



MID-PENINSULA
WATER DISTRICT

2020 Water Shortage Contingency Plan



FINAL

IN ASSOCIATION WITH:



ManageWater
Consulting, Inc.



MWDALIS
WATER
MANAGEMENT INC.

ManageWater Consulting, Inc.
430 Nimitz Ave.,
Redwood City, California, 94061 650-722-7841

PURPOSE. This Water Shortage Contingency Plan (WSCP) serves as a “stand alone” preparedness and response plan for the Mid-Peninsula Water District (MPWD), not only during water shortage conditions, but before and after as well. It includes specific actions for management of the MPWD’s water supply and demand, addresses the impacts associated with water shortages, and facilitates the timely implementation of effective contingency responses.

The six (6) Shortage Levels in this WSCP and corresponding information have been updated to comply with DWR’s requirements for 2020 WSCPs, add transparency about MPWD’s decision process on water shortages, include practical and necessary actions, and add flexibility for future shortage conditions requiring additional specialized solutions. The Maddaus Water Management (MWM) Team provided the practical and resourceful template for this WSCP. The MPWD staff provided extremely valuable input from their experience with voluntary and mandatory measures employed during the unprecedented drought and regulatory conditions from 2012 through 2016.

ADOPTION. This 2020 WSCP supersedes earlier MPWD WSCPs.

TABLE OF CONTENTS

1. WATER SHORTAGE CONTINGENCY PLAN OVERVIEW	8
1.1 WATER SHORTAGE CONTINGENCY PLAN REQUIREMENTS AND ORGANIZATION.....	9
2. BACKGROUND INFORMATION.....	11
2.1 MPWD SERVICE AREA.....	11
2.2 MPWD’S SUPPLIER, THE SFPUC RWS.....	15
3. WATER SHORTAGE CONTINGENCY PLAN.....	17
3.1 WATER SUPPLY RELIABILITY ANALYSIS	17
3.1.1 SFPUC Water Supply Projections for MPWD’s 2020 UWMP.....	19
3.2 ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCESS.....	21
3.2.1 Decision-Making Process	21
3.2.2 Data and Methodologies	24
3.3 SIX STANDARD WATER SHORTAGE LEVELS.....	26
3.4 SHORTAGE RESPONSE ACTIONS	30
3.4.1 Demand Reduction.....	30
3.4.2 Supply Augmentation.....	39
3.4.3 Operational Changes.....	41
3.4.4 Additional Mandatory Restrictions	42
3.4.5 MPWD’s Emergency Response Plan and Hazard Mitigation Plan	42
3.4.6 Seismic Risk Assessment and Mitigation Plan	44
3.4.7 Shortage Response Action Effectiveness.....	45
3.5 COMMUNICATION PROTOCOLS.....	46
3.6 COMPLIANCE AND ENFORCEMENT.....	48
3.7 LEGAL AUTHORITIES	49
3.8 FINANCIAL CONSEQUENCES OF WSCP.....	51
3.9 MONITORING AND REPORTING.....	52
3.10 WSCP REFINEMENT PROCEDURES.....	53
3.11 SPECIAL WATER FEATURE DISTINCTION.....	53
3.12 PLAN ADOPTION, SUBMITTAL AND AVAILABILITY	54
4. REFERENCES	55
5. APPENDICES – ALL APPENDICES ARE IN A SEPARATE VOLUME	59

LIST OF FIGURES

FIGURE 2-1. MPWD STREET SERVICE AREA BOUNDARIES.	12
FIGURE 2-2. MPWD DISTRIBUTION SYSTEM MAP.	13
FIGURE 2-3. MPWD’S SIX WATER USE SECTORS, BY PERCENT OF ALL ACCOUNTS.	14
FIGURE 2-4. MPWD’S SIX WATER USE SECTORS’ CONSUMPTION BY PERCENT OF TOTAL PRODUCTION.	14
FIGURE 2-5. 2000 - 2020 MPWD WATER CONSUMPTION) VS. POPULATION GROWTH.	15
FIGURE 2-6. SFPUC REGIONAL WATER SYSTEM MAP.....	16
FIGURE 3-1. SAMPLE OF MPWD’S ANNUAL ASSESSMENT REPORT TIMELINE.....	21
FIGURE 3-2. ANNUAL UPDATE PROCESS BETWEEN MPWD, BAWSCA, AND SFPUC.....	22
FIGURE 3-3. MPWD’S 2020 INDOOR AND OUTDOOR WATER USES, AND WATER LOSS.....	39

LIST OF TABLES

TABLE 3-1. SFPUC TIER 1 AVAILABLE WATER FOR SHORTAGES LESS THAN 20%.	18
TABLE 3-2. WATER SHORTAGE CONTINGENCY PLAN LEVELS (SUBMITTAL TABLE 8-1).	29
TABLE 3-3. DEMAND REDUCTION ACTIONS (SUBMITTAL TABLE 8-2).	31
TABLE 3-4. SUPPLY AUGMENTATION AND OTHER ACTIONS (SUBMITTAL TABLE 8-3).	40
TABLE 3-5. AGENCY CONTACTS AND COORDINATION PROTOCOLS	51
TABLE 3-6. MEASURES TO OVERCOME REVENUE IMPACTS.....	51

CREDITS

MPWD Board of Directors

Brian Schmidt, President
Kirk R. Wheeler, Vice President
Cathy Mostasisa, Director
Louis Vella, Director
Matthew P. Zucca, Director

MPWD Staff

Tammy Rudock, General Manager
Rene Ramirez, Operations Manager
Jeanette Kalabolas, Management Analyst
Brent Chester, Field Operations Supervisor

Consulting Team

Marty Laporte, ManageWater Consulting, Inc.
Jean Gardner, ManageWater Consulting, Inc.
Noel A. Laporte, ManageWater Consulting, Inc.
And support from
Michelle Maddaus and the Maddaus Water Management, Inc., Team

LIST OF ABBREVIATIONS

AB	Assembly Bill
ABAG	Association of Bay Area Governments
acct	account
AF	acre-feet
AFY	acre-feet per year
AMI	Advanced Metering Infrastructure
AWE	Alliance for Water Efficiency
AWIA	America's Water Infrastructure Act of 2018
AWSP	SFPUC's Alternative Water Supply Planning Program
AWWA	American Water Works Association
AWWARF	American Water Works Association Research Foundation
BART	Bay Area Rapid Transit
BAWSCA	Bay Area Water Supply and Conservation Agency
BDP	Bay Delta Plan Amendment
BMP	Best Management Practice
CCF	100 cubic feet
CalWEP	California Water Efficiency Partnership
CEC	California Energy Commission
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Information System
COVID-19	COVID-19 global pandemic, lasted all of 2020, into 2021
CPUC	California Public Utilities Commission
CUWCC	California Urban Water Conservation Council
CWC	California Water Code
DDW	State Water Resources Control Board Division of Drinking Water
DMM	Demand Management Measure
DOF	California Department of Finance
DRA	Drought Risk Assessment

DSS Model	Least Cost Planning Decision Support System Model, MWM
DWR	California Department of Water Resources
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ETo	Evapotranspiration
GCM	global climate model
GPCD	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
HCF, CCF	hundred cubic feet
HE	high efficiency
HET	High-Efficiency Toilet
HEU	High-Efficiency Urinal
HMP	Hazard Mitigation Plan
MF	Multi-family
MG	million gallons
MGD	million gallons per day
MGY	million gallons per year
MOU	Memorandum of Understanding
MPWD	Mid-Peninsula Water District
MW	ManageWater Consulting, Inc.
MWELO	Model Water Efficient Landscape Ordinance
MWM	Maddaus Water Management, Inc.
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
O&M	Operations & Maintenance

PWS	Public Water Systems
PWSID	Public Water System Identification Number
REUWS	Residential End Uses of Water Study
RUWMP	Regional Urban Water Management Plan
SB	Senate Bill
SB X7-7	Water Conservation Act of 2009
SVCW	Silicon Valley Clean Water
SF	Single Family
SFPUC	San Francisco Public Utilities Commission
SFR	Single Family Residential
SWRCB	State Water Resources Control Board
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act of 1983
WARN	Water/Wastewater Agency Response Network
WCR	Water Conservation Requirements
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WWTP	Wastewater Treatment Plant
WUE	Water Use Efficiency, DWR portal

1. WATER SHORTAGE CONTINGENCY PLAN OVERVIEW

Lay Description

The purpose of a Water Shortage Contingency Plan (WSCP) is to provide direction on specific actions to be taken by staff and customers in response to increasingly severe water supply shortage conditions.

This WSCP addresses all the requirements of Section 10632 of the California Water Code that states that the Urban Water Management Plan (UWMP) shall provide an urban water shortage contingency analysis that includes information on the estimated five-year water supply, actions in the event of a water shortage, water waste prohibitions, non-essential water uses during a water shortage, mechanisms for determining water use reductions, revenue and expenditure impacts and the emergency preparedness and plans for catastrophic events.

The Mid-Peninsula Water District's (MPWD's) WSCP is a document that stands alone — therefore it is separate from the UWMP and can be amended, as needed, without amending the corresponding UWMP. The DWR requires that MPWD's 2020 WSCP is submitted at the same time as MPWD's 2020 UWMP.

Water shortage conditions can arise due to various environmental and human-caused conditions, such as earthquakes, fires, power outages, water quality impairment, droughts, or contamination from hazardous material spills. MPWD's 2020 WSCP may be used to address water shortages and conditions requiring voluntary and mandatory water use reductions or restrictions.

The submittal date to DWR of MPWD's 2020 UWMP and WSCP was scheduled to be by July 1, 2021. However, due to unprecedented circumstances and modeling results from its sole supplier, the SFPUC, indicating drastic supply reductions during droughts, MPWD determined it needed to provide an appropriate amount of time for its public review period. MPWD submitted a letter to DWR before the July 1st deadline explaining the unprecedented situation and the need for an extended public outreach, review, and period (Appendix 2).

New requirements for MPWD's 2020 UWMP impact the 2020 WSCP. These requirements include a water supply analysis for the new Drought Risk Assessment (DRA) and consideration of climate change in future projections. The conclusions drawn from MPWD's water supply characterization are integrated into the DRA (Chapter 7, MPWD 2020 UWMP). MPWD coordinates with land use and planning authorities for future projections about management and mitigation actions to address in its updated 2020 WSCP.

The goal is to provide transparency about MPWD's decision process for water shortages, include practical and necessary actions, and add flexibility for future shortage conditions that require additional specialized solutions. The MPWD staff provided extremely valuable input from their experience with voluntary and mandatory measures employed during the unprecedented drought and regulatory conditions between 2012 through 2016.

The MPWD's WSCP presents a systematic approach to implement the actions for the six Shortage Levels in the case of water shortage conditions from its sole supplier, the SFPUC. This plan is part of MPWD's drought policy, as it specifies preparedness actions for droughts and other impacts on water supplies. The WSCP anticipates water supply shortages and provides pre-planned guidance for managing and mitigating a Supplier's shortage. MPWD's WSCP allows for adjustments to manage water shortage conditions based on the annual supply availability from SFPUC. In severe drought conditions, MPWD's WSCP provides guidance for planning and implementing actions to address extreme emergencies and shortage levels.

In its WSCP, MPWD also refers to actions in its Emergency Response Plan (ERP)¹ and its Hazard Mitigation Plan procedures, that are part of the San Mateo County Local Hazard Mitigation Plan (SMC LHMP).² MPWD's 2020 WSCP is its operating manual for its staff, management, Board, and the public to manage water shortages and prevent catastrophic service disruptions through proactive steps. Other entities, such as cities, counties, state, and federal agency water managers, regulators, and decision makers; local media; and business community groups; may also need to refer to the key elements of MPWD's WSCP.

MPWD requests that users of the water supply and cutback data in its 2020 UWMP and WSCP contact MPWD staff for potential updates about MPWD's water supply reliability and the DRA, before using the 2020 UWMP drought cutback projections for their planning projects and referencing the drought allocations.

1.1 Water Shortage Contingency Plan Requirements and Organization

The WSCP provides the steps and water shortage response actions to be taken in times of water shortage conditions. As part of its UWMP, Water Code Section 10632 requires that MPWD prepares and adopts a WSCP that consists of the following elements.

- An analysis of water supply reliability.
- The water shortage response actions for each of the six standard water shortage levels that correspond to water shortage percentages ranging from 10 percent to greater than 50 percent.
- An estimate of potential to close the supply gap for each measure.
- Process to communicate identified actions for current or predicted water shortage conditions.
- Procedures for an annual water supply and demand assessment (as required, starting July 1, 2022).
- Monitoring and reporting requirements to determine customer compliance, and the re-evaluation and improvement procedures for evaluating the WSCP.

MPWD's WSCP is organized into three main sections.

Section 1 WSCP Overview – the Lay Description (required in 2020 UWMPs) and an introduction to WSCP fundamentals.

Section 2 Background Information – a background on MPWD's water service area and source of supply.

Section 3 Water Shortage Contingency Plan, including:

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

3.2 Annual Water Supply and Demand Assessment Procedures – procedures to conduct and approve the Annual Assessment.

¹ MPWD Draft Emergency Response Plan, 2020.

² San Mateo County Local Hazard Mitigation Plan, Volume 2, Section 3, Part 2, Chapter 4, 2016.
<https://cmo.smcgov.org/multijurisdictional-local-hazard-mitigation-plan-resources>. (Also see Appendix 12)

The SMC LHMP is in the process of being updated.

3.3 Six Standard Water Shortage Stages – the WSCP’s six standard water shortage levels that correspond to progressive ranges of potential reductions up to 10, 20, 30, 40, 50, and more than 50 percent shortages, respectively.

3.4 Shortage Response Actions – the WSCP’s shortage response actions that align with the defined shortage levels. Included in this section is the information about MPWD’s Seismic Risk Assessment and Mitigation Plan.

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

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

3.7 Legal Authorities – legal authorities that enable the MPWD to implement and enforce its shortage response actions.

3.8 Financial Consequences of WSCP – the financial consequences of and responses for drought conditions.

3.9 Monitoring and Reporting – requirements and procedures to ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements. Included in this section is the information about MPWD’s data collection and assessment.

3.10 WSCP Refinement Procedures –re-evaluation and improvement procedures for monitoring and evaluating the functionality of the WSCP.

3.11 Special Water Feature Distinction – requirements for water decorative features are separate from swimming pools and spas.

3.12 Plan Adoption, Submittal, and Availability – a record of the process that MPWD followed to adopt and implement its WSCP.

California Water Code Section 10632.3 acknowledges that the State defers to the locally adopted Water Shortage Contingency Plans (WSCPs) to the extent practicable. Planning for water shortages necessitates that water suppliers consider the regional and local water supply reliability and understand the key factors that could contribute to water supply constraints (see Chapter 7, MPWD, 2020 UWMP).

The MPWD WSCP serves as a ‘stand-alone’ preparedness and response plan for the MPWD, not only during water shortage conditions, but before and after as well. It includes specific actions for management of the MPWD’s water supply and demand, addresses the impacts associated with water shortages, and facilitates the timely implementation of effective contingency responses. The WSCP can be updated in between UWMP cycles.

2. BACKGROUND INFORMATION

The MPWD's service area is five square miles with 8,116 service connections (Figure 2-1). The MPWD's sole source of potable water is from the SFPUC RWS. The MPWD system connects to the San Francisco Public Utilities Commission Regional Water System (SFPUC RWS) at two locations. MPWD has nine pressure zones due to varied topography and elevations within its service area. The MPWD is a member of the Bay Area Water Supply and Conservation Agency (BAWSCA), which represents the interests of 26 cities, water districts, and private utilities that purchase water Wholesale from the SFPUC RWS. Local groundwater of adequate quantity and quality is not available.

2.1 MPWD Service Area

In 2020, MPWD served water to 27,560 people and 93 % of MPWD's connections were residential services, while about 7% were Commercial, Institutional, and Industrial, (CII) and Landscape (Irrigation) (values are rounded)³. The service area is shown in Figure 2-1. Based on SFPUC AMI meter data from 2020 for purchased water from SFPUC, the average daily demand in the MPWD service area in 2020 was 2.66 million gallons per day, mgd. MPWD's total use divided by its total population in 2020 translates to 97 gallons per capita per day (GPCD), much below its 2020 Target of 121 GPCD.⁴

As with MPWD's 2015 UWMP, the 2020 and projected population estimates are based on data from the Association of Bay Area Governments (ABAG). The ABAG reference has been accepted by DWR for use in this 2020 UWMP for projecting population in five-year increments for the next 25 years.⁵

The number of connections (8116) in MPWD's service area and sectors are as follows:

- The City of Belmont: 7875 total connections, with: 7189 single-family, 173 multi-family, 338 commercial, 35 industrial, 76 institutional, and 64 large irrigation accounts.
- The city of San Carlos: 181 total connections, with: 101 single-family, 30 multi-family, 43 commercial, 2 institutional, 5 irrigation accounts.
- Parts of unincorporated San Mateo County with 60 total connections.⁶

The following are key changes in the service area since the MPWD's 2015 WSCP was completed:

- The population of MPWD's service area has increased from 26,924 to 27,560, by more than 2.3%⁷.
- Employment (jobs) in the service area has increased from 14,720 to 15,986, by 8.6%⁸.

³ MPWD purchased water in 2020 from SFPUC, based on SFPUC AMI production meters. Springbrook billing database. Data from January 2020 to December 2020. Springbrook was implemented in 2017.

