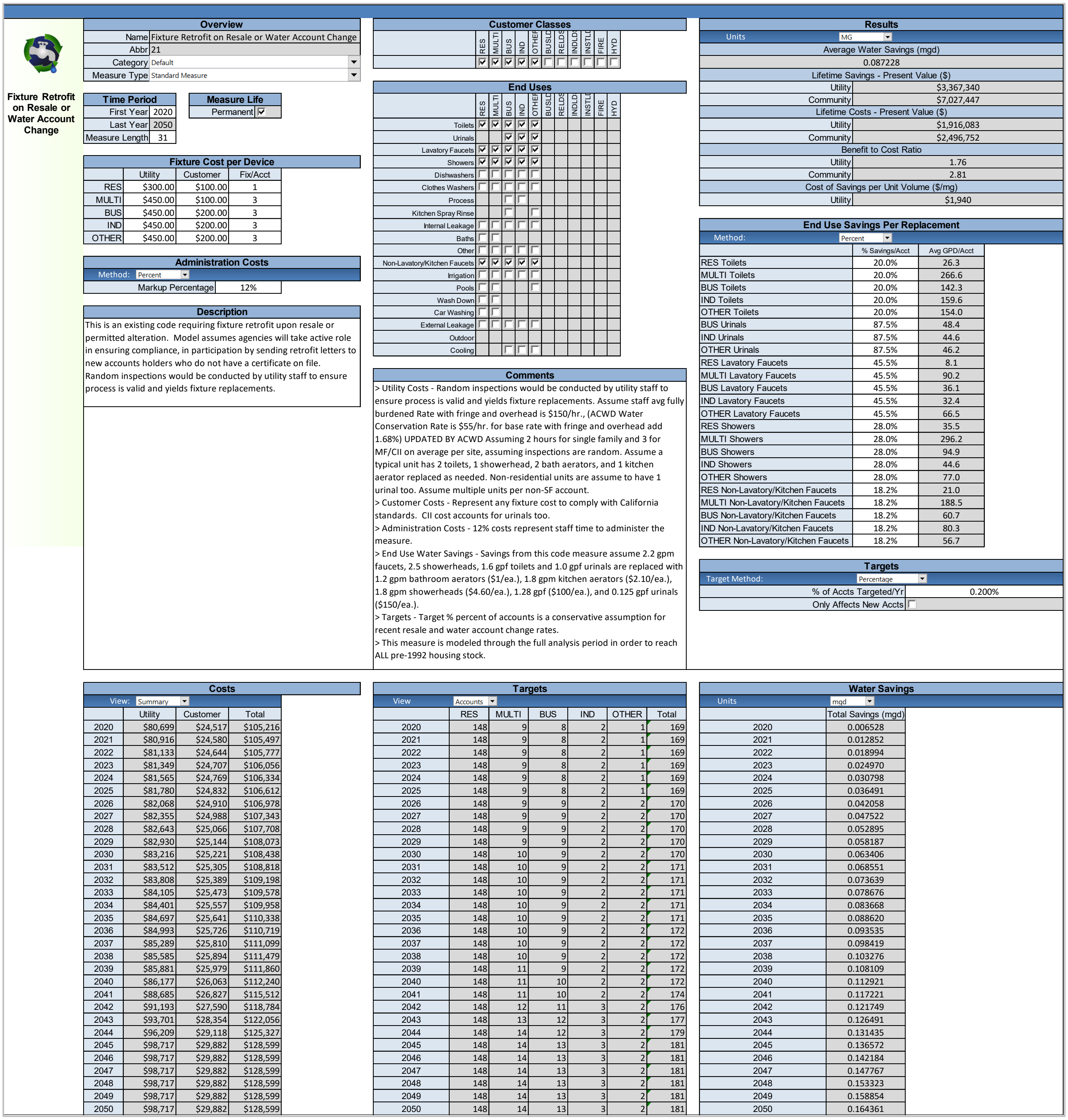
View: Accounts

	MULTI	Total
2020	0	0
2021	0	0
2022	0	0
2023	0	0
2024	0	0
2025	0	0
2026	0	0
2027	0	0
2028	0	0
2029	0	0
2030	0	0
2031	0	0
2032	0	0
2033	0	0
2034	0	0
2035	14	14
2036	14	14
2037	14	14
2038	14	14
2039	14	14
2040	14	14
2041	96	96
2042	96	96
2043	96	96
2044	96	96
2045	96	96
2046	0	0
2047	0	0
2048	0	0
2049	0	0
2050	0	0

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.000000
2024	0.000000
2025	0.000000
2026	0.000000
2027	0.000000
2028	0.000000
2029	0.000000
2030	0.000000
2031	0.000000
2032	0.000000
2033	0.000000
2034	0.000000
2035	0.001855
2036	0.003670
2037	0.005463
2038	0.007237
2039	0.008994
2040	0.010735
2041	0.022999
2042	0.035089
2043	0.047044
2044	0.058891
2045	0.070653
2046	0.070502
2047	0.070359
2048	0.070224
2049	0.070097
2050	0.069977



Fixture Retrofit on Resale or Water Account Change

Overview

Name	Fixture Retrofit on Resale or Water Account Change
Abbr	21
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2050
Measure Length	31

Measure Life

Permanent	☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$300.00	$100.00	1
MULTI	$450.00	$100.00	3
BUS	$450.00	$200.00	3
IND	$450.00	$200.00	3
OTHER	$450.00	$200.00	3

Administration Costs

Method: Percent

Markup Percentage	12%

Description

This is an existing code requiring fixture retrofit upon resale or permitted alteration. Model assumes agencies will take active role in ensuring compliance, in participation by sending retrofit letters to new accounts holders who do not have a certificate on file. Random inspections would be conducted by utility staff to ensure process is valid and yields fixture replacements.

Customer Classes

RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHE	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
Toilets	☑	☑	☑	☑	☑						
Urinals			☑	☑	☑						
Lavatory Faucets	☑	☑	☑	☑	☑						
Showers	☑	☑	☑	☑	☑						
Dishwashers	☐	☐	☐	☐	☐						
Clothes Washers	☐	☐	☐	☐	☐						
Process			☐	☐							
Kitchen Spray Rinse			☐		☐						
Internal Leakage	☐	☐	☐	☐	☐						
Baths	☐	☐									
Other	☐	☐	☐	☐	☐						
Non-Lavatory/Kitchen Faucets	☑	☑	☑	☑	☑						
Irrigation	☐	☐	☐	☐	☐						
Pools	☐	☐			☐						
Wash Down	☐	☐									
Car Washing	☐	☐									
External Leakage	☐	☐	☐	☐	☐						
Outdoor											
Cooling			☐	☐	☐						

Comments

> Utility Costs - Random inspections would be conducted by utility staff to ensure process is valid and yields fixture replacements. Assume staff avg fully burdened Rate with fringe and overhead is $150/hr., (ACWD Water Conservation Rate is $55/hr. for base rate with fringe and overhead add 1.68%) UPDATED BY ACWD Assuming 2 hours for single family and 3 for MF/CII on average per site, assuming inspections are random. Assume a typical unit has 2 toilets, 1 showerhead, 2 bath aerators, and 1 kitchen aerator replaced as needed. Non-residential units are assume to have 1 urinal too. Assume multiple units per non-SF account.

> Customer Costs - Represent any fixture cost to comply with California standards. CII cost accounts for urinals too.

> Administration Costs - 12% costs represent staff time to administer the measure.

> End Use Water Savings - Savings from this code measure assume 2.2 gpm faucets, 2.5 showerheads, 1.6 gpf toilets and 1.0 gpf urinals are replaced with 1.2 gpm bathroom aerators ($1/ea.), 1.8 gpm kitchen aerators ($2.10/ea.), 1.8 gpm showerheads ($4.60/ea.), 1.28 gpf ($100/ea.), and 0.125 gpf urinals ($150/ea.).

> Targets - Target % percent of accounts is a conservative assumption for recent resale and water account change rates.

> This measure is modeled through the full analysis period in order to reach ALL pre-1992 housing stock.

Results

Units: MG

Average Water Savings (mgd)	
	0.087228
Lifetime Savings - Present Value ($)	
Utility	$3,367,340
Community	$7,027,447
Lifetime Costs - Present Value ($)	
Utility	$1,916,083
Community	$2,496,752
Benefit to Cost Ratio	
Utility	1.76
Community	2.81
Cost of Savings per Unit Volume ($/mg)	
Utility	$1,940

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Toilets	20.0%	26.3
MULTI Toilets	20.0%	266.6
BUS Toilets	20.0%	142.3
IND Toilets	20.0%	159.6
OTHER Toilets	20.0%	154.0
BUS Urinals	87.5%	48.4
IND Urinals	87.5%	44.6
OTHER Urinals	87.5%	46.2
RES Lavatory Faucets	45.5%	8.1
MULTI Lavatory Faucets	45.5%	90.2
BUS Lavatory Faucets	45.5%	36.1
IND Lavatory Faucets	45.5%	32.4
OTHER Lavatory Faucets	45.5%	66.5
RES Showers	28.0%	35.5
MULTI Showers	28.0%	296.2
BUS Showers	28.0%	94.9
IND Showers	28.0%	44.6
OTHER Showers	28.0%	77.0
RES Non-Lavatory/Kitchen Faucets	18.2%	21.0
MULTI Non-Lavatory/Kitchen Faucets	18.2%	188.5
BUS Non-Lavatory/Kitchen Faucets	18.2%	60.7
IND Non-Lavatory/Kitchen Faucets	18.2%	80.3
OTHER Non-Lavatory/Kitchen Faucets	18.2%	56.7

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.200%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$80,699	$24,517	$105,216
2021	$80,916	$24,580	$105,497
2022	$81,133	$24,644	$105,777
2023	$81,349	$24,707	$106,056
2024	$81,565	$24,769	$106,334
2025	$81,780	$24,832	$106,612
2026	$82,068	$24,910	$106,978
2027	$82,355	$24,988	$107,343
2028	$82,643	$25,066	$107,708
2029	$82,930	$25,144	$108,073
2030	$83,216	$25,221	$108,438
2031	$83,512	$25,305	$108,818
2032	$83,808	$25,389	$109,198
2033	$84,105	$25,473	$109,578
2034	$84,401	$25,557	$109,958
2035	$84,697	$25,641	$110,338
2036	$84,993	$25,726	$110,719
2037	$85,289	$25,810	$111,099
2038	$85,585	$25,894	$111,479
2039	$85,881	$25,979	$111,860
2040	$86,177	$26,063	$112,240
2041	$88,685	$26,827	$115,512
2042	$91,193	$27,590	$118,784
2043	$93,701	$28,354	$122,056
2044	$96,209	$29,118	$125,327
2045	$98,717	$29,882	$128,599
2046	$98,717	$29,882	$128,599
2047	$98,717	$29,882	$128,599
2048	$98,717	$29,882	$128,599
2049	$98,717	$29,882	$128,599
2050	$98,717	$29,882	$128,599

Targets

View: Accounts

	RES	MULTI	BUS	IND	OTHER	Total
2020	148	9	8	2	1	169
2021	148	9	8	2	1	169
2022	148	9	8	2	1	169
2023	148	9	8	2	1	169
2024	148	9	8	2	1	169
2025	148	9	8	2	1	169
2026	148	9	9	2	2	170
2027	148	9	9	2	2	170
2028	148	9	9	2	2	170
2029	148	9	9	2	2	170
2030	148	10	9	2	2	170
2031	148	10	9	2	2	171
2032	148	10	9	2	2	171
2033	148	10	9	2	2	171
2034	148	10	9	2	2	171
2035	148	10	9	2	2	171
2036	148	10	9	2	2	172
2037	148	10	9	2	2	172
2038	148	10	9	2	2	172
2039	148	11	9	2	2	172
2040	148	11	10	2	2	172
2041	148	11	10	2	2	174
2042	148	12	11	3	2	176
2043	148	13	12	3	2	177
2044	148	14	12	3	2	179
2045	148	14	13	3	2	181
2046	148	14	13	3	2	181
2047	148	14	13	3	2	181
2048	148	14	13	3	2	181
2049	148	14	13	3	2	181
2050	148	14	13	3	2	181

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.006528
2021	0.012852
2022	0.018994
2023	0.024970
2024	0.030798
2025	0.036491
2026	0.042058
2027	0.047522
2028	0.052895
2029	0.058187
2030	0.063406
2031	0.068551
2032	0.073639
2033	0.078676
2034	0.083668
2035	0.088620
2036	0.093535
2037	0.098419
2038	0.103276
2039	0.108109
2040	0.112921
2041	0.117221
2042	0.121749
2043	0.126491
2044	0.131435
2045	0.136572
2046	0.142184
2047	0.147767
2048	0.153323
2049	0.158854
2050	0.164361

ACWD Public & School Education

Overview

Name	ACWD Public & School Education
Abbr	22
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2050
Measure Length	31

Measure Life

Permanent	☐
Years	2
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$3.50	$0.00	1

Administration Costs

Method: Percent

Markup Percentage	15%

Description

ACWD public and school education program measure that includes the following aspects: Recognition Programs for Water Savings by Residences & Apartments Program, Recognition Programs for Water Savings by Businesses, Recognition Programs for Water Savings by Residences & Apartments Program, Recognition Programs for Water Savings by Businesses, Outdoor Residential focused Public Awareness Information Program, Efficient Outdoor Use Education and Training Programs, Train Landscape Maintenance Workers (Green Gardener Program), Networking with Landscaping Industry, Landscape Water Calculator, Xeriscape Demonstration Gardens, Conservation Print Media, Electronic Conservation Options/Web Site/Social Media, Speakers Bureau/Event Participation, Media Campaign: such as the “Use Only What You Need” or “Beat the Peak”, Billing Report Educational Tool, Conservation Print Media, Electronic Conservation Options/Web Site/Social Media, Speakers Bureau/Event Participation, Media Campaign: such as the “Use Only What You Need” or “Beat the Peak”, Billing Report Educational Tool, Car Wash Coupon, Shade Tree Program

Customer Classes

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
Toilets	☑										
Urinals											
Lavatory Faucets	☑										
Showers	☑										
Dishwashers	☑										
Clothes Washers	☑										
Process											
Kitchen Spray Rinse											
Internal Leakage	☑										
Baths	☑										
Other	☑										
Non-Lavatory/Kitchen Faucets	☑										
Irrigation	☑										
Pools	☑										
Wash Down	☑										
Car Washing	☑										
External Leakage	☑										
Outdoor											
Cooling											

Comments

> Utility Cost - Utility costs include the following: dye tabs, shower timers, dish scrapers, plumbers tape, drip gauge, tank bags, adult stickers, website hosting and support, print ads, radio ads, signs, internet ads, events, realtor lunch, hospitality lunch, bill stuffer, printed collateral, customer appreciation, and tourism collateral. Might include school education outreach materials such as stickers, coloring books and activity books.   ACWD public and school education costs broken out into: $35K estimated WC staff time devoted to general WC outreach ~5 hours per week at $150/hr., $35K estimated PA staff time devoted to general WC outreach ~5 hours per week at $150/hr., $20K for materials, $60K for school education. Approx. a total of $150,000 per year.

> Customer Cost - No Customer Cost

> End Use Water Savings - Public info water savings range is 0.1%-0.5% on each end use. Assumed the average of 0.25%

> Targets - Target all end uses 50% of residential accounts per yr.

Results

Units: MG

Average Water Savings (mgd)	
0.035328	
Lifetime Savings - Present Value ($)	
Utility	$1,534,641
Community	$3,453,896
Lifetime Costs - Present Value ($)	
Utility	$3,314,530
Community	$3,314,530
Benefit to Cost Ratio	
Utility	0.46
Community	1.04
Cost of Savings per Unit Volume ($/mg)	
Utility	$8,286

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Toilets	0.3%	26.3
RES Lavatory Faucets	0.3%	8.1
RES Showers	0.3%	35.5
RES Dishwashers	0.3%	4.8
RES Clothes Washers	0.3%	17.3
RES Internal Leakage	0.3%	22.6
RES Baths	0.3%	6.5
RES Other	0.3%	19.4
RES Non-Lavatory/Kitchen Faucets	0.3%	21.0
RES Irrigation	0.3%	42.0
RES Pools	0.3%	1.0
RES Wash Down	0.3%	2.0
RES Car Washing	0.3%	2.0
RES External Leakage	0.3%	3.5

Targets

Target Method: Percentage

% of Accts Targeted/Yr	50.000%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$149,185	$0	$149,185
2021	$149,185	$0	$149,185
2022	$149,185	$0	$149,185
2023	$149,185	$0	$149,185
2024	$149,185	$0	$149,185
2025	$149,185	$0	$149,185
2026	$149,185	$0	$149,185
2027	$149,185	$0	$149,185
2028	$149,185	$0	$149,185
2029	$149,185	$0	$149,185
2030	$149,185	$0	$149,185
2031	$149,185	$0	$149,185
2032	$149,185	$0	$149,185
2033	$149,185	$0	$149,185
2034	$149,185	$0	$149,185
2035	$149,185	$0	$149,185
2036	$149,185	$0	$149,185
2037	$149,185	$0	$149,185
2038	$149,185	$0	$149,185
2039	$149,185	$0	$149,185
2040	$149,185	$0	$149,185
2041	$149,185	$0	$149,185
2042	$149,185	$0	$149,185
2043	$149,185	$0	$149,185
2044	$149,185	$0	$149,185
2045	$149,185	$0	$149,185
2046	$149,185	$0	$149,185
2047	$149,185	$0	$149,185
2048	$149,185	$0	$149,185
2049	$149,185	$0	$149,185
2050	$149,185	$0	$149,185

Targets

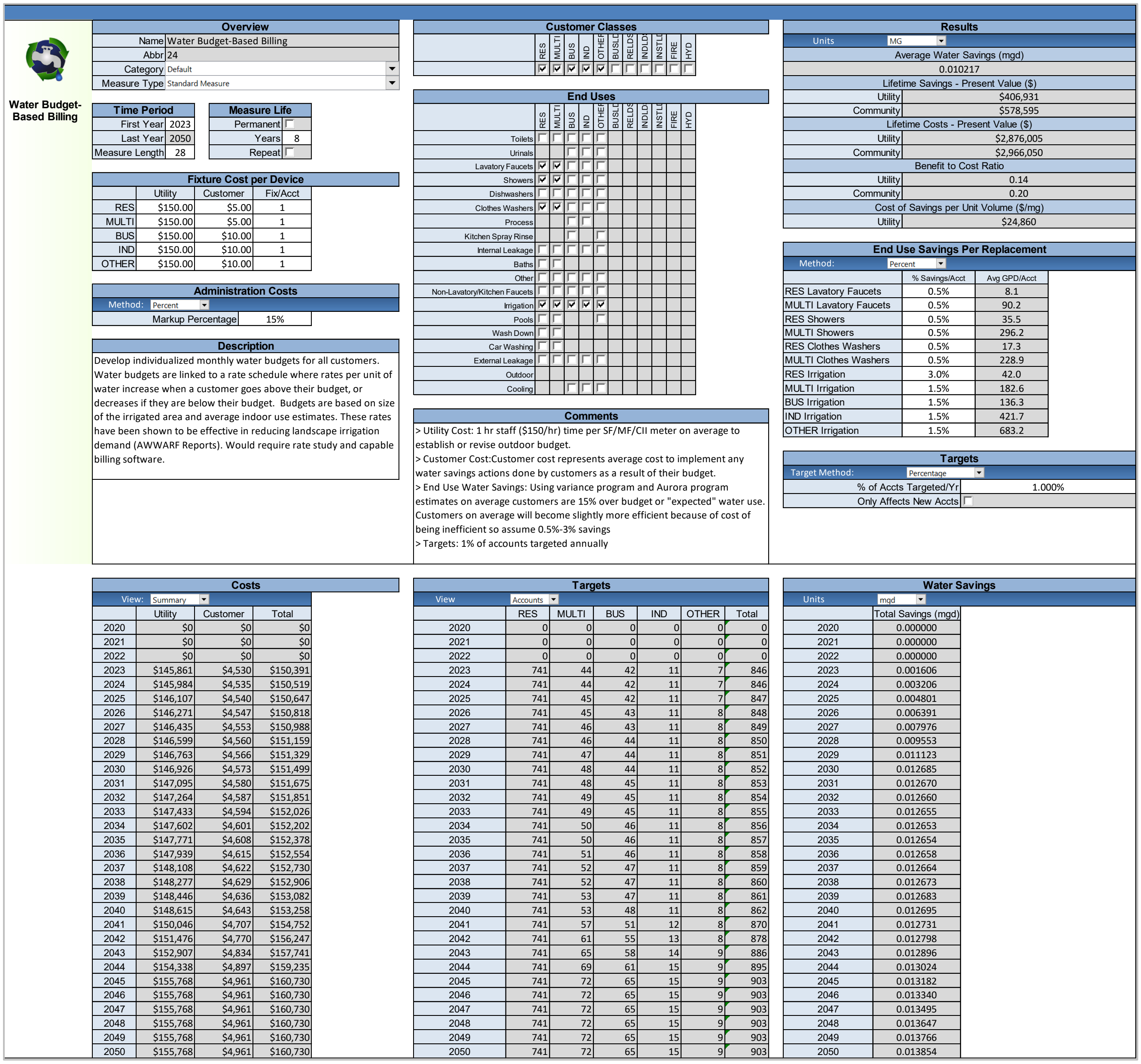
View: Accounts

	RES	Total
2020	37,065	37,065
2021	37,065	37,065
2022	37,065	37,065
2023	37,065	37,065
2024	37,065	37,065
2025	37,065	37,065
2026	37,065	37,065
2027	37,065	37,065
2028	37,065	37,065
2029	37,065	37,065
2030	37,065	37,065
2031	37,065	37,065
2032	37,065	37,065
2033	37,065	37,065
2034	37,065	37,065
2035	37,065	37,065
2036	37,065	37,065
2037	37,065	37,065
2038	37,065	37,065
2039	37,065	37,065
2040	37,065	37,065
2041	37,065	37,065
2042	37,065	37,065
2043	37,065	37,065
2044	37,065	37,065
2045	37,065	37,065
2046	37,065	37,065
2047	37,065	37,065
2048	37,065	37,065
2049	37,065	37,065
2050	37,065	37,065

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.019310
2021	0.038376
2022	0.038147
2023	0.037932
2024	0.037730
2025	0.037540
2026	0.037360
2027	0.037184
2028	0.036981
2029	0.036775
2030	0.036568
2031	0.036358
2032	0.036163
2033	0.035981
2034	0.035812
2035	0.035655
2036	0.035507
2037	0.035369
2038	0.035240
2039	0.035118
2040	0.035004
2041	0.034896
2042	0.034795
2043	0.034700
2044	0.034611
2045	0.034527
2046	0.034447
2047	0.034372
2048	0.034300
2049	0.034233
2050	0.034168



Water Budget-Based Billing

Overview	
Name	Water Budget-Based Billing
Abbr	24
Category	Default
Measure Type	Standard Measure

Time Period	
First Year	2023
Last Year	2050
Measure Length	28

Measure Life	
Permanent	☐
Years	8
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$150.00	$5.00	1
MULTI	$150.00	$5.00	1
BUS	$150.00	$10.00	1
IND	$150.00	$10.00	1
OTHER	$150.00	$10.00	1

Administration Costs

Method: Percent

Markup Percentage	15%

Description

Develop individualized monthly water budgets for all customers. Water budgets are linked to a rate schedule where rates per unit of water increase when a customer goes above their budget, or decreases if they are below their budget. Budgets are based on size of the irrigated area and average indoor use estimates. These rates have been shown to be effective in reducing landscape irrigation demand (AWWARF Reports). Would require rate study and capable billing software.

Customer Classes

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
	☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTL	FIRE	HYD
Toilets	☐	☐	☐	☐	☐						
Urinals			☐	☐	☐						
Lavatory Faucets	☑	☑	☐	☐	☐						
Showers	☑	☑	☐	☐	☐						
Dishwashers	☐	☐	☐	☐	☐						
Clothes Washers	☑	☑	☐	☐	☐						
Process			☐	☐							
Kitchen Spray Rinse			☐		☐						
Internal Leakage	☐	☐	☐	☐	☐						
Baths	☐	☐									
Other	☐	☐	☐	☐	☐						
Non-Lavatory/Kitchen Faucets	☐	☐	☐	☐	☐						
Irrigation	☑	☑	☑	☑	☑						
Pools	☐	☐			☐						
Wash Down	☐	☐									
Car Washing	☐	☐									
External Leakage	☐	☐	☐	☐	☐						
Outdoor											
Cooling			☐	☐	☐						

Comments

> Utility Cost: 1 hr staff ($150/hr) time per SF/MF/CII meter on average to establish or revise outdoor budget.

> Customer Cost:Customer cost represents average cost to implement any water savings actions done by customers as a result of their budget.

> End Use Water Savings: Using variance program and Aurora program estimates on average customers are 15% over budget or "expected" water use. Customers on average will become slightly more efficient because of cost of being inefficient so assume 0.5%-3% savings

> Targets: 1% of accounts targeted annually

Results

Units: MG

Average Water Savings (mgd)	
0.010217	
Lifetime Savings - Present Value ($)	
Utility	$406,931
Community	$578,595
Lifetime Costs - Present Value ($)	
Utility	$2,876,005
Community	$2,966,050
Benefit to Cost Ratio	
Utility	0.14
Community	0.20
Cost of Savings per Unit Volume ($/mg)	
Utility	$24,860

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Lavatory Faucets	0.5%	8.1
MULTI Lavatory Faucets	0.5%	90.2
RES Showers	0.5%	35.5
MULTI Showers	0.5%	296.2
RES Clothes Washers	0.5%	17.3
MULTI Clothes Washers	0.5%	228.9
RES Irrigation	3.0%	42.0
MULTI Irrigation	1.5%	182.6
BUS Irrigation	1.5%	136.3
IND Irrigation	1.5%	421.7
OTHER Irrigation	1.5%	683.2

Targets

Target Method: Percentage

% of Accts Targeted/Yr	1.000%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$0	$0	$0
2022	$0	$0	$0
2023	$145,861	$4,530	$150,391
2024	$145,984	$4,535	$150,519
2025	$146,107	$4,540	$150,647
2026	$146,271	$4,547	$150,818
2027	$146,435	$4,553	$150,988
2028	$146,599	$4,560	$151,159
2029	$146,763	$4,566	$151,329
2030	$146,926	$4,573	$151,499
2031	$147,095	$4,580	$151,675
2032	$147,264	$4,587	$151,851
2033	$147,433	$4,594	$152,026
2034	$147,602	$4,601	$152,202
2035	$147,771	$4,608	$152,378
2036	$147,939	$4,615	$152,554
2037	$148,108	$4,622	$152,730
2038	$148,277	$4,629	$152,906
2039	$148,446	$4,636	$153,082
2040	$148,615	$4,643	$153,258
2041	$150,046	$4,707	$154,752
2042	$151,476	$4,770	$156,247
2043	$152,907	$4,834	$157,741
2044	$154,338	$4,897	$159,235
2045	$155,768	$4,961	$160,730
2046	$155,768	$4,961	$160,730
2047	$155,768	$4,961	$160,730
2048	$155,768	$4,961	$160,730
2049	$155,768	$4,961	$160,730
2050	$155,768	$4,961	$160,730

Targets

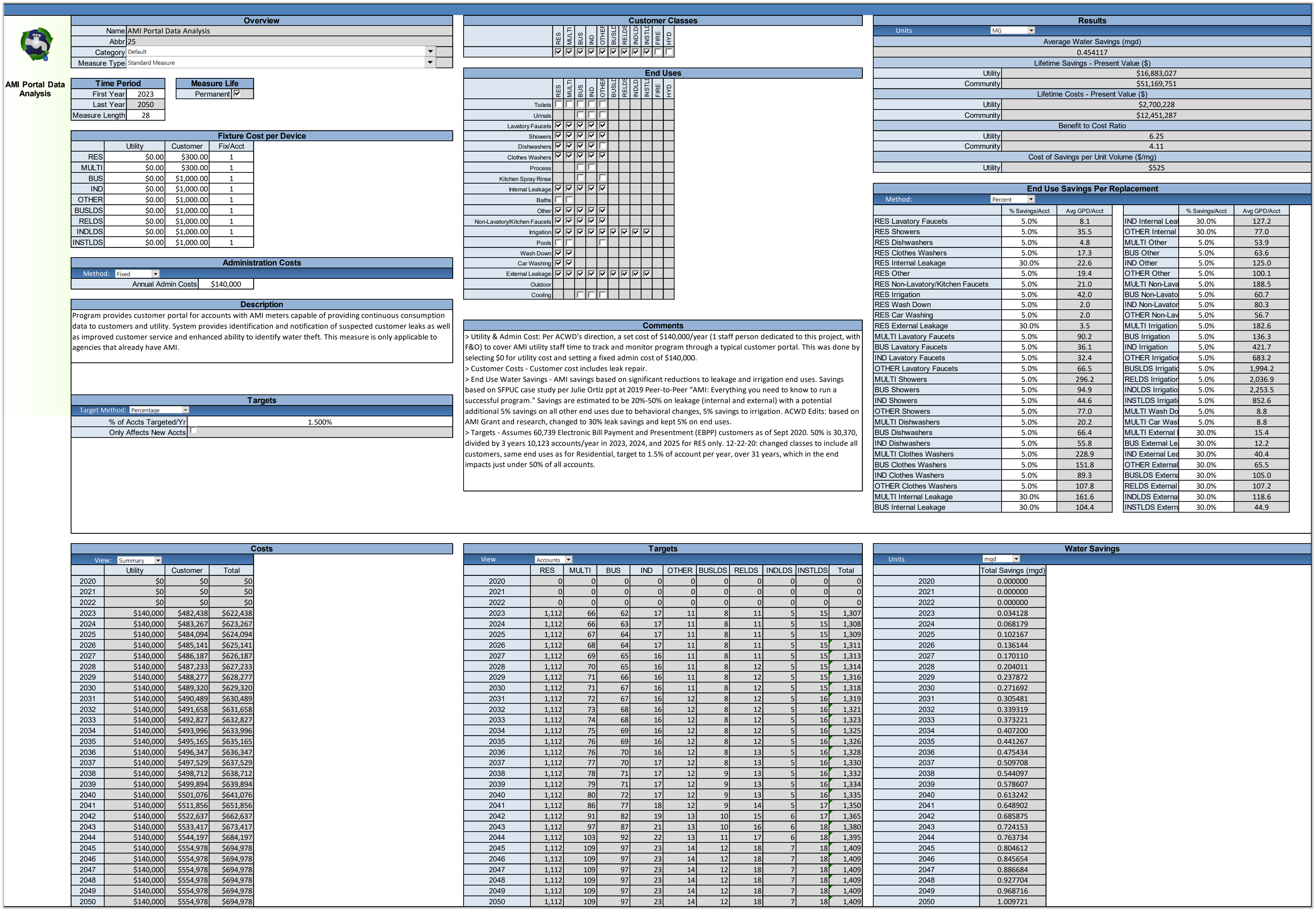
View: Accounts

	RES	MULTI	BUS	IND	OTHER	Total
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0
2023	741	44	42	11	7	846
2024	741	44	42	11	7	846
2025	741	45	42	11	7	847
2026	741	45	43	11	8	848
2027	741	46	43	11	8	849
2028	741	46	44	11	8	850
2029	741	47	44	11	8	851
2030	741	48	44	11	8	852
2031	741	48	45	11	8	853
2032	741	49	45	11	8	854
2033	741	49	45	11	8	855
2034	741	50	46	11	8	856
2035	741	50	46	11	8	857
2036	741	51	46	11	8	858
2037	741	52	47	11	8	859
2038	741	52	47	11	8	860
2039	741	53	47	11	8	861
2040	741	53	48	11	8	862
2041	741	57	51	12	8	870
2042	741	61	55	13	8	878
2043	741	65	58	14	9	886
2044	741	69	61	15	9	895
2045	741	72	65	15	9	903
2046	741	72	65	15	9	903
2047	741	72	65	15	9	903
2048	741	72	65	15	9	903
2049	741	72	65	15	9	903
2050	741	72	65	15	9	903

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.001606
2024	0.003206
2025	0.004801
2026	0.006391
2027	0.007976
2028	0.009553
2029	0.011123
2030	0.012685
2031	0.012670
2032	0.012660
2033	0.012655
2034	0.012653
2035	0.012654
2036	0.012658
2037	0.012664
2038	0.012673
2039	0.012683
2040	0.012695
2041	0.012731
2042	0.012798
2043	0.012896
2044	0.013024
2045	0.013182
2046	0.013340
2047	0.013495
2048	0.013647
2049	0.013766
2050	0.013854



AMI Portal Data Analysis

Overview

Name	AMI Portal Data Analysis
Abbr	25
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2023
Last Year	2050
Measure Length	28

Measure Life

Permanent	☑

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$0.00	$300.00	1
MULTI	$0.00	$300.00	1
BUS	$0.00	$1,000.00	1
IND	$0.00	$1,000.00	1
OTHER	$0.00	$1,000.00	1
BUSLDS	$0.00	$1,000.00	1
RELDS	$0.00	$1,000.00	1
INDLDS	$0.00	$1,000.00	1
INSTLDS	$0.00	$1,000.00	1

Administration Costs

Method: Fixed

Annual Admin Costs	$140,000

Description

Program provides customer portal for accounts with AMI meters capable of providing continuous consumption data to customers and utility. System provides identification and notification of suspected customer leaks as well as improved customer service and enhanced ability to identify water theft. This measure is only applicable to agencies that already have AMI.

Targets

Target Method: Percentage

% of Accts Targeted/Yr	1.500%
Only Affects New Accts	☐

Customer Classes

RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
☑	☑	☑	☑	☑	☑	☑	☑	☑	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLD	INSTLD	FIRE	HYD
Toilets	☐	☐	☐	☐	☐						
Urinals			☐	☐	☐						
Lavatory Faucets	☑	☑	☑	☑	☑						
Showers	☑	☑	☑	☑	☑						
Dishwashers	☑	☑	☑	☑	☐						
Clothes Washers	☑	☑	☑	☑	☑						
Process			☐	☐							
Kitchen Spray Rinse			☐		☐						
Internal Leakage	☑	☑	☑	☑	☑						
Baths	☐	☐									
Other	☑	☑	☑	☑	☑						
Non-Lavatory/Kitchen Faucets	☑	☑	☑	☑	☑						
Irrigation	☑	☑	☑	☑	☑	☑	☑	☑	☑		
Pools	☐	☐			☐						
Wash Down	☑	☑									
Car Washing	☑	☑									
External Leakage	☑	☑	☑	☑	☑	☑	☑	☑	☑		
Outdoor											
Cooling			☐	☐	☐						

Comments

> Utility & Admin Cost: Per ACWD's direction, a set cost of $140,000/year (1 staff person dedicated to this project, with F&O) to cover AMI utility staff time to track and monitor program through a typical customer portal. This was done by selecting $0 for utility cost and setting a fixed admin cost of $140,000.
> Customer Costs - Customer cost includes leak repair.
> End Use Water Savings - AMI savings based on significant reductions to leakage and irrigation end uses. Savings based on SFPUC case study per Julie Ortiz ppt at 2019 Peer-to-Peer “AMI: Everything you need to know to run a successful program." Savings are estimated to be 20%-50% on leakage (internal and external) with a potential additional 5% savings on all other end uses due to behavioral changes, 5% savings to irrigation. ACWD Edits: based on AMI Grant and research, changed to 30% leak savings and kept 5% on end uses.
> Targets - Assumes 60,739 Electronic Bill Payment and Presentment (EBPP) customers as of Sept 2020. 50% is 30,370, divided by 3 years 10,123 accounts/year in 2023, 2024, and 2025 for RES only. 12-22-20: changed classes to include all customers, same end uses as for Residential, target to 1.5% of account per year, over 31 years, which in the end impacts just under 50% of all accounts.

