# Water Cost of Service Rate Study Report

## East Bay Municipal Utility District

Prepared for:
East Bay Municipal Utility District

March 31, 2025

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# Executive Summary

East Bay Municipal Utility District (District) engaged Stantec Consulting Services, Inc. to conduct a water cost of service rate study (Study) to develop a water rate structure for calculating proposed water rates and charges beginning with Fiscal Year (FY) 2026 and 2027. The rate structure has been developed to proportionally recover costs from customers in accordance with the requirements outlined in California Constitution Article XIII D (Proposition 218).

The Study consists of three main phases:

1. **Revenue Requirement Determination:** This step evaluates the operating expenses, cash-funded capital project spending, and debt-service payments associated with maintaining and operating the water utility for the selected Test Year, FY 2024. Total revenue requirements amount to $814.9 million, including operating expenses, debt service obligations, and cash-funded capital project spending. Non-rate revenues in the Test Year total $153.6 million and are considered in the analysis as revenue offsets, yielding a rate revenue requirement of approximately $661.2 million to be recovered from water rates (rate revenue requirement).

2. **Cost of Service Analysis:** This step systematically allocates the rate revenue requirements into "system functions" reflective of the District's day-to-day operations, physical assets/existing infrastructure, and plans for near-term future capital investment. These system functions include raw water supply, water treatment plants, distribution pipelines, pumping facilities, conservation, recycled water, supplemental water supply facilities, service laterals and meters, hydrants, meter reading and billing, general administrative, and technical support. Subsequently, each system function cost is apportioned to "service components" such as base water service, treatment capacity for peak demands, elevation-based pumping, recycled water, supplemental water supply, public and private fire protection, meter reading and billing, and general administrative costs. This approach is necessary to allocate costs to customers and rate components for proportional cost recovery from each billed parcel.

3. **Rate Development:** The final step involves calculating unit costs for each service component by dividing total allocated costs by appropriate service units (e.g., water usage, meter equivalents, and customers). These calculated unit costs are then combined into the District's volumetric rates billed per hundred cubic feet (CCF) for potable and recycled water, monthly service charges based on meter size, monthly private fire service charges based on meter size, and elevation surcharges applicable to customers in higher elevation zones.

The Study ultimately produces the following rate structure for the Test Year:

**Volumetric Rates**

| Customer Class/Tier | Unit Cost for Base ($/CCF) | Unit Cost for Treatment Peaking ($/CCF) | Unit Cost for Supplemental Supply Facilities ($/CCF) | Total Volumetric Rate ($/CCF) |
|---|---|---|---|---|
| SFR - Tier 1 | $6.67 | $0.16 | $0.00 | **$6.83** |
| SFR - Tier 2 | $6.67 | $0.53 | $0.73 | **$7.92** |
| SFR - Tier 3 | $6.67 | $1.12 | $1.56 | **$9.34** |
| MFR | $6.67 | $0.14 | $0.38 | **$7.19** |
| All Other | $6.67 | $0.32 | $0.38 | **$7.37** |

**Monthly Service Charge**

| Meter Size | Meter Capacity Ratio | Charges Billed as $/MEU | Charges Billed as $/account | Proposed Service Charges ($/Month) |
|---|---|---|---|---|
| 5/8 inch | 1.00 | $18.28 | $4.97 | **$23.24** |
| 3/4 inch | 1.00 | $18.28 | $4.97 | **$23.24** |
| 1 inch | 1.67 | $30.46 | $4.97 | **$35.43** |
| 1-1/2 inch | 3.33 | $60.92 | $4.97 | **$65.89** |
| 2 inch | 5.33 | $97.48 | $4.97 | **$102.44** |
| 3 inch | 11.67 | $213.23 | $4.97 | **$218.20** |
| 4 inch | 20.00 | $365.54 | $4.97 | **$370.51** |
| 6 inch | 45.00 | $822.47 | $4.97 | **$827.43** |
| 8 inch | 53.33 | $974.77 | $4.97 | **$979.74** |
| 10 inch | 76.67 | $1,401.24 | $4.97 | **$1,406.20** |
| 12 inch | 106.67 | $1,949.55 | $4.97 | **$1,954.51** |
| 14 inch | 136.67 | $2,497.86 | $4.97 | **$2,502.82** |
| 16 inch | 173.33 | $3,168.02 | $4.97 | **$3,172.98** |
| 18 inch | 210.00 | $3,838.17 | $4.97 | **$3,843.14** |

**Monthly Private Fire Service Charge**

| Fire Service Size | Meter Capacity Ratio | Proposed Private Fire Service Charges ($/Month) |
|---|---|---|
| 5/8 inch | 1.00 | **$7.37** |
| 3/4 inch | 1.00 | **$7.37** |
| 1 inch | 1.67 | **$12.29** |
| 1-1/2 inch | 3.33 | **$24.58** |
| 2 inch | 5.33 | **$39.33** |
| 3 inch | 11.67 | **$86.03** |
| 4 inch | 20.00 | **$147.48** |
| 6 inch | 45.00 | **$331.83** |
| 8 inch | 53.33 | **$393.28** |
| 10 inch | 76.67 | **$565.33** |
| 12 inch | 106.67 | **$786.55** |
| 14 inch | 136.67 | **$1,007.77** |
| 16 inch | 173.33 | **$1,278.15** |
| 18 inch | 210.00 | **$1,548.53** |

**Elevation Surcharges**

| Elevation Band | Elevation Surcharge Rate ($/CCF) |
|---|---|
| 1 | **$0.00** |
| 2 | **$1.08** |
| 3 | **$2.32** |

**Recycled Water Volumetric Rate**

| | Recycled Water Volumetric Rate ($/CCF) |
|---|---|
| Retail Recycled Water | **$5.51** |

Additionally, the Study updates the District's drought surcharges to be implemented as a percent increase on the potable water volumetric rates during each of the four stages of drought. Drought surcharges have been calculated based on estimates of the costs for procuring supplemental water supplies, treating those additional water supplies, moving the supplemental water supply through the District's Freeport Regional Water Project, drought-related conservation program and outreach costs, revenue loss due to conservation, and the use of reserves to mitigate a portion of the financial impacts of droughts. These surcharges serve as maximum percent increases. Actual drought surcharges will be determined after the District's Board of Directors declares a drought, based on the drought stage, the District's budget, and necessary financial considerations.

**Drought Surcharges:**

| | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| Drought Surcharges | **5%** | **10%** | **20%** | **30%** |

# Glossary

| | |
|---|---|
| Acre feet (AF) | 43,560 cubic feet. Unit of volume often used in discussions of water supply. |
| All Other customer class | Water system customer class for customers who are not in the Single Family Residential, Multi-Family Residential, or Recycled Water customer classes. |
| Asset register | Water system asset register which includes asset values for all infrastructure and other major assets owned by the District's Water System. |
| Cash-funded capital project spending | Expenditures for capital assets paid for with rate revenues. |
| COS | Cost of Service |
| Debt service | The principal and interest payments on debt issued. |
| Drought surcharge | Charge that may be added to the potable water volumetric rate when a drought has been declared, expressed as a percent increase on the volumetric rate. |
| EBMUD | East Bay Municipal Water District |
| Elevation surcharge | Charge assessed for each unit (CCF) of water delivered to recover the cost to pump water to higher elevations. |
| Centum cubic feet (CCF) | Volume of water equal to 100 cubic feet or 748 gallons |
| Service charge | Monthly charge that varies based on the size and corresponding capacity of a water meter. |
| Meter equivalents units (MEU) | A ratio of hydraulic capacity of various sizes of water meters based on their flow capacity. |
| Million gallons per day (MGD) | Equal to 1 million gallons over the period of one day. |
| Multi-family residential (MFR) customer class | Customer class for multi-dwelling residential buildings where multiple residential units are served by single meter. |
| Operating expenses | Expenditures for daily operations and maintenance of the water system, including costs for administration and support functions. |
| Peak demand | Demand that exceeds average treatment system production. |
| Private fire service charge | Monthly charge for water meters that supply water exclusively to private fire protection systems. |
| Rate revenue requirement | The portion of annual rate revenue needed to satisfy annual operating expenses, debt service payments and capital-related expenditures. |
| Service components | Categories into which system function costs are allocated for the purpose of calculating the unit costs that are used to develop the rates billed to customer accounts. |
| System function | Categories that represent the elements of owning and operating a water utility and the associated types of infrastructure and operating costs. |

# 1 Introduction

Stantec Consulting Services, Inc. (Stantec) has conducted a comprehensive cost of service (COS) rate study (Study) for the water utility of East Bay Municipal Utility District (District). This report presents the approach, source data, analytical methodologies, and findings of the Study. This Study relates only to the District's water rates (EBMUD "Schedule A – Rate Schedule for Water Service" and "Schedule L – Drought Surcharge Rate Schedule for Water Service").

The Municipal Utility District (MUD) Act states: "The rates and charges for commodities or service furnished by a district shall be fixed by the board." The District's Board of Directors (Board) plans to consider the adoption of rates using this Study on June 10, 2025. It is anticipated those rates would comprise fiscal year (FY) 2026 rates, effective July 1, 2025, and FY 2027 rates, effective July 1, 2026. The District's fiscal year runs from July 1 to June 30. The Board, in general, considers adoption of rates in conjunction with its two-year budget at the end of every odd fiscal year. The Board may consider future rate adoptions using this Study.

This Study, its appendices, and its attachments serve as the basis for and support the FY 2026 and FY 2027 rates. The District's memo dated March 20, 2025, *Fiscal Years 2026 and 2027 Recommended Revisions to the Water and Wastewater Schedules of Rates and Charges Subject to Proposition 218* (Attachment 1) contains the recommendations for the FY 2026 and FY 2027 rates based on the parameters of the District's FY 2026/2027 budget. The District anticipates that rates for fiscal years beyond FY 2027 may be developed in the same manner.

## 1.1 California Constitution, Article XIII D

In November 1996, California voters approved Proposition 218, which amended the California Constitution by adding Article XIII C and Article XIII D. Section 6 of Article XIII D relates to "Property Related Fees and Charges" and reads as follows:

> *Property Related Fees and Charges. (a) Procedures for New or Increased Fees and Charges. An agency shall follow the procedures pursuant to this section in imposing or increasing any fee or charge as defined pursuant to this article, including, but not limited to, the following:*
>
> > *(1) The parcels upon which a fee or charge is proposed for imposition shall be identified. The amount of the fee or charge proposed to be imposed upon each parcel shall be calculated. The agency shall provide written notice by mail of the proposed fee or charge to the record owner of each identified parcel upon which the fee or charge is proposed for imposition, the amount of the fee or charge proposed to be imposed upon each, the basis upon which the amount of the proposed fee or charge was calculated, the reason for the fee or charge, together with the date, time, and location of a public hearing on the proposed fee or charge.*

*(2) The agency shall conduct a public hearing upon the proposed fee or charge not less than 45 days after mailing the notice of the proposed fee or charge to the record owners of each identified parcel upon which the fee or charge is proposed for imposition. At the public hearing, the agency shall consider all protests against the proposed fee or charge. If written protests against the proposed fee or charge are presented by a majority of owners of the identified parcels, the agency shall not impose the fee or charge.*

*(b) Requirements for Existing, New or Increased Fees and Charges. A fee or charge shall not be extended, imposed, or increased by any agency unless it meets all of the following requirements:*

*(1) Revenues derived from the fee or charge shall not exceed the funds required to provide the property related service.*

*(2) Revenues derived from the fee or charge shall not be used for any purpose other than that for which the fee or charge was imposed.*

*(3) The amount of a fee or charge imposed upon any parcel or person as an incident of property ownership shall not exceed the proportional cost of the service attributable to the parcel.*

*(4) No fee or charge may be imposed for a service unless that service is actually used by, or immediately available to, the owner of the property in question. Fees or charges based on potential or future use of a service are not permitted. Standby charges, whether characterized as charges or assessments, shall be classified as assessments and shall not be imposed without compliance with Section 4.*

*(5) No fee or charge may be imposed for general governmental services including, but not limited to, police, fire, ambulance or library services, where the service is available to the public at large in substantially the same manner as it is to property owners.*
*Reliance by an agency on any parcel map, including, but not limited to, an assessor's parcel map, may be considered a significant factor in determining whether a fee or charge is imposed as an incident of property ownership for purposes of this article. In any legal action contesting the validity of a fee or charge, the burden shall be on the agency to demonstrate compliance with this article.*

*(c) Voter Approval for New or Increased Fees and Charges. Except for fees or charges for sewer, water, and refuse collection services, no property related fee or charge shall be imposed or increased unless and until that fee or charge is submitted and approved by a majority vote of the property owners of the property subject to the fee or charge or, at the option of the agency, by a two-thirds vote of the electorate residing in the affected area. The election shall be conducted not less than 45 days after the public hearing. An agency may adopt procedures similar to those for increases in assessments in the conduct of elections under this subdivision.*

*(d) Beginning July 1, 1997, all fees or charges shall comply with this section.*

This Study has been prepared to comply with the requirements of Article XIII D, Section 6(b).

## 1.2 Water Rate Study Process

The purpose of a COS rate study for a water utility is to develop a rate structure under which the charges billed to each customer account reflect the cost to serve each parcel and thereby collect the revenue needed by the utility to provide the service.

This Study consists of the following three steps:

**Revenue Requirement Determination** – Determination of the annual rate revenue needed to satisfy annual operating expenses, debt service payments, and capital project spending.

**Cost-of-Service Analysis** – Translation of the revenue requirement to service components. Service components are the building blocks for the rates billed to customer accounts.

**Rate Development** – Distribution of the costs in each service component to the rates billed to customer accounts.

The Study reflects the analysis of conditions during a test year. FY 2024 has been selected as the representative test year (Test Year) because it provides a representative set of key factors including operating expenses, capital project spending, non-rate revenues, and consumption patterns. FY 2024 is also the most recent complete fiscal year with audited actual financial information. The Test Year was free from events such as drought, excessive rainfall, pandemic, and other anomalous external factors.

# 2 Revenue Requirement Determination

The first step in the rate study is to determine the revenue to be recovered from the water rates. The total revenue requirement is the sum of the Test Year costs (operating expenses plus debt service plus capital project spending). The Test Year total water system revenue requirements are:

- $349.0 million in operating expenses.
- $222.5 million in debt service payments.
- $243.4 million in cash-funded capital project spending (representing capital expenses less capital financing proceeds received from bond issuance).

Together these revenue requirements represent a total revenue requirement of $814.9 million for the Test Year. While the District meets its revenue requirement primarily via revenue from the Schedule A rates, the District also receives non-rate revenue from other sources, including but not limited to property taxes, System Capacity Charges (SCCs), and proceeds from the sale of electricity generated at District facilities. Net of the $153.6 million in Test Year non-rate revenue, the revenue requirement to be recovered from the Schedule A water rates is $661.2 million as shown below in Table 1. The allocation of non-rate revenue (as an offset to or deduction of the total revenue requirement) is discussed in Section 3.1.5 below.

**Table 1: Revenue Requirement**

| Revenue Requirement | Test Year |
|---|---|
| Operating Expense | $348,966,784 |
| Debt Service | $222,535,209 |
| Capital Project Spending (cash-funded) | $243,355,000 |
| **Total Revenue Requirement** | **$814,856,993** |
| | |
| Non-Rate Revenues | ($153,613,723) |
| | |
| **Rate Revenue Requirement** | **$661,243,270** |

Sections 3.1.1 to 3.1.4 below discuss the allocation of the total revenue requirement ($814.9 million) to system functions.

# 3 Cost of Service Analysis

The purpose of a COS analysis is to distribute the revenue requirements from water rates, first to system functions that help define the operations and systems of the District's water utility. These costs by system function are then allocated to service components, the building blocks for the rates billed to customer accounts. The specific elements of system functions and service components are described in detail in this section.

## 3.1 Allocation of Revenue Requirements to System Functions

The District's total revenue requirement, prior to offsets from non-rate revenues, has been allocated to system functions in order to reflect the ways the District tracks and budgets for expenditures into categories that support rate development. The system functions are described in Table 2, on the next page.

The following existing District categories for expense/financial data have been evaluated in the context of the identified system functions in Table 2:

- **Operating programs:** The District tracks operating expenses at multiple levels, the highest of which is the operating program. A system function has been assigned to each operating program.
- **Asset categories:** The District maintains an asset register of water system assets. These assets include infrastructure, such as pipelines, reservoirs, water treatment plants, etc. A system function has been assigned to each asset category.
- **Capital awards:** With its biennial budget, the District projects capital expenditures by capital awards, which are individual capital improvement projects or groupings of capital improvement projects. A system function has been assigned to each capital award.

Assignments of system functions to each operating program, asset category, and capital award are based District staff knowledge and experience, and on descriptions of the capital awards developed for the Proposed Biennial Budget for Fiscal Years 2026 and 2027. Assignments of system functions are shown in Appendix A, and the resulting cost allocations to each system function are shown in Sections 3.1.1 to 3.1.4 below.

**Table 2: System Functions**

| System Function | Description |
|---|---|
| Supply/Raw Water | Includes operating, debt service, and capital costs associated with watershed lands owned by the District and with facilities involved in the transport or storage of raw (untreated) water. These facilities include the Pardee and Camanche Reservoirs, the Mokelumne Aqueducts, and the East Bay terminal reservoirs that store raw water. |
| Water Treatment Plants | Includes operating, debt service, and capital costs associated with the District's six water treatment plants that treat raw water to meet potable standards. Exclusive of costs associated with water treatment plant chemicals, power and sludge disposal (see below). |
| Treatment Chemicals, Power, & Sludge Disposal | Includes operating costs for chemicals and electricity used for water treatment and costs for disposal of sludge material generated as a consequence of the treatment process. |
| Distribution Pipelines | Includes operating, debt service, and capital costs associated with infrastructure that delivers treated water from the water treatment plants to the service laterals. These facilities include potable water pipelines, distribution reservoirs (tanks storing treated water), and distribution system appurtenances, such as valves, pressure regulators, and control systems. |
| Distribution Pumping | Includes operating, debt service, and capital costs associated with pumping plants serving portions of the water service area at elevations that cannot be served without pumping. Includes electricity costs for these pumping plants. |
| Conservation | Includes operating, costs associated with the District's water conservation program, which includes customer outreach and communication about water conserving practices. |
| Recycled Water | Includes operating, debt service, and capital costs associated with the recycled (non-potable) water treatment and distribution infrastructure. Recycled water infrastructure includes three active recycled water treatment plants and the recycled water distribution pipelines. |
| Supplemental Supply Facilities | Includes operating, debt service, and capital costs associated with facilities that allow the District to utilize alternative water supplies during periods of water shortages or drought. The District's primary supplemental supply facility is the Freeport Regional Water Facility. Does not include drought costs (see Section 5). |
| Services Laterals & Meters | Includes operating, debt service, and capital costs associated with water meters and with the service laterals that connect the water main to the water meter. |
| Hydrants | Includes operating and debt service costs associated with fire hydrants owned by the District. |
| Meter Reading & Account Billing | Includes operating costs for meter reading and costs associated with billing each account. |
| General Administration | Includes operating costs for District departments such human resources, finance, and other general administrative functions. |
| Technical Support | Includes operating costs associated with District technical expertise supporting functions described above, such as costs for regulatory compliance, purchasing, and operation of power plants. Also includes operating, debt service, and capital costs associated with District facilities such as office buildings and other District infrastructure that cannot be assigned to the system functions above. |

### 3.1.1 Allocation of Operating Expenses to System Functions

Operating expenses include labor and materials costs associated with daily operations and routine infrastructure maintenance and repair. Table 3 shows the Test Year operating expenses by the different system functions. The assignments of system functions to each of the District's operating programs are shown in Appendix A.

**Table 3: Allocation of Operating Expenses to System Functions**

| System Function | Operating Expenses |
|---|---|
| Supply/Raw Water | $49,824,026 |
| Water Treatment Plants | $23,202,343 |
| Treatment Chemicals, Power, & Sludge Disposal | $14,002,591 |
| Distribution Pipelines | $67,413,507 |
| Distribution Pumping | $15,745,092 |
| Conservation | $4,005,879 |
| Recycled Water | $8,886,934 |
| Supplemental Supply Facilities | $1,893,209 |
| Services Laterals & Meters | $18,223,471 |
| Hydrants | $2,452,923 |
| Meter Reading & Account Billing | $23,111,947 |
| General Administration | $56,215,990 |
| Technical Support | $63,988,872 |
| **Total Operating Expenses** | **$348,966,784** |

### 3.1.2 Allocation of Debt Service Costs to System Functions

To allocate debt service costs to system functions, asset categories in the District's asset register have been reviewed and individually assigned to system functions. The net book value[1] of the assets in each system function has been tallied, and the percentage that each system function comprises of the total net book value has been calculated. These percentages for each system function are then applied to the total annual debt service revenue requirement to generate the amount of debt service costs to be allocated to each system function. For example, supply/raw water facilities comprise 12.7% of the total net book value of District assets and, as such, 12.7% of the debt service costs are allocated to the supply/raw water system function. Table 4 shows the percentage of the asset register associated with each system function and the corresponding allocation of the debt service costs to each system function. The assignment of system functions to each asset category in the District's asset register is shown in Appendix A.

**Table 4: Allocation of Debt Service to System Functions**

| System Function | System Function as % of Asset Register | Debt Service Cost Allocation |
|---|---|---|
| Supply/Raw Water | 12.7% | $28,157,828 |
| Water Treatment Plants | 9.2% | $20,436,685 |
| Treatment Chemicals, Power, & Sludge Disposal | 0.0% | $0 |
| Distribution Pipelines | 44.8% | $99,717,076 |
| Distribution Pumping | 5.2% | $11,592,638 |
| Conservation | 0.0% | $0 |
| Recycled Water | 1.2% | $2,744,570 |
| Supplemental Supply Facilities | 8.7% | $19,407,296 |
| Services Laterals & Meters | 11.7% | $26,051,349 |
| Hydrants | 0.9% | $2,044,359 |
| Meter Reading & Account Billing | 0.0% | $0 |
| General Administration | 0.0% | $0 |
| Technical Support | 5.6% | $12,383,409 |
| **Total Debt Service** | **100%** | **$222,535,209** |

[1] Net book value is used herein to mean the original asset cost minus accumulated depreciation.

### 3.1.3 Allocation of Capital Project Spending to System Functions

This Study uses the next five years of capital projects (FY 2026 – FY 2030, 5-Year Capital Improvement Program)[2] to quantify the level of investment in the system. The value of the project awards in the Capital Improvement Program (CIP) has been tallied, and the percentage that each system function comprises of the total CIP has been calculated. These percentages for each system function are then applied to the total annual capital project spending revenue requirement to generate the amount of capital spending costs to be allocated to each system function. For example, supply/raw water facilities comprise 18.1% of the total 5-year CIP and, as such, 18.1% of the capital spending costs are allocated to the supply/raw water system function. Table 5 presents the total allocation of capital project spending to each system function. The assignments of system functions to each capital award in the District's 5-Year CIP are shown in Appendix A.

**Table 5: Allocation of Capital Project Spending to System Functions**

| System Function | System Function as % of 5-Year CIP | Capital Project Cost Allocation |
|---|---|---|
| Supply/Raw Water | 18.1% | $44,092,754 |
| Water Treatment Plants | 21.6% | $52,551,760 |
| Treatment Chemicals, Power, & Sludge Disposal | 0.0% | $0 |
| Distribution Pipelines | 42.2% | $102,761,974 |
| Distribution Pumping | 3.4% | $8,379,622 |
| Conservation | 0.0% | $0 |
| Recycled Water | 2.6% | $6,295,643 |
| Supplemental Supply Facilities | 0.3% | $652,188 |
| Services Laterals & Meters | 4.9% | $12,028,570 |
| Hydrants | 0.0% | $0 |
| Meter Reading & Account Billing | 0.0% | $0 |
| General Administration | 0.0% | $0 |
| Technical Support | 6.8% | $16,592,488 |
| **Total Capital Project Spending** | **100%** | **$243,355,000** |

[2] The Study uses the rate and bond funded CIP, which does not include projects funded by grants or other external funding.

### 3.1.4 Total Revenue Requirement Allocations to System Functions

As shown in Table 6, summing the amounts of allocations developed in Sections 3.1.1 to 3.1.3 results in the total revenue requirement allocations to each system function.

**Table 6: Total Revenue Requirement Allocations to System Functions**

| System Function | Operating Expenses | Debt Service Allocation | Capital Project Spending Allocation | Total Allocation |
|---|---|---|---|---|
| Supply/Raw Water | $49,824,026 | $28,157,828 | $44,092,754 | **$122,074,608** |
| Water Treatment Plants | $23,202,343 | $20,436,685 | $52,551,760 | **$96,190,788** |
| Treatment Chemicals, Power, & Sludge Disposal | $14,002,591 | $0 | $0 | **$14,002,591** |
| Distribution Pipelines | $67,413,507 | $99,717,076 | $102,761,974 | **$269,892,557** |
| Distribution Pumping | $15,745,092 | $11,592,638 | $8,379,622 | **$35,717,352** |
| Conservation | $4,005,879 | $0 | $0 | **$4,005,879** |
| Recycled Water | $8,886,934 | $2,744,570 | $6,295,643 | **$17,927,147** |
| Supplemental Supply Facilities | $1,893,209 | $19,407,296 | $652,188 | **$21,952,693** |
| Services Laterals & Meters | $18,223,471 | $26,051,349 | $12,028,570 | **$56,303,390** |
| Hydrants | $2,452,923 | $2,044,359 | $0 | **$4,497,282** |
| Meter Reading & Account Billing | $23,111,947 | $0 | $0 | **$23,111,947** |
| General Administration | $56,215,990 | $0 | $0 | **$56,215,990** |
| Technical Support | $63,988,872 | $12,383,409 | $16,592,488 | **$92,964,769** |
| **Total** | **$348,966,784** | **$222,535,209** | **$243,355,000** | **$814,856,993** |

### 3.1.5 Non-Rate Revenues as Offsets to System Function Costs

The District receives non-rate revenues from a variety of sources. For this Study, non-rate revenues have been considered as offsets to the system function costs based on the nature in which the revenues are generated, which results either in pro-rata offsets to all system functions or in offsets to specific system functions. Table 7 presents categories of non-rate revenue, the amount of revenue from each source, and the basis for allocation for each type of non-rate revenue.

**Table 7: Non-Rate Revenues with Allocation Basis**

| Non-Rate Revenue Description | Test Year Non-Rate Revenue ($) | Basis for Allocation |
|---|---|---|
| Recreation Fees | $1,973,689 | Supply/Raw Water system function costs |
| Reimbursements/Payments from Contract Recycled Water Customers | $7,979,447 | Recycled Water system function costs |
| SCC (Buy-In Component) | $22,799,513 | Supply/Raw Water, Treatment, Distribution Pipelines, and Distribution Pumping system function costs |
| SCC (Future Water Supply Component) | $3,109,025 | Supplemental Supply system function costs |
| Operating Reimbursements, Account Establishment Charges, Service Trip Charges, Late Payment Charges, and revenue from other administrative charges | $17,763,087 | General Administration system function costs |
| Property Taxes and Other Revenue | $99,988,962 | Pro rata (all system function costs) |
| **Total Non-Rate Revenues** | **$153,611,163** | |

The non-rate revenue offsets to each system function are shown in Table 8.

**Table 8: Non-Rate Revenue Allocations to System Functions**

| System Function | Non-Rate Revenue Allocated Pro-Rata to All System Functions | Non-Rate Revenue Allocated to Specific System Functions | Total Non-Rate Revenue Allocated |
|---|---|---|---|
| Supply/Raw Water | $14,979,455 | $7,286,483 | $22,265,938 |
| Water Treatment Plants | $11,803,319 | $4,186,308 | $15,989,627 |
| Treatment Chemicals, Power, & Sludge Disposal | $1,718,221 | $0 | $1,718,221 |
| Distribution Pipelines | $33,117,807 | $11,745,961 | $44,863,768 |
| Distribution Pumping | $4,382,782 | $1,554,451 | $5,937,233 |
| Conservation | $491,551 | $0 | $491,551 |
| Recycled Water | $2,199,793 | $7,979,447 | $10,179,241 |
| Supplemental Supply Facilities | $2,693,757 | $3,109,025 | $5,802,782 |
| Services Laterals & Meters | $6,908,841 | $0 | $6,908,841 |
| Hydrants | $551,850 | $0 | $551,850 |
| Meter Reading & Account Billing | $2,836,006 | $0 | $2,836,006 |
| General Administration | $6,898,117 | $17,763,087 | $24,661,204 |
| Technical Support | $11,407,463 | $0 | $11,407,463 |
| **Total** | **$99,988,962** | **$53,624,762** | **$153,613,723** |

### 3.1.6 Allocation of Rate Revenue Requirement

Combining the allocation of the total revenue requirement (Table 6) and the allocation of the non-rate revenues (Table 8) yields the revenue to be recovered from rates. Table 9 presents the total revenue requirement, non-rate revenues, and the rate revenue requirement by system function.

**Table 9: Rate Revenue Requirement Allocations by System Function**

| System Function | Cost Allocation to System Function | Non-Rate Revenue Allocated | System Function Cost to be Recovered from Rate Revenue |
|---|---|---|---|
| Supply/Raw Water | $122,074,608 | ($22,265,938) | $99,808,671 |
| Water Treatment Plants | $96,190,788 | ($15,989,627) | $80,201,162 |
| Treatment Chemicals, Power, & Sludge Disposal | $14,002,591 | ($1,718,221) | $12,284,369 |
| Distribution Pipelines | $269,892,557 | ($44,863,768) | $225,028,789 |
| Distribution Pumping | $35,717,352 | ($5,937,233) | $29,780,119 |
| Conservation | $4,005,879 | ($491,551) | $3,514,328 |
| Recycled Water | $17,927,147 | ($10,179,241) | $7,747,906 |
| Supplemental Supply Facilities | $21,952,693 | ($5,802,782) | $16,149,912 |
| Services Laterals & Meters | $56,303,390 | ($6,908,841) | $49,394,549 |
| Hydrants | $4,497,282 | ($551,850) | $3,945,432 |
| Meter Reading & Account Billing | $23,111,947 | ($2,836,006) | $20,275,940 |
| General Administration | $56,215,990 | ($24,661,204) | $31,554,786 |
| Technical Support | $92,964,769 | ($11,407,463) | $81,557,306 |
| **Total** | **$814,856,993** | **($153,613,723)** | **$661,243,270** |

## 3.2 Allocation of System Function Costs to Service Components

After the allocation of the revenue requirements and non-rate revenues to system functions, the costs within each system function are allocated to service components. Service components are the building blocks for the rates billed to customer accounts and are described below in Table 10. Table 10 also shows where these service components will eventually be recovered in the rates.

**Table 10: Service Components**

| Service Component | Where Recovered in Rates | Description |
|---|---|---|
| Base Supply, Treatment, and Distribution (Base) | Volumetric Rates | Supply, treatment, and distribution costs associated with meeting customer demands and unrelated to treatment peaking. |
| Treatment Peaking | Volumetric Rates | Treatment costs incurred to meet peak demands. |
| Elevation | Elevation Surcharge | Costs associated with pumping plants serving portions of the water service area at elevations that cannot be served without pumping. |
| Supplemental Supply Facilities | Volumetric Rates | Costs associated with facilities that allow the District to utilize alternative water supplies during periods of water shortages/drought. |
| Recycled Water | Recycled Water Rate | Costs associated with providing water to recycled water customers. |
| Service Laterals & Meters | Service Charge | Costs associated with water meters and with the service laterals that connect those water meters to the water mains. |
| Public Fire Protection | Service Charge | Costs associated with hydrants and with providing capacity in the distribution system to serve fire hydrants. |
| Private Fire Protection | Private Fire Service Charge | Costs associated with private fire meters and service laterals, and with providing capacity in the distribution system to serve those private fire meters and service laterals. |
| Meter Reading & Account Billing | Service Charge | Costs for meter reading and costs associated with billing each account. |
| General Administration | Service Charge | Costs for District departments, such as human resources and finance, that do not fit within the other service components defined above. |

The system function costs are allocated to service components as follows:

- 100% of Supply/Raw Water system function costs are allocated to the Base service component to reflect that these costs are driven by the total demand for water and are not affected by treatment peaking.
- 78% of Water Treatment Plants system function costs are allocated to the Base service component and 22% are allocated to the Treatment Peaking service component to reflect that the District's treatment plants are sized to handle both the average demands and the peak demands on the treatment system. The basis for these allocations is discussed in Appendix B.
- 100% of the Treatment Chemicals, Power & Sludge Disposal system function costs are allocated to the Base service component to reflect that these costs are directly related to the volume of water treated at the District's plants.
- 87% of Distribution Pipelines system function costs are allocated to the Base service component. The remaining 13% of Distribution Pipelines system function costs are allocated to the Public Fire Protection (10%) and Private Fire Protection (3%) service components to reflect the additional capacity requirements of the distribution system to meet fire flow demands. The basis for these allocations is discussed in Appendix C.
- 95% of Distribution Pumping system function costs are allocated to the Elevation service component and 5% are allocated to the Base service component to reflect the portion of the pumping needs related to meeting pressure requirements.
- 100% of Conservation system function costs are allocated to the Base service component to reflect that conservation programs can help customers in all customer classes reduce water usage.
- 64% of Recycled Water system function costs are allocated to the Retail Recycled Water service component and 36% are allocated to the Supplemental Supply service component (see Appendix D).
- 100% of Supplemental Supply Facilities system function costs are allocated to the Supplemental Supply service component. See Appendix F for discussion of allocations with the Supplemental Supply service component.
- 65% of the Service Laterals & Meters system function costs are allocated to the Service Laterals & Meters service component and 35% is allocated to the Private Fire Protection service component based on the number and sizes of meters for potable water customers and Private Fire customers, respectively. The basis for these allocations is discussed in Appendix C.
- 100% of Hydrants system function costs are allocated to the Public Fire Protection service component (see Appendix C).
- 100% of Meter Reading & Account Billing system function costs are allocated to the Meter Reading & Account Billing service component to reflect that these costs are not affected by usage, peaking, or meter size.
- 100% of General Administrative system function costs are allocated to the General Administration service component to reflect that these costs are not affected by usage or peaking.
- Technical Support system function costs are allocated to all service components in proportion to each service component's contribution to the total revenue requirement minus the system

function costs for Technical Support ($661.2 million minus $81.6 million equals $579.7 million). For example, the Base service component constitutes 64.8% of the $579.7 million. As such, 64.8% of the Technical Support system function costs ($52,867,332) are allocated to the Base service component. Table 11 shows the allocation of Technical Support system function costs to service components.

**Table 11: Allocation of Technical Support System Function Costs to Service Components**

| Service Components (Excluding Technical Support) | Percent of Revenue Requirement by Service Component Excluding Technical Support | Technical Support Allocation |
|---|---|---|
| Base | 64.8% | $52,867,332 |
| Treatment Peaking | 3.1% | $2,489,238 |
| Elevation | 4.9% | $3,967,180 |
| Supplemental Supply | 3.7% | $3,031,556 |
| Retail Recycled Water | 0.4% | $330,681 |
| Service Laterals & Meters | 6.0% | $4,854,220 |
| Public Fire Protection | 4.7% | $3,817,356 |
| Private Fire Protection | 3.6% | $2,907,564 |
| Meter Reading & Account Billing | 3.5% | $2,852,667 |
| General Administration | 5.4% | $4,439,513 |
| **Total** | **100%** | **$81,557,306** |

Table 12 below shows the allocations of system function costs to the service components.