⁴ SBX7-7 Baseline and Targets, see MPWD's 2020 UWMP, Chapter 5 for a detailed explanation. (Also see Appendices 9 and 10)

⁵ Email Communication, from Julia Ekstrom, DWR, October 12, 2020.

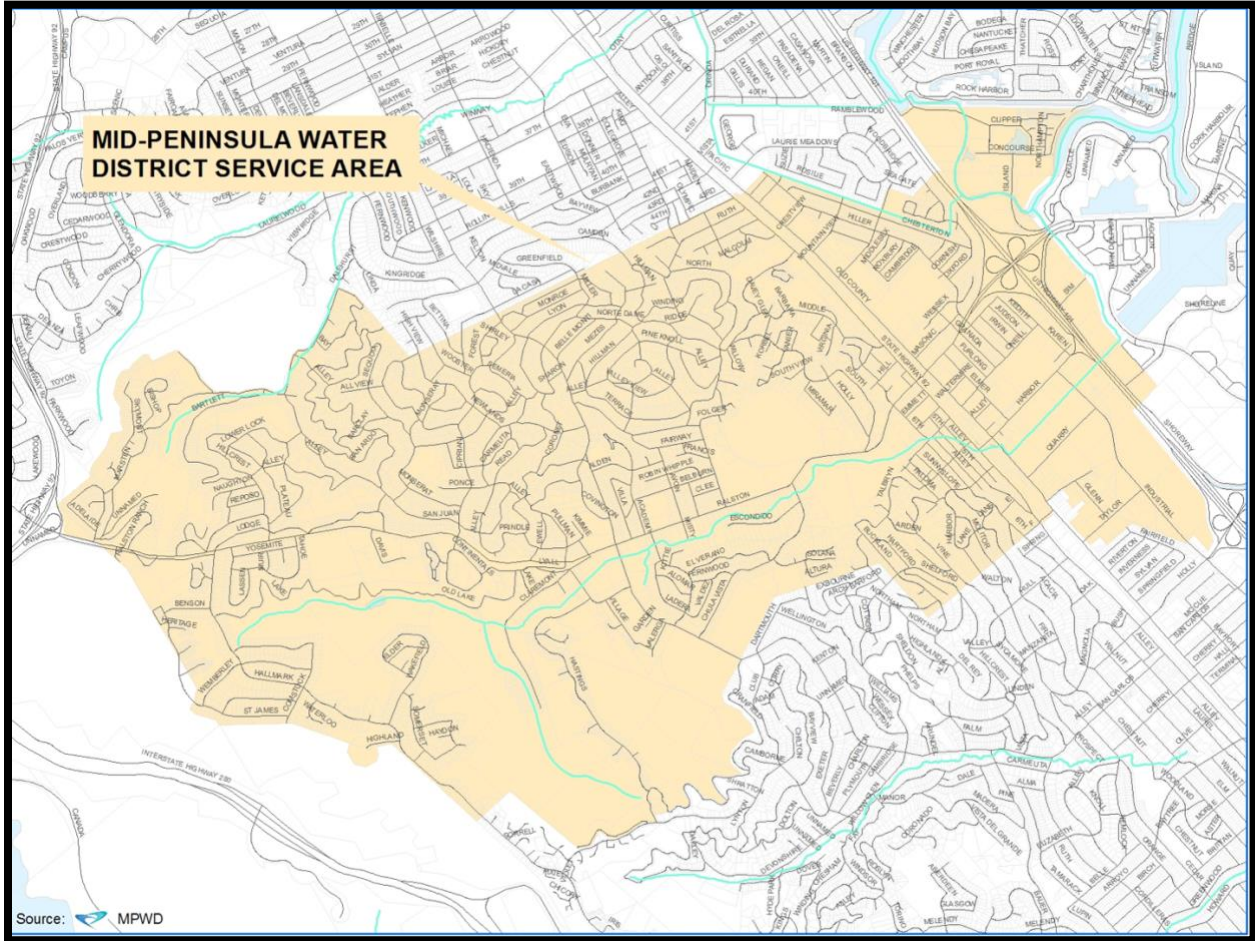
⁶ Source: Data from MPWD meter map, January 2020, Personal communication with MPWD, October 2020.

⁷ MPWD DSS Model, 2020. (Also see Appendix 13 for explanation about DSS Model)

⁸ Ibid.

- Total number of service accounts has increased slightly from 7,974 to 8,116, by 1.8% ⁹.

Figure 2-1. MPWD Street Service Area Boundaries.



The MPWD operates and maintains a complex distribution system that includes 20 pumps, 11 water tanks, 13 regulating valves, 813 hydrants, and 94 miles of water mains. The MPWD's service area includes 8116 service connections and contains nine pressure zones. ¹⁰

The eastern-most zone, east of State Route El Camino Real, is gravity fed by the SFPUC RWS lower elevation connection in Redwood City. Water from this lower elevation feed can be pumped to storage reservoirs at higher elevations to feed the remaining pressure zones to the west. The western-most zone is bound by I-280. Water is pumped up from the MPWD Tunnels pump station in proximity to the Pulgas Water Temple to two, 2.5 MG storage tanks (Hallmark site), and water is primarily gravity fed down to the lower zones.

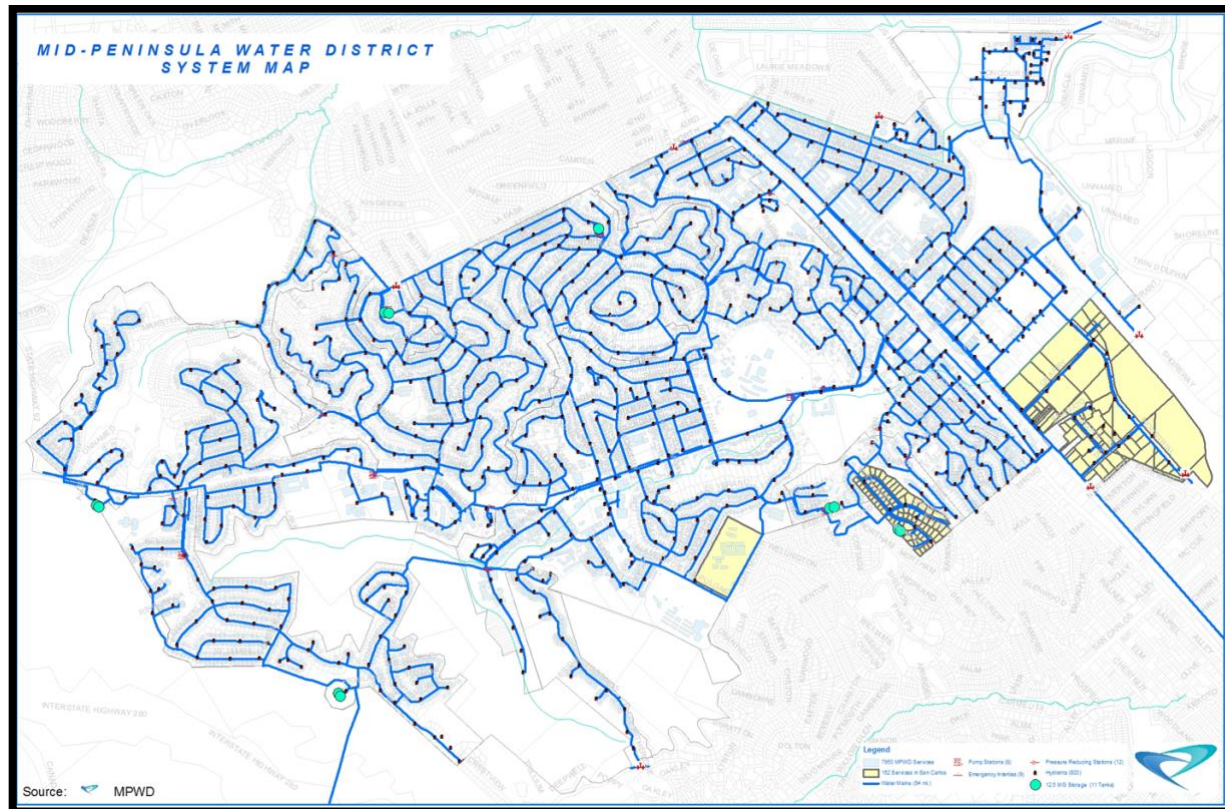
⁹ MPWD Springbrook billing database. Data from January 2020 to December 2021. Springbrook was implemented in 2017.

¹⁰ BAWSCA Annual Survey, FY2019-20, March 2021.

[http://bawasca.org/uploads/userfiles/files/Annual%20Survey%20FY%202019-20_FINAL\(1\).pdf](http://bawasca.org/uploads/userfiles/files/Annual%20Survey%20FY%202019-20_FINAL(1).pdf)

MPWD has the ability to transfer water between pressure zones either in a pump-up or flow-down mode. The MPWD also has redundancy built into the distribution system so that it can, if necessary, supply all customers from either one of the SFPUC connections. The MPWD's distribution system is shown in Figure 2-2.

Figure 2-2. MPWD Distribution System Map.

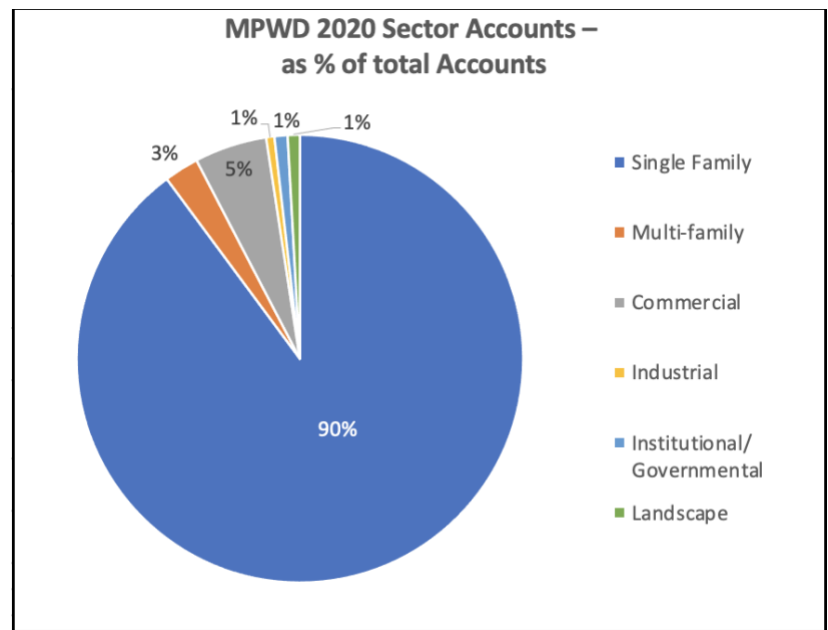


The MPWD has 12.5 million gallons of local storage that equates to 4.7 days of water supply (based on 2.66 MGD in 2020). All MPWD's zones can meet the eight-hour storage criteria either separately or by pumping from zones with excess capacity.

The MPWD started implementing its Automated Metering Infrastructure (AMI) technology in 2012 and completed the AMI installations in January 2020. The AMI technology has many benefits, especially for monitoring water use or misuse in near "real time." The AMI meters alert staff to potential water leaks daily. The AMI system is extremely helpful to MPWD's conservation program and for customers to view their consumption, conserve water, and save money on water bills.

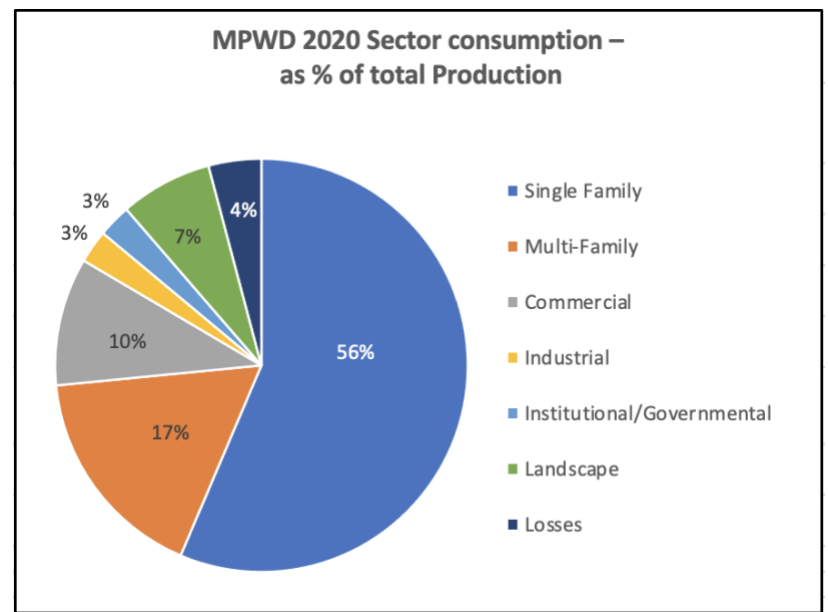
MPWD has six (6) water use sectors including: single family, multi-family, commercial, institutional, industrial, and irrigation (Figures: 2-3, 2-4). MPWD's six water use sectors by percent of all accounts are shown in Figure 2- 3. In 2020, 90% of MPWD's accounts are single-family residential, 3% were multi-family residential, 5% were commercial, and industrial, institutional, and irrigation were less than 1% each.

Figure 2-3. MPWD’s six water use sectors, by percent of all accounts.



Source: MPWD 2020 Springbrook billing data. Values are rounded.

Figure 2-4. MPWD’s six water use sectors’ consumption by percent of total production.



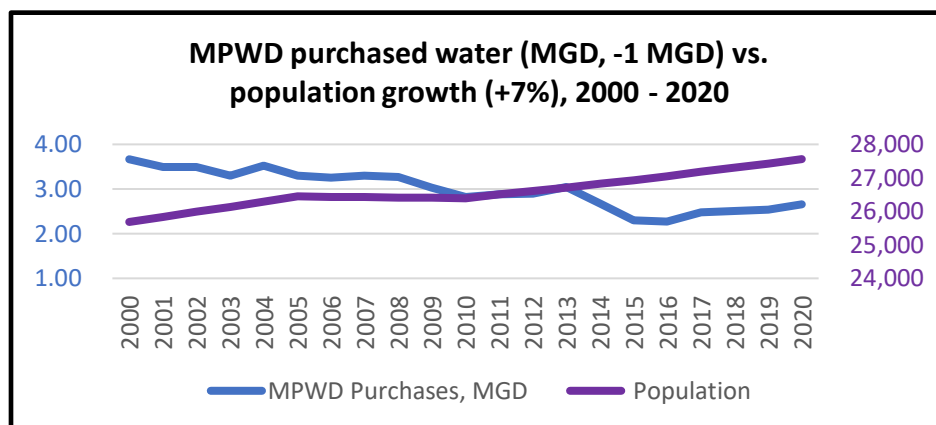
Source: MPWD 2020 AMI and Springbrook billing data. Values are rounded.

Of MPWD’s total 2020 consumption 56% was in the single-family residential sector, while 17% was in multi-family. The Commercial, Institutional, Industrial sector, and landscape Irrigation (CII) constituted

approximately 23% of total use. MPWD’s validated Water Audit for 2019 reported a 39 MG or 4.2% water loss. In 2020, MPWD’s (not yet validated) water loss was very low as well, at 4.4%.

MPWD’s population grew by seven percent from 2000 to 2020, to 27,560.¹¹ However, due to continued conservation efforts and from 2000 to 2020, during this period, the cumulative water consumption in the MPWD service area decreased by more than 1 million gallons per day, or 27.5%, as shown in Figure 2-5.

Figure 2-5. 2000 - 2020 MPWD water consumption) vs. population growth.



MPWD’s Individual Supply Guarantee from SFPUC

SFPUC has a perpetual commitment or “Supply Assurance” to deliver 184 mgd annually to the 24 permanent BAWSCA Wholesale Customers (collectively the BAWSCA agencies are referred to as the “Wholesale customers”). The Supply Assurance is allocated through Individual Supply Guarantees (ISGs) that represent each Wholesale agency’s allocation of the 184 mgd Supply Assurance.

The MPWD is a permanent customer of SFPUC and has an ISG from SFPUC. MPWD’s long-term contract with SFPUC does not limit daily or monthly water purchases and use. The SFPUC contract specifies an average day use and a total annual purchase. MPWD’s contractual ISG allocation from SFPUC is 3.891 mgd for an average day or 1,420.22 MG per year.¹²

MPWD’s ISG is of critical importance to its current and future customers for long-term vitality of its community, economy, and security.