Results

Units: MG

Average Water Savings (mgd)	
	0.454117
Lifetime Savings - Present Value ($)	
Utility	$16,883,027
Community	$51,169,751
Lifetime Costs - Present Value ($)	
Utility	$2,700,228
Community	$12,451,287
Benefit to Cost Ratio	
Utility	6.25
Community	4.11
Cost of Savings per Unit Volume ($/mg)	
Utility	$525

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct		% Savings/Acct	Avg GPD/Acct
RES Lavatory Faucets	5.0%	8.1	IND Internal Lea	30.0%	127.2
RES Showers	5.0%	35.5	OTHER Internal	30.0%	77.0
RES Dishwashers	5.0%	4.8	MULTI Other	5.0%	53.9
RES Clothes Washers	5.0%	17.3	BUS Other	5.0%	63.6
RES Internal Leakage	30.0%	22.6	IND Other	5.0%	125.0
RES Other	5.0%	19.4	OTHER Other	5.0%	100.1
RES Non-Lavatory/Kitchen Faucets	5.0%	21.0	MULTI Non-Lava	5.0%	188.5
RES Irrigation	5.0%	42.0	BUS Non-Lavato	5.0%	60.7
RES Wash Down	5.0%	2.0	IND Non-Lavator	5.0%	80.3
RES Car Washing	5.0%	2.0	OTHER Non-Lav	5.0%	56.7
RES External Leakage	30.0%	3.5	MULTI Irrigation	5.0%	182.6
MULTI Lavatory Faucets	5.0%	90.2	BUS Irrigation	5.0%	136.3
BUS Lavatory Faucets	5.0%	36.1	IND Irrigation	5.0%	421.7
IND Lavatory Faucets	5.0%	32.4	OTHER Irrigatior	5.0%	683.2
OTHER Lavatory Faucets	5.0%	66.5	BUSLDS Irrigatic	5.0%	1,994.2
MULTI Showers	5.0%	296.2	RELDS Irrigatior	5.0%	2,036.9
BUS Showers	5.0%	94.9	INDLDS Irrigatio	5.0%	2,253.5
IND Showers	5.0%	44.6	INSTLDS Irrigati	5.0%	852.6
OTHER Showers	5.0%	77.0	MULTI Wash Do	5.0%	8.8
MULTI Dishwashers	5.0%	20.2	MULTI Car Was	5.0%	8.8
BUS Dishwashers	5.0%	66.4	MULTI External I	30.0%	15.4
IND Dishwashers	5.0%	55.8	BUS External Le	30.0%	12.2
MULTI Clothes Washers	5.0%	228.9	IND External Lea	30.0%	40.4
BUS Clothes Washers	5.0%	151.8	OTHER External	30.0%	65.5
IND Clothes Washers	5.0%	89.3	BUSLDS Externa	30.0%	105.0
OTHER Clothes Washers	5.0%	107.8	RELDS External	30.0%	107.2
MULTI Internal Leakage	30.0%	161.6	INDLDS Externa	30.0%	118.6
BUS Internal Leakage	30.0%	104.4	INSTLDS Extern	30.0%	44.9

Costs

View: Summary

	Utility	Customer	Total
2020	$0	$0	$0
2021	$0	$0	$0
2022	$0	$0	$0
2023	$140,000	$482,438	$622,438
2024	$140,000	$483,267	$623,267
2025	$140,000	$484,094	$624,094
2026	$140,000	$485,141	$625,141
2027	$140,000	$486,187	$626,187
2028	$140,000	$487,233	$627,233
2029	$140,000	$488,277	$628,277
2030	$140,000	$489,320	$629,320
2031	$140,000	$490,489	$630,489
2032	$140,000	$491,658	$631,658
2033	$140,000	$492,827	$632,827
2034	$140,000	$493,996	$633,996
2035	$140,000	$495,165	$635,165
2036	$140,000	$496,347	$636,347
2037	$140,000	$497,529	$637,529
2038	$140,000	$498,712	$638,712
2039	$140,000	$499,894	$639,894
2040	$140,000	$501,076	$641,076
2041	$140,000	$511,856	$651,856
2042	$140,000	$522,637	$662,637
2043	$140,000	$533,417	$673,417
2044	$140,000	$544,197	$684,197
2045	$140,000	$554,978	$694,978
2046	$140,000	$554,978	$694,978
2047	$140,000	$554,978	$694,978
2048	$140,000	$554,978	$694,978
2049	$140,000	$554,978	$694,978
2050	$140,000	$554,978	$694,978

Targets

View: Accounts

	RES	MULTI	BUS	IND	OTHER	BUSLDS	RELDS	INDLDS	INSTLDS	Total
2020	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0
2023	1,112	66	62	17	11	8	11	5	15	1,307
2024	1,112	66	63	17	11	8	11	5	15	1,308
2025	1,112	67	64	17	11	8	11	5	15	1,309
2026	1,112	68	64	17	11	8	11	5	15	1,311
2027	1,112	69	65	16	11	8	11	5	15	1,313
2028	1,112	70	65	16	11	8	12	5	15	1,314
2029	1,112	71	66	16	11	8	12	5	15	1,316
2030	1,112	71	67	16	11	8	12	5	15	1,318
2031	1,112	72	67	16	12	8	12	5	16	1,319
2032	1,112	73	68	16	12	8	12	5	16	1,321
2033	1,112	74	68	16	12	8	12	5	16	1,323
2034	1,112	75	69	16	12	8	12	5	16	1,325
2035	1,112	76	69	16	12	8	12	5	16	1,326
2036	1,112	76	70	16	12	8	13	5	16	1,328
2037	1,112	77	70	17	12	8	13	5	16	1,330
2038	1,112	78	71	17	12	9	13	5	16	1,332
2039	1,112	79	71	17	12	9	13	5	16	1,334
2040	1,112	80	72	17	12	9	13	5	16	1,335
2041	1,112	86	77	18	12	9	14	5	17	1,350
2042	1,112	91	82	19	13	10	15	6	17	1,365
2043	1,112	97	87	21	13	10	16	6	18	1,380
2044	1,112	103	92	22	13	11	17	6	18	1,395
2045	1,112	109	97	23	14	12	18	7	18	1,409
2046	1,112	109	97	23	14	12	18	7	18	1,409
2047	1,112	109	97	23	14	12	18	7	18	1,409
2048	1,112	109	97	23	14	12	18	7	18	1,409
2049	1,112	109	97	23	14	12	18	7	18	1,409
2050	1,112	109	97	23	14	12	18	7	18	1,409

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000000
2021	0.000000
2022	0.000000
2023	0.034128
2024	0.068179
2025	0.102167
2026	0.136144
2027	0.170110
2028	0.204011
2029	0.237872
2030	0.271692
2031	0.305481
2032	0.339319
2033	0.373221
2034	0.407200
2035	0.441267
2036	0.475434
2037	0.509708
2038	0.544097
2039	0.578607
2040	0.613242
2041	0.648902
2042	0.685875
2043	0.724153
2044	0.763734
2045	0.804612
2046	0.845654
2047	0.886684
2048	0.927704
2049	0.968716
2050	1.009721

Prohibition of Water Waste & Practices

Overview

Name	Prohibition of Water Waste & Practices
Abbr	26
Category	Default
Measure Type	Standard Measure

Time Period

First Year	2020
Last Year	2050
Measure Length	31

Measure Life

Permanent	☐
Years	5
Repeat	☐

Fixture Cost per Device

	Utility	Customer	Fix/Acct
RES	$200.00	$50.00	1
MULTI	$200.00	$100.00	1
BUS	$200.00	$100.00	1
IND	$200.00	$100.00	1
OTHER	$200.00	$100.00	1

Administration Costs

Method: Percent

Markup Percentage	15%

Description

This ordinance prohibits water waste as defined as gutter flooding and failure to repair leaks in a timely manner. Residential customers shall not water lawns or gardens resulting in flooding or excessive run off; use water for washing sidewalks, walkways, driveways, or other hard surfaces which rest in excessive run off; and use of water for washing cars, trailers, boats, or other vehicles that result in excessive run off of water. Hoses should be equipped with shut off nozzles. Nonresidential customs shall not use single pass cooling systems in new connections; use non-recirculating systems in new conveyer car wash and commercial laundry systems; use non-recycling decorative fountains; use water for watering lawns or gardens that result in flooding or excessive runoff; and use water for washing sidewalks, walkways, driveways, and other hard surfaces in a manner that results in excessive runoff.

Customer Classes

RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLDS	INSTLD	FIRE	HYD
☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐

End Uses

	RES	MULTI	BUS	IND	OTHER	BUSLD	RELDS	INDLDS	INSTLD	FIRE	HYD
Toilets	☐	☐	☐	☐	☐						
Urinals			☐	☐	☐						
Lavatory Faucets	☐	☐	☐	☐	☐						
Showers	☐	☐	☐	☐	☐						
Dishwashers	☐	☐	☐	☐	☐						
Clothes Washers	☐	☐	☐	☐	☐						
Process			☐	☐							
Kitchen Spray Rinse			☐		☐						
Internal Leakage	☑	☑	☑	☑	☑						
Baths	☐	☐									
Other	☐	☐	☐	☐	☐						
Non-Lavatory/Kitchen Faucets	☐	☐	☐	☐	☐						
Irrigation	☑	☑	☑	☑	☑						
Pools	☐	☐			☐						
Wash Down	☑	☑									
Car Washing	☑	☑									
External Leakage	☑	☑	☑	☑	☑						
Outdoor											
Cooling			☑	☑	☑						

Comments

> Utility Costs - Utility costs and target to be based on historical non-drought Water Waste Reports database annual average. Assume less staff time for SF contact and enforcement.
> Customer Costs - Assume $50/SF customer cost and $100 MF/CII cost to fix irrigation water waste/leak - most visible water waste is irrigation.
> Administration Costs - represents staff time to identify waste and investigate the water waste calls. Admin time can vary from 1-2 hours per week of office time depending on call volume to manage the letters and manage the program. Assume average of 1.5 hours per week to manage the program and database tracking.
> End Use Water Savings - Savings of 6% approximately equates to an account having a leak of 33 gallons per day. Assumed 3% water savings per account to be conservative since not all site visits reveal water waste which yield water savings.
> Targets - Assume 0.062% of accounts targeted per year based off of 2016-2019 water waste reports. An average of 52 water waste reports a year over all customer accounts.
FYI - ACWD Water Waste ordinance link: https://www.acwd.org/DocumentCenter/View/1464/Ord-2008-01-Water-Waste?bidId=
> Watering days per week element is not enforced.

Results

Units: MG

Average Water Savings (mgd)	
	0.000884
Lifetime Savings - Present Value ($)	
Utility	$36,943
Community	$83,564
Lifetime Costs - Present Value ($)	
Utility	$273,022
Community	$340,672
Benefit to Cost Ratio	
Utility	0.14
Community	0.25
Cost of Savings per Unit Volume ($/mg)	
Utility	$27,276

End Use Savings Per Replacement

Method: Percent

	% Savings/Acct	Avg GPD/Acct
RES Internal Leakage	3.0%	22.6
MULTI Internal Leakage	3.0%	161.6
BUS Internal Leakage	3.0%	104.4
IND Internal Leakage	3.0%	127.2
OTHER Internal Leakage	3.0%	77.0
RES Irrigation	3.0%	42.0
MULTI Irrigation	3.0%	182.6
BUS Irrigation	3.0%	136.3
IND Irrigation	3.0%	421.7
OTHER Irrigation	3.0%	683.2
RES Wash Down	3.0%	2.0
MULTI Wash Down	3.0%	8.8
RES Car Washing	3.0%	2.0
MULTI Car Washing	3.0%	8.8
RES External Leakage	3.0%	3.5
MULTI External Leakage	3.0%	15.4
BUS External Leakage	3.0%	12.2
IND External Leakage	3.0%	40.4
OTHER External Leakage	3.0%	65.5
BUS Cooling	3.0%	26.2
IND Cooling	3.0%	115.5
OTHER Cooling	3.0%	140.4

Targets

Target Method: Percentage

% of Accts Targeted/Yr	0.062%
Only Affects New Accts	☐

Costs

View: Summary

	Utility	Customer	Total
2020	$12,027	$2,931	$14,958
2021	$12,037	$2,936	$14,973
2022	$12,048	$2,940	$14,988
2023	$12,058	$2,945	$15,002
2024	$12,068	$2,949	$15,017
2025	$12,078	$2,953	$15,032
2026	$12,092	$2,959	$15,051
2027	$12,105	$2,965	$15,070
2028	$12,119	$2,971	$15,090
2029	$12,132	$2,977	$15,109
2030	$12,146	$2,983	$15,129
2031	$12,160	$2,989	$15,149
2032	$12,174	$2,995	$15,169
2033	$12,188	$3,001	$15,189
2034	$12,202	$3,007	$15,209
2035	$12,216	$3,013	$15,229
2036	$12,230	$3,019	$15,249
2037	$12,244	$3,025	$15,269
2038	$12,258	$3,031	$15,289
2039	$12,272	$3,037	$15,309
2040	$12,286	$3,044	$15,329
2041	$12,404	$3,095	$15,499
2042	$12,522	$3,146	$15,668
2043	$12,640	$3,198	$15,838
2044	$12,759	$3,249	$16,008
2045	$12,877	$3,301	$16,177
2046	$12,877	$3,301	$16,177
2047	$12,877	$3,301	$16,177
2048	$12,877	$3,301	$16,177
2049	$12,877	$3,301	$16,177
2050	$12,877	$3,301	$16,177

Targets

View: Accounts

	RES	MULTI	BUS	IND	OTHER	Total
2020	46	3	2	1	0	52
2021	46	3	3	1	0	52
2022	46	3	3	1	0	52
2023	46	3	3	1	0	52
2024	46	3	3	1	0	52
2025	46	3	3	1	0	53
2026	46	3	3	1	0	53
2027	46	3	3	1	0	53
2028	46	3	3	1	0	53
2029	46	3	3	1	0	53
2030	46	3	3	1	0	53
2031	46	3	3	1	0	53
2032	46	3	3	1	0	53
2033	46	3	3	1	0	53
2034	46	3	3	1	0	53
2035	46	3	3	1	0	53
2036	46	3	3	1	0	53
2037	46	3	3	1	0	53
2038	46	3	3	1	0	53
2039	46	3	3	1	0	53
2040	46	3	3	1	0	53
2041	46	4	3	1	1	54
2042	46	4	3	1	1	54
2043	46	4	4	1	1	55
2044	46	4	4	1	1	55
2045	46	4	4	1	1	56
2046	46	4	4	1	1	56
2047	46	4	4	1	1	56
2048	46	4	4	1	1	56
2049	46	4	4	1	1	56
2050	46	4	4	1	1	56

Water Savings

Units: mgd

	Total Savings (mgd)
2020	0.000176
2021	0.000353
2022	0.000530
2023	0.000707
2024	0.000884
2025	0.000886
2026	0.000888
2027	0.000890
2028	0.000893
2029	0.000895
2030	0.000898
2031	0.000901
2032	0.000904
2033	0.000907
2034	0.000910
2035	0.000914
2036	0.000917
2037	0.000921
2038	0.000924
2039	0.000927
2040	0.000931
2041	0.000940
2042	0.000953
2043	0.000972
2044	0.000996
2045	0.001026
2046	0.001049
2047	0.001066
2048	0.001078
2049	0.001084
2050	0.001084

APPENDIX F – WATER USE EFFICIENCY ANALYSIS RESULTS

This appendix presents benefit-cost analysis results for individual water use efficiency measures incorporated into strategies. Table F-1 presents how much water the measures will save through 2030, how much they will cost, and the cost of saved water per unit volume *if the measures were to be implemented on a stand-alone basis (i.e., without interaction or overlap from other measures that might address the same end use or uses).* Savings from measures which address the same end use(s) are not additive; the model uses impact factors to avoid double counting in estimating the water savings from programs of measures.[32] This is why a measure like "ACWD Public & School Education" may show a distorted cost in comparison to water saved. Most, if not all measures rely on public awareness. However, it is important to note that water savings are more directly attributable to an "active" measure, like a toilet rebate, than the less "active" public education/awareness measure that informs the community of the active measure.

Since interaction between measures has not been accounted for in Table F-1, it is not appropriate to include totals at the bottom of the table. However, the table is useful to give a close approximation of the cost effectiveness of each measure.

Cost categories are defined as follows:

- Utility Costs – those costs that ACWD as a water utility will incur to operate the measure, including administrative costs.
- Utility Benefits – the avoided cost of producing water at the identified rate $1,742/AF. More information about the source of this value can be found in Section 6.2.
- Customer (Community) Costs – those costs customers will incur to implement a measure in ACWD's water use efficiency strategy and maintain its effectiveness over the life of the measure.
- Customer (Community) Benefits – the additional savings, such as energy savings resulting from reduced use of hot water. These savings are additional as customers would also have reduced water bills (since the utility costs and benefits transfer to the customers).
- Community Costs – includes Utility Costs plus Customer Costs.
- Community Benefits – includes Utility Benefits plus Customer Benefits.

The column headings in Table F-1 are defined as follows:

- Present Value (PV) of Utility and Community Costs and Benefits ($) = the present value of the 31-year time stream of annual costs or benefits, discounted to the base year.
- Utility Benefit to Cost Ratio = PV of Utility Benefits divided by PV of Utility Costs over 31 years.
- Community Benefit to Cost Ratio = (PV of Utility Benefits plus PV of customer energy savings) divided by (PV of Utility Costs plus PV of Customer Costs), over 31 years.

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[32] For example, if two measures are planned to address the same end use and both save 10% of the prior water use, then the net effect is not the simple sum of 20%. Rather, it is the cumulative impact of the first measure reducing the use to 90% of what it was originally, without the first measure in place. Then, the revised use of 90% is reduced by another 10% (10% x 90% = 9%) to result in the use being 81% (90% - 9% = 81%). In this example, the net savings is 19%, not 20%. Using impact factors, the model computes the reduction as follows, 0.9 x 0.9 = 0.81 or 19% water savings.

- Five Years of Water Utility Costs ($) = the sum of the annual Utility Costs for the years 2020-2024. The measures start in the years as specified for each measure shown in Appendix E. Utility costs include administrative costs and staff labor.
- Water Savings in 2030 (AFY) = water saved in acre-feet per year. The year 2030 is provided as requested by ACWD staff to correspond with the 2020 UWMP.
- Cost of Savings per Unit Volume ($/AF) = PV of Utility Costs over 31 years divided by the 31-year water savings. The analysis period is 2020-2050. This value is compared to the utility's avoided cost of water as ACWD's primary indicator of the cost effectiveness of water use efficiency efforts. Note that this value somewhat minimizes the cost of savings because program costs are discounted to present value, but water benefits are not.

Table F-1. Estimated Water Use Efficiency Measure Costs and Savings

Measure	Present Value of Water Utility Benefits	Present Value of Community Benefits	Present Value of Water Utility Costs	Present Value of Community Costs	Water Utility Benefit to Cost Ratio	Community Benefit to Cost Ratio	Five Years of Water Utility Costs 2020-2024	Water Savings in 2030 (AFY)*	Cost of Savings per Unit Volume ($/AF)	Strategy
Commercial, Industrial, and Institutional										
CII Water Survey	$718,528	$1,542,562	$382,432	$548,707	1.88	2.81	$75,980	21.82	$622	A, B, C
CII Water Efficient Technology (WET) Rebate	$3,261,467	$6,950,306	$4,355,840	$7,840,512	0.75	0.89	$566,238	61.09	$1,440	B, C
School Building Retrofit	$1,822,323	$2,806,516	$1,146,287	$2,063,317	1.59	1.36	$694,207	56.82	$748	B, C
Ultra-High Efficiency Toilet Incentive	$680,610	$680,610	$269,606	$865,960	2.52	0.79	$279,328	19.64	$496	A, B, C
Large Landscape										
Large Landscape Outdoor Water Surveys	$3,178,530	$3,178,530	$1,196,179	$1,737,943	2.66	1.83	$239,715	94.05	$437	A, B, C
Large Landscape (Waterfluence)	$5,484,743	$5,484,743	$1,002,658	$1,002,658	5.47	5.47	$298,845	202.67	$244	A, B, C
Water Efficient Landscape Rebate	$3,502,367	$3,502,367	$3,247,800	$12,216,924	1.08	0.29	$704,434	76.41	$1,039	B, C
Financial Incentives for Irrigation & Landscape Upgrades	$2,816,980	$2,816,980	$2,508,113	$3,503,784	1.12	0.80	$457,287	89.65	$1,027	B, C

Measure	Present Value of Water Utility Benefits	Present Value of Community Benefits	Present Value of Water Utility Costs	Present Value of Community Costs	Water Utility Benefit to Cost Ratio	Community Benefit to Cost Ratio	Five Years of Water Utility Costs 2020-2024	Water Savings in 2030 (AFY)*	Cost of Savings per Unit Volume ($/AF)	Strategy
Require Weather Adjusting Smart Irrigation Controllers and/or Rain Sensors in New Development	$2,311,992	$2,311,992	$342,678	$6,157,354	6.75	0.38	$14,103	24.72	$150	C
Landscape & Irrigation Codes	$8,473,371	$8,473,371	$1,253,510	$8,225,620	6.76	1.03	$121,463	108.11	$153	C
Residential (SFR and MFR)										
Residential Outdoor Water Surveys	$3,732,798	$3,732,798	$5,490,246	$6,062,147	0.68	0.62	$569,311	111.68	$1,674	B, C
Residential Indoor Water Surveys	$1,123,045	$3,013,575	$3,067,182	$3,680,618	0.37	0.82	$314,145	36.74	$3,192	C
Residential Water-Savings Devices Giveaway	$3,224,175	$7,949,092	$1,442,841	$2,597,113	2.23	3.06	$298,775	66.90	$496	A, B, C
Leak Repair & Plumbing Emergency Assistance	$419,791	$1,975,694	$614,036	$1,269,008	0.68	1.56	$62,208	12.10	$1,653	B, C
Multifamily UHET Direct Install	$81,917	$81,917	$208,815	$221,245	0.39	0.37	$92,551	2.87	$3,029	C
Developer Financed Zero Footprint New Development	$664,187	$1,596,988	$9,204,218	$21,755,423	0.07	0.07	$0	0.00	$13,164	C

Measure	Present Value of Water Utility Benefits	Present Value of Community Benefits	Present Value of Water Utility Costs	Present Value of Community Costs	Water Utility Benefit to Cost Ratio	Community Benefit to Cost Ratio	Five Years of Water Utility Costs 2020-2024	Water Savings in 2030 (AFY)*	Cost of Savings per Unit Volume ($/AF)	Strategy
Fixture Retrofit on Resale or Water Account Change	$3,367,340	$7,027,447	$1,916,083	$2,496,752	1.76	2.81	$405,662	71.07	$632	B, C
Plumber Initiated Ultra High Efficiency Toilet Retrofit	$735,289	$735,289	$1,146,038	$1,217,220	0.64	0.60	$370,922	27.02	$1,825	B, C
Community and Education										
ACWD Public & School Education	$1,534,641	$3,453,896	$3,314,530	$3,314,530	0.46	1.04	$745,923	40.99	$2,700	A, B, C
Water Budget-Based Billing	$406,931	$578,595	$2,876,005	$2,966,050	0.14	0.20	$291,845	14.22	$8,101	C
AMI Portal Data Analysis	$16,883,027	$51,169,751	$2,700,228	$12,451,287	6.25	4.11	$280,000	304.54	$171	A, B, C
Prohibition of Water Waste & Practices	$36,943	$83,564	$273,022	$340,672	0.14	0.25	$60,238	1.01	$8,888	A, B, C

* The year 2030 was selected for the Water Savings (AFY) column because it demonstrates estimated projected annual water savings achievements from established measures but is not too far out to lose the savings impact from measures that do not have permanent savings. One measure has zero savings in 2030 because the measure is proposed to start in 2035.

See Table 5-1 in Section 5 for measure descriptions. Overall strategy estimated costs, water savings, and benefit-cost ratios can be found in Table 6-2 in Section 6. Additional information about the water reduction methodology, perspectives on benefits and costs, and assumptions about present value parameters and measure costs/savings can be found earlier in this Plan in Appendix D.

Note: The following measures will be further studied: (1) Multifamily Submetering for Existing Accounts (not listed in the table above because it was not included in a strategy), and (2) Developer Financed Zero Footprint New Development.

APPENDIX G – UTILIZATION OF COMMUNITY SURVEY RESULTS IN WATER EFFICIENCY MASTER PLAN

G.1 Purpose and Background

The purpose of this appendix is to summarize the utilization of the 2019 Alameda County Water District Community Survey conducted to obtain fixture saturation and customer interest information for the ACWD Water Efficiency Master Plan.

G.1.1 Demand and Water Use Efficiency Projections Analysis Process

As explained in detail in previous appendices (Appendices B-D), the Least Cost Planning Decision Support System (DSS Model), developed by Maddaus Water Management, was used in this Plan's analysis to prepare long-range water demand and water use efficiency savings projections.

First developed in 1999 and continuously updated, the DSS Model is an end-use model that breaks down total water production (i.e., water demand in the service area) into specific water end uses (toilets, faucets, irrigation etc.). This "bottom-up" approach allows for detailed criteria to be considered when estimating future demands, such as the effects of natural fixture replacement, plumbing codes, and water use efficiency efforts. The purpose of using end-use data is to enable a more accurate assessment of the impact of water use efficiency measures on demand and to provide a rigorous and defensible modeling approach necessary for projects subject to regulatory or environmental review. The DSS Model also evaluates water use efficiency measures using benefit-cost analysis with the cost of water saved and benefit-to-cost ratio as economic indicators.

G.2 2019 ACWD Community Survey

This section will present the Community Survey methodology and specific points of application of qualitative and quantitative data in the DSS Model calculations.[33]

G.2.1 Methodology

From Saturday, October 26, 2019 to Thursday, October 31, 2019, Probolsky Research conducted live-interviewer telephone and online surveys among ACWD customers. A total of 400 customers were surveyed (100 by telephone, 300 online). A survey of this size yields a margin of error of +/-5%, with a confidence level of 95%. Interviews were conducted with respondents on both landline and mobile phones (50%) and were offered in English, Mandarin (5%), and Spanish (3%). For the online survey, participants were invited to participate through email and text messages. Probolsky Research applied a stratified random sampling methodology to the sample design, ensuring that the demographic proportions of survey respondents matched the demographic composition of ACWD customers.

ACWD staff conducted outreach to the entire service area prior to initiation of the survey to educate potential participants about the survey and the reasons for conducting it. To streamline the survey question development task, MWM provided ACWD with an existing set of survey questions that directly related to water use efficiency saturation and the adoption of water use efficiency measures. ACWD modified the questions to fit its service area and to gather specific data to inform the Plan process.

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[33] A detailed presentation of the survey questions and results can be found on the ACWD website at: https://www.acwd.org/2019ACWDCommunitySurvey.

G.2.2 Application

The 2019 ACWD Community Survey results contributed both qualitative and quantitative inputs to the DSS Model to further increase the accuracy of the assessment of water efficiency measures for ACWD by determining the following:

- **The saturation of ACWD low-flow fixtures/devices**: Community Survey results were combined with U.S. Census data, ACWD historical water use efficiency data,[34] and an assumed natural replacement rate per fixture to determine the current level of water-efficient fixtures and devices installed within ACWD's service area. In addition to this fixture saturation data being applied to demand projection calculations, it also identified the number of inefficient fixtures outstanding in the ACWD service area, including toilets, urinals, showers, faucets, and clothes washers.
- **The level of adoption of other water use efficiency measures**: Community Survey results provided qualitative data as to the knowledge, perceptions, and interest of ACWD customers regarding different water use efficiency topic areas. Insights from this data included community water use efficiency perceptions, communication preferences, areas of opportunity, water use behaviors, participation levels, and more. Incorporation of the data into the DSS Model enabled MWM and ACWD staff to build water use efficiency measures and programs tailored to ACWD customers with the intent that this will create maximum interest and participation.
- **The water use efficiency potential in the service area**: With the combination of the quantitative fixture saturation assessment and the qualitative community water use efficiency assessment, MWM and ACWD staff were able to evaluate, select, and build water use efficiency measures and strategies that could result in maximum participation, the highest benefit-cost ratio, and the greatest benefit to ACWD and its customers.
- **Fixture assessment**: The survey was successful in providing ACWD with a more relevant assessment of water fixture demographics and program participation in the service area and provided a good foundation for the DSS Model analysis.

Fixture Estimate Methodology – Toilets

As discussed in Appendix C, MWM reconciled water-efficient fixtures and devices installed within ACWD's service area and identified the number of inefficient fixtures outstanding. Determining the current level of efficient fixtures in a service area is part of the standard process while evaluating the passive savings in the DSS Model (called “initial fixture proportions”). MWM used the DSS Model to perform a saturation analysis for each of the following plumbing fixtures: toilets, urinals, showers, faucets, and clothes washers. These initial proportions of toilets were determined by categorizing homes by age (corresponding to efficiency levels), adding the net change due to natural replacement and rebate measures less any "free rider effect." The Community Survey (Probolsky October 2019 baseline survey) of 400 ACWD residential customers was used to refine this analysis by identifying actual saturation of low-flow fixtures/devices and level of adoption of other water use efficiency measures.

As mentioned previously in this Plan, “free-ridership” occurs when a customer applies for and receives a rebate on a targeted high efficiency fixture that they would have purchased even without a rebate. In this case, the rebate was not the incentive in their purchase but a “bonus.” Rebate measures are designed to target those customers needing financial incentive to install the more efficient fixture beyond current codes or standards. In the analysis, a 25% free-ridership factor was applied to all rebates awarded. This assumption is based on industry standards and MWM team field observations and can be adjusted at ACWD's direction.

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[34] Analysis uses past ACWD water use efficiency measure activities data (rebates for toilets, rebates for clothes washers, and device giveaways) going back approximately 10 years.

Fixture Initial Proportions – Toilets

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

- Using standards in place at the time of building construction (1.6 gpf required in 1992 and 1.28 gpf required in 2014),
- Taking the initial proportions of homes by age or year built as shown in the Table G-1,
- Adding the net change due to natural replacement (2%-4% per year for toilets depending on type as presented earlier in this document),
- Adding the change due to rebate measure minus the "free rider effect" (estimated to be 25% as explained earlier in this document), and
- Considering the results of the Probolsky October 2019 baseline survey.

Table G-1. Alameda County Water District Service Area Age of Housing

Year Structure Built	# of Structures	Percentage of Structures	Cumulative Percentage of Structures Built
2014 or later	1,152	1.01%	100.00%
2010 to 2013	1,406	1.23%	98.99%
2000 to 2009	5,316	4.67%	97.75%
1990 to 1999	13,493	11.84%	93.09%
1980 to 1989	32,110	28.18%	81.24%
1970 to 1979	28,046	24.62%	53.06%
1960 to 1969	19,204	16.86%	28.44%
1950 to 1959	10,288	9.03%	11.59%
1940 to 1949	1,385	1.22%	2.56%
1939 or earlier	1,526	1.34%	1.34%
Total Housing Units	113,926	**100.00%**	

Sources: DP04: SELECTED HOUSING CHARACTERISTICS 2017 American Community Survey 1-Year Estimates for Fremont City, California and Union City, California, and DP04: SELECTED HOUSING CHARACTERISTICS 2013-2017 American Community Survey 5-Year Estimates for Newark City, California.

A detailed analysis of how ACWD's service area's age of housing, toilet fixture replacement rates, and historical residential rebates were used to determine a preliminary estimate of residential toilet initial proportions can be found in a separate water use data sheet (WUDS) Excel file in the "Toilet Fixture Assumptions_2020" worksheet. A preliminary analysis only considering the service area's age of housing, relevant codes, free-ridership, replacement rates, and historical interventions yielded the residential toilet initial proportions presented in the following Table G-2. Since over 45% of service area water use is by Single Family (SF) with less than 20% for Multifamily (MF), the Probolsky baseline survey, which targeted any residential customer, was applied to the SF preliminary initial proportion toilet estimates.

Table G-2. Preliminary Residential Toilet Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate*	Notes
<1.0 gpf Toilet Residential	0%	No rebates were awarded for this fixture type. It is not code, so none were calculated or assumed.
1.28 gpf HET Residential	18.4%	Based on age of housing, AB 715 effective in 2014, 25% free-ridership, 2% replacement rate (or 50-year fixture life), and 3,621 SF toilet rebates awarded. ACWD did not offer SF rebates till 2014.
1.6 gpf ULFT Residential	48.5%	Based on age of housing, the Federal Energy Policy Act of 1992, and a 3% replacement rate (or 33-year fixture life).
High Use Toilet Residential (3.5 gpf or greater)	33.1%	Based on age of housing and 4% replacement rate (or 25-year fixture life).

* Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

In addition to the considerations mentioned above, a secondary and final analysis of ACWD's residential initial proportions also includes the results of the October 2019 Probolsky baseline study which is summarized earlier in this document. The calculations and methodology used to adjust the preliminary toilet initial proportion estimates in the revised analysis is presented in the following Table G-3.

Table G-3. Final Residential Toilet Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate[1]	Edits/Notes	Secondary/Revised/ Final Estimate[2]	
<1.0 gpf Toilet Residential	0%	The Probolsky survey reported 46.3% of residential toilets were 1.28 gpf or less. Assume approximately 3% of these 46.3% toilets are <1.0 gpf or 0.8 gpf; yields 1.3%. **0% + (3%)x(46.3%) ~ 1.3%**	1.3%	46.3%
1.28 gpf HET Residential	18.4%	The initial estimate of toilets flushing less than 1.3 gpf was 27.9% lower than the survey reported. Almost 97% of this difference was added to preliminary estimate (with the remaining 3% going to <1.0 gpf). **18.4% + (97%)x(46.3%) - 18.4% ~ 45%**	45.0%	
1.6 gpf ULFT Residential	48.5%	The Probolsky survey reported 46.3% of residential toilets were 1.28 gpf or less, meaning 53.7% were greater than 1.28 gpf. So, the initial estimate for all toilets greater than or equal to 1.6 gpf was too high at 81%. Assume half of the 53.7% difference are 1.6 gpf and half are > 3.5 gpf. This yields a value of approximately 14% that was subtracted from the initial estimates. **48.5% + 33.1% ~ 81%** **81% - 53.7% ~ 28%** **28%/2 ~ 14%** **48.5% - 14% ~ 35%** **33.1% - 14% ~ 19%**	34.7%	53.7%
High Use Toilet Residential	33.1%		19.0%	
Total	100%		100%	100%

[1] Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

[2] Also considers the Probolsky October 2019 Baseline Study results.

G.2.3 Fixture Initial Proportions – Showerheads

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

- Using standards in place at the time of building construction (2.5 gpm required in 1992 and 2.0 gpm required in 2016 and 1.8 gpm required in 2018),
- Taking the initial proportions of homes by age or year built as shown in the Table G-1 above,
- Adding the net change due to natural replacement (4% per year),
- Adding the change due to giveaway measure minus the "free rider effect" (estimated to be 25% as explained earlier in this document), and
- Considering the results of the Probolsky October 2019 baseline survey.

A detailed analysis of how ACWD's service area's age of housing, showerhead replacement rates, and historical residential fixture giveaways were used to determine a preliminary estimate of residential showerhead initial proportions, which can be found in a separate water use data sheet (WUDS) Excel document. A preliminary analysis only considering the service area's age of housing, relevant codes, free-ridership, replacement rates, and historical interventions yielded the residential showerhead initial proportions presented in the following table. Since over 45% of service area water use is by Single Family (SF) with less than 20% for Multifamily (MF), the Probolsky baseline survey which targeted any residential customer, was applied to the SF preliminary initial proportion showerhead estimates.

Table G-4. Preliminary Residential Showerhead Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate*	Edits/Notes
Ultra-High Efficiency 1.0 gpm	0.00%	No rebates or giveaways were awarded for this fixture type. It is not required by code.
High Efficiency 1.5 gpm	0.50%	Based on 1,096 1.5 gpm showerhead giveaways.
High Efficiency 1.8 gpm	5.00%	Based on 4% annual replacement rate and updated code requirement in 2018.
High Efficiency 2 gpm	9.70%	Based on natural replacement of 4% annual replacement and 5,497 showerhead giveaways.
Low Flow 2.5 gpm	58.80%	Based on 18.1% new building construction since 1990 and 50.8% natural replacement at a 4% annual replacement rate.
High Flow > 3 gpm	26.00%	Based on age of housing and 4% replacement rate (or 25-year fixtures life).

* Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

In addition to the considerations mentioned above, a secondary and final analysis of ACWD's residential initial proportions also includes the results of the October 2019 Probolsky baseline study which is summarized earlier in this document. The calculations and methodology used to adjust the preliminary showerhead initial proportion estimates in the revised analysis are presented in Table G-5.