**Table 12: Allocation of System Function Costs to Service Components**

| Service Component | System Functions Assigned to Service Component | Percent Allocation | Allocation Amount ($) | Total Allocations to Service Component ($) |
|---|---|---|---|---|
| Base | Supply/Raw Water | 100.0% | $101,106,657 | $428,633,176 |
| | Water Treatment Plants | 78.3% | $63,780,772 | |
| | Treatment Chemicals, Power, & Sludge Disposal | 100.0% | $12,284,369 | |
| | Distribution Pipelines | 87.0% | $193,595,634 | |
| | Distribution Pumping | 5.0% | $1,484,083 | |
| | Conservation | 100.0% | $3,514,328 | |
| | Technical Support | 64.8% | $52,867,332 | |
| Treatment Peaking | Water Treatment Plants | 21.7% | $17,692,787 | $20,182,025 |
| | Technical Support | 3.1% | $2,489,238 | |
| Elevation | Distribution Pumping | 95.0% | $28,197,581 | $32,164,762 |
| | Technical Support | 4.9% | $3,967,180 | |
| Supplemental Supply | Supplemental Supply Facilities | 100.0% | $16,149,912 | $24,578,990 |
| | Recycled Water | 69.7% | $5,397,522 | |
| | Technical Support | 3.7% | $3,031,556 | |
| Retail Recycled Water | Recycled Water | 30.3% | $2,350,384 | $2,681,065 |
| | Technical Support | 0.4% | $330,681 | |
| Service Laterals & Meters | Services Laterals & Meters | 69.9% | $34,502,403 | $39,356,623 |
| | Technical Support | 6.0% | $4,854,220 | |
| Public Fire Protection | Hydrants | 100.0% | $3,945,432 | $30,950,026 |
| | Distribution Pipelines | 10.4% | $23,187,238 | |
| | Technical Support | 4.7% | $3,817,356 | |
| Private Fire Protection | Services Laterals & Meters | 30.1% | $14,892,146 | $23,573,697 |
| | Distribution Pipelines | 2.6% | $5,773,987 | |
| | Technical Support | 3.6% | $2,907,564 | |
| Meter Reading & Account Billing | Meter Reading & Account Billing | 100.0% | $20,275,940 | $23,128,607 |
| | Technical Support | 3.5% | $2,852,667 | |
| General Administration | General Administration | 100.0% | $31,554,786 | $35,994,299 |
| | Technical Support | 5.4% | $4,439,513 | |
| **Total Revenue Requirement from Rates** | | | **$661,243,270** | **$661,243,270** |

# 4 Rate Development

Unit costs for each service component must be calculated to establish rates billed to customer accounts. This calculation is done by dividing the total annual costs assigned to each component by the total annual service units of the respective component. The calculation of unit costs also takes into account how different water usage patterns and meter sizes impact costs (see Sections 4.1 and 4.2 below). Section 4.3, and several appendices referenced therein, discuss how the unit costs are calculated. Finally, Sections 4.4 to 4.8 develop the unit costs into the rates and charges billed to customer accounts: the potable volumetric rates; the monthly service charges; the private fire monthly service charges; the elevation surcharges; and the recycled water volumetric rate.

## 4.1 Customer Classes and Tiers

For some of the service component costs that are recovered through the volumetric rates, different unit costs are developed for different types of customer accounts in order to best reflect the proportional cost to serve each parcel. To this end, customer accounts are grouped into customer classes based on shared characteristics and water consumption patterns. The District groups customer accounts into the following customer classes:

- **Single-Family Residential (SFR)** – Residential properties with a single meter, usually serving a single residence on a single parcel. In the Study's analysis of the Test Year consumption data, SFR accounts show an average monthly consumption within a relatively narrow range: 2 CCF/month for the 10th percentile account[3] and 14 CCF/month for the 90th percentile. Additionally, the distribution of water use for the SFR customer accounts yields a skew value[4] of 5.0, indicating a right skew of the distribution with a longer tail in the positive direction, but less skewed than the other classes. Because usage from SFR customer accounts is clustered in this way, it is proportional to use a tiered structure for the volumetric rates paid by SFR customer accounts to best reflect the cost to serve SFR parcels. For the SFR customer class, the District has historically had a three-tiered structure for volumetric rates that continues to allow for a proportional allocation of certain costs that are billed volumetrically: Treatment Peaking (Appendix E) and Supplemental Supply Facilities (Appendix F.). The tiers are as follows: Tier 1: water use up to 7 CCF/month; Tier 2: water use above 7 CCF/month and up to 16 CCF/month; and Tier 3: water use above 16 CCF/month.

- **Multi-Family Residential (MFR)** – Residential properties where multiple residential units are served by a single meter. MFR customer accounts range from duplexes to large apartments

[3] The 10th percentile account is the account for which 10% of customer accounts have less consumption and 90% have more consumption.

[4] Skewness is a statistical measure of asymmetry in the distribution of a histogram of data. A positive value indicates a right skew, meaning the tail on the right side of the distribution is longer than the left tail, and a larger positive value indicates a larger degree of asymmetry.

buildings with more than 100 dwellings. Average monthly Test Year consumption for MFR accounts ranges from 4 CCF/month for the 10th percentile account to 71 CCF/month for the 90th percentile, and the MFR customer class has relatively less peaking compared to the SFR customer class. The distribution of water use for MFR customer accounts yields a skew value of 13.5, meaning the MFR customer accounts have a greater right skew, or a longer tail in the positive direction than the SFR customer accounts. There are no tiers associated with the MFR customer class because water usage by account in this class is not clustered.

- **All Other** – Non-residential customer accounts including commercial, industrial, and public-school accounts. All Other customer accounts range from small corner stores to large industrial facilities. Average monthly Test Year consumption for All Other customer accounts ranges 1 CCF/month for the 10th percentile account and 107 CCF/month for the 90th percentile. The distribution of water use for All Other customer accounts yields a skew value of 81.7, a much more significant right skew, or a much longer tail in the positive direction than the SFR and MFR classes. There are no tiers associated with the All Other customer class because water usage by account in this class is not clustered.

## 4.2 Meter Equivalents

For some of the service component costs recovered through the monthly service charge, the concept of meter equivalents is utilized. By using meter equivalents, the analysis accounts for the greater demands placed on the water system, the greater costs to install, to maintain, and to replace meters/service laterals, and the greater capacity required in the system for larger meters than for smaller meters.

Meter equivalents are based on meter hydraulic capacity. A ratio of hydraulic capacity is calculated by dividing capacity for each meter size by the capacity of the smallest meter size. The actual number of meters by size is multiplied by the corresponding capacity ratio to calculate meter equivalent units (MEUs). Table 13 shows the meter capacity ratios and the MEUs, and Table 14 shows the fire meter equivalent units (FMEU) for private fire services.

**Table 13: Meter Equivalent Units**

| Meter Size | Meter Count | Capacity (gallons/minute) | Meter Capacity Ratio[1] | Meter Equivalent Units (MEUs) |
|---|---|---|---|---|
| 5/8 inch | 347,283 | 30 | 1.00 | 347,283 |
| 3/4 inch | 3,643 | 30 | 1.00 | 3,643 |
| 1 inch | 17,824 | 50 | 1.67 | 29,707 |
| 1-1/2 inch | 12,704 | 100 | 3.33 | 42,347 |
| 2 inch | 4,952 | 160 | 5.33 | 26,411 |
| 3 inch | 1,025 | 350 | 11.67 | 11,958 |
| 4 inch | 440 | 600 | 20.00 | 8,800 |
| 6 inch | 198 | 1,350 | 45.00 | 8,910 |
| 8 inch | 79 | 1,600 | 53.33 | 4,213 |
| 10 inch | 6 | 2,300 | 76.67 | 460 |
| 12 inch | 2 | 3,200 | 106.67 | 213 |
| 14 inch | 1 | 4,100 | 136.67 | 137 |
| 16 inch | 1 | 5,200 | 173.33 | 173 |
| 18 inch | 2 | 6,300 | 210.00 | 420 |
| **Total** | **388,160** | | | **484,675** |

1. Based on the District's Engineering Standard Practice (ESP) 521.2 (Attachment 3). 5/8 meters are no longer commonly issued. To account for this, existing 5/8 meters are attributed the same meter capacity ratio as 3/4 inch meters.

**Table 14: Fire Meter Equivalent Units**

| Fire Service Size | Meter Count | Capacity (gallons/minute) | Meter Capacity Ratio | Fire Meter Equivalent Units (FMEUs) |
|---|---|---|---|---|
| 5/8 inch | 0 | 30 | 1.00 | 0 |
| 3/4 inch | 0 | 30 | 1.00 | 0 |
| 1 inch | 4 | 50 | 1.67 | 7 |
| 1-1/2 inch | 278 | 100 | 3.33 | 927 |
| 2 inch | 504 | 160 | 5.33 | 2,688 |
| 3 inch | 4 | 350 | 11.67 | 47 |
| 4 inch | 2,205 | 600 | 20.00 | 44,100 |
| 6 inch | 2,554 | 1,350 | 45.00 | 114,930 |
| 8 inch | 1,617 | 1,600 | 53.33 | 86,240 |
| 10 inch | 195 | 2,300 | 76.67 | 14,950 |
| 12 inch | 22 | 3,200 | 106.67 | 2,347 |
| 14 inch | 0 | 4,100 | 136.67 | 0 |
| 16 inch | 1 | 5,200 | 173.33 | 173 |
| 18 inch | 0 | 6,300 | 210.00 | 0 |
| **Total** | **7,384** | | | **266,408** |

## 4.3 Calculation of Unit Costs

Unit costs are calculated for each service component by dividing the total costs of each service component by the relevant units of service. Converting total service component costs to unit costs allows for the proportional recovery of those costs for each service component as these costs are the building blocks of the District's rate structure.

### 4.3.1 Unit Costs for Service Components Recovered in the Potable Volumetric Rates

Unit costs for the Base service component are calculated by dividing the allocation for Base ($428,633,176) by the total amount of potable water sold in the Test Year (64,298,704 CCF), resulting in a unit cost of $6.67/CCF as a portion of all potable water volumetric rates.

Unit costs for the Treatment Peaking service component are calculated to reflect the contributions of each customer class to the Treatment Peaking costs. See Appendix E for a discussion of the methodology for developing Treatment Peaking unit costs. The resulting Treatment Peaking unit costs are as follows: SFR Tier 1: $0.16/CCF, SFR Tier 2: $0.53/CCF, SFR Tier 3: $1.12/CCF, MFR: $0.14/CCF, All Other: $0.32/CCF.

Unit costs for the Supplemental Supply service component are calculated as discussed in Appendix F. The resulting Supplemental Supply unit costs are as follows and shown below in Table 15: SFR Tier 1: $0.00/CCF, SFR Tier 2: $0.73/CCF, SFR Tier 3: $1.56/CCF, MFR: $0.38/CCF, All Other: $0.38/CCF.

**Table 15: Volumetric Unit Costs**

| Customer Class/Tier | Unit Cost for Base ($/CCF) | Unit Cost for Treatment Peaking ($/CCF) | Unit Cost for Supplemental Supply ($/CCF) |
|---|---|---|---|
| SFR - Tier 1 | $6.67 | $0.16 | $0.00 |
| SFR - Tier 2 | $6.67 | $0.53 | $0.73 |
| SFR - Tier 3 | $6.67 | $1.12 | $1.56 |
| MFR | $6.67 | $0.14 | $0.38 |
| All Other | $6.67 | $0.32 | $0.38 |

### 4.3.2 Unit Costs for Service Components Recovered in the Monthly Service Charge

Unit costs for the service components recovered in the monthly service charge are shown in Table 16. Unit costs for the Service Laterals & Meters, Public Fire Protection, and General Administration service components are calculated by dividing their allocations by the total number of MEUs in the Test Year, and then by 12 months, resulting in a unit cost of $18.28/month per MEU as a portion of the service charge.

**Table 16: $/MEU Unit Costs**

| Service Component | Allocation to Service Component | Units (MEUs) | Unit Cost ($/MEU per month) |
|---|---|---|---|
| Service Laterals & Meters | $39,356,623 | 484,675 | $6.77 |
| Public Fire Protection | $30,950,026 | 484,675 | $5.32 |
| General Administration | $35,994,299 | 484,675 | $6.19 |
| **Total Unit Cost for Service Components Billed on a per MEU basis** | | | **$18.28** |

Unit costs for the Meter Reading & Account Billing service component are calculated by dividing the allocation for Meter Reading & Account Billing by the total number of billed accounts in the Test Year, and then by 12 months, resulting in a unit cost of $4.97/month per account as a portion of the service charge.

**Table 17: $/Account Unit Costs**

| Service Component | Allocation to Service Component | Units (Accounts) | Unit Cost ($/Account per month) |
|---|---|---|---|
| Meter Reading & Customer Billing | $23,128,607 | 388,160 | $4.97 |
| **Total Unit Cost for Service Components Billed on per account basis** | | | **$4.97** |

### 4.3.3 Unit Costs for the Private Fire Protection Service Component

Unit costs for the Private Fire Protection service component are calculated by dividing the allocation for Private Fire Protection by the fire meter equivalents, and then by 12 months, resulting in a unit cost of $7.37/month per FMEU as a portion of the service charge.

**Table 18: $/FMEU per Month Unit Costs**

| Service Component | Allocation to Service Component | Units (FMEUs) | Unit Cost ($/FMEU per month) |
|---|---|---|---|
| Private Fire Protection | $23,573,697 | 266,408 | $7.37 |
| **Total Unit Cost for Service Components Billed on per FMEU** | | | **$7.37** |

### 4.3.4 Unit Costs for the Elevation Service Component

See Appendix G for a discussion of the methodology for developing unit costs for the Elevation service component. The resulting Elevation unit costs are as follows: Elevation Zone 1: $0.00/CCF; Elevation Zone 2: $1.08/CCF; Elevation Zone 3: $2.32/CCF.

**Table 19: $/CCF Elevation Unit Costs**

| Elevation Band | Allocated Elevation Costs | Consumption (CCF) | Unit Cost ($/CCF) |
|---|---|---|---|
| 1 | $0 | 39,928,403 | $0.00 |
| 2 | $21,133,474 | 19,570,698 | $1.08 |
| 3 | $11,137,979 | 4,799,541 | $2.32 |
| **Total** | **$32,271,452** | **64,298,642** | |

### 4.3.5 Unit Costs for the Retail Recycled Water Service Component

Unit costs for the Retail Recycled Water service component are calculated by dividing the allocation for Retail Recycled Water ($2,681,065) by the total amount of recycled water sold to retail (non-contract) recycled water customers in the Test Year (486,751 CCF), resulting in a unit cost of $5.51/CCF.

**Table 20: $/CCF Recycled Water Unit Costs**

| Service Component | Allocation to Service Component | Units (CCF) | Unit Cost ($/CCF) |
|---|---|---|---|
| Retail Recycled Water | $2,681,065 | 486,751 | $5.51 |
| **Total Unit Cost for Service Components Billed on per CCF** | | | **$5.51** |

## 4.4 Volumetric Rates

Table 21 below tallies the Test Year COS unit costs for service components recovered in the potable volumetric rates (Section 4.3.1) by customer class and tier.

**Table 21: Test Year Volumetric Rates – Potable Water**

| Customer Class/Tier | Unit Cost for Base ($/CCF) | Unit Cost for Treatment Peaking ($/CCF) | Unit Cost for Supplemental Supply Facilities ($/CCF) | Total Volumetric Rate ($/CCF) |
|---|---|---|---|---|
| SFR - Tier 1 | $6.67 | $0.16 | $0.00 | **$6.83** |
| SFR - Tier 2 | $6.67 | $0.53 | $0.73 | **$7.92** |
| SFR - Tier 3 | $6.67 | $1.12 | $1.56 | **$9.34** |
| MFR | $6.67 | $0.14 | $0.38 | **$7.19** |
| All Other | $6.67 | $0.32 | $0.38 | **$7.37** |

## 4.5 Monthly Service Charge

Table 22 shows the Test Year COS monthly service charge calculated by adding the $/MEU unit costs to the $/Account unit costs (Section 4.3.2). The monthly service charges shown in Table 22 apply to all customer accounts regardless of customer class.

**Table 22: Test Year Monthly Service Charges**

| Meter Size | Meter Capacity Ratio | Charges Billed as $/MEU[1] | Charges Billed as $/Account | Proposed Service Charges ($/Month) |
|---|---|---|---|---|
| 5/8 inch | 1.00 | $18.28 | $4.97 | **$23.24** |
| 3/4 inch | 1.00 | $18.28 | $4.97 | **$23.24** |
| 1 inch | 1.67 | $30.46 | $4.97 | **$35.43** |
| 1-1/2 inch | 3.33 | $60.92 | $4.97 | **$65.89** |
| 2 inch | 5.33 | $97.48 | $4.97 | **$102.44** |
| 3 inch | 11.67 | $213.23 | $4.97 | **$218.20** |
| 4 inch | 20.00 | $365.54 | $4.97 | **$370.51** |
| 6 inch | 45.00 | $822.47 | $4.97 | **$827.43** |
| 8 inch | 53.33 | $974.77 | $4.97 | **$979.74** |
| 10 inch | 76.67 | $1,401.24 | $4.97 | **$1,406.20** |
| 12 inch | 106.67 | $1,949.55 | $4.97 | **$1,954.51** |
| 14 inch | 136.67 | $2,497.86 | $4.97 | **$2,502.82** |
| 16 inch | 173.33 | $3,168.02 | $4.97 | **$3,172.98** |
| 18 inch | 210.00 | $3,838.17 | $4.97 | **$3,843.14** |

1. Charges billed as $/MEU are calculated by multiplying the unit cost for the smallest meter size (5/8 inch and 3/4 inch) by the meter capacity ratio (see Section 4.2).

## 4.6 Monthly Private Fire Service Charge

Table 23 shows the calculation of the Test Year COS monthly service charge for private fire services.

**Table 23: Test Year Monthly Private Fire Service Charges**

| Fire Service Size | Meter Capacity Ratio | Proposed Private Fire Service Charges ($/Month) [1] |
|---|---|---|
| 5/8 inch | 1.00 | **$7.37** |
| 3/4 inch | 1.00 | **$7.37** |
| 1 inch | 1.67 | **$12.29** |
| 1-1/2 inch | 3.33 | **$24.58** |
| 2 inch | 5.33 | **$39.33** |
| 3 inch | 11.67 | **$86.03** |
| 4 inch | 20.00 | **$147.48** |
| 6 inch | 45.00 | **$331.83** |
| 8 inch | 53.33 | **$393.28** |
| 10 inch | 76.67 | **$565.33** |
| 12 inch | 106.67 | **$786.55** |
| 14 inch | 136.67 | **$1,007.77** |
| 16 inch | 173.33 | **$1,278.15** |
| 18 inch | 210.00 | **$1,548.53** |

1. Charges billed as $/FMEU are calculated by multiplying the unit costs for the smallest meter size (5/8 inch and 3/4 inch) by the meter capacity ratio (Section 4.2).

## 4.7 Elevation Surcharge

The Test Year COS elevation surcharge is identical to the unit cost for the Elevation service component: Elevation Zone 1: $0.00/CCF, Elevation Zone 2: $1.08/CCF, and Elevation Zone 3: $2.32/CCF.

**Table 24: Elevation Surcharge Unit Costs**

| Elevation Band | Elevation Surcharge Rate ($/CCF) |
|---|---|
| 1 | **$0.00** |
| 2 | **$1.08** |
| 3 | **$2.32** |

## 4.8 Recycled Water Volumetric Rate

The Test Year COS recycled water volumetric rate is identical to the unit cost for the Recycled Water service component: $5.51/CCF.

**Table 25: Recycled Water Volumetric Rate**

| | Recycled Water Volumetric Rate ($/CCF) |
|---|---|
| Retail Recycled Water | **$5.51** |

## 4.9 High Water Users

In accordance with Assembly Bill No. 755 (AB 755), which passed in 2023 and is codified in Water Code sections 390 and 390.1, this Study includes an analysis of costs to serve "high water users," who are defined by statute as "the top 10 percent of water, in terms of volume of water consumed." (See Water Code § 390, subd. (b).) This analysis has been conducted by customer class. Table 26 shows the total potable water sales, the number of customer accounts purchasing the top 10% of volume, the total sales to those customer accounts, and the revenue from the volumetric rate, the service charge and the elevation surcharge generated by those customer accounts under the Test Year rates. Because the Test Year rates reflect the costs for the District to serve all customer accounts, the revenue from the high water users is equal to the cost to serve the high water users.

**Table 26: Costs to Serve High Water Users**

| | Total Usage (CCF) | Customer Accounts in Top 10% | Sales to Top 10% (CCF) | Service Charge Revenue | Volumetric Rate Revenue | Elevation Surcharge Revenue |
|---|---|---|---|---|---|---|
| **Single-Family** | 29,754,554 | 5,946 | 2,975,594 | $2,096,678 | $25,836,511 | $3,880,074 |
| **Multi-Family** | 12,797,782 | 76 | 1,289,620 | $583,325 | $9,270,761 | $390,743 |
| **All Other** | 21,746,368 | 2 | 3,529,850 | $84,193 | $26,021,077 | $0 |
| **Total** | **64,298,704** | **6,024** | **7,795,064** | **$2,764,197** | **$61,128,349** | **$4,270,817** |

# 5 Drought Surcharges

The District intermittently experiences droughts or water shortages of varying degrees of severity. Decreased water sales and increased operating costs lead to financial pressures during these times. The District uses drought surcharges to reflect the costs to provide service during drought.

As defined in the District's *Water Shortage Contingency Plan 2020*[5] (Attachment 6), the District categorizes droughts in four stages based on severity and total available system storage. Table 27 outlines the four stages of drought, and the corresponding storage criteria and customer demand reduction policies for each stage.

**Table 27: Drought Stages and Corresponding Demand Reductions**

| Drought Stage | Total System Storage (Thousand Acre Feet) | Customer Demand Reduction |
|---|---|---|
| Stage 1 (Moderate) | 475 – 425 | Voluntary (0 – 10%) |
| Stage 2 (Significant) | 425 – 390 | Mandatory (10 – 15%) |
| Stage 3 (Severe) | 390 – 325 | Mandatory (15%) |
| Stage 4 (Critical) | <325 | Mandatory (≥15%) |

Drought surcharges are calculated based on the estimated revenue needs during different stages of drought, including costs to purchase water, additional operating costs to treat and deliver the purchased water, costs for drought outreach, and costs for additional water conservation efforts. The surcharges also account for revenue loss due to the reduction in water sales during droughts in response to voluntary or mandatory reduction targets. Drought surcharges are set as maximum surcharges that can be implemented during each drought stage. After a drought is declared by the District's Board, the District will determine the magnitude of any actual drought surcharge to be implemented based on the declared drought stage, the District's budget, and necessary financial considerations.

Table 28 shows the calculation of the drought surcharges for each stage of drought.

[5] The District's current *Water Shortage Contingency Plan* is available at www.ebmud.com/uwmp.

**Table 28: Drought Surcharge by Drought Stage**

| **Drought Surcharge Calculations** | | | | |
|---|---|---|---|---|
| | **Stage 1** | **Stage 2** | **Stage 3** | **Stage 4** |
| Demand Reduction | 10% | 10%-15% | 15% | > 15% |
| Voluntary/Mandatory | Voluntary | Mandatory | Mandatory | Mandatory |
| ***Transfer Supply Purchase Costs*** | | | | |
| CVP Supply (AF) | 20,000 | 20,000 | 0 | 0 |
| CVP Unit Cost ($/AF)[1] | $127.00 | $127.00 | $127.00 | $127.00 |
| **CVP Purchase Cost** | **$2,540,000** | **$2,540,000** | **$0** | **$0** |
| Other Transfer Supply (AF) | 10,000 | 10,000 | 30,000 | 30,000 |
| Other Transfer Supply Unit Cost ($/AF)[2] | $720.00 | $720.00 | $720.00 | $720.00 |
| **Other Transfer Supply Purchase Cost** | **$7,200,000** | **$7,200,000** | **$21,600,000** | **$21,600,000** |
| **Total Transfer Supply Purchase Costs** | **$9,740,000** | **$9,740,000** | **$21,600,000** | **$21,600,000** |
| ***Transfer Supply Operations and Maintenance (O&M) Costs*** | | | | |
| Total Transfer Supply (AF) | 30,000 | 30,000 | 30,000 | 30,000 |
| Freeport Operating Costs ($/AF)[3] | $259.50 | $259.50 | $259.50 | $259.50 |
| WTP Additional O&M Costs ($/AF)[4] | $80.15 | $80.15 | $80.15 | $80.15 |
| **Total Transfer O&M Unit Cost ($/AF)** | **$339.65** | **$339.65** | **$339.65** | **$339.65** |
| **Total Transfer Supply O&M Costs** | **$10,189,565** | **$10,189,565** | **$10,189,565** | **$10,189,565** |
| **Drought Period Customer Support & Outreach** | **$1,007,855** | **$2,015,710** | **$2,519,638** | **$3,149,547** |
| ***Revenue Loss*** | | | | |
| Expected Non-Drought Revenue | $505,558,953 | $505,558,953 | $505,558,953 | $505,558,953 |
| Drought Conservation | 5% | 10% | 15% | 20% |
| **Total Expected Revenue Loss** | **$25,277,948** | **$50,555,895** | **$75,833,843** | **$101,111,791** |
| **Use of Reserves** | **($20,000,000)** | **($25,000,000)** | **($25,000,000)** | **($15,000,000)** |
| **Revenue Requirements Covered by Surcharge** | **$26,215,367** | **$47,501,170** | **$85,143,045** | **$121,050,902** |
| Expected Non-Drought Revenue Consumption (CCF/year) | 64,298,704 | 64,298,704 | 64,298,704 | 64,298,704 |
| Water Consumption During Drought (CCF/year) | 61,083,769 | 57,868,834 | 54,653,899 | 51,438,963 |
| **Drought Surcharge (%)** | **5%** | **10%** | **20%** | **30%** |

(See notes on next page)

1. Unit cost for CVP (Central Valley Project) water based on 2021 actual costs.
2. Unit cost for other transfer supply based on purchase price paid by the District to Placer County Water Agency in 2022 for supplemental supply water.
3. Additional operating costs for transferring water through the Freeport Regional Water Facility and associated infrastructure consistent with District's experience with water transfers from 2014 through 2022.
4. Additional operating costs associated with the increased use of the District's conventional water treatment plants (WTPs) preferentially over the in-line WTPs due to lower water quality of transfer water versus water from the Mokelumne supply.

# Appendix A: Allocation of Operating Programs, Asset Categories, and Capital Awards to System Functions

## Allocation of Operating Expenses to System Functions — Table A1

| Operating Programs | Allocation Factor/Basis | 2024 Test Year Expense |
|---|---|---|
| 1301-OPERATE POWER PLANTS | Technical Support | **$1,137,200** |
| 1305-MAINTAIN POWER PLANTS | Technical Support | **$2,028,400** |
| 1401-ENGINEERING EXSTNG WTR SOURCES | Supply/Raw Water | **$4,437,233** |
| 1405-ENGINEERING FUTURE WTR SOURCES | Supply/Raw Water | **$5,823,564** |
| 1415-OPERATE WTR SOURCE FACILITIES | Supply/Raw Water | **$2,225,233** |
| 1420-WS WATER RECLAMATION /CONSERVATN * | Conservation | **$4,005,879** |
| 1420- WATER RECYCLING PORTION * | Recycled Water | **5,845,631** |
| 1425-MAINT RESVR STRCTR, WTR SOURCE | Supply/Raw Water | **$13,027,922** |
| 1435-OPERATE AQUEDUCTS & RW PMP PLT | Supply/Raw Water | **$3,400,251** |
| 1440-MAINTAIN DELTA LEVEES | Supply/Raw Water | **$543,312** |
| 1445-MAINTAIN AQUED & RW PMP PLTS | Supply/Raw Water | **$2,986,774** |
| 1450-ENGINEERING TERMINAL STORAGE | Supply/Raw Water | **$806,675** |
| 1455-OPERATE TERMINAL RESERVOIRS | Supply/Raw Water | **$8,543,709** |
| 1460-MAINT RESVR STRCTR, RAW WATER | Supply/Raw Water | **$775,067** |
| 1465-ENGINEERING WATER TREATMENT | Water Treatment Plants | **$2,377,999** |
| 1470-OPERATE TREATMENT PLANTS ** | Water Treatment Plants | **$11,526,938** |
| 1470- TREATMENT PLANTS (CHEMICALS & POWER ONLY) ** | Treatment Chemicals, Power, & Sludge Disposal | **$14,001,377** |
| 1475-WS OPERATING CHEMICALS | Treatment Chemicals, Power, & Sludge Disposal | **$1,214** |
| 1480-MAINTAIN TREATMENT PLANTS | Water Treatment Plants | **$9,297,407** |
| 1485-WS INTERCEPTION | Supply/Raw Water | **$150,447** |
| 1501-ENGRNG DISTRIBUTN PUMPNG & RES | Reservoir | **$1,462,593** |
| 1505-OPERATE DISTRIBUTN RESERVOIRS | Reservoir | **$794,337** |
| 1510-OPERATE DISTRBN PUMPING PLANTS | Elevation | **$12,494,062** |
| 1520-MNTN DISTRBN PMPNG STRUCTURES | Reservoir | **$918,213** |
| 1525-MNTN DISTRBN PMPNG EQUIPMENT | Elevation | **$3,251,030** |
| 1525-MNTN DISTRBN PMPNG EQUIPMENT- NON ELEV | Reservoir | **$2,456,954** |
| 1530-MAINTAIN DISTRIBUTN RESERVOIRS | Reservoir | **$6,112,939** |
| 1535-ENGINEERING DISTRIBUTN NETWORK | Distribution Pipelines | **$2,689,844** |
| 1540-OPERATE DISTRIBUTION NETWORK | Distribution Pipelines | **$22,913,669** |
| 1545-LOCATE AND MARK FAC FOR OTHERS | Distribution Pipelines | **$2,739,105** |
| 1550-REGLTRY & ENVRNMNTL COMPLIANCE | Technical Support | **$4,572,512** |
| 1555-ENGINEERING SUPPORT REQUESTS | Distribution Pipelines | **$252,850** |
| 1560-MAINTAIN DISTRIBUTION MAINS | Distribution Pipelines | **$23,312,739** |
| 1565-MAINTAIN SERVICES | Service Laterals & Meters | **$12,548,383** |
| 1570-MAINTAIN HYDRANTS | Hydrants | **$2,452,923** |
| 1575-MAINTAIN METERS | Service Laterals & Meters | **$5,675,088** |
| 1585-OP/NET OPERATIONS | Distribution Pipelines | **$3,723,976** |
| 1590-O&M DISTRICT FUEL SITES | Distribution Pipelines | **$36,287** |
| 1601-WS CUSTOMER SERVICES & ACCOUNTING | Meter Reading & Account Billing | **$15,659,596** |
| 1605-METER READING | Meter Reading & Account Billing | **$5,328,599** |
| 1610-WS CUSTOMER RECORDS & BILLINGS | Meter Reading & Account Billing | **$2,123,752** |
| 1620-WS WORK FOR OTHERS | General Administration | **$2,324,452** |
| 1620- RARE O&M COSTS | Recycled Water | **$3,041,303** |
| 1650-WS-WORK FOR OTHERS | Technical Support | **$72,051** |
| 1695-RECREATION OPERATIONS, BILLABLE | Supply/Raw Water | **$7,103,839** |
| 1701-WS FINANCIAL MANAGEMENT DEPT | General Administration | **$2,394,623** |
| 1705-WS ACCOUNTING DEPT | General Administration | **$5,942,712** |
| 1710-INTERNAL AUDIT INVESTIGA DEPT | Technical Support | **$1,159,807** |
| 1730-WS GENERAL ADMINISTRATION DEPT *** | Technical Support | **($28,846,588)** |
| 1735-WS PUBLIC RELATIONS DEPT | Technical Support | **$125,324** |
| 1760-COMMUNICATIONS DEPT | Technical Support | **$4,152,084** |
| 1765-WS INFORMATIONS SYSTEMS DEV DEPT | General Administration | **$15,182,708** |
| 1770-WS PERSONNEL & EMPLOYEE SRV DEPT | General Administration | **$16,270,954** |
| 1775-WS DEPARTMENTAL OVERHEAD | Technical Support | **$26,117,978** |
| 1780-ADMINISTRATON & GENERAL CREDIT | General Administration | **$5,096** |
| 1806-WS ACCOUNTING DIST | General Administration | **$86,413** |
| 1815-WS RISK MANAGEMENT DIST | Technical Support | **$15,056,342** |
| 1820-WS MAINTAIN ADMIN FACILITIES DIST | Technical Support | **$13,542,488** |
| 1825-WS PROPERTY MANAGEMENT DIST | General Administration | **$2,692,258** |
| 1831-WS GENERAL ADMINISTRATION DIST | Technical Support | **$3,091,191** |
| 1836-WS PUBLIC RELATIONS DIST | Technical Support | **$57,455** |
| 1850-WS PURCHASING DIST | Technical Support | **($8,212)** |
| 1866-WS INFORMATIONS SYSTEMS DEV DIST | Technical Support | **$14,602,905** |
| 1871-WS PERSONNEL & EMPLOYEE SRV DIST | General Administration | **$2,667,264** |
| 1902-WS FINANCIAL MANAGEMENT OTHR | General Administration | **$1,961,685** |
| 1935-MISCELLANEOUS ADJUSTMENTS | Technical Support | **$1,137,404** |
| 1937-WS PUBLIC RELATIONS OTHR | Technical Support | **$4,329,290** |
| 1945-WS EMERGENCY PREPAREDNESS | Technical Support | **$876,166** |
| 1951-WS PURCHASING OTHER | Technical Support | **$785,076** |
| 1972-WS PERSONNEL & EMPLOYEE SRV OTHR | General Administration | **$6,687,825** |
| Freeport **** | Supplemental Supply Facilities | **$1,893,209** |
| **Total Operating Expenses** | | **$348,966,784** |

** Operating Program 1420 is separated into two categories of expenses in order to appropriately allocate to Conservation and Recycled Water.*
*** Operating Program 1470 is separated into two categories of expenses in order to appropriately allocate to Treatment Plants and Treatment Chemicals, Power, & Sludge Disposal.*
**** Operating Program 1730 includes capital support offsets.*
***** Freeport operating expenses are not included in Operating Program 1435 as they are allocated to Supplemental Supply Facilities.*

## Allocation of Assets to System Functions — Table A2

| Category Group | Allocation Basis/Factor | Net Book Value |
|---|---|---|
| Auto Control System-STRUC | Distribution Pipelines | $14,635,929 |
| Hydroelectric Power Gen-EQUIP | Technical Support | $15,493,110 |
| Groundwater systems - Equip | Supplemental Supply Facilities | $868,360 |
| Source of Water Supply-OTHER | Supply/Raw Water | $39,169,825 |
| Raw Water Transmission-CONDU | Supply/Raw Water | $249,008,796 |
| Raw Water Trans Pump-EQUIP | Supply/Raw Water | $11,573,168 |
| Terminal Reservoirs-OTHER | Supply/Raw Water | $143,081,442 |
| Water Reclam-Equipment | Recycled Water | $53,857,038 |
| Water Treatment-CNCST | Water Treatment Plants | $413,786,066 |
| Distribution Pumping-CNCST | Elevation | $236,669,770 |
| Distribution Reservoirs-STLST | Reservoir | $400,085,095 |
| Distribution Mains-MAINS | Distribution Pipelines | $1,568,439,210 |
| Distribution Aqueducts-DAQUE | Supply/Raw Water | $62,584,233 |
| Pressure Regulators-REGL | Distribution Pipelines | $42,271,485 |
| Venturi Met&CatProtSta-CATHP | Distribution Pipelines | $2,576,519 |
| Hydrants-HYD | Hydrants | $41,736,653 |
| Small Services 3in & und - SSM | Service Laterals & Meters | $449,945,095 |
| Large Services over 3in-SLG | Service Laterals & Meters | $81,906,845 |
| Gen PlantStruct-WaterSys-OTHER | Technical Support | $137,616,691 |
| Equip- Vehicles & Const-02 | Technical Support | $48,651,403 |
| Portable Equip - Laboratory | Technical Support | $1,629,659 |
| Equipment-Engineering | Technical Support | $262,153 |
| Equipment-Tools-3C | Technical Support | $873,976 |
| Equipment-Stores -WHSE | Technical Support | $4,579 |
| Equipment-Shop -SHOP | Technical Support | $327,899 |
| Non-Oper Prop ExceptLand-NOP | Supply/Raw Water | $170,765 |
| Recreation Area-STLST | Supply/Raw Water | $32,868,947 |
| Land-Source of Supply | Supply/Raw Water | $8,073,507 |
| ROW-Source of Supply | Technical Support | $135,247 |
| Land-Raw Water Transmission | Supply/Raw Water | $3,709,102 |
| Rights of Way-Raw Wtr Trans | Supply/Raw Water | $233,289 |
| Land - Terminal Reservoirs | Supply/Raw Water | $24,383,749 |
| Land - Water Treatment | Water Treatment Plants | $3,439,560 |
| Land - Reclamation | Recycled Water | $2,174,793 |
| Land - Distribution | Reservoir | $7,768,113 |
| Rights of Way - Distribution | Technical Support | $1,890,115 |
| Land Distribution Pumping | Technical Support | $17,164,349 |
| Land Distribution Reservoir | Technical Support | $3,872,216 |
| Deferred Software costs | Technical Support | $13,989,645 |
| Deferred Wtr Conservation Csts | Supplemental Supply Facilities | $4,919,748 |
| Deferred Wtr Sply Mgmt Csts | Supplemental Supply Facilities | $3,009,943 |
| CVP Contract Water Rights | Supplemental Supply Facilities | $4,409,509 |
| Regulatory Compliance | Technical Support | $1,375,799 |
| EB Watershed Master Plan costs | Technical Support | $3,543,879 |
| Deffered Lab Expansion costs | Technical Support | $2,876,935 |
| Prel Engineer & Envir Studies | Technical Support | $3,106,130 |
| Freeport Regional Water Project | Supplemental Supply Facilities | $383,002,561 |
| **Total** | | **$4,543,172,899** |