2.2 MPWD’s Supplier, the SFPUC RWS

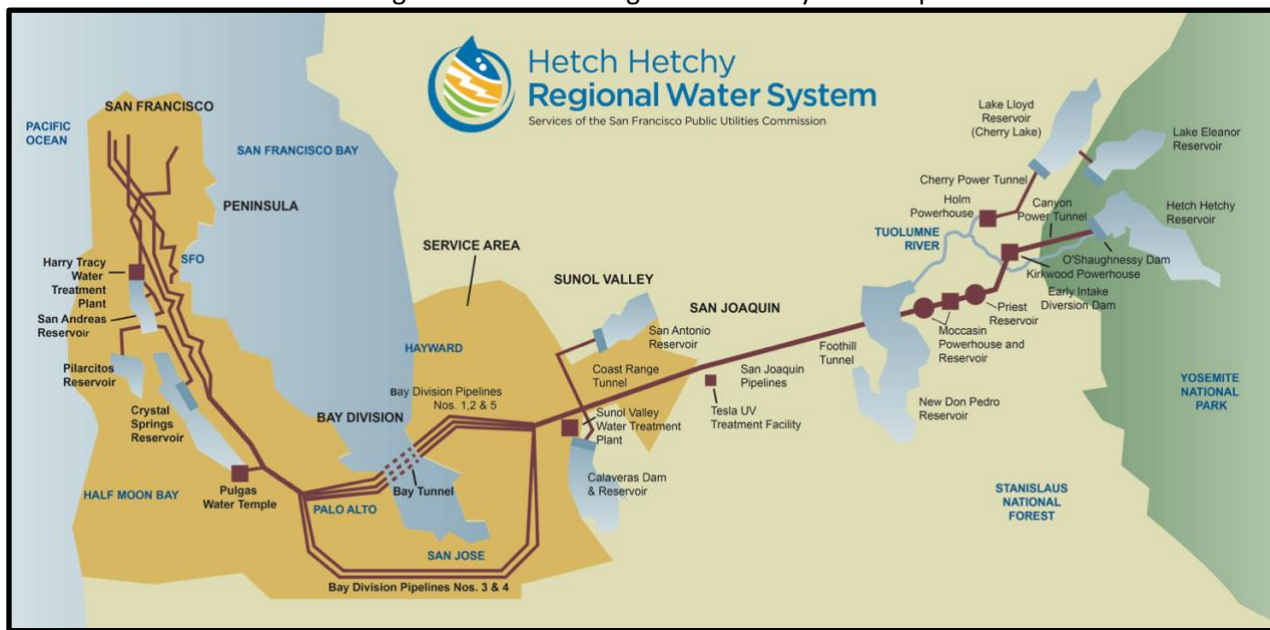
MPWD purchases all its potable water supply from the SFPUC Regional Water System (RWS). The SFPUC RWS supply is predominantly from the Sierra Nevada, delivered through the Hetch Hetchy aqueducts, but it also includes treated water produced by the SFPUC from its local watersheds and facilities in Alameda

¹¹ MPWD DSS Model, 2020. The DSS Model uses ABAG population data and the use of ABAG population data is consistent with MPWD’s 2015 UWMP and WSCP and the BAWSCA Regional Demand and Conservation Savings Projections Final Report, June 26, 2020.

¹² The terms “perpetual commitment,” “Supply Assurance,” “Individual Supply Guarantees,” and “ISG allocation” all refer to the same perpetual commitment from SFPUC to its Wholesale customers.

and San Mateo Counties (see Figure 2-6.). Water from the RWS is treated before delivery and supplied to MPWD from two connections, Bay Division Pipelines (BDPL) 1 and 2, and the Crystal Springs Bypass Tunnel. The SFPUC water is delivered to MPWD in two ways: 1) via a 20-inch water transmission pipeline that is connected to the SFPUC system in Redwood City and, 2) via a 24-inch pipeline connected to a pump station on the SFPUC watershed property near the Pulgas Water Temple.

Figure 2-6. SFPUC Regional Water System Map.



Source: SFPUC, 2020.

The amount of imported water available to the SFPUC's customers is constrained by climate, hydrology, physical facilities, and the institutional parameters that allocate the water supply of the Tuolumne River, the key source for SFPUC. Due to these constraints, the SFPUC is very dependent on reservoir and snow-pack storage to manage its water supplies. A vulnerability assessment related to climate change is included in Section 6 of the MPWD's 2020 UWMP. SFPUC water supplies during projected dry years based on SFPUC's hydrologic model are discussed in Chapter 7 of the MPWD's 2020 UWMP.

MPWD's supply reliability planning process and coordination with SFPUC and BAWSCA are described in the sections below.

3. WATER SHORTAGE CONTINGENCY PLAN

MPWD's WSCP addresses foreseeable and unforeseeable water supply risks to its water system. Water shortages may occur for various reasons such as: droughts, earthquakes or other catastrophic events, climate change, and service area population growth. A water shortage means that the water supply available is insufficient to meet the normally expected customer water use. Drought, regulatory action constraints, and natural and man-made disasters may occur at any time.

In response to DWR requirements to provide a uniform basis for requesting cutbacks in consumption by customers (e.g., sacrificial behaviors and changes in fixtures and appliances) and operational changes (e.g., reduced system flushing) due to cutbacks in supply from minor to extreme emergency conditions, the MPWD has developed six (6) Levels of actions (compared to 4 Levels in 2015) for water shortages based on the severity of the shortage. The MPWD's WSCP includes corresponding estimated percent ranges for water demand reductions for each shortage Level. In case of a catastrophic water supply interruption and water system failure or water quality issues requiring immediate response and action, please refer to the MPWD's Draft Emergency Operations and Response Plan¹³ and MPWD's section in the San Mateo County Local Hazard Mitigation Plan.¹⁴

3.1 Water Supply Reliability Analysis

New legislation was developed in 2018 in response to California's severe drought of 2012-2016.¹⁵ The legislation mandates that water suppliers replace their existing water shortage contingency analysis created under the former law. While overlapping with aspects of the prior law, the new requirements have several prescriptive elements:

- Key attributes of its Water Supply Reliability Analysis conducted pursuant to Water Code Section 10635. [Water Code Section 10632(a)(1)].
- 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. [Water Code Section 10632 (a)(3)(A)].
- Locally appropriate "shortage response actions" for each shortage level, with a corresponding estimate of the extent the action will address the gap between supplies and demands. [Water Code Section 10632 (a)(4)].
- Procedures for conducting an annual water supply and demand assessment with prescribed elements. Under Water Code Section 10632.1, urban water Suppliers are required to submit, by July 1 of each year, beginning in the year following adoption of the 2020 UWMP, an annual water shortage assessment report to DWR. [Water Code Section 10632 (a)(2)].

¹³ MPWD Draft Emergency Operations and Response Plan, 2020.

¹⁴ San Mateo County Local Hazard Mitigation Plan, 2016.

¹⁵ Drought extent is defined by DWR, Final 2020 UWMP Guidebook, March 2021.

<https://water.ca.gov/-/media/DWR-Website/Web-Pages/Water-Basics/Drought/Files/Publications-And-Reports/CNRA-Drought-Report-final-March-2021.pdf>

- Communication protocols and procedures to inform customers, the public, and government entities of any current or predicted water shortages and associated response actions. [Water Code Section 10632 (a)(5)].
- Monitoring and reporting procedures to assure appropriate data is collected to monitor customer compliance and to respond to any state reporting requirements. [Water Code Section 10632(a)(9)].
- A re-evaluation and improvement process to assess the functionality of its WSCP and to make appropriate adjustments as may be warranted. [Water Code Section 10632(a)(10)].

The current information from SFPUC about its supply reliability includes significant assumptions and uncertainty about SFPUC's supply reliability and ability to meet contractual obligations.

In its 2020 UWMP, MPWD, as required (Water Code Section 10635), developed a Drought Risk Assessment (DRA) that assumes a single year and multiple years of drought, starting with 2021 through 2025. MPWD's Water Supply Reliability Analysis and DRA are summarized below in this Section 3.1.1. For more detailed information, please see MPWD's Water Supply Reliability Analysis, in Chapter 7 of MPWD's 2020 UWMP.

In prior water shortage planning for SFPUC Wholesale water shortages of less than 20%, SFPUC and BAWSCA have developed the Water Shortage Allocation Plan (WSAP) to allocate shortages between the SFPUC and the Wholesale Customers collectively. In the two-tier drought allocation plan, Tier 1 applies to SFPUC, and Tier 2 applies to BAWSCA.¹⁶ They are explained in detail in Section 7.2.3 (MPWD's 2020 UWMP), Water Service Reliability. The Tier 2 allocations are applicable for drought cutbacks of less than 20 percent. Table 3-1 illustrates the SFPUC Tier 1 allocations for SFPUC and Wholesale customers.

Table 3-1. SFPUC Tier 1 available water for shortages less than 20%.

Level of Required System-Wide Reduction in Water Use	Share of Available Water	
	SFPUC Share (Tier 1)	Wholesale Customers Share (Supply available for BAWSCA Tier 2 drought formula)
5% or less	35.5%	64.5%
6% through 10%	36.0%	64.0%
11% through 15%	37.0%	63.0%
16% through 20%	37.5%	62.5%

In previous years, as well as in MPWD's 2015 UWMP, to address the allocation of potable water supply during dry years, the WSAP was used to allocate shortages between the SFPUC and the Wholesale Customers collectively (Tier 1). The Wholesale customers adopted the Tier 2 Plan, the second component of the WSAP, which allocates the collective Wholesale customer share among each of the 26 Wholesale customers. The SAP was designed for SFPUC RWS water shortages of less than 20%. For purposes of the 2020 UWMPs, when SFPUC RWS shortages exceed 20%, the allocations among the Wholesale Customers are assumed to be equivalent among them and to equal the drought cutback to Wholesale Customers by the SFPUC.

¹⁶ Common Language for BAWSCA Member Agencies' 2020 UWMPs, BAWSCA transmittal, February 11, 2020 (Appendix 6)

3.1.1 SFPUC Water Supply Projections for MPWD’s 2020 UWMP

Annually by April 15, SFPUC is required (by contract) to communicate to MPWD if water shortage conditions requiring demand reductions are expected. Independently, MPWD also monitors the water supply conditions and potential for water shortages. Historically, the SFPUC has met the demand in its service area in all year types from its watersheds.

Initially, for Wholesale Customers’ water supply reliability forecasts and DRA, SFPUC provided information from their Hetch Hetchy Local Simulation Model (HHLSM) model using the Wholesale purchase Water Supply Agreement Supply Assurance values with (Scenario 1) and without (Scenario 2) the Bay Delta Plan Amendment (BDP) for their projections.¹⁷

SFPUC assumes that the BDP will be implemented in 2023. However, the implementation of the BDP is highly uncertain because it is not self-implementing, does not automatically become effective, and is facing numerous lawsuits to limit or prevent its implementation. SFPUC acknowledges this uncertainty in its 2020 UWMP in Section 7.2.1 of the MPWD 2020 UWMP. Accordingly, in MPWD’s view, assuming the implementation of the BDP does not reflect a reasonable or accurate basis for SFPUC’s and MPWD’s water supply projections given this uncertainty. SFPUC has expressed doubts about the Tuolumne River ecosystem benefits provided by the BDP. In contrast, the TRVA (Tuolumne River Voluntary Agreement) has significant technical support to improve the Tuolumne River ecosystem and is a preferable path forward that protects water supplies for the RWS and could avoid protracted litigation. More discussion about the TRVA is presented in MPWD’s 2020 UWMP, Chapter 7.

In their March model for the “with BDP” scenario, SFPUC applied the Tier 1 allocations to the RWS supplies to determine the Wholesale supply for any system-wide shortage above 20%. SFPUC used a simulation of an 8.5-year design drought to develop the updated estimates for the water supply available from the RWS for five dry years.¹⁸ SFPUC also provided their existing analysis of water supply reliability using the Supply Assurance, as part of SFPUC’s Level of Service, of 184 MGD, for Wholesale customers.¹⁹

In years when the BDP is not in effect, sufficient RWS supplies will be available to meet the Wholesale Customers’ purchase requests assuming that they are between the 2020 and 2025 projected levels. SFPUC acknowledges that it has a Level of Service objective of meeting average annual water demand of 265 mgd from the SFPUC watersheds for retail and Wholesale Customers during non-drought years, as well as a contractual obligation to supply 184 mgd to the Wholesale Customers.

SFPUC’s 2021 modeling results project that “with the BDP” scenarios result in drastic water supply cutbacks, especially during multi-year droughts for BAWSCA wholesale agencies, as discussed in MPWD’S 2020 UWMP, Section 7.2.1. However, since the negotiations between SFPUC and the SWRCB are in progress and the situation is dynamic, it is not possible for MPWD to provide certainty about the drought cutbacks from SFPUC. In its 2020 UWMP, SFPUC is using the results from the updated “with BDP” for its DRA and WSCP instead of its January “with BDP” scenario.

¹⁷ SFPUC, Supply Reliability for 2020 UWMPs, January 22, 2021.

¹⁸ Ibid

¹⁹ SFPUC, Final 2020 UWMP, June 2021. https://www.sfpuc.org/sites/default/files/programs/local-water/SFPUC_2020_UWMP2020_%20FINAL.pdf

SFPUC is developing an alternative, collaborative approach to the State Water Control Board's (SWRCB) BDP. The SFPUC submitted a proposed project description on March 1, 2019, for the Tuolumne River that could be the basis for a voluntary substitute agreement with the SWRCB ("March 1st Proposed Voluntary Agreement"). The SFPUC has been in negotiations with the SWRCB on the BDP Amendment for many years. The process continues to be in litigation and the outcome is still uncertain. This is a dynamic situation and SFPUC may revise its modeling and drought cutback projections.

Due to the continued uncertainty for the SFPUC water supply during droughts and impacts from the implementation of the BDP on its water supply reliability, in its 2020 UWMP, MPWD presents information for water supply reliability using SFPUC model runs, with the BDP, and without the BDP consistent with the information presented in the SFPUC Draft UWMP.

With this uncertainty, the MPWD could update its DRA (see MPWD 2020 UWMP, Section 7.3) prior to the 2025 UWMP update if significant new information becomes available. The Water Code Section 10635(b) permits urban water suppliers to conduct an interim update or updates to their DRA within the five-year cycle of its UWMP update. MPWD anticipates that by the 2025 UWMP update, SFPUC will provide more specific information about the AWSP, with estimated water supply contributions from such projects. Additionally, MPWD expects that SFPUC will provide more specific information and a refined estimate of the Bay Delta Plan impacts to the SFPUC supply.

As required in its 2020 UWMP, MPWD includes the analysis of three types of water years: Average (Normal), Single-Dry, and Multiple-Dry years. These water years are analyzed for availability of water supply for MPWD, with 2020 as the base year. The three categories of year types are discussed in detail in Chapter 7 of the MPWD's 2020 UWMP. Based on SFPUC's model results, using the projected minimum water supply conditions applied to the next five years, water shortages start in 2023.

MPWD's Water Supply Reliability Analysis includes both the SFPUC's water service reliability assessment and MPWD's DRA. MPWD's expected water service reliability projections for a normal year, single dry year and five consecutive dry years are presented in Chapter 7 of MPWD's 2020 UWMP, in Submittal Tables 7-1 to 7-5. MPWD is working with BAWSCA and its member agencies to identify regional mitigation measures to improve reliability for regional and local water supplies and meet its customers' water needs.

Over the years, MPWD joined BAWSCA and many of its members to formally comment on the significant impacts to their communities and rate payers from potential supply cutbacks posed by the BDP on the SFPUC water supply. In its 2020 UWMP, MPWD again raises concerns about the SFPUC's projected supply cutbacks provided in its scenarios with the BDP. The clear risk to MPWD is that its sole supplier, the SFPUC, with the BDP, appears not to be able to meet its contractual obligations and MPWD's forecast demands during multi-year droughts, especially as the service area grows.

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.

However, implementation of feasible projects developed under the SFPUC's Alternative Water Supply Planning Program is not yet reflected in the supply reliability scenarios and may reduce the cutback allocations.

3.2 Annual Water Supply and Demand Assessment Process

As of July 1, 2022, MPWD is required to prepare its annual water supply and demand assessment and submit it to DWR. Pursuant to California Water Code Section 10632(a), MPWD'S WSCP includes its procedures for:

- annual steps in its demand and supply assessment process, and
- timeline to complete the Annual Assessment, such that it can be consistently followed year-after-year, regardless of changing Supplier staff performing the Assessment.

The focus of the MPWD'S Annual Assessment is based on actual and forecasted near-term (for the next 12 months) water supply conditions to ensure appropriate shortage response actions are triggered in a timely manner with expected outcomes. This analysis contrasts with the DRA (see MPWD'S 2020 UWMP, Chapter 7 that has a longer-term, multiyear water supply reliability focus.

Water Code Section 10632.1 requires that MPWD complete specific response actions for its Annual Water Supply and Demand Assessment.

3.2.1 Decision-Making Process

Throughout the year, MPWD attends working meetings with BAWSCA and reviews water supply availability updates from SFPUC. SFPUC updates BAWSCA on February 1, March 1, and provides the final annual supply availability by April 15. A sample timeline for MPWD'S Annual Assessment report is presented in Figure 3-1.

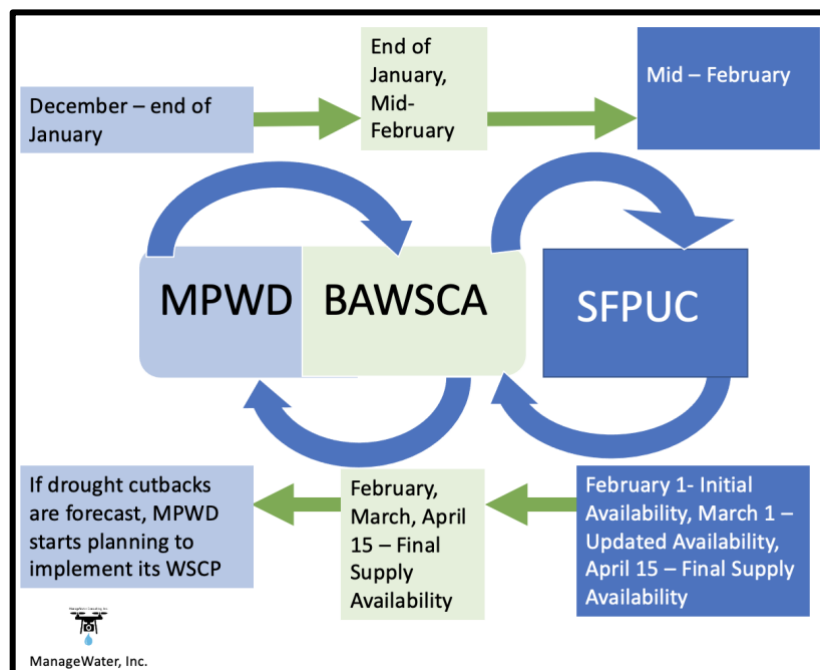
Figure 3-1. Sample of MPWD'S Annual Assessment report timeline.