Table G-5. Final Residential Showerhead Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate[1]	Edits/Notes	Secondary/Revised/ Final Estimate[2]
Ultra-High Efficiency 1.0 gpm	0.00%	No change	0.00%
High Efficiency 1.5 gpm	0.50%	No change: 0.5% due to free giveaways	0.50%
High Efficiency 1.8 gpm	5.00%	Probolsky Survey reported 49% of SF showerheads were replaced in the last 5 years or WaterSense indicating a higher percentage of HE fixtures installed than estimated in the preliminary analysis. The preliminary analysis accounted for 15.2% of the 49% of HE fixtures leaving 38% of HE fixtures installations unaccounted for. To better reflect Community Survey results, 16.9% (half of the 38%) was removed from the >3 gpm category and distributed proportionally into 1.8 gpm and 2 gpm to reflect purchases made after July 2016. Only a quarter of the remaining 38% (8.45%) was removed from the 2.5gpm to account for purchase made prior to July 2016. The remaining 8.45% was allocated to the 2.0 gpm category since 1.8 gpm showerheads have been the shortest on the market. **49%- (9.70%+5.0%+0.5%) = 33.8%.** **5.0% + (16.9%/2) = 5%+8.45% = 13.5%** **9.7%+16.9 = 27%** **58.8%-(16.9%/2) = 58.8%-8.45%=50%** **26.0%- 16.9%=9%**	13.50%
High Efficiency 2 gpm	9.70%		27%
Low Flow 2.5 gpm	58.80%		50%
High Flow > 3 gpm	26.00%		9%
Total	100%		100%

[1] Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

[2] Also considers the Probolsky October 2019 Baseline Study results.

G.2.4 Fixture Initial Proportions – Clothes Washers

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

- Using standards in place at the time of building construction (8.0/4.5 Water Factor [WF] for top load and front load machines (respectively) in 2015 and 6.0 WF for top load machines in 2018),
- Taking the initial proportions of homes by age or year built as shown in the Table G-1 above,
- Adding the net change due to natural replacement (10% per year for clothes washers),

- Adding the change due to rebate measure minus the "free rider effect" (estimated to be 25% as explained earlier in this document), and
- Considering the results of the Probolsky October 2019 baseline survey.

A detailed analysis of how ACWD's service area's age of housing, clothes washer fixture replacement rates, and historical residential rebates were used to determine a preliminary estimate of residential clothes washer initial proportions can be found in a separate water use data sheet (WUDS) Excel file. A preliminary analysis only considering the service area's age of housing, relevant codes, free-ridership, replacement rates, and historical interventions yielded the residential clothes washer initial proportions presented in Table G-6. Since over 45% of service area water use is by Single Family (SF) with less than 20% for Multifamily (MF), the Probolsky baseline survey, which targeted any residential customer, was applied to the SF preliminary initial proportion clothes washer estimates.

Table G-6. Final Single Family Residential Clothes Washers Initial Proportions – 2019

Fixture Analysis	Final Estimate[1]	Edits/Notes
Efficient Front Loader	43.40%	Based on age of home, 10% natural replacement rate, and 11,534 High Efficiency Clothes Washer rebated between 2009-2014.
Medium Efficient Front Loader	44.60%	Based on percent of new washers that are medium efficiency, 10% natural replacement rate, and 3,055 Medium Efficiency Clothes Washer rebates prior to 2009.
Top Loader	12.00%	Based on age of housing and 10% replacement rate (or 10-year fixtures life).
Total	100%	--

[1] Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

[2] Also considers the Probolsky October 2019 Baseline Study results.

G.2.5 Fixture Initial Proportions – Lavatory Faucets

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

- Using standards in place at the time of building construction (2.5 gpm required in 1990 and 2.2 gpm required in 1992 and 1.2 gpm required in 2016),
- Taking the initial proportions of homes by age or year built as shown in the Table G-1 above,
- Adding the net change due to natural replacement (10% per year for lavatory faucets),
- Adding the change due to rebate measure minus the "free rider effect" (estimated to be 25% as explained earlier in this document), and
- Considering the results of the Probolsky October 2019 baseline survey.

A detailed analysis of how ACWD's service area's age of housing, lavatory faucet fixture replacement rates, and historical residential fixture giveaways were used to determine a preliminary estimate of residential lavatory faucet initial proportions can be found in a separate water use data sheet (WUDS) Excel file. A preliminary analysis only considering the service area's age of housing, relevant codes, free-ridership, replacement rates, and historical interventions yielded the residential lavatory faucet initial proportions presented in Table G-7.

Since over 45% of service area water use is by Single Family (SF) with less than 20% for Multifamily (MF), the Probolsky baseline survey, which targeted any residential customer, was applied to the SF preliminary initial proportion lavatory faucet estimates.

Table G-7. Preliminary Residential Lavatory Faucet Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate*	Edits/Notes
0.5 gpm Residential Lavatory Faucets	0.40%	Based on 1,088 giveaways.
1.0 gpm Residential Lavatory Faucets	0.00%	
1.2 gpm Residential Lavatory Faucet	28.50%	Based on age of home relative to 2016 code requirement, 10% natural replacement rate, and 1,539 giveaways.
1.5 gpm Residential Lavatory Faucet	0.00%	
2.2 gpm Residential Lavatory Faucet	68.10%	Based on age of home, 10% natural replacement rate, and 5,049 giveaways.
2.5 gpm Residential Lavatory Faucet	0.70%	Based on age of home relative to 1992 code requirement and 10% natural replacement rate.
>2.5 gpm Residential Lavatory Faucet	2.40%	Based on age of housing and 10% replacement rate (or 10-year fixtures life).

* Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

In addition to the considerations mentioned above, a secondary and final analysis of ACWD's residential initial proportions also includes the results of the October 2019 Probolsky baseline study which is summarized earlier in this document. The calculations and methodology used to adjust the preliminary lavatory faucet initial proportion estimates in the revised analysis is presented in Table G-8.

Table G-8. Final Residential Lavatory Faucet Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate[1]	Edits/Notes	Secondary/Revised/ Final Estimate[2]
0.5 gpm Residential Lavatory Faucets	0.40%	No change	0.40%
1.0 gpm Residential Lavatory Faucets	0.00%	0.5% increase a portion of survey results of 35.5% of lavatory aerators replaced in the last 5 years.	0.50%
1.2 gpm Residential Lavatory Faucet	28.50%	No change based on survey results since 1.2 gpm was still code for part of the 5-year review span of the survey period (post-2016).	28.50%
1.5 gpm Residential Lavatory Faucet	0.00%	0.5% increase a portion of survey results of 35.5% of lavatory aerators replaced in the last 5 years.	0.50%
2.2 gpm Residential Lavatory Faucet	68.10%	1% of 2.2 gpm faucets replaced with 1.0 and 1.5 gpm. Small decrease due to 2.2 was still code requirement for part of the 5-year review span of the survey period (pre-2016).	67%
2.5 gpm Residential Lavatory Faucet	0.70%	No change	0.70%
>2.5 gpm Residential Lavatory Faucet	2.40%	No change	2.40%
Total	100%		100%

[1] Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

[2] Also considers the Probolsky October 2019 Baseline Study results.

G.2.6 Fixture Initial Proportions – Non-Lavatory Faucets

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

- Using standards in place at the time of building construction (2.5 gpm required in 1990 and 2.2 gpm required in 1992 and 1.8 gpm required in 2016),
- Taking the initial proportions of homes by age or year built as shown in the Table G-1 above,
- Adding the net change due to natural replacement (10%),
- Adding the change due to rebate measure minus the "free rider effect" (estimated to be 25% as explained earlier in this document), and
- Considering the results of the Probolsky October 2019 baseline survey.

A detailed analysis of how ACWD's service area's age of housing, non-lavatory faucet fixture replacement rates, and historical residential fixture giveaways were used to determine a preliminary estimate of residential non-lavatory faucet initial proportions can be found in a separate water use data sheet (WUDS) Excel file. A preliminary analysis only considering the service area's age of housing, relevant codes, free-ridership, replacement rates, and historical interventions yielded the residential non-lavatory faucet initial proportions presented in Table G-9, along with a secondary and final analysis of ACWD's residential initial proportions which includes the results of the October 2019 Probolsky Baseline Study. Since over 45% of service area water use is by Single Family (SF) with less than 20% for Multifamily (MF), the Probolsky baseline survey, which targeted any residential customer, was applied to the SF preliminary initial proportion non-lavatory faucet estimates.

Table G-9. Final Residential Non-Lavatory/Kitchen Faucet Initial Proportions – 2019

Fixture Analysis	Preliminary Estimate[1]	Edits/Notes	Secondary/Revised/ Final Estimate[2]
1.5 gpm Residential Non-Lavatory/Kitchen Faucet	0.80%	Based on age of home, natural replacement rate, and 1,088 giveaways.	0.80%
1.8 gpm Residential Non-Lavatory/Kitchen Faucet	28.50%	Based on age of home relative to 2016 code requirement and 10% natural replacement rate.	28.50%
2.2 gpm Residential Non-Lavatory/Kitchen Faucet	68.00%	Based on age of home relative to 1992 code requirement and 10% natural replacement rate.	68.00%
2.5 gpm Residential Non-Lavatory/Kitchen Faucet	0.50%	Based on age of home relative to pre-1995 code requirement, and 10% natural replacement rate.	0.50%
>2.5 gpm Residential Non-Lavatory/Kitchen Faucet	2.30%	Based on age of housing and 10% replacement rate (or 10-year fixtures life).	2.30%
Total	100%		100%

[1] Considers free-ridership, codes, age of housing, replacement rates, and historical interventions.

[2] Also considers the Probolsky October 2019 Baseline Study results.

APPENDIX H – ACWD'S PAST WATER USE EFFICIENCY MEASURES AND ACTIVITY (UP TO FY 2019/20)

Table H-1 provides activity data for ACWD's Water Use Efficiency measures since program inception (25 years). Some elements of this activity were discussed in greater detail in Section 1.

Table H-1. ACWD's Detailed Water Use Efficiency Measure Activity To-Date[35]

Measure/Activity	Activity Numbers/Description
Residential Measures	
Residential High Efficiency Clothes Washer Rebate	Washer Rebates Issued: 35,861
Residential Low-Flow Device Distribution	Water Conservation Kits Distributed: 25,071 Leak Detection Kits Distributed: 322
Single Family and Multifamily Residential High Efficiency Toilet Rebate	Rebates Issued: 4,822
Multifamily Residential Water Use Efficiency Surveys	Multifamily Units Surveyed: 10,218
Partnership with California Youth Energy Services (CYES)	Single Family and Multifamily Units Surveyed: 4,453
Water Savings Assistance for Income-Qualified Customers	Homes Surveyed: 240 Ultra-High Efficiency Toilets (UHET) Installed: 280 Shower Heads Installed: 329 Faucet Aerators Installed: 523 Toilet Repairs: 177
Residential High Water Use Notification	WaterSmart Home Water Use Reports: measure targeted the top 20% of water users or about 19,000 customers annually. This measure was in effect from 2014-2017. Single Family High Water Use Notices: measure targeted the top 2% of water users or about 1,000 customers. This measure was in effect from 2004-2010.
Residential Leak Detection and Notification	Leak Notices (door hangers left by meter readers): ~880 per year
Residential Seasonal Irrigation Reminder	Irrigation reminders are sent on a seasonal basis to single family residential customers to update them on current landscape irrigation requirements. Reminders are sent via postcards, social media, and/or bill messages each year since 1998.

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[35] Participation numbers from FY15/16 start to FY 19/20 end (7/1/2015–6/30/2020) were added to the UWMP 2015 "Detailed Program Activity Table."

Measure/Activity	Activity Numbers/Description
Residential Landscape Workshops, landscape events, and Garden Tours	Partner with BAWSCA and Bay-Friendly Gardening to provide workshops to residential customers on efficient water use in the landscape throughout the spring and fall. Topics include efficient irrigation, water-efficient design elements, low water use plants, rainwater harvesting, and lawn alternatives. In the past ten years, 40 workshops were held and were attended by 1,405 people. In 2020, some landscape events and workshops were offered virtually. In addition, ACWD sponsors and promotes local garden tours including the Bringing Back the Natives Garden Tour. ACWD participates in local landscaping events including StopWaste sheet mulching parties and garden supply store vendor events. ACWD updated its Water-Efficient Landscape Demonstration Garden between 2013-2016, which is located at District Headquarters. The garden serves as an educational tool to showcase what residential and commercial customers can do with their landscape to be more efficient.
"Water-Wise Gardening in the Bay Area" Online Tool	ACWD refers customers to this web tool as a resource for water-efficient landscaping projects.
Residential Rain Barrel Rebate	Rebates Issued: 285
Single-Family Residential Water Efficient Landscape Rebate (Turf Removal)	Square Feet of Turf Removed: 364,663 Sites: 327
Single-Family Residential Smart Sprinkler Controller Instant Rebate	Incentives Redeemed: 93
Commercial, Industrial, and Institutional Measures	
Commercial Water Use Efficiency Survey and Green Business Certification	Surveys Conducted: 731
Commercial High Efficiency Toilet (HET) and Urinal (HEU) Rebate and Waterless Urinal Installation at Local Schools	HET/HEU Rebates Issued: 791
Commercial High Efficiency Clothes Washer Rebate	Rebates Issued: over 300
Spray and Rinse Valve Installation	Spray Valves Installed: over 570
Commercial Custom Water and Energy Efficient Equipment Incentives	Incentives Offered: 1

Measure/Activity	Activity Numbers/Description
Large Landscape Measures	
Landscape Water Use Reports	There are currently over 800 sites (representing approximately 1,600 accounts) receiving reports which represents the majority of dedicated landscape water consumption. 500+ sites receive full access to an online water budget report tool, Waterfluence, that compares the site's water use to a customized water budget each billing cycle. 300 additional sites are monitored by ACWD. ACWD has been providing these reports to customers for over 20 years.
City Parks Landscape Water Use Reports	City parks in Fremont (44), Newark (12), and Union City (35) are included in the measure for a total of 91 parks. Reports are provided annually.
Landscape Conservation Business of the Year Awards	Awards provided to customers who met their landscape water use budgets. In 2020, 323 sites were eligible to receive the award.
Landscape Audits	Audits Completed: 198
Workshops, Trainings, and Certifications for Landscape Contractors	Partner with Bay-Friendly, BAWSCA, irrigation supply manufacturers/distributors, Bay Area Qualified Water Efficient Landscaper (QWEL) via CalWEP, and other interested organizations to provide landscape water use efficiency training and certification programs in the service area and region.
Water Efficient Landscape Rebate **(Commercial, Industrial, and Institutional and Multifamily Customers)**	Square Feet of Turf Removed: 440,524 Sites: 41
Weather-based Irrigation Controller Rebate	Controllers Installed: 229
California Irrigation Management Information System (CIMIS)	Partner with DWR and Union City to host a CIMIS station at a park in Union City. The station provides climate data that is used for measures such as the landscape water budget measure. ACWD maintains the station on a monthly basis.
Public Information and School Measures	
School Education	Measure that educates students in the service area to better equip them for understanding and practicing water use efficiency techniques. Measure includes assembly programs, student video contests, free online educational resources, classroom giveaways, facility tours, and special activities. ACWD-sponsored assembly programs reach approximately 16,000 students annually.
Avenues for Public Outreach	ACWD website, Aqueduct newsletter, social media, bill messages, postcards, brochures, mailings, email blasts, community newsletters, newspaper advertisements, press releases, community meetings, and participation at community events.

Measure/Activity	Activity Numbers/Description
Customer Service and Conservation Material Distribution	Address customer questions about water conservation in-person, via phone or email. Email and/or mail materials and resources to assist customers in achieving water use efficiency goals.
ACWD's Water Efficient Landscape Demonstration Garden	ACWD's ReScape (previously Bay-Friendly) rated Water Efficient Landscape Demonstration Garden is a great resource for customers interested in water-efficient gardening techniques. The garden demonstrates both commercial and residential water-efficient garden ideas and includes plant labels and educational signage. The garden is also used as a venue for water-efficient landscaping classes.
Other Water Use Efficiency Activities at ACWD	
System Leak Detection, Repair, and Water Loss Auditing	Evaluate the distribution system for leaks and make necessary repairs to the system. On average, ACWD surveys over 39 miles of pipeline for leaks bi-annually. ACWD submits a validated water loss audit to the state annually, per the requirements of SB 555, to monitor ACWD's distribution system water loss and identify system improvements.
Metering and Advanced Metering Infrastructure	All ACWD accounts are metered. ACWD approved the AMI project in 2020. With the capability of offering near real-time data, AMI will enable customers to view water usage at any time during the billing cycle and monitor use to identify the possibility of leaks more quickly.
Billing	All ACWD accounts are billed based on the amount of water used.
Water Waste Reporting	Water Waste Reports: 2,455 Courtesy Notices: 2,298
State Reporting and Compliance	ACWD adheres to all state program/activity reporting requirements, such as monthly reporting to the State Water Resource Control Board.
Partnerships	ACWD maintains strong partnerships with organizations like the Green Business Network, California Urban Water Agencies (CUWA), Local Ecology Agriculture Fremont (LEAF), CalWEP, BAWSCA, StopWaste, and neighboring water agencies through coordination and information sharing.

APPENDIX I – EXAMPLES OF LOCAL AND REGIONAL OUTREACH INITIATIVES

Social Media Examples

Alameda County Water District
Aug 20, 2020 ·

Conserving water lessens the demand on the electrical grid (water pumps are powered by electricity) & ensures water for firefight... See More

Alameda County Water District
Dec 2, 2020 ·

Have you been thinking about replacing your thirsty lawn with a water-efficient landscape? 🌻
🌿 With ACWD's rebate program, now... See More

Did you know?
California native plants thrive in our climate.

California native plants...
- Use less water
- Create wildlife habitat
- Require less maintenance
- Reduce the need for
- fertilizer or pesticides

Alameda County WD @AlamedaCountyWD · May 21, 2020
Reimagina tu paisaje!

CA - DWR @CA_DWR · May 21, 2020
¡Transforma Tu Jardín! Haz el cambio a plantas nativas de California porque usan menos agua. Para obtener más información sobre las mejores maneras para conservar agua o para transformar su jardín, visite SaveOurWater.com.

Alameda County Water District
Jul 7, 2020 ·

It's Smart Irrigation Month! 💦 ACWD can help you save 20% or more on your outdoor water usage with a Rachio Smart Sprinkler Controlle... See More

Select & inspect sprinklers properly
Select sprinkler heads and nozzles that apply water uniformly to the target area. Inspect your sprinkler heads regularly to make sure they are not obstructed or watering onto pavement.

Alameda County WD @AlamedaCountyWD · Jun 18, 2020
#ThankfulThursday ❤️ Thankful to be a partner for the 17th annual #WaterConservationShowcase! It's a FREE online event on 7/21, 8/4, 8/18, & 8/ 25. See the schedule & register today! bit.ly/3anrto7 #ACWDcares 👍 @ebmud @AIASF @PGE4Me @SFWater @sjwaterco @usgbcncc

Alameda County Water District
Sep 24, 2020 ·

Question: How can I become a certified Qualified Water Efficient Landscaper (QWEL)? 🌿🌻
Answer: Register for a FREE online QW... See More

Qualified Water Efficient Landscaper Training
NOW ONLINE!

FREE CLASS FOR BAY AREA PROFESSIONALS
Become a recognized industry leader in sustainable landscaping and irrigation by earning your QWEL certification online this fall.

Class series start October 5th!
Evening & morning sessions available

REGISTER TODAY: QWEL.NET

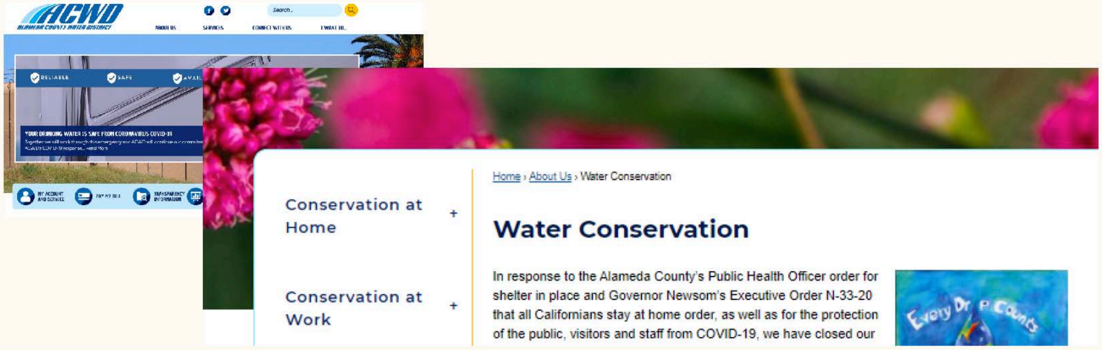
Alameda County WD @AlamedaCountyWD · May 12, 2020
It's #WaterAwarenessMonth! Check out simple water saving tips from wat education performers ZunZun! For more info on ZunZun and water education distance learning go to acwd.org/watereducation #ACWDcares #TriCitiesTogether @FremontUSD @nusdschoolnews @AlamedaCOE

Alameda County Water District
Oct 22, 2020 ·

Virtual Workshop Alert! 🌿🌷🙌 Come along as we explore an approachable way to develop designs for beautiful, productive, low w... See More

VIRTUAL WORKSHOP
Design It Yourself - Native Plant Landscape
Wed. Nov. 4, 2020
7 pm - 8 pm
Register at: https://bawsca.org/classes

Online Examples



Home › About Us › Water Conservation

Conservation at Home +

Conservation at Work +

Water Conservation

In response to the Alameda County's Public Health Officer order for shelter in place and Governor Newsom's Executive Order N-33-20 that all Californians stay at home order, as well as for the protection of the public, visitors and staff from COVID-19, we have closed our

Online Connection

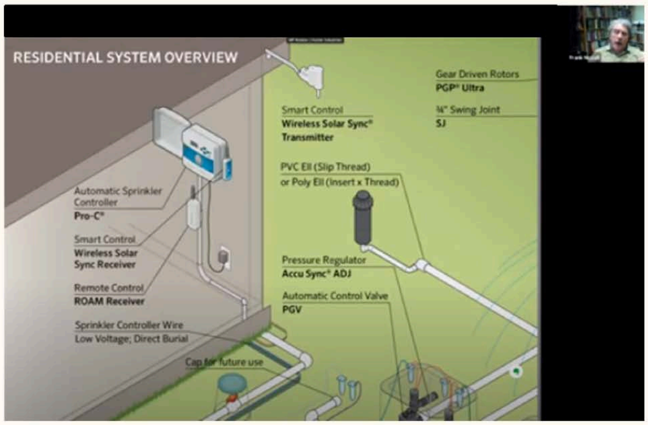
ACWD Website, YouTube, AMI Portal, Email Listservs

Website: www.acwd.org
YouTube: AlamedaCountyWater

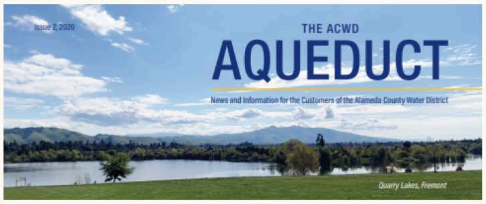
ACWD
ALAMEDA COUNTY WATER DISTRICT

Rain Water Harvesting

In Partnership with:
Bay Area Water Supply & Conservation Agency
Water-Efficient Landscape Workshop



Print Ad Examples


Issue 2, 2020

THE ACWD

AQUEDUCT

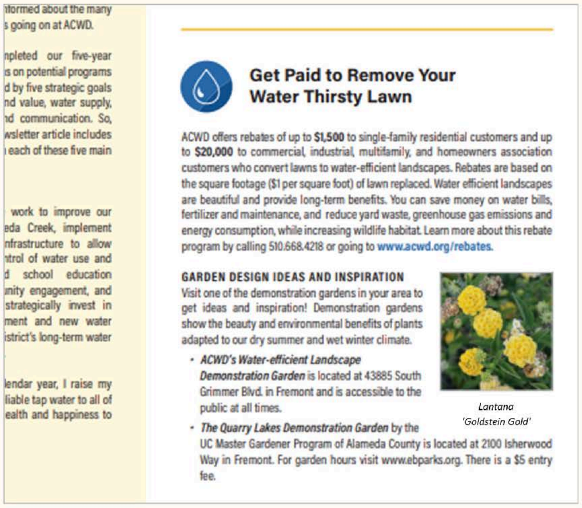
News and Information for the Customers of the Alameda County Water District

Quarry Lakes, Fremont


Quick Tip: *Irrigating Effectively*

Fall means shorter days and less irrigation needed. Cut back watering by as much as 50 percent until you completely shut off your irrigation system in the winter. Summer months require the most irrigating, but your watering schedule should never be more than 3-4 days per week.

Learn more at **www.acwd.org/conserve.**


ıformed about the many
s going on at ACWD.

npleted our five-year
s on potential programs
d by five strategic goals
nd value, water supply,
ıd communication. So,
wsletter article includes
ı each of these five main

work to improve our
eda Creek, implement
nfrastructure to allow
ıtrol of water use and
d school education
ınity engagement, and
strategically invest in
ment and new water
istrict's long-term water

lendar year, I raise my
liable tap water to all of
ealth and happiness to

Get Paid to Remove Your Water Thirsty Lawn

ACWD offers rebates of up to **$1,500** to single-family residential customers and up to **$20,000** to commercial, industrial, multifamily, and homeowners association customers who convert lawns to water-efficient landscapes. Rebates are based on the square footage ($1 per square foot) of lawn replaced. Water efficient landscapes are beautiful and provide long-term benefits. You can save money on water bills, fertilizer and maintenance, and reduce yard waste, greenhouse gas emissions and energy consumption, while increasing wildlife habitat. Learn more about this rebate program by calling 510.668.4218 or going to **www.acwd.org/rebates.**

GARDEN DESIGN IDEAS AND INSPIRATION

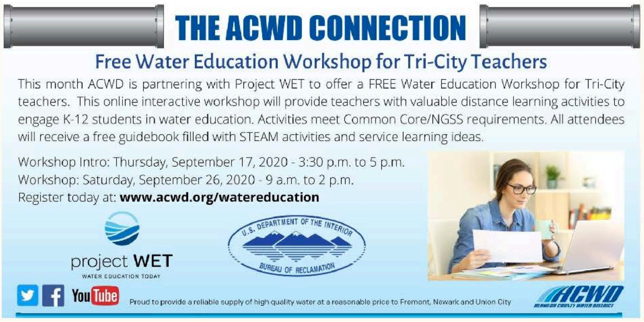
Visit one of the demonstration gardens in your area to get ideas and inspiration! Demonstration gardens show the beauty and environmental benefits of plants adapted to our dry summer and wet winter climate.

- ***ACWD's Water-efficient Landscape Demonstration Garden*** is located at 43885 South Grimmer Blvd. in Fremont and is accessible to the public at all times.
- ***The Quarry Lakes Demonstration Garden*** by the UC Master Gardener Program of Alameda County is located at 2100 Isherwood Way in Fremont. For garden hours visit www.ebparks.org. There is a $5 entry fee.

Lantana
'Goldstein Gold'

Print Media

Aqueduct Newsletter, Bill Messages, Bill Inserts &
Weekly Newspaper Ad: "The ACWD Connection"


THE ACWD CONNECTION

Free Water Education Workshop for Tri-City Teachers

This month ACWD is partnering with Project WET to offer a FREE Water Education Workshop for Tri-City teachers. This online interactive workshop will provide teachers with valuable distance learning activities to engage K-12 students in water education. Activities meet Common Core/NGSS requirements. All attendees will receive a free guidebook filled with STEAM activities and service learning ideas.

Workshop Intro: Thursday, September 17, 2020 - 3:30 p.m. to 5 p.m.
Workshop: Saturday, September 26, 2020 - 9 a.m. to 2 p.m.
Register today at: **www.acwd.org/watereducation**

Proud to provide a reliable supply of high quality water at a reasonable price to Fremont, Newark and Union City


THE ACWD CONNECTION

Celebrate Smart Irrigation Month and take advantage of our rebate programs designed to help customers create water-efficient landscapes.

- Smart Controller Rebates: Residential customers can receive a Rachio 3 Smart Sprinkler Controller at a discounted price of $100, visit **https://bawsca.rachio.com/** to apply.
- Commercial and large landscape customers that replace their existing conventional irrigation controller with a "smart" irrigation controller may qualify for a rebate of up to $30 per active station.
- Water-Efficient Landscape (WEL) Rebate Program: Receive a rebate for converting lawn to a water-efficient landscape. ACWD is currently offering $1.00/sq.ft of lawn converted. To be eligible for this rebate, customers must be pre-approved.

For information, visit: **www.acwd.org/rebates** or call 510.668.4218

Proud to provide a reliable supply of high quality water at a reasonable price to Fremont, Newark and Union City

APPENDIX F
District Board of Directors Resolution No. 21-021
Adopted on May 13, 2021

RESOLUTION NO. 21-021

OF BOARD OF DIRECTORS OF ALAMEDA COUNTY WATER DISTRICT ADOPTING THE 2020-2025 URBAN WATER MANAGEMENT PLAN, WATER SHORTAGE CONTINGENCY PLAN, AND AN ADDENDUM TO THE 2015-2020 URBAN WATER MANAGEMENT PLAN TO INCLUDE THE REDUCE RELIANCE ON THE DELTA APPENDIX

WHEREAS, pursuant to the Urban Water Management Planning Act, California Water Code Sections 10610 *et seq.* (Act), the Alameda County Water District (District) must prepare and adopt an Urban Water Management Plan (UWMP) and a Water Shortage Contingency Plan (WSCP);

WHEREAS, while the District's WSCP is a separate document, it is also included in its UWMP;

WHEREAS, pursuant to the California Code of Regulations, Title 23, section 5003, the District must prepare and adopt a Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Reduce Reliance on the Delta) appendix and also include this Reduce Reliance on the Delta appendix through an addendum to the 2015-2020 UWMP (2015-2020 UWMP addendum) by following the process for amending the 2015-2020 UWMP;

WHEREAS, on June 9, 2016, with the adoption of the 2015-2020 UWMP, the District adopted a method for determining its urban water use target for compliance with the Water Conservation Bill of 2009, California Water Code Sections 10608 et seq. (SB X7-7);

WHEREAS, the analysis and selection of the District's SB X7-7 compliance method is set forth in its UWMP;

WHEREAS, with the 2020-2025 UWMP, the District must show its compliance with the Water Conservation Bill of 2009;

WHEREAS, the District met the procedural requirements of the Act by doing all of the following: (1) coordinated the preparation of the UWMP, WSCP, and the 2015-2020 UWMP addendum with other appropriate agencies in the area; (2) notified the County of Alameda and cities of Fremont, Hayward, Newark, and Union City as well as numerous local and regional agencies and other parties that the District will be reviewing the UWMP, WSCP, and the 2015-2020 UWMP addendum at least 60 days prior to the public hearing; (3) distributed notice of the availability of the draft UWMP, WSCP, and the 2015-2020 UWMP addendum to the County of Alameda and cities of Fremont, Hayward, Newark, and Union City as well as numerous local and regional agencies and other parties; (4) because of the Covid-19 pandemic, made the draft UWMP, WSCP, and the 2015-2020 UWMP addendum available at the District headquarters upon request; (5) posted the draft UWMP, WSCP, and the 2015-2020 UWMP addendum on the District's website; (6) encouraged active involvement of different elements of the population and the community; (7) reviewed the draft UWMP, WSCP, and the 2015-2020 UWMP addendum assumptions at the regular, publicly noticed, April 13 Board meeting; (8) published a notice of the May 13 public hearing in the local newspaper once a week for two successive weeks beginning at least fourteen days prior to the public hearing and posted that notice on the District'swebsite; (9) held a public hearing inviting public input regarding the draft UWMP, WSCP, and the 2015-2020 UWMP addendum; and (10) considered all comments received during the public hearing.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of Alameda County Water District as follows:

1. The Board adopts the 2020-2025 Urban Water Management Plan as presented by staff, and authorizes staff to incorporate the public hearing comments as approved by the Board after the close of the public hearing.

2. The Board adopts the Water Shortage Contingency Plan as presented by staff, and authorizes staff to incorporate the public hearing comments as approved by the Board after the close of the public hearing.

3. The Board adopts the addendum to the 2015-2020 Urban Water Management Plan to include the Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance appendix as presented by staff, and authorizes staff to incorporate the public hearing comments as approved by the Board after the close of the public hearing.

4. The Board authorizes the General Manager to submit copies of the final UWMP, WSCP, and 2015-2020 UWMP addendum to the Department of Water Resources, the California State Library, the County of Alameda, and the cities of Fremont, Hayward, Newark, and Union City by June 12, 2021.

PASSED AND ADOPTED this 13th day of May 2021, by the following vote:

AYES: Directors Weed, Gunther, Huang, Sethy, and Akbari

NOES: None

ABSENT: None

Aziz Akbari, President
Board of Directors
Alameda County Water District

ATTEST:

Gina Markou

Gina Markou, District Secretary
Alameda County Water District
(Seal)

APPROVED AS TO FORM:

Patrick T. Miyaki, General Counsel
Alameda County Water District

CERTIFICATE

I, the undersigned District Secretary of ALAMEDA COUNTY WATER DISTRICT, do hereby certify that the foregoing is a full, true and correct copy of a Resolution of the Board of Directors of ALAMEDA COUNTY WATER DISTRICT, a political subdivision, which said Resolution was duly adopted at a meeting of said Board regularly held on May 13, 2021, that a copy of said Resolution was forthwith duly entered in the minutes of said meeting of said Board, and that the same is in full force and effect.

Dated: May 19, 2021

Gina Markou

Gina Markou, District Secretary
Alameda County Water District

APPENDIX G
DWR Standard Tables and SB X7-7 Tables

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SUBMITTAL 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			
CA0110001	Alameda County Water District	86,788	45,872
	TOTAL	86,788	45,872

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

NOTES: Number of Municipal Connections taken from the District's 2020 electronic Annual Report (eAR), also known as the Large Water System Report. Volume of Water Supplied in 2020 includes private pumping, and uses DWR's SWP reporting values instead the District's SCADA, and therefore differs from the 2020 eAR.

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: Ref. UWMP Chapter 1, "District Background"	

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
California Department of Water Resources (DWR)
San Francisco Public Utilities Commission (SFPUC)
NOTES: Ref. UWMP Chapter 3, Sources of Supply and Supply Availability.

Submittal Table 3-1 Retail: Population - Current and Projected

Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	356,823	362,400	371,100	379,000	387,000	442,100

NOTES: Ref. UWMP Table 1-3.

Submittal Table 4-1 Retail: Demands for Potable and Non-Potable[1] Water - Actual

Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Single Family		Drinking Water	18,762
Multi-Family		Drinking Water	7,813
Commercial		Drinking Water	4,245
Industrial		Drinking Water	2,410
Institutional/Governmental		Drinking Water	1,064
Landscape		Drinking Water	5,463
Other	Other Distribution System Demands	Drinking Water	83
Losses	Gross Non-Revenue Water (difference between metered production and billed consumption)	Drinking Water	4,483
Other	Private Groundwater Pumping	Raw Water	1,569
Saline water intrusion barrier	Aquifer Recovery Program (ARP) Pumping (not desalinated)	Raw Water	463
Saline water intrusion barrier	Saline and Other Groundwater Outflows to SF Bay via the Newark Aquifer	Raw Water	7,190
Sales/Transfers/Exchanges to other Suppliers		Raw Water	0
		TOTAL	53,546

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*

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

NOTES: CY2020 consumption totals. "Drinking Water" deliveries plus Private Groundwater Pumping are billed CY2020 totals. Aquifer Recovery Program (ARP) pumping was informed by the District's SCADA record. Saline and Other Groundwater Outflows volumes were estimated based on the District's Integrated Resources Planning Model groundwater level modeling for CY2020.

Submittal Table 4-2 Retail: Use for Potable and Non-Potable[1] Water - Projected

Use Type	Additional Description (as needed)	Projected Water Use[2] Report To the Extent that Records are Available				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Single Family	Distribution System	18,300	17,700	17,100	16,700	16,400
Multi-Family	Distribution System	9,800	10,000	10,200	10,500	14,100
Commercial	Distribution System	6,800	7,000	7,100	7,200	9,700
Industrial	Distribution System	3,200	3,000	3,000	3,100	4,100
Institutional/Governmental	Distribution System	2,500	2,500	2,600	2,600	3,000
Other	Distribution System	200	200	200	200	200
Losses	Distribution System	3,800	3,800	3,800	3,900	4,500
Other	Groundwater System	16,300	16,200	16,100	16,000	15,500
	TOTAL	60,900	60,400	60,100	60,200	67,500

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.*

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

NOTES: Ref. UWMP Table 2-5.
Losses are calculated as the difference between 'Total Distribution System Demand (with losses)' less the 'Total Distribution System Demand (without losses)' from UWMP Table 2-5. Distribution System demand categories include adjustments for both natural and programmatic water use efficiency savings (active and passive).

