COASTSIDE COUNTY WATER DISTRICT

Cost of Service and Rate Study

Final Report / May 15, 2018

RAFTELIS

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May 15, 2018

Mary Rogren, Assistant General Manager
Coastside County Water District
766 Main Street
Half Moon Bay, CA 94019

Subject: Cost of Service and Rate Study Report

Dear Ms. Rogren,

Raftelis Financial Consultants, Inc. (Raftelis) is pleased to provide this Cost of Service and Rate Study Report (Study) for Coastside County Water District (CCWD or District) to develop cost of service based water rates with a technically sound methodology which meets the requirements of California Constitution Article XIII D, Section 6 (commonly referred to as "Proposition 218"). In particular, this Study contains thorough details on the following:

1. The legal framework surrounding Proposition 218, particularly with respect to potable water service
2. Recommended revisions and modifications to rate structures and customer classes
3. Equitable cost of service based potable water commodity rates, bi-monthly fixed charges, and private fire service charges that meet the requirements of Proposition 218

The Study summarizes the key findings and results related to the cost allocations to customer classes and development of rates and charges for water service.

It has been a pleasure working with you and we thank you, Mr. David Dickson, and District staff for the support provided during the course of this Study.

Sincerely,
Raftelis Financial Consultants, Inc.

Sanjay Gaur
Vice President

Kevin Kostiuk
Senior Consultant

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1. EXECUTIVE SUMMARY

1.1 STUDY BACKGROUND

In 2018, Coastside County Water District (CCWD or District) contracted with Raftelis to conduct a Cost of Service and Rate Study (Study) across all water services. This Study presents the cost allocations for the respective customer classes and services and resulting water rates for implementation in July 2018.

This Executive Summary compiles the proposed water rates and charges and contains a description of the rate study process, methodology, results, and recommendations for CCWD rates. CCWD's last rate adjustment was effective July 1, 2017. CCWD wishes to establish fair and equitable rates that:

- Proportionately allocate the costs of providing service in accordance with California Constitution Article XIII D, Section 6 (commonly referred to as Proposition 218)
- Meet the District's fiscal needs in terms of operational expenses, reserve targets, and capital investment to maintain the water system
- Maintain affordable charges for customers that are fair and equitable
- Preserve an indirect price signal for those whose higher usage creates greater demands and burdens on CCWD's water system
- Are easy for customers to understand and easy for CCWD staff to implement and update in the future

1.2 STUDY OBJECTIVES

The major objectives of the Study include the following:

1. Evaluate the existing rate structures and propose revisions to tiered rate structures
2. Ensure recovery of all operations and maintenance (O&M) costs, ensure sufficient funding of financial reserves, and funding of capital repair and replacement (R&R) collectively
3. Conduct a cost of service analysis for the water system
4. Allocate costs between user classes
5. Develop fair and equitable water rates that adequately recover costs, provide revenue stability for recovering fixed costs, and maintain affordable water service while remaining compliant with the requirements of Proposition 218

This Study was prepared using the principles established by the American Water Works Association's (AWWA) *Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices M1*, *Sixth Edition* (M1 Manual). The M1 Manual's general principles of rate structure design and the objectives of the Study are described in Section 1.3.3.

1.3 WATER SYSTEM AND SERVICE AREA CHARACTERISTICS

The District provides treated water service to the City of Half Moon Bay and the communities of Princeton, Miramar, and El Granada. The service area is approximately 14 square miles with service provided to roughly 6,400 connections across a population of 17,000. The service area is heavily residential with other customers including commercial and governmental users, landscape irrigators, and agricultural users.

Raw water is provided from two sources: a mix of local surface water and groundwater and imported water purchased from the San Francisco Public Utility Commission (SFPUC). Long term water supply

mix is approximately 50 percent local source and 50 percent purchased water. Raw water from 20 miles of transmission pipelines is treated at one of two treatment plants before distribution through the District's 83 miles of pipeline.