## Allocation of Capital Improvement Program (CIP) to System Functions — Table A3

| Award | Allocation Basis/Factor | 5-Year Total |
|---|---|---|
| 7000003-Pipeline Rebuild | Distribution Pipelines | **$596,964,878** |
| 7000006-Pipeline Relocations | Distribution Pipelines | **$40,940,891** |
| 7000012-East Bay Watershed Mgmt | Supply/Raw Water | **$7,183,830** |
| 7000017-Open Cut Reservoir Program | Reservoir | **$91,621,684** |
| 7000021-Distrib Sys Wtr Quality Imprv | Supply/Raw Water | **$395,666** |
| 7000024-Pipeline System Improvements | Distribution Pipelines | **$541,373** |
| 7000029-Op/Net Sys Improvements | Supply/Raw Water | **$6,525,984** |
| 7000030-Distr Sys Cathodic Protection | Distribution Pipelines | **$12,868,783** |
| 7000031-Reservoir Rehab/Maintenance | Reservoir | **$59,753,431** |
| 7000033-Pumping Plant Rehabilitation* | Elevation | **$77,143,000** |
| 7000033-Pumping Plant Rehabilitation- Non Elev* | Reservoir | **$58,300,549** |
| 7000034-Reservoir Tower Modifications | Supply/Raw Water | **$20,059,653** |
| 7000035-East Bayshore | Recycled Water | **$15,473,860** |
| 7000036-DERWA | Recycled Water | **$1,557,752** |
| 7000041-Service Lateral Replacements | Service Laterals & Meters | **$77,924,841** |
| 7000042-Trench Soils Management | Distribution Pipelines | **$55,549,706** |
| 7000043-Aqueduct Cathodic Protection | Supply/Raw Water | **$1,998,725** |
| 7000045-Raw Wtr Aqueduct Imprvmts | Supply/Raw Water | **$3,512,568** |
| 7000055-Trans Main Cathodic Protection | Supply/Raw Water | **$2,340,358** |
| 7000061-Raw Water Infrastructure | Supply/Raw Water | **$49,671,763** |
| 7000065-Pressure Zone Improvements | Reservoir | **$4,556,266** |
| 7000067-GroundWaterResourceDevelopment | Supplemental Supply Facilities | **$4,695,838** |
| 7000068-Dam Operational Upgrades | Supply/Raw Water | **$11,615,921** |
| 7000070-River and Watershed | Supply/Raw Water | **$1,128,314** |
| 7000071-San Ramon Valley RW | Recycled Water | **$30,493,545** |
| 7000074-Upcountry WW Trmt Imprvmts | Supply/Raw Water | **$5,878,209** |
| 7000085-Security Improvements | Technical Support | **$20,610,120** |
| 7000089-Rate Control Station Rehab | Water Treatment Plants | **$3,997,657** |
| 7000090-Treatment Plant Upgrades | Water Treatment Plants | **$476,742,336** |
| 7000117-Powerhouse Improvements | Supply/Raw Water | **$12,722,608** |
| 7000126-Building Facilities Improve | Technical Support | **$71,381,646** |
| 7000131-Dam Seismic Upgrades | Supply/Raw Water | **$3,321,470** |
| 7000155-Mokelumne Aqueducts Recoating | Supply/Raw Water | **$14,988,644** |
| 7000164-Annual Appurtenance Work | Distribution Pipelines | **$9,145,171** |
| 7000165-Planned Meter Replacements | Service Laterals & Meters | **$32,810,459** |
| 7000167-Dam Surveillance Improvements | Supply/Raw Water | **$3,222,520** |
| 7000185-Mok Aqueduct No 2 & 3 Relining | Supply/Raw Water | **$75,963,009** |
| 7000215-Distribution System Upgrades | Distribution Pipelines | **$4,307,637** |
| 7000223-Regulator Rehabilitation | Distribution Pipelines | **$11,141,026** |
| 7000224-West of Hills Master Plan | Water Treatment Plants | **$3,052,746** |
| 7000225-Wtr Supply Monitoring System | Supply/Raw Water | **$1,850,978** |
| 7000240-Moke River Hatchery | Supply/Raw Water | **$9,789,065** |
| 7000254-Large Diameter Pipelines | Supply/Raw Water | **$45,431,574** |
| 7000263-Lafayette Rec Infrastructure | Supply/Raw Water | **$2,967,430** |
| 7000271-Miscellaneous Planning Studies | Technical Support | **$2,830,171** |
| 7000273-Enhanced Power Revenue | Supply/Raw Water | **$665,754** |
| 7000289-San Pablo Rec Infrastructure | Supply/Raw Water | **$3,069,470** |
| 7000299-Pardee Ctr Cap Maint & Imprvmt | Supply/Raw Water | **$9,484,666** |
| 7000300-Rec Area Cap Maint & Imprvmt | Supply/Raw Water | **$11,731,934** |
| 7000305-Small Capital Improvements | Supply/Raw Water | **$18,045,753** |
| 7000314-SGMA Compliance | Supplemental Supply Facilities | **$1,308,224** |
| 7000315-North Richmond Water Recycling Plant | Recycled Water | **$10,432,679** |
| 7000319-Chloramine Boosting Stations | Supply/Raw Water | **$813,700** |
| 7000323-Reservoir Mixing System | Reservoir | **$337,751** |
| 7000325-Water Loss Control | Supply/Raw Water | **$25,865,554** |
| 7000326-Facility Paving | Supply/Raw Water | **$9,979,848** |
| 7100001-Delta Tunnel | Supply/Raw Water | **$4,775,441** |
| 7100002-Facilities Cathodic Protection | Technical Support | **$2,403,939** |
| 7100004-Camanche Hills Hunting Preserv | Supply/Raw Water | **$1,125,509** |
| 7100007-Water Rights, Licenses & Plans | Supply/Raw Water | **$20,565,627** |
| 71000XX-Raw Water Facilities | Supply/Raw Water | **$19,227,382** |
| 71000XX-HRIS & Information Technology | Technical Support | **$55,524,959** |
| **Total** | | **$2,240,331,842** |

** Capital Award 7000033 is separated into two project categories to allocate projects associated with providing reliability and redundancy to the Reservoir system function.*

# Appendix B: Development of Factor for Allocating Water Treatment Plants System Function Costs to the Base and Treatment Peaking Service Components

The District owns and operates six water treatment plants. The individual service areas for the water treatment plants overlap, and the District operates the six plants as one treatment system. For example, if one treatment plant is temporarily offline due to maintenance, the District increases production at its other treatment plants. As a whole, the District's treatment system must be able to meet peak demands. To meet peak demands, the District incurs additional costs beyond those for average demands, as treatment facilities must be built and maintained at larger capacities to accommodate peak usage rather than just average usage.

After evaluating water treatment plant production data from FY 2018 to FY 2024, FY 2024 (the Test Year) has been found to be representative of a typical year of customer demands. In the Test Year, the average rate of production of the treatment system was 151.7 MGD and the maximum rate of monthly production for the treatment system was 193.8 MGD (average production in August of the Test Year). As such, the average production is 78% of the production during the maximum month. This calculation is used to allocate costs in the Water Treatment Plants system function to the Base service component (78% of Water Treatment Plants system function costs) and the Treatment Peaking service component (22% of Water Treatment Plants system function costs).

# Appendix C: Allocation of System Function Costs to Public and Private Fire Protection Service Components

While the primary function of the District's distribution system is to serve potable water, it also provides fire protection benefits via public fire hydrants and private fire services.[1] Fire protection costs consist of:

- Installing, operating and maintaining public fire hydrants;
- Operating and maintaining private fire services (meters and service laterals); and
- Providing additional capacity in the distribution system pipelines and distribution reservoirs to accommodate the flows/pressures that are required for firefighting above and beyond the flow/pressures needed for potable water supply.

For the purposes of the Study, fire protection costs are separated into the Public Fire Protection service component (to be recovered via rates paid by water system customer accounts), and Private Fire Protection service component (to be recovered via rates paid by private fire service accounts).

## Allocation of the Hydrants System Function to the Public Fire Protection Service Component

The District owns and maintains approximately 31,000 fire hydrants throughout its water service area. The sole function of fire hydrants is to provide public fire protection services. As such, 100% of the Hydrants system function costs are allocated to the Public Fire Protection service component.

## Allocation of the Service Laterals & Meters System Function to the Private Fire Protection Service Component and Service Laterals & Meters Service Component

District costs associated with private fire services consist of maintenance of private fire meters, associated service laterals, and related appurtenances (e.g., check valves). The District's internal cost accounting does not segregate these costs between potable water services and private fire services. To allocate the proportion of meter/service lateral maintenance costs associated with private fire services, the proportion of private fire services meter equivalent units of the total system-wide meter equivalent units has been calculated.

As discussed in the body of the Study (see Section 4.2), the private fire service connections represent 266,408 fire meter equivalent units (FMEU), while water meters represent 484,675 meter equivalent units

[1] A private fire service is a water service connection provided under written agreement for the sole use of fire protection to a premise. A private fire service for a premise is separate from that premise's potable water service (uses a different service lateral connection to the water main) and may serve fire sprinklers, private fire hydrants, or other private fire suppression infrastructure downstream of the private fire service meter.

(MEUs). As such, the FMEUs represent 35.5% of the total 751,083 MEUs. Fire service connections, however, generally require less maintenance than potable water service meters or service laterals. To account for this, the costs associated with FMEUs are allocated 85% of the costs associated with other MEUs. These proportions are used to allocate costs in the Service Laterals & Meters system function service component as follows: 30.1% (35.5% multiplied by 85%) to the Private Fire Protection service component and 69.9% to the Service Laterals & Meters service component.

## Allocation of Distribution Pipelines System Function Costs to the Public Fire Protection Service Component and to the Private Fire Protection Service Component

The District owns and maintains approximately 4,200 miles of distribution system pipelines, with approximately 3,700 miles being smaller (12 inches in diameter or less) pipelines that move water at the neighborhood-level and connect to service laterals and fire hydrants, and approximately 500 miles of larger pipelines (greater than 12 inches in diameter) that function primarily as regional transmission pipelines and do not connect to service laterals or fire hydrants.

As detailed in the District's *Engineering Standard Practice 492.1 Planning Criteria for Distribution Water Mains* (Attachment 2), distribution system pipelines are designed to accommodate fire flows/pressures. For pipelines with diameters of 12 inches or less, fire flows generally are the determining factor for the installed size of the pipe (i.e. the pipe would be smaller if its sole purpose was to deliver potable water). For pipelines with diameters larger than 12 inches, however, regional transmission needs generally dominate the sizing of the pipe, while also allowing for sufficient flow/pressure at downstream pipes/hydrants to satisfy fire protection design criteria.

Table C 1 shows calculations for allocating the Distribution Pipelines system function costs attributable to fire protection. As shown in Table C 1, the estimated replacement cost of the District's distribution system, including all pipes sizes, is approximately $13.4 billion. To determine the costs associated with "upsizing" pipelines to accommodate fire flows/pressures, the value of the distribution system has been recalculated assuming existing 6-inch/8-inch distribution pipelines would be sized 4-inch and 10-inch/12-inch distribution pipelines would be sized 6-inch if fire protection had not been accounted for in pipe sizing based on District experience with pipe design and hydraulic modeling. With this reduced sizing, the replacement cost of the distribution system is estimated at $11.7 billion or 87% of the value of the existing distribution system. Therefore, distribution pipeline costs that can be attributable to Public Fire Protection and Private Fire Protection is 13% of total distribution pipeline costs. Distribution system reservoirs are designed to serve the needs of downstream pipelines, including the extent to which those pipelines are designed to provide for fire protection. As such, the allocation of 13% of distribution system costs discussed above is also applied to distribution reservoirs costs.

Allocation of these costs between Public Fire Protection and Private Fire Protection is discussed in the next section, below.

**Table C 1: Proportion of Distribution System Costs Attributable to Sizing for Fire Flows**

| Pipe Diameter (inches) | Length of Pipe (ft) - Existing System | *Length of Pipe (ft) - Without Sizing for Fire* | Estimated cost per foot ($/ft) | Total Replacement Cost - Existing System | *Total Replacement Cost - Without Sizing for Fire* |
|---|---|---|---|---|---|
| 0.75 | 647 | *647* | $410 | $265,560 | *$265,560* |
| 1 | 3,173 | *3,173* | $418 | $1,325,775 | *$1,325,775* |
| 1.5 | 443 | *443* | $433 | $191,639 | *$191,639* |
| 2 | 89,921 | *89,921* | $447 | $40,226,923 | *$40,226,923* |
| 3 | 3,290 | *3,290* | $477 | $1,568,958 | *$1,568,958* |
| 4 | 1,403,341 | *16,584,656* | $506 | $710,673,065 | *$8,398,720,133* |
| 6 | 9,039,426 | *2,822,018* | $565 | $5,111,539,570 | *$1,595,771,311* |
| 8 | 6,141,889 | - | $625 | $3,835,783,508 | *$0* |
| 10 | 187,488 | - | $684 | $128,163,967 | *$0* |
| 12 | 2,634,530 | - | $743 | $1,956,511,336 | *$0* |
| 14 | 4,119 | *4,119* | $449 | $1,850,105 | *$1,850,105* |
| 16 | 856,279 | *856,279* | $464 | $396,999,109 | *$396,999,109* |
| 18 | 7,577 | *7,577* | $480 | $3,637,197 | *$3,637,197* |
| 20 | 393,794 | *393,794* | $498 | $196,250,794 | *$196,250,794* |
| 22 | 162 | *162* | $519 | $84,016 | *$84,016* |
| 24 | 399,582 | *399,582* | $541 | $216,094,775 | *$216,094,775* |
| 25 | 2,583 | *2,583* | $553 | $1,427,414 | *$1,427,414* |
| 30 | 195,348 | *195,348* | $619 | $120,907,885 | *$120,907,885* |
| 32 | 31 | *31* | $649 | $20,114 | *$20,114* |
| 36 | 350,051 | *350,051* | $714 | $250,087,895 | *$250,087,895* |
| 42 | 91,582 | *91,582* | $827 | $75,765,118 | *$75,765,118* |
| 48 | 209,662 | *209,662* | $958 | $200,754,651 | *$200,754,651* |
| 54 | 43,458 | *43,458* | $1,105 | $48,025,511 | *$48,025,511* |
| 60 | 13,876 | *13,876* | $1,270 | $17,623,226 | *$17,623,226* |
| 66 | 35,353 | *35,353* | $1,452 | $51,345,391 | *$51,345,391* |
| 69 | 24,256 | *24,256* | $1,550 | $37,597,535 | *$37,597,535* |
| 72 | 680 | *680* | $1,652 | $1,123,386 | *$1,123,386* |
| 78 | 1,041 | *1,041* | $1,869 | $1,945,709 | *$1,945,709* |
| 84 | 9,623 | *9,623* | $2,103 | $20,241,769 | *$20,241,769* |
| 90 | 761 | *761* | $2,355 | $1,792,340 | *$1,792,340* |
| 96 | 1,265 | *1,265* | $2,624 | $3,319,828 | *$3,319,828* |
| 108 | 313 | *313* | $3,215 | $1,006,206 | *$1,006,206* |
| **Total** | **22,145,544** | ***22,145,544*** | | **$13,434,150,274** | ***$11,685,970,272*** |

| | | |
|---|---|---|
| **Cost difference between distribution system with and without design for fire flow** | **$** | **1,748,180,002** |
| **Proportion of Distribution System Costs Attributable to Sizing for Fire Flows** | | **13.0%** |

Notes

1. Pipe sizes shown in gray remain unchanged from existing in this allocation of the proportion of distribution system costs attributable to sizing for fire.
2. Lengths of pipe sized 0.75 to 3 inches remain unchanged because these small pipes do not serve hydrants or private fire services.
3. Lengths of pipe sized greater than 12 inches remain unchanged because these large pipes are designed primarily for regional transmission.
4. Existing 6-inch/8-inch pipes are assumed to be 4-inch in a system not designed to accommodate fire flows.
5. Existing 10-inch pipes are assumed to be 6-inch in a system not designed to accommodate fire flows.
6. See discussion below regarding pipeline cost per foot.

Costs per foot for pipes with diameters less than or equal to 12 inches are based on the District's FY 2024 Schedule G - Water Main Extension Charges. Figure C 1 plots Schedule G charges and shows the linear line-of-best-fit upon which the costs above are based. Costs for pipes with diameters greater than 12 inches are shown in Figure C 2 and are based on as-built costs from District distribution system projects completed by contractors. The line-of-best-fit for costs for pipelines greater than 12 inches is based on a regression analysis of the relationship between pipe cross sectional area and the $/ft cost. Pipes with diameters less than or equal to 12 inches are generally installed by District staff whereas pipes with diameters greater than 12 inches are generally installed by contractors.

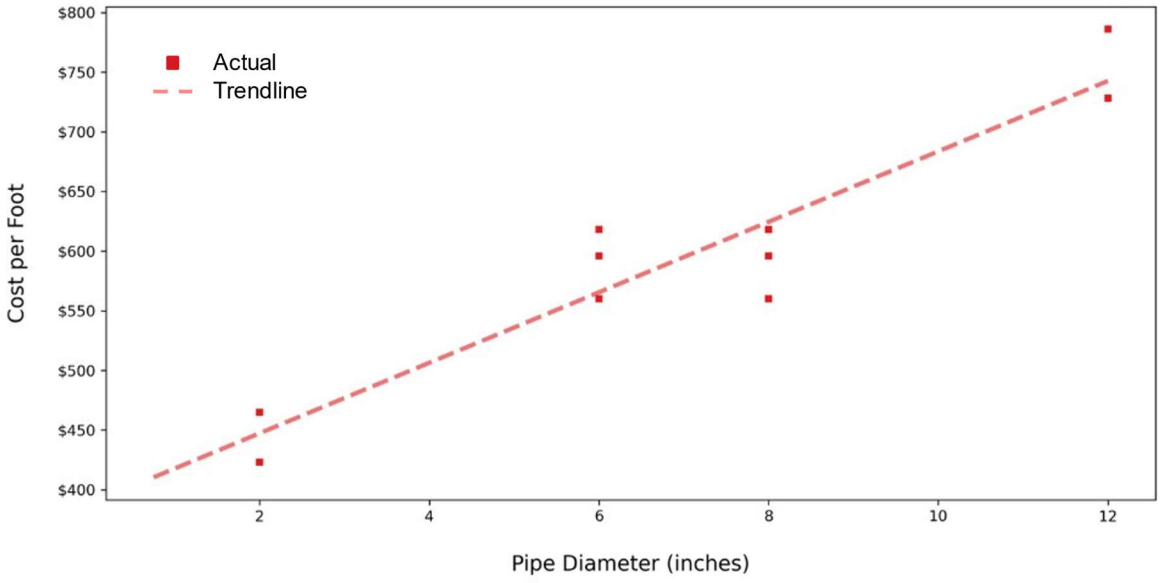


**Figure C 1: Replacement Unit Costs per Foot for Pipelines 12 Inches in Diameter and Less**

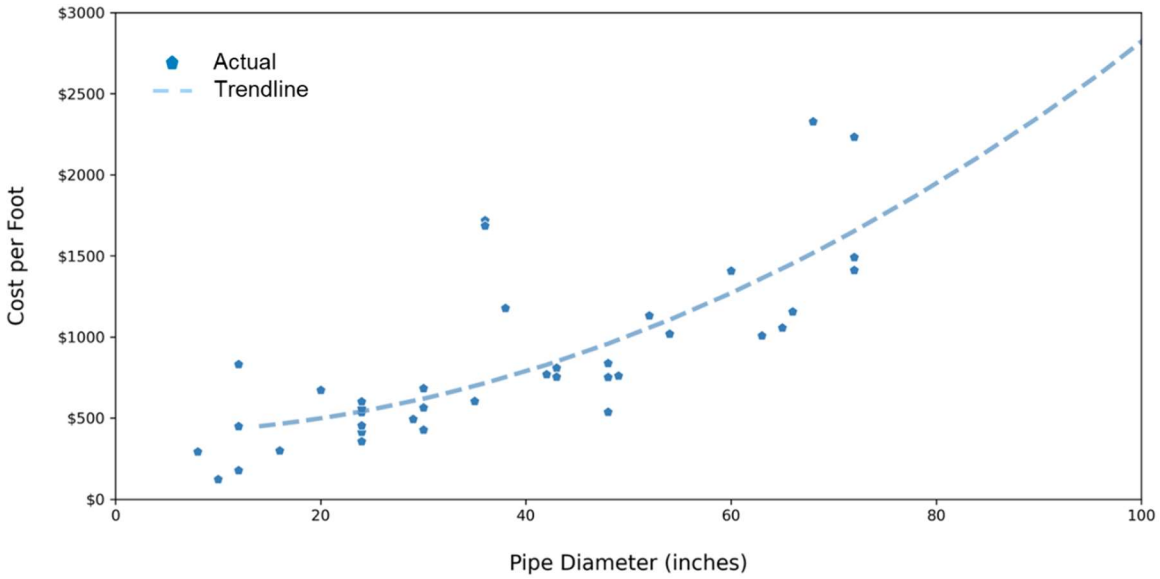


**Figure C 2: Replacement Unit Costs per Foot for Pipelines Greater than 12 Inches in Diameter**

The distribution system pipelines and reservoirs serve both the fire hydrants and the private fire services. To allocate pipeline and reservoir costs between the Public Fire Protection and Private Fire Protection service components, the flow potentials of the hydrants and the private fire services have been calculated as discussed in Table C 2 below. Flow potential is represented by a demand factor that represents the relative potential demand of each size of a fire service connection during a fire event. The relative flow potential of hydrants constitutes 80.1% of total fire protection relative flow potential from both hydrants and private fire services.

**Table C 2: Public and Private Fire Protection Allocation**

| Item | Number of Connections | Demand Factor[1] | Relative Flow Potential |
|---|---|---|---|
| **Private Fire Services[2]** | | | |
| 1 inch | 4 | 1.00 | 4 |
| 1.5 inch | 278 | 2.90 | 808 |
| 2 inch | 504 | 6.19 | 3,120 |
| 3 inch | 4 | 17.98 | 72 |
| 4 inch | 2,205 | 38.32 | 84,494 |
| 6 inch | 2,554 | 111.31 | 284,288 |
| 8 inch | 1,617 | 237.21 | 383,563 |
| 10 inch | 195 | 426.58 | 83,183 |
| 12 inch | 22 | 689.04 | 15,159 |
| 14 inch | - | 1,033.51 | - |
| 16 inch | 1 | 1,468.37 | 1,468 |
| 18 inch | - | 2,001.55 | - |
| **Total Private Fire Services** | **7,384** | | **856,159** |
| | | | |
| **Hydrants** | | | |
| **6 inch** | **30,888** | **111.31** | **3,438,172** |
| **Percent of relative flow potential from hydrants** | | | **80.1%** |
| **Percent of relative flow potential from private fire services** | | | **19.9%** |

1. Relative flow potential is calculated using the Hazen-Williams equation.
2. 1-inch is the smallest private fire service within the District's service area.

As described above, 13% of the Distribution system function costs are allocated to fire protection. Applying the resulting percentages from Table C 2 to the 13% of Distribution system function costs results in a 10% allocation of Distribution Pipelines system function costs to the Public Fire Protection service component and a 3% allocation of Distribution Pipelines system function costs to the Private Fire Protection service component.

# Appendix D: Allocation of Recycled Water Function Costs to the Retail Recycled Water and Supplemental Supply Service Components

The District's recycled water program is a water reliability program benefitting potable water users. Specifically, supplying recycled water to customers who do not require potable water service displaces the demand for potable water supplies and makes those supplies available to potable water customers. Additionally, the use of recycled water directly decreases the frequency of water shortages and increases the availability of potable water during a water shortage when additional supplemental supplies are either not available or are available at significantly greater cost. Because potable water customers directly benefit from the recycled water program and avoid costs of developing new, or acquiring supplemental, potable water supplies, they share in a portion of the costs of this program.

Table D 1 shows the total costs allocated to the Recycled Water system function and the avoided costs of acquiring supplemental potable water supplies that are effectively credited to the total recycled water cost of service. This credit is based on the volume of recycled water produced and the unit cost of procuring supplemental supply. The credited costs are equal to the cost of acquiring an additional 6,538 acre feet (AF)[1] of water (i.e., the total volume of recycled water produced in the Test Year) at $825.59 per AF (i.e., the estimated cost of producing supplemental water supply).[2]

Table D 1 shows the total recycled water costs of $7,747,906 is offset by the cost credit of $5,397,522. The $5,397,522cost is allocated to the Supplemental Supply Facilities service component.

**Table D 1: Recycled Water Cost Allocation to Supplemental Supply**

| | Test Year |
|---|---|
| Recycled Water system function costs after non-rate revenue offsets | $7,747,906 |
| Total recycled water production (AF) | 6,538 |
| Cost of transfer water ($/AF) | $825.59 |
| Recycled Water system function cost credit | $5,397,522 |
| Percent of Recycled Water system function costs allocated to the Supplemental Supply service component | 69.7% |

[1] 6,538 AF equals 2,847,854 CCF.

[2] The estimated cost of producing supplemental water supply is calculated by using the purchase price of transfer water ($485.94/AF), plus additional operating costs for transferring water through the Freeport Regional Water Facility and associated infrastructure consistent with District's experience with water transfers since 2014 ($259.50/AF), plus additional operating costs associated with the increased use of the District's conventional water treatment plants preferentially over the in-line water treatment plants due to lower water quality of transfer water versus water from the Mokelumne supply ($80.15). The estimated purchase price of transfer water ($485.94/AF) is calculated by using the price the District paid to the Contra Costa Water District for water transfers in 2021 ($432/AF) inflated by 4% per year (resulting in $485.94/AF).

# Appendix E: Calculation of Unit Costs by Customer Class and Tier for the Treatment Peaking Service Component

As discussed in Appendix B, $20,182,025 is allocated to the Treatment Peaking service component. The costs associated with the Treatment Peaking service component are recovered in each customer class/tier in proportion to the amount of usage that occurs in each customer class/tier during the month in which the maximum usage occurs. During the Test Year, peak monthly treatment system water production occurred in August (see Appendix B). All customer classes/tiers exhibited peak consumption over the same period.

Billing data provided by the District from the Test Year has been used to calculate the maximum month consumption for each customer class and each tier within the SFR customer class. As the majority of District customers are billed on a bi-monthly basis, bi-monthly data has been converted into monthly demand trends by following the District's normalization algorithms. An overview of this normalization process is outlined below:[1]

1. Convert total usage for each billing period into daily usage by dividing the total billed usage by the number of days in the billing period;

2. Distribute the daily usage into each month of the individual bill's billing period by multiplying the daily usage from the prior step by the number of days in each billing period that fall within the month;

3. Apply a Seasonal Index (SI) to the use that falls within each month from each billing period, effectively applying different weights to the proportion of the usage in each month;

4. Divide the SI-adjusted use in each month by the weighted average of the SI values for each month in the billing period, with the number of days in each month falling within the billing period serving as the weights in the weighted average; and

5. Calculate the total normalized monthly usage for each customer by summing the SI-adjusted use from each bill over each month of the year.

Table E 1 displays the Test Year consumption, the average monthly consumption (calculated as annual consumption divided by twelve), and consumption during the peak month. Table E 1 also shows calculated values for peaking consumption (consumption during the peak month minus average monthly consumption), and the percent of peaking consumption represented by each customer class/tier.

[1] A detailed explanation of the monthly normalization process is discussed in Attachment 4, and examples of the calculation process are provided in Attachment 5.

**Table E 1: Percent of Peaking Consumption by Customer Class and Tier**

| Customer Class and Tier | Test Year consumption (CCF/year) | Average monthly consumption (CCF/month) | Consumption during peak month (CCF/month) | Peaking Consumption (CCF/month) | Percent of Peaking Consumption |
|---|---|---|---|---|---|
| SFR Tier 1 | 19,076,989 | 1,589,749 | 1,973,678 | 383,929 | 16% |
| SFR Tier 2 | 6,311,273 | 525,939 | 931,822 | 405,882 | 16% |
| SFR Tier 3 | 4,366,292 | 363,858 | 963,001 | 599,144 | 24% |
| MFR | 12,797,782 | 1,066,482 | 1,285,885 | 219,403 | 9% |
| All Other | 21,746,368 | 1,812,197 | 2,671,519 | 859,321 | 35% |
| **Total** | **64,298,704** | **5,358,225** | **7,825,905** | **2,467,679** | **100%** |

As shown in Table E 2, these percentages are then used to apportion the $20,182,025 in Treatment Peaking service component cost among the customer classes/tiers. To arrive at a unit cost ($/CCF), the cost allocation for each customer class/tier is divided by the annual usage in that customer class/tier. In this way, the costs for the Treatment Peaking service component are proportionally allocated.

**Table E 2: Treatment Peaking Unit Costs**

| Customer Class and Tier | Test Year consumption (CCF/year) | Percent of Consumption During Peak Month | Treatment Peaking Service Component Cost Allocation | Unit Cost ($/CCF) |
|---|---|---|---|---|
| SFR Tier 1 | 19,076,989 | 16% | $3,139,978 | **$0.16** |
| SFR Tier 2 | 6,311,273 | 16% | $3,319,526 | **$0.53** |
| SFR Tier 3 | 4,366,292 | 24% | $4,900,124 | **$1.12** |
| MFR | 12,797,782 | 9% | $1,794,398 | **$0.14** |
| All Other | 21,746,368 | 35% | $7,027,998 | **$0.32** |
| **Total** | **64,298,704** | **100%** | **$20,182,025** | |

# Appendix F: Calculation of Unit Costs for the Supplemental Supply Service Component

The District's water supply primarily comes from the Mokelumne River, a supply for which the District holds water rights. The District's supplemental supply facilities allow the District to provide additional water to meet customer demands above and beyond what may be available from its primary Mokelumne River supply. The Supplemental Supply Facilities service component costs ($24,578,990) for the Test Year are as follows:

- Maintenance and administration of the Freeport Regional Water Facility.
- Debt service associated with the Freeport Regional Water Facility.
- Development of new supplemental supply projects.
- Recycled Water system function costs allocated to the Supplemental Supply Facilities service component. (See Appendix D.)

These costs occur year-over-year, regardless of drought status.[1]

Each customer class's proportion of Test Year consumption is used to allocate the $24,578,990 in Supplemental Supply Facilities service component costs among the customer classes as shown in Table F 1.

**Table F 1: Allocation of Supplemental Supply Facilities Service Component Costs to Customer Classes**

| Customer Class | Test Year Consumption (CCF) | Percent of Test Year Consumption | Allocation of Supplemental Supply Facilities Service Component Costs |
|---|---|---|---|
| All Other | 21,746,368 | 34% | $8,312,823 |
| MFR | 12,797,782 | 20% | $4,892,114 |
| SFR | 29,754,554 | 46% | $11,374,053 |
| **Total** | **64,298,704** | **100%** | **$24,578,990** |

For the All Other and MFR customer classes, the allocations of the Supplemental Supply Facilities service component are divided by the total consumption by that customer class to calculate a unit cost: the allocation to the All Other Customer Class is $0.38/CCF ($8,312,823 divided by 21,746,368 CCF); the allocation to the MFR customer class is also $0.38/CCF ($4,892,114 divided by 12,797,782 CCF). As

[1] Supplemental Supply Facilities service component costs do not include the additional costs to purchase water during drought or other drought costs. See Section 5 in the body of the Study for a discussion of costs incurred by the District during a drought and the drought surcharge.

discussed in Section 4.1 of the body of the Study, volumetric charges for the All Other and MFR customer classes are not tiered based on use.

As the Supplemental Supply Facilities help ensure a reliable water supply to accommodate higher marginal water sales, the Supplemental Supply Facilities costs are allocated among the tiers within the SFR customer class. Analyzing the flow capacities of the supply facilities provides the appropriate way to allocate the $11,374,053 in Supplemental Supply Facilities costs attributable to the SFR customer class among the tiers. Table F 2 shows the flow capacities in million gallons per day (MGD) for the Freeport Regional Water Facility (supplemental supply), the recycled water facilities (supplemental supply), and the Mokelumne Aqueducts (primary/main supply).

**Table F 2: Flow Capacity of Primary and Supplemental Supply Facilities**

| Facility | Type of Supply | Flow Capacity (MGD) |
|---|---|---|
| Freeport Regional Water Facility | Supplemental | 100[1] |
| Recycled Water Facilities | Supplemental | 5.8[2] |
| Mokelumne Aqueducts | Primary | 325[3] |
| | **Total Capacity (MGD)** | **430.8** |
| | **% Primary** | **75.4%** |
| | **% Supplemental** | **24.6%** |

1. Per the Joint Exercise of Powers Agreement between the District and the Sacramento County Water Authority dated February 13, 2002, the District's dedicated share of the Freeport Regional Water Facility capacity is 100 MGD.
2. Capacity of recycled water facilities is equivalent to the Test Year recycled water consumption of retail and contract recycled water customers as recycled water functions as a potable offset/supplemental supply to the extent that the recycled water customers can use this restricted-use water supply.
3. As outlined in the Permit 10478 Time Extension Project Draft Environmental Impact Report dated September 2013, the District has the water rights and capacity to divert up to 325 MGD from the Mokelumne River.

As shown in Table F 2, the Supplemental Supply Facilities represent 24.6% of total water supply capacity (105.8 MGD divided by 430.8 MGD). Therefore, the Supplemental Supply Facilities costs are allocated to 24.6% of SFR usage, or 7,309,293 CCF.[2] All SFR customers first purchase Tier 1 water before purchasing Tier 2 water and then Tier 3 water.[3] Because all SFR customers purchase Tier 1 water first before accessing Tier 2 and then Tier 3 water, the costs of supplemental supplies are apportioned sequentially to the tiers beginning with Tier 3.

[2] 7,309,293 CCF is calculated as follows: 105.8 MGD divided by 430.8 MGD and then multiplied by 29,754,554 CCF.
[3] All SFR customer accounts consume in Tier 1. The first 7 CCF/month of consumption for any SFR account is billed at the Tier 1 volumetric rate. Consumption over 7 CCF and less than 16 CCF is billed at the Tier 2 volumetric rate for SFR. Consumption over 16 CCF is billed at the Tier 3 volumetric rate for SFR.

Tier 3 consumption in the Test Year was 4,366,292 CCF, constituting 59.7% of the total SFR consumption allocated to Supplemental Supply Facilities (7,309,293 CCF). The remaining 40.3% equals 2,943,001 CCF, which is less than the Tier 2 Test Year consumption of 6,311,273 CCF. Therefore, the remaining 2,943,001 CCF of usage, after the allocation to Tier 3, is fully allocated to Tier 2. The allocation to Tier 1 is 0 CCF in consumption. This is proportional because Supplemental Supply Facilities are not necessary to ensure a reliable water supply for Tier 1 consumption.[4]

Table F 3 below shows how the $11,374,053 in Supplemental Supply Facilities service component costs attributable to the SFR customer class are allocated among the tiers based on the proportions described above. Unit costs are then calculated by dividing the cost allocation to each tier by the Test Year consumption in that tier.