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*	53,546	60,900	60,400	60,100	60,200	67,500
Recycled Water Demand[1] *From Table 6-4*	0	0	0	0	0	0
Optional Deduction of Recycled Water Put Into Long-Term Storage[2]						
TOTAL WATER USE	53,546	60,900	60,400	60,100	60,200	67,500

[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: Ref. Tables 2-1 and 2-5.

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]
NA	NA
01/2016	1,992
01/2017	3,550
01/2018	3,596
01/2019	3,416

[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: Ref. Appendix H. Prior to the CY2016 audit cycle, the Water Loss Technical Assistance Program was not available for agencies; therefore, the District does not have a validated water loss audit prior to CY2016.

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)*	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	Section 2.4, pp. 2-4 to 2-5.
Are Lower Income Residential Demands Included In Projections? *Drop down list (y/n)*	Yes

NOTES: Ref. UWMP Chapter 2.

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	*1995*	*2004*	*170*	*138*
5 Year	*2003*	*2007*	*160*	

**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: Ref. UWMP Chapter 8. Verification form submitted in 2015 had an error that showed 137 GPCD for the 2020 target using Provisional Method 4, although the value is actually 137.5 GPCD, which rounds up to 138 GPCD.

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)*		
115	*0*	*115*	*138*	*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: Ref. UWMP Chapter 8 and SB X7-7 Table 9.

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						
Alluvial Basin	Niles Cone Groundwater Basin	19,100	19,800	21,100	19,900	21,700
	TOTAL	19,100	19,800	21,100	19,900	21,700
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES: Ref. UWMP Table 4-2 (FY)						

Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020

☐ There is no wastewater collection system. The supplier will not complete the table below.

Percentage of 2020 service area covered by wastewater collection system *(optional)*

Percentage of 2020 service area population covered by wastewater collection system *(optional)*

Wastewater Collection			**Recipient of Collected Wastewater**			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? *Drop Down List*	Volume of Wastewater Collected from UWMP Service Area 2020 *	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? *Drop Down List*	Is WWTP Operation Contracted to a Third Party? *(optional)* *Drop Down List*
Union Sanitary District	Metered	26,212	Union Sanitary District	Alvarado Wastewater Treatment Plant	Yes	No
Total Wastewater Collected from Service Area in 2020:		26,212				

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

NOTES: Ref. UWMP Chapter 6.

Submittal Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2020

☐ **No wastewater is treated or disposed of within the UWMP service area.** The supplier will not complete the table below.

Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal ***Drop down list***	Does This Plant Treat Wastewater Generated Outside the Service Area? ***Drop down list***	Treatment Level ***Drop down list***	**2020 volumes** [1]				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
Alvarado Wastewater Treatment Plant	East Bay Dischargers Authority	San Francisco Bay	n/a	Bay or estuary outfall	No	Secondary, Disinfected - 23	26,212	26,212	0	0	0
						Total	26,212	26,212	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: Data supplied by Union Sanitary District (USD). Ref. UWMP Chapter 6. Level of treatment does not fit DWR categories, which may be better characterized as "Secondary Disinfected." USD is not required to meet a total coliform limit of 23 MPN/100 mL, rather the limit is 500 MPN/100 mL for fecal coliform as a 5-sample geometric mean.

Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area

☑ Recycled water is not used and is not planned for use within the service area of the supplier.
The supplier will not complete the table below.

Name of Supplier Producing (Treating) the Recycled Water:

Name of Supplier Operating the Recycled Water Distribution System:

Supplemental Water Added in 2020 (volume) *Include units*

Source of 2020 Supplemental Water

Beneficial Use Type *Insert additional rows if needed.*	**Potential** Beneficial Uses of Recycled Water (Describe)	Amount of **Potential** Uses of Recycled Water (Quantity) *Include volume units* [1]	General Description of 2020 Uses	Level of Treatment *Drop down list*	2020 [1]	2025 [1]	2030[1]	2035[1]	2040[1]	2045[1] (opt)
Agricultural irrigation										
Landscape irrigation (exc golf courses)										
Golf course irrigation										
Commercial use										
Industrial use										
Geothermal and other energy production										
Seawater intrusion barrier										
Recreational impoundment										
Wetlands or wildlife habitat										
Groundwater recharge (IPR)										
Reservoir water augmentation (IPR)										
Direct potable reuse										
Other (Description Required)										
				Total:	0	0	0	0	0	0
				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		
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	3,000	0
Groundwater recharge (IPR)		
Reservoir water augmentation (IPR)		
Direct potable reuse		
Other (Description Required)		
Total	3,000	0

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

NOTE: Average annual use as stated in the District's 2015 UWMP.

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.		
Sect. 6-5, p. 6-4	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			
		Total	0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES:			

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				
Purchased or Imported Water	State Water Project supplies (including previously banked SWP supplies from Semitropic) used at District facilities	23,029	Other Non-Potable Water	
Purchased or Imported Water	San Fancisco Public Utilities Commission Regional Water System supply	9,411	Drinking Water	
Supply from Storage	Del Valle Reservoir local supply	750	Other Non-Potable Water	
Groundwater (not desalinated)	Net Local Groundwater Recharge	18,462	Other Non-Potable Water	
Desalinated Water - Groundwater	Newark Desalination Facility production	8,680	Drinking Water	
	Total	60,332		0

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

NOTES: These supplies are for CY2020. Net Local Groundwater Recharge from the Alameda Creek watershed (and excluding imported supplies) are estimated from the District's Integrated Resources Planning Model for CY2020 groundwater levels.

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											
Purchased or Imported Water	State Water Project supplies (including previously banked SWP supplies from Semitropic) used at District facilities	20,900		20,900		20,900		20,900		20,900	
Purchased or Imported Water	San Fancisco Public Utilities Commission Regional Water System supply	15,400		15,400		15,400		15,400		15,400	
Supply from Storage	Del Valle Reservoir local supply	5,000		5,000		5,000		5,000		5,000	
Groundwater (not desalinated)	Net Local Groundwater Recharge	21,800		21,800		21,900		21,900		21,800	
Desalinated Water - Groundwater	Newark Desalination Facility production	5,100		5,100		5,100		5,100		5,100	
	Total	68,200	0	68,200	0	68,300	0	68,300	0	68,200	0

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

Ref. UWMP Table 9-2 "Normal Year"

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	Calc. median	68,100	100%
Single-Dry Year	1977	52600	
Consecutive Dry Years 1st Year	1988	61400	
Consecutive Dry Years 2nd Year	1989	66300	
Consecutive Dry Years 3rd Year	1990	55500	
Consecutive Dry Years 4th Year	1991	56100	
Consecutive Dry Years 5th Year	1992	56700	

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: Ref. UWMP Tables 9-2, 9-3, and 9-4. 'Average Year' values are calculated median water supply availability values over the 1922-2003 planning hydrology rather than a specific 'base year'.

Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	68,200	68,200	68,300	68,300	68,200
Demand totals *(autofill from Table 4-3)*	63,900	63,400	63,100	63,200	70,500
Difference	4,300	4,800	5,200	5,100	(2,300)
NOTES: Values autofilled using data from other DWR Tables.					

Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	52,600	52,700	52,700	52,800	52,300
Demand totals*	58,200	57700	57,400	57,400	63,900
Difference	(5,600)	(5,000)	(4,700)	(4,600)	(11,600)
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES: Ref. UWMP Table 9-3					

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison

		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	61,400	59,900	58,200	56,700	55,300
	Demand totals	57,000	58,800	58,200	58,000	59,100
	Difference	4,400	1,100	0	(1,300)	(3,800)
Second year	Supply totals	66,300	66,500	66,700	66,900	67,600
	Demand totals	58,100	59,300	58,900	58,300	60,500
	Difference	8,200	7,200	7,800	8,600	7,100
Third year	Supply totals	55,500	55,500	55,500	55,500	55,100
	Demand totals	57,100	57,800	57,200	57,000	60,500
	Difference	(1,600)	(2,300)	(1,700)	(1,500)	(5,400)
Fourth year	Supply totals	56,100	57,100	58,200	59,100	60,500
	Demand totals	56,000	56,000	55,700	55,500	60,200
	Difference	100	1,100	2,500	3,600	300
Fifth year	Supply totals	56,700	56,700	56,700	56,500	51,200
	Demand totals	56,100	55,600	55,300	54,800	61,000
	Difference	600	1,100	1,400	1,700	(9,800)
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0

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

NOTES: Ref. UWMP Tables 9-4, 9-5, 9-6, 9-7, and 9-8.

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Total Water Use	44,290
Total Supplies	57,422
Surplus/Shortfall w/o WSCP Action	13,132
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	13,132
Resulting % Use Reduction from WSCP action	0%

2022	Total
Total Water Use	43,184
Total Supplies	56,159
Surplus/Shortfall w/o WSCP Action	12,975
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	12,975
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use	43,646
Total Supplies	55,607
Surplus/Shortfall w/o WSCP Action	11,961
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	11,961
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	44,129
Total Supplies	51,848
Surplus/Shortfall w/o WSCP Action	7,719
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	7,719
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	44,665
Total Supplies	53,687
Surplus/Shortfall w/o WSCP Action	9,022
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	9,022
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%	Minimal shortage (moderate impact to one source of supply or minimal impact to more than one source). Begin voluntary conservation request for all customers, on all uses: indoor and outdoor use. District Actions: • Request voluntary water conservation. • Initiate public information campaign regarding water supply shortages; explain other water shortage stages and forecast potential future action. • Engage and inform local governments, community groups, and other stakeholders. • Develop a "Drought Resource Center" on the District's website. • Prepare and disseminate educational brochures, bill inserts/messages, newsletters, and other drought outreach materials. • Send technical information to specific customer types regarding ways to save water. • Attend community events/meetings to provide information. • Evaluate need for implementation of Stage Rates; initiate a Proposition 218 process, if needed. • Add additional actions, as needed, to coordinate with any State regulations/requirements. Customer Actions: All Customers • Implement voluntary water use reductions (water use efficiency improvements and behavior changes). • Utilize the District's AMI customer portal to track usage. • Identify and prevent any wasteful uses of water. • Identify additional water use efficiency opportunities. Residential • Participate in the District's water use efficiency programs to increase efficiency of homes. Business/Industrial, Cities/Schools • Educate employees to reduce water use at work. • Participate in the District's water use efficiency programs to increase efficiency of facilities. • Research water use efficiency improvements and potential reuse options. • Improve industrial process efficiencies (e.g., cooling towers, etc.). Enforcement: • Educational letters, mailers, calls, and emails. • Accelerate water waste tracking, monitoring and enforcement using existing water waste ordinance. • Use AMI to track overall usage trends to ensure reductions are occurring and accelerate high use and leak notifications and alerts.

2	Up to 20%	Moderate Shortage (severe impacts to one source or moderate impacts to more than one source). Begin mandatory conservation request and enforcement; focus enforcement on outdoor use and eliminating water waste; encourage adoption of water efficient landscaping. District Actions: Implement all actions in Stage 1 plus some or all of the following, as necessary to meet the District's reduction target: • Adopt and enforce a Water Shortage Emergency Ordinance (WSE Ordinance) banning wasteful uses of water and limiting other uses. Prohibitions and restrictions will include existing prohibitions such as: o prohibiting excessive run-off from irrigation and other activities, o prohibiting the use of a hose without a shut-off nozzle, o requiring that leaks are fixed as soon as practicable, • plus additional prohibitions and restrictions (depending on the conservation reduction target) such as: o prohibiting hosing down paved surfaces, o prohibiting the use of non-recirculating water features , o prohibiting draining and then refilling pools, o restricting landscape water use (e.g., limiting the number of days per week customers can irrigate, and/or time of day, and/or only allowing irrigation on specific days). • Consider setting allocations/budgets and/or restrictions by customer type and/or water use type (e.g., landscape meters). • Request consumer water use reductions at prescribed levels. • Initiate Proposition 218 process if not done previously and consider implementation of the applicable Stage Rate. • Consider additional fines or surcharges for excessive water users. • Accelerate the public information campaign. • Coordinate drought actions and programs with service area cities. • Encourage the use of a drought budget (based on ET) for landscape watering. • Cross-train District staff to interact with and inform the public, especially on leak detection and irrigation issues. • Conduct water audit program to increase the efficiency of District operations to ensure adequate supply and minimize losses. • Minimize hydrant flushing. • Expand outdoor water use efficiency programs – use AMI to target appropriate customers for these programs: water-efficient landscape rebates (to remove lawns), weather-based irrigation controllers, encouraging the application of mulch and compost in landscapes. • Add additional actions, as needed, to comply with State regulations/requirements. Customer Actions: Implement all actions in Stage 1 plus: All Customers • Adhere to WSE Ordinance, allocations/budgets, or other use reduction requests; request an exception if hardship or a health and safety issue arises. • Implement all practical water use efficiency changes at home and at work – for example: replace old inefficient fixtures and devices. • Do not drain and refill pools except where a health and safety issue exists. • Implement the use of water recapture/rain catchment systems, if feasible. Commercial/Industrial, Cities/Schools • Utilize a drought budget (based on ET) for landscape watering. Enforcement: All actions in Stage 1 plus: • Educational letters, mailers, calls, and emails; site visits if necessary, with warnings. • Use AMI to identify excessive users that may be in violation of WSE Ordinance restrictions/prohibitions. • Possible termination of water service and/or fines if not in compliance with WSE Ordinance. • If water shut-off, pay reconnection fee and other fines to reinstate service.

3	Up to 30%	"Severe Shortage (major impacts to more than one source of supply). Intensify mandatory conservation. Most reductions will be from irrigation limits and other outdoor use limits, some additional reduction for indoor residential, less impact on businesses. Really push customers to adopt water efficient landscaping. Well maintained lawns are stressed/look brown but can survive until winter rains, water efficient landscapes and trees should remain healthy. District Actions: Implement all actions in Stages 1 and 2 plus some or all of the following, as necessary to meet the District's reduction target: •Adopt Base Consumption Allowance for each customer class and establish excessive use/overage charges, fines and/or penalties. •Advise area planning staffs of possible short-term (temporary) inability to supply new developments/annexations due to shortages to existing customers and/or require new developments to implement extreme (but proven) water use efficiency measures. •Expand the District's water audit and leak detection program. •Only essential outdoor water use at District facilities. •Flush mains in emergency situations only. •Fire hydrant flow testing in critical situations only. •Intensify outreach for outdoor water use efficiency programs targeting lawns and other high water use plants in favor of water efficient landscapes. •Add additional actions, as needed, to comply with State regulations/requirements. Customer Actions: Implement all actions in Stages 1 and 2 plus: All Customers •Make additional behavior changes to further reduce indoor use (shorten or skip showers, flush toilets sparingly "let it mellow"). •Further limit landscape watering, only irrigate with drip or low flow/efficient systems, no overspray type irrigation allowed, except where an exception has been granted; encourage hand watering only. •Turn off all water features. •Cover all pools. Commercial/Industrial, Cities/Schools •Conduct an internal audit of all water use and provide a summary of findings that identifies non-efficient uses/equipment, opportunities for on-site water reuse, and demonstrates efforts to improve efficiencies. •For restaurants/food service facilities, serve water on request only. •For hotels/hospitality businesses, provide guests the option to not have their linens laundered. Enforcement: •All actions in Stages 1 and 2 plus: •Use of AMI to monitor allocations and compliance with the Base Consumption Allowances. •Send warnings to customers over their allowance and bill for overages."
4	Up to 40%	Critical Shortage (major impacts to all sources of supply). Severely dry conditions, no lawn irrigation allowed but minimal irrigation for trees and native plants is allowed to keep them alive. District Actions: Implement all actions in Stage 1, 2, and 3 plus some or all of the following, as necessary to meet the District's reduction target: Intensify all District actions. • Net zero water demand increase by new developments during the water shortage. • Revisit WSE Ordinance, allowances, etc. for modification to meet reduction targets. • Add additional actions, as needed, to comply with State regulations/requirements. Customer Actions: Implement all actions in Stage 1, 2, and 3 plus: All Customers • Severely limit landscape watering to no more than one day per week in the hottest part of the summer using drip only or hand watering, to preserve trees and native plants. Encourage irrigation from water reuse/rain catchment systems only. • No car washing unless water is from a reuse or rain catchment system. • Monitor water meters for spikes in use to avoid fines and penalties for excessive use. • Pools covered and refilled with tank truck services only if health and safety concerns. • No use of potable water for street cleaning. • Intensify water reuse Enforcement: All actions in Stage 1, 2, and 3 plus: • Intensify use of AMI for monitoring excessive use. • Augment water waste and excessive use monitoring with water waste patrols.

5	Up to 50%	Severe Critical Shortage (major and severe impacts to all sources of supply). No irrigation. All outdoor use is for health and safety only. Moratorium on development. Additional quality of life adjustments for extreme conditions. District Actions: Implement all actions in Stage 1, 2, 3, and 4 plus some or all of the following, as necessary to meet the District's reduction target: • Intensify all District actions. • By Ordinance, no potable water can be used by landscape meters. • No new developments, new water service connections or expanded services unless health and safety issue. • Revisit WSE Ordinance, allowances, etc. for modification to meet reduction targets. • Add additional actions, as needed, to comply with State regulations/requirements. Customer Actions: Implement all actions in Stage 1, 2, 3, and 4 plus: All Customers • No landscape watering. • No car washing. • Water reuse / rain catchment for flushing toilets only. Enforcement: • Continue and intensify all actions in Stage 1, 2, 3, and 4.
6	>50%	Severe emergency – only essential use allowed. Many connections are compromised. District will likely need to repair and fix mains. All customers extremely impacted - some are without any water, or water is limited in duration/time available, and may need to be delivered in trucks. This stage impacts businesses the most. District Actions: Implement all actions in Stage 1, 2 3, 4, and 5 plus some or all of the following, as necessary to meet the District's reduction target: Intensify all District actions. • Consider water service shut offs and rolling "dry" periods (limited service). • Revisit WSE Ordinance, allowances, etc. for modification to meet reduction targets. • Add additional actions, as needed, to comply with State regulations/requirements. Customer Actions: Implement all actions in Stage 1, 2, 3, 4, and 5 plus: All Customers • Only essential uses of water for health and safety. Enforcement: • Continue and intensify all actions in Stage 1, 2, 3, 4, and 5, if needed. • In extreme emergency operations mode so some enforcement actions may not be relevant at this point.
NOTES: This information is copied from Tables 10-2a-f in the District's 2020-2025 UWMP Chapter 10: Water Shortage Contingency Plan		

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				
All Stages	Expand Public Information Campaign	Part of each stage; reduction depends on stage and level of expansion.	Continues and accelerates beyond stage 1.	No
All times	Offer Water Use Surveys	Ongoing program and part of each stage; reduction depends on target for each stage.	The District offers this already	No
All times	Provide Rebates on Plumbing Fixtures and Devices	Ongoing program and part of each stage; reduction depends on target for each stage.	The District offers this already	No
All times	Provide Rebates for Landscape Irrigation Efficiency	Ongoing program and part of each stage; reduction depends on target for each stage.	The District offers this already	No
All times	Provide Rebates for Turf Replacement	Ongoing program and part of each stage; reduction depends on target for each stage.	The District offers this already	No
Stage 2-6	Decrease Line Flushing	Part of stage 2-6, reduction depends on target for each stage, health and safety needs and requirements.	Continues and accelerates beyond stage 2.	No
Stage 2-6	Reduce System Water Loss	Part of stage 2-6, reduction depends on target for each stage.	Continues and accelerates beyond stage 2.	No
Stage 2-6	Increase Water Waste Patrols	Part of stage 2-6, reduction depends on target for each stage.	Virtual patrols using AMI in Stage 2, continues and accelerates beyond stage 2 with extra patrols in Stage 4	Yes
Stage 4-6	Moratorium or Net Zero Demand Increase on New Connections	Part of stage 4-6; reduction depends on development rate.	Stage 3 includes working with cities regarding a possible short-term inability to supply new developments and only allow developments with extreme water use efficiency measures installed.	Yes
Stage 2-6	Implement or Modify Drought Rate Structure or Surcharge	3-8%; depends on pricing structures, revenue and reduction needs		Yes
All times	Landscape - Restrict or prohibit runoff from landscape irrigation	Ongoing program and part of each stage; reduction depends on enforcement targets for each stage.	Exisiting Ordinance already prohibits excessive run-off.	Yes
Stage 2-3	Landscape - Limit landscape irrigation to specific days	10-30%; Part of stage 2-3, reduction depends on target and number of days allowed for each stage.	Limit number of days per week that customers can irrigate vs. specific days.	Yes
Stage 2-3	Landscape - Limit landscape irrigation to specific times	2-5%; Part of stage 2-3, reduction depends on target and watering windows allowed for each stage.	Early morning and evening only	Yes
Stage 3-4	Landscape - Prohibit certain types of landscape irrigation	2-5%; Part of stage 2-5, reduction depends on target and types of irrigation allowed for each stage.	Drip or low flow/efficiency irrigation only or hand-watering allowed in these stages.	Yes
Stage 5-6	Landscape - Prohibit all landscape irrigation	30%		Yes
Stage 2-4	Landscape - Other landscape restriction or prohibition	Part of landscape reduction target for each stage.	Encourage water reuse options such as rain catchment/graywater systems.	Yes
Stage 3-6	CII - Lodging establishment must offer opt out of linen service	<1%		Yes
Stage 3-6	CII - Restaurants may only serve water upon request	<1%		Yes
Stage 3-6	CII - Commercial kitchens required to use pre-rinse spray valves	<1%; Depends on saturation of spray valves which is unknown at this time but likely fairly saturated.	Require other efficiency improvements as well after audit.	Yes
Stage 2-4	CII - Other CII restriction or prohibition	Captured under irrigation limitations	Use of drought water budgets (based on ET for landscape use); audits to identify non-efficient use or equipment	Yes
Stage 2-6	Water Features - Restrict water use for decorative water features, such as fountains	<1%	Exisiting Ordinance already prohibits non-recycling water fountains for nonresidential customers.	Yes
Stage 3-6	Pools and Spas - Require covers for pools and spas	<1%; Unknown but is likely a small percentage.		Yes
Stage 2-6	Other water feature or swimming pool restriction	<1%; Unknown but is likely a small percentage.	No draining/refilling pools, turn off fountains in stage 3	Yes
All times	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	<1%	Exisiting Ordinance	Yes
Stage 2-6	Other - Require automatic shut of hoses	<1%		Yes
Stage 4-6	Other - Prohibit use of potable water for construction and dust control	<1%	Only outdoor water use is to keep trees alive in stage 4 and no outdoor use in Stage 5-6 except in an emergency.	Yes
Stage 2-6	Other - Prohibit use of potable water for washing hard surfaces	<1%		Yes
Stage 4	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	<1%	Can use reclaimed/captured water when washing at home. Beyond Stage 4 all vehicle washing would be prohibited.	Yes
Stage 2-6	Other	Part of stage 2-6, reduction depends on target/allocation for each stage.	Adopt consumption allowances or allocations, monitor with AMI, iniitate fines/penalties for overages.	Yes

NOTES: Tables 10-2a-f in the District's 2020-2025 UWMP Chapter 10: Water Shortage Contingency Plan contain more details regarding the specific actions in each Stage which collectively achieve the % reduction needed in each Stage.

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			
Stages 4-6	Other Actions (describe)	Situationally dependent on nature of emergency, although the groundwater basin could meet up to 100% of any shortage gap in a given year. This option is not considered part of the District's planning, may negatively impact the coastal aquifer, and is a measure of last resort.	See notes for further detail.

NOTES: In a severe water shortage emergency, the District may consider temporary additional drawdown of the Niles Cone to even lower than 5 feet below mean sea level to meet short-term demands. Any drawdown past 5 feet below mean sea level would constitute supply augmentation as this water supply is not considered normal water supply management during shortages.

Submittal Table 10-1 Retail: Notification to Cities and Counties

City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
City of Fremont	Yes	Yes
City of Newark	Yes	Yes
City of Union City	Yes	Yes
City of Hayward	Yes	Yes
City of Milpitas	Yes	Yes
City of San Jose	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Alameda County	Yes	Yes
Santa Clara County	Yes	Yes

NOTES: Notifications were sent via hardcopy and electronic mail due to the COVID-19 pandemic that occurred during the notifications. The 60 day notice and notice of public hearing were also sent to the Bay Area Water Supply & Conservation Agency, California Department of Water Resources, East Bay Municipal Utility District, East Bay Regional Park District, San Francisco Public Utilities Commission, Santa Clara Valley Water District, Semitropic Water Storage District, State Water Contractors, Union Sanitary District, and Zone 7 Water Agency.

SB X7-7 TABLES

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	356,823
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.*	
	45,872	-		-	-	-	**45,872**

*** 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 Treated State Water Project

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
	17,654	-	17,654

[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 : SWP Supply Treated at Surface Water Treatment Plants.

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 San Francisco Public Utilities Regional Water System

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
	9,411		9,411

[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 Treated Del Valle Reservoir Supply

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
	629		629

[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: Del Valle Reservoir Supply Treated at Surface Water Treatment Plants

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
	7,929		7,929

[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: Mowry and Peralta-Tyson Wellfield Production

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 Desalination

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
	8,680		8,680

[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: Newark Desalination Facility Product Water

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 (Private pumping)
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
	1,569		1,569

[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: Niles Cone Groundwater managed by the District and Pumped by Private Well Owners Subject to a Replenishment Assessment

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**
45,872	356,823	**115**

NOTES:

SB X7-7 Table 9: 2020 Compliance

Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	Did Supplier Achieve Targeted Reduction for 2020?
	Enter "0" if Adjustment Not Used						
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]	TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
115	-	-	-	-	115	138	**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:

ENERGY USE TABLE

Urban Water Supplier: *Alameda County Water 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 12/31/2020

☐ Is upstream embedded in the values reported?

	Water Volume Units Used	Urban Water Supplier Operational Control							
		Water Management Process						Non-Consequential Hydropower (if applicable)	
		Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process	AF	*5496*	*0*	*0*	*44324*	*44324*	*44324*	*0*	*44324*
Energy Consumed (kWh)	N/A	*27334*	*0*	*0*	*3317164*	*21667250*	*25011748*	*0*	*25011748*
Energy Intensity (kWh/vol. converted to MG)	N/A	*15.3*	*0.0*	*0.0*	*229.7*	*1500.2*	*1731.8*	*0.0*	*1731.8*

Quantity of Self-Generated Renewable Energy

kWh

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

Combination of Estimates and Metered Data

Data Quality Narrative:

Used metered data from Pacific Gas and Electric Company and East Bay Community Energy to estimate the total energy consumed and estimated a best fit between metered facilities and water management processes. The volume of water entering the distribution system matches the "Drinking Water" components of Table 4-1, as the distirbution system only delivered treated water.

Please note that a value of "0.0" for cells F14 and G14 was hardcoded in because the formulas provided showed the "#DIV/0" error when the volumes were entered as 0 in cells F12 and G12. Also, we kept the "Total Utility" cell (cell J12) to equal the "Distribution" cell (cell I12) per Appendix O of DWR's Final UWMP Guidebook and the note in cell J12.

Narrative:

Ref. Chapter 3. The “Extract and Divert” water management process includes the District facilities on Alameda Creek that diverts raw water to the Quarry Lakes. The District does not consider any of its facilities within the service area to be categorized as “Place into Storage” and “Conveyance.” The “Treatment” water management process includes the District’s Water Treatment Plant 2, Desal Facility, Blending Facility, and the Mission San Jose Water Treatment Plant. These processes treat or blend potable water from different sources to provide high-quality potable water prior to supplying the distribution system. The “Distribution” water management process includes infrastructure after treatment such as booster pump stations, booster pumps, and tanks and reservoirs that the boosters pump treated water up to prior to being distributed mostly by gravity to the service area.

APPENDIX H
AWWA Water Audits

AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits
for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person:	Leonard Ash
Email Address:	leonard.ash@acwd.com
Telephone (incl Ext.):	510-668-4209
Name of City / Utility:	Alameda County Water District
City/Town/Municipality:	Fremont
State / Province:	California (CA)
Country:	USA
Year:	2016 Calendar Year
Audit Preparation Date:	7/31/2017
Volume Reporting Units:	Million gallons (US)
PWSID / Other ID:	CA0110001

The following guidance will help you complete the Audit

All audit data are entered on the ***Reporting Worksheet***

☐	Value can be entered by user
🟨	Value calculated based on input data
🟪	These cells contain recommended default values

Use of Option (Radio) Buttons:

Pcnt:			Value:
0.25%	●	○	

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

Instructions
The current sheet. Enter contact information and basic audit details (year, units etc)

Reporting Worksheet
Enter the required data on this worksheet to calculate the water balance and data grading

Comments
Enter comments to explain how values were calculated or to document data sources

Performance Indicators
Review the performance indicators to evaluate the results of the audit

Water Balance
The values entered in the Reporting Worksheet are used to populate the Water Balance

Dashboard
A graphical summary of the water balance and Non-Revenue Water components

Grading Matrix
Presents the possible grading options for each input component of the audit

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

Definitions
Use this sheet to understand the terms used in the audit process

Loss Control Planning
Use this sheet to interpret the results of the audit validity score and performance indicators

Example Audits
Reporting Worksheet and Performance Indicators examples are shown for two validated audits

Acknowledgements
Acknowledgements for the AWWA Free Water Audit Software v5.0

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: Alameda County Water District (CA0110001)
Reporting Year: 2016 1/2016 - 12/2016

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	Value	Unit	Grade	Pcnt:		Value:	Unit
Volume from own sources:	4	10,054.016	MG/Yr	4		○ ●	0.999	MG/Yr
Water imported:	4	2,279.398	MG/Yr	1		● ○		MG/Yr
Water exported:	3	0.000	MG/Yr			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 12,332.415 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grade	Value	Unit	Pcnt:		Value:	Unit
Billed metered:	4	11,666.358	MG/Yr				
Billed unmetered:	n/a	0.000	MG/Yr				
Unbilled metered:	5	3.098	MG/Yr				
Unbilled unmetered:	5	13.981	MG/Yr		○ ●	13.981	MG/Yr

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION: ? 11,683.437 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption) 648.978 MG/Yr

Apparent Losses

	Grade	Value	Unit	Pcnt:		Value:	Unit
Unauthorized consumption:		30.831	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:	3	238.152	MG/Yr	2.00%	● ○		MG/Yr
Systematic data handling errors:	5	29.166	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: ? 298.149 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 350.829 MG/Yr

WATER LOSSES: 648.978 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 666.057 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Unit
Length of mains:	8	906.1	miles
Number of active AND inactive service connections:	6	84,189	
Service connection density:		93	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: 4 75.0 psi

COST DATA

	Grade	Value	Unit
Total annual cost of operating water system:	10	$93,215,000	$/Year
Customer retail unit cost (applied to Apparent Losses):	8	$3.37	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	5	$1,710.00	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 51 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:
System Attributes and Performance Indicators

Water Audit Report for: **Alameda County Water District (CA0110001)**
Reporting Year: **2016** **1/2016 - 12/2016**

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 51 out of 100 *****

System Attributes:

	Apparent Losses:	298.149	MG/Yr
+	Real Losses:	350.829	MG/Yr
=	**Water Losses:**	**648.978**	MG/Yr
?	Unavoidable Annual Real Losses (UARL):	479.89	MG/Yr
	Annual cost of Apparent Losses:	$1,344,368	
	Annual cost of Real Losses:	$599,917	Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	5.4%	
	Non-revenue water as percent by cost of operating system:	2.1%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	9.70	gallons/connection/day
	Real Losses per service connection per day:	11.42	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.15	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	350.83	million gallons/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	0.73	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software:
User Comments

American
Water

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:	

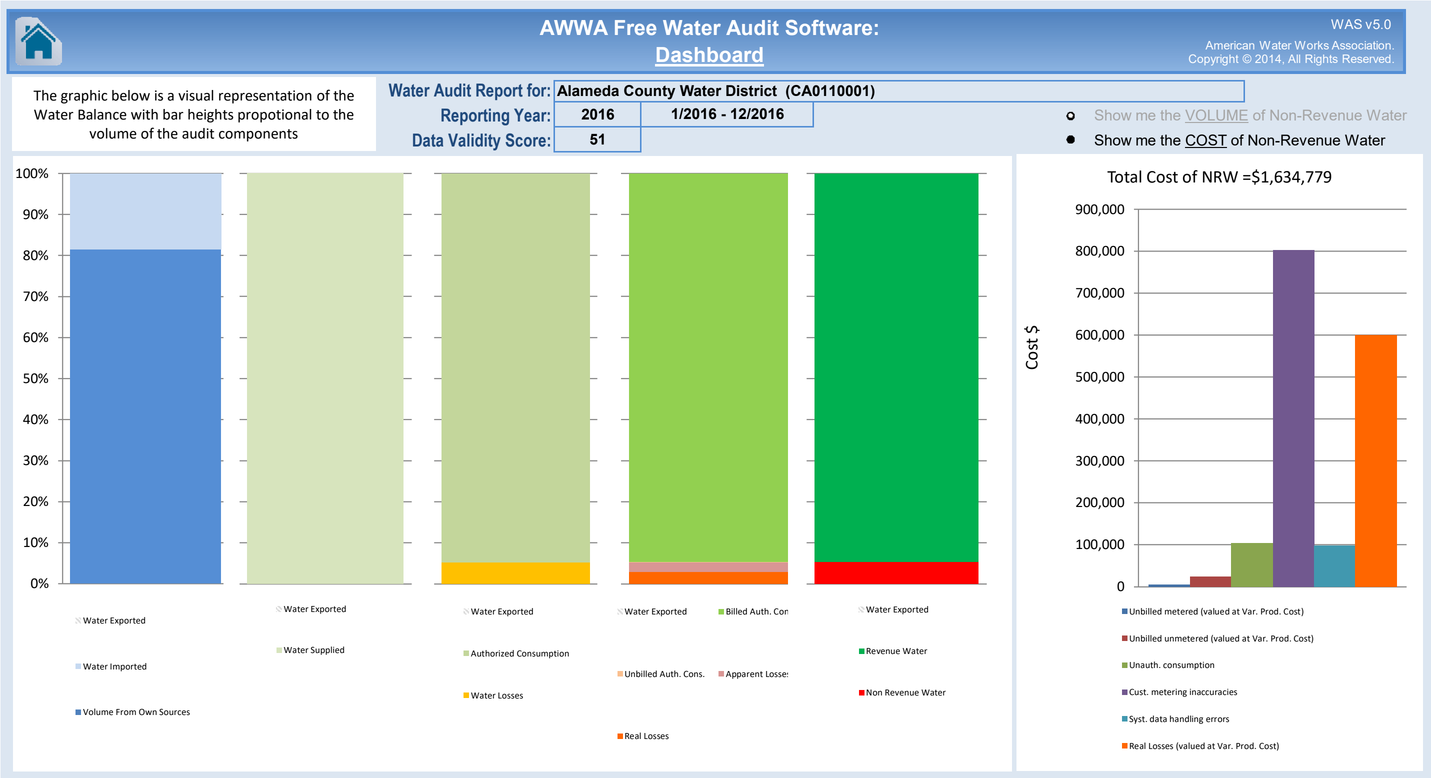
Audit Item	Comment
Volume from own sources:	District source data from Operations Department, report managed by Water Resources Planning.
Vol. from own sources: Master meter error adjustment:	District source data District Operations Department
Water imported:	District source data from Operations Department, report managed by Water Resources Planning.
Water imported: master meter error adjustment:	District source data District Operations Department
Water exported:	Not applicable.
Water exported: master meter error adjustment:	Not applicable.
Billed metered:	District source data from Finance Department account database, report managed by Water Resources Planning.
Billed unmetered:	Not applicable.
Unbilled metered:	District source data from Finance Department account database, report managed by Finance Department.
Unbilled unmetered:	Default value used, however compared to District source data from Operations Department and Engineering & Information Technologies Department databases, report compiled by Operations Department.
Unauthorized consumption:	Default value selected.
Customer metering inaccuracies:	District source data District Operations Department
Systematic data handling errors:	Default value selected.
Length of mains:	District source data from Operations Department and Engineering & Information Technologies Department databases, report compiled by Operations Department.
Number of active AND inactive service connections:	District source data from Operations Department and Engineering & Information Technologies Department databases, report compiled by Operations Department.
Average length of customer service line:	District standard installation locations for all meters at the curb or property line.
Average operating pressure:	District source data from Operations Department modeling and database, report compiled by Operations Department.
Total annual cost of operating water system:	District source data from Finance Department.
Customer retail unit cost (applied to Apparent Losses):	District source data from Finance Department.
Variable production cost (applied to Real Losses):	District source data from Operations Department.