1.4 LEGAL REQUIREMENTS AND RATE SETTING METHODOLOGY

1.4.1 *California Constitution - Article XIII D, Section 6 (Proposition 218)*

Proposition 218 was enacted by voters in 1996 to ensure, in part, that fees and charges imposed for ongoing delivery of a service to a property (property-related fees and charges) are proportional to, and do not exceed, the cost of providing service. Water service fees and charges are property-related fees and charges subject to the provisions of California Constitution Article XIII D, Section 6. The principal requirements, as they relate to public water service fees and charges are as follows:

1. Revenues derived from the fee or charge shall not exceed the costs required to provide the property-related service.
2. Revenues derived by 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 the fee or charge imposed upon any parcel shall not exceed the proportional cost of service attributable to the parcel.
4. No fee or charge may be imposed for a service unless that service is actually used or immediately available to the owner of property.
5. A written notice of the proposed fee or charge shall be mailed to the record owner of each parcel not less than 45 days prior to a public hearing, when the agency considers all written protests against the charge.

The restructured tiered rates presented in this report comply with the substantive requirements of Proposition 218 as interpreted by the courts, including the April 2015 appellate court decision Capistrano Taxpayers Association, Inc. v. City of San Juan Capistrano (2015) 235 Cal.App.4th 1493., which requires calculating the cost of providing service among the different tiers for tiered rate structures.

As stated in AWWA's M1 Manual, "water rates and charges should be recovered from classes of customers in proportion to the cost of serving those customers." Raftelis follows industry standard rate setting methodologies set forth by the AWWA M1 Manual to ensure this Study meets Proposition 218 requirements for potable customers and creates rates that do not exceed the proportionate cost of providing water services on a parcel basis.

1.4.2 *California Constitution - Article X, Section 2*

Article X, Section 2 of the California Constitution states the following:

> *"It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare."*

Article X, Section 2 of the State Constitution acknowledges the need to preserve the State's water supplies and to discourage the waste or unreasonable use of water by encouraging conservation. Accordingly, public agencies are constitutionally mandated to maximize the beneficial use of water, prevent waste, and encourage conservation.

To meet the objectives of Article X, Section 2 a water purveyor may utilize its water rate design to incentivize the efficient use of water. CCWD utilizes inclining tier (also known as "conservation based" or simply "tiered") water rates to incentivize customers to use water in an efficient manner. The tiered rates (as well as rates for uniform rate classes) need to be based on the proportionate costs incurred to provide water to customer classes and on a parcel basis within each customer class to achieve compliance with Proposition 218.

CCWD is a signatory to the Memorandum of Understanding (MOU) of the California Water Efficiency Partnership, formerly the California Urban Water Conservation Council (CUWCC). As a member agency, CCWD recognizes the importance of water conservation in its portfolio of water supplies and is committed to use water efficiently throughout its service area.

In addition to being a member of the California Water Efficiency Partnership, CCWD is charged with mandates by the State of California to achieve reduced per capita water use. In 2008, Governor Schwarzenegger signed into law a bill referred to as SBX7-7. In addition to providing a plan for improving the Sacramento-San Joaquin Delta through co-equal goals for the environment and people, SBX7-7 required all urban water suppliers to reduce per capita water use by 20 percent by the year 2020. CCWD's rate structure is one of the means by which the District is able to achieve this mandate.

When properly designed and differentiated by customer class, tiered rates allow a water utility to send indirect conservation price signals to customers while proportionately allocating the costs of service. Due to heightened interest in water use efficiency and conservation, tiered water rates are ubiquitous, especially in California. Tiered rates meet the requirements of Proposition 218 as long as the tiers reasonably reflect the proportionate cost of providing service on a parcel basis in each tier.

1.4.3 *Cost-Based Rate-Setting Methodology*

As stated in the AWWA M1 Manual, "the costs of water rates and charges should be recovered from classes of customers in proportion to the cost of serving those customers." To develop utility rates that comply with Proposition 218 and industry standards while meeting other emerging goals and objectives of the utility, there are four major steps discussed below and previously addressed in Section 1.2.