Mid-Peninsula Water District's key actions and information for its annual Supply/Demand Assessment.												
Actions	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MPWD Supply/Demand Assessment	MPWD staff internal data review	Submit forecast to BAWSCA by mid-Feb.			Staff present SFPUC supply availability to MPWD Board of Directors. If no shortage, no special reports to Board, unless requested. Continue supply/use monitoring monthly.		Submit Annual Assessment to DWR on July.	New Annual Assessment cycle starts.				
Updates from SFPUC		1st Water Supply forecast from SFPUC	2nd Water Supply forecast from SFPUC	Final Water Supply forecast from SFPUC by April 15	Periodic updates from SFPUC and BAWSCA.							
MPWD continues monthly water supply and demand monitoring using its AMI and Springbrook billing system.												
If needed, implement MPWD's WSCP.				If SFPUC's forecast identifies water shortage conditions, MPWD works with BAWSCA and SFPUC to develop and implement appropriate WSCP Level actions. MPWD routinely reports to its Board of Directors.								

As required by Water Code Section 10632(a)(2), the procedures MPWD will follow to conduct and document its Annual Assessment for water demand and supply and formally approve it include staff and Board actions, such as:

- Review, analysis, and documentation of monthly and annual (prior year) service area water consumption by sector.
- Comparison, analysis, and documentation of monthly and annual MPWD consumption to SFPUC production data.
- Review and analysis of actual consumption compared to forecast (i.e., MPWD's update and DSS Model forecast), and, if changes are apparent, review of potential impacts on water use patterns (e.g., drought, COVID-19 pandemic, etc.).
- Review and analysis of SFPUC updated (final SFPUC supply availability on April 15, annually) annual supply projections (SFPUC's hydrological and water availability forecast), and available related information.
- Review and analysis of new regulatory requirements that could potentially impact MPWD's water supply.
- Review, analysis, and documentation of other related data and information including an analysis of water system reliability for the coming year with the presumption that the year would be dry.
- Presentation of findings to its Board with recommendations, if any, for discussion, documentation, and approval. Under normal conditions (no cutbacks), there would be no further formal Board action, except routine update reports from staff to the Board about MPWD's water consumption and conservation based on MPWD's current year AMI results.
- Following Board approval, MPWD would complete and submit its Annual Assessment report to DWR by July 1.
- MPWD would implement approved actions resulting from MPWD's Annual Assessment, if any, in addition to routine demand and supply monitoring, documentation, and start a new Annual Assessment cycle.

Figure 3-2. Annual update process between MPWD, BAWSCA, and SFPUC.



If the SFPUC water supply availability is normal, without expected shortages, the MPWD presentation is documented in meeting minutes and the WSCP is not implemented.

If shortage conditions are expected by the SFPUC, the MPWD staff will review the implementation options of the WSCP and present recommendations to the Board. Following discussion, deliberations, and, if any, follow-up actions from staff (e.g., if the WSCP is implemented, specific actions, such as communication with customers, implementation of shortage Levels, and other necessary steps are identified).

MPWD's routine annual demand and supply assessment and approval process includes interactions with BAWSCA and SFPUC. Figure 3-2 illustrates the annual demand and supply steps in the communication and decision-making process between MPWD, BAWSCA, and SFPUC.

Typically, the annual water demand and supply assessment includes the following interactions with BAWSCA and SFPUC:

- In January of each year, using MPWD's current Decision Support System (DSS) Model MPWD reviews its previous demand forecast and updates it, as needed, in preparation to submit to BAWSCA for the following year.
- In January BAWSCA asks MPWD to provide an updated forecast for its SFPUC water purchase for the next fiscal year (July 1 to June 30).
- By mid- to late January, MPWD submits its current demand forecast to BAWSCA for its next fiscal year. For the past 10 years, annually BAWSCA agencies have the opportunity to review and, if needed, revise their purchase forecasts that BAWSCA submits to SFPUC annually, in January. This annual reporting is routine for BAWSCA agencies and part of the SFPUC's Wholesale rate setting process.
- By mid-February, BAWSCA submits the aggregate demand forecast of its 26 agencies to SFPUC.
- On February 1, SFPUC provides BAWSCA with their initial "Water Supply Availability" conditions for its RWS. On March 1, SFPUC provides an update and by April 15 SFPUC identifies the "Water Supply Availability" for the year and provides tables that reflect the RWS supply conditions, including its determination if drought conditions are expected, and cutbacks will be imposed. Routinely, the SFPUC's supply assessment includes information about its Tuolumne and San Francisco Bay Area watersheds, precipitation at Hetch-Hetchy (85 percent of its supply) and snowpack, reservoir storage, and supply limitations due to regulatory constraints.
- For triggered shortages, MPWD uses its WSCP and documents the response actions.
- When water conditions return to normal, with Board approval, MPWD communicates the water supply conditions to its customers.
- Routinely, MPWD continues to monitor the SFPUC supply and its service area demand conditions using its AMI monthly metering results and analyzing its water use by sector. Staff provide monthly updates about water supply and demand conditions to the MPWD Board and as directed, follow up with response actions.

DWR is developing a guidance document with recommend procedures and analytical methods that may be used by water suppliers to comply with the Annual Assessment requirements. The Annual Assessment guidance will be reviewed by MPWD, when it is available (not available from DWR as of 6/9/21).

MPWD, as part of BAWSCA, also participates in regional water supply planning. BAWSCA's regional planning involves three major efforts:²⁰

²⁰ Email communication: BAWSCA, March 13, 2021.

1. The BAWSCA Annual Survey.
2. Update DSS Model for member agencies.
3. Update to the BAWSCA Demand Study.²¹

BAWSCA Annual Survey

Each year, BAWSCA conducts an annual survey (Survey) of its members to update key BAWSCA service area information including population, current and projected water use, and climate. BAWSCA conducts the Survey using their Water Conservation Data Sheet. BAWSCA's annual timeline for the Survey begins each fall and concludes between March and June of the following year. Once BAWSCA receives the annual updates from all 26 member agencies it compiles the information in the Survey. The Survey summarizes actual water use in the fiscal year that was just completed, projected use by source, and projected water demand (purchases) by source.

Once the draft Annual Survey is completed by BAWSCA, it sends it to its agencies for review and incorporates agency comments into the final Survey. In March 2021, BAWSCA finalized the Survey for FY19-20.

Least Cost Planning Decision Support System Model (DSS Model)

The purpose of the DSS Model is to update each BAWSCA agency's actual and forecast population, jobs, water production, water consumption by sector, annual water loss, water conservation, new planned water conservation measures, and related information. Typically, the DSS update process for all 26 BAWSCA agencies takes about a year and is conducted approximately every four years. The resulting DSS models are used for individual agency planning, their UWMPs, updating BAWSCA's Demand Study, and for forecasting purchases from SFPUC. Currently MPWD's DSS forecasts its data through 2045.

BAWSCA Demand Study

The purpose of the BAWSCA Demand Study is to aggregate agencies' near-term and future demands for water purchases from SFPUC. The Demand Study data, currently through 2045, are updated every two to four years and used for regional planning by BAWSCA agencies and the SFPUC.

3.2.2 Data and Methodologies

As required by DWR, MPWD will use key data and methods to evaluate its water system reliability for the coming year, while also considering that the following year could be a dry year.

The key data inputs and assessment methodology that MPWD will use annually to evaluate its water supply reliability include its current year unconstrained demand (without additional water conservation), growth, and other influencing factors.

²¹ BAWSCA Demand Study, June 26, 2020.

http://bawasca.org/uploads/pdf/BAWSCA_Regional_Water_Demand_and_Conservation%20Projections%20Report_Final.pdf

Evaluation Criteria for Reliability

In the 2020 UWMP, MPWD assessed the reliability of its water service to its customers during normal, dry, and multiple dry water years (see Chapter 7 of MPWD's 2020 UWMP). This water supply and demand assessment compares the total (SFPUC) water supply available to MPWD with the long-term total projected water demand for the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years.

Water Supply and Demand

For its water supply and demand assessment in the 2020 UWMP, MPWD used available annual and monthly total production and consumption AMI and billing data, data about its service area, including: its service area population, land use development, climate change projections, SFPUC's projected water supply and its reliability.

Unconstrained Customer Demand

For the WSCP and Annual Assessment, DWR defines unconstrained demand as expected water use prior to any projected shortage response actions that may be taken under the WSCP. Unconstrained demand is distinguished from observed demand, which may be constrained by preceding, ongoing, or future actions, such as emergency supply allocations during a multi-year drought. For its unconstrained customer demand assessment, in the 2020 UWMP, MPWD analyzed total consumption and individually for its six water-use sectors.

Planned Water Use for Current Year Considering Dry Subsequent Year

Water Code Section 10632(a)(2)(B)(ii) requires the Annual Assessment to determine "current year available supply, considering hydrological and regulatory conditions in the current year and one dry year." MPWD's Annual Assessment will include two separate estimates of MPWD's annual water supply and unconstrained demand using: 1) current year conditions, and 2) assumed dry year conditions. The "single dry year" is defined by DWR as a year in which conditions reflect the lowest water supply available to MPWD.

For current year conditions, MPWD uses the SFPUC final water supply availability report provided annually by April 15. SFPUC also, provides assumed dry year conditions with supply cutback information, as applicable. If SFPUC determines cutbacks in its supply, BAWSCA applies an allocation formula (i.e., Tier 2 if less than 20 percent cutback and an alternate cutback formula if more than 20 percent cutback) to allocate the SFPUC supply available to Wholesale Customers.

Infrastructure Considerations

MPWD's Annual Assessment will include consideration of any infrastructure issues that may pertain to near-term water supply reliability, including repairs, construction, and environmental mitigation measures that may temporarily constrain capabilities, as well as any new projects that may add to system capacity.

Other Factors

For the Annual Assessment, MPWD will consider any known issues related to water quality and its potential effects on water supply reliability.

3.3 Six Standard Water Shortage Levels

The California Water Code Section 10632.3 defers to the locally adopted WSCPs. Planning for water shortages necessitates that MPWD considers its water supply reliability from SFPUC and understands the key factors that could contribute to water supply constraints. A detailed description of potential constraints that could affect MPWD's water supply reliability from SFPUC is included in Chapter 7 of MPWD's 2020 UWMP.

MPWD uses its AMI meters and data to accurately characterize customer water use and to identify the factors that affect both use and supply within its six water-use sectors (MPWD 2020 UWMP Figures 4-1, 4-2; Chapters 3, 7, and MPWD 2020 UWMP, Submittal Table 4-2). MPWD's annual and almost real-time AMI data provide the essential baseline information for MPWD's water demand and, if needed, reductions.

For its demand projections, annually MPWD develops updated purchase forecasts and presents them to BAWSCA and the SFPUC. SFPUC, in turn, provides its supply projections to its Wholesale BAWSCA customers, including MPWD. In addition to providing "Normal year"²² supply projections, SFPUC also provides its projections for supply availability under varying hydrologic and regulatory conditions, contract provisions, and its infrastructure risks.

Since MPWD currently does not have multiple water supplies, its main method to address near-term shortages is to reduce demand. However, for the long-term, if funding will be available, MPWD could develop alternative supplies in response to severe shortages, especially for non-potable, outdoor uses, such as decorative landscape irrigation. New supply sources developed under the SFPUC's AWSP are also expected to be available in the long-term to lessen the impacts of SFPUC supply shortfalls.

This section explains MPWD's WSCP's six standard water shortage Levels corresponding to progressive ranges of up to 10, 20, 30, 40, 50, and more than 50 percent shortages [Water Code Section 10632 (a)(3)(A)]. Although the circumstances surrounding future droughts, or any other long-term supply shortages, may differ from the situations that the MPWD has faced in previous shortages, a systematic approach and framework are in place with MPWD's updated WSCP. This approach includes the necessary flexibility for MPWD and practical, initial voluntary conservation Levels, followed by mandatory water rationing in response to increasingly severe water shortages.

The key foreseeable or unforeseeable issues that may create shortage conditions were discussed in MPWD 2020 UWMP, Chapter 7, Section 7.2.1. and include:

- Changes in hydrological or other local conditions, including droughts lasting one or multiple years.
- Changes in precipitation patterns, such as time of snowfall or rain, intensity, and duration.
- Fewer months of continuous below freezing (<32F) temperatures in the Sierra Nevada, resulting in less precipitation as snow, shorter duration for snowpack storage.
- Warmer temperatures leading to melt of the snowpack storage.
- Inadequate storage capacity to store the snowmelt water source.
- Changes in water quality as a result of changes in precipitation patterns and storage.

²² DWR uses "Normal" and "Average" supply interchangeably, meaning 100% of supply is available, with no cutbacks.

- Regulatory changes affecting the SFPUC water supplies, such as implementation of the BDP Amendment that could reduce supply water for the MPWD by up to 47% in drought years.²³

The above-noted constraints may potentially affect SFPUC's Hetch-Hetchy watershed and management of the RWS water supply and its distribution. Additional situations that may cause catastrophic interruption of water supplies and require implementation of MPWD's WSCP, could include (but not be limited to):

- Regional power outages.
- Earthquakes.
- Fires.
- Floods.
- Infrastructure problems, such as: line breaks or inadequate storage capacity.
- Water quality problems.
- Regulatory restrictions.
- Other situations affecting MPWD's water supply.

The Mediterranean climate in MPWD's service area is typified by normal seasonal dry summers, wet winters and year-on-year variability in weather. Historically, annual fluctuations in rainfall, up to 10% of "normal" have not been unusual. Normal conditions are typical water supply conditions where the SFPUC water supply is sufficient to meet MPWD's projected demand. However, with a changing climate, droughts are expected.²⁴

SFPUC provided tables with rationing frequency if the BDP is implemented.²⁵ The SFPUC hydrologic modeling results indicate that rationing will be required in the next 25 years for the Wholesale Customers in critically dry years. The frequency of water rationing is estimated to occur in 5 years of the 25-year timeframe, including one three-consecutive-year drought sequence.

Under "Normal" conditions, MPWD continues ongoing conservation measures. For fiscal year 2020-21, MPWD is requesting its customers, using WSCP Level 1, to voluntarily reduce water use by 10%.²⁶ The normal, Level 0, condition exists when the MPWD notifies its water users that no supply reductions are anticipated. MPWD proceeds with planned water efficiency best practices to support consumer demand reduction in line with state mandated requirements and local MPWD goals for water supply reliability.

MPWD's shortage Levels align with its response actions that will be implemented to meet the severity of the shortages. The MPWD's Six Levels of Action and percent reductions to increasingly restrictive water supply conditions, including a reduction of more than 50% are consistent with MPWD's Water Service Ordinance 112, Attachment "103A" Schedule of Rates and Fees.²⁷

²³ Additional Supply Reliability Modeling, SFPUC, March 30, 2021.

²⁴ California Energy Commission. <http://www.climatechange.ca.gov/> and Department of Water Resources Climate Action Plan. <https://water.ca.gov/Programs/All-Programs/Climate-Change-Program/Climate-Action-Plan>

²⁵ SFPUC, 2020 UWMP Annual Rationing Tables, April 12, 2021. (Also see Appendix 7)

²⁶ MPWD Web site: Normal supply year Level 1 Water Alert in effect for fiscal year 2020 – 21. <https://www.midpeninsulawater.org/waterconservation>

²⁷ Water Service Ordinance 112, Attachment 103A, Schedule of Rates and Fees <https://www.midpeninsulawater.org/legislation>

MPWD's Six Levels of Action are presented in Table 3-2 (MPWD 2020, UWMP Submittal Table 8-1). The menu of reduction actions is listed in Table 3-3. (MPWD 2020, Submittal Table 8-2).

Shortage Levels of 3 through 6 would require MPWD to invoke "Emergency" procedures according to California Water Code section 350.²⁸

Level 0: Water Supply Shortage condition represents a 'normal' condition, when MPWD notifies its water users that no supply reductions are anticipated. MPWD proceeds with planned water efficiency best practices to support consumer demand reduction in line with state mandated requirements and local MPWD goals for water supply reliability. Permanent water waste prohibitions are in place.

Level 1: Water Warning condition exists when the MPWD notifies its water users that due to drought or other supply reductions, consumers are asked to voluntarily reduce demand of up to 10%. MPWD's website and messaging through billing include information requesting water efficiency practices.

Level 2: Water Restricted up to 20% condition exists when MPWD notifies its water users that due to drought or other supply reductions, a consumer demand reduction of up to 20% is necessary for more efficient use of water and to respond to existing water conditions.

Level 3: Water Restricted up to 30% Condition exists when MPWD notifies its customers that up to 30% use reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. MPWD will declare a Water Supply Shortage Emergency Condition as provided in California Water Code section 350.²⁹

Level 4: Water Crisis condition exists when notifies its customers that up to 40% water demand reductions are required to ensure sufficient supplies for human consumption, sanitation, and fire protection. For sustained water reductions of up to 40 percent, enforcement of the selected mandatory actions may be necessary. MPWD will declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350.