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for:	Alameda County Water District (CA0110001)	
Reporting Year:	2016	1/2016 - 12/2016
Data Validity Score:	51	

<table>
<tr><td rowspan="8">Own Sources
(Adjusted for known errors)
10,053.017</td><td>Water Exported
0.000</td><td colspan="4">Billed Water Exported</td></tr>
<tr><td rowspan="10">Water Supplied
12,332.415</td><td rowspan="4">Authorized Consumption
11,683.437</td><td rowspan="2">Billed Authorized Consumption
11,666.358</td><td>Billed Metered Consumption (water exported is removed)
11,666.358</td><td rowspan="2">Revenue Water
11,666.358</td></tr>
<tr><td>Billed Unmetered Consumption
0.000</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption
17.079</td><td>Unbilled Metered Consumption
3.098</td><td rowspan="8">Non-Revenue Water (NRW)
666.057</td></tr>
<tr><td>Unbilled Unmetered Consumption
13.981</td></tr>
<tr><td rowspan="6">Water Losses
648.978</td><td rowspan="3">Apparent Losses
298.149</td><td>Unauthorized Consumption
30.831</td></tr>
<tr><td>Customer Metering Inaccuracies
238.152</td></tr>
<tr><td>Systematic Data Handling Errors
29.166</td></tr>
<tr><td rowspan="3">Water Imported
2,279.398</td><td rowspan="3">Real Losses
350.829</td><td>Leakage on Transmission and/or Distribution Mains
Not broken down</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks
Not broken down</td></tr>
<tr><td>Leakage on Service Connections
Not broken down</td></tr>
</table>



AWWA Free Water Audit Software:
Dashboard

WAS v5.0
American Water Works Association.
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The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for: **Alameda County Water District (CA0110001)**
Reporting Year: **2016** **1/2016 - 12/2016**
Data Validity Score: **51**

○ Show me the VOLUME of Non-Revenue Water
● Show me the COST of Non-Revenue Water

AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person: Devon Becker
Email Address: devon.becker@acwd.com
Telephone | Ext.: 510-668-6511
Name of City / Utility: Alameda County Water District
City/Town/Municipality: Fremont
State / Province: California (CA)
Country: USA
Year: 2017 Calendar Year

Audit Preparation Date: 9/12/2018
Volume Reporting Units: Million gallons (US)
PWSID / Other ID: CA0110001

The following guidance will help you complete the Audit

All audit data are entered on the ***Reporting Worksheet***

☐	Value can be entered by user
🟨	Value calculated based on input data
🟪	These cells contain recommended default values

Use of Option (Radio) Buttons: Pcnt: 0.25% ● ○ Value:

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

Instructions	The current sheet. Enter contact information and basic audit details (year, units etc)
Reporting Worksheet	Enter the required data on this worksheet to calculate the water balance and data grading
Comments	Enter comments to explain how values were calculated or to document data sources
Performance Indicators	Review the performance indicators to evaluate the results of the audit
Water Balance	The values entered in the Reporting Worksheet are used to populate the Water Balance
Dashboard	A graphical summary of the water balance and Non-Revenue Water components
Grading Matrix	Presents the possible grading options for each input component of the audit
Service Connection Diagram	Diagrams depicting possible customer service connection line configurations
Definitions	Use this sheet to understand the terms used in the audit process
Loss Control Planning	Use this sheet to interpret the results of the audit validity score and performance indicators
Example Audits	Reporting Worksheet and Performance Indicators examples are shown for two validated audits
Acknowledgements	Acknowledgements for the AWWA Free Water Audit Software v5.0

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: Alameda County Water District (CA0110001)
Reporting Year: 2017 1/2017 - 12/2017

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	Value	Unit	Grade	Pcnt:		Value:	Unit
Volume from own sources: + ?	4	10,485.659	MG/Yr	+ ? 4		○ ●	-3.562	MG/Yr
Water imported: + ?	5	2,906.119	MG/Yr	+ ? 3	0.25%	● ○		MG/Yr
Water exported: + ?	3	0.000	MG/Yr	+ ?		● ○		MG/Yr
WATER SUPPLIED:		**13,388.093**	MG/Yr					

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grade	Value	Unit	Pcnt:		Value:	Unit
Billed metered: + ?	5	12,196.668	MG/Yr				
Billed unmetered: + ?	n/a	0.000	MG/Yr				
Unbilled metered: + ?	5	3.623	MG/Yr				
Unbilled unmetered: + ?	5	31.256	MG/Yr		○ ●	31.256	MG/Yr
AUTHORIZED CONSUMPTION: ?		**12,231.547**	MG/Yr				

Use buttons to select percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption)

1,156.546 MG/Yr

Apparent Losses

	Grade	Value	Unit	Pcnt:		Value:	Unit
Unauthorized consumption: + ?		33.470	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: + ?	3	300.007	MG/Yr	2.40%	● ○		MG/Yr
Systematic data handling errors: + ?	5	30.492	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: ? **363.969** MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? **792.577** MG/Yr

WATER LOSSES: **1,156.546** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? **1,191.425** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Unit
Length of mains: + ?	8	909.6	miles
Number of active AND inactive service connections: + ?	6	84,955	
Service connection density: ?		93	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: + ?	4	70.4	psi

COST DATA

	Grade	Value	Unit
Total annual cost of operating water system: + ?	10	$96,277,947	$/Year
Customer retail unit cost (applied to Apparent Losses): + ?	8	$5.90	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses): + ?	5	$2,048.84	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 53 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: Customer metering inaccuracies
3: Billed metered

WAS v5.0
American Water Works Association.

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

Water Audit Report for: **Alameda County Water District (CA0110001)**
Reporting Year: **2017** **1/2017 - 12/2017**

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 53 out of 100 *****

System Attributes:

	Apparent Losses:	363.969	MG/Yr
+	Real Losses:	792.577	MG/Yr
=	**Water Losses:**	**1,156.546**	MG/Yr
?	Unavoidable Annual Real Losses (UARL):	454.02	MG/Yr
	Annual cost of Apparent Losses:	$2,870,680	
	Annual cost of Real Losses:	$1,623,864	Valued at **Variable Production Cost** Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	8.9%	
	Non-revenue water as percent by cost of operating system:	4.7%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	11.74	gallons/connection/day
	Real Losses per service connection per day:	25.56	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.36	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	792.58	million gallons/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	1.75	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software:
User Comments

WAS v5.0
A
m

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:	

Audit Item	Comment
Volume from own sources:	District source data from Operations Department, report managed by Water Resources Planning.
Vol. from own sources: Master meter error adjustment:	District source data District Operations Department
Water imported:	District source data from Operations Department, report managed by Water Resources Planning.
Water imported: master meter error adjustment:	District source data District Operations Department and the San Francisco Public Utilities Commission Operations Department.
Water exported:	Not applicable.
Water exported: master meter error adjustment:	Not applicable.
Billed metered:	District source data from Finance Department account database, report managed by Water Resources Planning.
Billed unmetered:	Not applicable.
Unbilled metered:	District source data from Finance Department account database, report managed by Water Resources Planning.
Unbilled unmetered:	District source data from Operations Department and Engineering & Information Technologies Department databases, as well as publicly available data from municipal services; report compiled by Water Resources Planning.
Unauthorized consumption:	Default value selected.
Customer metering inaccuracies:	District source data District Operations Department
Systematic data handling errors:	Default value selected.
Length of mains:	District source data from Engineering & Information Technologies Department databases, report compiled by Engineering & Information Technologies Department.
Number of active AND inactive service connections:	District source data from Operations Department and Engineering & Information Technologies Department databases, report compiled by Engineering & Information Technologies Department.
Average length of customer service line:	District standard installation locations for all meters at the curb or property line.

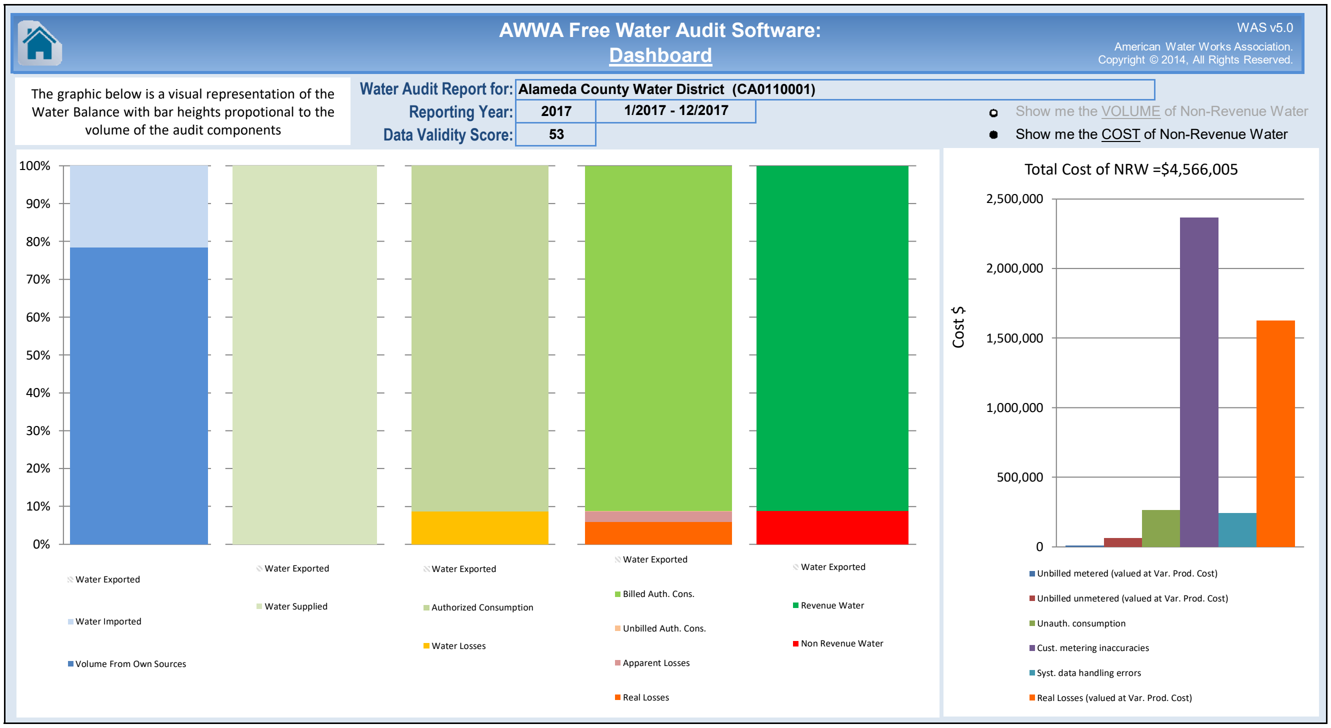
Audit Item	Comment
Average operating pressure:	District source data from Operations Department and Engineering & Information Technologies Department hydraulic model and databases, report compiled by Water Resources Planning.
Total annual cost of operating water system:	District source data from Finance Department.
Customer retail unit cost (applied to Apparent Losses):	District source data from Finance Department.
Variable production cost (applied to Real Losses):	District source data from Finance Department.

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for: Alameda County Water District (CA0110001)
Reporting Year: 2017 1/2017 - 12/2017
Data Validity Score: 53

Own Sources **(Adjusted for known errors)** *10,489.221*	**System Input** *13,388.093*	**Water Exported** *0.000*			**Billed Water Exported**	**Revenue Water** **0.000**
		Water Supplied *13,388.093*	**Authorized Consumption** *12,231.547*	**Billed Authorized Consumption** *12,196.668*	**Billed Metered Consumption (water exported is removed)** *12,196.668*	**Revenue Water** **12,196.668**
					Billed Unmetered Consumption *0.000*	
				Unbilled Authorized Consumption *34.879*	**Unbilled Metered Consumption** *3.623*	**Non-Revenue Water (NRW)** **1,191.425**
					Unbilled Unmetered Consumption *31.256*	
			Water Losses *1,156.546*	**Apparent Losses** *363.969*	**Unauthorized Consumption** *33.470*	
					Customer Metering Inaccuracies *300.007*	
					Systematic Data Handling Errors *30.492*	
Water Imported *2,898.872*				**Real Losses** *792.577*	**Leakage on Transmission and/or Distribution Mains** *Not broken down*	
					Leakage and Overflows at Utility's Storage Tanks *Not broken down*	
					Leakage on Service Connections *Not broken down*	



WAS v5.0

American Water Works Association.
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AWWA Free Water Audit Software: Dashboard

The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for: Alameda County Water District (CA0110001)

Reporting Year: 2017 1/2017 - 12/2017

Data Validity Score: 53

○ Show me the VOLUME of Non-Revenue Water

● Show me the COST of Non-Revenue Water

AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits
for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person: Devon Becker
Email Address: devon.becker@acwd.com
Telephone (incl Ext.): 510-668-6511
Name of City / Utility: Alameda County Water District
City/Town/Municipality: Fremont
State / Province: California (CA)
Country: USA
Year: 2018
Start Date: 01/2018 Enter MM/YYYY numeric format
End Date: 12/2018 Enter MM/YYYY numeric format
Audit Preparation Date: 9/12/2019
Volume Reporting Units: Million gallons (US)
PWSID / Other ID: CA0110001

The following guidance will help you complete the Audit

All audit data are entered on the ***Reporting Worksheet***

☐ Value can be entered by user
🟨 Value calculated based on input data
🟪 These cells contain recommended default values

Use of Option (Radio) Buttons:

Pcnt:		Value:
0.25%	● ○	

Select the default percentage by choosing the option button

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

Instructions
The current sheet. Enter contact information and basic audit details (year, units etc)

Reporting Worksheet
Enter the required data on this worksheet to calculate the water balance and data grading

Comments
Enter comments to explain how values were calculated or to document data sources

Performance Indicators
Review the performance indicators to evaluate the results of the audit

Water Balance
The values entered in the Reporting Worksheet are used to populate the Water Balance

Dashboard
A graphical summary of the water balance and Non-Revenue Water components

Grading Matrix
Presents the possible grading options for each input component of the audit

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

Definitions
Use this sheet to understand the terms used in the audit process

Loss Control Planning
Use this sheet to interpret the results of the audit validity score and performance indicators

Example Audits
Reporting Worksheet and Performance Indicators examples are shown for two validated audits

Acknowledgements
Acknowledgements for the AWWA Free Water Audit Software v5.0

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

AWWA Free Water Audit Software:
Reporting Worksheet

WAS
American Water Works Association.

? Click to
+ Click to add a

Water Audit Report for: Alameda County Water District (CA0110001)
Reporting Year: 2018 1/2018 - 12/2018

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

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

	Grade	Value	Unit	Grade	Pcnt:		Value:	Unit
Volume from own sources:	4	11,056.758	MG/Yr	4		○ ●	-0.974	MG/Yr
Water imported:	5	2,664.979	MG/Yr	3	0.25%	● ○		MG/Yr
Water exported:	3	0.000	MG/Yr			● ○		MG/Yr
WATER SUPPLIED:		**13,716.065**	MG/Yr					

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Click here: ?
for help using option

	Grade	Value	Unit	Pcnt:		Value:	Unit
Billed metered:	5	12,504.313	MG/Yr				
Billed unmetered:	10	0.302	MG/Yr				
Unbilled metered:	5	2.802	MG/Yr				
Unbilled unmetered:	5	37.054	MG/Yr		○ ●	37.054	MG/Yr
AUTHORIZED CONSUMPTION:		**12,544.471**	MG/Yr				

Use buttons to select
percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption) **1,171,595** MG/Yr

Apparent Losses

	Grade	Value	Unit	Pcnt:		Value:	Unit
Unauthorized consumption:		34.290	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:	4	248.739	MG/Yr	1.95%	● ○		MG/Yr
Systematic data handling errors:	5	31.261	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: **314.290** MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: **857.304** MG/Yr

WATER LOSSES: **1,171.595** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: **1,211.450** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Unit
Length of mains:	8	946.8	miles
Number of active AND inactive service connections:	6	86,250	
Service connection density:		91	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:	4	72.9	psi

COST DATA

	Grade	Value	Unit
Total annual cost of operating water system:	10	$90,353,749	$/Year
Customer retail unit cost (applied to Apparent Losses):	8	$5.39	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	5	$1,821.79	$/Million gallons ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 56 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 v5.0
American Water Works Association.

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

Water Audit Report for: **Alameda County Water District (CA0110001)**
Reporting Year: **2018** **1/2018 - 12/2018**

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 56 out of 100 *****

System Attributes:

Apparent Losses: 314.290 MG/Yr
\+ Real Losses: 857.304 MG/Yr
= **Water Losses:** **1,171.595** MG/Yr

Unavoidable Annual Real Losses (UARL): 480.48 MG/Yr

Annual cost of Apparent Losses: $2,264,580

Annual cost of Real Losses: $1,561,830 Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financi
Non-revenue water as percent by volume of Water Supplied: 8.8%
Non-revenue water as percent by cost of operating system: 4.3% Real Losses valued at Variable Production Cost

Operational
Apparent Losses per service connection per day: 9.98 gallons/connection/day
Real Losses per service connection per day: 27.23 gallons/connection/day
Real Losses per length of main per day*: N/A
Real Losses per service connection per day per psi pressure: 0.37 gallons/connection/day/psi

From Above, Real Losses = Current Annual Real Losses (CARL): 857.30 million gallons/year

Infrastructure Leakage Index (ILI) [CARL/UARL]: 1.78

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software:

American Water Works

User Comments

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:	

Audit Item	Comment
Volume from own sources:	
Vol. from own sources: Master meter error adjustment:	
Water imported:	
Water imported: master meter error adjustment:	
Water exported:	
Water exported: master meter error adjustment:	
Billed metered:	
Billed unmetered:	
Unbilled metered:	
Unbilled unmetered:	
Unauthorized consumption:	
Customer metering inaccuracies:	
Systematic data handling errors:	
Length of mains:	
Number of active AND inactive service connections:	

Audit Item	Comment
Average length of customer service line:	
Average operating pressure:	
Total annual cost of operating water system:	
Customer retail unit cost (applied to Apparent Losses):	
Variable production cost (applied to Real Losses):	

AWWA Free Water Audit Software: Water Balance

Water Audit Report for: Alameda County Water District (CA0110001)
Reporting Year: 2018 | 1/2018 - 12/2018
Data Validity Score: 56

<table>
<tr><td rowspan="8">Own Sources
(Adjusted for known errors)
11,057.732</td><td>Water Exported
0.000</td><td colspan="4">Billed Water Exported</td></tr>
<tr><td rowspan="10">Water Supplied
13,716.065</td><td rowspan="4">Authorized Consumption
12,544.471</td><td rowspan="2">Billed Authorized Consumption
12,504.615</td><td>Billed Metered Consumption (water exported is removed)
12,504.313</td><td rowspan="2">Revenue Water
12,504.615</td></tr>
<tr><td>Billed Unmetered Consumption
0.302</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption
39.855</td><td>Unbilled Metered Consumption
2.802</td><td rowspan="8">Non-Revenue Water (NRW)
1,211.450</td></tr>
<tr><td>Unbilled Unmetered Consumption
37.054</td></tr>
<tr><td rowspan="6">Water Losses
1,171.595</td><td rowspan="3">Apparent Losses
314.290</td><td>Unauthorized Consumption
34.290</td></tr>
<tr><td>Customer Metering Inaccuracies
248.739</td></tr>
<tr><td>Systematic Data Handling Errors
31.261</td></tr>
<tr><td rowspan="3">Water Imported
2,658.333</td><td rowspan="3">Real Losses
857.304</td><td>Leakage on Transmission and/or Distribution Mains
Not broken down</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks
Not broken down</td></tr>
<tr><td>Leakage on Service Connections
Not broken down</td></tr>
</table>

AWWA Free Water Audit Software: Dashboard

WAS v5.0
American Water Works Association.

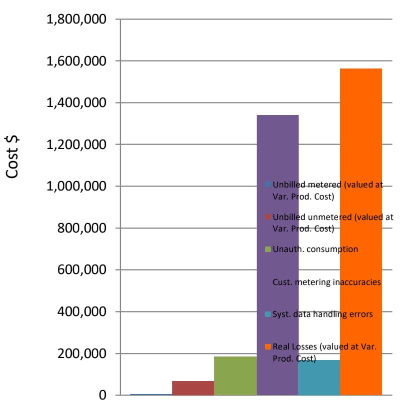
The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for:	Alameda County Water District (CA0110001)	
Reporting Year:	2018	1/2018 - 12/2018
Data Validity Score:	56	

○ Show me the VOLUME of Non-Revenue Water

● Show me the COST of Non-Revenue Water

Total Cost of NRW =$3,328,462



AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person: Devon Becker
Email Address: devon.becker@acwd.com
Telephone (incl Ext.): 510-668-6511
Name of City / Utility: Alameda County Water District
City/Town/Municipality: Fremont
State / Province: California (CA)
Country: USA
Year: 2019 Calendar Year

Audit Preparation Date: 9/12/2020
Volume Reporting Units: Million gallons (US)
PWSID / Other ID: CA0110001

The following guidance will help you complete the Audit

All audit data are entered on the ***Reporting Worksheet***

☐	Value can be entered by user
🟨	Value calculated based on input data
▨	These cells contain recommended default values

Use of Option (Radio) Buttons:	Pcnt:		Value:
	0.25%	● ○	

Select the default percentage by choosing the option button

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

Instructions
The current sheet. Enter contact information and basic audit details (year, units etc)

Reporting Worksheet
Enter the required data on this worksheet to calculate the water balance and data grading

Comments
Enter comments to explain how values were calculated or to document data sources

Performance Indicators
Review the performance indicators to evaluate the results of the audit

Water Balance
The values entered in the Reporting Worksheet are used to populate the Water Balance

Dashboard
A graphical summary of the water balance and Non-Revenue Water components

Grading Matrix
Presents the possible grading options for each input component of the audit

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

Definitions
Use this sheet to understand the terms used in the audit process

Loss Control Planning
Use this sheet to interpret the results of the audit validity score and performance indicators

Example Audits
Reporting Worksheet and Performance Indicators examples are shown for two validated audits

Acknowledgements
Acknowledgements for the AWWA Free Water Audit Software v5.0

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

American Water Works Association.

AWWA Free Water Audit Software:
Reporting Worksheet

Click

Click

Water Audit Report for: Alameda County Water District (CA0110001)

Reporting Year: 2019 1/2019 - 12/2019

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

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

	Grade	Value	Unit	Master Meter and Supply Error Adjustments: Grade	Pcnt:	Value:	Unit
Volume from own sources:	4	10,636.854	MG/Yr	4		3.189	MG/Yr
Water imported:	5	2,880.479	MG/Yr	3	0.25%		MG/Yr
Water exported:	3	0.000	MG/Yr				MG/Yr
WATER SUPPLIED:		**13,506.961**	MG/Yr				

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Click here: ?
for help using option

	Grade	Value	Unit
Billed metered:	5	12,356.103	MG/Yr
Billed unmetered:	10	0.796	MG/Yr
Unbilled metered:	10	3.660	MG/Yr
Unbilled unmetered:	5	33.267	MG/Yr
AUTHORIZED CONSUMPTION:		**12,393.825**	MG/Yr

Pcnt:	Value:	Unit
	33.267	MG/Yr

Use buttons to select percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption)

1,113.136 MG/Yr

Apparent Losses

	Grade	Value	Unit	Pcnt:	Value:	Unit
Unauthorized consumption:		33.767	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:	4	244.523	MG/Yr	1.94%		MG/Yr
Systematic data handling errors:	5	30.890	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: **309.181** MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: **803.955** MG/Yr

WATER LOSSES: **1,113.136** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: **1,150.063** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Unit
Length of mains:	8	948.5	miles
Number of active AND inactive service connections:	6	85,825	
Service connection density:		90	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:	4	72.9	psi

COST DATA

	Grade	Value	Unit
Total annual cost of operating water system:	10	$108,100,252	$/Year
Customer retail unit cost (applied to Apparent Losses):	8	$6.60	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	6	$2,355.87	$/Million gallons ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 60 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

American Water Works Association.

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

Water Audit Report for: Alameda County Water District (CA0110001)
Reporting Year: 2019 | 1/2019 - 12/2019

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 60 out of 100 ***

System Attributes:

Apparent Losses:	309.181	MG/Yr
+ Real Losses:	803.955	MG/Yr
= **Water Losses:**	**1,113.136**	MG/Yr
Unavoidable Annual Real Losses (UARL):	479.27	MG/Yr
Annual cost of Apparent Losses:	$2,727,876	
Annual cost of Real Losses:	$1,894,013	Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Fi

Non-revenue water as percent by volume of Water Supplied:	8.5%	
Non-revenue water as percent by cost of operating system:	4.4%	Real Losses valued at Variable Production Cost

Oper

Apparent Losses per service connection per day:	9.87	gallons/connection/day
Real Losses per service connection per day:	25.66	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	0.35	gallons/connection/day/psi
From Above, Real Losses = Current Annual Real Losses (CARL):	803.95	million gallons/year
Infrastructure Leakage Index (ILI) [CARL/UARL]:	1.68	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software:
User Comments

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:	

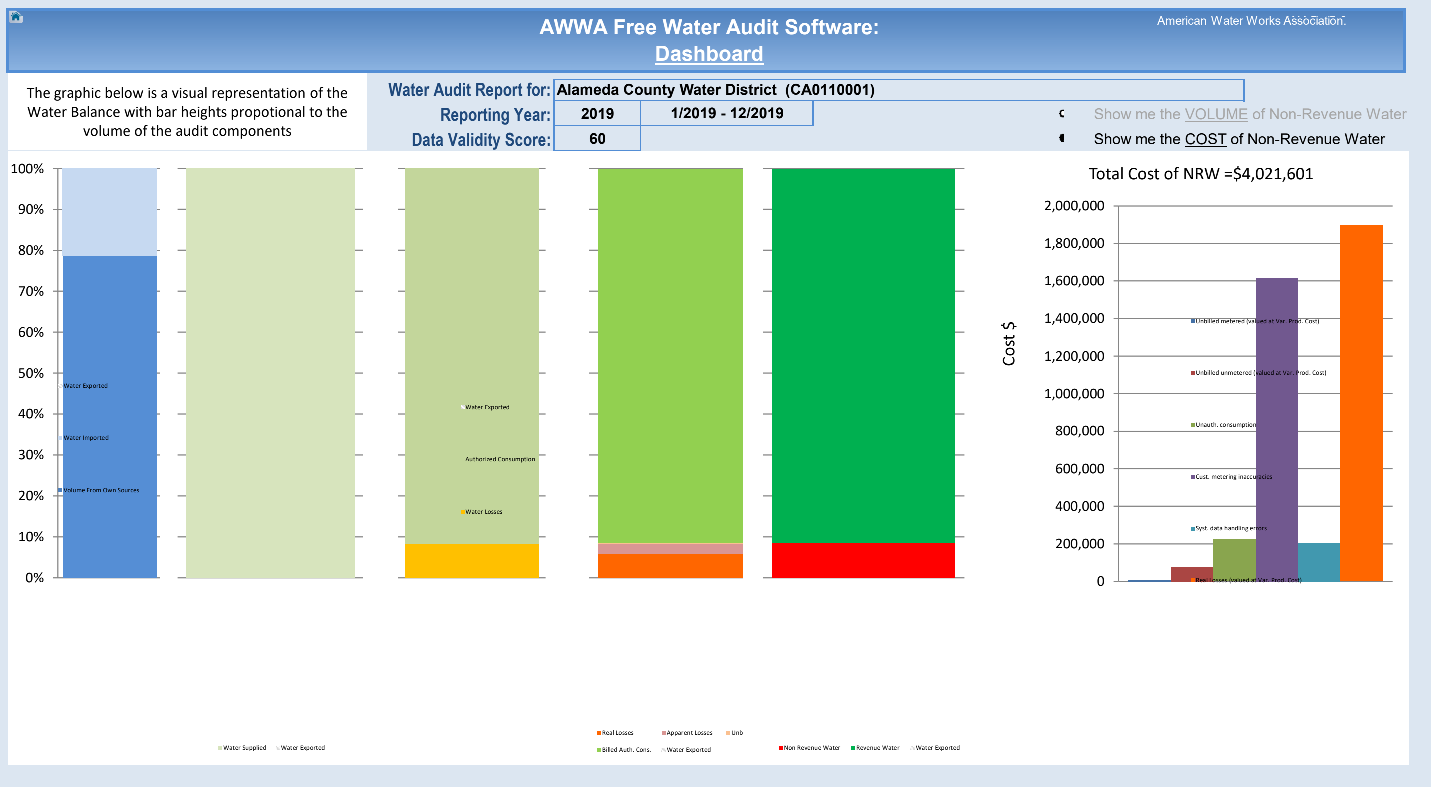
Audit Item	Comment
Volume from own sources:	
Vol. from own sources: Master meter error adjustment:	
Water imported:	
Water imported: master meter error adjustment:	
Water exported:	
Water exported: master meter error adjustment:	
Billed metered:	
Billed unmetered:	
Unbilled metered:	
Unbilled unmetered:	
Unauthorized consumption:	
Customer metering inaccuracies:	
Systematic data handling errors:	
Length of mains:	
Number of active AND inactive service connections:	

Audit Item	Comment
Average length of customer service line:	
Average operating pressure:	
Total annual cost of operating water system:	
Customer retail unit cost (applied to Apparent Losses):	
Variable production cost (applied to Real Losses):	

AWWA Free Water Audit Software: Water Balance

Water Audit Report for:	Alameda County Water District (CA0110001)	
Reporting Year:	2019	1/2019 - 12/2019
Data Validity Score:	60	

<table>
<tr><td rowspan="8">Own Sources
(Adjusted for known errors)
10,633.665</td><td>Water Exported
0.000</td><td colspan="4">Billed Water Exported</td></tr>
<tr><td rowspan="10">Water Supplied
13,506.961</td><td rowspan="4">Authorized Consumption
12,393.825</td><td rowspan="2">Billed Authorized Consumption
12,356.898</td><td>Billed Metered Consumption (water exported is removed)
12,356.103</td><td rowspan="2">Revenue Water
12,356.898</td></tr>
<tr><td>Billed Unmetered Consumption
0.796</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption
36.927</td><td>Unbilled Metered Consumption
3.660</td><td rowspan="8">Non-Revenue Water (NRW)
1,150.063</td></tr>
<tr><td>Unbilled Unmetered Consumption
33.267</td></tr>
<tr><td rowspan="6">Water Losses
1,113.136</td><td rowspan="3">Apparent Losses
309.181</td><td>Unauthorized Consumption
33.767</td></tr>
<tr><td>Customer Metering Inaccuracies
244.523</td></tr>
<tr><td>Systematic Data Handling Errors
30.890</td></tr>
<tr><td rowspan="3">Water Imported
2,873.296</td><td rowspan="3">Real Losses
803.955</td><td>Leakage on Transmission and/or Distribution Mains
Not broken down</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks
Not broken down</td></tr>
<tr><td>Leakage on Service Connections
Not broken down</td></tr>
</table>



AWWA Free Water Audit Software:
Dashboard

American Water Works Association.

The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for: Alameda County Water District (CA0110001)
Reporting Year: 2019 1/2019 - 12/2019
Data Validity Score: 60

○ Show me the VOLUME of Non-Revenue Water
● Show me the COST of Non-Revenue Water

Total Cost of NRW =$4,021,601

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APPENDIX I
District UWMP Public Outreach, Notices, and Submittal

I.1 PUBLIC OUTREACH AND NOTIFICATION OF UWMP UPDATES

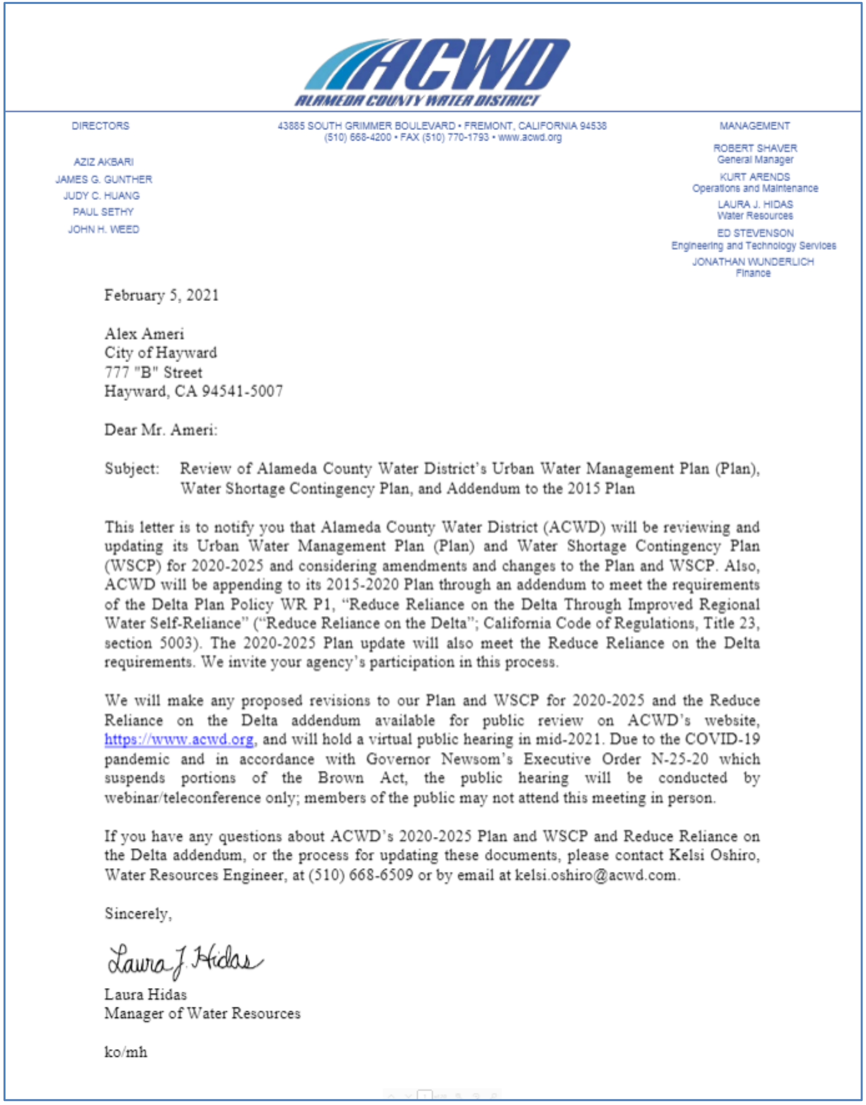
Code Requirement:	CWC §10621(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.
District Actions Taken:	On February 5, 2021, the District sent notification letters via e-mail and mail to cities, counties, and agencies. Reference the example letter and recipient list on the following pages.
Code Requirement:	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. 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. 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. 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. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. 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.
District Actions Taken:	On February 5, 2021, the District sent notification letters via e-mail and mail to cities, counties, and agencies. Reference the example letter on the following page and recipient list below.

Recipients of Notification Letters, dated February 5, 2021

Contact	Organization
Alex Ameri	City of Hayward
Cheryl Munoz	City of Hayward
Steven Erickson	City of Milpitas
Tony Ndah	City of Milpitas
Tom Francis	Bay Area Water Supply and Conservation Agency
Joel Pullen	City of Fremont
Joan Malloy	City of Union City
Lenka Hovorka	City of Newark
Chris Bazar	Alameda County

Contact	Organization
Daniel Woldesenbet	Alameda County
Jennifer Pierre	State Water Contractors
Rob Eastwood	Santa Clara County
Sami Ghossain	Union Sanitary District
Steve Ritchie	San Francisco Public Utilities Commission
Ted Craddock	State Water Project, California Department of Water Resources
Jason Gianquinto	Semitropic Water Storage District
Valerie Pryor	Zone 7 Water Agency
Aaron Baker	Santa Clara Valley Water District
Carol Victor	East Bay Regional Park District
Kerrie Romanow	Environmental Service Department, City of San Jose

Example Notification Letter, dated February 5, 2021



ACWD
ALAMEDA COUNTY WATER DISTRICT

43885 SOUTH GRIMMER BOULEVARD • FREMONT, CALIFORNIA 94538
(510) 668-4200 • FAX (510) 770-1793 • www.acwd.org

DIRECTORS

AZIZ AKBARI
JAMES G. GUNTHER
JUDY C. HUANG
PAUL SETHY
JOHN H. WEED

MANAGEMENT

ROBERT SHAVER
General Manager
KURT ARENDS
Operations and Maintenance
LAURA J. HIDAS
Water Resources
ED STEVENSON
Engineering and Technology Services
JONATHAN WUNDERLICH
Finance

February 5, 2021

Alex Ameri
City of Hayward
777 "B" Street
Hayward, CA 94541-5007

Dear Mr. Ameri:

Subject: Review of Alameda County Water District's Urban Water Management Plan (Plan), Water Shortage Contingency Plan, and Addendum to the 2015 Plan

This letter is to notify you that Alameda County Water District (ACWD) will be reviewing and updating its Urban Water Management Plan (Plan) and Water Shortage Contingency Plan (WSCP) for 2020-2025 and considering amendments and changes to the Plan and WSCP. Also, ACWD will be appending to its 2015-2020 Plan through an addendum to meet the requirements of the Delta Plan Policy WR P1, "Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance" ("Reduce Reliance on the Delta"; California Code of Regulations, Title 23, section 5003). The 2020-2025 Plan update will also meet the Reduce Reliance on the Delta requirements. We invite your agency's participation in this process.