1) Calculate the Revenue Requirement

The rate-making process starts by determining the base year (rate setting year) revenue requirement, which for this Study is Fiscal Year (FY) 2018-2019. The revenue requirement should sufficiently fund the utility's operations and maintenance (O&M), debt service, capital expenses (Repair and Replacement abbreviated as R&R), and reserve funding.

2) Cost of Service Analysis (COS)

The annual cost of providing water service is distributed among customer classes commensurate with their service requirements. A COS analysis involves the following:

1. Functionalize costs. Examples of functions are supply, treatment, transmission, distribution, storage, meter servicing, and customer billing and collection.
2. Allocate functionalized costs to cost components. Cost components include variable supply, base delivery, maximum day, maximum hour[1], conservation, public fire protection, meter service, and customer servicing and billing costs.
3. Develop unit costs for each cost component using appropriate units of service for each component.
4. Distribute the cost components. Distribute cost components, using unit costs, to customer classes in proportion to their demands and burdens on the water system. This is described in the M1 Manual published by AWWA.

A COS analysis considers both the average quantity of water consumed (base costs) and the peak rate at which it is consumed (peaking or capacity costs as identified by maximum day and maximum hour demands)[2]. Peaking costs are costs that are incurred during peak times of consumption. There are additional costs associated with designing, constructing, operating and maintaining, and replacing facilities to meet peak demands. These peak demand costs need to be allocated to those customers whose water usage patterns generate additional costs for the utility. In other words, not all customer classes and not all customers share the same responsibility for peaking related costs.

3) Rate Design and Calculations

Rates do more than simply recover costs. Within the legal framework and industry standards, properly designed rates should support and optimize a blend of various utility objectives, such as conservation, affordability for essential needs, and revenue stability, among others. Rates may also act as a public information tool in communicating these objectives to customers.

4) Rate Adoption

Rate adoption is the last step of the rate-making process. Raftelis documents the rate study results in this Study which reflect the basis upon which the rates were calculated, the rationale and justifications behind the proposed changes, and their anticipated financial impacts to ratepayers.

1.5 RESULTS AND RECOMMENDATIONS

1.5.1 Factors Affecting Revenue Adjustments

The following items affect the water system's revenue requirement (i.e., costs), thus its water rates. CCWD's expenses include Operation and Maintenance (O&M) expenses and capital expenses (including debt service).

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[1] Collectively maximum day and maximum hour costs are known as peaking costs or capacity costs.

[2] System capacity is the system's ability to supply water to all delivery points at the time when demanded. Coincident peaking factors are calculated for each customer class at the time of greatest system demand. The time of greatest demand is known as peak demand. Both the operating costs and capital asset related costs incurred to accommodate the peak flows are generally allocated to each customer class based upon the class's relative demands during the peak month, day, and hour event.

- **Operating & Maintenance Expenses:** CCWD incurs costs to operate and maintain the water system including water supply costs, personnel and customer service costs, water pumping and treatment facilities costs, and technical services costs. Inflationary pressure on these expenses is generally between two and four percent per year. This is comparable to the long-term consumer price index (CPI) of approximately 2.8 percent per year.

  Water supply costs have increased substantially in the past several years as the cost of imported purchased water from the San Francisco Public Utility Commission (SFPUC) increased by 41 percent from FY 2012-2013 to FY 2016-2017.

- **Capital Funding:** CCWD requires approximately $3.6 million in annual capital expenditures to maintain the existing system at the same level of service. These capital expenditures include both capital projects and capitalized expenses. For the purpose of this Study, capital projects are expected to be fully funded by rate revenue (cash reserves). Management may elect to expedite or postpone annual Capital Improvement Projects (CIP) based on system demand, funding availability, and other conditions.