Level 5: Water Emergency condition exists when MPWD notifies its customers that up to 50% consumer demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. Sustained water reductions of up to 50% are unprecedented in the MPWD service area. Strict enforcement with fines for lack of compliance may be necessary. Alternate supplies, such as graywater reuse, available recycled water will be encouraged for non-potable uses (see Table 3-4). MPWD will declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350.

Level 6: Extreme Emergency condition exists when MPWD notifies its customers about requirements for greater than 50% water use reduction by customers to ensure sufficient supplies for human consumption, sanitation and fire protection. For sustained water reductions of more than 50%, alternate supplies, such as graywater reuse and available recycled water will be encouraged for non-potable uses (see Table 3-4).

²⁸California Water Code section 350.

https://leginfo.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT§ionNum=350

²⁹ Ibid.

MPWD will declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350.

The water shortage Levels, and response actions are summarized in Table 3-2 and included in MPWD 2020 UWMP, Submittal Table 8-1.

Table 3-2. Water Shortage Contingency Plan Levels (Submittal Table 8-1).

Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	Percent Shortage Range	Shortage Response Actions (Narrative description)
0	0% (Normal)	Level 0 Water Supply Shortage Condition exists when MPWD notifies its water users that no supply reductions are anticipated. MPWD proceeds with planned water efficiency best practices to support consumer demand reduction in line with state mandated requirements and local MPWD goals for water supply reliability. Permanent water waste prohibitions are in place as stipulated in the MPWD's Water Shortage Response Ordinance.
1	>0 to 10%	Level 1: Water Warning Condition exists when the MPWD notifies its water users that due to drought or other supply reductions, a consumer demand reduction of up to 10% is necessary to make more efficient use of water and respond to existing water conditions. Upon the declaration of a Water Warning, MPWD will implement the voluntary Level 1 conservation measures identified in its WSCP. The type of event that may prompt the MPWD to declare a Level 1 Water Supply Shortage may include, among other factors, a finding that its Wholesale water provider calls for a 10 % reduction in water use. MPWD routinely asks its customers to voluntarily conserve water by 10 percent.
2	>10% to 20%	Level 2: Water Restricted up to 20% – Condition exists when MPWD notifies its water users that due to drought or other supply reductions, a consumer demand reduction of up to 20% is necessary for more efficient use of water and to respond to existing water conditions. Upon declaration of a Level 2, MPWD will implement the mandatory Level 2 conservation measures identified in its WSCP.
3	>20% to 30%	Level 3: Water Restricted up to 30% Condition exists when MPWD declares a water shortage Restricted condition pursuant to California Water Code section 350 and notifies its residents and businesses that up to 30% mandatory consumer demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. MPWD will declare a Water Supply Shortage Emergency Condition in the manner and on the grounds provided in California Water Code section 350. Reference: https://leginfo.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=350
4	>30% to 40%	Level 4: Water Crisis Condition exists when MPWD declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its residents and businesses that up to 40% mandatory consumer demand reduction is required to ensure sufficient supplies for human consumption, sanitation and fire protection. MPWD will declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350.

5	>40% to 50%	Level 5: Water Emergency Condition exists when MPWD declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its residents and businesses that up to 50% mandatory consumer demand reduction is required to ensure sufficient supplies for human consumption, sanitation and fire protection. MPWD will declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350.
6	>50%	Level 6: Extreme Emergency – Condition exists when MPWD declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its residents and businesses that greater than 50% mandatory consumer demand reduction is required to ensure sufficient supplies for human consumption, sanitation and fire protection. MPWD will declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350.
NOTES: MPWD Water Demand Offset Charges, UWMP Water Shortage Response Levels, Water Service Ordinance 112 Attachment 103A, Schedule of Rates and Fees, June 25, 2015.		

3.4 Shortage Response Actions

DWR requires retail and Wholesale suppliers to include specific types of shortage response actions in their WSCP. The authority to determine shortage conditions and to select the appropriate shortage response actions remains with the supplier.

3.4.1 Demand Reduction

The demand reduction actions that MPWD could implement to address shortage levels are listed in Table 3-3 (Submittal Table 8-2). This table indicates the Levels, actions per Level, if enforcement will be applied, and estimated percent range for water reductions per action to reduce the gap between supplies and demands. The estimated percent reductions provide an extensive ‘menu’ of demand reduction options for MPWD to choose from.

MPWD’s specific response actions will depend on the severity of the shortage levels, local conditions, and be based on assessment of the effectiveness of each action. The shortage response actions presented in Table 3-3 will be applied to include locally appropriate elements as required by Water Code Section 10632 (a)(4). Operational changes may be necessary. The elements for implementing WSCP Levels are:

- Demand reduction actions to adequately respond to shortages.
- Additional, mandatory prohibitions against specific water use practices.
- Supply augmentation actions (see Table 3-4, Submittal Table 8-3).
- For each reduction action, an estimate (in % range) for the extent its implementation is estimated to reduce the gap between SFPUC supply and MPWD demand.
- Alignment of MPWD’s actions with SFPUC water supply cutbacks or another condition causing the supply shortfall.

However, even the extensive suite of MPWD’s shortage response actions presented in Table 3- may not deliver the unprecedented demand reductions that may be necessary due to the projected SFPUC shortages for multi-year droughts, if the BDP is implemented. These would have to be used in conjunction with supply augmentation measures (discussed in the next section) to mitigate a high level of sustained supply shortfall.

The lengthy list of response actions presented in Table 3-3 is a toolbox from which MPWD can choose the most appropriate responses for specific shortage situations. MPWD's six Levels of reduction actions present estimated individual and cumulative reductions. In practice, due to many local variables impacting water use and typical combined implementation of drought response actions (multiple actions are typically employed at the same time, e.g., local various public outreach campaigns combined with regional requirements, drought water rates, etc.), actual and specific savings per response action are estimates. Water reductions that include reductions or elimination of landscape irrigation typically present the highest potential water savings.

Table 3-3. Demand Reduction Actions (Submittal Table 8-2).

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions Drop down list <i>These are the only categories that will be accepted by the WUE data online submittal tool. Select those that apply.</i>	How much is this going to reduce the shortage gap? <i>Include units used (volume type or percentage)</i>	Additional Explanation or Reference <i>(optional)</i>	Penalty, Charge, or Other Enforcement? For Retail Suppliers Only <i>DropDown List</i>
<i>Add additional rows as needed</i>				
0	Other water feature or swimming pool restriction	Statewide Prohibition is Required	All decorative water features must recirculate water or users must secure a waiver from the MPWD.	No
0	Other	Statewide Prohibition is Required	Washing or hosing down vehicles is prohibited except by use of a handheld container, hose with an automatic shut off device, or at a commercial car wash.	No

0	Other - Prohibit use of potable water for washing hard surfaces	Statewide Prohibition is Required	Washing hard or paved surfaces is prohibited except to alleviate safety or sanitary hazards using a handheld container, hose with an automatic shut off device, or a low-volume high pressure cleaning machine that recycles used water.	No
0	Landscape - Restrict or prohibit runoff from landscape irrigation	Statewide Prohibition is Required	Watering vegetated areas in a manner that causes excessive water flow or runoff onto an adjoining sidewalk, driveway, street, alley, gutter, or ditch is prohibited.	No
0	Landscape - Other landscape restriction or prohibition	Statewide Prohibition is Required	Irrigating ornamental turf on public street medians is prohibited.	No
0	Landscape - Other landscape restriction or prohibition	Statewide Prohibition is Required	No landscape watering shall occur within 48 hours after measurable precipitation.	No
0	Landscape - Limit landscape irrigation to specific times	On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	Watering or irrigation with a device that is not continuously attended to is limited to fifteen (15) minutes per day per valve. Low flow drip type systems, water efficient stream rotor systems, and sensor/weather-controlled systems are exempt.	No
0	Landscape - Other landscape restriction or prohibition	On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	Any new planting should be performed with drought tolerant plants.	No
0	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	Fix leaks or faulty sprinklers promptly/within 10 day(s).	No
0	CII - Other CII restriction or prohibition	On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	No single pass cooling systems may be installed in new or remodeled buildings.	Yes
0	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	All new commercial car wash and laundry facilities must re-circulate the wash water or obtain a waiver from the MPWD.	Yes

0	CII - Commercial kitchens required to use pre-rinse spray valves	On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	Food preparation establishments must use water efficient kitchen spray valves.	Yes
0	Landscape - Limit landscape irrigation to specific times	On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	Watering or irrigation of vegetated areas is prohibited between 10am and 6 pm except by use of a handheld device, hose equipped with an automatic shutoff device, or for adjusting or repairing an irrigation system for short periods of time.	No
0	Other - Require automatic shut of hoses	On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	Use a shutoff nozzle on hoses.	No
0	Other	On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	Unauthorized use of hydrants is prohibited. Authorization for use must be obtained from water supplier.	Yes
1	Expand Public Information Campaign	0-1%	Community Outreach and Messaging (Expand Public Information Campaign)	No
1	Expand Public Information Campaign	0-1%	Encourage customers to wash only full loads when washing dishes or clothes.	No
1	Expand Public Information Campaign	0-1%	Encourage customers to use pool covers to minimize evaporation.	No
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	0-1%	Fix leaks or faulty sprinklers promptly/within 10 day(s).	No
1	CII - Restaurants may only serve water upon request	0-1%	CII - Restaurants may only serve water upon request	No

1	CII - Lodging establishment must offer opt out of linen service	0-1%	CII - Lodging establishment must offer opt out of linen service	No
1	Landscape - Other landscape restriction or prohibition	0-5%	New and existing residential automated irrigation systems must be equipped with rain sensors that shut off the system when it rains, or smart controllers or evapotranspiration sensors that use weather-based data to set efficient watering schedules.	No
1	Landscape - Limit landscape irrigation to specific times	0-5%	Watering or irrigation of vegetated areas is prohibited between 9 am and 6 pm except by use of a handheld device, hose equipped with an automatic shutoff device, or for adjusting or repairing an irrigation system for short periods of time.	No
1	CII - Other CII restriction or prohibition	0-1%	Commercial, industrial, institutional equipment must be properly maintained and in full working order.	No
1	Landscape - Prohibit certain types of landscape irrigation	0-1%	All non-essential water use for nurseries should cease.	No
1	Landscape - Prohibit certain types of landscape irrigation	0-1%	All non-essential water use for public entities should cease.	No
1	Landscape - Prohibit certain types of landscape irrigation	0-1%	All non-essential water use for commercial and industrial use should cease.	No
1	Other	5-10%	Other Prohibited Uses: MPWD may implement other prohibited water uses as determined by MPWD, after notice to customers.	No
1	Other	5-10%	MPWD may reduce water allocations in all categories to meet the available water supply.	No
1	Improve Customer Billing	0-3%	AMI Customer Leak Reports with Detection	No

1	Provide Rebates for Landscape Irrigation Efficiency	0-1%	Expanded/Enhanced Rebate Programs	No
1	Reduce System Water Loss	0-5%	Real Loss Reduction - Pressure Management and More Aggressive Leak Detection	No
1	Offer Water Use Surveys	0-1%	Offer Water Use Surveys	No
1	Provide Rebates on Plumbing Fixtures and Devices	0-1%	Provide Rebates on Plumbing Fixtures and Devices	No
1	Provide Rebates for Turf Replacement	0-1%	Provide Rebates for Turf Replacement	No
1	Increase Water Waste Patrols	0-1%	Increase Water Waste Patrols	No
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	0-1%	Fix leaks or faulty sprinklers within 5 day(s).	No
2	Landscape - Limit landscape irrigation to specific days	5-10%	Irrigation shall be limited to 3 days per week turf watering when using potable water. Plant containers, trees, shrubs and vegetable gardens may be watered additional days using only drip irrigation or hand watering.	Yes
2	Water Features - Restrict water use for decorative water features, such as fountains	0-1%	Filling or refilling ornamental lakes and ponds is prohibited. Ornamental lakes and ponds that sustain aquatic life of significant value and were actively managed prior to the storage declaration are exempt.	No
2	Implement or Modify Drought Rate Structure or Surcharge	0-5%	Drought Rates and Surcharges	Yes
2	Improve Customer Billing	0-1%	Improve customer billing reports to include more details on water use.	No
2	Decrease Line Flushing	0-1%	Decrease Line Flushing without impacting water quality.	No
2	Pools and Spas - Require covers for pools and spas	0-1%	Pools and Spas - Require covers for pools and spas.	No
2	Pools - Allow filling of swimming pools only when an appropriate cover is in place.	0-1%	Pools - Allow filling of swimming pools only when an appropriate cover is in place.	No

2	Other	5-10%	Other Prohibited Uses: MPWD may implement other prohibited water uses as determined by the MPWD, after notice to customers.	No
2	Other	5-10%	MPWD may reduce water allocations in all categories to meet the available water supply.	No
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	0-1%	Fix leaks or faulty sprinklers within 3 day(s).	Yes
3	Other water feature or swimming pool restriction	0-1%	Decorative water features that use potable water must be drained and kept dry.	Yes
3	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	0-1%	Car washing is only permitted using a commercial carwash that recirculates water or by high pressure/low volume wash systems.	Yes
3	Other - Prohibit use of potable water for construction and dust control	0-1%	Require a construction water use plan be submitted to the water supplier that addresses how impacts to existing water users will be mitigated (such as dust control).	Yes
3	Landscape - Other landscape restriction or prohibition	0-1%	Except for landscapes watered with non-potable water, limit the installation of new landscaping to drought tolerant trees, shrubs and groundcover. Prohibit installation of new turf or hydroseed. Customers may apply for a waiver to irrigate during an establishment period for the installation of new turf or hydroseed.	Yes
3	Landscape - Limit landscape irrigation to specific days	10-25%	Irrigation shall be limited to 2 days per week turf watering when using potable water. Plant containers, trees, shrubs, and vegetable gardens may be watered additional days using only drip irrigation or hand watering.	Yes
3	Landscape - Prohibit certain types of landscape irrigation	0-1%	Plant containers, trees, shrubs, and vegetable gardens shall be watered only by drip irrigation or hand watering.	No
4	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	0-1%	Fix leaks or faulty sprinklers within 2 day(s).	Yes

4	Other water feature or swimming pool restriction	0-1%	Existing pools shall not be emptied and refilled using potable water unless required for public health and safety purposes.	Yes
4	Other water feature or swimming pool restriction	0-1%	No new permits for pools will be issued.	No
4	Landscape - Other landscape restriction or prohibition	0-1%	No new landscape installations or renovations will be permitted.	No
4	Landscape - Prohibit all landscape irrigation	0-1%	Previous waivers for watering during an establishment period will be revoked.	No
4	Landscape - Limit landscape irrigation to specific days	5-20%	Irrigation shall be limited to 1 day per week turf watering when using potable water. Plant containers, trees, shrubs and vegetable gardens may be watered additional days using only drip irrigation or hand watering.	Yes
4	Other	5-10%	Other Prohibited Uses: MPWD may implement other prohibited water uses as determined by MPWD, after notice to customers.	No
4	Other	5-10%	MPWD may reduce water allocations in some or all categories to meet the available water supply.	No
5	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	0-1%	Fix leaks or faulty sprinklers within 1 day.	Yes
5	Other	0-1%	Potable water for agricultural or commercial nursery purposes, is prohibited.	Yes
5	Landscape - Prohibit all landscape irrigation	5-25%	All irrigation is prohibited.	Yes
5	Landscape - Prohibit certain types of landscape irrigation	0-5%	Watering of parks, school grounds, and recreation fields is prohibited, except for rare plant or animal species	Yes
5	Net Zero Demand Increase on New Connections	0-2%	Net Zero Demand Increase on New Connections	Yes
5	Other	0-25%	Water use for public health and safety purposes only.	Yes

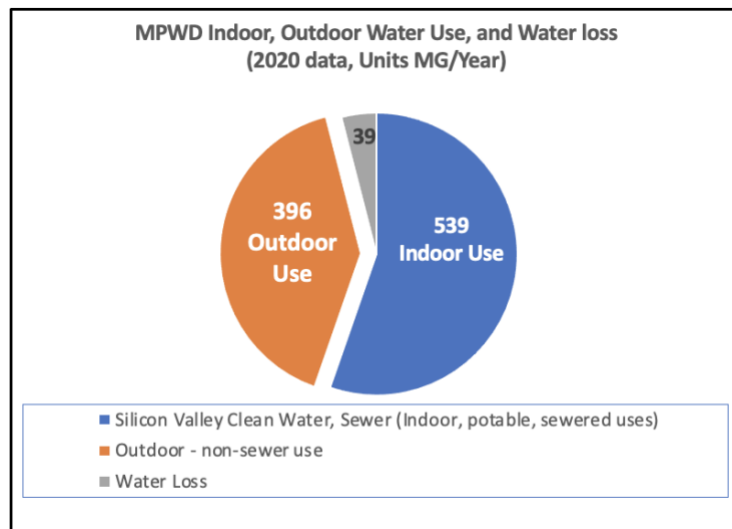
6	Other	0-1%	MPWD may discontinue service to consumers who willfully violate any water conservation provisions	Yes
6	Other	0-1%	Water for new cooling towers is prohibited, except for health and safety	Yes
6	Landscape - Other landscape restriction or prohibition	0-5%	Require all decorative turf to be removed permanently and replaced with drought-tolerant planting upon sale of property	Yes
	Landscape - Other landscape restriction or prohibition	0-5%	Prohibit decorative turf on all new construction	Yes
6	Landscape - Prohibit all landscape irrigation	0-25%	MPWD may shut off all non-essential water services. All irrigation is prohibited.	Yes
6	Expand Public Information Campaign	0-5%	An expanded public information campaign may include increased frequency and intensity of messages about water shortage conditions. For example, frequency may increase to several days a week and messaging may include direct messages from community leaders.	No
6	CII - Other CII restriction or prohibition	0-10%	Water for commercial, manufacturing, or processing purposes shall be reduced in volume by up to 50% or higher, if necessary, for public health and safety purposes.	Yes
6	Other	0-50%	Water use for public health and safety purposes only. Customer rationing may be implemented.	Yes
NOTES: This table identifies a menu of possible demand reduction measures that MPWD could employ to reduce its water in each of the six Levels. Each level includes an estimated percent range for water reduction in MPWD's service area. These actions are options and MPWD will determine which are most applicable for a given situation as it arises. Additional actions, technologies, or augmentation measures may be employed by MPWD, as necessary.				