We will make any proposed revisions to our Plan and WSCP for 2020-2025 and the Reduce Reliance on the Delta addendum available for public review on ACWD's website, https://www.acwd.org, and will hold a virtual public hearing in mid-2021. Due to the COVID-19 pandemic and in accordance with Governor Newsom's Executive Order N-25-20 which suspends portions of the Brown Act, the public hearing will be conducted by webinar/teleconference only; members of the public may not attend this meeting in person.

If you have any questions about ACWD's 2020-2025 Plan and WSCP and Reduce Reliance on the Delta addendum, or the process for updating these documents, please contact Kelsi Oshiro, Water Resources Engineer, at (510) 668-6509 or by email at kelsi.oshiro@acwd.com.

Sincerely,

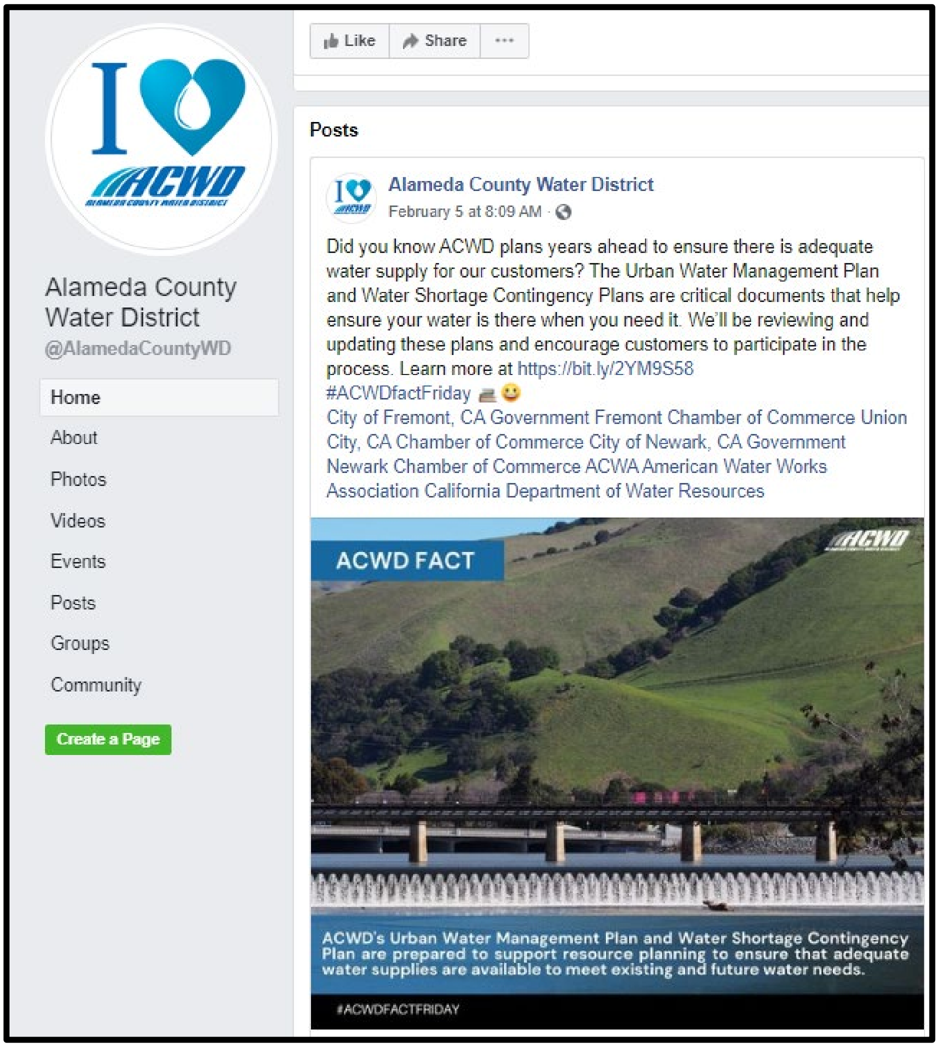
Laura J. Hidas

Laura Hidas
Manager of Water Resources

ko/mh

District Actions Taken: On February 5, 2021, the District posted on its website (www.acwd.org) notice that the District will be reviewing the UWMP and considering amendments or changes to the plan. On the same date, the District also posted announcements on social media (Facebook and Twitter) linking to the website notice. The District also published these announcements in two local newspapers: *The Fremont Argus* on February 12, 2021, and *The Tri-City Voice* on February 16, 2021.

Announcement on Facebook



Alameda County Water District
February 5 at 8:09 AM

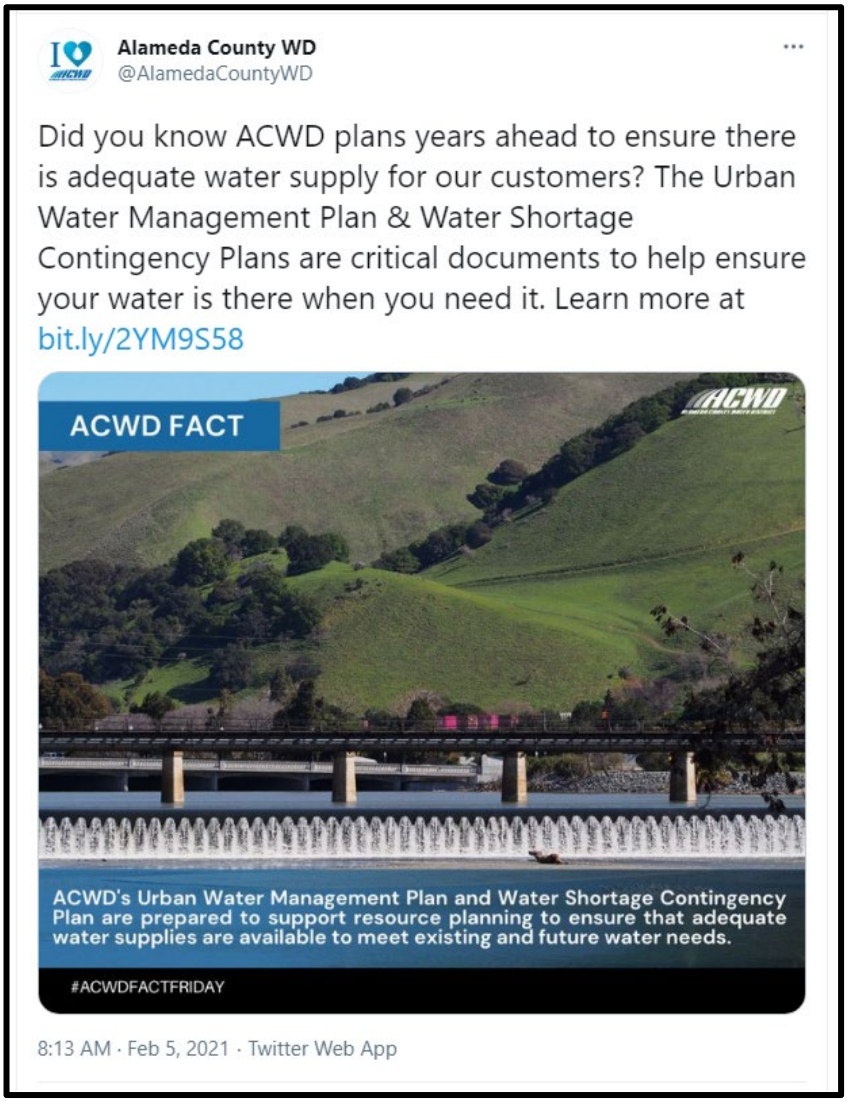
Did you know ACWD plans years ahead to ensure there is adequate water supply for our customers? The Urban Water Management Plan and Water Shortage Contingency Plans are critical documents that help ensure your water is there when you need it. We'll be reviewing and updating these plans and encourage customers to participate in the process. Learn more at https://bit.ly/2YM9S58
#ACWDfactFriday 😀
City of Fremont, CA Government Fremont Chamber of Commerce Union City, CA Chamber of Commerce City of Newark, CA Government Newark Chamber of Commerce ACWA American Water Works Association California Department of Water Resources

ACWD FACT

ACWD's Urban Water Management Plan and Water Shortage Contingency Plan are prepared to support resource planning to ensure that adequate water supplies are available to meet existing and future water needs.

#ACWDFACTFRIDAY

Announcement on Twitter



Alameda County WD
@AlamedaCountyWD

Did you know ACWD plans years ahead to ensure there is adequate water supply for our customers? The Urban Water Management Plan & Water Shortage Contingency Plans are critical documents to help ensure your water is there when you need it. Learn more at bit.ly/2YM9S58

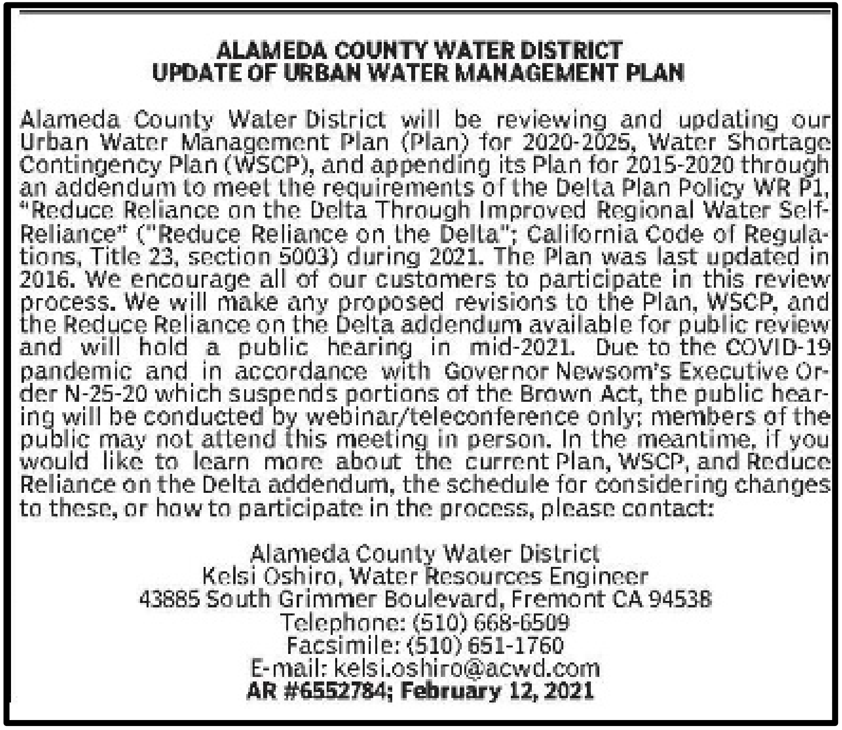
ACWD FACT

ACWD's Urban Water Management Plan and Water Shortage Contingency Plan are prepared to support resource planning to ensure that adequate water supplies are available to meet existing and future water needs.

#ACWDFACTFRIDAY

8:13 AM · Feb 5, 2021 · Twitter Web App

Announcement in *The Fremont Argus*

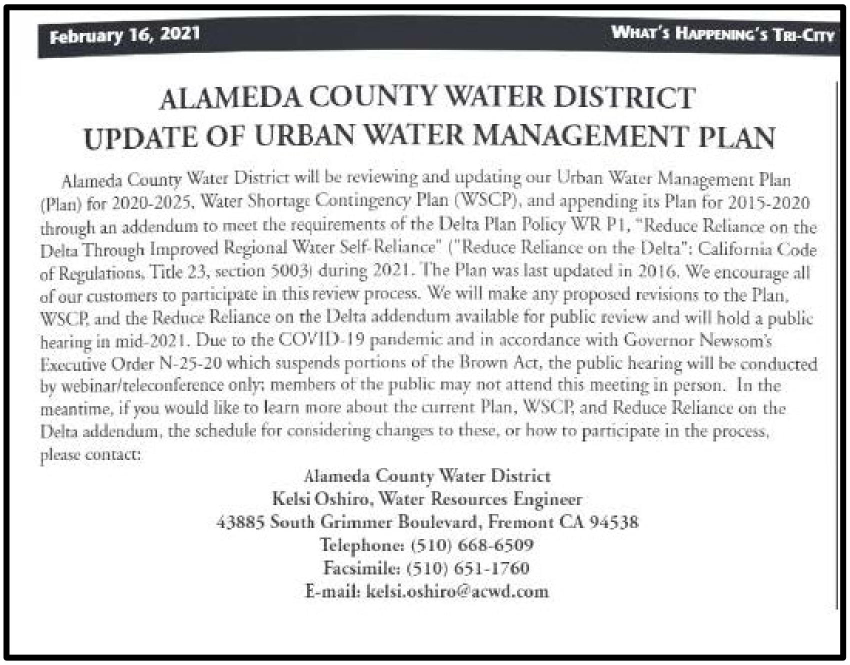


ALAMEDA COUNTY WATER DISTRICT
UPDATE OF URBAN WATER MANAGEMENT PLAN

Alameda County Water District will be reviewing and updating our Urban Water Management Plan (Plan) for 2020-2025, Water Shortage Contingency Plan (WSCP), and appending its Plan for 2015-2020 through an addendum to meet the requirements of the Delta Plan Policy WR P1, "Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance" ("Reduce Reliance on the Delta"; California Code of Regulations, Title 23, section 5003) during 2021. The Plan was last updated in 2016. We encourage all of our customers to participate in this review process. We will make any proposed revisions to the Plan, WSCP, and the Reduce Reliance on the Delta addendum available for public review and will hold a public hearing in mid-2021. Due to the COVID-19 pandemic and in accordance with Governor Newsom's Executive Order N-25-20 which suspends portions of the Brown Act, the public hearing will be conducted by webinar/teleconference only; members of the public may not attend this meeting in person. In the meantime, if you would like to learn more about the current Plan, WSCP, and Reduce Reliance on the Delta addendum, the schedule for considering changes to these, or how to participate in the process, please contact:

Alameda County Water District
Kelsi Oshiro, Water Resources Engineer
43885 South Grimmer Boulevard, Fremont CA 94538
Telephone: (510) 668-6509
Facsimile: (510) 651-1760
E-mail: kelsi.oshiro@acwd.com
AR #6552784; February 12, 2021

Announcement in The Tri-City Voice



February 16, 2021 **WHAT'S HAPPENING'S TRI-CITY**

ALAMEDA COUNTY WATER DISTRICT
UPDATE OF URBAN WATER MANAGEMENT PLAN

Alameda County Water District will be reviewing and updating our Urban Water Management Plan (Plan) for 2020-2025, Water Shortage Contingency Plan (WSCP), and appending its Plan for 2015-2020 through an addendum to meet the requirements of the Delta Plan Policy WR P1, "Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance" ("Reduce Reliance on the Delta"; California Code of Regulations, Title 23, section 5003) during 2021. The Plan was last updated in 2016. We encourage all of our customers to participate in this review process. We will make any proposed revisions to the Plan, WSCP, and the Reduce Reliance on the Delta addendum available for public review and will hold a public hearing in mid-2021. Due to the COVID-19 pandemic and in accordance with Governor Newsom's Executive Order N-25-20 which suspends portions of the Brown Act, the public hearing will be conducted by webinar/teleconference only; members of the public may not attend this meeting in person. In the meantime, if you would like to learn more about the current Plan, WSCP, and Reduce Reliance on the Delta addendum, the schedule for considering changes to these, or how to participate in the process, please contact:

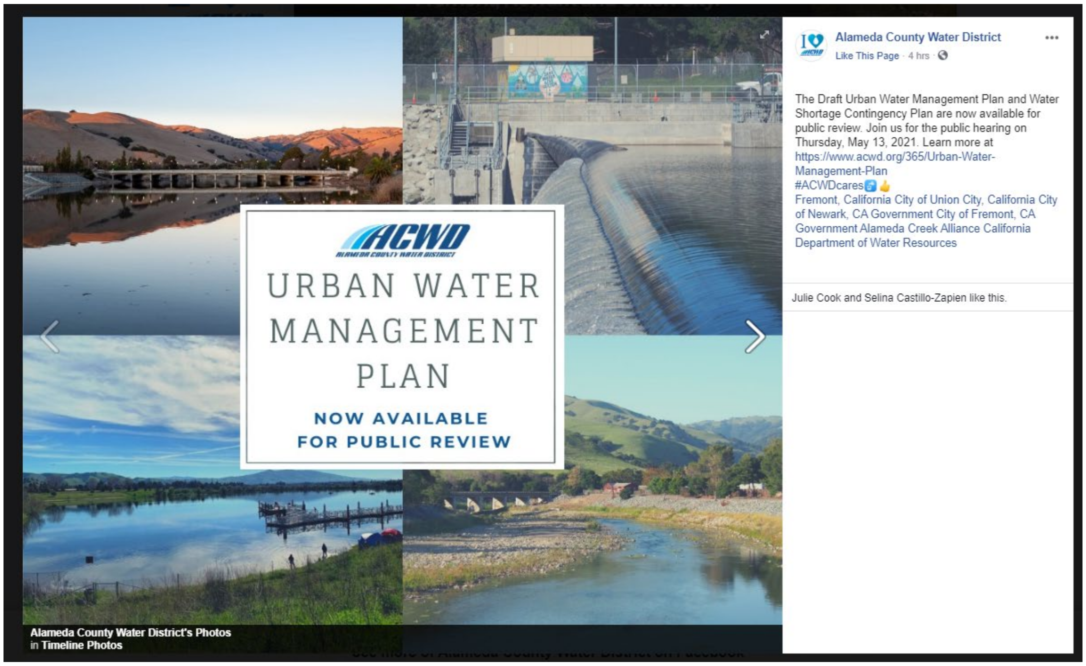
Alameda County Water District
Kelsi Oshiro, Water Resources Engineer
43885 South Grimmer Boulevard, Fremont CA 94538
Telephone: (510) 668-6509
Facsimile: (510) 651-1760
E-mail: kelsi.oshiro@acwd.com

I.2 PUBLIC HEARING AND BOARD APPROVAL

Code Requirement: 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. 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. 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. 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. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. 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.

District Actions Taken: From April 23, 2021 through the public hearing on May 13, 2021, a copy of the Draft 2020 UWMP, WSCP, and the 2015 UWMP Reduce Reliance on the Delta addendum was posted on its website. On April 28 and April 29, 2021, the District sent notification letters via e-mail and mail to cities, counties, and agencies. Reference the example letter and recipient list on the following pages. On April 23, 2021, the District also included the notice of public hearing on its website. On April 26, 2021, the District also posted announcements on social media (Facebook and Twitter) linking to the website notice. Due to the COVID-19 pandemic, District headquarters was closed during the public review period so no paper copies were available for review on site. However, it was explained in the public hearing notifications to contact the District if anyone was unable to access the 2020 UWMP, WSCP, and the 2015 UWMP Reduce Reliance on the Delta addendum. Two notices of the public hearing were also published in the local newspapers (*The Fremont Argus* and *The Tri-City Voice*) at least once a week for two successive weeks prior to the public hearing. The District held a public hearing on Thursday, May 13, 2021, at 6:00 p.m. via webinar/teleconference in accordance with Governor Newsom's Executive Order N-25-20 which suspends portions of the Brown Act; members of the public were not allowed to the public hearing meeting in person.

Announcement on Facebook

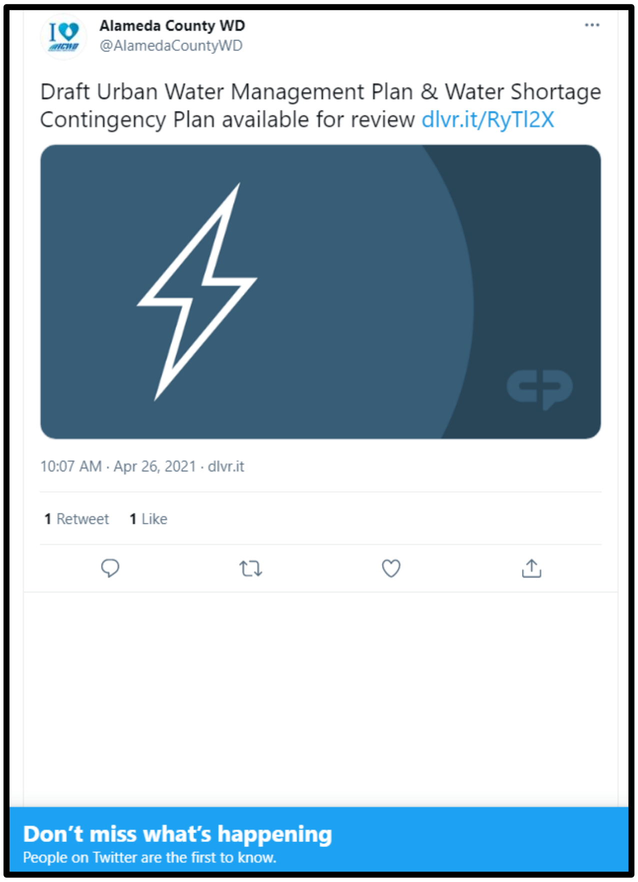


Alameda County Water District

The Draft Urban Water Management Plan and Water Shortage Contingency Plan are now available for public review. Join us for the public hearing on Thursday, May 13, 2021. Learn more at https://www.acwd.org/365/Urban-Water-Management-Plan
#ACWDcares🚰👍
Fremont, California City of Union City, California City of Newark, CA Government City of Fremont, CA Government Alameda Creek Alliance California Department of Water Resources

Julie Cook and Selina Castillo-Zapien like this.

Announcement on Twitter



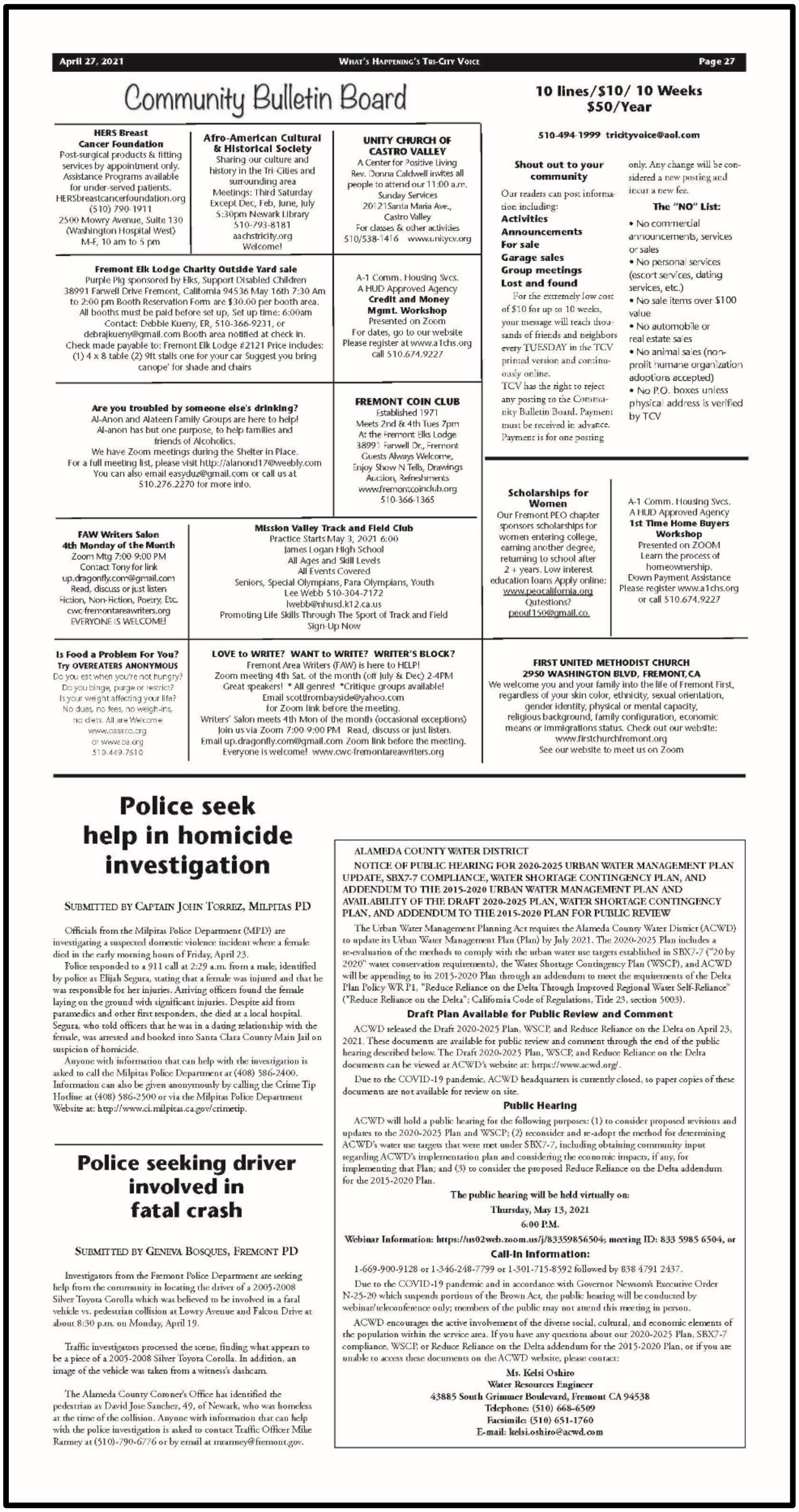
Alameda County WD
@AlamedaCountyWD

Draft Urban Water Management Plan & Water Shortage Contingency Plan available for review dlvr.it/RyTl2X

10:07 AM · Apr 26, 2021 · dlvr.it

1 Retweet 1 Like

Notices Published in the *Tri-City Voice* on Tuesday, April 27, 2021, and Tuesday, May 4, 2021



Community Bulletin Board

HERS Breast Cancer Foundation
Post-surgical products & fitting services by appointment only.
Assistance Programs available for under-served patients.
HERSbreastcancerfoundation.org
(510) 790-1911
2500 Mowry Avenue, Suite 130
(Washington Hospital West)
M-F, 10 am to 5 pm

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Sharing our culture and history in the Tri-Cities and surrounding area
Meetings: Third Saturday
Except Dec, Feb, June, July
5:30pm Newark Library
510-793-8181
aachstricity.org
Welcome!

UNITY CHURCH OF CASTRO VALLEY
A Center for Positive Living
Rev. Donna Caldwell invites all people to attend our 11:00 a.m. Sunday Services
20121Santa Maria Ave., Castro Valley
For classes & other activities
510/538-1416 www.unitycv.org

Fremont Elk Lodge Charity Outside Yard sale
Purple Pig sponsored by Elks, Support Disabled Children
38991 Farwell Drive Fremont, California 94536 May 16th 7:30 Am to 2:00 pm Booth Reservation Form are $30.00 per booth area.
All booths must be paid before set up, Set up time: 6:00am
Contact: Debbie Kueny, ER, 510-366-9231, or debrajkueny@gmail.com Booth area notified at check in.
Check made payable to: Fremont Elk Lodge #2121 Price includes: (1) 4 x 8 table (2) 9ft stalls one for your car Suggest you bring canope' for shade and chairs

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A HUD Approved Agency
Credit and Money Mgmt. Workshop
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Established 1971
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At the Fremont Elks Lodge
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Guests Always Welcome,
Enjoy Show N Tells, Drawings
Auction, Refreshments
www.fremontcoinclub.org
510-366-1365

FAW Writers Salon
4th Monday of the Month
Zoom Mtg 7:00-9:00 PM
Contact Tony for link
up.dragonfly.com@gmail.com
Read, discuss or just listen
Fiction, Non-Fiction, Poetry, Etc.
cwc-fremontareawriters.org
EVERYONE IS WELCOME!

Mission Valley Track and Field Club
Practice Starts May 3, 2021 6:00
James Logan High School
All Ages and Skill Levels
All Events Covered
Seniors, Special Olympians, Para Olympians, Youth
Lee Webb 510-304-7172
lwebb@nhusd.k12.ca.us
Promoting Life Skills Through The Sport of Track and Field
Sign-Up Now

Is Food a Problem For You?
Try OVEREATERS ANONYMOUS
Do you eat when you're not hungry?
Do you binge, purge or restrict?
Is your weight affecting your life?
No dues, no fees, no weigh-ins, no diets. All are Welcome
www.oasacco.org
or www.oa.org
510-449-7610

LOVE to WRITE? WANT to WRITE? WRITER'S BLOCK?
Fremont Area Writers (FAW) is here to HELP!
Zoom meeting 4th Sat. of the month (off July & Dec) 2-4PM
Great speakers! * All genres! *Critique groups available!
Email scottfrombayside@yahoo.com for Zoom link before the meeting.
Writers' Salon meets 4th Mon of the month (occasional exceptions)
Join us via Zoom 7:00-9:00 PM Read, discuss or just listen.
Email up.dragonfly.com@gmail.com Zoom link before the meeting.
Everyone is welcome! www.cwc-fremontareawriters.org

10 lines/$10/ 10 Weeks $50/Year

510-494-1999 tricityvoice@aol.com

Shout out to your community

Our readers can post information including:
Activities
Announcements
For sale
Garage sales
Group meetings
Lost and found

For the extremely low cost of $10 for up to 10 weeks, your message will reach thousands of friends and neighbors every TUESDAY in the TCV printed version and continuously online.

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- No sale items over $100 value
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- No animal sales (non-profit humane organization adoptions accepted)
- No P.O. boxes unless physical address is verified by TCV

Scholarships for Women
Our Fremont PEO chapter sponsors scholarships for women entering college, earning another degree, returning to school after 2 + years. Low interest education loans Apply online:
www.peocalifornia.org
Qutestions?
peouf150@gmail.co.

A-1 Comm. Housing Svcs.
A HUD Approved Agency
1st Time Home Buyers Workshop
Presented on ZOOM
Learn the process of homeownership.
Down Payment Assistance
Please register www.a1chs.org
or call 510.674.9227

FIRST UNITED METHODIST CHURCH
2950 WASHINGTON BLVD, FREMONT, CA
We welcome you and your family into the life of Fremont First, regardless of your skin color, ethnicity, sexual orientation, gender identity, physical or mental capacity, religious background, family configuration, economic means or immigrations status. Check out our website:
www.firstchurchfremont.org
See our website to meet us on Zoom

Police seek help in homicide investigation

SUBMITTED BY CAPTAIN JOHN TORREZ, MILPITAS PD

Officials from the Milpitas Police Department (MPD) are investigating a suspected domestic violence incident where a female died in the early morning hours of Friday, April 23.

Police responded to a 911 call at 2:29 a.m. from a male, identified by police as Elijah Segura, stating that a female was injured and that he was responsible for her injuries. Arriving officers found the female laying on the ground with significant injuries. Despite aid from paramedics and other first responders, she died at a local hospital. Segura, who told officers that he was in a dating relationship with the female, was arrested and booked into Santa Clara County Main Jail on suspicion of homicide.

Anyone with information that can help with the investigation is asked to call the Milpitas Police Department at (408) 586-2400. Information can also be given anonymously by calling the Crime Tip Hotline at (408) 586-2500 or via the Milpitas Police Department Website at: http://www.ci.milpitas.ca.gov/crimetip.

Police seeking driver involved in fatal crash

SUBMITTED BY GENEVA BOSQUES, FREMONT PD

Investigators from the Fremont Police Department are seeking help from the community in locating the driver of a 2005-2008 Silver Toyota Corolla which was believed to be involved in a fatal vehicle vs. pedestrian collision at Lowry Avenue and Falcon Drive at about 8:30 p.m. on Monday, April 19.

Traffic investigators processed the scene, finding what appears to be a piece of a 2005-2008 Silver Toyota Corolla. In addition, an image of the vehicle was taken from a witness's dashcam.

The Alameda County Coroner's Office has identified the pedestrian as David Jose Sanchez, 49, of Newark, who was homeless at the time of the collision. Anyone with information that can help with the police investigation is asked to contact Traffic Officer Mike Ramsey at (510)-790-6776 or by email at mramsey@fremont.gov.

ALAMEDA COUNTY WATER DISTRICT

NOTICE OF PUBLIC HEARING FOR 2020-2025 URBAN WATER MANAGEMENT PLAN UPDATE, SBX7-7 COMPLIANCE, WATER SHORTAGE CONTINGENCY PLAN, AND ADDENDUM TO THE 2015-2020 URBAN WATER MANAGEMENT PLAN AND AVAILABILITY OF THE DRAFT 2020-2025 PLAN, WATER SHORTAGE CONTINGENCY PLAN, AND ADDENDUM TO THE 2015-2020 PLAN FOR PUBLIC REVIEW

The Urban Water Management Planning Act requires the Alameda County Water District (ACWD) to update its Urban Water Management Plan (Plan) by July 2021. The 2020-2025 Plan includes a re-evaluation of the methods to comply with the urban water use targets established in SBX7-7 ("20 by 2020" water conservation requirements), the Water Shortage Contingency Plan (WSCP), and ACWD will be appending to its 2015-2020 Plan through an addendum to meet the requirements of the Delta Plan Policy WR P1, "Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance" ("Reduce Reliance on the Delta"; California Code of Regulations, Title 23, section 5003).

Draft Plan Available for Public Review and Comment

ACWD released the Draft 2020-2025 Plan, WSCP, and Reduce Reliance on the Delta on April 23, 2021. These documents are available for public review and comment through the end of the public hearing described below. The Draft 2020-2025 Plan, WSCP, and Reduce Reliance on the Delta documents can be viewed at ACWD's website at: https://www.acwd.org/.

Due to the COVID-19 pandemic, ACWD headquarters is currently closed, so paper copies of these documents are not available for review on site.

Public Hearing

ACWD will hold a public hearing for the following purposes: (1) to consider proposed revisions and updates to the 2020-2025 Plan and WSCP; (2) reconsider and re-adopt the method for determining ACWD's water use targets that were met under SBX7-7, including obtaining community input regarding ACWD's implementation plan and considering the economic impacts, if any, for implementing that Plan; and (3) to consider the proposed Reduce Reliance on the Delta addendum for the 2015-2020 Plan.

The public hearing will be held virtually on:

Thursday, May 13, 2021

6:00 P.M.

Webinar Information: https://us02web.zoom.us/j/83359856504; meeting ID: 833 5985 6504, or

Call-In Information:

1-669-900-9128 or 1-346-248-7799 or 1-301-715-8592 followed by 838 4791 2437.