- **Reserve Funding:** CCWD has adopted reserve policies for the utility to meet cash flow needs (operating), ensure adequate funding of capital repairs and replacements (capital), and to fund certain liabilities as part of bond covenants (debt). The targeted reserve policy for the Operating Reserve is 25 percent of annual expenses to fund short term variations in operating costs and for unanticipated changes in revenues and expenses. The Operating Reserve for FY 2018-2019 is $2.09 million. The capital reserve allows the utility to award contracts and provide flexibility in the timing of projects. The defined policy for the Capital Reserve is one year of long term annual CIP or $3.63 million. The Debt Service Reserve policy is one year of debt service which is $1.14 million for the District. The total target for all reserves is approximately $6.86 million in FY 2018-2019. The District's current reserve balance is approximately $5.1 million. Modest additions in annual reserve funding will allow the District to achieve the target over a long horizon.

- **Conservation:** The recent drought, mandated water conservation, and public outreach efforts have reduced water demand within CCWD's service area and, therefore, the revenues of the utility. Customers reduced water use by approximately 20 percent when comparing FY 2016-2017 to FY 2012-2013. CCWD anticipates permanent demand reductions from behavioral changes, increased efficiencies, and permanent conservation actions and measures taken during the drought, such as the installation of water efficient appliances and landscape changes that have occurred. Total long-term demand is estimated at 1,810 acre-feet per year.

Given the factors detailed above and the FY 2018-2019 revenue requirement of $11.71 million, CCWD has proposed a revenue adjustment of 2.3 percent for FY 2018-2019 when compared to FY 2017-2018. Table 1-1 shows the proposed revenue adjustment, which is used to allocate costs to the service classes and calculate proposed rates. The revenue adjustment is proposed for implementation on July 1, 2018 with a second-year increase of 4 percent on July 1, 2019 based on the District's FY 2019-2020 budget. The assumptions used in calculating the FY 2018-2019 revenue adjustments are described in more detail in Section 2 and the rationale for the FY 2019-2020 revenue requirement is discussed in Section 7.

Table 1-1: Proposed Revenue Adjustments

Year	Revenue Requirement	Revenue Adjustment
FY 2018-2019	$11.71 Million	2.3%
FY 2019-2020	$12.18 Million	4.0%

1.5.2 *Proposed Rates and Charges*

The following subsections summarize the final rates and charges derived through the cost of service study. All rates are proposed to be implemented on July 1, 2018.

Table 1-2 shows the current and proposed meter-based fixed charges. The proposed rates are applicable to all metered users. The rates for the current and proposed fixed charge are calculated on the basis of a property's meter size. The proposed FY 2018-2019 rates account for the revenue adjustment found in Table 1-1.

Table 1-2: Current and Proposed Rates for Bi-Monthly Base Charges ($/Meter Size)

Meter Size	Proposed Base Charge	Current Base Charge	$ Difference	% Difference
5/8"	$55.55	$52.20	$3.35	6%
3/4"	$82.09	$78.45	$3.64	5%
1"	$135.18	$130.76	$4.42	3%
1-1/2"	$267.90	$252.52	$15.38	6%
2"	$427.16	$418.48	$8.68	2%
3"	$931.48	$915.50	$15.98	2%
4"	$1,674.70	$3,139.22	($1,464.52)	-47%

Table 1-3 shows the current and proposed charges for private fire service customers. The proposed rates are applicable to all users with private fire service. The rates for the current and proposed fire service charge are calculated on the basis of the diameter of the fireline serving a property. The proposed FY 2018-2019 rates are inclusive of the revenue adjustment found in Table 1-1.