In addition to efficiency measures included in Table 3-3, MPWD's response to water shortages may require adoption of additional mandatory water restrictions such as water budgets, consumption limits on a gallon per capita basis for residential customers, and a percentage reduction from a normal base year level of use for nonresidential customers. Additionally, since MPWD has invested in AMI technology, it has almost real-time consumption data that can be used for managing water demand and close monitoring of its water use sectors. AMI can also be used for MPWD's pressure zone management. The MPWD's program could also include increased limitations on specific water uses. During the 2012 through 2016 drought, through continuous outreach to its service area, MPWD sustained more than 25% reductions. MPWD invoked multiple water reduction measures, including continued public notifications, rebates for water-efficient fixtures, indoor and outdoor water use restrictions, and drought water rates. Clearly outdoor water use restrictions contributed significantly to water use reductions. However, staff could not identify specific savings from specific measures.

The key means by which MPWD may be able to sustain continued 47% reductions for multiple years without additional supplies, will require severe restrictions of potable use outdoors, GPCD application for indoor use, and potentially lowering its water losses (which are already very low at 4.4%). Theoretically, MPWD could achieve up to approximately 41% reductions by eliminating all potable water use outdoors (except for health and safety needs).³⁰

The theoretical reduction is based on using MPWD's 2020 total domestic water production (total indoor and outdoor consumption) and subtracting wastewater (that represents only indoor consumption), as shown in Figure 3-3.

Figure 3-3. MPWD's 2020 indoor and outdoor water uses, and water loss.



2020 Data sources: Silicon Valley Clean Water, BAWSCA, MPWD.

However, it is not realistic to assume that 100 percent of outdoor use of potable water could be eliminated. Outdoor, non-sewer uses include essential functions, such as flushing water lines to maintain water quality, fire-fighting practice and fighting fires, and other practices necessary for public health and safety.

MPWD will have to work closely and continuously with its customers, BAWSCA, and SFPUC when implementing reductions of more than 40% using WSCP water reduction Levels 4 through 6.

Extended, multi-year, extreme emergency reductions of more than Level 4 are unprecedented and will be very difficult to sustain. Funding and planning for additional alternate supplies, such as recycled water, and demand reduction measures will likely be necessary.

3.4.2 Supply Augmentation

The supply augmentation actions are presented in Table 3-4 (MPWD 2020 UWMP, Submittal Table 8-3). Funding will be necessary to implement these augmentation measures safely, reliably, and on a large scale throughout MPWD's service area to supplement the SFPUC supply during multi-year supply cutbacks.

³⁰ Non-sewer use including landscape irrigation water = Production (974MG) – [wastewater (539 MG) + water loss (39MG)] = 396 MG/year

For the long-term, MPWD is working with BAWSCA and member agencies to coordinate mutual agreements for emergency water supplies. In the near-term, MPWD could also analyze the feasibility of implementing local, service area-wide, graywater reuse program. Graywater reuse would necessitate that MPWD develop or use existing standards and best practices based on state and local health and safety requirements for safe, cost-effective, and reliable installations.³¹

In the near-term, the feasibility for funding and implementation of graywater reuse and recycled water installation of recycled water ‘fill stations’ in or near the MPWD service area could be investigated. Recycled water fill stations could be used for long-term, multi-year droughts to support minimum requirements for landscaping, especially heritage trees. Fill stations could be used by landscape contractors and others to fill water tank trucks or containers to maintain landscapes. Such ‘fill stations’ have been installed in other service areas in California.

The potential for implementation of large-scale graywater reuse³² and recycled water distribution in MPWD’s service area as alternate, non-potable water supplies are longer-term, complicated, large scale, and costly projects. Resources will be needed for planning and implementing such alternate supplies. Additional capital is needed for feasibility analysis, public outreach, design, and installation, as well as on-going compliance monitoring and maintenance.³³

Table 3-4. Supply Augmentation and other Actions (Submittal Table 8-3).

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier Drop down list <i>These are the only categories that will be accepted by the WUE data online submittal tool</i>	How much is this going to reduce the shortage gap? <i>Include units used (volume type or percentage)</i>	Additional Explanation or Reference <i>(optional)</i>
<i>Add additional rows as needed</i>			
1- 5	Other Actions- Graywater reuse	0 – 1 %	Implementation will likely require resources for coordination with San Mateo Co. Health Dept. Large-scale water savings will be difficult to achieve and verify. Monitoring water savings and other impacts will require new funding and resources.
5	Other Actions - Use existing recycled water fill station (s)	0 – 1%	Large-scale water savings will be difficult to achieve and verify. Monitoring water savings and other impacts will require new funding and resources.

³¹ San Mateo County graywater implementation requirements. <https://www.smchealth.org/alternative-water-program>

³² <https://www.nap.edu/catalog/21866/using-graywater-and-stormwater-to-enhance-local-water-supplies-an>

³³ California Recycled water regulations: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/RecycledWater.html

5	New Recycled Water - Install new recycled water fill stations	1 – 5%	Multi-year project, costly project, likely implementation in many phases, will require new funding and resources
6	New Recycled Water - Install recycled water distribution system	To be determined	Long-term, costly project, likely implementation in many phases, will require new funding and resources
NOTES: The feasibility and cost-effectiveness of the above-listed augmentation measures will need to be evaluated in detail for local and regional implementation. Funding and resources will be necessary to develop feasibility studies, design and install the alternate supplies, develop Best Practices and compliance criteria, and monitor and maintain the infrastructure.			

MPWD plans to work with neighboring water agencies and BAWSCA to develop collaborative options to augment its supply for non-potable and potable demands to provide additional dry-year supply sources.

If MPWD pursues implementing alternative water supplies, it will need to monitor the effectiveness of adding these supplies, impacts on water use, the effects on demand reduction. Fortunately, MPWD's AMI system allows for efficient data collection and analysis.

For the long term, SFPUC is investing resources for the long-term reliability of its water supply portfolio. As presented in Chapter 7 of MPWD's 2020 UWMP, SFPUC is working on potential water augmentation projects and additional storage to supplement its anticipated supply gaps due to hydrologic, climate, and regulatory changes that it projects will impact its future supply.

If SFPUC's supply shortfalls occur, as presented by SFPUC in its highly uncertain "with BDP" scenario, MPWD will experience significant water demand cutbacks. The cutbacks would be unprecedented and most severe for multiple dry years. To reduce the need for continued extreme use reductions, MPWD is considering accelerating seeking additional water supplies, including recycled water.

3.4.3 Operational Changes

During shortage conditions, MPWD operations may be affected by reducing demand and/or augmenting supply. The MPWD reviewed its operational procedures to identify changes that could be implemented to address water shortage on a short-term basis, including:

- Reduce or temporarily stop system flushing operations.
- MPWD may suspend temporary water service meters.
- Delay planned projects.
- Defer water storage tank projects that require emptying tanks.
- Defer planned system outages.
- Temporarily reduce pressure in zones during periods of low demand, when safe.
- Implement other short-term operational adjustments to increase water savings while maintaining safe conditions in system water quality and supply.

Multi-year extended and severe water shortages, such as those beyond MPWD's Level 4, will necessitate an increase in system water quality and demand monitoring, analysis, and close tracking of the data. Operational changes will necessitate that MPWD develops a strategy for additional water quality and system monitoring. Management of the additional data collection and its analysis will also likely necessitate additional resources.

3.4.4 Additional Mandatory Restrictions

The California Water Code Section 10632(a)(4)(D) specifies that: “additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions” be included among the WSCP’s shortage response actions. MPWD has identified additional mandatory restrictions in its Resolution 2016-04 that references Water Code 10632 and Ordinance 113.

Following a notice to customers, MPWD may prohibit other water uses as determined by the MPWD’s General Manager and Board of Directors.

3.4.5 MPWD’s Emergency Response Plan and Hazard Mitigation Plan

MPWD is responsible for managing the response effort within its service area in the event of an emergency. To avoid duplicating requests and efforts, MPWD can use the California Standardized Emergency Management System (SEMS) and the National Incident Management System (NIMS). SEMS and NIMS implement an organized system of information flow to ensure a timely and coordinated effort in response to any sort of disaster.

MPWD’s Draft Emergency Response Plan (ERP)³⁴ will be activated once the Emergency Operations Center (EOC) is notified. The MPWD’s emergency plan may be activated automatically under rare circumstances where communication is not possible such as during a significant earthquake or fire.

In compliance with Section 2013 of America’s Water Infrastructure Act (AWIA) of 2018, MPWD is in the process of re-certifying its ERP by the required deadline of December 30, 2021. The updated ERP will provide guidance and direction for MPWD’s staff both during an emergency and for the post emergency response. MPWD’s EOC may be activated to act as a coordination center for all the MPWD’s emergencies.

MPWD’s primary EOC is located at the MPWD office at 3 Dairy Lane in Belmont. The backup location has emergency radio transmitters and power can be provided with portable generators. District phone service can also be paired with any cell or land line. System maps and mobile radios are also available and stocked in all MPWD maintenance vehicles.

The EOC is equipped with radios, telephones, emergency power equipment, and supplementary documents and supplies. Also available are facility diagrams and summaries of exchange capacities at interconnections between adjoining water systems and information on designated emergency connection sites. In addition, emergency pumps and equipment for portable hydrant systems are available at the MPWD Headquarters. The EOC would be the central point of coordination for government services, communications, and emergency public information.

The MPWD actively participates with the San Mateo County Emergency Managers Association (EMA) and has prepared a section on hazard mitigation for its water system in the San Mateo County Local Hazard Mitigation Plan (SMC LHMP)³⁵. MPWD staff attend monthly meetings in addition to annual and periodic

³⁴ MPWD, Draft Emergency Response Plan, 2020.

³⁵ San Mateo County Local Hazard Mitigation Plan, Chapter 5, 2016.

<https://cmo.smcgov.org/multijurisdictional-local-hazard-mitigation-plan-resources>.

emergency drills and community tabletop exercises. As part of the SFPUC RWS, the MPWD also participates in emergency training exercises with BAWSCA agencies and the SFPUC.

Communication protocols have been established and damage evaluation procedures have been defined. In the immediate period following a major disaster, such as an earthquake, the MPWD's initial task would be to evaluate the water supply system and present a status report with the General Manager as quickly as possible. If a water shortage emergency were to be declared, the Board of Directors would be assembled to make a Declaration of the Water Shortage Emergency. The Board President and/or the General Manager would be responsible for media contacts and press briefings as necessary.

The MPWD has an inventory of resources, equipment, materials, supplies, and maintains specific vehicles in a "ready to respond" condition. The MPWD also has arrangements with several local contractors for emergency backhoe and underground work in the event there is more damage than the MPWD staff can manage.

The goal of the MPWD's post-disaster response is to keep the water transmission and storage system operational to the greatest extent possible. Emergency response protocols specify the leadership role of the General Manager (or his/her designee), procedures for activating the EOC, mobilization of necessary staff and other support, and taking action to cope with the specific situation. The repair or shut-down work would be coordinated from the EOC, and field crews would report progress to the emergency operations team. Regular progress reports would then be filed with the appropriate police department and/or fire district.

Communication from MPWD about the emergency would be broadcast to alert the service area customers and notices would be issued via public announcements (e.g., radio, TV, social media, web site). Written notices may also be used (e.g., letters or door hangers, or other means) to advise customers of the water issue (e.g., shortage, water quality impacts, etc.) and its anticipated duration. All customers would then be similarly noticed when the situation is resolved.

MPWD will address a catastrophic water shortage according to the appropriate water shortage level and corresponding response actions. MPWD may need to immediately require Level 5 or 6 water use reductions due to catastrophic situations, such as a major earthquake or fire. Such catastrophic events could trigger temporary but significant water shortages. MPWD's ERP and HMP (included in San Mateo County's Local Hazard Mitigation Plan, SMC LHMP) provide detailed instructions for managing catastrophic events that impact MPWD's water system. MPWD will follow its ERP in the event of a catastrophic water supply interruption.

The objectives of the MPWD's ERP are:

- Protect public health by maintaining water quality standards.
- Maintain, restore, or establish water services to meet requirements of emergency services and the essential needs of MPWD's community.
- Assess damage and initiate repairs within the service area and report damage to the MPWD's Emergency Operations Center (EOC).
- Request and coordinate mutual aid resources through MPWD's EOC.

MPWD may also initiate a mutual aid request if MPWD is unable to provide the level of emergency response support required for the situation. MPWD has an informal agreement with the City of Belmont on mutual assistance during an emergency.

MPWD may find it necessary to inform the public and require a ‘call to action’ to safeguard public health and safety. If potentially water quality may be impaired, MPWD will address the issue as soon as possible and take the necessary steps to verify the water quality of its system. MPWD will communicate with customers and appropriate authorities the results of its assessment about the condition of its system.

3.4.6 Seismic Risk Assessment and Mitigation Plan

Earthquakes are common in California and are recognized as high probability occurrences in many regions across the state. Per the Water Code Section 10632.5, MPWD is required to assess its seismic risk to water supplies as part of their WSCP. The plan also must include the mitigation plan for the seismic risk(s).

Since the MPWD purchases 100 percent of its water from the SFPUC, it is highly dependent on the SFPUC RWS infrastructure reliability. The SFPUC conveyance system crosses five major faults and the majority (about 85 percent) travels 167 miles through pipelines and tunnels from the Hetch-Hetchy watershed in the Sierra Nevada Mountains. SFPUC also has four major storage facilities and distribution lines in the San Francisco Bay Area. Both the regional and San Francisco Bay Area parts of the SFPUC system are vulnerable to seismic events. However, the SFPUC’s nearly completed Water System Improvement Program (WSIP) provides improvements in reliability for water delivery and supply through the SFPUC RWS. The SFPUC’s 2020 Capital Improvement Program (CIP) includes various projects to enhance reliability of the SFPUC RWS.³⁶

MPWD’s seismic risk assessment for its system is part of the San Mateo County Local Multi-Hazard Mitigation Plan (San Mateo County Local Hazard Mitigation Plan, Volume 2, Section 3, Part 2, Chapter 4, 2016) that is required under the federal Disaster Mitigation Act of 2000 (Public Law 106-390). MPWD’s San Mateo County Local Hazard Mitigation Plan is included in Appendix 12.³⁷ The SMC LHMP is in the process of being updated.³⁸ As required, MPWD also has an ERP that describes strategies, resources, plans, and procedures utilities can use to prepare for and respond to an incident, natural or man-made, that threatens life, property, or the environment.

MPWD’s Capital Improvement Program (CIP), includes seismic retrofits for its older tanks. For example, project 15-89 – Dekoven Tanks Replacement – Replaces the existing 1.0 MG and 0.7 MG originally constructed in 1952 with two 0.8 MG tanks to improve seismic reliability.

The California Office of Emergency Services provides an online planning tool My Plan for local governments and others (<https://www.myplan.caloes.ca.gov/>). This includes many layers related to seismic risk that can be explored by users. Maps include, but are not limited to, information on shaking hazards, landslide zones, liquefaction, and fault lines.

³⁶ SFPUC 2020 Capital Improvement Plan, adopted February 11, 2020. [San Francisco Public Utilities Commission : 2020 Agendas-Minutes](#)

³⁷ San Mateo County Local Hazard Mitigation Plan, Chapter 5, 2016. <https://cmo.smcgov.org/multijurisdictional-local-hazard-mitigation-plan-resources>

³⁸ <https://cmo.smcgov.org/blog/2021-03-12/county-launches-multijurisdictional-local-hazard-mitigation-plan-update>

3.4.7 Shortage Response Action Effectiveness

Unforeseen events and conditions in addition to droughts, can also lead to temporary or long-term water shortages. For each specific Shortage Response Action identified in MPWD's WSCP, Table 3-4 (MPWD 2020 UWMP, Submittal Table 8-2), the corresponding estimate is included as a percent range for water savings to reduce the gap between supplies and demands.

To the extent feasible, MPWD has estimated percent savings for the chosen suite of shortage response actions, which can be anticipated to deliver the expected outcomes necessary to meet the requirements of a given shortage level.

In practice, due to many local variables impacting water use and typical combined implementation of drought response actions (multiple actions are typically employed at the same time, e.g., local various public outreach campaigns combined with regional requirements, drought water rates, etc.), actual and specific savings per response action may differ, because of diverse local conditions and other variables. Therefore, these percent ranges are estimates based on studies and experience from previous droughts.