**Table F 3: Calculation of Supplemental Supply Facilities Unit Cost for the SFR Customer Class**

| Tier | Test Year Consumption (CCF) | Allocation % | Allocation of Supplemental Supply Facilities Service Component Costs | Unit Costs ($/CCF) |
|---|---|---|---|---|
| Tier 3 | 4,366,292 | 59.7% | $6,794,424 | $1.56 |
| Tier 2 | 6,311,273 | 40.3% | $4,579,629 | $0.73 |
| Tier 1 | 19,076,989 | 0% | $0 | $0.00 |
| **Total** | **29,754,554** | **100%** | **$11,374,053** | |

[4] The District's *Water Shortage Contingency Plan (WSCP) 2020* (Attachment 6) includes estimates for the volume of Mokelumne Supply available during water shortages (see Attachment 6 at page 8, Table W-3). For the 2025 estimates in the WSCP, the minimum amount of Mokelumne supply estimated to be available is 86 MGD (approximately 42,000,000 CCF). 42,000,000 CCF is greater than total consumption within Tier 1 during the Test Year (19,076,989 CCF).

# Appendix G: Calculation of Unit Costs for the Elevation Service Component

Elevation surcharges recover the costs associated with serving customers in higher elevations. These costs include the operating expenses, capital spending, and debt service related to the District's pumping plants. Total pumping costs based on the hydraulic lift method are used because the pumps at lower elevations also provide the lift to the higher elevations. The District's service area varies from sea level to over 1,300 feet above sea level. The elevation surcharges only recover the costs that are associated with providing service to higher elevations.

Elevation surcharges are calculated based on the pressure zone in which the service connection is located. The water system pressure zones are categorized into elevation zones. The elevation zones are grouped into three Elevation Bands for the purpose of the elevation surcharge. Elevation Band 1 includes the elevation zones 0 and 1 (0 through 200 feet above sea level approximately). Because these elevation zones are served by gravity flow, no pumping is required to provide water service to customers within Elevation Band 1. Accordingly, the District does not incur any Elevation service component costs for customers within Elevation Band 1. Elevation Band 2 includes elevation zones 200 through approximately 600 feet above sea level. These elevation zones require pumping. Elevation Band 3 includes elevation zones above approximately 600 feet above sea level. These elevation zones require considerable pumping. Figure G 1 on the last page of this appendix shows the elevation bands by location.

Table G 1 below shows the consumption within each of elevation zones below and calculates weighted consumption for each zone by multiplying the consumption in each zone by the elevation zone number (e.g. the weighted consumption of 9,129,760 for elevation zone 2 is calculated by multiplying 4,564,880 CCF by 2). The weighted consumption number reflects the linear relationship between elevation and the cost to pump water to that elevation. Water pumped to 300 feet above sea level requires all the expenditures related to pumping water to 200 feet above sea level plus the costs to pump the water the additional 100 feet between 200 feet above sea level and 300 feet above sea level.

**Table G 1: Calculation of Weighted Consumption by Elevation Zone**

| Elevation Band (1, 2, 3) | Elevation Zone[1] | Weighting Factor | Consumption (CCF) | Weighted Consumption |
|---|---|---|---|---|
| 1 | 0 | 0 | 30,418,606 | 0 |
| 1 | 1 | 1 | 9,509,798 | 0 |
| 2 | 2 | 2 | 4,564,880 | 9,129,760 |
| 2 | 3 | 3 | 4,958,259 | 14,874,777 |
| 2 | 4 | 4 | 2,672,319 | 10,689,276 |
| 2 | 5 | 5 | 7,271,261 | 36,356,305 |
| 2 | 6 | 6 | 103,979 | 623,874 |
| 3 | 7 | 7 | 2,977,585 | 20,843,095 |
| 3 | 8 | 8 | 642,171 | 5,137,368 |
| 3 | 9 | 9 | 640,525 | 5,764,725 |
| 3 | 10 | 10 | 82,592 | 825,920 |
| 3 | 11 | 11 | 366,717 | 4,033,887 |
| 3 | 13 | 12 | 89,951 | 1,079,412 |
| **Total** | | | **64,298,642** | **109,358,399** |

The numbers associated with each of the District's elevation zones represent the lower limit of the zone rounded to the nearest 100 feet. For example, elevation zone 2 starts at approximately 200 feet above sea level and stops where elevation zone 3 begins (at roughly 300 feet above sea level). Elevation zone 11 ends at approximately 1,249 feet above sea level and elevation zone 13 starts 1,250 feet above sea level (rounding 1250 to 1300 results in "13" and the skipping of "12").

Table G 2 below sums the consumption and weighted consumption for the twelve elevation zones into the three elevation bands. It then calculates the percentage of the weighted consumption for each band and applies that percentage the Elevation service component cost ($32,271,452) to calculate the cost allocation to each elevation band. This cost allocation is translated to a unit rate by dividing it by the consumption (unweighted) within each band.

**Table G 2: Calculation of Test Year Elevation Surcharge Unit Costs**

| Elevation Band | Consumption (CCF) | Weighted Consumption | Percent of Weighted Consumption | Allocated Elevation Costs | Unit Cost ($/CCF) |
|---|---|---|---|---|---|
| 1 | 39,928,403 | 0 | 0% | $0 | $0.00 |
| 2 | 19,570,698 | 71,673,992 | 65% | $21,133,474 | $1.08 |
| 3 | 4,799,541 | 37,774,358 | 35% | $11,137,979 | $2.32 |
| **Total** | **64,298,642** | **109,448,350** | **100%** | **$32,271,452** | |

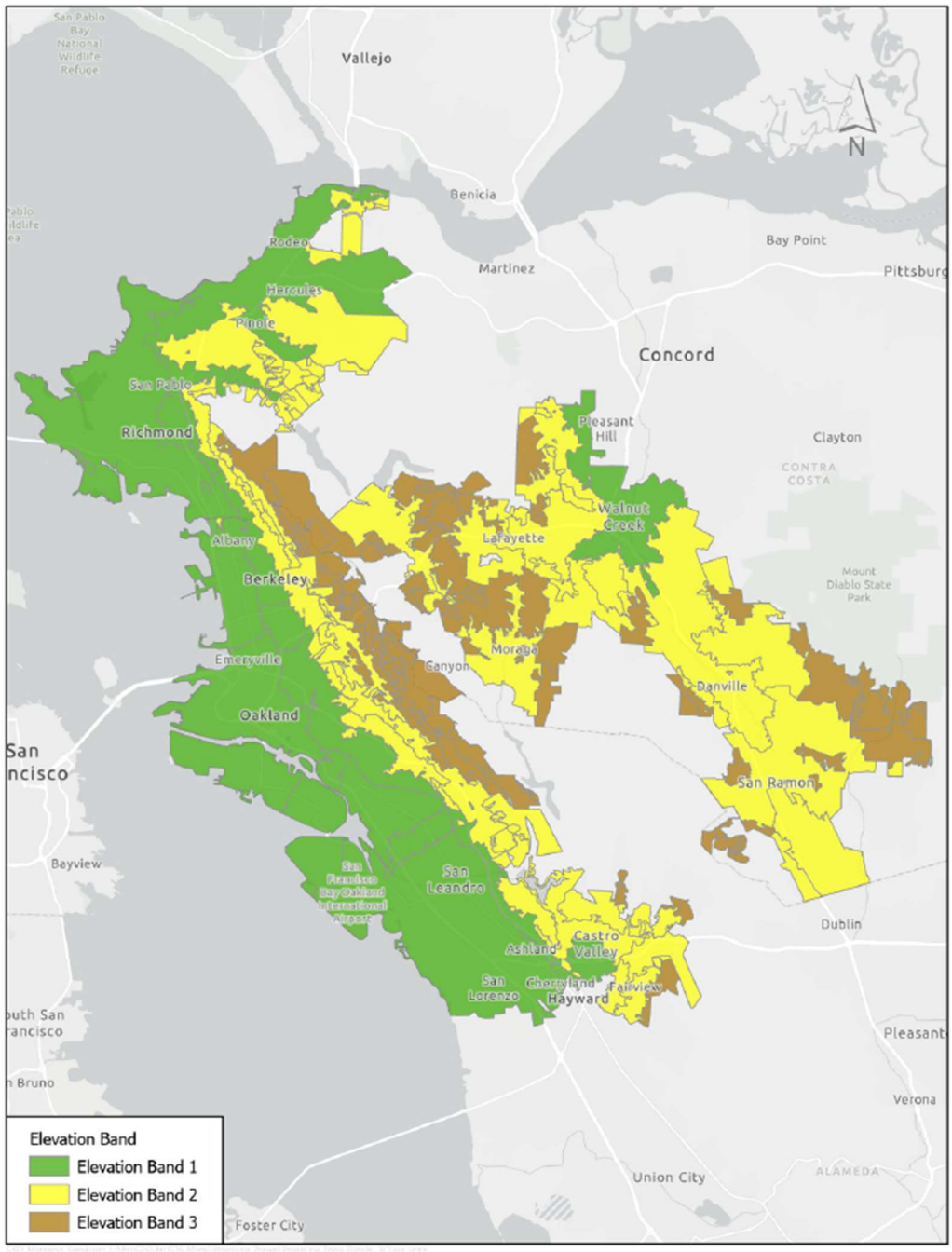


**Figure G 1: Elevation Band Location**

# Attachment 1: Memo – Fiscal Years 2026 and 2027 Recommended Revisions to the Water and Wastewater Schedules of Rates and Charges Subject to Proposition 218

**EAST BAY MUNICIPAL UTILITY DISTRICT**

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DATE: March 20, 2025

MEMO TO: Board of Directors

FROM: Clifford C. Chan, General Manager CCC

SUBJECT: Fiscal Years 2026 and 2027 Recommended Revisions to the Water and Wastewater Schedules of Rates and Charges Subject to Proposition 218

## SUMMARY

The District updates the Water and Wastewater rates and charges biennially in conjunction with the development of its budget. The proposed Fiscal Year (FY) 2026 and FY 2027 rates and charges are designed to cover the expenditures identified in the proposed FY 2026 and FY 2027 Biennial Budget.

To determine the appropriate rates and charges needed to recover its costs, the District engages independent rate consultants to perform cost of service (COS) rate studies for the Water and Wastewater systems. The Water System COS Rate Study is scheduled to be completed in March 2025; the Wastewater System COS Rate Study was completed in May 2019. These studies establish water and wastewater rates and charges to conform to COS principles to allocate operating and capital costs to ratepayers based on the proportional cost of service consistent with California Constitution article XIII D, section 6 (commonly referred to as Proposition 218). The Water System COS Rate Study will be made available on *ebmud.com/rates* once it is completed.

The proposed FY 2026 and FY 2027 budgets address the operating and capital needs of the District for the next two fiscal years. The recommended rates are necessary to:

- Meet the costs of operating and maintaining the Water and Wastewater systems;
- Address impacts of inflationary cost increases;
- Invest in capital infrastructure improvements;
- Maintain financial stability;
- Comply with state-mandated regulatory requirements; and
- Meet annual debt service requirements and comply with debt covenants.

Staff recommends the proposed water and wastewater rates and charges be adopted by the District's Board of Directors. The proposed FY 2026 rates and charges would take effect for services provided on or after July 1, 2025, and the proposed FY 2027 rates and charges would take effect for services provided on or after July 1, 2026.

The recommended average rate increases for the Water System are 6.5 percent for FY 2026 and 6.5 percent for FY 2027. The recommended average rate increases of the Wastewater System are 8.5 percent for FY 2026 and 8.5 percent for FY 2027. The recommended rates will continue to reflect proportional recovery of cost of service for each parcel served by the Water and Wastewater systems. After implementation of these recommended rate increases, a typical (median) single-family residential (SFR) customer using five units[1] of water per month will see an increase of $3.79 per month in FY 2026 and an increase of $4.31 per month in FY 2027 in water charges. A SFR wastewater customer using five units of water per month will see an increase of $2.31 per month in FY 2026 an increase of $2.50 per month in FY 2027 in wastewater treatment charges. Wastewater customers also pay a Wet Weather Facilities Charge (WWFC) collected on the property tax bill. Depending on lot size, in FY 2026 the WWFC will increase between $12.52 and $44.70 per year and in FY 2027 will increase between $13.58 and $48.50 per year.

The recommendations in this memo (Memo) cover FY 2026 and 2027 water and wastewater rates and charges subject to Proposition 218. In compliance with Proposition 218, the District plans to hold a public hearing on June 10, 2025 for the Board to consider adoption of the proposed rates and charges. At least 45 days prior to the scheduled public hearing, notices will be mailed to the owners of record of parcels upon which the proposed charges will be imposed. The owner of record of any parcel upon which the water and wastewater rates are proposed for imposition, or a customer of record who is not the property owner (e.g., a tenant), may submit a written protest to one or more proposed rate changes. On March 25, 2025, a draft copy of the Proposition 218 notice will be presented to the Board for review.

The recommended rates and charges discussed herein as well as fees not subject to Proposition 218 (including capacity charges, recreation fees, installation charges, and other one-time fees and charges) will be presented in a report and recommendation from the General Manager at the May 13, 2025 Board meeting.

## RECOMMENDATIONS

Recommended updates to Water and Wastewater systems' rates and charges are as follows:

<u>Water System Rates and Charges</u>

- Implement the rate structure consistent with the 2025 Water System COS Rate Study.
- Increase water rates and charges (meter, volume, elevation surcharge, non-potable/recycled water, and private fire service) by approximately 6.5 percent for FY 2026 and 6.5 percent for FY 2027. These proposed rate changes support the District's

[1] 1 unit of water = 748 gallons = 1 centum cubic foot (CCF). In the Water system service area, 5 units/month represents the *median* water use. In the wastewater service area, 5 units per month represents *mean* water use.

FY 2026 and FY 2027 operating and capital expenses described in the Proposed Biennial Budget and reflect the results of the 2025 Water System COS Rate Study.

- The impact of these changes to the typical (median) SFR customer (5 units/month) is an increase of $3.79 per month in FY 2026 and an additional increase of $4.31 per month in FY 2027.

Wastewater System Rates and Charges

- Increase wastewater treatment rates and charges and the WWFC by approximately 8.5 percent overall for FY 2026 and 8.5 percent for FY 2027. These proposed rate changes support the District's proposed FY 2026 and FY 2027 operating and capital expenses described in the Proposed Biennial Budget and reflect the results of the 2019 Wastewater COS rate study.
- For the wastewater treatment charges collected on the bill, the impact to the typical (median) SFR customer (4 units/month) is an increase of $2.17 per month in FY 2026 and an additional increase of $2.35 per month in FY 2027.
- For the WWFC collected on the property tax bill, the impact will depend on lot size. In FY 2026 the WWFC will increase between $12.52 to $44.70 per year, and in FY 2027 the WWFC will increase between $13.58 to $48.50 per year.
- No increase is proposed to the San Francisco Bay Pollution Prevention Fee, which is a fixed monthly charge to fund programs to reduce pollutants in wastewater before it is treated at District facilities and discharged into the San Francisco Bay.

## DISCUSSION

### Water Rates and Charges

The District's projected growth in water rate revenue is predominantly based on two factors: changes in rates and projected changes in water consumption. The recommended average annual rate increases are 6.5 percent for FY 2026 and 6.5 percent for FY 2027. The District is projecting water consumption of 143.9 million gallons per day (MGD) in FY 2026 and 144.6 MGD in FY 2027, representing a 0.5 percent annual growth in each year. The average rate increases combined with the assumed consumption levels are projected to generate rate revenue sufficient to cover the expenditures identified in the proposed FY 2026 and FY 2027 Biennial Budget.

Water System COS Rate Study

Working with an independent rate consultant, the District has developed a new Water System COS Rate Study. The purpose of a Water System COS Rate Study is to develop a rate structure under which the charges billed to each customer account reflect the cost to serve each parcel and thereby collect the revenue needed by the utility to provide the service. The

Water System COS Rate Study reflects the analysis of conditions during a "Test Year." FY 2024 was selected as the representative Test Year because it was free from events such as drought, excessive rainfall, pandemic, and other anomalous external factors, and is the most recent complete fiscal year with audited financial information. The Test Year provides a representative set of key factors including operating expenses, capital spending, non-rate revenues, and consumption patterns. The Water System COS Rate Study establishes new rates and charges for the Test Year that, when applied to actual water sales in the Test Year, generate the revenue requirements for that year.

Since the completion of the Test Year (FY 2024), the District increased water rates 8.5 percent beginning on July 1, 2024. The rates established in the 2025 Water System COS Rate Study for the Test Year were increased by the same 8.5 percent to establish a base set of water rates under the Water System COS Rate Study to determine required average rate increases for the following two years, FY 2026 and FY 2027.

Water Rate Revenue Requirements for FY 2026 and FY 2027

The FY 2026 and FY 2027 budget objectives, operating budget, capital expenses, and debt expenses are detailed in the Proposed FY 2026 and FY 2027 Biennial Budget and Capital Project Summaries that will be presented to the Board at the March 25, 2025 Budget Workshop No. 2. The proposed operating and capital budgets contribute to the proposed changes to the FY 2026 and FY 2027 water rates and charges in approximately the following proportions:

- Operating – significant increases in expenses such as chemicals, energy, and computer software and licenses, as well as increases in labor and benefits, and additional funded positions drive approximately $79.4 million in additional required revenue over the two-year period.
- Capital – increases in capital improvement plan and debt service drive approximately $88.1 million in additional required revenue over the two-year period.

Table 1 shows the calculation of the average annual rate adjustment required over the two-year period between the end of FY 2025 and FY 2027. The overall spending from FY 2025 to FY 2027 is projected to increase by over 28 percent. The District plans to issue bonds to fund a portion of its capital spending in FY 2026 and FY 2027, which spreads the impact of funding the CIP over future years. Absent any rate increases, the District projects a revenue shortfall of $46.8 million in FY 2026. An average rate increase of 6.5 percent is required to eliminate the FY 2026 shortfall. Taking into account a 6.5 percent average rate increase in FY 2026, the District projects an additional revenue shortfall of $51.9 million in FY 2027. An average rate increase of 6.5 percent in FY 2027 is required to eliminate the projected FY 2027 shortfall.

**Table 1 - Revenue Shortfalls (In Million $) Addressed Through Proposed Rate Increase**

| **Revenue Requirement** | **FY 2025** | **FY 2026** | **FY 2027** |
|---|---|---|---|
| + O&M Expenses | 399.1 | 456.4 | 478.5 |
| + Debt Service Expense | 253.8 | 266.3 | 286.6 |
| + Capital Expense | 543.5 | 579.5 | 598.8 |
| - Other Sources | (174.1) | (148.4) | (164.9) |
| - Proceeds from Bond Issues | (275.0) | (355.0) | (345.0) |
| **Revenue requirement** | **747.3** | **798.9** | **854.0** |
| | | | |
| **Revenue Adjustment** | | | |
| + Revenue Requirement | | 798.9 | 854.0 |
| - Revenue from Prior Year Rates | | (747.3) | (798.9) |
| - Revenue from Change in Water Sales | | (3.0) | (3.2) |
| **Revenue Shortfall** | | **48.6** | **51.9** |
| | | | |
| **Average Rate Increase Required** | | **6.5%** | **6.5%** |

Recommended FY 2026 and FY 2027 Water Rates and Charges

The District's water rates and charges have five customer classes: single-family residential, multi-family residential, and "all other" (non-residential accounts including commercial and industrial accounts), private fire service, and non-potable/recycled water. Together, the rates and charges are structured to proportionately recover the costs of providing water to each parcel. The District's water rates and charges have five components: Water Volumetric Rate, Water Service Charge, Elevation Surcharge, Private Fire Service Charge, and Recycled Water Volumetric Rate. If the Board of Directors declares a drought, the District may assess a temporary Drought Surcharge applied to the Water Volumetric Rate.

A summary of the proposed rates and charges and the resulting customer impacts are as follows:

**Table 2 - Proposed Water Volumetric Rates and Elevation Surcharges - ($/Unit)**

| Water Volumetric Rates and Elevation Surcharges ($/unit) | FY 2025 | FY 2026 | FY 2027 |
|---|---|---|---|
| Single-Family Residential | | | |
| Tier 1: up to 7 units | $5.41 | $7.89 | $8.40 |
| Tier 2: over 7, up to 16 units | $7.44 | $9.15 | $9.74 |
| Tier 3: over 16 units | $9.83 | $10.79 | $11.49 |
| Multi-Family Residential | $7.65 | $8.31 | $8.85 |
| All Other Accounts (Commercial/Industrial) | $7.62 | $8.52 | $9.07 |
| Nonpotable/Recycled Water | $5.93 | $6.37 | $6.78 |
| Elevation Surcharge ($/unit) | | | |
| Elevation Zone 1 | $0.00 | $0.00 | $0.00 |
| Elevation Zone 2 | $1.10 | $1.25 | $1.33 |
| Elevation Zone 3 | $2.27 | $2.67 | $2.84 |

**Table 3 - Proposed Monthly Water Service Charges (Meter) - ($/Meter Size)**

| Monthly Meter Service Charges on Water Bill | | | |
|---|---|---|---|
| **Meter Size (in inches)** | **FY 2025** | **FY 2026** | **FY 2027** |
| 5/8 or 3/4 | $35.48 | $26.85 | $28.60 |
| 1 | $53.60 | $40.94 | $43.60 |
| 1-1/2 | $98.91 | $76.14 | $81.09 |
| 2 | $153.23 | $118.37 | $126.06 |
| 3 | $298.19 | $252.14 | $268.53 |
| 4 | $461.24 | $428.13 | $455.96 |
| 6 | $914.09 | $956.12 | $1,018.27 |
| 8 | $1,457.58 | $1,132.11 | $1,205.70 |
| 10 | $2,091.61 | $1,624.90 | $1,730.52 |
| 12 | $2,906.86 | $2,258.49 | $2,405.29 |
| 14 | $3,722.02 | $2,892.07 | $3,080.05 |
| 16 | $4,718.40 | $3,666.46 | $3,904.78 |
| 18 | $5,714.75 | $4,440.84 | $4,729.49 |

**Table 4 - Proposed Monthly Private Fire Service Charges - ($/Meter Size)**

| Monthly Private Fire Service Charges on Water Bill | | | |
|---|---|---|---|
| **Meter Size (in inches)** | **FY 2025** | **FY 2026** | **FY 2027** |
| 5/8 or 3/4 | $18.88 | $8.52 | $9.07 |
| 1 | $25.95 | $14.20 | $15.12 |
| 1-1/2 | $43.51 | $28.40 | $30.25 |
| 2 | $64.59 | $45.44 | $48.39 |
| 3 | $120.91 | $99.41 | $105.87 |
| 4 | $184.21 | $170.42 | $181.50 |
| 6 | $360.08 | $383.43 | $408.35 |
| 8 | $571.13 | $454.44 | $483.98 |
| 10 | $817.32 | $653.26 | $695.72 |
| 12 | $1,133.86 | $908.88 | $967.96 |
| 14 | $1,450.45 | $1,164.50 | $1,240.19 |
| 16 | $1,837.38 | $1,476.93 | $1,572.93 |
| 18 | $2,224.29 | $1,789.36 | $1,905.67 |

**Table 5 – Example Single-Family Residential Customer Monthly Water Bill Impacts with Proposed Rates and Charges**

| Single Family Residential Water Charges on EBMUD Bill (5/8" and 3/4" meters) | | | | | | |
|---|---|---|---|---|---|---|
| | **Use (Unit)** | **FY 2025 Bill** | **FY 2026 Bill** | **Change from FY 2025** | **FY 2027 Bill** | **Change from FY 2026** |
| 25th Percentile | 3 (74 GPD) | $51.71 | $50.52 | ($1.19) | $53.80 | $3.28 |
| 50th Percentile (typical/median use) | 5 (123 GPD) | $62.53 | $66.30 | $3.77 | $70.60 | $4.30 |
| 75th Percentile | 9 (221 GPD) | $88.23 | $100.38 | $12.15 | $106.88 | $6.50 |
| 95th Percentile | 19 (467 GPD) | $169.80 | $196.80 | $27.00 | $209.53 | $12.73 |
| Mean Single Family Residential Use | 7 (172 GPD) | $73.35 | $82.08 | $8.73 | $87.40 | $5.32 |

**Table 6 – Other Example Customer Monthly Water Bill Impacts with Volumetric Proposed Rates and Charges**

| Multi-Family Residential and Non-Residential Water Charges on Water Bill | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Meter (Inches)** | **Use (Unit)** | **FY 2025 Bill** | **FY 2026 Bill** | **Change from FY 2025** | **FY 2027 Bill** | **Change from FY 2026** |
| Multi-Family Residential 4 dwellings | 1 | 25 | $244.85 | $248.69 | $3.84 | $264.85 | $16.16 |
| Multi-Family Residential 5+ dwellings | 1 | 50 | $436.10 | $456.44 | $20.34 | $486.10 | $29.66 |
| Commercial | 1 | 50 | $434.60 | $466.94 | $32.34 | $497.10 | $30.16 |
| Industrial | 2 | 500 | $3,963.23 | $4,378.37 | $415.14 | $4,661.06 | $282.69 |

Drought Surcharge

If the Board declares a drought, EBMUD may assess a temporary Drought Surcharge that is applicable to all potable water customer accounts. The Drought Surcharge corresponds to increasingly severe stages of drought from Stage 1 to 4 and is charged on each unit of water used during the billing period. The surcharge is calculated to recover costs of providing supplemental water, losses of revenue, and other drought-related costs. The Drought Surcharge applies to the potable Water Volumetric Rate as follows: Stage 1-up to 5 percent, Stage 2-up to 10 percent, Stage 3-up to 20 percent, and Stage 4-up to 30 percent. Prior to assessing a Drought Surcharge, EBMUD will adopt a drought budget that reflects the most current and updated drought-related costs.

The surcharge will be developed to be consistent with EBMUD's updated drought budget and Water System COS Rate Study and will not exceed the Drought Surcharge percentages. Under a Stage 4 drought in FY 2027, the typical (median) single-family residential customer using 5 units of water per month would pay a Drought Surcharge of no more than $12.60 per month (about $0.41 a day). The actual surcharge in any drought stage may be less than the maximum rates indicated above, depending on the costs of the drought. The District's Proposition 218 notice for FY 2026 and FY 2027 includes information regarding these Drought Surcharges.

## Wastewater Rates and Charges

The District's projected growth in wastewater rate revenue is predominantly based on planned average rate increases. The recommended average annual rate increases of 8.5 percent in FY 2026 and 8.5 percent in FY 2027 are projected to generate rate revenue sufficient to cover the expenditures identified in the proposed FY 2026 and FY 2027 Biennial Budget.

Wastewater System COS Rate Study

Working with an independent rate consultant, the District developed a Wastewater System COS Rate Study in 2019. The structure of the proposed wastewater rates and charges are based on the Wastewater System COS Rate Study.

Wastewater Rate Revenue Requirements for FY 2026 and FY 2027

The details of the FY 2026 and FY 2027 budget objectives, operating budget, capital expenses, and debt expenses are contained in the Proposed FY 2026 and FY 2027 Biennial Budget and Capital Project Summaries and will be presented to the Board at the March 25, 2025 Budget Workshop No. 2. The proposed operating and capital budgets contribute to the proposed changes to the FY 2026 and FY 2027 wastewater rates and charges as follows:

- Operating – significant increases in expenses such as chemicals, energy as well as increases in labor and benefits, and additional funded positions, drive approximately $12.7 million in additional required revenue over the two-year period.
- Capital – increases in capital improvement plan and debt service drive approximately $31.5 million in additional required revenue over the two-year period.

Table 7 shows the calculation of the average annual rate adjustment required over the two-year period between FY 2025 and FY 2027. The overall spending from FY 2025 to FY 2027 is projected to increase by almost 18 percent. The District plans to issue bonds to fund a portion of its planned capital spending in FY 2026 and FY 2027, which spreads the impact of funding the CIP over future years. Absent any rate increases, the District projects a revenue shortfall of $11.6 million in FY 2026. An average rate increase of 8.5 percent is required to eliminate this shortfall. Taking into account an 8.5 percent average rate increase in FY 2026, the District projects an additional revenue shortfall of $11.6 million in FY 2027. An average rate increase of 8.5 percent in FY 2027 is required to eliminate the projected FY 2027 shortfall.

**Table 7 – Revenue Shortfalls (In Million $) Addressed Through Proposed Rate Increases**

| **Revenue Requirement** | **FY 2025** | **FY 2026** | **FY 2027** |
|---|---|---|---|
| + O&M Expenses | 111.0 | 118.9 | 123.7 |
| + Debt Service Expense | 32.8 | 35.7 | 35.5 |
| + Capital Expense | 59.1 | 82.9 | 87.9 |
| - Other Sources | (36.9) | (50.0) | (52.0) |
| - Proceeds from Bond Issues | (30.0) | (40.0) | (35.0) |
| **Revenue Requirement** | **136.0** | **147.5** | **160.1** |
| | | | |
| **Revenue Adjustment** | | | |
| + Revenue Requirement | | 147.5 | 160.1 |
| - Revenue from Prior Year Rates | | (136.0) | (147.5) |
| **Revenue Shortfall** | | **11.6** | **12.5** |
| | | | |
| **Average Rate Increase Required** | | **8.5%** | **8.5%** |

Recommended FY 2026 and FY 2027 Wastewater Rates and Charges

Wastewater rates and charges have three customer classes in the Wastewater System COS Rate Study: single-family residential, multi-family residential, and non-residential. Non-residential customers are further classified based on the type of business operated. Together, the recommended rates and charges are structured to proportionately recover the costs of providing wastewater to each parcel served by the wastewater system. The rates for the wastewater fees have five components: Treatment Service Charge, Treatment Flow Charge, Treatment Strength Charge, Pollution Prevention Fee, and Wet Weather Facilities Charge.

Wastewater Treatment Rates and Charges

Table 8 shows the proposed wastewater treatment unit rates that are used to calculate the total wastewater flow and strength charges based on the wastewater discharge characteristics.

**Table 8 - Proposed Wastewater Treatment Unit Rates**

| Wastewater Treatment Unit Rates | | | |
|---|---|---|---|
| **Unit Rates** | **FY 2025** | **FY 2026** | **FY 2027** |
| Service Charge ($ per account, per month) | $9.29 | $10.08 | $10.94 |
| Flow ($ per unit - Up to 9 units max., 1 unit = 748 gallons) | $1.677 | $1.820 | $1.975 |
| Strength – COD ($/pound) | $0.170 | $0.184 | $0.200 |
| Strength – Total Suspended Solids ($/pound) | $0.702 | $0.762 | $0.827 |

Table 9 shows the proposed wastewater treatment charges for residential customers based on the unit rates in Table 8 and the number of dwellings and monthly flow. Table 10 and Table 11 show the proposed wastewater combined flow and strength charge per unit for non-residential customers listed by business classification code (BCC) that is calculated from the unit rates in Table 8. Wastewater customers who have been issued strength permits for unique wastewater strength and flow are charged based on the unit rates in Table 8. Included in the monthly wastewater bill is the San Francisco Bay Pollution Prevention Fee that fund programs to reduce pollutants in wastewater before it is treated at District facilities and discharged into the San Francisco Bay. The San Francisco Bay Pollution Prevention Fee will remain $0.20 per month per dwelling for residential customers; $5.48 per month per account for non-residential customers; and $1.00 per month for multi-family residential customers with five or more units as shown in Table 12. Table 13 shows example resulting customer impacts for the proposed increases for the wastewater treatment bill.

**Table 9 - Proposed Wastewater Service, Flow and Strength Charges for Single-Family Residential and Multi-Family Residential with 2–4 Dwellings**

| Wastewater Treatment Rates & Charges | | | |
|---|---|---|---|
| **Rate Components** | **FY 2025** | **FY 2026** | **FY 2027** |
| Service Charge ($ per account, per month) | $9.29 | $10.08 | $10.94 |
| Flow ($ per unit – up to 9 units maximum, 1 unit = 748 gallons) | $1.68 | $1.82 | $1.97 |
| Strength – ($ per dwelling, per month) | $9.67 | $10.49 | $11.38 |

**Table 10 -Proposed Combined Flow and Strength Rates for Non-Residential and Apartment Buildings with 5+ Dwellings**

| Business Classification Code | | FY 2025 Current Rate per Unit | FY 2026 Proposed Rate per Unit | FY 2027 Proposed Rate per Unit |
|---|---|---|---|---|
| 2010 | Meat Products | $11.74 | $12.74 | $13.82 |
| 2011 | Slaughterhouses | 11.24 | 12.20 | 13.24 |
| 2020 | Dairy Product Processing | 9.21 | 9.99 | 10.84 |
| 2030 | Fruit and Vegetable Canning | 7.41 | 8.04 | 8.72 |
| 2040 | Grain Mills | 7.38 | 8.01 | 8.69 |
| 2050 | Bakeries (including Pastries) | 12.76 | 13.84 | 15.02 |
| 2060 | Sugar Processing | 7.29 | 7.91 | 8.58 |
| 2077 | Rendering Tallow | 22.15 | 24.03 | 26.07 |
| 2080 | Beverage Manufacturing & Bottling | 5.54 | 6.01 | 6.52 |
| 2090 | Specialty Foods Manufacturing | 23.82 | 25.84 | 28.04 |
| 2600 | Pulp and Paper Products | 6.33 | 6.87 | 7.45 |
| 2810 | Inorganic Chemicals Mfgr. | 8.15 | 8.84 | 9.59 |
| 2820 | Synthetic Material Manufacturing | 1.91 | 2.07 | 2.25 |
| 2830 | Drug Manufacturing | 4.11 | 4.46 | 4.84 |
| 2840 | Cleaning and Sanitation Products | 8.31 | 9.02 | 9.79 |
| 2850 | Paint Manufacturing | 16.03 | 17.39 | 18.87 |
| 2893 | Ink and Pigment Manufacturing | 5.80 | 6.29 | 6.82 |
| 3110 | Leather Tanning and Finishing | 22.14 | 24.02 | 26.06 |
| 3200 | Earthenware Manufacturing | 4.50 | 4.88 | 5.29 |
| 3300 | Primary Metals Manufacturing | 3.56 | 3.86 | 4.19 |
| 3400 | Metal Products Fabricating | 2.08 | 2.26 | 2.45 |
| 3410 | Drum and Barrel Manufacturing | 22.54 | 24.46 | 26.54 |
| 3470 | Metal Coating | 2.26 | 2.45 | 2.66 |
| 4500 | Air Transportation | 2.97 | 3.22 | 3.49 |
| 4951 | Groundwater Remediation | 1.74 | 1.89 | 2.05 |
| 5812 | Food Service Establishments | 7.71 | 8.37 | 9.08 |
| 6513 | Apartment Buildings (5 or more units) | 3.75 | 4.07 | 4.42 |
| 7000 | Hotels, Motels with Food Service | 5.55 | 6.02 | 6.53 |
| 7210 | Commercial Laundries | 4.99 | 5.41 | 5.87 |
| 7215 | Coin Operated Laundromats | 3.74 | 4.06 | 4.41 |
| 7218 | Industrial Laundries | 14.17 | 15.37 | 16.68 |
| 7300 | Laboratories | 2.68 | 2.91 | 3.16 |
| 7542 | Automobile Washing and Polishing | 3.55 | 3.85 | 4.18 |
| 8060 | Hospitals | 3.41 | 3.70 | 4.01 |
| 8200 | Schools | 2.51 | 2.72 | 2.95 |
| | All Other BCC (includes dischargers of only segregated domestic wastes from sanitary conveniences) | 3.75 | 4.07 | 4.42 |

**Table 11 - Proposed Maximum Blended Flow and Strength Rates for Multi-Use Accounts**

| Business Classification Code | | FY 2025 Current Rate per Unit | FY 2026 Proposed Rate per Unit | FY 2027 Proposed Rate per Unit |
|---|---|---|---|---|
| A | 0-9% Food/91-100% Domestic | $3.75 | $4.07 | $4.42 |
| B | 10-19% Food/81-90% Domestic | 4.15 | 4.50 | 4.89 |
| C | 20-29% Food/71-80% Domestic | 4.55 | 4.93 | 5.35 |
| D | 30-39% Food/61-70% Domestic | 4.94 | 5.36 | 5.82 |
| E | 40-49% Food/51-60% Domestic | 5.34 | 5.79 | 6.29 |
| F | 50-59% Food/41-50% Domestic | 5.73 | 6.22 | 6.75 |
| G | 60-69% Food/31-40% Domestic | 6.13 | 6.65 | 7.22 |
| H | 70-79% Food/21-30% Domestic | 6.53 | 7.08 | 7.68 |
| I | 80-89% Food/11-20% Domestic | 6.92 | 7.51 | 8.15 |
| J | 90-99% Food/1-10% Domestic | 7.32 | 7.94 | 8.62 |
| K | 0-9% Bakery/91-100% Domestic | 3.75 | 4.07 | 4.42 |
| L | 10-19% Bakery/81-90% Domestic | 4.66 | 5.05 | 5.48 |
| M | 20-29% Bakery/71-80% Domestic | 5.56 | 6.02 | 6.54 |
| N | 30-39% Bakery/61-70% Domestic | 6.46 | 7.00 | 7.60 |
| O | 40-49% Bakery/51-60% Domestic | 7.36 | 7.98 | 8.66 |
| P | 50-59% Bakery/41-50% Domestic | 8.26 | 8.96 | 9.73 |
| Q | 60-69% Bakery/31-40% Domestic | 9.16 | 9.93 | 10.78 |
| R | 70-79% Bakery/21-30% Domestic | 10.06 | 10.91 | 11.84 |
| S | 80-89% Bakery/11-20% Domestic | 10.96 | 11.89 | 12.90 |
| T | 90-99% Bakery/1-10% Domestic | 11.86 | 12.86 | 13.96 |

**Table 12 – Monthly San Francisco Bay Pollution Prevention Fee**

| Monthly San Francisco Bay Pollution Prevention Fee | | | |
|---|---|---|---|
| | FY 2025 | FY 2026 | FY 2027 |
| Residential ($ per dwelling)* | $0.20 | $0.20 | $0.20 |
| Non-residential ($ per account) | $5.48 | $5.48 | $5.48 |

*SF Bay Pollution Prevention Fee for apartments (5 or more dwellings) will remain $1.00 per month for both FY 2026 and FY 2027.