Table 1-3: Current and Proposed Rates for Bi-Monthly Private Fire Service Charges ($/Line Size)

Fireline Size	Proposed Fire Service Charge	Current Fire Service Charge	$ Difference	% Difference
3/4"	$9.31	$8.57	$0.74	9%
1"	$12.42	$11.43	$0.99	9%
1-1/2"	$18.62	$17.15	$1.48	9%
2"	$24.83	$22.86	$1.97	9%
3"	$37.24	$34.29	$2.95	9%
4"	$49.65	$45.72	$3.93	9%
5"	$62.07	$57.15	$4.92	9%
6"	$74.48	$68.58	$5.90	9%
8"	$99.30	$91.44	$7.86	9%
10"	$124.13	$114.30	$9.83	9%

Table 1-4 shows the current and proposed water rates (commodity charges) for all customers. The rates for the current and proposed commodity charges are calculated on the basis of customer class and tier and are expressed in dollars per hundred cubic feet ($/hcf).

Raftelis recommends certain rate structure changes to better reflect similarities and differences across customer classes as well as usage characteristics within customer classes. In addition to the class rate structure modifications, Raftelis recommends new tier definitions as shown in Table 1-4. Changes to the existing customer classes and tier definition modifications are discussed in detail in Section 5. The proposed FY 2018-2019 rates are inclusive of the revenue adjustment found in Table 1-1.

Table 1-4: Current and Proposed Rates for the Water Commodity Charges ($/hcf)

Customer Class & Tier	Proposed Tier Definition	Current Tier Definition	Proposed Rate	Current Rate
SFR				
Tier 1	0-8	0-4	$8.83	$9.65
Tier 2	9-16	5-16	$12.92	$10.77
Tier 3	>16	17-30	$15.63	$13.89
Tier 4		>30	N/A	$18.41
MFR	Uniform	N/A	$11.77	$11.88
All Other Customers	Uniform	Uniform	$12.55	$11.88

Together, the components of the proposed water service charges are structured to recover the proportionate costs of providing water service to each customer class and each connection within the service area.

2. DISTRICT BUDGET

The Study year is Fiscal Year (FY) 2018-2019[3], with proposed revenue adjustments and rates presented for the same year. CCWD staff provided Raftelis with budgeted FY 2018-2019 operating expenditures and estimated capital and reserve contribution (net cash). The combination of the two becomes the total revenue required to operate and maintain the utility at the existing level of service. For FY 2018-2019 the operating requirement is $8.19 million. The capital requirement is $3.52 million[4]. The total revenue required from rates is $11.71 million and is summarized in Table 2-1. The revenue requirement is discussed in detail in Table 4-1 in Section 4: Cost of Service Analysis.

Table 2-1: FY 2018-2019 Proposed Budget

REVENUE REQUIREMENTS	FY 2018-2019 BUDGET
REVENUES	
Operating Revenues	
Water Sales	$11,450,000
Total Operating Revenues	***$11,450,000***
Non-Operating Revenues	
Hydrant Sales	$50,000
Late Penalty	$60,000
Service Connections	$10,000
Interest Earned	$6,236
Property Taxes	$725,000
Miscellaneous	$25,000
Cell Site Lease Income	$165,000
ERAF Refund	$325,000
Total Non-Operating Revenues	**$1,366,236**
TOTAL REVENUES	**$12,816,236**
OPERATING EXPENDITURES	
Water Purchased	$1,900,998
Electrical Exp. Nunes WTP	$42,697
Electrical Expenses, CSP	$337,080
Electrical Expenses/Trans. & Dist.	$26,966
Elec Exp/Pilarcitos Cyn	$39,248
Electrical Exp., Denn	$130,000
CSP - Operation	$10,700
CSP - Maintenance	$37,000
Nunes WTP Oper	$77,850
Nunes WTP Maint	$122,500

[3] CCWD's fiscal year is July 1 through June 30.
[4] The capital requirement includes $3.62 million in long term annual CIP repair and replacement and use of $100,000 in reserves in FY 2018-2019.