MPWD's experience from the 2012 - 2016 drought³⁹

During the most recent 2012 – 2016 drought MPWD used its WSCP and implemented a diversity of conservation measures to reduce its service area water use by as much as 27%. The conservation and restriction measures that were employed by MPWD are listed below. The conservation measures were used in combination, not individually, and controlled studies were not performed to measure water savings from each specific action.

- Public education and outreach – (Newsletter, Bill Statements, Community Banner, Website, Events, School Programs, Conservation Kits (sink aerator, shower heads, tank diverters).
- Rebates – for efficient: washing machines, toilets; lawn-be-gone.
- Regional landscape education classes.
- Service area campaign – “20% Mandatory reduction” call-to-action.
- Use of door hangers for the timely Repair of Leaks, Breaks and Malfunctions (48 hours).
- Water waste submission form – added to MPWD's website.
- Hose shut-off nozzle requirement implemented.
- Irrigation Limitations – implemented requirements for no irrigation between Specific Times (10AM to 6PM).
- Hotels – implemented “opt-out linen services”.
- Restaurants – implemented “Can serve water only upon request”.
- Power Washers – prohibited use of power washers with potable water for all customers and dust control.
- Sidewalks or Driveways (Hard Surfaces) – prohibited use of potable water for washing down hard surfaces.
- Decorative water fountains or features – prohibited use.
- Car Washing Not Allowed with potable water.
- Swimming Pool Restrictions – prohibited draining/refilling, required covers.

³⁹ MPWD staff, March 23, 2021.

Additionally, MPWD provided free-of-charge conservation kits and savings devices (aerators, shower heads, tank bank, toilet, dye tabs, etc.); water bills stuffers with messages about saving water, promotions with “save water” messages, such as dish squeegees, flapper valves, and buckets.

MPWD’s key communication efforts in support of the demand reduction actions and to convey related information during the last drought, from 2012 to 2016, included:

- Communication campaign: “If Everyone saves a little, we can all save a lot” notice sent in bills.
- Communication campaign: started Conservation Newsletter.
- Directive comes from SFPUC for a 10% voluntary reduction: 10 Ways to Save 10% mailer dropped to customers.
- Governor Brown Executive Order (EO): “Drought state of emergency”.
- Initiated 9-week Public Safety Announcement marketing “the need to conserve” in the Daily Journal newspaper.
- SWRCB monthly water conservation (consumption reporting) started. Notice about state mandate mailed to customers. 20X20 Banner was hung on City of Belmont flagpole and posted on the back of MPWD’s District office that faces State Highway 101.
- Carlmont Shopping Center – water conservation message on entry sign, restaurants received notice to only serve water upon requests, developed report to inform the Board monthly on water savings Ordinance 111 Implementing Stage 2 Water Shortage Response of 2016 WSCP Regarding Mandatory Restrictions on Outdoor Use is adopted by the Board.
- Governor Brown extends EO “Drought state of emergency”.
- Grocery cart water conservation campaign started at Safeway on El Camino in Belmont.
- Customer water waste complaint tracking started, using MPWD’s web submission form.
- Rotating water conservation web banners started on MPWD’s website. “20 Ways to Save 20%” mailer sent to customers.
- Governor Brown extended a third EO with key provisions ordering the SWRCB to impose restrictions to achieve a 25% reduction in potable urban water usage through February 28, 2016.
- MPWD implemented BAWSCA’s drought marketing campaign in coordination with SFPUC.
- MPWD joined state-wide “Save Our Water” campaign.
- MPWD developed its Annual Water Conservation Report.
- Landscape Ordinance 115 for Water Efficiency was adopted by MPWD’s Board.
- Adopted by MPWD’s Board of Ordinance 113, Implementing Stage 2 Water Shortage Response actions (MPWD’s 2016 WSCP) for Mandatory Restrictions on Outdoor Use, BAWSCA & MPWD host Water Conservation 101 class at the City of Belmont library.

The above actions saved up to 27% of MPWD’s 2013 (baseline) service area water demand.

During future, extensive shortages, MPWD will need to monitor its service area sectors and demand reductions closely. By using its AMI data, MPWD has existing technology to help it identify the most productive and least disruptive combinations of reduction actions.

3.5 Communication Protocols

This section addresses communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments regarding any current or expected shortages, implementation of corresponding shortage response actions, and related information.

Timely and effective communication is a key element of MPWD's WSCP implementation. Per the Water Code Section 10632 (a)(5), the MPWD has established communication protocols and procedures to inform customers and local, regional, and state governments regarding any current or predicted shortages (Section 10632.1). Also, MPWD's procedures include communication about shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.

Prior to a water shortage level declaration, unless it is a sudden catastrophic event requiring immediate action, MPWD informs its customers about the water shortage levels, Level definitions, and targeted water savings for each Level. MPWD also provides guidelines for customers to follow during each Level and directs customers to its web site for current information on its supply and demand response conditions. The type and degree of communication varies with each shortage level, thus MPWD has established predefined and actionable communication protocols.

Roles and Responsibilities

The MPWD General Manager is responsible for monitoring all potential water shortage conditions and makes recommendations to the MPWD Board of Directors regarding the implementation of its WSCP Levels 1 through 6. The MPWD General Manager also manages issues of timing, policy, public relations, financial solvency, customer education, facility operations, environmental considerations, and public health. The MPWD General Manager routinely updates the MPWD Board of Directors about water supply conditions at monthly and special Board meetings. During extreme water shortages, updates may occur more often by e-mail or by phone, consistent with the requirements of the Ralph M. Brown Open Meetings Act.

In emergencies, such as earthquakes or fires, the General Manager may need to make in-the-field decisions to mitigate potentially hazardous consequences of the emergency. In such situations, the General Manager or a designee will inform the Board of Directors and its President about the emergency as soon as practicable.

It is the responsibility of the MPWD Board of Directors to formally declare a water shortage. The specific Levels and triggers to activate each Level, based on a percentage reduction in water supply will be determined in cooperation with the SFPUC, BAWSCA, and regulatory requirements specific to the shortage conditions. MPWD will communicate with customers about the required actions for specific shortage Levels, targeted water savings, and water-saving guidelines. The concluding task in any water shortage management effort is MPWD's final report to the Board, as well as communication with the MPWD's customers summarizing the event and its consequences for MPWD.

As a member of BAWSCA, MPWD works and coordinates with BAWSCA and SFPUC to stay current about water supply conditions. MPWD attends monthly BAWSCA agency and frequent SFPUC meetings and during water shortages receives monthly or more frequent water supply status reports. BAWSCA and SFPUC keep MPWD staff informed on current conditions and forecasts.

Additionally, MPWD monitors directives and policies from the California State Water Resources Control Board (SWRCB) and Department of Water Resources (DWR). When water shortage conditions are announced, MPWD intensifies its efforts to monitor the evolving conditions and develop responses to projected shortfalls. Actions that may be taken by the MPWD for drought and other water shortage conditions include:

- Review, communicate, and comply with legal and regulatory requirements for drought preparedness. This includes mandatory regulations by Governor Executive Orders, State Water Resources Control Board or other authority associated with reduction targets or other mandates.
- Review and update MPWD's WSCP or Ordinances⁴⁰ as needed based on new monitoring data, changes in supply, operational changes, or changes in expected water demands.
- Provide education and outreach to customers on efficient and reasonable uses of water and best ways to save, with increased intensity in messaging during times of drought.
- Continue MPWD's water loss management⁴¹ procedures (including leak identification and repair).
- Enforce prohibition of wasted water per the MPWD Ordinance 103, Section 4.2.
- Enforce conservation policies and water-efficient plumbing codes.
- On an as-needed basis and at a minimum of every 5 years, review and refine the rate stabilization policy relating to drought impacts.
- Update educational materials on an as-needed basis.
- Invoke drought/emergency water rates, as needed.

MPWD's website⁴² includes information about on-going conservation under Normal conditions, such as:

- Water saving tips.
- Free water conservation kits.
- Valuable rebate programs.
- Leak detection assistance.
- Free hands-on landscape workshops.
- Water conservation annual reports.
- Online customer water use reports.

3.6 Compliance and Enforcement

This section describes MPWD's actions to monitor customer compliance, enforcement, appeal, and exemption procedures when shortage response actions are triggered as determined pursuant to Section 10632.2.

Per the Water Code Section 10632 (a)(6), MPWD has defined customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions of the MPWD Ordinances. MPWD has instituted various Ordinances and Resolutions⁴³ to manage water demand and consumption. They are presented in Chapter 4 of MPWD's 2020 UWMP and in Section 3.7 below.

⁴⁰ Water Service Ordinance 103 Section 4.2 discusses water waste. Ordinance 112 is also important because it amends sections in Ordinance 103. Ordinance 111 implemented Level 2 water shortage response to the MPWD's WSCP regarding mandatory restrictions on outdoor water use. Ordinance 113 amended sections in Ordinance 111.

⁴¹ Annual AWWA Water Loss Audit software. <https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control>

⁴² MPWD's website: <https://www.midpeninsulawater.org/water-conservation-overview.php>

⁴³ <https://www.midpeninsulawater.org/legislation>

MPWD will coordinate with BAWSCA, the city of Belmont, San Carlos, and San Mateo County within its service area for the possible proclamation of a local emergency. Once the MPWD Board declares a water shortage emergency, MPWD will communicate with its customers that a specific WSCP Level is invoked and requires compliance. Customers will also be notified about MPWD's enforcement measures for non-compliance.

For the first and subsequent water waste violations, penalties will be issued according to MPWD's Ordinance 103, Article 4.2, and MPWD Ordinance 111, Section 4. While maintaining adequate minimum fire flows for those homes with fire sprinklers, the MPWD may install a flow restrictor on the service line if customer's average daily usage is not reduced to within the allocation threshold after 10 days from the date of the written notice.

A flow restrictor may be installed for a minimum of 10 days. The flow restrictor may remain in place during the irrigation season until December 1st or the MPWD may suspend service temporarily until the violation is corrected. The flow restrictor may be removed based on the General Manager's approval and payment of all outstanding penalty and water service charges have been paid. A minimum of a reconnection fee will be charged per MPWD Water Service Ordinance 103. A customer may appeal the termination of water service or installation of a flow restrictor in writing to the General Manager per MPWD Ordinance 111, Section 5.

MPWD works collaboratively with its customers and provides timely information about water conservation measures on its website⁴⁴. During the recent 2012-2016 drought emergency restrictions, the MPWD customers and community, through their active support for conservation, illustrated great community resolve by reducing water use by up to 27% which was greater than the 2015 25% state-wide reduction mandated by the Governor's Executive Order.

In the future, if severe potable water reductions are mandated, MPWD could enforce water use prohibitions and water shortage emergency rates using MPWD's Ordinance 112, Attachment 103A, Schedule of Rates and Fees with Ordinances 113 amending 111.

3.7 Legal Authorities

MPWD has the legal authority to implement and enforce this water shortage contingency plan. California Constitution article X, section 2, and California Water Code (CWC) section 100 provide that water must be put to beneficial use, the waste or unreasonable use or unreasonable method of use of water shall be prevented, and the conservation of water is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and the public welfare. In addition, CWC Section 375 provides MPWD with the statutory authority to adopt and enforce water conservation restrictions, and CWC sections 350 et seq. authorize MPWD to declare a water shortage emergency and impose water conservation measures when it determines that the MPWD may not be able to satisfy ordinary demands without depleting supplies to an insufficient level.

If necessary, the MPWD shall declare a water shortage emergency in according with CWC Chapter 3 (commencing with Section 350) of Division 1. Once having declared a water shortage, MPWD is provided

⁴⁴ MPWD website. <https://www.midpeninsulawater.org/tips>

with broad powers to implement and enforce regulations and restrictions for managing a water shortage. For example: CWC section 375(a) provides:

Notwithstanding any other provision of the law, any public entity which supplies water at retail or Wholesale for the benefit of persons within the service area or area of jurisdiction of the public entity may, by ordinance or resolution adopted by a majority of the members of the governing body after holding a public hearing upon notice and making appropriate findings of necessity for the adoption of a water conservation program, adopt and enforce a water conservation program to reduce the quantity of water used by those persons for the purpose of conserving the water supplies of the public entity.

(CWC Section 375(a).) CWC Section 375(b) grants MPWD with the authority to set prices to encourage water conservation.

Under California law, including CWC Chapters 3.3 and 3.5 of Division 1, Parts 2.55 and 2.6 of Division 6, Division 13, and Article X, Section 2 of the California Constitution, is authorized to implement the water shortage actions outlined in this WSCP and in its ordinances and resolutions set forth below. In water shortage cases, shortage response actions to be implemented will be at the discretion of MPWD and will be based on an assessment of the supply shortage, customer response, and need for demand reductions as outlined in this WSCP.

It is noted that upon proclamation by the Governor of a state of emergency under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions, the state will defer to implementation of locally adopted water shortage contingency plans to the extent practicable.

Water waste is prohibited in all Normal (Level 0) conditions and water shortage Levels in the MPWD service area. The MPWD has adopted the Mandatory Restrictions on Outdoor Water Use Ordinance 111.⁴⁵ MPWD's restrictions and prohibitions on end uses, as well as any penalties, charges, or other enforcements that MPWD has developed are presented earlier in Table 3-3.

Per Water Code Section 10632 (a)(7)(A) requirements, the following are MPWD's legal authorities that enable it to implement and enforce its shortage response actions.

- Ordinance No. 121 – “An Ordinance Amending MPWD Water Service Ordinance No. 103 Regarding Termination of Water Service”. The purpose of this Ordinance is to provide the legal authority and procedures to terminate a water service, when needed.
- Resolution No. 2020-01 – Adopting “The Residential Water Service Termination Policy”.
- Ordinance 111 – Amending Level 2 water shortage response of MPWD's WSCP for mandatory restrictions on outdoor water use. The purpose of this Ordinance is to provide the legal authority to support and enforce mandatory restrictions on outdoor water use during WSCP Level 2.
- Ordinance 112 Amending the Water Service Ordinance No. 103 for the Mid-Peninsula Water District regarding Rates and Charges. The purpose of this Ordinance is to provide the legal authority to support, enforce, and set the schedule of rates and fees.

⁴⁵ MPWD Ordinance 103, Section 4.2. Ordinance 111 implemented Level 2 water shortage response to the MPWD's WSCP regarding mandatory restrictions on outdoor water use. Ordinance 113 amended sections in Ordinance 111.

- Ordinance 115 Water Efficient Landscape Ordinance (WELO), “Adopting water-efficient landscaping”. The purpose of this Ordinance is to provide the legal authority to support and enforce installation of water-efficient landscaping.
- Ordinance No. 120 – “An Ordinance Amending Attachment "A" Regarding Rates and Charges to The Water Service Ordinance for The Mid-Peninsula Water District”. The purpose of this Ordinance is to provide the legal authority to support and enforce MPWD’s tiered rates.

Upon declaring a water shortage emergency [Water Code Section 10632 (a)(7) (B)], to coordinate implementation of its WSCP Levels and in the event of a local emergency declaration under the California Emergency Services Act (Article 2, Section 8558), MPWD’s General Manager will contact the City of Belmont, the City of San Carlos, and San Mateo County to coordinate implementation of its WSCP Levels [Water Code Section 10632 (a)(7)(C)].

Table 3-5. Agency Contacts and Coordination Protocols

Contact (Office/Department)	Agency	Coordination Protocol Options
City Manager’s Office	City of Belmont	Call, email, meet, send letter
City Manager’s Office	City of San Carlos	Call, email, meet, send letter
County Manager’s Office	San Mateo County	Call, email, meet, send letter

3.8 Financial Consequences of WSCP

DWR requires suppliers to describe the overall anticipated financial consequences to the Supplier of implementing the WSCP [Water Code Section 10632(a)(8)]. Additionally, DWR requires suppliers to describe the additional costs of discouraging excessive water use during a drought emergency, as stated in Water Code Section 10632(a)(8)(C).

MPWD’s actions can address various water shortage conditions, but they may have a potential impact on MPWD’s expenditures and revenues. MPWD is in the process of addressing the six new water shortage levels and analyzing various rate options to minimize financial impacts to ratepayers and its operations.

Typically, MPWD’s expenditures do not decline in proportion to reduced water sales, because a large part of the expenditures is related to fixed capital costs or on-going maintenance and operations. Nonetheless, to minimize the potential financial impacts of water supply shortages that necessitate water consumption reductions, MPWD adopted tiered pricing and water shortage emergency rates, and a pass-through provision for additional increases to SFPUC Wholesale water rates that could or would be enacted. Measures to overcome revenue and expenditure impacts are shown in Tables 3-6.

Table 3-6. Measures to Overcome Revenue Impacts

Measures	Revenue Impacts
Rate Adjustment	Offset loss in revenue
Implement emergency water shortage rates	Offset loss in revenue
Use of financial reserves	Offset loss in revenue
SFPUC pass-through rate adjustment	Offset increase in Wholesale water rates
Water Capacity Charges	Support Capital Improvement Program

The MPWD's tiered pricing and water shortage emergency rates may be enacted during water shortages. Further rate increases could also be part of a drought rate structure.

Pursuant to California Government Code 53756, MPWD adopted a pass-through provision for any additional increases in SFPUC Wholesale water rates above projected SFPUC rates. Future pass-throughs would be implemented by increasing the MPWD's proposed Water Consumption Charges by exact amount of the increase in cents per hundred cubic feet (CCF, 748 gallons) in excess of the assumed SFPUC Wholesale rates. Prior to initiating water shortage emergency (pursuant to Water Code Section 350 and/or Water Code Section 31026) and pass-through for SFPUC Wholesale rates, the MPWD will send notification to all customers at least 30 days prior to implementation. Water Shortage Emergency Rates may be implemented by authorization of MPWD's Board of Directors.