**Table 13 - Example Customer Monthly Wastewater Treatment Bill Impacts with Proposed Rates, Charges and Fees**

| Wastewater Charges on EBMUD Bill | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Meter (Inches)** | **Use (Unit)** | **FY 2025 Bill** | **FY 2026 Bill** | **Change from FY 2025** | **FY 2027 Bill** | **Change from FY 2026** |
| Typical (median_ Single-Family Residential | 5/8 | 4 | $25.88 | $28.05 | $2.17 | $30.40 | $2.35 |
| Single-Family Residential (maximum) | 5/8 | 9 | $34.28 | $37.15 | $2.87 | $40.25 | $3.10 |
| Multi-Family Residential 4 dwellings | 1 | 25 | $90.77 | $98.34 | $7.57 | $106.51 | $8.17 |
| Multi-Family Residential 5+dwellings | 1 | 50 | $197.79 | $214.58 | $16.79 | $232.94 | $18.36 |
| Commercial* | 1 | 50 | $202.27 | $219.06 | $16.79 | $237.42 | $18.36 |
| Industrial** | 2 | 500 | $2,784.77 | $3,020.56 | $235.76 | $3,276.42 | $255.86 |

*Calculation conducted using the combined strength and flow charge for "All Other Business Classifications"
**Calculation conducted using the combined strength and flow charge for BCC 2080 "Beverage Manufacturing & Bottling"

Wet Weather Facilities Charge (WWFC)

The WWFC is a charge that is imposed on a property itself. The WWFC pays for costs associated with inflow and infiltration of stormwater into the sanitary sewer system. This annual charge is calculated based on parcel/lot size, which accounts for each parcel's capacity to contribute inflow and infiltration during a wet weather event. The amount of wet weather flows that enter the wastewater system in the form of inflow and infiltration is proportional to the size of the collection system needed to serve each property. For example, larger parcels generally have more wet weather flows that could enter the wastewater system than smaller parcels. For this reason, parcel size is used as a proxy to estimate the size of the collection system to serve each property. Accordingly, the WWFC is structured using three generalized lot sizes (or bins): 0 to 5,000 square feet (sq ft), 5,001 to 10,000 sq ft, and over 10,000 sq ft. The WWFC is based on median lot size for each of these bins, regardless of whether a property is residential or non-residential. Inflow and infiltration of wet weather flows into the wastewater system increases the District's wastewater related costs because any water that enters the system must be conveyed and treated.

Since the WWFC is based on the property's propensity to contribute peak wet weather flows and is unrelated to the amount of water used at the property, the District collects the WWFC

on the property tax bill for all parcels that have connections to the local wastewater collection systems within the District's wastewater service area. The WWFC for public agencies that are exempt from property taxes is collected through the District's billing process. As shown in Table 14, the proposed WWFC will increase 8.5 percent in FY 2026 and 8.5 percent in FY 2027.

**Table 14 - Proposed Annual Wet Weather Facilities Charge - ($/Lot Size)**

| Proposed Wet Weather Facilities Charge on Property Tax Bill ($/Lot Size) | | | | | |
|---|---|---|---|---|---|
| | **FY 2025 Bill** | **FY 2026 Bill** | **Change from FY 2025** | **FY 2027 Bill** | **Change from FY 2026** |
| Small Lot<br>0 - 5,000 sq. ft. | $147.38 | $159.90 | $12.52 | $173.48 | $13.58 |
| Medium Lot<br>5,001 – 10,000 sq. ft. | $230.16 | $249.72 | $19.56 | $270.94 | $21.22 |
| Large Lot<br>>10,000 sq. ft. | $526.00 | $570.70 | $44.70 | $619.20 | $48.50 |

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# Attachment 2: Engineering Standard Practice 492.1 Planning Criteria for Distribution Water Mains

## PURPOSE

The purpose of this Engineering Standard Practice (ESP) is to establish basic criteria for the planning and sizing of water mains and reservoir inlet/outlet pipelines in the distribution system. For new water main extensions to serve applicants, this ESP also provides the basis for determining charges to applicants for water service under the Regulations Governing Water Service to Customers of the East Bay Municipal Utility District (EBMUD). The detailed design and installation of water mains and inlet/outlet pipelines shall conform to current District engineering and operations criteria, standards, and current design practices.

## PLANNING OF WATER MAINS

### General

- New water mains in the distribution system (extensions to serve, improvements, and replacements) shall be sized and located to meet the estimated water service requirements of District customers, including projected water demands and fire flows.

- If an existing water main on the frontage of an applicant's premises is 20 inches or larger, the existing water main shall not be available for installation of a service connection for water service to those premises, subject to the conditions and exceptions provided below.

- In cases where water quality is a concern, such as low water use that could potentially lead to high water age or incremental residence time, new water mains shall be sized to minimize water quality operations while meeting the estimated water service requirements, including projected water demands and, to the extent feasible, fire flows. The appropriate material of new water mains shall also be evaluated in such cases.

- The appropriate material to be used for new water mains shall also be evaluated for special circumstances, such as in steep terrain, narrow rights-of-way, potential landslide, liquefiable soil, corrosive soil areas, dead-end mains or creek, bridge, freeway, and railroad crossings where the use of conventional open-trench pipeline installation methods and pipeline materials may not be feasible and/or where conventional installation methods may be cost prohibitive.

- Specific material requirements for design are in ESP 512.1, Water Main and Services Design Criteria.

### Demand

- For the purpose of sizing distribution water mains, the future Maximum Day Demand (MDD) for the entire pressure zone being modeled shall be used. The method for the calculation of the MDD is

based on a historical analysis of pressure zone peaking factors and average annual day demand projections from the most recent Demand Study.

**Fire Flow**

- For new residential, commercial, industrial, or other development, the design fire flow basis for planning main extensions and system improvements shall be as required in writing by the fire agency with jurisdiction in accordance with the Uniform Fire Code; to the extent feasible. These fire flow requirements are typically specified in Form C-128F, Hydrant/Fire Service/Dual Service Requirements.

- If the existing distribution system cannot deliver the required fire flow, the distribution system shall be upgraded at the applicant's expense to meet the required fire flow or approval of the existing available fire flow shall be obtained in writing from the local fire agency with jurisdiction.

- Replacement of mains and system improvements shall be based on current design fire flow standards subject to water quality considerations.

**Size of Water Mains**

- The minimum size of water mains shall be as follows:

  - In low- and medium-density residential areas (typically single-family residential neighborhoods, or multi-family residential areas with fewer than 40 dwelling units per acre), except as provided below, the minimum size shall be 6 inches. If water quality is a concern, a 4-inch pipeline shall be considered if level of service and fire flow can be met. An applicant shall be charged for the size of the main extension needed to meet the water service requirements, including fire flow, for the project.

  - In high-density residential (more than 40 dwelling units per acre), commercial, and industrial areas, and on long streets without side connections such as on terraced hillsides, the minimum size shall be 8 inches. If water quality is a concern, a 6-inch pipeline shall be considered if level of service and fire flow can be met. An applicant shall be charged for the size of the main extension needed to meet the water service requirements, including fire flow, for the project.

  - Four-inch pipeline may be used in short cul-de-sacs, shallow side courts, or similar areas where all of the following conditions exist: (1) there is no possibility of further extensions or looping; (2) there are no required hydrants or potential for future hydrants; and (3) the service conditions provided below can be met. An applicant shall be charged for the size of the main extension to be installed.

  - Two-inch pipeline may be used in private driveways or roads where all the following conditions exists: (1) there are no more than three possible service connections; (2) there is no possibility of further extension or service connections; (3) there is no requirement for a fire hydrant; and (4) standard service is reasonably available from the extension

to all premises to be served.

- New water mains shall be sized to meet the following level of service, with storage in the pressure zone at 70 percent of capacity:

  - Projected MDD demand with a residual pressure of at least 40 pounds per square inch (psi) in the main, where feasible;

  - Projected MDD plus the project's design fire flow with a residual pressure of at least 20 psi in the main and at existing service connections throughout the pressure zone;

  - Projected maximum pumping rate with the pressure not exceeding 140 psi at the nominal lower elevation of the pressure zone (equivalent to 300 feet below reservoir overflow elevation); and

  - Pressure fluctuation in the main limited to a maximum of 30 psi under normal operating extremes, not including fire flow.

  Exception: Low-pressure service shall be governed by Section 8 and Section 8A of the Regulations Governing Water Service to Customers of EBMUD.

- Mains between pumping plants and reservoirs shall be increased in size to reduce energy consumption in pumping when economically justified. Where applicable, the applicant shall be charged for the size of main increase required to reduce energy consumption for service.

- The planning of major transmission mains shall include the consideration of phased construction with parallel mains when economically and operationally justified.

- Main extensions, replacements, and improvements for service shall be sized to provide capacity for the applicant and the potential future demand beyond that of the applicant. The applicant shall be charged only for the size of main required for the applicant's project as determined above.

**Length and Location of Water Mains**

To the extent practicable, water mains shall be located within the paved area of streets or roads. Specific location requirements for design are in ESP 512.1.

- To the extent practicable, the distribution system pipeline network shall consist of closed loops so each section of the main can be fed from either end; dead ends shall be avoided, existing dead ends shall be eliminated; and relatively large areas shall have more than one pipeline feed. An applicant shall not be charged for the additional water main necessary to close a loop in the existing distribution system unless it is required to meet estimated water service requirements and/or minimize water quality operations. When a closed loop system is required for a new development project, the charge for these water mains shall be included in the applicant's water service estimate.

- For operational reasons, a water main 20 inches or larger, which has the primary purpose of transmission of water between major facilities and/or significant areas of the distribution system, shall not be available for installation of service connections. Service shall be granted from a smaller parallel main extended from the nearest available main in the distribution system or from a turnout on the larger main at a location consistent with the orderly development of the distribution system pipeline grid in the vicinity of the applicant's premises. An applicant shall be charged for the parallel main extension required for service. If the existing larger main carries a front foot charge, EBMUD shall reimburse the original applicant based on the front footage of the properties that shall be served by the smaller parallel main, provided that the front foot charge is payable.

  Exceptions: Installation of a service connection on a 20-inch or larger water main which has the primary purpose of transmission of water between major facilities and/or significant areas of the distribution system may be considered (1) for an isolated service that can be interrupted for long periods, such as an irrigation service under a conditional service agreement; or (2) for an isolated service where the District determines that the installation of a smaller parallel water main would be impractical because an available main does not exist and the development of a distribution system to serve other properties in the vicinity is not anticipated in the foreseeable future.

- Separate parallel water mains may be required on each side of the traveled way in streets or roads with three or more traffic lanes and curb parking, or with four or more traffic lanes, or which are divided or which contain a subsurface structure or facility interfering with the normal installation of a service lateral. In such cases, existing mains are available for service connections only to premises with frontage on the same side of the street or road. An applicant may be charged for a parallel main extension if it is required for service.

- New water mains shall not be placed at an elevation above the upper elevation limit of the pressure zone.

**PLANNING OF INLET/OUTLET PIPELINES**

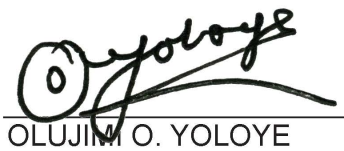
**Valve Pit and Inlet/Outlet Pipelines for Water Storage Facilities**

- Inlet/outlet pipelines and valve vaults for reservoirs shall be sized to meet ultimate flow requirements of the pressure zone being served, and consistent with the design criteria above. The inlet/outlet pipelines shall generally have a continuous uphill slope toward the reservoir and not be located above the bottom elevation of the reservoir.

- The size of the inlet pipeline from inside the valve vault to the storage facility shall be based on the long-term design pumping plant capacity supplying the reservoir, with a maximum pipeline velocity of 7 feet per second. The outlet pipeline from inside the storage facility to the valve pit shall be sized to meet the greater of the projected peak-hour demand, or the projected MDD plus design fire flow supplied by the reservoir, whichever is controlling, at a maximum velocity of 10 feet per second, but in no case smaller than 12-inches.

- If dual tanks are operated in series, the inlet and outlet pipelines of the second tank in series shall be sized to meet required fire flows at a maximum velocity of 10 feet per second. If dual tanks are configured in parallel with a common inlet/outlet pipeline, then the valve pit outlet pipelines shall be sized to meet the entire demand in the event one reservoir outlet valve is closed for maintenance or cycled to improve water quality.

- Consideration shall be given to upsizing the inlet and outlet pipelines from inside the storage facility to the valve pit if hydraulic analysis indicates the water distribution system shall not meet the service conditions defined above.



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# Attachment 3: Engineering Standard Practice 521.2 Equivalent Meter Sizes

## PURPOSE

To provide guidance on selection of the type and size of customer revenue meters for a new water service or a change in use of existing water service. In addition, this document establishes equivalent meter sizes to be used to assign water service charges, or when using a battery of meters.

## METER SIZE – CAPACITY

"Water Service Charge Designated Flow Rates in GPM" listed below are used to assign water services charges.

**Table A: Displacement, Compound, and Mag Meters**

| Nominal Meter Size, Inches | Usual Meter Type | Standard Meter Maximum Flow in GPM | | Water Service Charge Designated Flow Rate in GPM*** |
|---|---|---|---|---|
| | | Recommended Continuous, or SMOC* | Safe Intermittent | |
| 5/8 | Displacement | 10 | 20 | 20 |
| 3/4 | " | 15 | 30 | 30 |
| 1 | " | 25 | 50 | 50 |
| 1-1/2 | " | 50 | 100 | 100 |
| 2 | " | 80 | 160 | 160 |
| 3 | Compound | 175 | 350 | 350 |
| 4 | " | 300 | 600 | 600 |
| 6 | " | 675 | 1,350 | 1,350 |
| 8 | " | 900 | 1,600 | 1,600 |
| 10 | Mag* | 4,500 | | 2,300 |
| 12 | " | 5,500 | | 3,200 |
| 14** | " | 6,500 | | 4,100 |
| 16 | " | 8,000 | | 5,200 |
| 18** | " | 9,800 | | 6,300 |
| 20 | " | 12,000 | | 7,500 |
| 22** | " | 14,400 | | 8,800 |
| 24** | " | 17,100 | | 10,100 |

* The values listed under "Recommended Continuous" for Mag meters are defined in AWWA C715-18 as "Safe Maximum Operating Capacity" (SMOC).

** SMOC values were interpolated or extrapolate from existing data presented in AWWA C715-18, Table 1.

*** The Water Service Charge Designated Flow Rate is established as the Safe Intermittent flow rate for Displacement and Compound meters. (See Water Service Charge Designated Flow Rate Extrapolation" for sizes greater than 8").

| Table B: Turbine Meter (for irrigation services only) | | | | |
|---|---|---|---|---|
| Nominal Meter Size, Inches | (Vertical Shaft Type) | | (In-line Type) | |
| | Maximum Flow in GPM | | Maximum Flow in GPM | |
| | Safe Intermittent | Recommended Continuous | Safe Intermittent | Recommended Continuous |
| 1-1/2 | 100 | 65 | 120 | 90 |
| 2 | 160 | 100 | 190 | 160 |
| 3 | 350 | 220 | 435 | 350 |
| 4 | 630 | 420 | 750 | 650 |
| 6 | 1,300 | 865 | 1,600 | 1,400 |
| 8 | | | 2,800 | 2,400 |
| The "Water Service Charge Flow Rates in GPM" are the same as the "Safe Intermittent" flow rates for each meter type listed in this table. | | | | |

## CRITERIA AND REFERENCES

Standard capacities are from the following AWWA Standards:

- C 700-15: Displacement type
- C 701-15: Turbine type
- C 702-15: Compound type
- C 715-18: Electromagnetic (Mag) type

A battery of meters is two or more meters in parallel combining for a single service. The single meter equivalent to a battery of meters shall be that standard meter size whose capacity is equal to or next below the sum of the capacities of the meters in the battery.

The Water Service Charge Designated Flow Rates Extrapolation: The values listed in Table A for sizes greater than 8" were determined by the formula $Q = 50D^{1.67}$, where Q is the capacity in GPM and D is the nominal diameter in inches of the corresponding meter. This formula was developed from displacement and compound meter Safe Intermittent data points of meter sizes ranging from 5/8" to 8".

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# Attachment 4: Procedure 900, Water Consumption Accounting and Reporting

EBMUD

# Procedure 900

| | |
|---|---|
| EFFECTIVE | 17 MAY 23 |
| SUPERSEDES | 24 MAR 21 |
| LEAD DEPARTMENT | WNR |

## WATER CONSUMPTION ACCOUNTING AND REPORTING

**PURPOSE** – To establish a consistent District-wide protocol for storing, retrieving, reporting and publishing consumption data for internal and regulatory purposes.

**General Provisions**

This procedure applies to all District employees directly or indirectly engaged in measuring, collecting, storing, retrieving, validating, reporting, or publishing District raw water use, treated water production, water consumption, and water demand projections data.

**Limitations**

This procedure provides only a general overview of water consumption accounting and reporting procedures. Operating manuals developed by departments for their internal use provide details on methodologies; however, they do not constitute District policy or adopted procedures.

**Definitions**

**Customer Account**

Account - Accounts can be classified into seven major use types, as defined by Business Classification Code (BCC) Categories[1]. One customer can have multiple accounts. BCC Categories include Single-Family, Multi-Family, Commercial, Industrial, Petroleum, Institutional, and Irrigation. For a complete list of BCC Categories or BCC Types (which is the grouping of BCCs into similar type of end users and it is more granular than the BCC Categories) visit http://waterconsumptiondata/glossary.php.

Account Status - For billing purposes, accounts can have one of the following statuses:

- *Active* - a customer is currently responsible for service at a premise[2].
  - Charged – a price/rate has been applied to an account component, i.e., water flow, wastewater flow, and meter size; the account is "statemented" after being "charged".
  - Billed/Statemented – after the account is "charged", the statement or bill is generated.
- *Closed* - an off order has been completed and the account has been charged; the statement may or may not have been generated at this point. The official closed date is the last day the customer is responsible for service.
- *Inactive* - an order has been created for a customer who will be responsible for service at a premise.
- *Landlord* - Active - customers having Intervening Water Service Agreement become responsible for service when a tenant moves out.
- *Landlord* - Inactive - customers having Intervening Water Service Agreements but the tenant is responsible for service.

[1] BCC Categories are mapped to "Dwelling Description" within Customer Watch. For billing purposes accounts can also be differentiated into Revenue Classes which include Residential, Commercial, Industrial and Public. Note that Revenue Classes do not necessarily correspond to BCC Categories.

[2] A premise is the physical location/address where the water use is taking place.

Account Type[3] - There are six types of water service available:

- Standard (Water) = Standard Water Service including irrigation services; potable (treated) drinking water and does not include Fire Services and Hydrant uses.
- Fire Service[4] = Private Fire Service.
- Hydrant = Hydrant Meter Service; Hydrant meters borrowed by contractors are accounted for in the Water Consumption Data Hub (WCD Hub).
- Wastewater = No Water (Wastewater only).
- Untreated (Water Non-Potable) = Non-Potable Water Service; untreated – raw water used by such accounts as golf courses.
- Water Recycled = Recycled Water Service
  Recycle Secondary
  Recycle Tertiary

**Metered Consumption Data: Storage**

The District stores metered water consumption data in two databases - Customer Watch and Water Consumption Data Warehouse.

**Customer Watch (CW)** - A utility billing and customer information application used to manage customer contacts, meter readings, charge calculations, statements and correspondence, equipment inventory, service orders, etc.

Most meters are read bimonthly except meters for large commercial and industrial customers which are read monthly. The majority of meters are read manually and entered into handheld units. The reads are then transferred to CW to calculate the Water Flow Charge.

In CW, the data remain in a billing cycle format. CW stores what was charged to individual customers. Because of cancel rebills or delayed reads, the billing period on a statement could be less or much more than the standard billing cycle.

Managed by the Customer Information System (CIS) Control Group, CW replaced the CIS in 2011, which replaced the Customer Billing System in 1987. Data in CW is only available from September 2011 to the present.

**Water Consumption Data Warehouse (WCDW)** - The database stores water consumption data in monthly, seasonally adjusted monthly, and billing cycle formats, for accounts that have been charged in CW. Metered accounts, both billed and unbilled, are transferred and/or converted from CW to the WCDW on the second Tuesday of every month.

Monthly Normalized Aggregate

Within the WCDW, the billing data is converted into a monthly format and archived. WCDW contains data from 1975 to present. Due to the differences in timing of the billing cycles, data in WCDW is available about two months prior to the current month. This ensures that the data presented for a given month represents all of the District's active accounts.

Since 1975, the District has utilized an algorithm to redistribute billing cycle data into monthly data - equally distributing the data across each month. The algorithm for the conversion can be found via the WCD Hub's Glossary page (http://waterconsumptiondata/glossary.php).

[3] Intertie meter data are not accounted for in the WCD Hub.
[4] It is not feasible for the District to accurately estimate a potentially significant portion of fire service consumption as fire departments are not required to report their usage to the District.

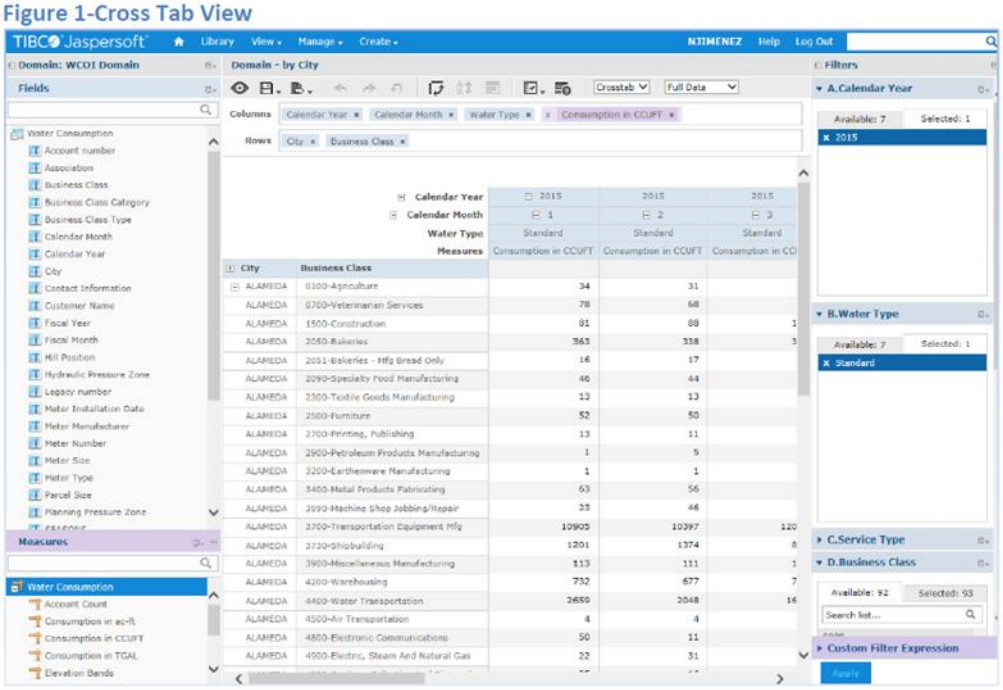
Seasonally Indexed Monthly Format Algorithm

In January 2014, the District began keeping water consumption data based on a seasonally adjusted algorithm. This data is available for calendar year 2013 to the present. For publishing purposes, if the Seasonally Adjusted Monthly Aggregate data is used, that needs to be clearly indicated on any report, chart, or table created.

The seasonally indexed monthly format algorithm refines the monthly format algorithm by accounting for the seasonal nature of water consumption, attributed to irrigation in the warmer months. The refinement improves the accuracy of the monthly consumption calculation by prorating consumption based on historical monthly water consumption trends by BCC Category. The Seasonal Indices (SI) that are used in the algorithm will be assessed approximately every 10 years by Water Resources Planning Division in consultation with Water Distribution Planning Division.

The algorithm for the conversion can be found via the WCD Hub's Glossary page (http://waterconsumptiondata/glossary.php).

Figure 1-Cross Tab View




**Metered Consumption Data: Retrieval/ Reporting**

Historical and reproducible metered water consumption data can be retrieved and reported using the following:

- Water Consumption Data Hub
  - Jasper Reports
  - Jasper Analytics Tool
  - Data Query Request
- Customer Watch

Water Consumption Data Hub - CW water use data is translated into normalized monthly aggregate consumption values when it is loaded into the WCD hub. This is a portal in which District staff can query and view water consumption data, obtain a reference for standardized consumption related terms, and access relevant policies and procedures in reporting data. The WCD Hub helps to ensure consistent, accurate, reproducible water consumption data is used throughout the District. The WCD Hub can be accessed via http://waterconsumptiondata. Definitions of BCC and corresponding types and categories, and seasonal indices for west and east of hills by BCC category are published on the WCD Hub's Glossary page. These can be accessed at http://waterconsumptiondata/glossary.php.

**Metered Consumption Data: QA/ QC**

The accuracy and integrity of water consumption data are maintained through a Quality Assurance/ Quality Control (QA/ QC) process in CW.

In CW, to assure correct billing, exceptions reports are produced daily as "Special Handling" when anomalies are noted in the data. Some of the criteria for triggering an exception flag in CW include:

- High/Low - Consumption values calculated from meter reads uploaded by the Meter Reading & Maintenance Division are compared with historical data. Customer Services Support Division, Field Services, Water Conservation Division and Meter Reading & Maintenance Division staff review consumption values that are higher or lower than the historical range, and take appropriate actions such as requesting service order, confirming the read, etc., before the consumption is released for charge calculation.

- High Charge - a type of service (water, wastewater, or fire service) and the corresponding revenue class has a dollar amount assigned to it that triggers a high charge flag. Customer Services Support Division reviews all accounts that exceed the high dollar amount before releasing the account for statement.

Accuracy of the meter reads provided to the CW application is maintained by the Meter Reading & Maintenance Division.

**Department and Committee Responsibilities**

Departments are responsible for assisting and supporting other groups and committees to assure that reporting of water supply and use information is consistent with this procedure. Attachment A provides a list of standard publications that report the information produced by the District.

Water and Natural Resources Department (WNR)

The Water Resources Planning Division (WRPD) of the WNR is responsible for assessing and reporting District water supplies and use, including historical, current, and future assessments as required by District policy; California State Water Code; water rights, contracts, and agreements; state and regional planning agencies; legislative initiatives; and legal matters. WRPD is also responsible for calculating the water savings estimates for inclusion in the State Water Regional Control Board (SWRCB) Annual Report. WRPD reports/publishes water consumption data in the District's Urban Water Management Plan to meet the State's and Federal regulatory requirements. WRPD oversees the WCD Hub and Procedure 900.

The Office of Water Recycling of the Water Supply Improvements Division, which is located within the WNR, is responsible for assessing recycled water production and use from wastewater sources, as well as potable supplement and customer raw water use. The District recycled water use is reported annually with the potable supplement and other non-potable values to be retrieval through the Hub. The District's recycled water accounting terms and reporting responsibilities are defined in Procedure 901.

Operations and Maintenance Department (OMD)

OMD is responsible for measuring, collecting, retrieving, recording, validating, reporting, and making available metered water supply production and use data from the District's water treatment facilities.

Customer and Community Services Department (CUS)

The Customer Services Support Division of the CUS is responsible for storing metered water readings, calculating usage and charges from metered water readings, as well as accuracy of CW data, as described in the Data QA/QC section of this procedure. The Customer Services Support Division is also under contract to bill for other public agencies.

The Water Conservation Division (WCD) of the CUS is responsible for water conservation service, assessment and reporting current and projected water conservation savings by customer type and land use. The District's water conservation accounting terms and reporting responsibilities are defined in Procedure 902.

Information Systems Department (ISD)

The Applications Division (AD) of the ISD is responsible for developing and maintaining the repositories of the water consumption data. The AD development the WCD Hub that centralizes and meets water consumption query needs of District staff.
AD is also responsible for implementing quality control procedures on the data. To ensure accuracy and consistency, all metered water consumption data to be released to the public should be retrieved via the sources listed in this Procedure. (See Metered Consumption Data: Retrieval/ Reporting section of this procedure).

Finance Department (FIN)

Treasury Operations of the FIN is responsible for tracking billed water use and revenue, including classification by customer and service area region for use in the District's financial planning and reporting. The water use reported by FIN is taken directly from CW and reflects the billed metered water consumption that was printed for customer statements during the reporting period. These consumption reports do not correspond to the monthly water consumption in the WCDW. Treasury Operations develops their short-term water consumption projections data that is reviewed by the Demand Projections Committee (DPC). FIN reports on water consumption and revenue to the Board of Directors on a monthly basis.

The Controller's Office of the FIN gathers information about water production for the District Annual Report "comparative highlights" section.

Wastewater Department (WWD)

The Environmental Services Division of the WWD is responsible for developing and assessing capacity fees, rates, and charges associated with wastewater services. The Environmental Services Division is responsible for determining wastewater flow for billing and verifying wastewater flows for facility planning and billing purposes. The WWD is also responsible for coordinating with the Office of Water Recycling to ensure non-potable water served within the District's recycled water systems is recorded and properly assessed to account for potable water makeup deliveries.

Engineering and Construction Department (ENG)

The Water Distribution Planning Division (WDPD) of the ENG is responsible for preparing the District's Demand Study Updates that forecast water use over a 30-year planning horizon by land use categories and census tracts; and for preparing Water Supply Assessments and Written Verifications of Sufficient Water Supply as required by the State Water Code. The WDPD chairs the DPC that is responsible for reviewing and approving demand projections that are reported by District staff.

Office of the General Manager (OGM)

The Communications Office of the OGM is responsible for ensuring consistent data on current and past water use that is provided to the media and used in publications and at community events attended by the District's Board of Directors, management and staff. Consistent data helps maintain customer and stakeholder confidence in the District; therefore the Communications Office should coordinate with the Project Management Office of the ADD on all metered water consumption data released to the public.

Demand Projections Committee (DPC)

The DPC members are representatives from each Department in the District described above. The DPC is chaired by WDPD. It is an inter-departmental committee that reviews and provides oversight of any short-term or long-term demand projections as well as providing feedback and guidance to Departments that are performing water use analysis.

**Acronyms**

AD – Applications Division
BCC – Business Classification Code
CIS – Customer Information System
CUS – Customer and Community Services Department
CW – Customer Watch
DPC – Demand Projections Committee
EBMUD – East Bay Municipal Utility District
ENG – Engineering and Construction Department
FIN – Finance Department
ISD – Information Systems Department
OGM – Office of the General Manager
OMD – Operations and Maintenance Department
QA/QC – Quality Assurance/ Quality Control
SI – Seasonal Index
SWRCB – State Water Resources Control Board
USBR – United States Bureau of Reclamation
WCD – Water Conservation Division
WCDW – Water Consumption Data Warehouse
WNR – Water and Natural Resources Department
WRPD – Water Resources Planning Division
WWD – Wastewater Department

**References**

Procedure 146 – Water Conservation Accounting and Reporting
Procedure 708 – Facilities: Metering Water Consumption
Procedure 901 – Recycled Water Accounting and Reporting
EBMUD Urban Water Management Plan (2020)
EBMUD Water Conservation Strategic Plan (2021)
EBMUD Recycled Water Master Plan (2020)

## Attachment A
STANDARD REPORTS AND PUBLICATION DATES

| Dept | Report | Board Action | External Action | Frequency | Month | FY[1] | CY[2] |
|---|---|---|---|---|---|---|---|
| WNR | **Water Rights Reports**<br>*Annual reports submitted to the SWRCB summarizing the District's water use characteristics.* | | Submitted to SWRCB | Annually | June | | • |
| | **Urban Water Management Plan**<br>*A comprehensive report of water supply sources, production, usage, wastewater, recycled water and conservation. It is submitted to the California Department of Water Resources (DWR) and the U.S. Bureau of Reclamation.* | Adoption with a Resolution | Submitted to DWR | Every 5 years | July | • | • |
| | **Annual Water Supply and Demand Assessment**<br>*The Annual Assessment provides an estimate of the gap between demand for water and actual supplies available each year.* | | Submitted to DWR | Annually | July | | • |
| | **Monthly Volumes Delivered**<br>*As a requirement of the District's CVP Contract, the District shall inform the USBR and the DWR in writing by April 30 of each year of the monthly volume of surface water delivered within the District's service area during the previous contract year (February-March).*<br><br>*A report that provides current information on the District's service area, supply and usage. It is submitted to the USBR as a requirement of the District's Central Valley Project (CVP) Contract.* | | Submitted to USBR | Annually | April | • | |
| | **Municipal & Irrigation Use**<br>*As a requirement of the District's CVP Contract the District shall inform USBR on or before the 20th of each month of the quantity of CVP water taken during the previous month.* | | Submitted to USBR | Monthly (after CVP water takes only) | All | | • |
| | **Monthly Consumption/Production Values**<br>*As a requirement of the SWRCB, monthly values are required to be submitted by the 15th of each month for the water use in the prior month. Information on DMP measures implemented are required during drought periods* | | | | | | |

| Dept | Report | Board Action | External Action | Frequency | Month | FY[1] | CY[2] |
|---|---|---|---|---|---|---|---|
| OMD | **Water Loss Audit Report** *As a requirement of SB-555, the District produces a validated annual report on water use that must be certified by the GM. OMD compiles and produces the report, and WNR submits it.* | | Submitted to DWR | Annually | Jan | | ● |
| | **Water Supply Operations Plan** *The Plan describes the actual and projected water supply operations for the water year from October 1 to September 30 for the Mokelumne and the East Bay systems.* | | | Annually | May | | ● |
| | **Water Supply Engineering Statistical Report** *The Report provides an annual record of operation for the water supply system.* | | | Annually | Nov | ● | |
| ENG | **Demand Study Update** *A study using a land-use based methodology to forecast water distribution system demand for a 30-year planning horizon.* | | | Every 5-10 years | Varies | | ● |
| FIN | **Financial and Statistical Report** *A Blue Book that provides separate financial statements, flux analyses and water consumption for Water and Wastewater.* | | | Semi-Annually | Dec | | ● |
| | **Comprehensive Annual Financial Report** *The report represents the District's financial position and results of operations, and demographic and statistical information.* | | | Annually | Jun | ● | |
| OGM (Public Affairs) | **EBMUD Biennial Report** *External report representing District-wide activities and focus for two fiscal years. The report provides a summary of water programs and projects that are completed and underway.* | | Public Distribution | Annually | Dec-Jan | ● | |
| | **All About EBMUD** *A report describing EBMUD's system.* | | Public Distribution | Biennially (last update 2018-2019) | Dec | ● | |
| | **Reponses to Media Inquiries** *Disseminates fiscal and calendar year information about water use in response to media inquiries, which are sometimes very time-sensitive and require prompt response.* | | Public Distribution | Annually | Varies | | |

[1]/ Fiscal Year
[2]/ Calendar Year

# Attachment 5: Memo – Summary of Water Consumption Data Hub Glossary Water Consumption Data Monthly Normalization

**EAST BAY MUNICIPAL UTILITY DISTRICT**

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DATE: March 27, 2025

MEMO TO: Sophia Skoda, Director of Finance

FROM: Phoebe Grow, Principal Management Analyst

SUBJECT: Monthly Normalized and Seasonally Adjusted Aggregates

## INTRODUCTION

The COS (Cost of Service) model uses the Monthly Normalized Aggregate formula and its seasonal variant, Seasonally Adjusted Monthly Aggregate to calculate the average and peak month consumptions for the different customer classes. In general, the District reads meters on a bimonthly basis,[1] with a small minority of meters being read on a monthly basis. As it is not always practicable to read meters at equal intervals, the period between reading dates may vary as much as five days less than thirty or sixty days and as much as eight days more than thirty or sixty days and still be considered one or two months for billing purposes. These formulas for the Monthly Normalized Aggregate and the Seasonally Adjusted Monthly Aggregate are necessary to adequately allocate water consumption to each month in the year.