Denn. WTP Oper.	$47,000
Denn WTP Maint	$101,850
Laboratory Expenses	$71,450
Maintenance Expenses	$291,700
Maintenance, Wells	$40,000
Uniforms	$12,500
Studies/Surveys/Consulting	$160,000
Water Resources	$25,200
Community Outreach	$54,700
Legal	$100,000
Engineering	$60,000
Financial Services	$20,000
Computer Services	$163,600
Salaries, Admin.	$1,133,881
Salaries - Field	$1,400,505
Payroll Taxes	$177,733
Employee Medical Insurance	$444,246
Retiree Medical Insurance	$50,659
Employee Retirement	$598,859
SIP 401a Plan	$35,000
Motor Vehicle Exp.	$60,000
Office & Billing Expenses	$261,600
Meetings/Training/Seminars	$26,000
Insurance	$129,000
Memberships & Subscriptions	$75,970
Election Expense	$25,000
Union Expenses	$6,000
County Fees	$20,000
State Fees	$36,500
TOTAL OPERATING EXPENDITURES	**$8,353,991**
REVENUES LESS OPERATING EXPENSES	**$4,462,245**
DEBT SERVICE	
Existing Bonds - 2006B	$486,383
Existing Bond-CIEDB 11-099	$336,126
CIEDB 16-111	$324,235
TOTAL DEBT SERVICE	**$1,146,744**
Net Revenue to CIP & Reserves Contribution	**$3,315,501**

3. PROJECTED WATER DEMAND AND ACCOUNT INFORMATION

FY 2018-2019 is the baseline consumption year within the cost of service and rate model using billed water consumption for FY 2016-2017. Table 3-1 through Table 3-3 shows the total number of connections and water demand. Total potable water demand is assumed to increase by seven and a half percent relative to FY 2016-2017, based on District staff estimates.

Table 3-1 shows the count of meters by meter size. The overwhelming majority of customers are Single Family Residential (SFR) and the most common meter size is 5/8". The District has 6,439 active meters subject to the bi-monthly base charge[5]. No growth in meters or customer accounts is assumed.

Table 3-1: FY 2018-2019 Potable Meter Count

Meter Size	Total by Meter Size
5/8"	6,000
3/4"	194
1"	175
1-1/2"	28
2"	34
3"	5
4"	3
Total	**6,439**

Table 3-2 shows the firelines and sizes subject to private fire service charges. The vast majority of firelines are 1" in diameter. The District has 995 firelines subject to charges. No growth in fireline accounts is assumed.

Table 3-2: FY 2018-2019 Private Fireline Count

Fireline Size	Total by Fireline Size
3/4"	10
1"	658
1-1/2"	49
2"	82
3"	4
4"	123
5"	0
6"	55
8"	13
10"	1
Total	**995**

Table 3-3 shows estimated water demand for FY 2018-2019, by customer class. FY 2016-2017 actual water sales are increased by seven and a half percent to arrive at staff's estimated FY 2018-2019

[5] Certain customers are billed by the District monthly instead of bi-monthly

water sales. Total estimated water deliveries in FY 2018-2019 are 788,525 hundred cubic feet (hcf) or 1,810 acre-feet (AF). FY 2018-2019 represents the estimate for long term baseline demand. The totals do not account for system water loss, which is discussed in Section 6.

Table 3-3: Annual Water Demand by Proposed Rate Class

Delivery	Water Sales FY 2016-2017 (Actual) hcf	Water Demand Factor	Water Sales FY 2018-2019 (Estimated) hcf	Water Sales FY 2018-2019 (Estimated) AF
Single Family Residential (SFR)	386,887	107.5%	415,904	955
Multi-Family Residential (MFR)	40,919	107.5%	43,988	101
All Other Customers	305,706	107.5%	328,634	754
Total	**733,512**		**788,525**	**1,810**

4. COST OF SERVICE ANALYSIS

4.1 METHODOLOGY

The principles and methodology of a cost of service analysis were described in Section 1.4 and are summarized in this sub-section. The annual cost of providing water service is distributed among customer classes commensurate with their service requirements. A COS analysis involves the following:

1. Functionalize costs. Examples of functions are supply, treatment, transmission, distribution, storage, meter servicing, and customer billing and collection.
2. Allocate functionalized costs to cost components. Cost components include variable supply, base delivery, maximum day, maximum hour, conservation, public fire protection, meter service, and customer servicing and billing costs.
3. Develop unit costs for each cost component using appropriate units of service for each component.
4. Distribute the cost components. Distribute cost components, using unit costs, to customer classes in proportion to their demands and burdens on the water system. This is described in the M1 Manual published by AWWA.