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ACWD encourages the active involvement of the diverse social, cultural, and economic elements of the population within the service area. If you have any questions about our 2020-2025 Plan, SBX7-7 compliance, WSCP, or Reduce Reliance on the Delta addendum for the 2015-2020 Plan, or if you are unable to access these documents on the ACWD website, please contact:

Ms. Kelsi Oshiro
Water Resources Engineer
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Telephone: (510) 668-6509
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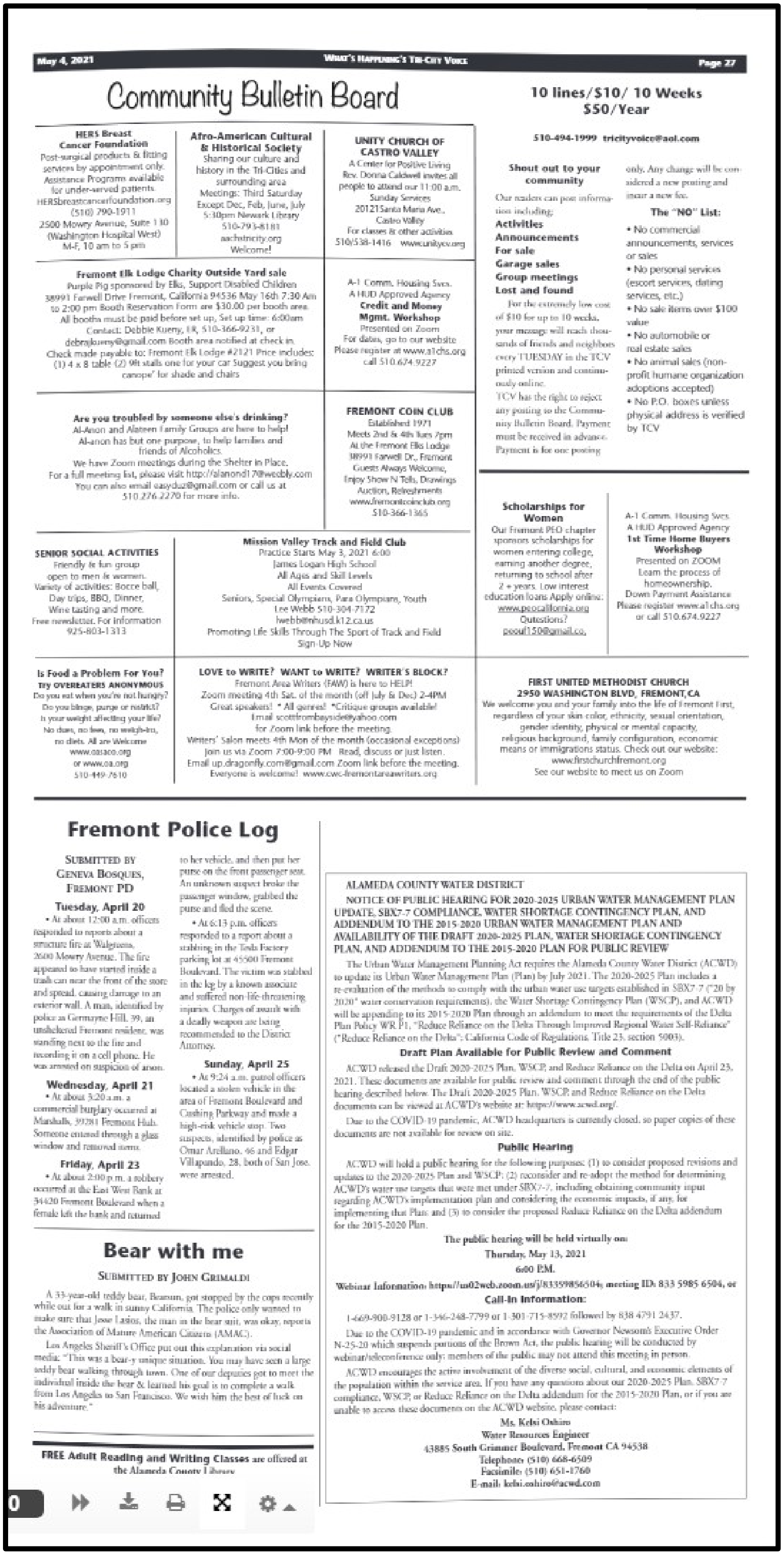

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Purple Pig sponsored by Elks, Support Disabled Children
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open to men & women.
Variety of activities: Bocce ball,
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Free newsletter. For information
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Mission Valley Track and Field Club
Practice Starts May 3, 2021 6:00
James Logan High School
All Ages and Skill Levels
All Events Covered
Seniors, Special Olympians, Para Olympians, Youth
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Promoting Life Skills Through The Sport of Track and Field
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Do you eat when you're not hungry?
Do you binge, purge or restrict?
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Scholarships for Women
Our Fremont PEO chapter
sponsors scholarships for
women entering college,
earning another degree,
returning to school after
2 + years. Low interest
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www.peocalifornia.org
Qutestions?
peoul150@gmail.co.

A-1 Comm. Housing Svcs.
A HUD Approved Agency
1st Time Home Buyers Workshop
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regardless of your skin color, ethnicity, sexual orientation,
gender identity, physical or mental capacity,
religious background, family configuration, economic
means or immigrations status. Check out our website:
www.firstchurchfremont.org
See our website to meet us on Zoom

Fremont Police Log

SUBMITTED BY
GENEVA BOSQUES,
FREMONT PD

Tuesday, April 20

• At about 12:00 a.m. officers responded to reports about a structure fire at Walgreens, 2600 Mowry Avenue. The fire appeared to have started inside a trash can near the front of the store and spread, causing damage to an exterior wall. A man, identified by police as Germayne Hill, 39, an unsheltered Fremont resident, was standing next to the fire and recording it on a cell phone. He was arrested on suspicion of arson.

Wednesday, April 21

• At about 3:20 a.m. a commercial burglary occurred at Marshalls, 39281 Fremont Hub. Someone entered through a glass window and removed items.

Friday, April 23

• At about 2:00 p.m. a robbery occurred at the East West Bank at 34420 Fremont Boulevard when a female left the bank and returned to her vehicle, and then put her purse on the front passenger seat. An unknown suspect broke the passenger window, grabbed the purse and fled the scene.

• At 6:13 p.m. officers responded to a report about a stabbing in the Tesla Factory parking lot at 45500 Fremont Boulevard. The victim was stabbed in the leg by a known associate and suffered non-life-threatening injuries. Charges of assault with a deadly weapon are being recommended to the District Attorney.

Sunday, April 25

• At 9:24 a.m. patrol officers located a stolen vehicle in the area of Fremont Boulevard and Cushing Parkway and made a high-risk vehicle stop. Two suspects, identified by police as Omar Arellano, 46 and Edgar Villapando, 28, both of San Jose, were arrested.

Bear with me

SUBMITTED BY JOHN GRIMALDI

A 33-year-old teddy bear, Bearum, got stopped by the cops recently while out for a walk in sunny California. The police only wanted to make sure that Jose Lasios, the man in the bear suit, was okay, reports the Association of Mature American Citizens (AMAC).

Los Angeles Sheriff's Office put out this explanation via social media: "This was a bear-y unique situation. You may have seen a large teddy bear walking through town. One of our deputies got to meet the individual inside the bear & learned his goal is to complete a walk from Los Angeles to San Francisco. We wish him the best of luck on his adventure."

FREE Adult Reading and Writing Classes are offered at the Alameda County Library

ALAMEDA COUNTY WATER DISTRICT

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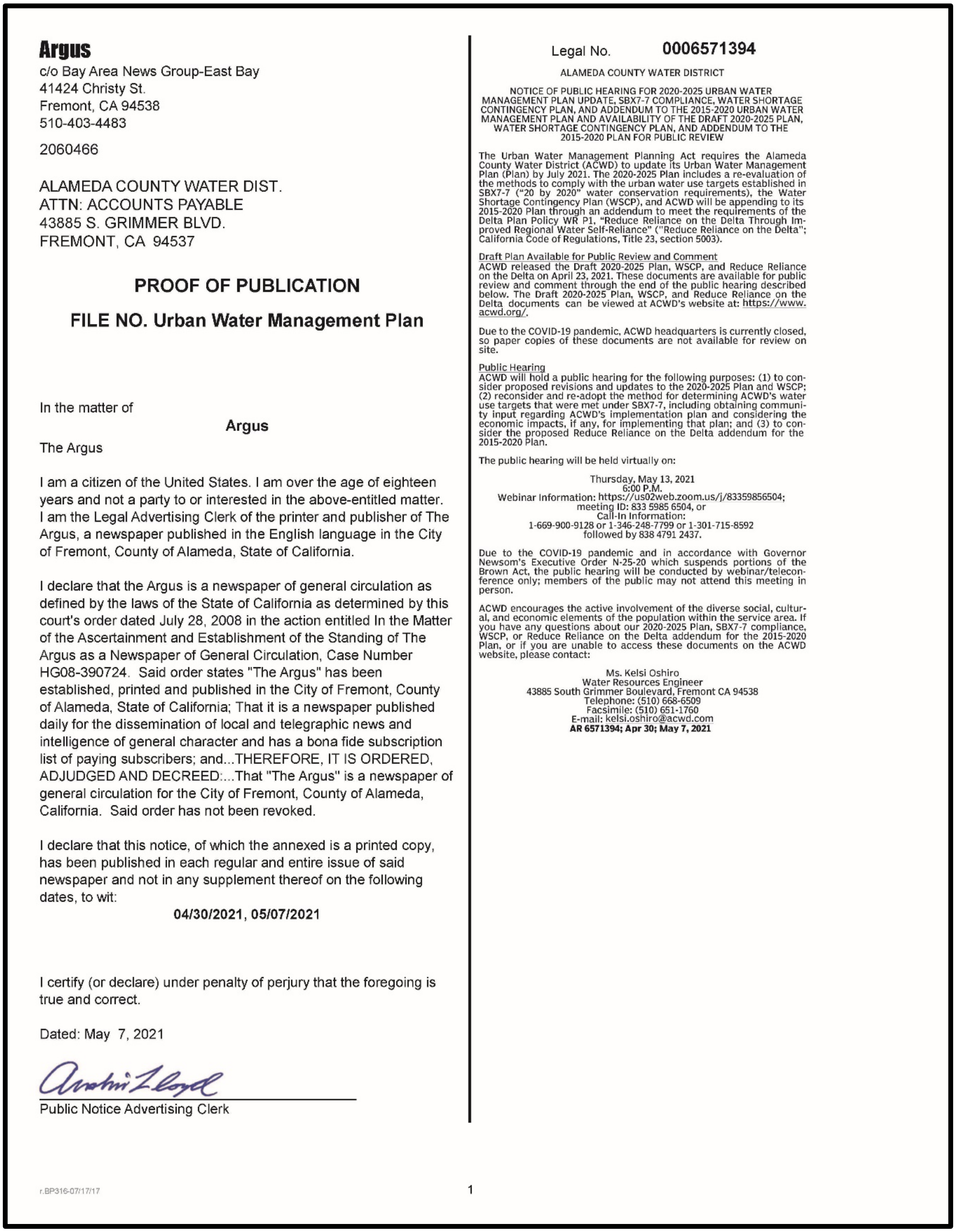
E-mail: kelsi.oshiro@acwd.com

Notices Published in *The Fremont Argus* on Friday, April 30, 2021, and Friday, May 7, 2021



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c/o Bay Area News Group-East Bay
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Fremont, CA 94538
510-403-4483

2060466

ALAMEDA COUNTY WATER DIST.
ATTN: ACCOUNTS PAYABLE
43885 S. GRIMMER BLVD.
FREMONT, CA 94537

PROOF OF PUBLICATION

FILE NO. Urban Water Management Plan

In the matter of

Argus

The Argus

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the Legal Advertising Clerk of the printer and publisher of The Argus, a newspaper published in the English language in the City of Fremont, County of Alameda, State of California.

I declare that the Argus is a newspaper of general circulation as defined by the laws of the State of California as determined by this court's order dated July 28, 2008 in the action entitled In the Matter of the Ascertainment and Establishment of the Standing of The Argus as a Newspaper of General Circulation, Case Number HG08-390724. Said order states "The Argus" has been established, printed and published in the City of Fremont, County of Alameda, State of California; That it is a newspaper published daily for the dissemination of local and telegraphic news and intelligence of general character and has a bona fide subscription list of paying subscribers; and...THEREFORE, IT IS ORDERED, ADJUDGED AND DECREED:...That "The Argus" is a newspaper of general circulation for the City of Fremont, County of Alameda, California. Said order has not been revoked.

I declare that this notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

04/30/2021, 05/07/2021

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated: May 7, 2021

Public Notice Advertising Clerk

Legal No. **0006571394**

ALAMEDA COUNTY WATER DISTRICT

NOTICE OF PUBLIC HEARING FOR 2020-2025 URBAN WATER MANAGEMENT PLAN UPDATE, SBX7-7 COMPLIANCE, WATER SHORTAGE CONTINGENCY PLAN, AND ADDENDUM TO THE 2015-2020 URBAN WATER MANAGEMENT PLAN AND AVAILABILITY OF THE DRAFT 2020-2025 PLAN, WATER SHORTAGE CONTINGENCY PLAN, AND ADDENDUM TO THE 2015-2020 PLAN FOR PUBLIC REVIEW

The Urban Water Management Planning Act requires the Alameda County Water District (ACWD) to update its Urban Water Management Plan (Plan) by July 2021. The 2020-2025 Plan includes a re-evaluation of the methods to comply with the urban water use targets established in SBX7-7 ("20 by 2020" water conservation requirements), the Water Shortage Contingency Plan (WSCP), and ACWD will be appending to its 2015-2020 Plan through an addendum to meet the requirements of the Delta Plan Policy WR P1, "Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance" ("Reduce Reliance on the Delta"; California Code of Regulations, Title 23, section 5003).

Draft Plan Available for Public Review and Comment
ACWD released the Draft 2020-2025 Plan, WSCP, and Reduce Reliance on the Delta on April 23, 2021. These documents are available for public review and comment through the end of the public hearing described below. The Draft 2020-2025 Plan, WSCP, and Reduce Reliance on the Delta documents can be viewed at ACWD's website at: https://www.acwd.org/.

Due to the COVID-19 pandemic, ACWD headquarters is currently closed, so paper copies of these documents are not available for review on site.

Public Hearing
ACWD will hold a public hearing for the following purposes: (1) to consider proposed revisions and updates to the 2020-2025 Plan and WSCP; (2) reconsider and re-adopt the method for determining ACWD's water use targets that were met under SBX7-7, including obtaining community input regarding ACWD's implementation plan and considering the economic impacts, if any, for implementing that plan; and (3) to consider the proposed Reduce Reliance on the Delta addendum for the 2015-2020 Plan.

The public hearing will be held virtually on:

Thursday, May 13, 2021
6:00 P.M.
Webinar Information: https://us02web.zoom.us/j/83359856504;
meeting ID: 833 5985 6504, or
Call-In Information:
1-669-900-9128 or 1-346-248-7799 or 1-301-715-8592
followed by 838 4791 2437.

Due to the COVID-19 pandemic and in accordance with Governor Newsom's Executive Order N-25-20 which suspends portions of the Brown Act, the public hearing will be conducted by webinar/teleconference only; members of the public may not attend this meeting in person.

ACWD encourages the active involvement of the diverse social, cultural, and economic elements of the population within the service area. If you have any questions about our 2020-2025 Plan, SBX7-7 compliance, WSCP, or Reduce Reliance on the Delta addendum for the 2015-2020 Plan, or if you are unable to access these documents on the ACWD website, please contact:

Ms. Kelsi Oshiro
Water Resources Engineer
43885 South Grimmer Boulevard, Fremont CA 94538
Telephone: (510) 668-6509
Facsimile: (510) 651-1760
E-mail: kelsi.oshiro@acwd.com
AR 6571394; Apr 30; May 7, 2021

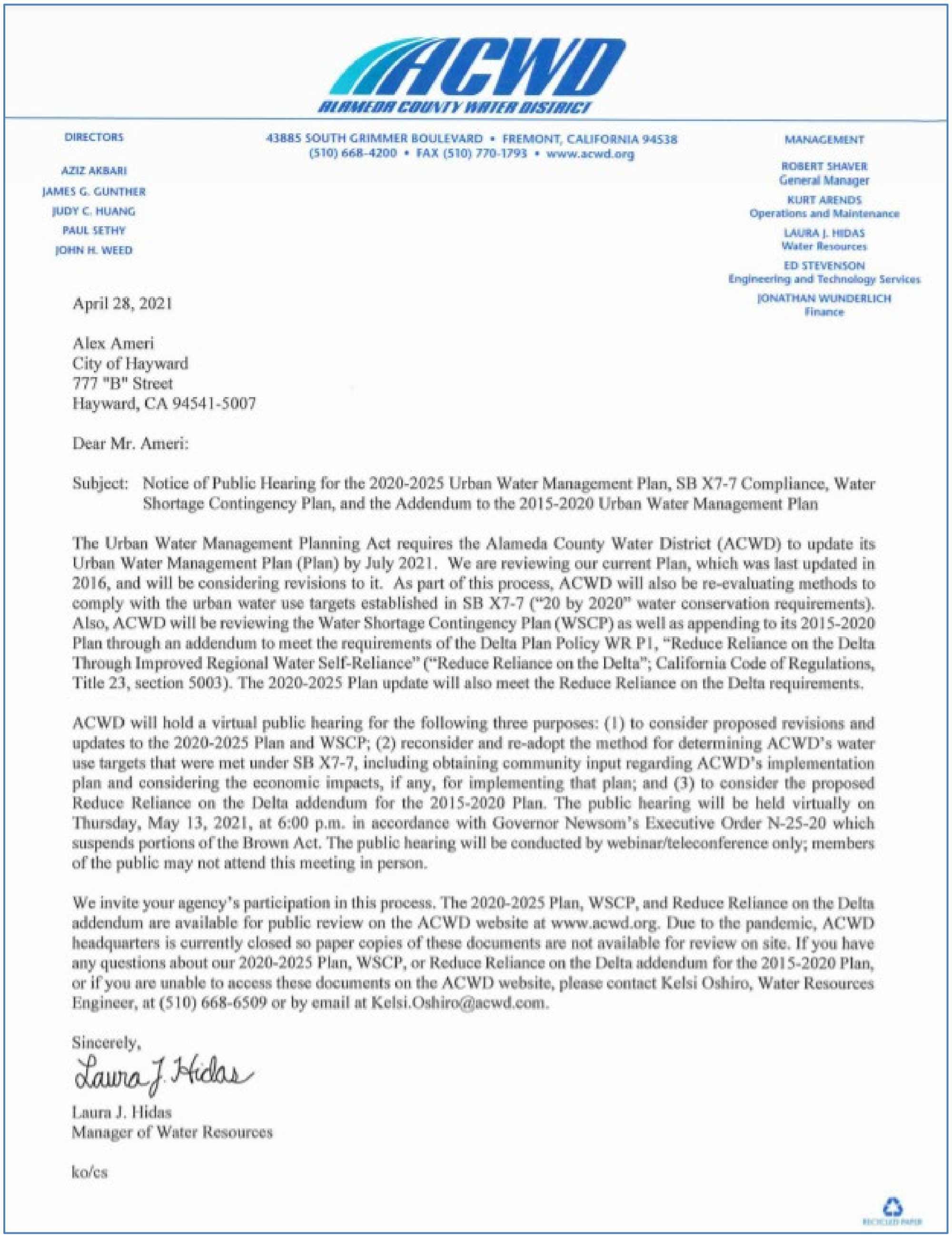
Code Requirement: CWC §10642 Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of both the plan and the water shortage contingency plan. Prior to adopting either, 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. 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. 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. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. 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.

District Actions Taken: On April 28 and 29, 2021, the District sent notification letters via e-mail and mail to cities, counties, and agencies. Reference the example letter on the following page and recipient list below.

Recipients of Notification Letters dated April 28 and 29, 2021

Contact	**Organization**
Alex Ameri	City of Hayward
Corinne Ferreyra	City of Hayward
Steve Machida	City of Milpitas
Nina Hawk	City of Milpitas
Michael Hurley	Bay Area Water Supply and Conservation Agency
Kristie Wheeler	City of Fremont
Joan Malloy	City of Union City
Terrence Grindall	City of Newark
Chris Bazar	Alameda County
Daniel Woldesenbet	Alameda County
Terry Erlewine	State Water Contractors
Kirk Girard	Santa Clara County
Sami Ghossain	Union Sanitary District
Steve Ritchie	San Francisco Public Utilities Commission
Carl Torgersen	State Water Project, California Department of Water Resources
Jason Gianquinto	Semitropic Water Storage District
Jill Duerig	Zone 7 Water Agency
Jim Fiedler	Santa Clara Valley Water District
Robert E. Doyle	East Bay Regional Park District
Kerrie Romanow	Environmental Service Department, City of San Jose

Example Notification Letter, dated April 28 and 29, 2021



ALAMEDA COUNTY WATER DISTRICT

DIRECTORS
AZIZ AKBARI
JAMES G. GUNTHER
JUDY C. HUANG
PAUL SETHY
JOHN H. WEED

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MANAGEMENT
ROBERT SHAVER
General Manager
KURT ARENDS
Operations and Maintenance
LAURA J. HIDAS
Water Resources
ED STEVENSON
Engineering and Technology Services
JONATHAN WUNDERLICH
Finance

April 28, 2021

Alex Ameri
City of Hayward
777 "B" Street
Hayward, CA 94541-5007

Dear Mr. Ameri:

Subject: Notice of Public Hearing for the 2020-2025 Urban Water Management Plan, SB X7-7 Compliance, Water Shortage Contingency Plan, and the Addendum to the 2015-2020 Urban Water Management Plan

The Urban Water Management Planning Act requires the Alameda County Water District (ACWD) to update its Urban Water Management Plan (Plan) by July 2021. We are reviewing our current Plan, which was last updated in 2016, and will be considering revisions to it. As part of this process, ACWD will also be re-evaluating methods to comply with the urban water use targets established in SB X7-7 ("20 by 2020" water conservation requirements). Also, ACWD will be reviewing the Water Shortage Contingency Plan (WSCP) as well as appending to its 2015-2020 Plan through an addendum to meet the requirements of the Delta Plan Policy WR P1, "Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance" ("Reduce Reliance on the Delta"; California Code of Regulations, Title 23, section 5003). The 2020-2025 Plan update will also meet the Reduce Reliance on the Delta requirements.

ACWD will hold a virtual public hearing for the following three purposes: (1) to consider proposed revisions and updates to the 2020-2025 Plan and WSCP; (2) reconsider and re-adopt the method for determining ACWD's water use targets that were met under SB X7-7, including obtaining community input regarding ACWD's implementation plan and considering the economic impacts, if any, for implementing that plan; and (3) to consider the proposed Reduce Reliance on the Delta addendum for the 2015-2020 Plan. The public hearing will be held virtually on Thursday, May 13, 2021, at 6:00 p.m. in accordance with Governor Newsom's Executive Order N-25-20 which suspends portions of the Brown Act. The public hearing will be conducted by webinar/teleconference only; members of the public may not attend this meeting in person.

We invite your agency's participation in this process. The 2020-2025 Plan, WSCP, and Reduce Reliance on the Delta addendum are available for public review on the ACWD website at www.acwd.org. Due to the pandemic, ACWD headquarters is currently closed so paper copies of these documents are not available for review on site. If you have any questions about our 2020-2025 Plan, WSCP, or Reduce Reliance on the Delta addendum for the 2015-2020 Plan, or if you are unable to access these documents on the ACWD website, please contact Kelsi Oshiro, Water Resources Engineer, at (510) 668-6509 or by email at Kelsi.Oshiro@acwd.com.

Sincerely,

Laura J. Hidas

Laura J. Hidas
Manager of Water Resources

ko/cs

District Actions Taken: The District held a public hearing on Thursday, May 13, 2021, at 6:00 p.m. via webinar/teleconference in accordance with Governor Newsom's Executive Order N-25-20 which suspends portions of the Brown Act; members of the public were not allowed to the public hearing meeting in person.

I.3 PLAN SUBMISSION AND PUBLIC ACCESS TO APPROVED PLAN

Code Requirements: CWC §10621(f) Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.

CWC §10644(a)(2) The plan, or amendments to the plan, submitted to the department pursuant to paragraph (1) shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

CWC §10644(b) If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department. Reference the letter to DWR on the following pages.

District Actions Taken: Per communications with DWR on May 24, 2021, the District provided its updated 2020 UWMP, WSCP, and the 2015 UWMP Reduce Reliance on the Delta addendum electronically via e-mail to DWR on May 28, 2021, prior to July 1, 2021, as the WUEdata portal was not available at the time of the District's submission. The District uploaded the updated 2020 UWMP, WSCP, and the 2015 UWMP Reduce Reliance on the Delta addendum to the WUEdata portal as soon as was possible.

Code Requirement: 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.

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. 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.

District Actions Taken: On May 28, 2021, the District provided the cities and counties an electronic copy of its updated 2020-2025 UWMP, WSCP, and the 2015-2020 UWMP Reduce Reliance on the Delta addendum. The 2020-2025 UWMP also includes the Water Shortage Contingency Plan and the Reduce Reliance on the Delta. Reference the example letter on the following pages and recipient list below.

Code Requirement: 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. 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.

CWC §10632(c) The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan.

District Actions Taken: On May 28, 2021, the District provided the California State Library a copy of its updated 2020 UWMP, WSCP, and the 2015 UWMP Reduce Reliance on the Delta addendum. Reference the letter on the following pages.

Code Requirement: 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.

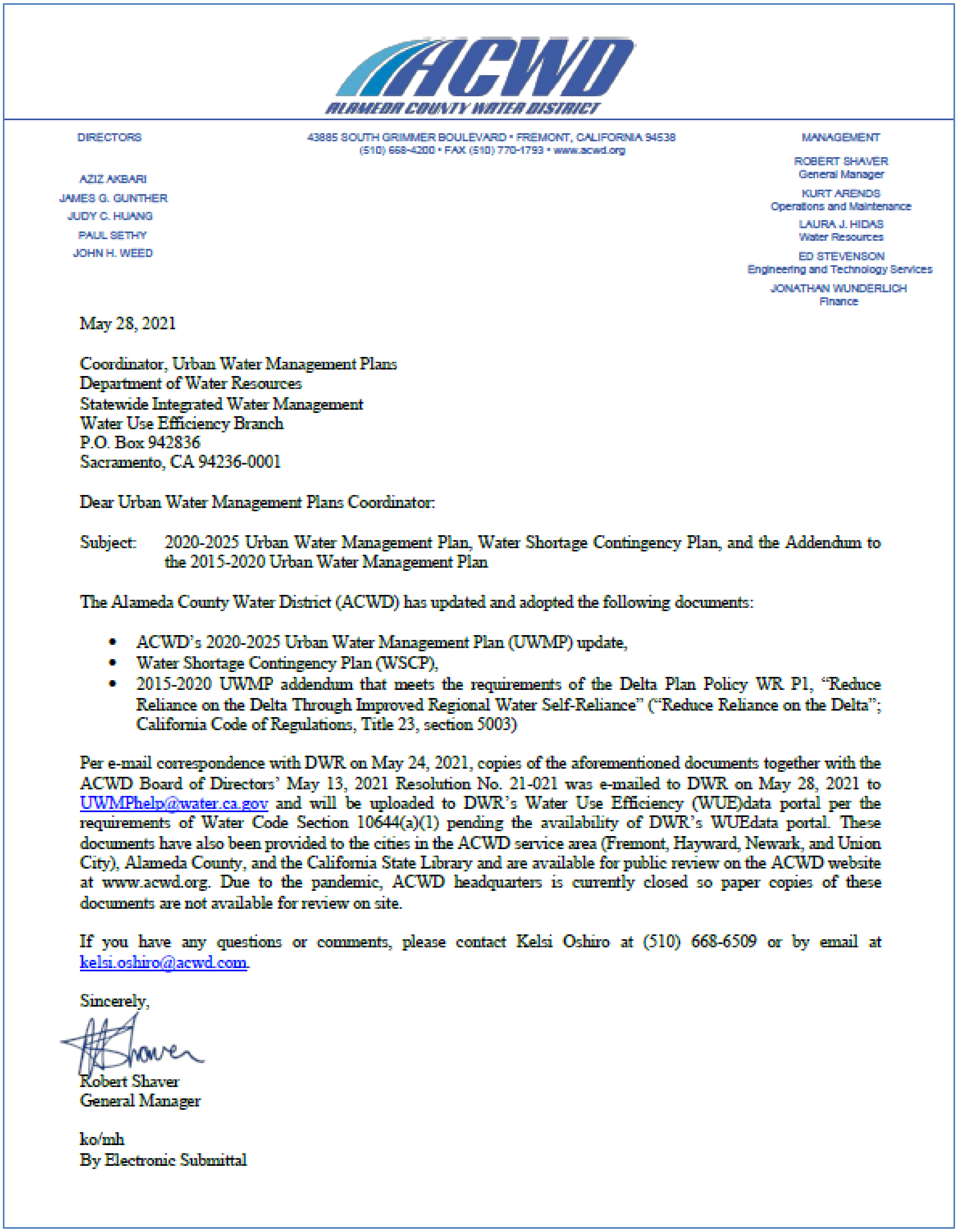
CWC §10645(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

District Actions Taken: On May 28, 2021, the District has made a copy of its updated 2020 UWMP, WSCP, and the 2015 UWMP Reduce Reliance on the Delta addendum available for public inspection on the District's website. Due to the ongoing COVID-19 pandemic, District headquarters remained closed during the posting period of the final 2020 UWMP, WSCP, and the 2015 UWMP Reduce Reliance on the Delta addendum documents. However, it was explained on the ACWD website to contact the District if anyone was unable to access the 2020 UWMP, WSCP, and the 2015 UWMP Reduce Reliance on the Delta addendum. When District headquarters is open to the public again, the District will have a copy of the final 2020 UWMP, WSCP, and the 2015 UWMP Reduce Reliance on the Delta addendum documents.

Recipients of Transmittal Letters, dated May 28, 2021, to Cities and Counties

Contact	Organization
Kelly McAdoo	City of Hayward
Mark Danaj	City of Fremont
David Benoun	City of Newark
John Becker	City of Union City
Susan Muranishi	Alameda County

DWR Transmittal Letter, dated May 28, 2021



ACWD
ALAMEDA COUNTY WATER DISTRICT

DIRECTORS

AZIZ AKBARI
JAMES G. GUNTHER
JUDY C. HUANG
PAUL SETHY
JOHN H. WEED

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General Manager
KURT ARENDS
Operations and Maintenance
LAURA J. HIDAS
Water Resources
ED STEVENSON
Engineering and Technology Services
JONATHAN WUNDERLICH
Finance

May 28, 2021

Coordinator, Urban Water Management Plans
Department of Water Resources
Statewide Integrated Water Management
Water Use Efficiency Branch
P.O. Box 942836
Sacramento, CA 94236-0001

Dear Urban Water Management Plans Coordinator:

Subject: 2020-2025 Urban Water Management Plan, Water Shortage Contingency Plan, and the Addendum to the 2015-2020 Urban Water Management Plan

The Alameda County Water District (ACWD) has updated and adopted the following documents:

- ACWD's 2020-2025 Urban Water Management Plan (UWMP) update,
- Water Shortage Contingency Plan (WSCP),
- 2015-2020 UWMP addendum that meets the requirements of the Delta Plan Policy WR P1, "Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance" ("Reduce Reliance on the Delta"; California Code of Regulations, Title 23, section 5003)

Per e-mail correspondence with DWR on May 24, 2021, copies of the aforementioned documents together with the ACWD Board of Directors' May 13, 2021 Resolution No. 21-021 was e-mailed to DWR on May 28, 2021 to UWMPhelp@water.ca.gov and will be uploaded to DWR's Water Use Efficiency (WUE)data portal per the requirements of Water Code Section 10644(a)(1) pending the availability of DWR's WUEdata portal. These documents have also been provided to the cities in the ACWD service area (Fremont, Hayward, Newark, and Union City), Alameda County, and the California State Library and are available for public review on the ACWD website at www.acwd.org. Due to the pandemic, ACWD headquarters is currently closed so paper copies of these documents are not available for review on site.

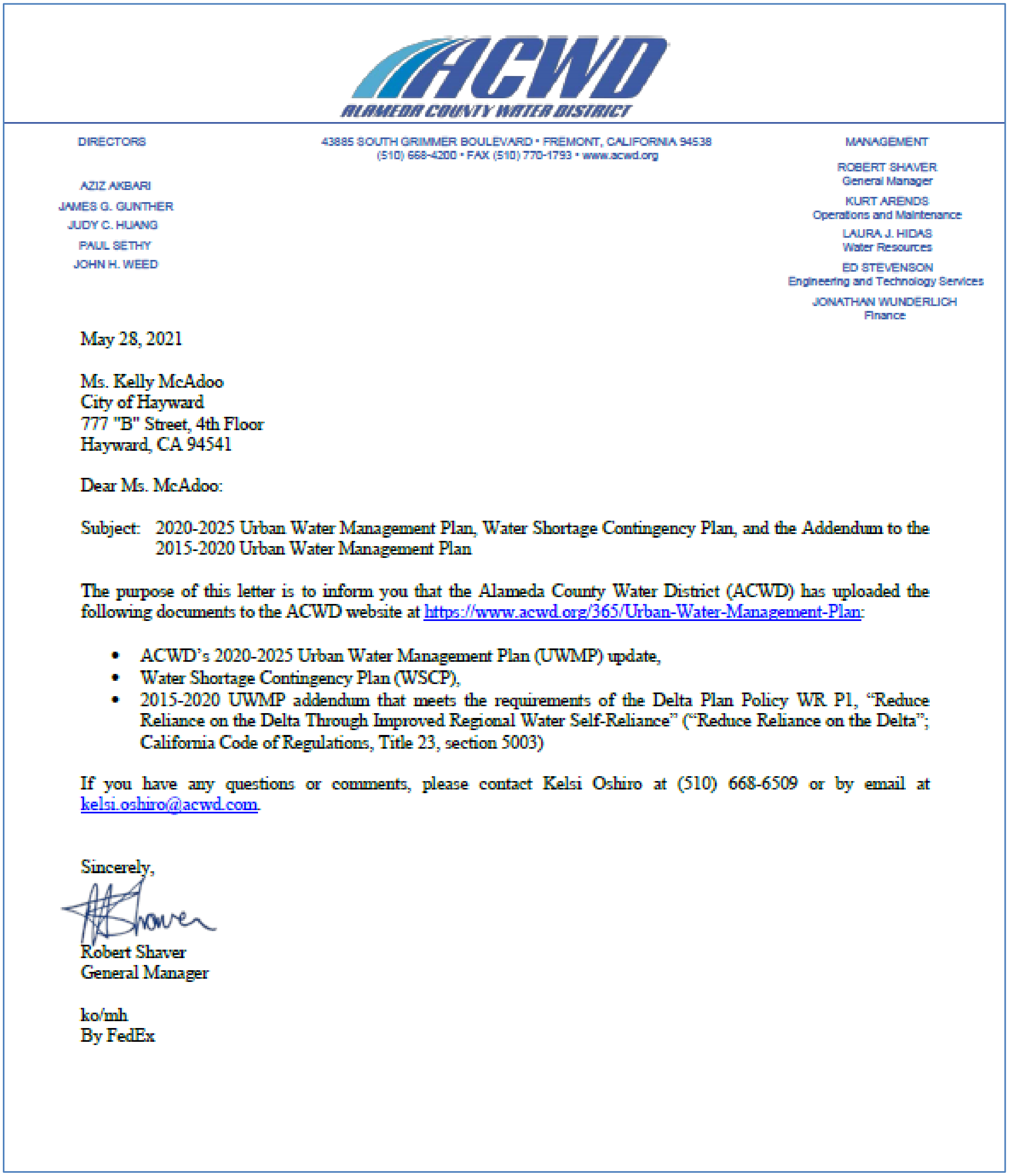
If you have any questions or comments, please contact Kelsi Oshiro at (510) 668-6509 or by email at kelsi.oshiro@acwd.com.