## DISCUSSION

### Monthly Normalized Aggregate

There are two steps in deriving the consumption in each month for a given bill.
1. Count the number of days billed in each month using the start and end date of the bill.
2. Distribute the total consumption to each of the months proportionally to the number of days in that month of the total days billed.

Example
Consider a bill for a single-family residence in Oakland that spans 62 days over three calendar months from July 25 to September 25 with a total usage of 10 ccf. Of the 62 days in this bill, 6 days are in July, 31 days are in August, and 25 days are in September. We estimate the usage in each month as:

Usage in July: 10 ccf * (6/62) = 0.9677 ccf
Usage in August: 10 ccf * (31/62) = 5.0000 ccf
Usage in September: 10 ccf * (25/62) = 4.0323 ccf

---

[1] The District conducts monthly meter reading for 805 of its nearly 400,000 water service accounts. The meters that are read monthly are generally associated with high-water use commercial/industrial accounts

**Seasonally Adjusted Monthly Aggregate**

The Seasonally Adjusted Monthly Aggregate formula uses pre-defined seasonal indices. The Seasonally Adjusted Monthly Aggregate formula adds one additional layer on top of the Monthly Normalized Aggregate formula.

1. Weight the *number of days* in each month by the seasonal index for that month.
2. Calculate consumption in each month according to the monthly normalized aggregate formula using the newly calculated number of days per month.

Example

Consider the same bill for a single-family residence in Oakland that spans 62 days over three calendar months from July 25 to September 25 with a total usage of 10 ccf. The single-family seasonal indices for July, August, and September are 1.18, 1.25, and 1.23 respectively. We normalize these seasonal indices and weight the number of days in each month as:

Weighted days in July: 6 * 1.18 = 7.08
Weighted days in August: 31 * 1.25 = 38.75
Weighted days in September: 25 * 1.23 = 30.75
Total number of days: 7.08 + 38.75 + 30.75 = 76.58

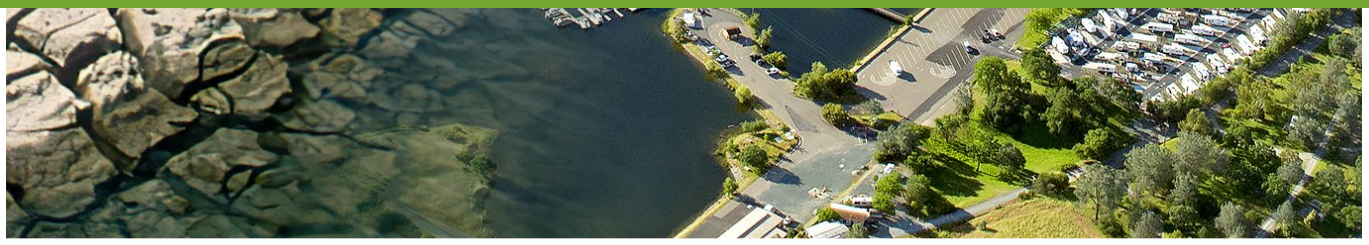
We estimate the usage in each month as:

Seasonally adjusted usage in July: 10 ccf * (7.08/76.58) = 0.9245 ccf
Seasonally adjusted usage in August: 10 ccf * (38.75/76.58) = 5.0601 ccf
Seasonally adjusted usage in September: 10 ccf * (30.75/76.58) = 4.0154 ccf

# Attachment 6: East Bay Municipal Utility District Water Shortage Contingency Plan 2020

# WATER SHORTAGE CONTINGENCY PLAN 2020

EAST BAY MUNICIPAL UTILITY DISTRICT



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# ATTACHMENT 1 - WATER SHORTAGE CONTINGENCY PLAN

## 1. WATER SHORTAGE CONTINGENCY PLAN (WSCP) OVERVIEW

Uncertainty is inherent in any future-oriented planning effort and is a driving factor in long-term water resources planning. Water supplies are constantly subject to uncertainties which directly affect the amount and timing of availability of the sources of water. The Water Shortage Contingency Plan (WSCP) provides a framework to help address water shortages that may occur. As noted in Chapter 2, there are many factors that create a high degree of unpredictability on both the supply and demand side, and with that understanding, EBMUD's WSCP considers a range of possible future scenarios considering both aspects of water resources, demand and supply. This approach is a shift from simply predicting and planning for a singular outcome as it anticipates a wide range of futures which then leads to developing a more resilient portfolio of response actions to manage changing conditions.

### 1.1 WSCP PURPOSE

EBMUD is responsible for providing drinking water to about 1.4 million people and ensuring a reliable supply of potable water is core to EBMUD's mission. As discussed in Chapters 2 and 4, EBMUD has implemented and is planning to implement numerous projects to ensure the reliability of its water supply, including developing supplemental water supplies and strengthening the resilience of critical infrastructure.

In addition to these efforts, EBMUD recognizes the need to have plans and procedures in place to respond to water shortages that may occur. Droughts, earthquakes that damage distribution infrastructure, Delta floods that impact aqueducts, power outages, fire, and other emergencies could impact EBMUD's ability to supply water to its customers. The purpose of the WSCP is to develop a coordinated response to these situations and to guide EBMUD's planning and response through thoughtful assessment and management of the water supply.

The WSCP defines an orderly process for collecting information on water supply availability, assessing conditions, determining fiscal actions, allocating resources, enforcing regulatory water use restrictions, monitoring customer response, and planning and implementing drought communications. The WSCP describes EBMUD's actions to implement and enforce regulations and restrictions for managing a water shortage when it declares a water shortage emergency under the authority of the Water Code. It also describes EBMUD's planned actions to manage supply and demand before and during a water shortage to ensure a reliable water supply. In an emergency, the primary function of EBMUD's water supply system is to meet essential public health, safety, and firefighting needs.

The WSCP describes emergency readiness and response including efforts to coordinate with local, county, regional, state, and federal agencies. Section 4.7 on Emergency Preparedness describes EBMUD's roles and responsibilities to provide mutual assistance and highlights coordination with state agencies. This coordination aligns with the state's strategy to prepare for, respond to, and recover from droughts and water shortages as discussed in the California Drought Contingency Plan (CDCP) 2016. The goals of the CDCP that align with EBMUD's are to:

- meet essential human health and safety needs, by supplying adequate water supplies throughout a water supplier's service area for drinking, sanitation, and fire suppression, as a first priority;
- provide and maintain adequate protections for State and Federal endangered and threatened species and other fish and wildlife resources; and
- seek and consider water management flexibilities to maximize the benefit of limited water supplies.

The CDCP defines the roles and responsibilities of state agencies, establishes the structure for integrating state interagency planning, and identifies an integrated regional approach to assessing droughts, drought action levels, and appropriate agency responses as drought severity changes.

Consistent with the Delta Plan, the 2020 UWMP also includes an Enhanced Reliability Element that discusses EBMUD's plan for responding to possible interruption of water supplies resulting from catastrophic events impacting the Delta. This element is discussed in Appendix H.

## 1.2 WSCP REQUIREMENTS

Section 10632 of the California Water Code requires UWMPs to include an urban water shortage contingency analysis. The relevant section of the Code is provided in Appendix A. As required by the Water Code, in 1992 EBMUD adopted its first WSCP, and the WSCP has continued to evolve since. It was updated in the 2010 UWMP to reflect the 2007-2010 drought period, the completion of the Freeport Regional Water Facility, and numerous other changes. In 2015, EBMUD revised its Drought Management Program (DMP) Guidelines and ordinances on excessive use and water theft to incorporate lessons learned from the recent drought.

In 2018, new legislation required replacing the water shortage analysis under the former law with the creation of a WSCP with several prescriptive elements. With this update in 2020, EBMUD modified its DMP to integrate the requirements of the 2018 legislation as well as incorporating additional lessons learned from the 2014-2016 drought.

# 2. WATER SUPPLY ANALYSIS

As required by the Urban Water Management Planning Act - Section 10635, a water supply reliability assessment must compare future water demands and verifiable water supplies under multiple hydrologic conditions as both supply and demand can vary seasonally. EBMUD uses a water supply system model to assess the sufficiency and reliability of its long-term water supply by modeling its Mokelumne River and CVP water supplies against projected demands under three potential future scenarios. Consideration of scenarios in its long-term planning provides for a robust water supply portfolio in combination with a comprehensive Drought Management Program which allows for EBMUD to provide reliable water service in all year types.

## 2.1 MODELING METHODOLOGY

For the 2015 UWMP and prior plans, the supply assessment was performed using EBMUD's water supply system Simulation Model (EBMUDSIM). Since 2018, the EBMUD has transitioned to using the RiverWare software, equipped with state-of-the-art simulation and accounting algorithms, as its tool to perform water supply mass balance modeling for the supply and demand analyses.

Historic hydrology is used to capture the variability of Mokelumne River water supply in the model. For the 2020 UWMP, hydrology from 1921 – 2015 was available for use in the water supply modeling. The water service reliability analysis assumes that any of the historical hydrologic sequences could reoccur in the future. In evaluating its water supply, EBMUD incorporates both upstream and downstream diversions by senior water right holders, existing water rights agreements and contractual obligations, flood control flow releases, and other in-stream flow requirements into the model. EBMUD is required to make in-stream flow releases per the terms of its JSA[1] with the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife. The model also allows for rationing levels, demands, and existing dry year supplemental supplies to be varied so as to be able to analyze for different scenarios or projections.

EBMUD uses historical hydrologic data to inform its modeling and planning for future droughts. During some historical dry periods when runoff from the Mokelumne River Basin was insufficient to meet service area demands, EBMUD relied on stored water in its reservoirs to meet most of its customers' water needs. The worst hydrologic drought event in EBMUD's history was the 1976-1977 drought, when runoff was only 25 percent of average and total reservoir storage decreased to 39 percent of normal. In September 1977, with an uncertain precipitation and runoff forecast for the following year, EBMUD continued to require its customers to ration water to avoid depleting system storage. Fortunately, a very wet year in 1978 followed the critically dry year of 1977 and contributed to the water system's rapid recovery.

EBMUD uses a three year "drought planning sequence" (DPS) to assess the adequacy of its water supply for long-term water resources planning. Model simulation of the first and second years of this DPS uses the actual runoff that occurred in 1976 and 1977, the driest recorded two-year period. The simulated runoff in the third year is 185 thousand acre-feet (TAF), which is the average of a number of hydrologic parameters from 1976 and 1977. EBMUD's water supply system model assumes that such a severe drought (1) would not continue beyond the third year of this sequence and (2) would result in all accessible storage being depleted during the third drought year.

EBMUD undertook an analysis to test the adequacy of the DPS for planning purposes. Because of the

[1] EBMUD continues to meet its flow commitment to protect the lower Mokelumne River by providing instream flow releases from EBMUD's Camanche Dam to improve fishery conditions, per the requirements of the 1998 Joint Settlement Agreement (JSA) among EBMUD, US Fish and Wildlife Service, and the California Department of Fish and Wildlife.

persisting extreme dry conditions throughout most of California from 2012 through 2016, EBMUD analyzed the three-year DPS was in fact the most severe credible drought, in terms of significant impacts to available water supply to meet customer demands and other obligations, that should be considered in its planning. The evaluations found that, when the DPS was applied, it was the most severe drought in the historic record.

EBMUD uses a DPS to simulate the effects of a severe, multi-year drought as the basis of EBMUD's long-term water supply planning. New legislation (Senate Bill 606) also now requires the UWMP to include a drought risk assessment that examines water shortage risks for a drought lasting at least five consecutive years. There was a significant drought that occurred from 1987-1992 in the hydrologic period that affected EBMUD and is included in the analysis for this UWMP.

Computer simulations help evaluate the need for additional supplemental supplies in each modeled year. While modeling cannot predict the future, it does provide comparative analysis that can be used to gauge how the water supply system might perform under different scenarios. EBMUD's response to any specific situation will vary depending on the actual water supply and demand conditions and external factors such as regional to state-wide hydrology.

## 2.2 EXISTING DRY YEAR SUPPLIES

EBMUD's sources for its water supply projections include EBMUD's Mokelumne River flow entitlement, and water from Central Valley Project (CVP) diverted through the Freeport Facilities.

EBMUD uses historic Mokelumne River hydrology with inclusion of the DPS to determine supply availability scenarios from the Mokelumne River.

EBMUD holds a water service contract with the USBR to receive water from the CVP through the Freeport Regional Water Project in years when EBMUD's water supplies are relatively low. Specifically, EBMUD's contract allows it to receive CVP water in years when EBMUD's March 1 projection, as updated monthly through May 1, of its October 1 total stored water is forecast to be below 500 TAF. The contract enables EBMUD to receive up to 133,000 AF of CVP water in a single qualifying year, not to exceed a total of 165,000 AF over three consecutive qualifying years.

When deciding how much CVP water to request, EBMUD considers the following:

- Current projections of customer demand;
- Current projection of end-of-water-year total system storage, with reference to EBMUD's Drought Management Program;
- Likelihood that USBR will have sufficient water in the following year to allow EBMUD to receive the water under its contractual entitlement; and, remaining amount of the 165,000 AF three-year contractual quantity available to EBMUD in the current CVP contract year, based on deliveries taken by EBMUD in the preceding two CVP contract years.

In some dry years, there may not be sufficient water supplies for all CVP contractors to receive their full requested amount, and USBR may limit allocations. In August 2015, USBR released the final version of its Municipal and Industrial (M&I) Water Shortage Policy outlining how it will allocate water during years when there is not enough water to meet all CVP contractor requests. The policy provides for reduced allocations for M&I contractors in comparison to the contractually specified quantity. Whether allocations are reduced, and the extent of any reductions, depends on the quantity of water available to the CVP. The M&I Water Shortage Policy also states that USBR may increase the amount of water that the contractor receives above the reduced allocation to the extent needed to ensure that the contractor has enough supply to maintain a "Public Health and Safety" (PHS) level calculated in the manner described in the M&I Water Shortage Policy Implementation Guidelines and Procedures dated August 2015 and February 1, 2017.

For purposes of EBMUD's analysis in this WSCP, CVP allocations for each hydrologic year are assigned based on model results generated by Department of Water Resources (DWR) using the CalSim model. The DWR results show what the CVP allocation would have been in a particular hydrologic year given future build-out demands, regulations, and levels of development on the system. As a result, these allocations may differ from the historic allocations. For example, during a moderately dry year, the DWR CalSim allocation may be lower than the actual, historic allocation because the DWR CalSim results are based on a higher demand and level of development. In the most recent drought that occurred, EBMUD's CVP allocation

went as low as 25 percent and consequently the assessment analysis in the WSCP also includes a scenario to reflect this actual allocation.

The Bayside Groundwater Project, Phase I, was previously included in the 2015 UWMP as an available dry year supply. EBMUD, however, is currently in the process of developing the Groundwater Sustainability Plan for the East Bay Plain Sub-basin, and when the evaluation and recommendations become available, they will be included in the next update of the UWMP.

## 2.3 WATER SUPPLY PLANNING AND CLIMATE CHANGE

Climate change could impact EBMUD's ability to reliably provide water to its customers, with current climate change scenarios predicting an increase of the probability of occurrence of extreme weather events. Changes in precipitation and air temperature can impact the timing and quantity of water resources; long-term changes in maximum daily air temperature and rainfall predicted by available climate change models were reviewed to determine any impact to the water supply. Similar to the analysis done to look at climate change impacts on projected water demand (Chapter 3), the approach used for this study is based on guidance from California Department of Water Resources' expert advisory committee, the CCTAG[1], on the use of climate models and associated technical tools for water resources planning.

To be consistent with the 2050 Demand Study climate change analysis, an ensemble of 10 GCMs for planning studies was used, since these models capture the range and uncertainty of future climate projections. The output for all GCMs and associated scenarios are available via Cal-Adopt.org. In selecting the worst-case scenario, RCP 8.5 scenario was considered for analyzing Mokelumne watershed. Chapter 3 of the UWMP provides more detail as to how this scenario was selected.

For air temperature change, the GCM model CanESM2 (Average) with RCP 8.5 (High Emission scenario) and GCM model HadGEM2-ES (Warmer/Drier) with RCP 8.5 (High Emission scenario) were considered. Figure W-1 presents the model output for annual average maximum air temperatures. Overall air temperatures are projected to rise substantially throughout this century. Data for the aforementioned models were downloaded from Cal-Adopt.org website and analysis was then performed in MS Excel. The plotted maximum air temperatures have a spread, or uncertainty band. Polynomial best-fit line was applied to compute the air temperature change between years of interest from 2020 to 2045. The analysis for CanESM2 showed an approximate 2.4°C increase in 2045 from 2020, and an approximate 2.5°C increase for HadGEM2-ES.

The air temperature increases for both CanESM2 and HadGEM2-ES models are within the range of the analysis done by EBMUD and referenced in the 2015 UWMP climate change scenario. In 2015, EBMUD looked at three possible scenarios related to climate change: a 2°C increase in average air temperature; a 4°C increase in average air temperature; and a 20% reduction in precipitation. These scenarios provide an initial framework to understand potential climate change impacts.

An increase in average air temperature is predicted to shift the timing of runoff, as snowpack melts earlier in the year, or as precipitation falls as rain instead of snow. In order to model this effect, EBMUD used result of its Water Supply Management Plan (WSMP) 2040 study[2] on climate change and applied them to updated conditions and assumptions. The WSMP 2040 study used a Mokelumne Watershed Digital Elevation Model (DEM) coupled with a Geographic Information System (GIS) to estimate potential impacts of increased air temperature on precipitation. The DEM data was used to develop an elevation-area relation from which watershed land area above/below specified contour lines were estimated. EBMUD used snow survey data to develop snow water equivalent (SWE) data. The data were used as input for multiple linear regressions calculating a relationship between monthly air temperature, precipitation, and SWE at five snow courses over the historical record. The regression equations were then used to estimate SWE under the scenarios with 2°C and 4°C increases in air temperature.

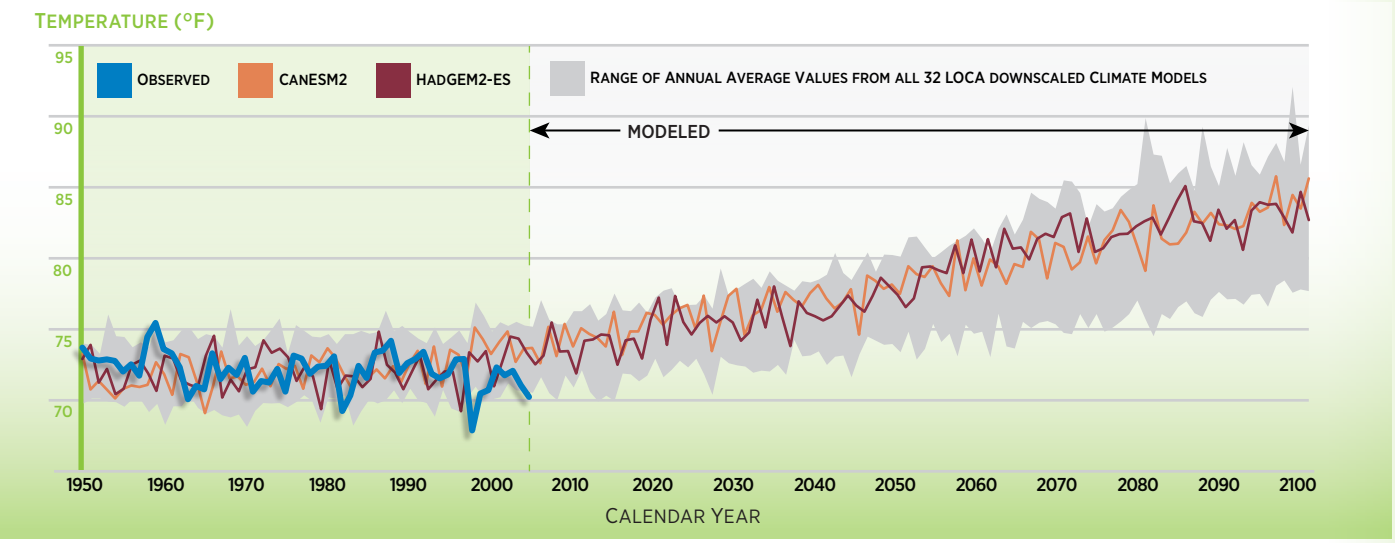
EBMUD also evaluated a 20% reduction in precipitation. A 20% reduction in precipitation was assumed to correspond to a 20% reduction in runoff. EBMUD reduced the runoff in its historic hydrology accordingly.

Each of the climate change scenarios was run through a Visual Basic Script adjusting PG&E operations upstream accordingly. The resulting regulated flows

[1] DWR, CCTAG, August 2015. Perspectives and Guidance for Climate Change Analysis.

[2] The Water Supply Management Program (WSMP) 2040 was a program-level effort that looked at EBMUD's water supply needs over a thirty-year planning horizon and proposed a diverse portfolio of policy initiatives and potential projects to pursue. The final plan was adopted by EBMUD Board of Directors on April 24, 2012.

FIGURE W-1 ANNUAL AVERAGE MAXIMUM TEMPERATURE




were then input into the EBMUDSIM model. Although EBMUD has transitioned to using the Riverware model for its supply and demand assessment, the climate change analysis and evaluation based on the aforementioned hydrologic scenarios that was provided in the 2015 UWMP is still informative.

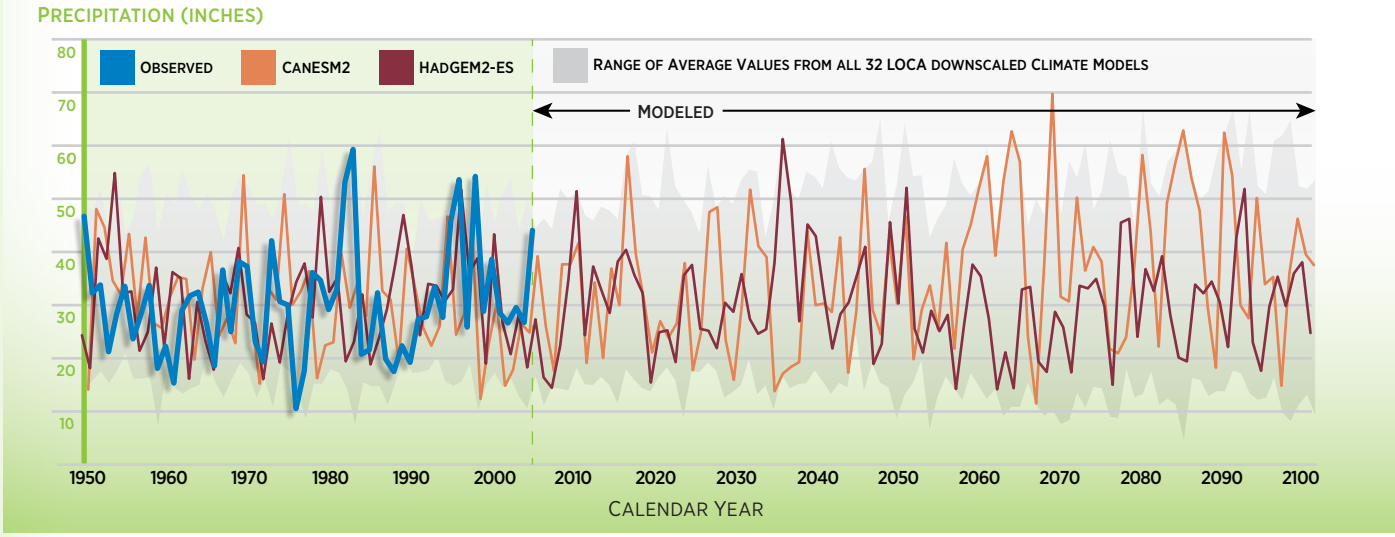
The results from the analysis illustrated potential impacts to EBMUD, depending on how climate change affects EBMUD specific watershed. It is important to note that the modeling of climate change is still an imperfect science, especially at the level of granularity required to study a specific watershed. There is no standard model that is used to quantify the effects of climate change on watershed hydrology. While it is difficult to quantify the exact impacts of climate change, EBMUD's modeling does provide useful information on the potential qualitative impacts.

The scenarios that modeled an increase in average air temperature included a shift in runoff patterns, with some spring snow melt runoff arriving earlier as winter rain runoff. However, the Mokelumne River has storage that helps to attenuate the effects of the change in runoff pattern so as to minimize its effects on EBMUD's customers. For example, there are reservoirs upstream of Pardee and Camanche Reservoirs that would act to regulate runoff. Modeling showed that winter runoff was caught and stored in the upstream reservoirs, then released in the spring and summer in a timeline similar to what EBMUD experiences now. These scenarios do result in small changes in total system storage and rationing, but the need for water was not affected in the time horizon considered. EBMUD will conduct further research and data gathering on runoff forecasting and shifts and operations of reservoirs in the upper Mokelumne watershed and of Pardee and Camanche to better understand the impacts to water supply for the next update of the UWMP.

The other climate change scenario that was evaluated, which focused on a 20% overall reduction in watershed runoff, created more substantial changes than the scenarios focusing on air temperature change. The reduction in runoff scenario showed a significant increase in the need for water as well as an increase in the overall amount of rationing experienced by EBMUD customers. It is important to note that among several models, precipitation projections do not show a consistent trend during the next century. The GCM model output showed high variability in rainfall as well and therefore high uncertainty in the forecasts. Figure W-2 depicts annual average precipitation, and on average, the projections show little change in average annual precipitation.

Due to the high variability and thereby the high uncertainty, more refined analysis, using EBMUD's new water supply system model and improved data science, will be performed with an approach that looks at extreme shifts that may occur within the precipitation range. The results will then be evaluated to understand the potential impacts and how EBMUD will plan to address those potential impacts. These response actions would build upon the current plan of developing a diversified and resilient portfolio to help adaptively manage for long-term water supply planning.

FIGURE W-2 ANNUAL AVERAGE PRECIPITATION




## 2.4 SCENARIO DEVELOPMENT

For the 2020 UWMP supply-demand analysis, EBMUD evaluated several different scenarios to assess its need for water under potential future conditions. The rationale for developing these scenarios is to capture uncertainty in long-term planning. Traditionally, long-term demand forecasts have been and continue to be used for identifying the timing and magnitude of future water supply needs. However, there is a growing recognition that factors used in making projections are based on assumptions that may be different in the future. Scenarios were developed based on plausible assumptions in both demand and supply availability. Table W-1 shows additional details on how these scenarios were developed and the assumptions that were included in them.

### Base Condition

The base condition scenario represents EBMUD's current operations and assumptions. This scenario uses EBMUD's historic hydrology - with the DPS - to assess the historic water supply against each of the future demands projected in the 2050 Demand Study. In addition to the Mokelumne River supply, it is assumed that EBMUD will receive its requested allocation of CVP supply subject to the M&I Shortage Policy using the modeled yearly CVP allocations provided by USBR[1]. For this scenario, CVP supplies began delivery in May of the first year of drought. The triggers to take delivery of CVP water and implement rationing are followed as outlined in DMP Guidelines.

A Normal Water Year is a year that EBMUD does not need to implement any DMP measures. A Single Dry Water Year is determined to be a year that EBMUD would implement DMP elements, which includes obtaining CVP water deliveries and setting voluntary rationing goal between 0 to 10%.

Year 2 being the second consecutive dry year is determined as a year that EBMUD would implement DMP elements, which includes continuing to obtain CVP water deliveries and setting a mandatory rationing between 10 – 15%.

TABLE W-1 SUPPLY-DEMAND SCENARIOS MODELED BY EBMUD

| SCENARIO | DROUGHT PLANNING PERIOD | ASSUMPTIONS |
|---|---|---|
| UWMP BASE CONDITION | 1976-1978 DROUGHT PLANNING SEQUENCE | CVP SUPPLIES ARE AVAILABLE WHEN NEEDED SUBJECT TO M&I WATER SHORTAGE POLICY AS MODELED BY DWR. |
| HIGH DEMAND | 1976-1978 DROUGHT PLANNING SEQUENCE | HIGH WATER DEMAND CONDITION MODELED THE UPPER END OF THE DEMAND PROJECTION. |
| EXTREME DROUGHT | 1976-1978 DROUGHT PLANNING SEQUENCE | CVP ALLOCATION REDUCED TO 25% IN SECOND AND SUBSEQUENT YEARS OF DROUGHT. |
| FIVE-YEAR HISTORICAL DRY PERIOD | 1987-1992 DROUGHT | MEET LEGISLATIVE REQUIREMENT OF LOOKING AT A FIVE YEAR CONSECUTIVE DROUGHT. |

[1] The Final State Water Project Delivery Capability Report 2019. August 26, 2020.

Year 3 being the third consecutive dry year is determined as a year that EBMUD would implement DMP elements which includes obtaining CVP water deliveries and implementing mandatory rationing of 15%.

### High Water Demand Scenario

The Planning Level of Demand (PLOD) presented in Table W-2 was developed using predictions of changes in land use, climate, and existing customer water demands. However, uncertainty exists in the predictions used to develop the PLOD. To account for this uncertainty in the long-term planning, EBMUD modeled a High Water Demand scenario where the upper end of the demand projection was selected for analysis.

### Extreme Drought Scenario

To reflect what can and did occur during the most recent drought, this scenario looks at a reduced allocation of CVP supplies to 25% in drought Year 2 and 3 of the DPS. As discussed earlier, EBMUD's CVP supply is subject to USBR's M&I Shortage Policy. USBR indicated in that policy that, depending on CVP water supply conditions and operational constraints, it is possible for M&I deliveries to be reduced to below 50%. In 2015, EBMUD only received 25% allocation. Therefore, for this scenario, EBMUD takes CVP water when Stage 2 of the DMP is triggered and assumes that only 25% of CVP allocation is received.

Another constraint that occurred in the most recent drought period was curtailments of water diversions. In June 2014 through the Fall of 2014, and then again in May 2015 and through the Fall of 2015, the State Water Resources Control Board curtailed water diversions by EBMUD and all other post-1914 water rights holders.

The additional flow released downstream in the Mokelumne River due to curtailments in 2014 and in 2015 was 10 TAF and 25 TAF, respectively.

Although it occurred, curtailment is not included in the Extreme Drought Scenario analysis due to the complexity of determining how and when curtailments would be mandated in the future. Consequently, the impacts of curtailments on water supply availability cannot be quantified at this time. However, based on the reduced CVP allocation assumption, EBMUD's total available water supply storage is essentially empty near the end of the second year of a drought period and the entire third year of the drought period. Any additional reduction of available water supply would result in a direct change in the amount of water that is delivered to EBMUD customers and would result in an additional need for water.

### Five-Year Historical Dry Period

Recent updates to the Urban Water Planning Act now require water agencies to assess water supply and demand during a five-year drought. To meet this new requirement, EBMUD looked at the hydrologic record and focused on the 1987-1992 drought period. Base Condition, High Demand, and Extreme Drought scenarios were analyzed for this five-year drought period.

## 2.5 SCENARIO ANALYSIS RESULTS

### Base Condition Scenario Results

EBMUD modeled its system in the UWMP Base Condition Scenario according to the updated DMP guidelines. The 2020-2050 demand projects were modeled against EBMUD's historic 1921-2015 hydrology to determine

**TABLE W-2**

**AVERAGE ANNUAL DEMAND PROJECTIONS BY CUSTOMER USE CATEGORY (MGD)**

| | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| SINGLE-FAMILY RESIDENTIAL | 115 | 117 | 119 | 121 | 125 | 126 | 129 |
| MULTI-FAMILY RESIDENTIAL | 40 | 44 | 48 | 52 | 59 | 63 | 67 |
| INSTITUTIONAL | 17 | 18 | 20 | 21 | 22 | 24 | 26 |
| INDUSTRIAL | 33 | 35 | 35 | 36 | 36 | 37 | 37 |
| COMMERCIAL | 16 | 18 | 19 | 21 | 22 | 24 | 25 |
| IRRIGATION | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| TOTAL | 234 | 245 | 254 | 264 | 277 | 287 | 297 |
| WATER CONSERVATION | -48 | -53 | -58 | -61 | -63 | -65 | -66 |
| NON-POTABLE WATER | -5 | -6 | -6 | -9 | -13 | -13 | -13 |
| PLANNING LEVEL OF DEMAND (ROUNDED) | 181 | 186 | 190 | 194 | 201 | 209 | 218 |

system reliability during normal years, single dry years, and the three-year DPS.

The results of this analysis provided in Table W-3, show that under base condition assumptions, EBMUD can meet customer demand out to 2050 during normal years and single dry years; however, during multi-year droughts, even with customer demand reduction measures in place, EBMUD will need to obtain supplemental supplies to meet customer demands.

## 2.6 Findings from Other Scenarios

All except the five-year drought scenario shows a need for water in the future, but the magnitude of that need varies.

### High Water Demand Scenario Results

With higher water demands, EBMUD's water supplies are reduced more rapidly than in the Base Condition Scenario, and the DMP is triggered sooner, reaching mandatory rationing in Year 2 of the DPS. In Year 3 of the DPS, with the combination of a greater supply deficit and increased demands, there is a significant increase in the need for water. Table W-3 provides the results of the analysis for this scenario, focusing in on Year 3 of the DPS.

### Extreme Drought Scenario Results

The extreme drought scenario did not change significantly from Base Condition because CVP diversions, although reduced in years 2 and 3, were available throughout the drought period analyzed. Figure W-3 shows the results of the supply and demand assessment in year 3 of the DPS for each of the three scenarios evaluated.