3.9 Monitoring and Reporting

Per Water Code Section 10632(a)(9), MPWD is required to provide information about the monitoring and reporting requirements and procedures that it has implemented to ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.

Monitoring and reporting key water use metrics are fundamental to water supply management and planning. Monitoring is also essential in times of water shortage to ensure that the response actions are achieving their intended water use reductions, or if improvements, or new actions need to be considered (see Section 3.10). Monitoring for customer compliance tracking is also useful in enforcement actions.

MPWD uses its AMI metering system to monitor and track water consumption for its six water-use sectors (see Chapter 3, MPWD 2020 UWMP). Under normal conditions, MPWD routinely monitors its potable water consumption as well as production from SFPUC's AMI meters. MPWD's consumption and SFPUC's production AMI metering data are automatically recorded daily and MPWD reviews the data monthly.

The monthly consumption and production data are queried in MPWD's Springbrook billing system. The data are used for billing and analyzing and reporting monthly and annual water consumption and trends for MPWD's six sectors. The AMI and billing data are also used for tracking MPWD's system water losses. Routinely, MPWD's consumption data are presented to its Board and submitted to BAWSCA (BAWSCA database) and DWR (monthly conservation reports, MPWD's UWMPs). Starting July 1, 2022, MPWD will also use the data for its Annual Assessment report, required by DWR. Additionally, the SWRCB is preparing regulations for future monthly reporting of water production and other water uses, along with associated enforcement metrics.

The consumption data from the Springbrook billing system will be used to measure the effectiveness of water shortage contingency Levels that may be implemented when Levels of water shortage are declared by MPWD. MPWD will follow the impacts of its implementation of those Levels, as appropriate, based on the risks at the time when its supplier, the SFPUC, declares supply shortfalls, or when a supply shortage occurs due to another emergency condition.

Routinely, MPWD also participates in monthly BAWSCA water resources and management group meetings that review regional data and monitoring. For example, SFPUC supply and agency consumption data, reporting requirements, and other related matters are reviewed. MPWD's General Manager is

responsible for coordinating the data management and reporting to its Board, customers, BAWSCA, SFPUC, and regulatory agencies.

3.10 WSCP Refinement Procedures

The Legislature recognizes that the WSCP is best prepared and implemented as an adaptive management plan. Therefore, MPWD's WSCP is prepared and implemented as an adaptive management plan. Per Water Code Section 10632 (a)(10), MPWD is required to provide reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of its WSCP to ensure its water shortage mitigation strategies are appropriate to implement during all six Levels of water shortages. MPWD plans to continue to monitor water supply and demand monthly and review and evaluate trends in sector consumption. In the event of excessive consumption, MPWD will re-evaluate the effectiveness of existing local and regional conservation measures and consider additional conservation measures. Typically, during regional water shortages, MPWD works with BAWSCA and member agencies to develop and implement regional conservation actions.

MPWD will use its historic and current AMI and Springbrook billing data, institutional knowledge, and practical experience from past water shortages and droughts to adjust or update the WSCP water shortage actions. MPWD will continue to evaluate existing and new water shortage reduction actions to determine their effectiveness, and incorporate changes, as needed, into the WSCP.

MPWD's WSCP is typically revised and updated during the five-year UWMP update cycle. However, if revisions are warranted before the next UWMP is updated, the WSCP will be updated outside of the UWMP update cycle. While preparing the Annual Assessment each year, MPWD staff will routinely review the WSCP and, if needed, prepare recommendations for MPWD's Board to consider.

3.11 Special Water Feature Distinction

Per Water Code Section 10632 (b), MPWD has defined water features as: water features are artificially supplied with water, including ponds, lakes, waterfalls, and fountains. Water features are not swimming pools or spas. Swimming pools and spas are defined separately in subdivision (a) of Section 115921 of the Health and Safety Code.

Non-pool or non-spa water features may use or be able to use recycled water, whereas swimming pools and spas must use potable water for health and safety considerations. Limitations to pools and spas may require different considerations compared to non-pool or non-spa water features.

MPWD's WSCP, as required, specifies that when MPWD includes a limitation on any water restrictions specific to ponds, lakes, waterfalls, and fountains, they are not applicable for swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code. All ponds, lakes, waterfalls, and fountains shall have recirculating systems. A once-through water supply to these water features is prohibited. If MPWD includes limitations on pools or spas, MPWD will list those separately from limitations on water features.

Below are examples of restrictions or prohibitions that may fall within the water features and swimming pools categories:

- Restrict water use for decorative water features, such as decorative fountains, and they may only be operated if they use recirculating water. During certain water shortage Levels, decorative water features shall not be allowed to operate.

- Require covers for pools and spas because they reduce evaporation during hours that the pool or spa is not in use; allow filling of swimming pools only when an appropriate pool cover is in place.

3.12 Plan Adoption, Submittal and Availability

To support the public process MPWD notified DWR that it is extending its public comment period beyond the July 1 submittal date, to July 22, 2021 (Appendix 2). MPWD's Board of Directors and its General Manager considered it important to extend the public comment period, to ensure sufficient time for its public input process.

Per Water Code Section 10632 (a)(c), MPWD provided notices of more than 60 days in advance of the availability of its draft 2020 UWMP and draft 2020 WSCP. Also as required, MPWD provided two weekly notices for two consecutive weeks about its first and second public hearings on June 24 and July 22, 2021. The MPWD Board considered the adoption of its 2020 UWMP and WSCP on September 23, 2021. The public review drafts of the 2020 UWMP and the 2020 WSCP were posted prominently on MPWD'S website, <https://www.midpeninsulawater.org/> , on June 10, 2021, well in advance of the public hearings.⁴⁶

Copies of the draft WSCP were made available for public inspection at the MPWD's offices. Copies of MPWD's 60-day notice and the two consecutive notices prior to the first and second MPWD's public hearing are included in Appendix 4. The MPWD Board's Adoption Resolution for the 2020 UWMP and WSCP is included in Appendix 8.

Due to the COVID-19 State of Emergency and pursuant to the Brown Act waiver provided under the Governor's Executive Order, the hearings were held by web and teleconference only.

By October 1, 2021, MPWD's adopted 2020 UWMP and WSCP will be filed with DWR, and within 30 days of submittal to DWR, MPWD's 2020 UWMP and WSCP will be filed with the California State Library. MPWD will make electronic copies available to the City of Belmont, San Carlos, and San Mateo County, and to its customers on its website within the 30 days after filing with DWR.

Based on DWR's review of MPWD's WSCP, MPWD will amend its adopted WSCP, as required and directed by DWR.

If the MPWD revises its 2020 WSCP after its 2020 UWMP is approved by DWR, then an electronic copy of the revised WSCP will be submitted to DWR within 30 days of its adoption.

MPWD requests that users of the water supply and cutback data in its 2020 UWMP and WSCP contact MPWD staff for potential updates before using the 2020 UWMP drought cutback projections for their planning projects and referencing the drought allocations. MPWD anticipates updates from SFPUC for its water supply reliability and the DRA.

⁴⁶ Notices were posted on MPWD's website on 4/14/2021.

<https://www.midpeninsulawater.org/news>

<https://www.midpeninsulawater.org/documents#tabs-3>

4. REFERENCES

Association of Bay Area Governments (ABAG), 2017. Association of Bay Area Governments (ABAG) Plan Bay Area 2040. "Projections 2040 is the most recent in the Association of Bay Area Governments' series of statistical compendia on demographic, economic, and land-use changes in coming decades. The current version covers the period between 2010 and 2040. The projections illustrate how the region will accommodate growth if local jurisdictions adopt a set of policies consistent with the vision of Plan Bay Area. We make reasonable assumptions about the Bay Area's share of national economic growth informed by an understanding of the region's changing demographic characteristics. The distribution of growth within the region among counties, cities, and PDAs is built around expected local policies and infrastructure investment as well as historic economic behavior.

<http://projections.planbayarea.org/>

American Water Works Association (AWWA). G480 Standard and AWE Leaderboard web page.

<https://www.allianceforwaterefficiency.org/resources/topic/g480-standard-and-awe-leaderboard>

American Water Works Association (AWWA), 2017. *M52 Water Conservation Programs – A Planning Manual, 2nd Edition*. <https://www.awwa.org/Store/Product-Details/productId/61841578>

American Water Works Association (AWWA)., 2021. Water Loss Audit software.

<https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control>

BAWSCA, 2018. *Tier 2 Drought Implementation Plan (DRIP)*.

BAWSCA, June 26, 2020. Bay Area Water Supply and Conservation Agency (BAWSCA) Regional Water Demand and Conservation Projections Report.

BAWSCA, February 10, 2021. Common Language for BAWSCA Member Agencies' 2020 UWMPs. (Also, see Appendix 6.)

BAWSCA, March 1, 2021. Attachment B: Updated 2020 UWMP Drought Cutbacks, BAWSCA, (Also, see Appendix 6.)

BAWSCA, March 19, 2021. Common Language for BAWSCA Member Agencies' 2020 UWMPs.

BAWSCA, April 8, 2021. Attachment B, 2020 UWMP Drought Cutbacks/Allocations. (Also, see Appendix 6.)

BAWSCA, April 2021. BAWSCA Annual Survey, 2019-2020.

[http://bawasca.org/uploads/userfiles/files/Annual%20Survey%20FY%202019-20_FINAL\(1\).pdf](http://bawasca.org/uploads/userfiles/files/Annual%20Survey%20FY%202019-20_FINAL(1).pdf)

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>

California Department of Water Resources, 2017. *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16*.

http://www.water.ca.gov/wateruseefficiency/conservation/docs/20170407_EO_B-37-16_Final_Report.pdf

California Energy Commission, 2013. *Analysis of Standards Proposal for Residential Faucets and Faucet Accessories*, Docket #12-AAER-2C, prepared by Energy Solutions and Natural Resources Defense Council.

<https://efiling.energy.ca.gov/GetDocument.aspx?tn=71768&DocumentContentId=8103>

California Energy Commission, 2015. *Appliance Efficiency Regulations, California Code of Regulations, Title 20, Sections 1601-1609, Toilet, Urinal, Faucet, and Showerhead Regulations.*

California Energy Commission, 2014. *Staff Analysis of Toilets, Urinals and Faucets*, Report # CEC-400-2014-007-SD.
<http://droughtresilience.com/wp-content/uploads/2018/08/CEC-400-2014-007-SD.pdf>

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>

California State Legislature. Assembly Bill 715 (Laird), October 11, 2007.
http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200720080AB715

California State Legislature. Assembly Bill 1668 (Friedman), May 31, 2018.
http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB1668

California State Legislature, 1949. Government Code Section 6066.
http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV§ionNum=6066

California State Legislature, 1995. Health and Safety Code Section 116275.
https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=HSC§ionNum=116275.

California State Legislature, Senate Bill 407 (Padilla), October 11, 2009.
https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200920100SB407

California State Legislature. Senate Bill 555 (Wolk), October 9, 2015.
https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB555

California State Legislature. Senate Bill 606 (Hertzberg), May 31, 2018.
http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB606

California State Legislature. Senate Bill 837 (Blakeslee), July 1, 2011.
http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201120120SB837

California State Legislature. Water Code Section 1058.5.
https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT§ionNum=1058.5

California State Legislature, 1983. Water Code Section 10617, amended 1996.
https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT§ionNum=10617

California State Legislature, 1983. Water Code Section 10621.
http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT§ionNum=10621

California State Legislature, 1983. Water Code Section 10632.1.
http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=10632.1&lawCode=WAT

California State Legislature, 1983. Water Code Section 10632.5.
http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=10632.5&lawCode=WAT

California Water Code, Urban Water Management Planning Act: www.leginfo.ca.gov

Consortium for Efficient Energy website. www.cee1.org

DeOreo, W.B. (2016). *Residential End Uses of Water, Version 2 - 4309*. Denver, Colorado: AWWA Research Foundation. <https://www.waterrf.org/research/projects/residential-end-uses-water-version-2>

DeOreo, W.B., P.W. Mayer, Leslie Martien, Matthew Hayden, Andrew Funk, Michael Kramer-Duffield, Renee Davis, James Henderson, Bob Raucher, Peter Gleick and Matt Heberger. (2011). *California Single Family Water Use Efficiency Study*. Sacramento, California: Department of Water Resources. <http://water.cityofdavis.org/Media/PublicWorks/Documents/PDF/PW/Water/Documents/California-Single-Family-Home-Water-Use-Efficiency-Study-20110420.pdf>

Dilling, L. et al. 2019. Drought in Urban Systems: Learning lessons for climate adaptive capacity. *Climate Risk Management* 23, 32-42.

DWR Communication re: ABAG population data, Julie Ekstrom, DWR, emails to M. Laporte, ManageWater Consulting, Inc.: October 12, 2020.

Dziegielewski, B., J. C. Kiefer, W. DeOreo, P. Mayer, E. M. Opitz, G. A. Porter, G. L. Lantz and J. O. Nelson. (2000). *Commercial and Institutional End Uses of Water*. Denver, Colorado: AWWA, Research Foundation and American Water Works Association with Cooperation of the U.S. Bureau of Reclamation. Catalog No.90806. 264 pp. ISBN 1-58321-035-0. <http://ufdc.ufl.edu/WC13511002/00001>

GMP Research, Inc. (2019). 2019 U.S. WaterSense Market Penetration Industry Report, commissioned by Plumbing Manufacturers International. <https://www.safeplumbing.org/files/safeplumbing.org/documents/misc/7-1-19-WaterSense-2019-Report.pdf>

MPWD website: <https://www.midpeninsulawater.org/>

MPWD, Website: Level 1 Water Alert in effect for fiscal year 2020 – 21. <https://www.midpeninsulawater.org/water-conservation-overview.php>

MPWD, legislation: <https://www.midpeninsulawater.org/legislation>

MPWD, June 2020, DSS Model update.

MPWD Draft Emergency Operations and Response Plan, 2020.

MPWD, Ordinance 103, Section 4.2. Ordinance 111 implemented Level 2 water shortage response to the MPWD's WSCP regarding mandatory restrictions on outdoor water use. <https://www.midpeninsulawater.org/legislation>

MPWD, Water Service Ordinance 103 Section 4.2 discusses water waste. <https://www.midpeninsulawater.org/legislation>

MPWD, Ordinance 112 amends sections in Ordinance 103. <https://www.midpeninsulawater.org/legislation>

MPWD, Water Service Ordinance 112, Attachment "103A", Schedule of Rates and Fees, June 25, 2015. <https://www.midpeninsulawater.org/legislation>

MPWD, Ordinance 113 amended sections in Ordinance 111. <https://www.midpeninsulawater.org/legislation>

MPWD, Ordinance 115, “Water Efficient Landscape Ordinance,” effective as of February 1, 2016. <https://www.midpeninsulawater.org/legislation>

MPWD, Water Service Ordinance 103, Establishing, Updating and Re-codifying the Rules Regulations and Fees for Water Service by Mid-Peninsula Water District and Superseding all Prior District Ordinances and Amendments Thereto. <https://www.midpeninsulawater.org/legislation>

Oak Ridge National Laboratory, Energy Division. (1998). “Bern Clothes Washer Study, Final Report,” prepared for U.S. Department of Energy. <https://digital.library.unt.edu/ark:/67531/metadc691712/>

Plumbing Efficiency Research Coalition, 2012. *The Drainline Transport of Solid Waste in Buildings, PERC Phase 1 Report*, Table 2-A: Water Consumption by Water-Using Plumbing Products and Appliances – 1980-2012. http://www.map-testing.com/assets/files/PERC%20Report_Final_Phase%20One_Nov%202011_v1.1.pdf

San Mateo County Local Hazard Mitigation Plan, 2016. The SMC LHMP is in the process of being updated. <https://cmo.smcgov.org/multijurisdictional-local-hazard-mitigation-plan-resources>

SFPUC, January 22, 2021.

SFPUC, March 4, 2021. Common Language about rate impacts of water shortages. (Also, see Appendix 7.)

SFPUC, March 18, 2021. “Shift of Presentation Approach for SFPUC 2020 Urban Water Management Plan”, (Also, see Appendix 7.)

SFPUC, March 19, 2021. Water Supply Reliability with RWS purchase projections.

SFPUC, March 24, 2021. SFPUC DRAFT Water Supply and Demand Assessment Procedures. (Also, see Appendix 7.)

SFPUC, March 24, 2021. SFPUC DRAFT Emergency Preparedness Procedures (Also, see Appendix 7.)

SFPUC, June 11, 2021. SFPUC 2020 UWMP.

<https://www.sfpuc.org/about-us/policies-plans/urban-water-management-plan>

SFPUC, June 2, 2021. Regional Water System Supply Reliability and UWMP 2020.

State Water Resources Control Board. California Statutes web page (defining “Making Conservation a California Way of Life”).

https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/california_statutes.html

U.S. Congress. Energy Policy Act of 1992; amended in 2005. <https://www.congress.gov/bill/102nd-congress/house-bill/776/text/enr>; <https://www.epa.gov/laws-regulations/summary-energy-policy-act>; <https://www.gpo.gov/fdsys/pkg/BILLS-109hr6enr/pdf/BILLS-109hr6enr.pdf>

For Additional References – Please see MPWD 2020 UWMP References

5. APPENDICES – ALL APPENDICES ARE IN A SEPARATE VOLUME