Sincerely,

Robert Shaver
General Manager

ko/mh
By Electronic Submittal

Example of Cities' and County's Transmittal Letter, dated May 28, 2021



ACWD
ALAMEDA COUNTY WATER DISTRICT

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DIRECTORS

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MANAGEMENT

ROBERT SHAVER
General Manager
KURT ARENDS
Operations and Maintenance
LAURA J. HIDAS
Water Resources
ED STEVENSON
Engineering and Technology Services
JONATHAN WUNDERLICH
Finance

May 28, 2021

Ms. Kelly McAdoo
City of Hayward
777 "B" Street, 4th Floor
Hayward, CA 94541

Dear Ms. McAdoo:

Subject: 2020-2025 Urban Water Management Plan, Water Shortage Contingency Plan, and the Addendum to the 2015-2020 Urban Water Management Plan

The purpose of this letter is to inform you that the Alameda County Water District (ACWD) has uploaded the following documents to the ACWD website at https://www.acwd.org/365/Urban-Water-Management-Plan:

- ACWD's 2020-2025 Urban Water Management Plan (UWMP) update,
- Water Shortage Contingency Plan (WSCP),
- 2015-2020 UWMP addendum that meets the requirements of the Delta Plan Policy WR P1, "Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance" ("Reduce Reliance on the Delta"; California Code of Regulations, Title 23, section 5003)

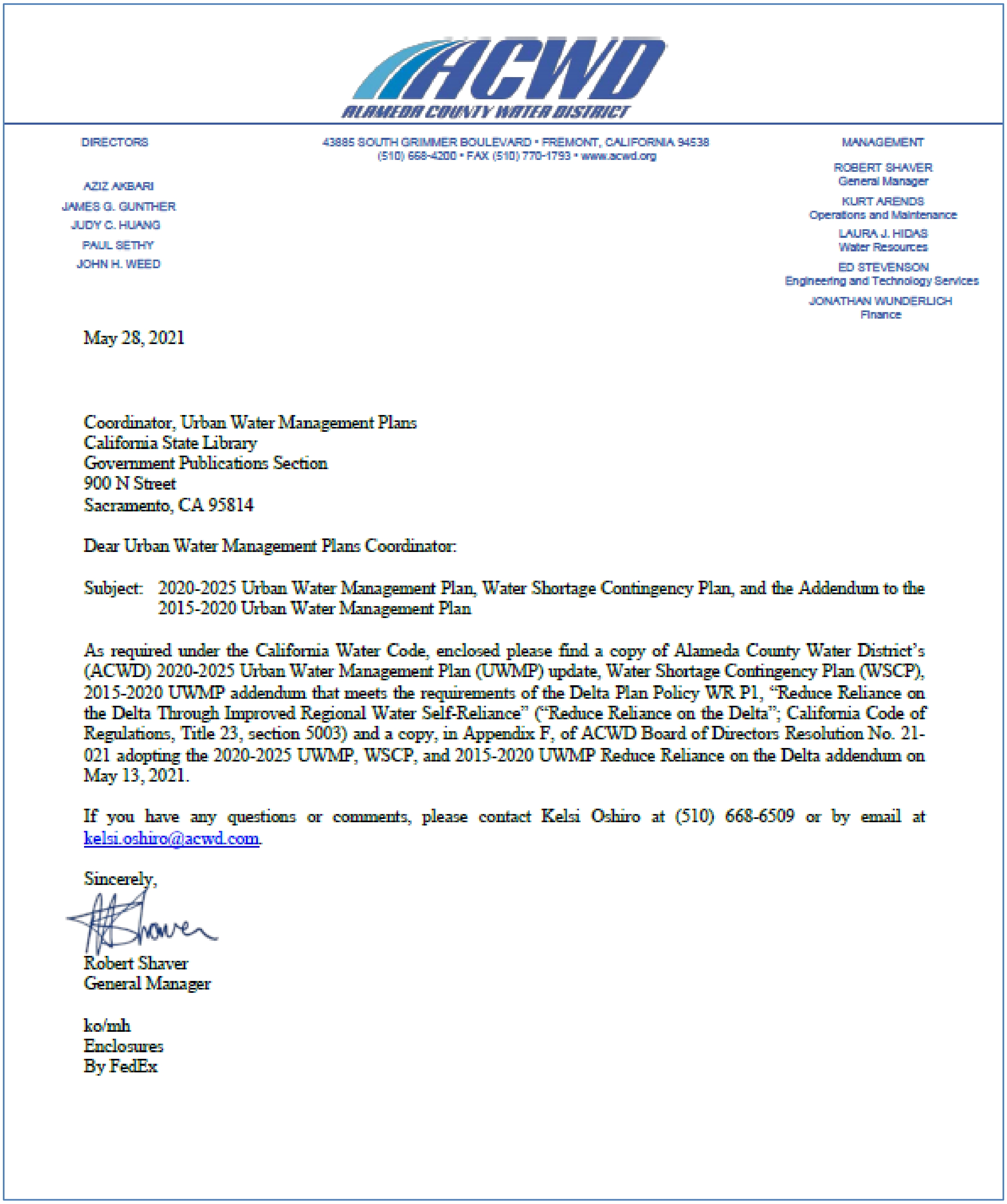
If you have any questions or comments, please contact Kelsi Oshiro at (510) 668-6509 or by email at kelsi.oshiro@acwd.com.

Sincerely,

Robert Shaver
General Manager

ko/mh
By FedEx

California State Library Transmittal Letter, dated May 28, 2021



ALAMEDA COUNTY WATER DISTRICT

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Water Resources
ED STEVENSON
Engineering and Technology Services
JONATHAN WUNDERLICH
Finance

May 28, 2021

Coordinator, Urban Water Management Plans
California State Library
Government Publications Section
900 N Street
Sacramento, CA 95814

Dear Urban Water Management Plans Coordinator:

Subject: 2020-2025 Urban Water Management Plan, Water Shortage Contingency Plan, and the Addendum to the 2015-2020 Urban Water Management Plan

As required under the California Water Code, enclosed please find a copy of Alameda County Water District's (ACWD) 2020-2025 Urban Water Management Plan (UWMP) update, Water Shortage Contingency Plan (WSCP), 2015-2020 UWMP addendum that meets the requirements of the Delta Plan Policy WR P1, "Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance" ("Reduce Reliance on the Delta"; California Code of Regulations, Title 23, section 5003) and a copy, in Appendix F, of ACWD Board of Directors Resolution No. 21-021 adopting the 2020-2025 UWMP, WSCP, and 2015-2020 UWMP Reduce Reliance on the Delta addendum on May 13, 2021.

If you have any questions or comments, please contact Kelsi Oshiro at (510) 668-6509 or by email at kelsi.oshiro@acwd.com.

Sincerely,

Robert Shaver
General Manager

ko/mh
Enclosures
By FedEx

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APPENDIX J
Alameda County Water District's Reduced Delta Reliance Reporting

APPENDIX J
ALAMEDA COUNTY WATER DISTRICT'S REDUCED DELTA RELIANCE REPORTING

J.1 BACKGROUND

Under the Sacramento-San Joaquin Delta Reform Act of 2009, state and local public agencies proposing a covered action in the Delta,[1] prior to initiating the implementation of that action, must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with applicable Delta Plan policies and submit that certification to the Delta Stewardship Council.[2] Anyone may appeal a certification of consistency, and if the Delta Stewardship Council grants the appeal, the covered action may not be implemented until the agency proposing the covered action submits a revised certification of consistency, and either no appeal is filed, or the Delta Stewardship Council denies the subsequent appeal.[3]

An urban water supplier that anticipates participating in or receiving water from a proposed covered action such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta should provide information in their 2015 and 2020 Urban Water Management Plans (UWMPs) that can then be used in the covered action process to demonstrate consistency with Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (WR P1).[4]

WR P1 details what is needed for a covered action to demonstrate consistency with reduced reliance on the Delta and improved regional self-reliance. WR P1 subsection (a) states that:

(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

(1) One or more water suppliers that would receive water as a result of the export, transfer, or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c);
(2) That failure has significantly caused the need for the export, transfer, or use; and
(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.

WR P1 subsection (c)(1) further defines what adequately contributing to reduced reliance on the Delta means in terms of (a)(1) above.

(c)(1) Water suppliers that have done all the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;

---

[1] Water Code, § 85057.5; Cal. Code Regs. tit. 23, § 5001.
[2] Water Code, § 85225; Delta Plan, App. D.
[3] Water Code, §§ 85225.10-85225.25; Delta Plan, App. D.
[4] Cal. Code Regs., tit. 23, § 5003.

(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).

The analysis and documentation provided below include all of the elements described in WR P1(c)(1) that need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action.

J.2 SUMMARY OF EXPECTED OUTCOMES FOR REDUCED RELIANCE ON THE DELTA

As stated in WR P1 (c)(1)(C), the policy requires that, commencing in 2015, UWMPs include expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta.

DWR's UWMP Guidebook (Guidebook Appendix C) proposes the use of 2010 as a baseline for such outcomes. While it is understood that a fixed year is needed to establish a baseline against which future actions to reduce reliance can be measurably compared, the District is concerned that analyses resulting from this methodology fail to recognize considerable efforts by 'early-adopter' agencies, such as the District, that have been highly proactive in reducing reliance on the Delta. After experiencing large reductions in State Water Project reliability during the 1987-1992 drought, the District's Board of Directors adopted a set of reliability policy objectives as part of its 1995 Integrated Resources Plan (IRP) to explicitly reduce reliance on imported supplies from the Delta[5], setting in motion 25 years of focused investment in local supply reliability measures. These measures included the conjunctive use groundwater storage expansion, brackish groundwater desalination, stormwater capture, and targeted water use efficiency programming. Between 1995 and 2010, the District implemented over $94 million[6] in IRP recommendations to reduce Delta reliance, including a regrade of the Quarry Lakes recharge ponds to increase the capture of local surface water and expand conjunctive use management of the Niles Cone Groundwater Subbasin ($21 million[6]); Phases 1 and 2 of the Newark Desalination Facility (Desal Facility), a brackish groundwater desalination facility that produces potable water from salt-contaminated groundwater as part of the District's Aquifer Recovery Program ($60 million[6]); and invested over $13 million[6] in water use efficiency programming. Under the Guidebook Appendix C methodology, however, the District does not receive credit for any of these proactive investments that have reduced pre-2010 reliance on Delta by at least 10,000 AF/year.

Accordingly, the District maintains that the Guidebook Appendix C methodology does not provide a complete picture of reduced Delta reliance for our agency and that any future consistency determination under Delta Plan Policy WR P1 should also consider pre-2010 water use efficiency savings and pre-2010 capital projects and water supply initiatives implemented to reduce Delta reliance. However, for compliance

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[5] https://www.acwd.org/DocumentCenter/View/1514/1995-Integrated-Resources-Planning-Study?bidId=

[6] Historical investment estimates have been escalated to 2020 dollars.

purposes, the District has prepared the following reduced Delta reliance analysis in accordance with the Guidebook Appendix C methodology.

The expected outcomes for the District's Delta reliance and regional self-reliance were developed using the approach and guidance described in Guidebook Appendix C. The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for the District's Delta reliance and regional self-reliance. The results show that the District is measurably reducing reliance on the Delta and improving regional self-reliance, both as an amount of water used and as a percentage of water used.

Expected Outcomes for Regional Self-Reliance

- Near-term (2025) – Normal water year regional self-reliance is expected to increase by 15,400 AF from the 2010 baseline; this represents an increase of about 21 percent of 2025 normal water year retail demands (Table J-2).
- Long-term (2045) – Normal water year regional self-reliance is expected to increase by more than 26,500 AF from the 2010 baseline, this represents an increase of about 23 percent of 2045 normal water year retail demands (Table J-2).

Expected Outcomes for Reduced Reliance on Supplies from the Delta Watershed

- Near-term (2025) – Using the methodology outlined in the Guidebook Appendix C that relies on normal year retail demands, normal water year reliance on supplies from the Delta watershed decreased by 5,800 AF from the 2010 baseline, this represents a decrease of about 12 percent of 2025 normal water year retail demands (Table J-3).
- Long-term (2045) – Using the methodology outlined in the Guidebook Appendix C that relies on normal year retail demands, normal water year reliance on supplies from the Delta watershed decreased by 5,800 AF from the 2010 baseline, this represents a decrease of about 22 percent of 2045 normal water year retail demands (Table J-3).

J.3 DEMONSTRATION OF REDUCED RELIANCE ON THE DELTA

The methodology used to determine the District's reduced Delta reliance and improved regional self-reliance is consistent with the approach detailed in Guidebook Appendix C. Narrative justifications for the accounting of supplies as well as the documentation of specific data sources are also consistent with DWR's recommendations in Guidebook Appendix C. Some of the key assumptions underlying the District's demonstration of reduced reliance include:

- All data were populated from the current 2020 UWMP or previously adopted UWMPs and their associated modeling runs, as well as modeling runs from the District's Integrated Surface Water and Groundwater Model (IGSM) that incorporate the same methodology used to generate the data published in the District's Sustainable Groundwater Management Act (SGMA) Annual Report. The data provided represent average or 'normal water' year conditions.
- All analyses were conducted at the service area level.
- No projects or programs that are described in the UWMPs as potential future water supply alternatives were included in the accounting of supplies.

Baseline and Expected Outcomes

A baseline is needed to calculate the expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C. Documentation of the specific data sources and assumptions are included in the discussions below.

Service Area Demands

Demand data for the 2010 baseline was taken from the District's 2005 UWMP, as the UWMPs generally provide 'current year actual' data for the year in which they are adopted (i.e., 2005 UWMP forecasts begin in 2010, 2010 UWMP forecasts begin in 2015, and so on). Consistent with the 2010 baseline data approach, the demand data for reduced Delta reliance and improved regional self-reliance for 2015 was taken from the District's 2010 UWMP. Demand data for 2020-2045 were taken from the current 2020 UWMP.

In alignment with the Guidebook Appendix C, this analysis uses normal water year demands to calculate expected outcomes in terms of the percentage of water used. According to the Guidebook Appendix C, using normal water year demands can serve as a proxy for the amount of supplies that would be used in a normal water year, which helps alleviate issues associated with how supply capability is presented to fulfill requirements of the UWMP Act versus how supplies might be accounted for to demonstrate consistency with WR P1.

Because WR P1 considers water use efficiency savings a source of water supply, water suppliers such as the District that explicitly calculate water use efficiency savings will need to make an adjustment to properly reflect normal water year demands in the calculation of reduced reliance. As explained in the Guidebook Appendix C, water use efficiency savings must be added back to the normal year demands to represent demands without water use efficiency savings accounted for; otherwise, the effect of water use efficiency savings on regional self-reliance would be overestimated. Table J-1 shows the results of this adjustment for the District. Supporting narratives and documentation for the all the data shown in Table J-1 are provided below. Water use efficiency savings volumes calculated based on SB X7-7 reporting methodology are presented in Attachment 1 to this Appendix J.

Table J-1
Demands without Water Use Efficiency Accounted For

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	58,800	50,100	42,200	44,600	44,200	44,000	44,100	52,100
Reported Water Use Efficiency or Estimated Water Use Efficiency Since Baseline	4900	13,100	23,800	22,400	24,500	26,200	27,600	30,200
Service Area Water Demands without Water Use Efficiency Accounted For	63,700	63,200	66,000	67,000	68,700	70,200	71,700	82,300

Service Area Demands without Water Use Efficiency

The service area demands shown in Table J-1 represent the total retail water demands for the District's service area and includes single family residential, multi-family residential, commercial, industrial, institutional, landscape, and other use demands. These demand types and the modeling methodologies used to calculate them are described in Chapter 2 and Appendix E of the District's UWMP.

Water Use Efficiency

The water use efficiency numbers shown in Table J-1 represent the calculated water use efficiency savings (conservation) for the District's service area, including savings from active and passive water use efficiency measures. These water use efficiency volumes were calculated using the SB X7-7 gallons per capita per day (gpcd) reporting values as published in the District's 2020 UWMP Table 8-1, as these published values include all historical data needed to calculate the 2010 and 2015 water use efficiency volumes as well. All water use efficiency volumes were calculated in comparison to the SB X7-7 baseline of 170 gpcd. For the 2010 baseline year as well as 2015, the water use efficiency volumes were calculated as the differences between the 10-year running averages from 2010 and 2015, respectively, and the SB X7-7 baseline 170 gpcd value. For 2020-2045, the water use efficiency volumes were calculated as the difference between the District's 2020 WEMP future demand forecast with both passive and active water use efficiency savings and the SB X7-7 baseline of 170 gpcd value. These sources of water use efficiency and the methodologies used to calculate them are further described in Chapter 2 and Chapter 7 of the UWMP, and are presented in Attachment 1 of this Appendix J.

Although the District demonstrates a water use efficiency savings volume of 4,900 AF in Table J-1 in the 2010 baseline year, which is consistent with SB X7-7 reporting in the District's 2010 UWMP, the formulas and tables for reduced Delta reliance developed in the Guidebook Appendix C do not provide a mechanism to include this pre-2010 water use efficiency savings into any percentage metrics, i.e. the District does not receive credit for any pre-2010 conservation in either Table J-2 or Table J-3. However, the District maintains that such pre-2010 water use efficiency savings should technically be included in any future consistency determination under WR P1.

The demand and water use efficiency data shown in Table J-1 were collected from the following sources:

- Baseline (2010) values – the District's 2005 UWMP, Table 8-2: Projected Normal Year Water Supply and Demand Comparison; Attachment 1 to Appendix J: Historic and Projected Water Use Efficiency Savings as a Source of Supply based on SB X7-7 Methodology.
- 2015 values – the District's 2010 UWMP, Table 9-2: Projected Normal Year Water Supply and Demand Comparison; Attachment 1 to Appendix J: Historic and Projected Water Use Efficiency Savings as a Source of Supply based on SB X7-7 Methodology.
- 2020-2045 values – the District's 2020 UWMP, Table 9-2: Projected Normal Year Water Supply and Demand Comparison; Attachment 1 to Appendix J: Historic and Projected Water Use Efficiency Savings as a Source of Supply based on SB X7-7 Methodology.

Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table J-2 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in Table J-2 represent efforts to improve regional self-reliance for the District's service area. Supporting narratives and documentation for all of the data shown in Table J-2 are provided below.

The results shown in Table J-2 demonstrate that the District's service area is measurably improving its regional self-reliance. In the near-term (2025), the expected outcome for normal water year regional self-reliance increases by 15,400 AF from the 2010 baseline; this represents an increase of about 21 percent of 2025 normal water year retail demands. In the long-term (2045), normal water year regional self-reliance is expected to increase by 26,500 AF from the 2010 baseline; this represents an increase of about 23 percent of 2045 normal water year retail demands.

Table J-2
Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Use Efficiency	4,900	13,100	23,800	22,400	24,500	26,200	27,600	30,200
Water Recycling	-	-	-	-	-	-	-	-
Stormwater Capture and Use	900	900	900	900	900	900	900	900
Advanced Water Technologies	-	-	-	-	-	-	-	-
Conjunctive Use Projects	13,100	13,100	13,000	13,100	13,300	13,500	13,600	15,800
Local and Regional Water Supply and Storage Projects(1)	2,100	-	-	-	-	-	-	600
Other Programs and Projects that Contribute to Regional Self-Reliance	5,100	5,100	5,100	5,100	5,100	5,100	5,100	5,100
Water Supplies Contributing to Regional Self-Reliance	26,100	32,200	42,800	41,500	43,800	45,700	47,200	52,600

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	63,700	63,200	66,000	67,000	68,700	70,200	71,700	82,300

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies Contributing to Regional Self-Reliance	26,100	32,200	42,800	41,500	43,800	45,700	47,200	52,600
Change in Water Supplies Contributing to Regional Self-Reliance		6,100	16,700	15,400	17,700	19,600	21,100	26,500

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	41.0%	50.9%	64.8%	61.9%	63.8%	65.1%	65.8%	63.9%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		10.0%	23.9%	21.0%	22.8%	24.1%	24.9%	22.9%

Notes:

(1) 1. Local and Regional Water Supply and Storage Projects includes the sum of surface water captured in Del Valle Reservoir and deep percolation less saline outflow and less default Aquifer Reclamation Program pumping. If the sum is less than zero due to greater saline outflow resulting from high groundwater levels, zero acre-feet of local supply is shown for that year.

Water Use Efficiency

The Water Use Efficiency information shown in Table J-2 is taken directly from Table J-1 above.

Water Recycling

Water recycling is not currently a source of supply for the District and therefore does not contribute to regional self-reliance as a source of supply in Table J-2. However, the District continues to evaluate future water recycling opportunities in the service area. Chapter 6 and Chapter 9 of the District's UWMP summarize potential future water supply alternatives that involve water recycling.

Stormwater Capture and Use

The Stormwater Capture and Use data shown in Table J-2 is composed of supplies that are used to recharge the local groundwater basin from direct rainfall and runoff into the District's groundwater recharge facilities. Note that this stormwater capture is separate and additive to groundwater recharge included under Conjunctive Use Projects in Table J-2, as the Conjunctive Use Projects' component only includes surface water volumes diverted into the District's recharge facilities under the District's water right on Alameda Creek. The values in Table J-2 reflect the normal year values as derived from the District's Integrated Surface Water and Groundwater Model (ISGM) using the same methodology that underpins the data published in the District's Sustainable Groundwater Management Act (SGMA) Annual Report. Since the surface area and topography of the recharge facilities has remained essentially unchanged during the period between 2010-2020 and is expected to remain unchanged for the foreseeable future, the normal year stormwater capture volume derived from the ISGM represents a static 'normal year' value appropriate for all years from 2010-2045.

Advanced Water Technologies

Advanced Water Technologies does not currently represent a source of supply for the District and therefore does not contribute to regional self-reliance as a source of supply in Table J-2. However, the District continues to evaluate future Advanced Water Technologies opportunities in the service area. Chapter 9 of the District's UWMP summarizes potential future water supply alternatives that include Advanced Water Technologies.

Conjunctive Use Projects

The values for Conjunctive Use Projects shown in Table J-2 represent the surface water volumes diverted into the District's recharge facilities under the District's water right on Alameda Creek. As described in the Stormwater Capture and Use discussion above, direct rainfall into the District's recharge facilities and local runoff captured within the District's service area comprises the Stormwater Capture and Use volumes and is therefore not included in the Conjunctive Use Projects' volumes. The values in Table J-2 were populated using median 'normal year' diversion data from the District's 2015 and 2020 UWMP modeling. Since the reporting methodology used in the 2010 UWMP did not provide a median 'normal year' diversion volume, the 2010 baseline borrowed the 2015 UWMP median 'normal year' diversion volume, a reasonable analog for this 'normal year' value. Chapter 4, Chapter 9, and Appendix C of the District's UWMP discusses the future of the District's groundwater management in greater depth.

Local and Regional Water Supply and Storage Programs

The data for Local and Regional Water Supply and Storage Programs shown in Table J-2 includes supplies from the District's water right on Arroyo Del Valle, which allows water to be captured and stored in Del Valle Reservoir, as well as deep percolation from direct rainfall in the service area. These supplies are described in Chapter 3, Appendix A, and Appendix B of the District's UWMP. As described in the Stormwater Capture and Use discussion above, direct rainfall into the District's recharge facilities is included separately in the Stormwater Capture and Use component; however, all other deep percolation from direct rainfall in the service area is included here under Local and Regional Water Supply and Storage Programs. Similarly, as described in the Conjunctive Use Projects discussion above, supplies from Arroyo Del Valle and deep percolation within the service area are not included in the Conjunctive Use Projects component. Lastly, groundwater system demands for saline outflow and Aquifer Reclamation Pumping to provide salt management for the Niles Cone Groundwater Subbasin are subtracted from these values so as not to over-allocate groundwater supply necessary for sustainable groundwater management.

The values in Table J-2 were populated using the results of the 2010, 2015, and 2020 UWMP modeling, with deep percolation values static throughout all years, and Aquifer Reclamation Pumping, Del Valle Reservoir volumes, and saline outflow specific to each modeling run. Since the 2010 UWMP did not provide the modeling history to obtain median 'normal year' volumes for local supply available in Del Valle Reservoir or deep percolation, the 2010 baseline year borrowed the 2015 UWMP median 'normal year' values for these two inputs, which serve as reasonable analogs for these 'normal year' values.

Other Programs and Projects that Contribute to Regional Self-Reliance

The data for Other Programs and Projects that Contribute to Regional Self-Reliance shown in Table J-2 represents supplies from the District's Newark Desalination Facility, which desalinates brackish water for potable use as part of the District's aquifer reclamation program. The Other Programs and Projects values in Table J-2 were populated using the District's 2010, 2015, and 2020 UWMPs.

The local and regional supply numbers shown in Table J-2 were obtained from the following sources:

- Baseline (2010) values – the District’s 2010 and 2015 UWMPs and their associated modeling runs, modeling runs from the District’s Integrated Surface Water and Groundwater Model (IGSM) that incorporate the same methodology used to generate the data published in the District’s Sustainable Groundwater Management Act (SGMA) Annual Report, Table 9-2: Projected Normal Year Water Supply and Demand Comparison
- 2015 values – the District’s 2015 UWMP and its associated modeling, modeling runs from the District’s Integrated Surface Water and Groundwater Model (IGSM) that incorporate the same methodology used to generate the data published in the District’s Sustainable Groundwater Management Act (SGMA) Annual Report, Table 9-2: Projected Normal Year Water Supply and Demand Comparison
- 2020 values – the District’s 2020 UWMP and its associated modeling, modeling runs from the District’s Integrated Surface Water and Groundwater Model (IGSM) that incorporate the same methodology used to generate the data published in the District’s Sustainable Groundwater Management Act (SGMA) Annual Report, Table 9-2: Projected Normal Year Water Supply and Demand Comparison

Reliance on Water Supplies from the Delta Watershed

In order for a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) requires that water suppliers report the expected outcomes for measurable reductions in supplies from the Delta watershed either as an amount or as a percentage. This analysis provides both calculations. Based on the methodology described in Guidebook Appendix C, and consistent with the approach of this analysis in not including projects under development or potential future water supply alternatives, this accounting does not include any supplies from potential future covered actions. Table J-3 shows the expected outcomes for reliance on supplies from the Delta watershed for the District’s service area based on normal year retail demands without water use efficiency.

The results shown in Table J-3 demonstrate that the District’s service area is measurably reducing its Delta reliance. In the near-term (2025), the expected outcome for normal water year reliance on supplies from the Delta watershed decreased by 5,800 AF from the 2010 baseline; this represents a decrease of about 12 percent of 2025 normal water year retail demands. In the long-term (2045), normal water year reliance on supplies from the Delta watershed decreased by 5,800 AF from the 2010 baseline; this represents a decrease of about 22 percent of 2045 normal water year retail demands.

Table J-3
Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
CVP/SWP Contract Supplies	26,700	27,400	20,900	20,900	20,900	20,900	20,900	20,900
Delta/Delta Tributary Diversions								
Transfers and Exchanges of Supplies from the Delta Watershed								
Other Water Supplies from the Delta Watershed	15,400	15,400	15,400	15,400	15,400	15,400	15,400	15,400
Total Water Supplies from the Delta Watershed	42,100	42,800	36,300	36,300	36,300	36,300	36,300	36,300

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	63,700	63,200	66,000	67,000	68,700	70,200	71,700	82,300

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies from the Delta Watershed	42,100	42,800	36,300	36,300	36,300	36,300	36,300	36,300
Change in Water Supplies from the Delta Watershed		700	(5,800)	(5,800)	(5,800)	(5,800)	(5,800)	(5,800)

Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies from the Delta Watershed	66.1%	67.7%	55.0%	54.2%	52.8%	51.7%	50.6%	44.1%
Change in Percent of Water Supplies from the Delta Watershed		1.6%	-11.1%	-11.9%	-13.3%	-14.4%	-15.5%	-22.0%

Note:

(1) In 2015, the District's actual imports of Water Supplies from the Delta Watershed were much lower than shown in Table J-3 due to the 2012-2016 state-wide drought and associated constraints on water supplies and deliveries, with only 17,658 AF available from the CVP/SWP Contract Supplies and only 11,797 AF available from the Other Water Supplies from the Delta Watershed (SFPUC RWS). These actual imported volumes available in 2015 would calculate as 46.6% as Percent of Water Supplies from the Delta Watershed and -19.4% as Change in Percent of Water Supplies from the Delta Watershed compared to the 2010 baseline using the same methodology shown in Table J-3.

CVP/SWP Contract Supplies

The CVP/SWP contract supplies shown in Table J-3 include the District's SWP Table A and Article 21 supplies. These supplies are described in Chapter 3 and Appendix A of the District's UWMP. The District does not have contract supplies with the CVP.

These contract supplies are representative of 'normal year' values, with the 2010 baseline year 2015 populated from the median year Table A allocations as published in the District's respective 2010 and 2015 UWMPs. 'Normal year' values for 2020-2045 were taken from the District's 2020 UWMP, which uses the agency-specific median Table A allocations from the Alternate Reporting Tables from DWR's 2019 DCR Future Conditions scenario for all years.

Transfers and Exchanges of Supplies from the Delta Watershed

For the District, no normal year supply sources fall under the Transfers and Exchanges of Supplies from the Delta Watershed category and therefore are not listed as a source of supply in Table J-2. However, the District continues to evaluate future opportunities for increased self-reliance in the service area. Chapter 9 of the District's UWMP discusses potential future water supply alternatives that could enhance regional self-reliance, including transfer and exchanges.

Other Water Supplies from the Delta Watershed

The Other Water Supplies from the Delta Watershed shown in Table J-3 includes the District's SFPUC RWS supplies. These supplies are described in Chapter 3 and Appendix A of the District's UWMP.

These contract supplies are representative of 'normal year' values, with the values taken from the 2010, 2015, and 2020 UWMP modeling.

Supplies from the Delta Watershed shown in Table J-3 are from the following sources.

- Baseline (2010) values – the District's 2010 UWMP, Table 3-3: District Supply Request and Projected Availability of SWP Supplies
- 2015 values – the District's 2015 UWMP, Table 3-3: District Supply Request and Projected Availability of SWP Supplies
- 2020-2045 values – the District's 2020 UWMP, Table 3-3: District Supply Request and Projected Availability of SWP Supplies

J.4 UWMP IMPLEMENTATION

In addition to the analysis and documentation described above, WR P1 subsection (c)(1)(B) requires that all programs and projects included in the UWMP that are locally cost-effective and technically feasible, which reduce reliance on the Delta, are identified, evaluated, and implemented consistent with the implementation schedule. WR P1 (c)(1)(B) states that:

> *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta[.]*

In accordance with Water Code Section 10631(f), water suppliers must already include in their UWMP a detailed description of expected future projects and programs that they may implement to increase the amount of water supply available to them in normal and single-dry water years and for a period of drought lasting five consecutive years. The UWMP description must also identify specific projects, include a description of the increase in water supply that is expected to be available from each project, and include an estimate regarding the implementation timeline for each project or program.

Chapter 9 of the District's UWMP summarizes the implementation plan and continued progress in developing a diversified water portfolio to meet the region's water needs. Chapter 9 also covers a range of potential future water supply alternatives that include water use efficiency, water recycling, advanced water technologies, conjunctive use projects, local and regional water supply and storage programs, other projects and programs that contribute to regional self-reliance, and transfers and exchanges of the supplies from the Delta watershed.

J.5 2015 UWMP APPENDIX J

The information contained in this Appendix J is also intended to be attached as a new Appendix J to the District's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) *(*Cal. Code Regs. tit. 23, § 5003). The District provided notice of the availability of the draft 2020 UWMP (including this Appendix J which will also be a new Appendix J to its 2015 UWMP) and 2020 WSCP and the public hearing to consider adoption of both plans in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The public review drafts of the 2020 UWMP, Appendix J to the 2015 UWMP, and the 2020 WSCP were posted prominently on the District's website, acwd.org, on April 23, 2021, in advance of the public hearing on May 13, 2021. The notice of availability of the documents was sent to the cities and the county in the District's service area as well as numerous other agencies. In addition, a public notice advertising the public hearing was published in two regional Bay Area newspapers (*The Argus* and *The Tri-City Voice*) on April 27 and May 4, 2021 for *The Tri-City* Voice and April 30 and May 7, 2021 for *The Argus* 2021. Copies of: (1) the notification letter sent to the cities and the county in the District's service area and numerous other agencies, and (2) the notice published in the newspapers are included in the 2020 UWMP Appendix I. Thus, this

Appendix J to the District's 2020 UWMP, which was adopted with the District's 2020 UWMP, is also appended to the District's 2015 UWMP.

ATTACHMENT 1

Historic and Projected Water Use Efficiency Savings as a Source of Supply based on SB X7-7 Methodology

	Population Estimate (CA DOF and US Census)	Historic and Projected Production Demand (AF/yr.)	Historic and Projected Private Pumping Demand (AF/yr.)	Total Demand (AF/yr.)	Total Demand (GPCD)	SBX7-7 10 yr. Moving Average (GPCD)	Water Use Efficiency Savings: Historic 10-yr. Moving Average relative to baseline (AF/yr.)	Water Use Efficiency Savings: Projected year relative to baseline (AF/yr.)
1990	264,962	46,639	5,913	52,552	177			
1991	265,853	39,696	4,592	44,288	149			
1992	269,396	42,873	5,206	48,079	159			
1993	274,105	46,211	4,730	50,941	166			
1994	275,940	46,375	4,620	50,995	165			
1995	278,182	47,958	4,823	52,781	169			
1996	280,812	52,115	4,501	56,616	180			
1997	286,734	55,797	4,580	60,377	188			
1998	295,661	51,549	3,158	54,707	165			
1999	304,006	54,532	2,845	57,377	168			
2000	312,753	55,727	3,901	59,628	170.2			
2001	316,401	55,751	2,984	58,735	165.7			
2002	319,589	55,574	3,540	59,114	165.1			
2003	319,048	54,204	3,466	57,670	161.4			
2004	317,523	55,082	3,846	58,928	165.7	170		
2005	316,780	52,815	3,290	56,105	158.1	169	400	
2006	316,304	52,526	2,864	55,390	156.3	166	1,237	
2007	317,739	54,497	2,577	57,074	160.3	164	2,226	
2008	320,468	54,302	2,081	56,383	157.1	163	2,536	
2009	323,043	49,018	2,129	51,147	141.3	160	3,539	
2010	325,741	46,596	1,709	48,305	132.4	156	**4,948**	
2011	329,596	46,810	1,764	48,574	131.6	153	6,267	
2012	333,994	48,140	2,033	50,173	134.1	150	7,511	
2013	337,400	50,250	1,759	52,009	137.6	147	8,486	
2014	341,649	40,555	2,106	42,661	111.5	142	10,667	
2015	345,656	36,519	1,935	38,454	99.3	136	**13,068**	
2016	348,113	38,162	1,874	40,036	102.7	131	15,253	
2017	350,649	40,866	1,671	42,537	108.3	126	17,408	
2018	352,602	41,954	1,689	43,643	110.5	121	19,344	
2019	355,229	41,576	1,670	43,246	108.7	118	20,788	
2020	356,823	42,223	1,924	44,147	110.4	N/A	N/A	**23,762**
2021	358,246	42,658	1,924	44,582	111.1	N/A	N/A	23,598
2022	359,669	43,158	1,924	45,082	111.9	N/A	N/A	23,369
2023	361,092	43,620	1,924	45,544	112.6	N/A	N/A	23,178
2024	362,515	44,102	1,924	46,026	113.3	N/A	N/A	22,966
2025	362,442	44,637	1,924	46,561	114.7	N/A	N/A	**22,418**
2026	364,165	44,595	1,924	46,520	114.0	N/A	N/A	22,787
2027	365,887	44,500	1,924	46,424	113.3	N/A	N/A	23,210
2028	367,609	44,388	1,924	46,312	112.5	N/A	N/A	23,650
2029	369,332	44,279	1,924	46,203	111.7	N/A	N/A	24,087
2030	371,054	44,184	1,924	46,108	110.9	N/A	N/A	**24,510**
2031	372,649	44,112	1,924	46,037	110.3	N/A	N/A	24,884
2032	374,243	44,056	1,924	45,980	109.7	N/A	N/A	25,244
2033	375,838	44,026	1,924	45,950	109.1	N/A	N/A	25,577
2034	377,432	44,008	1,924	45,932	108.6	N/A	N/A	25,899
2035	379,027	43,999	1,924	45,923	108.2	N/A	N/A	**26,212**
2036	380,620	44,003	1,924	45,927	107.7	N/A	N/A	26,510
2037	382,213	44,016	1,924	45,941	107.3	N/A	N/A	26,800
2038	383,807	44,037	1,924	45,961	106.9	N/A	N/A	27,083
2039	385,400	44,065	1,924	45,989	106.5	N/A	N/A	27,358
2040	386,993	44,148	1,924	46,072	106.3	N/A	N/A	**27,579**
2041	398,016	45,709	1,924	47,633	106.8	N/A	N/A	28,115
2042	409,038	47,303	1,924	49,228	107.4	N/A	N/A	28,619
2043	420,061	48,902	1,924	50,826	108.0	N/A	N/A	29,118
2044	431,084	50,503	1,924	52,427	108.6	N/A	N/A	29,615
2045	442,106	52,062	1,924	53,986	109.0	N/A	N/A	**30,154**

Notes:

(1) Water Use Efficiency Savings values for 2005-2019 are based on historic values and were calculated as the difference between the 10-year moving average gallons per capita per day (gpcd) value and the SB X7-7 10-year average baseline value of 170 gpcd, converted to acre-feet. Additional information on SB X7-7 can be found in Chapter 8 of the UWMP.

(2) Water Use Efficiency Savings values for 2020-2045 were calculated as the difference between the District's 2020 Water Efficiency Master Plan (WEMP) future demand forecast with both passive or active water use efficiency savings and the SB X7-7 10-year average baseline value of 170 gpcd, converted to acre-feet. Additional information on the WEMP can be found in Chapter 2 and Appendix E of the UWMP.

(3) Future private pumping demand projections are estimated from the UWMP modeling as presented in Chapter 9 of the UWMP.