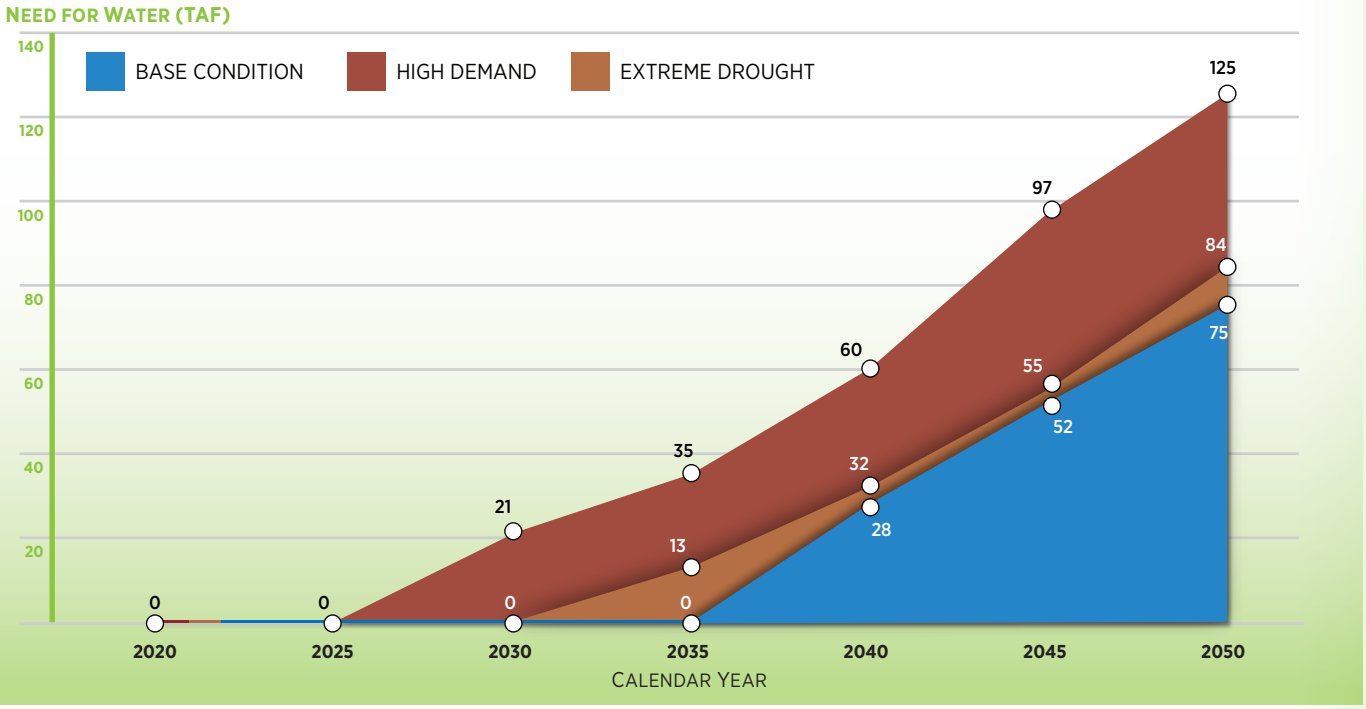
### Five-Year Historical Dry Period Scenario Results

The five-year drought period evaluated is longer than the DPS, however it does not have any single year that is as critically dry as what occurs in 1977 in the DPS. The results show overall there are not many changes between scenarios during the five-year drought. The High Demand scenario creates a consistent average

**Table W-3** **Supply & Demand Assessment, 2020-2050**

| EBMUD Planning Level of Demand (PLOD) | | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|
| Normal Year | Mokelumne Supply (MGD ) | >181 | >186 | >190 | >194 | >201 | >209 | >218 |
| | EBMUD Planning Level of Demand (PLOD) (MGD) | 181 | 186 | 190 | 194 | 201 | 209 | 218 |
| | Need For Water (TAF) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Single Dry Year | Mokelumne Supply (MGD) | 121 | 126 | 129 | 132 | 138 | 144 | 151 |
| | CVP Supplies (MGD) | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | Total Supplies (MGD) | 181 | 186 | 189 | 192 | 198 | 204 | 211 |
| | Voluntary Rationing (%) | 0 | 0 | 1 | 1 | 2 | 2 | 3 |
| | Need For Water (TAF) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Second Dry Year | Mokelumne Supply (MGD) | 82 | 86 | 89 | 92 | 98 | 104 | 111 |
| | CVP Supplies (MGD) | 74 | 74 | 74 | 74 | 74 | 74 | 74 |
| | Total Supplies (MGD) | 156 | 161 | 164 | 167 | 172 | 178 | 185 |
| | Mandatory Rationing (%) | 13 | 13 | 13 | 14 | 14 | 14 | 15 |
| | Need For Water (TAF) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Third Dry Year | Mokelumne Supply (MGD) | 141 | 145 | 146 | 145 | 132 | 118 | 105 |
| | CVP Supplies (MGD) | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | Total Supplies (MGD) | 153 | 157 | 158 | 157 | 144 | 130 | 117 |
| | Mandatory Rationing (%) | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| | Need For Water - Base Condition (TAF) | 0 | 0 | 0 | 0 | 28 | 52 | 75 |
| | Need For Water - High Demand Scenario (TAF) | 0 | 0 | 21 | 35 | 60 | 97 | 125 |
| | Need For Water - Extreme Drought Scenario (TAF) | 0 | 0 | 0 | 13 | 32 | 55 | 84 |

FIGURE W-3 DPS WITH THREE SCENARIOS




reduction in storage compared to Base Condition. The Extreme Drought scenario oscillates from matching Base Condition to results that are similar with the High Demand scenario. Overall, EBMUD's storage has sufficient water supply from 1987 through 1992 during all three potential scenarios – Base Condition, High Demand, and Extreme Drought.

## 3. ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES

EBMUD has developed a process and policies for monitoring, assessing, and responding to annual water supply availability. EBMUD's Water Supply Availability and Deficiency Policy 9.03 (Appendix G) describes its process for evaluating the adequacy of its water supplies every year. Since the early 1980s, EBMUD has been doing annual water shortage assessments to help make informed decisions on water supply management.

### 3.1 WATER SUPPLY AVAILABILITY & DEFICIENCY POLICY

Under the Policy, EBMUD's Board of Directors receives a preliminary Water Supply Availability and Deficiency (WSADR) by March 1 of each year evaluating the adequacy of that year's water supply if the year is anticipated to be a Dry or Critically Dry Year. The Board of Directors adopts a final WSADR in April, which updates the water supply projections based on the April 1st snow survey by DWR. These reports inform decisions by EBMUD's Board of Directors regarding whether to declare a water shortage emergency and implement a drought management program, institute mandatory water use reductions, and/or obtain/pursue supplemental supplies. The 2020 WSADR is provided as a sample in Appendix K. The WSADR will be the basis for the annual water shortage assessment report submittal to DWR as required by California Water Code section 10632.1. DWR has indicated it will begin requiring these submittals by 2022.

### 3.2 DECISION-MAKING TIMELINE & PROCESS

If water supplies are severely depleted, EBMUD's Board of Directors may declare a water shortage emergency and implement the Drought Management Program (DMP), which is designed to provide guidance to minimize drought impacts on its customers while continuing to meet stream flow release requirements and obligations to downstream Mokelumne River water users. Following the declaration of a water shortage emergency, depending on drought stage, EBMUD's Board of Directors may put into effect certain regulations, ordinances, and surcharges. The Board may also

implement the DMP in the absence of a declaration of water shortage emergency if the supplies are moderately depleted or the State mandates water use restrictions. The DMP guided EBMUD in successfully managing water demand during mandatory and voluntary rationing periods in 1976-1978, 1987-1994, 2007-2010, and 2014-2016 when supplies were limited. Table W-4 shows the rationing levels that EBMUD has historically set, starting with the 1976 drought period.

EBMUD begins drought preparations early in the calendar year if there is potential for a water shortage. Figure W-4 shows the timeline of a typical dry year, marking when EBMUD makes key decisions about that year's water supply. As illustrated, EBMUD determines drought actions involving rationing levels, state and federal mandates, and acquiring supplemental supplies based on projections of end of the water year storage. Often EBMUD must make these decisions as hydrologic conditions continue to evolve.

EBMUD monitors water supply conditions and projected runoff into EBMUD reservoirs. Beginning in January, EBMUD assesses the potential for a shortage and, if warranted, convenes EBMUD's Drought Committee. This committee includes senior staff representing key functions that are affected and involved in customer response to drought.

As discussed earlier, the final WSADR is adopted by May 1 of each year. The WSADR is based on EBMUD's projected end of September storage which includes water supplies from local, Pardee and Camanche reservoirs. Based on this report, the Board may declare one of the four stages of drought and activate the DMP depending on the projected end of the water year water storage. The adopted stage of drought helps determine the need for dry year supplemental supplies and customer water use reductions. Depending on the projected level of storage, the Board may also decide to request CVP supplies from USBR and/or secure water transfers. Section 2 above, Water Supply Reliability Analysis, discusses EBMUD's CVP supplies and how these supplies factor into drought planning. EBMUD submits an initial schedule of requested CVP deliveries to USBR by March 1. However, as conditions change, EBMUD may modify the requested quantity or timing of CVP deliveries, up to the maximum quantity allocated by USBR in that particular year or may cancel previously made requests as needed.

Throughout the year, EBMUD continues to monitor the water supply and the impacts on demand of any voluntary or mandatory rationing policy. As warranted by the water supply status and the DMP guidelines, the Drought Committee initiates response activities and sets timelines for these activities. The Drought Committee manages program implementation and monitors and reports on activities and results.

In multi-year droughts, EBMUD begins planning in the fall for the following year's water supply needs in anticipation of continuing dry year conditions. Depending on the level of uncertainty regarding the availability of water transfers and the length of time required to secure permitting and regulatory approvals, EBMUD must begin planning to secure water transfers early if EBMUD anticipates there may be a need the next year. This includes discussions with potential sellers and preparation of necessary environmental reviews that would be required to implement the water transfer.

## 3.3 DATA AND METHODOLOGIES FOR SHORT-TERM DEMAND FORECAST

EBMUD has developed an annual demand projection methodology that is used for operational planning. Water treatment plants produce water demand data that is then used to make correlations with current water year estimates combined with screening historical demand patterns and trends to make a new

**TABLE W-4 HISTORIC RATIONING LEVELS**

| DATE | RATIONING LEVEL |
|---|---|
| 05/25/1976 | VOLUNTARY CONSERVATION, NO LEVEL SET |
| 02/08/1977 | 25% MANDATORY |
| 04/26/1977 | 35% MANDATORY |
| 01/24/1978 | VOLUNTARY CONSERVATION, NO LEVEL SET |
| 04/14/1987 | 12% VOLUNTARY |
| 05/09/1989 | 25% RATIONING |
| 09/12/1989 | 15% VOLUNTARY |
| 02/26/1991 | 15% MANDATORY |
| 04/09/1991 | 15% MANDATORY |
| 04/14/1992 | 15% MANDATORY |
| 03/09/1993 | 10% VOLUNTARY |
| 04/26/1994 | VOLUNTARY CONSERVATION, NO LEVEL SET |
| 05/01/1994 | 15% VOLUNTARY |
| 04/24/2007 | 15% VOLUNTARY |
| 05/13/2008 | 15% MANDATORY |
| 05/12/2009 | 10% VOLUNTARY |
| 02/11/2014 | 10% VOLUNTARY |
| 04/22/2014 | 10% VOLUNTARY |
| 12/09/2014 | 15% VOLUNTARY |
| 04/14/2015 | 20% MANDATORY |

demand projection. The annual projection is then partitioned into projected average monthly demands based on the historical monthly distribution. In recent years, the new annual demand projections take into account water conservation. An assessment on availability of supply takes into account projection of runoff based on DWR's snow survey, Mokelumne River diversions based on water rights terms, agreements, as well as the instream environmental flow requirement and expected diversions by riparian and senior water rights holders. The annual assessment, driven by hydrological conditions and analyzed using a stochastic spreadsheet model, is evaluated against the criteria established in the DMP to make a determination of water availability and if necessary, implementation of any potential response actions. The results of the assessment and all relevant operational decisions are captured in the annual water operations plan. This plan is a dynamic document as hydrologic conditions and forecasts can change significantly through the winter and spring months.

## 3.4 WATER OPERATIONS DURING DROUGHT

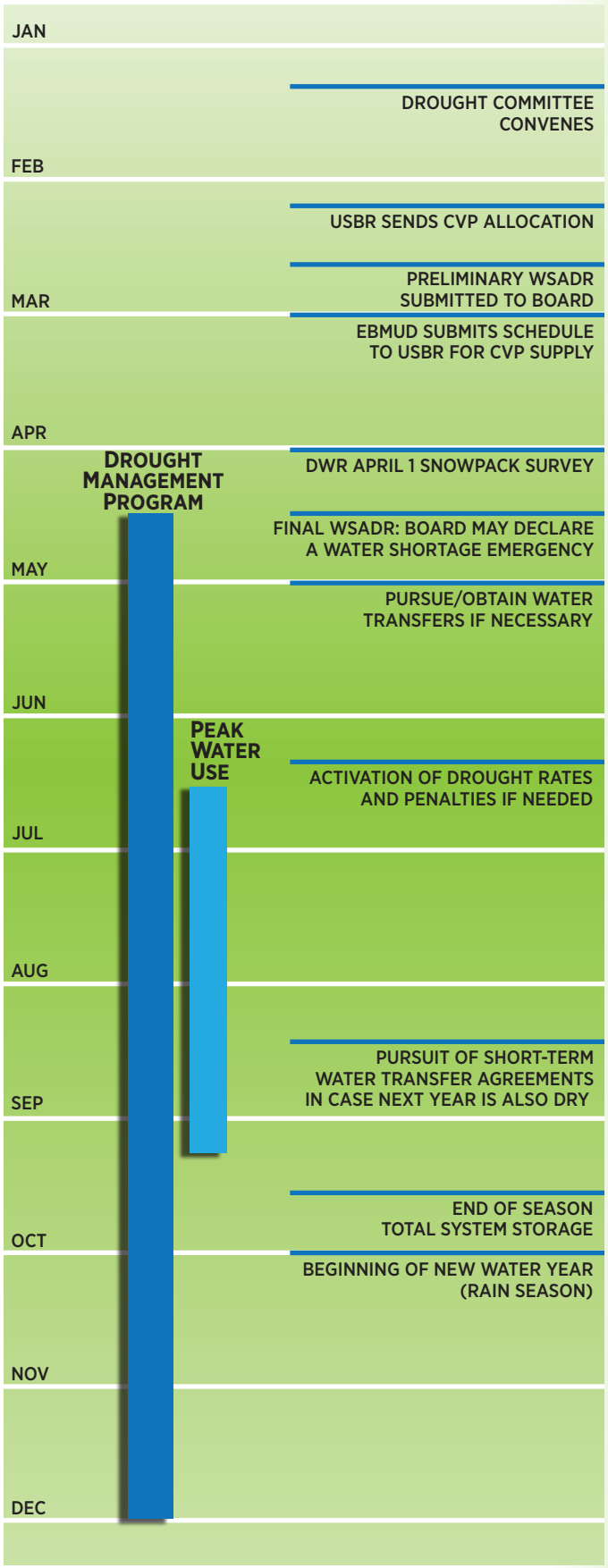
The 2014-2016 drought was the first time the EBMUD delivered water from the Freeport facilities, and valuable lessons were learned regarding water operations. The key findings from the 2016 Freeport Regional Water Project (FRWP) operation are: (1) take delivery of the supply as early as possible in the drought sequence to maximize delivery of the lower-cost drought supply, (2) maximize production at the West of Hills water treatment plants, and (3) manage the terminal reservoirs to maximize available space for storage. These lessons were incorporated into the DMP and operational decision-making processes moving forward.

### Obtaining Dry Year Supply Early

EBMUD's CVP allocation was reduced by 50 percent in the contract year 2014 and by 75 percent in contract year 2015 as the CVP was faced with increasing demands and reduced supplies as the drought continued. EBMUD made up for the reduced allocation by purchasing transfer water in 2015 and by securing options to purchase transfer water for 2016. The transfer water was more expensive than the CVP water and may not have been necessary had CVP water been available. Therefore, EBMUD will maximize delivery of lower-cost drought supply at the start of the drought.

**FIGURE W-4**

**TYPICAL DRY YEAR DECISION MAKING TIMELINE**



### Maximize Production at West of Hills (WHO) Water Treatment Plants

The delivery quantity of dry year supply water can be maximized when the treatment rate of this water matches the delivery rate. When dry year water was delivered at a greater rate than it could be treated, it increased the storage levels in USL and San Pablo reservoirs within the service area. This limited the reservoirs' ability to store runoff and increased the risk of spill.

In 2016, the treatment rates at conventional WTPs could not be maximized, because in-line Orinda WTP needed to operate at a lower rate, which would allow more dry year supply water to be treated at the conventional WTPs. Improvements at Orinda WTP will be completed as a part of the WTP infrastructure improvements project so Orinda WTP can operate at a lower rate so more dry year supply water can be treated at the West of Hills plants. Chapter 4 of the UWMP discusses in more detail the infrastructure improvements project.

### Terminal Reservoir Management

At the start of the 2015 FRWP operation, the dry year supply could only be delivered to USL and San Pablo reservoirs and treated at the associated conventional WTPs. Because the rate of FRWP delivery exceeded the rate of treatment at the conventional plants, terminal reservoir capacity needed to be made available to maximize delivery rates. This was accomplished by operating the Sobrante and USL WTPs in advance of the FRWP delivery so that San Pablo and USL reservoirs began the FRWP operation at the lower end of their operating ranges. This practice will be continued in future FRWP operations.

## 4. WATER SHORTAGE LEVELS AND SHORTAGE RESPONSE ACTIONS

EBMUD's Drought Management Program provides a framework to manage customer demand and pursue a diversified portfolio to reach a goal of providing 85 percent reliability for customers in EBMUD's service area while continuing to meet all stream flow obligations on the lower Mokelumne River. The DMP guided EBMUD in managing demand and supply during the 2014-16 drought when mandatory and voluntary rationing was imposed, and water supplies were limited. During that recent drought, EBMUD faced unanticipated constraints and updated and implemented measures to assist with demand and supply management. The DMP was revised to reflect lessons learned and actions that were taken.

EBMUD performed modeling to better understand the effects of various actions on operations, in-stream flow requirements, and customer rationing. The results provided a basis to develop the revised drought stages and associated response actions as outlined in Figure W-5.

EBMUD declares different drought stages based upon projected end-of-September total system storage with the Normal Stage corresponding to a normal water year condition in which no demand or supply management measures need to be implemented. Each stage thereafter is associated with recommendations for requesting CVP water or additional dry year water supplies that could be obtained in combination with the level of customer demand reduction that may be requested.

Table W-5 shows the link between the drought stages and rates, penalties, and regulations in effect. Beginning in Stage 2, EBMUD may apply a drought surcharge to help recover costs, as discussed in more detail in the Financial Consequences of WSCP. In Stages 3 and 4, the Excessive Use Penalty Ordinance and Section 28 of EBMUD's Regulations Governing Water Services may come into effect.

Table W-6 shows the types of programs and actions that EBMUD might undertake at each stage of drought. The triggers to implement water shortage response action are defined by the TSS.

The availability of water to EBMUD may be impacted depending on the nature of an emergency. In such cases, EBMUD would determine the applicable shortage response actions as outlined in this WSCP.

**TABLE W-5 DROUGHT MANAGEMENT PROGRAM GUIDELINES**

| STAGE | RATE/PENALTY IMPACTS | REGULATIONS IN EFFECT OR POTENTIALLY ENACTED |
|---|---|---|
| 0 NORMAL | NORMAL RATES | SECTION 29 |
| 1 MODERATE | NORMAL RATES | SECTION 29 |
| 2 SIGNIFICANT | NORMAL RATES<br>DROUGHT SURCHARGE | SECTION 29 |
| 3 SEVERE | NORMAL RATES<br>DROUGHT SURCHARGE<br>EXCESSIVE USE PENALTY | SECTION 28<br>SECTION 29<br>EXCESSIVE USE ORDINANCE |
| 4 CRITICAL | NORMAL RATES<br>DROUGHT SURCHARGE<br>EXCESSIVE USE PENALTY | SECTION 28<br>SECTION 29<br>EXCESSIVE USE ORDINANCE |

Notes:
a Drought Surcharges will reflect the most recently adopted Proposition 218 rates.
b Under Stages 3 or 4, the Board would declare a water shortage emergency and enact Section 28 to implement water conservation measures. Penalties under the Excessive Use Ordinace would apply.

Water Code Section 10632 requires water shortage contingency plans to provide water supply shortage levels at 10, 20, 30, 40, 50, >50 percent thresholds. Urban water suppliers with existing water shortage contingency plans may meet this requirement by cross referencing the water utility's existing water shortage stages to the State's six standard water shortage levels.

In general, EBMUD begins to bring in supplemental supply water and requests customers to reduce demand when the total operational storage is reduced by almost one-third.

Table W-7 presents EBMUD's water shortage levels cross referenced with the State's new standardized water shortage levels. EBMUD's water shortage levels for this cross-referencing is determined by the total operational storage[1] that is available.

It is difficult to quantify the reduction in gap between supplies and demand due to the implementation of the response actions as outlined in Table W-6. The response actions would be adjusted based on the level of rationing that is achieved and to meet EBMUD's policy of providing 85% reliability to its customers. At each stage, EBMUD will consider augmenting its supplies as outlined in Figure W-5 with the quantities determined based on antecedent conditions and projected demand. The response actions to close the gap between supply and demand as well as the augmented supplies needed that year are outlined in the annual water supply availability assessments.

[1] EBMUD's Total System Storage (TSS) is defined in the contract with U.S. Bureau of Reclamation as the total reservoir capacity for the upcountry and terminal reservoirs, which is approximately 771 Thousand Acre-Feet (TAF). The Total Operational Storage (TOS) is defined as the accessible water supply volume in the upcountry and three terminal reservoirs, thereby excluding: dead storage in all reservoirs, 20 TAF of water (referred to as "gainsharing" water per the FERC license) allocated for environmental use only, and Chabot & Lafayette Reservoirs which are currently disconnected from the distribution system. The TOS results in total accessible water supply volume of approximately 697 TAF.

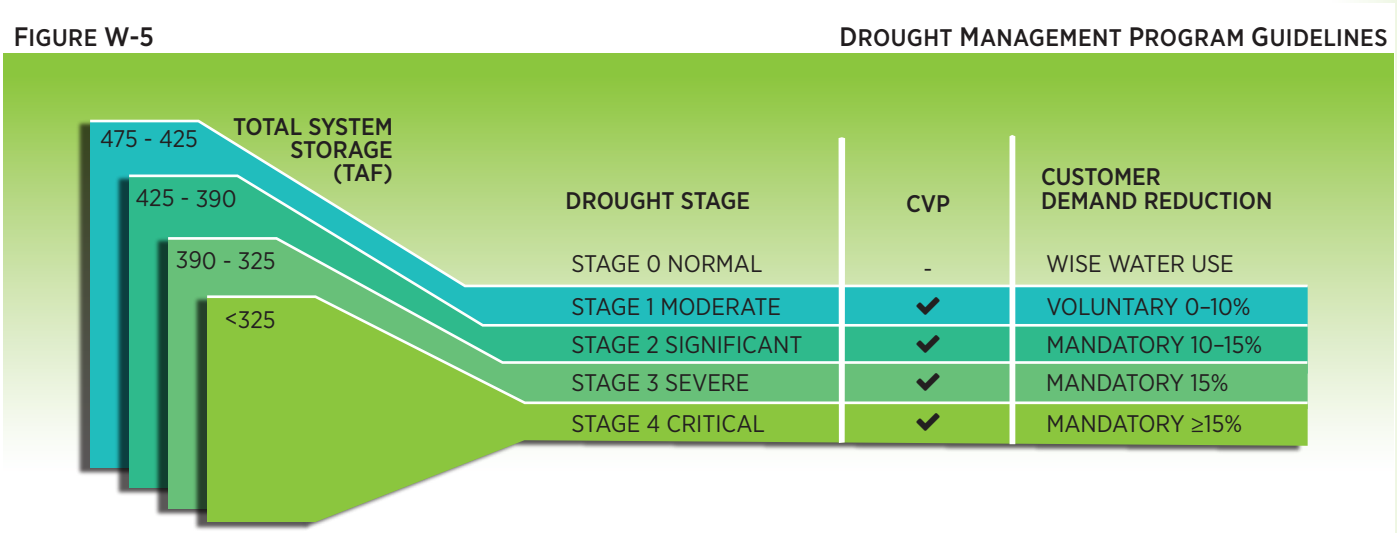
## 4.1 WATER SUPPLY SHORTAGE MITIGATION

EBMUD has invested extensively in preparations for water supply shortages. In addition to encouraging conservation as discussed in Chapter 6, EBMUD has developed a portfolio of water supply projects to help supplement any shortage in its water supply. These projects, described in Chapter 4, will not only provide customers with relief from frequent and severe water rationing during multi-year droughts, but will also help EBMUD respond to other adverse situations that lead to water shortages.

EBMUD has also invested in projects to provide operational flexibility and improve its ability to recover following an emergency. However, during extreme and catastrophic water shortage conditions, EBMUD may need to explore short-term, temporary options to augment its supply. Temporary dry year supplemental water supply options include:

- trucking recycled water for customers for approved uses;
- drawing from reserve supplies (terminal reservoir standby storage);
- pursuing emergency transfers or exchanges.

**FIGURE W-5** **DROUGHT MANAGEMENT PROGRAM GUIDELINES**




TOTAL SYSTEM STORAGE includes Pardee, Camanche, Upper San Leandro, Briones, Lafayette, Chabot, and San Pablo Reservoirs

CVP - Central Valley Project

**TABLE W-6 DROUGHT MANAGEMENT PROGRAM ELEMENTS BY STAGE FOR TSS SCENARIO**

| DROUGHT STAGE | DROUGHT PROGRAM ELEMENTS CONSIDERED |
|---|---|
| STAGE 1 MODERATE VOLUNTARY 0 – 10% RATIONING | ESTABLISH VOLUNTARY WATER USE REDUCTION GOALS AND DETERMINE USE RESTRICTIONS |
| | INITIATE A PUBLIC INFORMATION CAMPAIGN TO EXPLAIN THE WATER SUPPLY SITUATION AND CUSTOMER RESPONSIBILITIES |
| | OUTREACH AND EDUCATION MAY INCLUDE EBMUD'S WEBSITE, SOCIAL MEDIA, MEDIA OUTREACH, ADVERTISING, WORKSHOPS AND EVENTS, BILL INSERTS AND BILL MESSAGING |
| | INITIATE COMMUNITY WATER WASTE HOTLINE AND ONLINE WATER WASTE REPORTING |
| | ISSUE UP TO 50,000 SINGLE FAMILY RESIDENTIAL (SFR) HOME WATER REPORTS |
| | PROVIDE COMMERCIAL AND RESIDENTIAL LANDSCAPE WATER BUDGETS TO UP TO 5,000 ACCOUNTS |
| | PROVIDE CONSERVATION AUDITS AND WATERSMART HOME SURVEY KITS |
| | ISSUE UP TO 5,000 INDOOR PLUMBING FIXTURE AND APPLIANCE REBATES |
| | ISSUE UP TO 5,000 OUTDOOR LANDSCAPE & IRRIGATION REBATES |
| | CONDUCT WATER AUDITS |
| | PROVIDE UP TO 5,000 FREE WATER SAVING DEVICES |
| | EXPAND WATER LOSS CONTROL PROGRAM (E.G., ACOUSTIC LOGGERS, LEAK DETECTION CREWS) |
| STAGE 2 SIGNIFICANT MANDATORY 10 – 15% RATIONING | IN ADDITION TO ELEMENTS OF STAGE 1: |
| | APPLY STAGE 2 DROUGHT SURCHARGE |
| | CONTINUED OUTREACH AND EDUCATION |
| | PROVIDE ONLINE EBMUD STORE ORDERING (RESTAURANT AND HOTEL TENT CARDS, STICKERS) |
| | INCREASE SFR HOME REPORTS TO 75,000 HOUSEHOLDS |
| | INCREASE COMMERCIAL AND RESIDENTIAL LANDSCAPE WATER BUDGETS TO 25,000 ACCOUNTS |
| | ISSUE UP TO 10,000 FREE WATER SAVINGS DEVICES |
| STAGE 3 SEVERE MANDATORY 15% RATIONING | IN ADDITION TO ELEMENTS IN STAGE 2: |
| | APPLY STAGE 3 DROUGHT SURCHARGE |
| | ADVANCED MEDIA OUTREACH / RESPONSE |
| | ADVANCED CUSTOMER OUTREACH & EDUCATION |
| | CONSIDER WATER SAVING CAMPAIGNS, CHALLENGES |
| | CONSIDER SUPPLEMENTING EDUCATION AND OUTREACH WITH WEBSITE TOOLS AND INFORMATION; OUTDOOR, RADIO, PUBLICATIONS, AND ONLINE ADVERTISING; DROUGHT THEATERS OR OTHER EDUCATION FOR CHILDREN; CONTESTS AND PLEDGES; PROMOTIONAL ITEMS, SIGNS, DROUGHT NEWSLETTERS, CUSTOMER OUTDIAL MESSAGES, POSTCARD MAILINGS, ETC. |
| | INSTITUTE EXCESSIVE USE PENALTY FOR SFR CUSTOMER WITH USE > 60 CCF/MONTH |
| | INITIATE SUPERSAVER RECOGNITION PROGRAM |
| | INCREASE SFR HOME REPORTS TO 100,000 HOUSEHOLDS |
| | INCREASE COMMERCIAL AND RESIDENTIAL LANDSCAPE WATER BUDGETS TO 50,000 ACCOUNTS |
| | ISSUE UP TO 7,000 INDOOR PLUMBING FIXTURE AND APPLIANCE REBATES |
| | ISSUE UP TO 8,000 OUTDOOR LANDSCAPE & IRRIGATION REBATES |
| | ISSUE UP TO 15,000 FREE WATER SAVINGS DEVICES |
| | PROVIDE FIELD ENFORCEMENT OF REGULATIONS AND WATER USE RESTRICTIONS |
| STAGE 4 CRITICAL MANDATORY ≥15% RATIONING | IN ADDITION TO ELEMENTS IN STAGE 3: |
| | APPLY STAGE 4 DROUGHT SURCHARGE |
| | INSTITUTE EXCESSIVE USE PENALTY FOR SFR CUSTOMER WITH USE > 40 CCF/MONTH |
| | INCREASE SFR HOME REPORTS TO 325,000 HOUSEHOLDS |
| | INCREASE COMMERCIAL AND RESIDENTIAL LANDSCAPE WATER BUDGETS TO 150,000 ACCOUNTS |
| | ISSUE UP TO 20,000 FREE WATER SAVINGS DEVICES |

**TABLE W-7 SHORTAGE LEVELS CROSS-REFERENCE WITH STATE'S SHORTAGE STAGES**

| EBMUD DROUGHT STAGE | EBMUD SUPPLY SHORTAGE | STATE SHORTAGE LEVELS |
|---|---|---|
| 0 | NORMAL | 1–4 |
| 1 | MODERATE (43%) | 5 |
| 2 | SIGNIFICANT (50%) | 5 |
| 3 | SEVERE (55%) | 6 |
| 4 | CRITICAL (64%) | 6 |

## 4.2 WATER RESERVE DRAWDOWN

It is EBMUD's policy to operate its terminal reservoirs to maintain enough standby storage to meet rationed customer demand for 180 days, in case the Mokelumne River supply is disrupted. After the emergency ends, the Mokelumne River supply is returned to service soon as practicable and within the regulatory framework to refill terminal reservoirs to meet minimum standby storage levels while also supplying inline plants. Emergency supplies through interties with the Contra Costa Water District (CCWD), San Francisco Public Utilities Commission (SFPUC), Dublin San Ramon Services District (DSRSD), and City of Hayward (Hayward) can be used during an emergency to reduce demand on the local reservoirs or used following an emergency to help EBMUD's recovery in re-establishing storage levels.

## 4.3 INTERTIES & AGREEMENTS FOR TRANSFERS & EXCHANGES

EBMUD continues its efforts to formulate and to support mutually agreeable actions, including the development of interties that improve water quality and supply reliability for the Bay Area. As a partner agency in providing mutual aid, EBMUD has limited, short-term water sharing agreements for emergencies with several neighboring agencies, including SFPUC, DSRSD, Hayward, and CCWD. Transfers/exchanges would be made under these agreements only for a short-term period of one year or less. These agreements provide an alternate source of water during planned facility outages and for emergency mutual aid to the parties but would not be used in situations involving a shortage of water due to high demand or drought. Figure W-6 presents a map of these emergency interties for transfers/exchanges in EBMUD's service area and lists the agreed upon quantities for transfer/exchange with water service agencies during emergencies.

EBMUD, the Freeport Regional Water Authority, County of Sacramento, and Sacramento County Water Agency entered into a long-term non-emergency agreement for water delivery with CCWD and separately with Valley Water as part of the negotiated settlement of the Freeport Regional Water Project (FRWP) EIR/ EIS. These agreements are also discussed in more detail below.

In the future the Freeport facility may also provide regional reliability benefits, as EBMUD could partner with other Bay Area water agencies to help them receive water that may otherwise be inaccessible to them given their own system constraints. To accomplish this, EBMUD could temporarily use the Freeport Project to deliver water to its treatment and distribution system in the East Bay, when capacity is available, on behalf of other local agencies, and existing interagency interties could be used to deliver the water to its ultimate destination.

### SFPUC-Hayward-EBMUD Agreement for Emergency Water Services

In 2002, EBMUD formed a regional partnership with SFPUC and Hayward to construct the SFPUC-Hayward-EBMUD Intertie Project. This project increases water service reliability by allowing EBMUD and SFPUC to obtain a short-term water supply during emergencies or planned outage of critical facilities. Up to 30 MGD could be provided to either EBMUD or SFPUC and Hayward through the intertie. The project included a new pump station and 1.5 miles of pipeline in Hayward, with minor improvements in EBMUD's and SFPUC's water systems. Construction was completed in 2007.

### Agreement for Emergency Water Services with City of Hayward

EBMUD has two locations earmarked for connecting smaller interties (2.8 and 5.7 MGD) with Hayward's water system under a 2000 agreement, and three additional sites for treated water transfer through fire hydrants (2.1 MGD each) under a 1994 agreement. Interconnections are made only for a short-term basis by mutual consent and under emergency conditions and are not substitutes for standby or reserve sources of water for normal operations. Hayward's and EBMUD's personnel would connect the systems during a declared emergency in accordance with the conditions outlined in the agreements. Supplied

water would be metered, and expenses would be billed to each agency as outlined in the agreements.

### Agreement for Emergency Services with DSRSD

A 1990 agreement with DSRSD identified two locations available for transferring treated water between the two agencies, at up to 1.4 MGD at one location and up to 0.7 MGD at the second location. A 2007 amendment to the 1990 agreement with the DSRSD added a third 1.4 MGD DSRSD intertie on Dougherty Road connected in 2007. The three intertie locations are shown in Figure W-6. The process and billing are outlined in an agreement similar to that with Hayward.

### Agreements with CCWD

In 2002, EBMUD executed an agreement with Contra Costa Water District (CCWD) for emergency services. Per the agreement, intertie locations can be added, removed, or modified as mutually agreed upon by each agency. Currently two intertie locations are identified. Up to 1 MGD could be provided to CCWD at one location. The second location could allow transfer of up to 10 MGD to CCWD and up to 8 MGD to EBMUD. One agency will provide the other with water quantities that will reasonably meet needs during the emergency without endangering the supplying agency's system and overall supplies.

### Agreement with SCVWD

In 2003, Freeport Regional Water Authority and SCVWD (now Valley Water) signed a settlement agreement in which EBMUD would make available to Valley Water 6500 AF of its CVP allocation during the first year of its 3-year consecutive drought cycle. In exchange, Valley Water would return to EBMUD the equivalent amount of water in the second or third consecutive year of drought. To date there is no implementation agreement.

## 4.4 Demand Reduction Method

During Water shortage emergencies, many of the programs and projects described in EBMUD's water conservation program (see Chapter 6) are expanded to reduce demand. Implementation of a drought surcharge and excessive use penalties and application of water use restrictions also help EBMUD reduce demand during declared droughts. All of these are discussed in Compliance and Enforcement section.

EBMUD has also developed water efficiency requirements for new water service. Section 31 of EBMUD's Regulations Governing Water Service to Customers (Appendix G) outlines the water efficiency measures required for new and expanded service. Applications for standard service require approval from EBMUD's Water Conservation Division. Section 31 sets water efficiency requirements for indoor fixtures including toilets and urinals, showerheads, faucets, and appliances. For outdoor water use, Section 31 includes requirements for the design and installation of landscaping and irrigation systems. Section 31 requires that ornamental turf areas shall be limited to no more than 25% of the total landscaped area, and that non-turf areas shall be native or climate- appropriate species. It also sets efficiency requirements for irrigation systems. Applicants are required to meet the requirements of local and State regulations including the Model Water Efficient Landscape Ordinance (MWELO). In addition, EBMUD requires weather-based controllers for all premises with 500 square feet or more of new irrigable landscape area. Depending on the size of the area to be irrigated, a dedicated irrigation meter may be required.

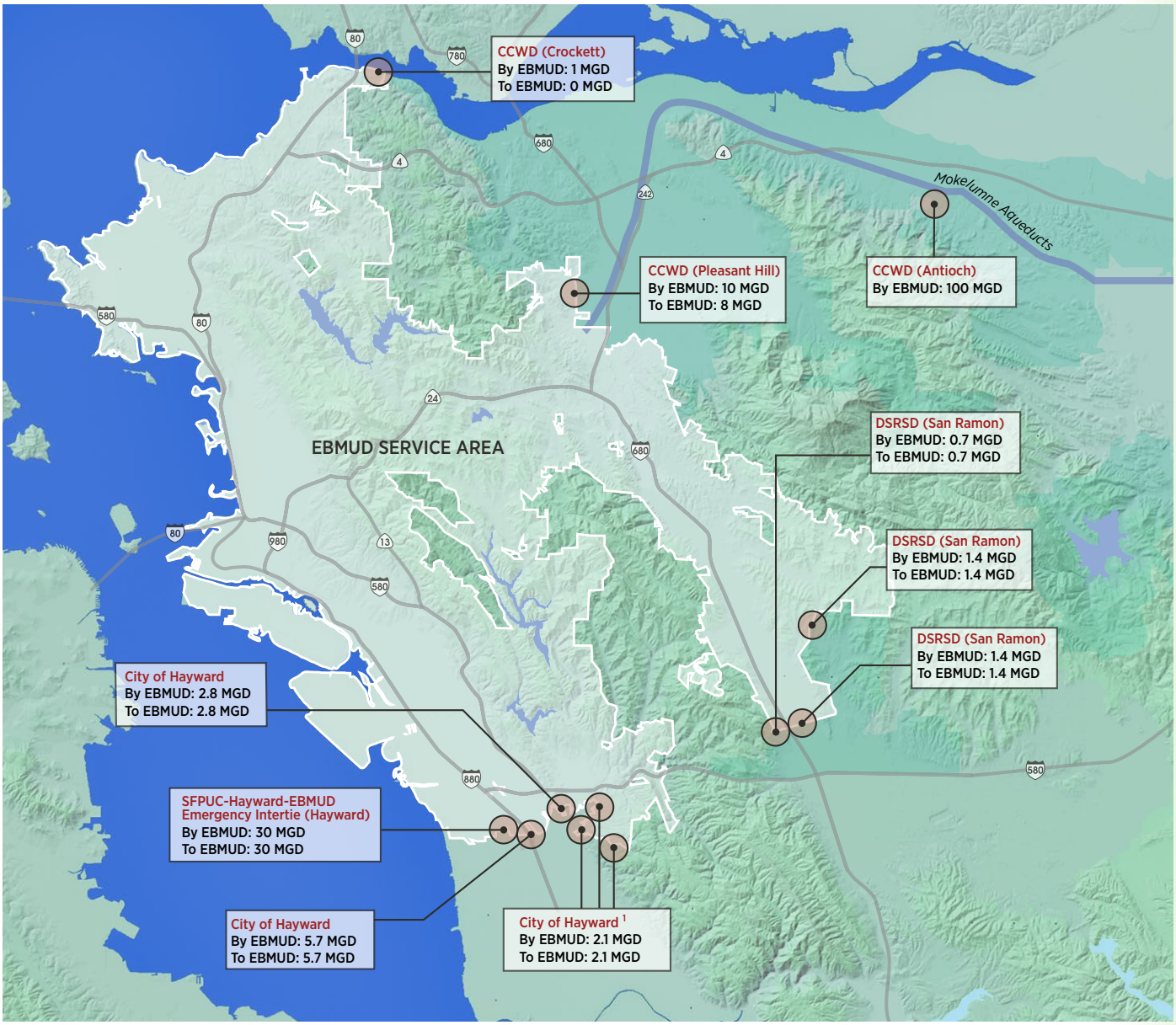
### Water Consumption Reduction

EBMUD partners with its customers to cut back water use in significant and sustained ways during water shortage emergencies. EBMUD's new system of drought surcharges, combined with the existing tiered-volume rate structure for single family residential customers, provides a financial incentive for reducing water consumption. In past droughts, EBMUD has expanded incentive and rebate programs to encourage greater water use efficiency. EBMUD's website has also become increasingly important for educating customers about methods for conserving and providing tools to assist them in meeting their water savings goals.

During the 2008-2010 drought, EBMUD developed a system whereby customers were given a particular allotment of water based on their past use. Customers who exceeded this allotment were charged an additional surcharge. In the 2014-2015 drought, EBMUD focused its efforts on education, public outreach, and providing information and tools to help customers conserve and did not implement water rationing with water allotments. In the future, EBMUD will consider community input and outreach approaches that align with the specific needs during that drought.

FIGURE W-6

EMERGENCY INTERTIES FOR SHORT-TERM TRANSFERS & EXCHANGES
With Maximum Flows




[1] Emergency Water Transfers/Exchanges to City of Hayward are supplied through connections between fire hydrants instead of through dedicated constructed appurtenances.

## Water Use Reduction Targets

EBMUD's DMP recommends specific levels of voluntary or mandatory rationing based on the projected end of year total system storage. EBMUD's goal is to provide 85% reliability to customers.

EBMUD's ability to limit mandatory water use reductions to 15 percent depends upon the extent to which supplemental supplies are available and whether/how much USBR reduces CVP allocations in a given year. Supplemental supplies and CVP supplies may not always be available when needed as indicated by recent events. In 2014, USBR limited EBMUD to 50 percent of its CVP allocation, and in 2015 USBR was only able to provide EBMUD with a 25 percent CVP allocation. In extraordinary circumstances, such as when CVP or other supplies are minimally available or unavailable during an extreme drought, EBMUD may need to increase the rationing level above 15 percent in order to ensure adequate supplies the current and next year. For example, in 2015, EBMUD's Board declared a mandatory 20% water use reduction target due to extraordinary circumstances at the time and to meet the State's imposed water use reduction mandate.

A 15 percent reduction overall can be achieved by applying different levels of conservation for each

customer category. Table W-8 lists example customer category reduction goals that EBMUD estimates would be required to achieve the district-wide rationing target.

The reduction goals are based on an analysis of the total demand of each customer category, the outdoor water use of each category, and the potential aggregate economic impact on the service area. Several factors are considered: drought management principles; analysis of historical consumption; and likelihood that customers in each category can achieve their water use reduction goals through indoor and outdoor demand management. The distribution of rationing varies across customer categories, and the actual savings from each customer category could vary due to several factors, including methods of implementation and enforcement. Key assumptions and data for setting customer goals are:

1. Balancing water use reductions across customer categories based on four principles:
   - emphasizing reductions in non-essential uses of water;
   - avoiding and limiting impacts to the economy and the environment;
   - safeguarding water supplies for uses that meet public health needs; and
   - maintaining equity in water use reduction expectations.
2. Evaluating each customer category's actual historical consumption:
   - determining the percent of total water demand by customer category, and
   - determining the percent of indoor and outdoor demand by customer category.
3. Gauging customer response to water savings measures:
   - assessing the likelihood of achieving the potential savings from each measure;
   - assessing research on customer ability and willingness to comply with measures; and
   - considering previous EBMUD experience in managing and monitoring measures.

**TABLE W-8 EXAMPLE OF CUSTOMER CATEGORY REDUCTION GOALS**

| CUSTOMER CATEGORY | REDUCTION GOAL[1] |
|---|---|
| SINGLE-FAMILY RESIDENTIAL | 19% |
| MULTI-FAMILY RESIDENTIAL | 11% |
| COMMERCIAL | 12% |
| INSTITUTIONAL | 8% |
| INDUSTRIAL | 5% |
| IRRIGATION | 30% |
| TOTAL CUSTOMER DEMAND RATIONING GOAL | 15% |

1 Annual average goals estimated to achieve 15% reduction of year 2040 total demand.

## 4.5 EMERGENCY RESPONSE PLAN

In addition to maintaining its own emergency preparedness program, EBMUD coordinates with local, regional, state, and federal partners to ensure readiness in the event of an emergency.

Consistent with EBMUD Policy 7.03 (Appendix G), EBMUD maintains an active emergency preparedness and business continuity program and coordinates emergency responses with other public and private organizations. EBMUD's Security and Emergency Preparedness Section coordinates and publishes the EBMUD Emergency Operations Plan (EOP), which describes the internal organizational structure used in the response to all emergencies, including regional power outages and earthquakes. EBMUD reviewed and updated the EOP in 2019. An update to the Emergency Response Plan for EBMUD's FERC regulated dams was done in early 2020 to include, among other revisions, the FERC Emergency Action Plan Support Team in the EBMUD Emergency Operations Team (EOT). The EOP was also updated to formally designate the Director of Engineering and Construction as the Chief Dam Safety Officer, along with an alternate. EBMUD's EOP ensures effective coordination with local and state emergency management agencies in response to emergency conditions. EBMUD complies with the California Standardized Emergency Management System (SEMS), which includes all National Incident Management System (NIMS) guidance for federal emergency operations plans. EBMUD also prepared business continuity plans for all key departments and functions in coordination with EOP actions. In response to an emergency incident or an event requiring significant planning for a potential emergency, a well-trained team of District personnel assigned to the EOT will carry out the five SEMS functions (management, operations, planning, logistics, and finance; plus a public communication function added by EBMUD in 2014). Operating under the EOP, the Emergency Operations Director and

Section Chiefs establish response priorities based on the nature of the emergency, focusing on actions to address life safety concerns first, then incident stabilization, and finally protection of property and restoration of normal operations. The Operations Section Chief also works with the Planning Section to determine the needs for mutual aid/ assistance resources, the scope of work to be done, and the planning objectives to accomplish this work.

In October 2018, the America's Water Infrastructure Act (AWIA) Section 2013 (A-H) was signed into law. AWIA requires community drinking water systems to develop or update risk and resilience assessments (RRAs) and emergency response plans (ERPs). AWIA specifies the components each of the plans must address and establishes deadlines by which water systems must certify to EPA completion of the plans. Based on the number of District customers, EBMUD complete its initial RRA in September 2020. These plans will need to be re-certified every 5 years. AWIA does not specify any standards for the RRA or the ERP, but recommends the use of standards, such as the AWWA J100-10, to facilitate preparation of the RRA and ERP.

## 4.6 Mutual Assistance and Coordination with Other Agencies

Effective coordination with state and local agencies is critical in responding to a catastrophic event that interrupts water supplies. As one of the eight major water suppliers in the San Francisco Bay Area, EBMUD recognizes, as do the other agencies, that in the event of a regional catastrophe, assistance from other local agencies is not guaranteed. To mitigate the risk of limited access to local mutual aid, EBMUD entered into a Multi-Agency Mutual Assistance Agreement with the Los Angeles Department of Water and Power (LADWP) and with the Las Vegas Valley Water District (LVVWD) to mutually supply as much of the requested resources as possible to the other agency, if possible, if a disaster impacts only one of the agencies. EBMUD is also a member of the California Water Agency Response Network (CalWARN), which serves as a central point of coordination through the Omnibus Mutual Aid/Assistance Agreement with water agencies throughout the state. The signatories may be called upon during an emergency to provide available resources.

## 4.7 Coordination Among Local, County, Regional, State, and Federal Governments

EBMUD and other special districts, such as schools and parks, are considered local government agencies, which coordinate resources and manage operations in an emergency at the local level and serve as an interface with their local Operational Area Offices of Emergency Services. In California, each county is responsible for maintaining these operational area offices. The state is divided into six regions, each of which is responsible for maintaining a Regional Emergency Operations Center (REOC). The State of California, which regulates SEMS, maintains the State Office of Emergency Services that oversees these REOCs and the Operational Areas, working out of the State Operations Center in Mather, California.

SEMS was mandated by Government Code section 8607 following the 1991 East Bay Hills Firestorm. Reimbursement for claims filed after a disaster requires that all EBMUD emergency plans, procedures, and training follow the SEMS regulations, and that they directly correlate with the EOP. The SEMS in California and the guidelines for training for all emergency responders roll up from the states to the federal government under the national response framework. Each state has a Principal Coordination Official assigned by the federal government to coordinate planning and response under the Emergency Support Functions established by the federal government.

In 1995, EBMUD partnered with 14 federal, state, and public agencies to develop procedures for obtaining potable water in an emergency. In 1996, this California Potable Water Task Force published a Multi-Agency Emergency Response Procedures for Potable Water Procurement and Distribution report. In 2007, EBMUD spearheaded the efforts of a working group that includes the eight largest water agencies in the Bay Area, Operational Area, and Bay Area Regional Emergency Management Agencies to update this document. Published in its second edition and formally adopted by the State of California for the first time, this document allows water agencies to request assistance from city, county, or regional SEMS response levels to acquire and distribute potable water during a state or local emergency in California. The Emergency Drinking Water Procurement document was last updated

in 2014. This helps water agencies that sustain heavy damage to focus on rebuilding and returning their system to a dependable level of service.

## 4.8 SEISMIC RISK ASSESSMENT AND MITIGATION PLAN

New Water Code Section 10632.5 requires the 2020 UWMP to include a seismic risk assessment of the vulnerability of the water system facilities. Section 10632.5 also allows an urban water supplier to comply with this requirement by submitting a copy of its most recently adopted local hazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390), if that plan addresses seismic risk. In 2018, consistent with the Disaster Mitigation Act of 2000, EBMUD adopted its Local Hazardous Mitigation Plan (LHMP). The chapter on Identified Hazards builds on available historical data and establishes detailed profiles for each of the primary hazards impacting EBMUD's service area: five related to earthquakes (faulting, shaking, earthquake induced landslides, liquefaction, and tsunami), and four related to weather (flooding, landslides, wildfires, and drought).

The Vulnerability Assessment chapter summarizes the risks to each facility type. In particular, it assesses the exposure and vulnerability of the identified hazards and summarizes the impact and estimated loss by facility type. These risk assessments collectively contribute to the development, adoption, and implementation of a meaningful and functional mitigation strategy based on accurate background information.

The Mitigation Goals, Objectives, and Actions chapter describes the specific mitigation actions, capital improvements, and other measures EBMUD has undertaken and/or will undertake to address the identified risks for each facility type.

The 2018 LHMP executive summary is located in Appendix I. The comprehensive LHMP is available on EBMUD's website at ***www.ebmud.com/files/8916/1194/8548/EBMUD_2018_LHMP.PDF***

## 5. COMMUNICATION PROTOCOLS

During a water shortage emergency, EBMUD implements a public education program to inform the public and uses various methods and tactics to promote water use reductions and improved efficiencies. The campaign explains the potential impacts of a water shortage, the water supply status, methods to reduce water consumption, potential excessive use penalties, EBMUD actions, and customer responsibilities. The campaign typically highlights specific EBMUD programs and services to help customers reduce their water use.

At the onset of a water shortage emergency, EBMUD develops a detailed Drought Communication Plan (DCP) to provide information to customers, public officials, and other stakeholders. The specific details and messages are tailored to the particular drought situation. Components of an effective DCP include a set of well-defined, focused key messages and an action plan detailing all communication activities. The DCP outlines general and targeted communication methods; general communication methods focus on creating a strong education campaign with broad reach, while targeted communication methods focus on particular customers or sectors. General communication methods include media outreach, creating outdoor and other advertising, expanding stakeholder outreach, providing information on the web, producing bill inserts and messages, sending direct mail to public officials, briefing key community leaders and officials, and providing information through the customer contact center. Targeted communication methods can include direct contact with high-volume water users, proactively offering more support to customers through conservation training and tools and increasing EBMUD's interactions with customers and customer engagement about their water use. In some previous, statewide droughts, EBMUD has also benefited from "earned" media when statewide messaging and advertising reaches EBMUD customers.

Following are additional details on some of the general and targeted communications methods that EBMUD has employed in previous droughts.

- Advertising campaigns throughout the EBMUD service area broadcast conservation messages on radio and cable television, local newspapers and magazines, bus exteriors, transit shelters and EBMUD billboards. EBMUD has also participated in regional advertising campaigns on radio and television when the messages were consistent with EBMUD's and donated billboard space for the statewide campaign. Campaign messages included appreciation for customer conservation, continued encouragement to save water by fixing leaks and installing efficient outdoor landscape irrigation and using online tools to understand and curb water use.
- EBMUD invests in resources and tools to support customer contacts and customer billing functions to ensure a continuous level

of quality customer service during a water shortage. Drought periods increase the volume of calls to EBMUD's customer Contact Center, Field Services, Water Conservation, Customer Services Support, and Public Affairs divisions. EBMUD ensures adequate staffing to respond to customers' questions and requests for assistance.

- EBMUD's website has become an increasingly important tool for disseminating information to customers and the media during drought periods and EBMUD's social media presence provides another tool to communicate to customers about drought.
- EBMUD initiates significantly more direct customer contacts and responds to significantly more inquiries from customers. Water conservation and field services staff distribute drought messages and water savings devices, encourage water savings, assist customers in changing their water use, inform customers about voluntary program requirements, and enforce mandatory requirements.
- EBMUD has used "out-dial" calls and direct mail to alert customers to the start of the drought program and to request curtailed water use during especially prolonged hot weather.
- EBMUD reaches out to civic, community, nongovernmental and business groups, homeowner associations, nurseries, schools, trade organizations, and local officials and also conducts workshops on water conservation topics, as discussed in Chapter 6. This work expands during droughts. EBMUD informs local stakeholder groups and seeks their assistance in communicating with their constituents, which generates a multiplier effect as they share the information with additional customers.

# 6. CUSTOMER COMPLIANCE AND ENFORCEMENT

## 6.1 WATER USE RESTRICTIONS

EBMUD's Regulations Governing Water Service to Customers, included in Appendix G, include various restrictions on water use and prohibitions on the waste of water. Section 29, "Water Use Restrictions," is continuously enforced. Section 28, "Water Use During Water Shortage Emergency Condition," is enacted when the EBMUD Board of Directors declares a Water Shortage Emergency. In addition, Section 28 may be added in response to state mandated water use reductions designed to address short-term statewide water shortages.

Section 29 details on-going requirements that residential and nonresidential customers must observe. For example, residential customers are required to irrigate their property in a manner that does not result in excessive flooding or runoff, and all customers are required to repair leaks wherever it is feasible to do so. Under normal conditions, EBMUD relies on customer education to ensure that these requirements are met. When customers and field staff report of overwatering or water waste, EBMUD responds by contacting the customer and may send water conservation and field services personnel to apprise the customer of the wasteful conditions and make recommendations on using water more efficiently. If the customer cannot be located, and the water loss is significant, staff may turn off the water at the meter until the customer is contacted or the problem is resolved. The ongoing restrictions in Section 29 are supplemented temporarily with additional restrictions when the Board declares a Water Shortage Emergency and enacts Section 28.

Section 28 sets water use rules and provides guidance to customers about reducing water use during a declared Water Shortage Emergency or when necessary to comply with state mandated water use reductions. The rules and guidance in Section 28 are tailored to the specific drought stage. Enforcement actions can include extra meter readings, written warnings, installation of flow-restriction devices, and even discontinuance of water service. However, EBMUD would not discontinue water service during a pandemic. EBMUD updated Section 28 in 2014 and 2015 to reflect the state mandated restrictions on outdoor water use.

Section 28 prohibits certain uses of potable water during a water shortage emergency, including:

- Using potable water for decorative ponds, fountains, and other water features that do not recirculate water (this does not include swimming pools or spas);
- Washing cars, boats, trailers, aircraft, and other vehicles by hose without a shutoff nozzle;
- Washing sidewalks, driveways, or hard surfaces;
- Irrigating ornamental turf on public street medians; and
- Flushing sewers or hydrants with potable water.

Section 28 also states that irrigating turf and ornamental landscape with potable water is permitted no more than two days each week, not on consecutive days, and only before 9 AM and after 6 PM. Irrigation of turf and ornamental landscape with potable water is also prohibited during and within 48 hours following measurable precipitation.

During a water shortage situation, enforcement of water waste restrictions becomes particularly important and EBMUD may choose to devote additional resources to this effort. EBMUD staff monitors the service area to encourage water savings, help customers change their water use habits, and enforce regulatory requirements and water waste prohibition rules. EBMUD developed a Water Savings Team that patrolled the service area to respond to reports of water waste, place warning hangers on doors, and educate customers about wise water use. The team also assisted customers with conservation activities like identifying leaks and installing water-efficient fixtures and appliances.

During water shortages, EBMUD typically receives a higher volume of water waste reports from members of the community who report the waste via the EBMUD website or by calling the Water Waste Hotline or Contact Center. Customers can also report water waste for EBMUD through the State Water Resources Control Board's online water waste portal. EBMUD staff investigates the reports and takes appropriate actions. In most cases, EBMUD only needs to report the situation to the responsible party, who then takes action to address the problem. If necessary, EBMUD can also proceed with enforcement.

EBMUD also developed two separate ordinances to control water use: an Excessive Water Use Penalty Ordinance (Ordinance No. 364-15) and a Water Theft Penalty Ordinance (Ordinance No. 368-17). The Excessive Water Use Penalty Ordinance only applies during Stage 3 or 4 droughts, whereas the Water Theft Penalty Ordinance is in place at all times. Copies of these ordinances are provided in Appendix G.

The Excessive Water Use Penalty Ordinance sets penalties for single-family residential (SFR) customers who use large volumes of water during declared droughts. If the Board declares a Stage 3 drought, SFR customers must not consume more than 120 hundred cubic feet (CCF) of water over a two-month billing cycle, or 60 CCF per month. Customers using in excess of this amount are charged a penalty of $2 per CCF above the allotted amount. During Stage 4 droughts, the maximum amount of water allowed before incurring a penalty drops to 80 CCF over a two-month billing cycle, or 40 CCF per month. The purpose of the ordinance is to prohibit excessive water use when the Board has declared a Stage 3 or Stage 4 drought and to authorize EBMUD to impose a financial penalty on customers who violate the Ordinance.

The Water Theft Penalty Ordinance prohibits the theft or unauthorized use of water. Although this ordinance was established during a drought period, it is enforceable throughout the year and not directly tied to drought declarations. This ordinance builds on existing EBMUD regulations related to water theft and give EBMUD the authority to impose administrative penalties on any person who violates the Ordinance's prohibitions.

Per water code Section 10632.2, EBMUD has procedures and ordinances that have exemptions and appeals processes in effect during water shortage emergencies. The Excessive Use Penalty Ordinance for Drought Stages 3 and 4 has an appeals process. Appeals can be granted due to meter error, if the water is needed for health and safety reasons, or due to leaks. Section 28 of the Regulations, "Water Use During Water Shortage Emergency Conditions," says that customers may apply for an exemption to the water use restrictions in the regulation. EBMUD can grant an exemption to prevent undue hardship or to avoid conditions affecting health, sanitation, fire protection, or safety.

There are also regulations, procedures, and ordinances that are in effect at all times, not just during droughts. Procedure 145, "Wasteful Use of Water," has exemptions for hardship and potential public health risks. Similarly, the Water Theft Penalty Ordinance has an appeals process and Section 29 of Regulations, "Water Use Restrictions," offers exemptions for undue hardship or to avoid conditions affecting health, sanitation, fire protection or safety.

EBMUD also has policies related to the approval of water connections for new developments during drought. EBMUD Policy 3.07, "Responsibility to Serve Water Customers," sets out the agency's priorities during a water shortage. EBMUD's first priority is to serve existing customers within its existing service area. EBMUD then serves expected new customers within its service area, but only if this does not unacceptably impair its ability to serve existing customers. Lastly, EBMUD will consider customers outside its existing service area only if this does not impair its ability to serve existing and expected new customers within its service area.

## 6.2 DROUGHT RATES

Water sales typically account for over 80 percent of EBMUD's operating revenues. The balance includes revenues from a variety of sources such as fees and charges, taxes, hydropower sales, and interest. EBMUD also sells bonds to assist with funding capital activities. EBMUD maintains cash reserves and has a policy of maintaining a debt service coverage ratio of at least 1.6 times coverage.

EBMUD rates and charges are designed to meet its revenue requirements for its water and wastewater systems, to recover the expenditures identified in its operating and capital budgets, and to meet Board policy goals. To determine the appropriate rates needed to recover its expenditures, EBMUD engaged an independent rate consultant in 2015 and in 2019 to perform cost of service (COS) studies on the water and wastewater systems. Based on its COS studies, EBMUD sets its rates based on capital investments, operating expenses, payment of debt service, and maintenance of sufficient reserves. Capital investments are typically large, multi-year projects that can involve significant construction. Capital projects including water system reliability improvements, seismic upgrades, and investments in supplemental supply can help EBMUD prepare for emergencies and droughts. Short-term costs associated with drought management and conservation program activities are also covered.

In 2014, the EBMUD Board and staff participated in a series of workshops exploring long-term financial stability for the organization. The goal of the workshops was to consider and discuss elements of the long range financial plan and cost of service study including underlying assumptions, financial risks, and financial policies aimed at mitigating risks. The results of these efforts laid the groundwork for the development of EBMUD's current budget and rates.

One of the main challenges identified was the need to develop a strategy for dealing with the financial impacts of drought. Drought leads to increased costs such as public outreach, conservation programs, additional staff resources, and the purchase, delivery, and treatment of supplemental supplies. In addition, reduced customer water use can decrease revenues.

As an outcome of the workshops, EBMUD developed a staged system of drought rates which have been developed in tandem with EBMUD's regular rates since fiscal year 2016. Following are additional details on the financial impacts of droughts and how the new rate structure helps EBMUD to mitigate those impacts.

Specific drought surcharges were adopted along with EBMUD's regular rates and charges in 2015, following a process which complied with the requirements of Proposition 218 and other applicable laws. The drought surcharge provides funds to cover EBMUD's water shortage related costs, including the costs of purchasing and delivering supplemental supplies, increased treatment costs, increased conservation and public outreach messaging, increased customer account management services, and revenue loss due to reduction in water use. EBMUD developed drought surcharges of up to 8 percent, 20 percent and 25 percent on the volumetric charges during water shortage Stages 2, 3 and 4, respectively. The drought surcharges correspond to increasingly severe stages of water shortages and are charged on each unit of water used during the billing period. The amount of the drought surcharges in each stage was developed to recover the anticipated drought costs at each stage, including the cost of supplemental supplies (purchase, treatment and delivery), costs of water shortage-related customer service, drought management activities, and lost revenue from reduced water sales. The drought surcharge may be imposed by the Board of Directors at the time or after a specific drought stage has been declared in accordance with EBMUD's Drought Management Program Guidelines.

The board approved drought surcharges do not impose a drought surcharge for Stage 1 when only voluntary customer demand reductions are being implemented. EBMUD's DMP as described in this WSCP allows for supplemental supplies to be acquired during Stage 1; the additional costs of the supplemental supplies delivered will be funded from EBMUD's operating revenues, reserves or rate stabilization fund.

In tandem with the new drought rates, EBMUD also adopted an excessive use penalty for single family residential (SFR) customers who use excessive amounts of water when EBMUD has declared a stage three or stage four drought. This penalty was discussed in the previous section.

EBMUD also established a non-monetary supersaver recognition program for the SFR customer class starting at stage three to recognize customers who use 4ccf or less per month (e.g., 100 gpd or less). The bill insert thanks customers for reducing their use and encourages sustained efforts.

## 7. LEGAL AUTHORITIES

This section provides a description of the legal authorities that empower EBMUD to implement and enforce its shortage response actions as discussed in this WSCP.

### Municipal Utility District (MUD) Act

Among other things, the MUD Act authorizes and empowers EBMUD to fix rates and charges, and make and enforce rules, regulations, and practices in connection with its provision of water service within its service area.

### Local Emergencies

California Government Code section 8558 defines the types of emergencies that can be proclaimed under the California Emergency Services Act. The Act allows for the proclamation of a local emergency based upon the existence of drought conditions. In a Stage 3 or Stage 4 drought, EBMUD will coordinate with cities and counties within its service area regarding the possible proclamation of a local drought emergency.

### Water Shortage Emergencies

Water Code section 350 calls for water agencies like EBMUD to declare a water shortage emergency when the "ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection." EBMUD would declare a water shortage emergency as described under the DMP Guidelines set forth in the WSCP. Among other things, Water Code sections 351 through 359 require a water agency to hold a properly noticed public hearing prior to declaring a water shortage emergency, to adopt regulations and water use restrictions that will conserve water supplies, and to maintain those regulations and restrictions in full force and effect until the water shortage emergency has ended.

### Water Conservation Programs

Water Code section 375 et seq. allows water agencies like EBMUD to adopt and enforce water conservation programs to reduce the quantity of water used by its customers. Water conservation programs adopted pursuant to section 375 may be enacted by ordinance or resolution and must be published and/or posted according to section 376. Following publication or posting, violation of any requirement of a water conservation program is a misdemeanor, and a violator may be held criminally or civilly liable. (See Water Code section 377.) In specific DMP stages, EBMUD may choose to adopt a water conservation program pursuant to section 375 et seq.

### Excessive Use Penalty Ordinance

Water Code sections 365-367 require water agencies like EBMUD to identify and discourage excessive residential water use in times of drought. EBMUD complies with this requirement through its excessive use penalty ordinance as discussed in Section 6.1.

### CVP Contract

EBMUD executed a contract with United States Bureau of Reclamation for delivery of Central Valley Project water. Chapter 1 Section 1.4.3 of the UWMP provides in-depth discussion of this contract.

## 8. FINANCIAL CONSEQUENCES OF WSCP

Specific drought surcharges were adopted along with EBMUD's regular rates and charges in 2015, following a process which complied with the requirements of Proposition 218 and other applicable laws. The drought surcharge provides funds to cover EBMUD's implementation and compliance with its water shortage program components, including the costs of purchasing and delivering supplemental supplies, increased treatment costs, increased conservation and public outreach messaging, increased customer account management services, and revenue loss due to reduction in water use. Section 6.2 above provided detail information pertaining to drought surcharges.

### 8.1 IMPACT OF REDUCED SALES ON REVENUES & EXPENDITURES

Implementation of a DMP entails added costs for EBMUD. Costs include paying for additional temporary personnel and equipment resources, supplemental water purchases, increased outreach to customers, expansion of water conservation rebate and device distribution programs, and development and execution of educational and marketing programs.

In previous droughts, EBMUD hired temporary staff to help implement the DMP. These workers provided administrative support to respond to customer and media inquiries, provided field support to perform water use audits, assisted customers in identifying leaks, provided information technology support for bill adjustments, provided community outreach, responded to water waste calls/emails,

and assisted with mass media outreach efforts. Employing temporary staff increases EBMUD's labor costs. EBMUD also hired an advertising agency to create drought campaigns to encourage customers to cut back their water use.

Outreach to customers is intensified during a drought. There are costs to create and place ads, resources needed for website updates and tools, costs to develop and print publications, production costs to create informative videos, expenses to place automated "out-dial" phone calls, and special mailings costs. Additional media response also requires added resources to gather and vet information, respond to calls, and set up and do onsite interviews. EBMUD may also offer free conservation- related devices to customers or participate in/organize seminars and workshops aimed at teaching customers how to conserve water. These efforts help to educate customers about the drought, highlight water use prohibitions, and emphasize each customer's role and responsibility in responding to the drought.

As part of the DMP, EBMUD may also intensify some of its conservation programs, such as the distribution of water-saving devices and home water audit kits, which also add costs. Additional costs are also incurred for rebate programs that target improving water efficiency; for example, EBMUD offers rebates to encourage customers to remove turf, to install flow meters, to upgrade irrigation equipment to purchase and install low-flush toilets, and to upgrade to water-efficient commercial equipment.

In addition to costs related to implementation of the DMP, EBMUD may face additional costs for the purchase, delivery, and treatment of supplemental supplies. These costs can include the purchase of transfer water, permitting, administrative and environmental work related to transfers, increased treatment costs related to the transfer water, and the operations costs associated with activating and using projects like the Freeport Project or the Bayside Groundwater project.

Table W-9 provides estimates of the costs associated with stage 2 through 4 droughts. For each stage, there are costs for the purchase, transmission, treatment, and storage of additional water, added staff to implement the DMP, and lost revenue due to rationing.

## 8.2 EBMUD DROUGHT RATE STRUCTURE

As said in Section 6.2, EBMUD held a series of public workshops on Long-Term Financial Stability. In June 2015, EBMUD's Board of Directors adopted a staged system of drought rates and the Excessive Water Use Penalty Ordinance. The specific drought surcharges are adopted along with EBMUD's regular rates and charges, following a process which fully complies with the requirements of Proposition 218 and other applicable laws. On April 26, 2016, the Board suspended the implementation of the Excessive Water Use Penalty Ordinance based on a reduction in potable water use and EBMUD's improved water supply projections.

The drought surcharge raises funds necessary to cover EBMUD's water-shortage related costs, including revenue to cover the costs of purchasing and delivering supplemental supplies, increased treatment costs, increased conservation and public outreach messaging, increased customer account management services, and revenue loss due to conservation.

Table W-5 in Section 4 shows when the drought surcharge would first be applied and the corresponding percent increases throughout the various drought stages.

Proposition 218 notification requirements control the schedule for selecting and implementing drought

**TABLE W-9** **DROUGHT COST IMPACTS**

| ITEM | STAGE 2 SIGNIFICANT | STAGE 3 SEVERE | STAGE 4 CRITICAL |
|---|---|---|---|
| PURCHASE, TRANSMISSION, & TREATMENT OF ADDITIONAL WATER | $15,750,000 | $42,412,500 | $55,800,000 |
| STORAGE COSTS | $6,100,000 | $6,100,000 | $6,100,000 |
| CUSTOMER RELATED COSTS (ADDITIONAL STAFF, PUBLIC INFORMATION) | $2,300,000 | $3,250,000 | $3,250,000 |
| REVENUE LOSS | 0-15% OF BASELINE VOLUME REVENUE | 15% OF BASELINE VOLUME REVENUE | 20% OF BASELINE VOLUME REVENUE |
| CUSTOMER SURCHARGE | UP TO 8% | UP TO 20% | UP TO 25% |

NOTES
Costs derived from EBMUD Water and Wastewater Cost of Service Study, April 2015.
Costs shown are based on FY2016. Costs are developed for each budget cycle and actual costs and revenue loss are based in market and customer behaviors.

rates and charges. Consequently, EBMUD must consider options for drought rate structures prior to the anticipated start of a drought program. EBMUD's goal in developing the drought surcharges was to increase its ability to successfully manage water supplies by having a set of drought surcharges that, having already gone through the Proposition 218 process, could be implemented quickly.

## 9. MONITORING AND REPORTING

During droughts, EBMUD monitors customer demand closely to ensure that its DMP is effective in reducing demand to the required level. Data gathered from monitoring can help EBMUD to make decisions on priorities for customer outreach and conservation programs.

EBMUD evaluates both billed consumption and daily water production data relative to reduction goals. Using this data, staff gauges EBMUD's effectiveness in managing overall demand and customers' responsiveness to requests to conserve. The results are presented to the EBMUD Board of Directors in regular drought management reports. The reporting frequency depends on the level of activity occurring and the severity of the drought.

Customer accounts are metered, providing bi-monthly and monthly (for large water use accounts) consumption data that can be evaluated by customer category characteristics. Water production data tracks treated water input to the distribution system leading to customers' taps. Air temperature variations are also tracked with water production to observe the effects of weather conditions on consumption behavior. Using financial records summarized from customer bills, EBMUD analyzes whether customer groups are reaching their conservation targets based on the distribution of customers affected by drought surcharges and higher drought rates.

EBMUD assesses the effectiveness of its demand management programs on the projected water supply in each report to the Board. This ensures timely action can be taken to recommend improvements to the DMP for Board consideration if results fall short of EBMUD's water use reduction goals.

The success of a DMP depends on customers reducing their water use. Experience shows that providing clear feedback on consumption relative to goals and water use reduction expectations, benchmarking efficient water use among customer sectors, clearly stating the financial penalties for overuse, clearly stating the consequences for violating water use regulations and ordinances, and acknowledging all customers' efforts to save water all reinforce prudent behavior. EBMUD uses Home Water Reports for enrolled customers and uses its Customer Information System (CIS) to inform all customers of their current and past water uses and routinely updates printed messages on customer water bills. This information helps customers monitor their individual rationing efforts and encourages adjustments to usage.

## 10. WSCP REFINEMENT PROCEDURES

EBMUD prepares internal lessons learned reports from various departments after consecutive drought events; these reports document the challenges and successes to understand causes of difficulties and to make improvements in handling future droughts/water shortages. The benefits of looking back at past experience include process improvement, risk management, identifying constraints and uncertainties. This reflection and evaluation facilitate EBMUD to make continuous improvement in refining response actions.

EBMUD also has a Drought Committee made up of managers and senior management who convene as necessary to address drought related problems and responses. Under the direction of the Drought Committee, the DMP guidelines were updated in 2015 and 2016. For this update of the UWMP, the Drought Committee recommended reviewing the DMP guidelines once again as discussed in Section 4 to refine based on the recent drought as well as to reflect new legislation. This evaluation and assessment support the refinement process that EBMUD takes to ensure WSCP is prepared adequately and implemented as an adaptive management plan to provide guidance leading up to and during a water shortage situation.

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