A COS analysis considers both the average quantity of water consumed (base costs) and the peak rate at which it is consumed (peaking or capacity costs as identified by maximum day and maximum hour demands). Peaking costs are costs that are incurred during peak times of consumption. There are additional costs associated with designing, constructing, and operating and maintaining facilities to meet peak demands. These peak demand costs need to be allocated to those customers whose water usage patterns generate additional costs for the utility. In other words, not all customer classes and not all customers share the same responsibility for peaking related costs.

The functionalization of costs allows us to better allocate to the **cost causation components** (plainly, cost components). Organizing the costs in terms of end function allows direct correlation between the cost component and the rate, coupling the cost incurred by the utility to the demand and burden that the customer places on the utility's system and/or water resources. The costs incurred are generally responsive to the specific service requirements or cost drivers imposed on the system and its water resources by its customers. The **functions** (i.e., cost categories) for the cost of service analysis include:

1. Water Supply
2. Reservoir
3. Pumping
4. Transmission
5. Treatment
6. Distribution
7. Meters
8. Hydrants
9. Conservation
10. Operations, Meters, and Customer[6]

[6] This function reflects the specific accounting of District cost categories which include personnel and costs related to water operations, meter maintenance, and customer service duties.

11. General

The functionalized costs are then allocated to the **cost causation components** which become the rate components in Section 6.[7] The cost components include:

1. **Supply** costs are related to the production of local raw water and purchase of imported raw water supplies. As explained in previous sections, CCWD acquires water from two primary sources of supply, local and imported.
2. **Base** (average) costs vary with the total quantity of water used within the water system under average conditions. These costs may include treatment, transmission and distribution facilities, storage costs, and capital costs associated with serving customers at a constant, or average, annual rate of use. Base costs are, therefore, spread over all units of water equally.
3. **Peaking** (maximum day and maximum hour) costs are divided into maximum day and maximum hour demand. The maximum day demand is the maximum amount of water used in a single day in a year. The maximum hour demand is the maximum usage in an hour on the maximum usage day. Different facilities, such as distribution and storage facilities, and the capital and O&M costs associated with those facilities, are designed to meet the peak demands placed on the system by customers. Therefore, extra capacity costs include the O&M and capital costs associated with meeting peak customer demand in excess of average annual rate of use, or base use, requirements.
4. **Meter Service** costs include maintenance and capital costs related to meters and associated services.
5. **Customer** costs are directly associated with serving customers, irrespective of the amount of water used, and generally include meter reading, bill generation, accounting, customer service, and collection expenses.
6. **Fire Protection** are costs of providing public and private fire protection service. They include both direct and indirect capital and maintenance costs for fire hydrants and private fire connections, as well as indirect costs for source of supply, treatment, transmission, and distribution of water as these facilities and infrastructure must be upsized to meet fire flow demand.
7. **Conservation** costs include all costs of funding, administering, and executing water conservation and efficiency related programs and services, as well as development of alternative and/or supplemental water supplies.
8. **General** and administrative costs are incurred in operating and maintaining the water system not otherwise recovered in the other functionalized cost components. These costs are distributed to the other cost components in proportion to the cost responsibility of the other components.

This method of functionalizing costs is consistent with the AWWA M1 Manual and is widely used in the water industry to perform cost of service analyses.

4.2 REVENUE REQUIREMENT

Table 4-1 shows the FY 2018-2019 revenue requirement of $11,710,499. The total represents all O&M and capital revenue requirements. O&M expenses include costs directly related to the supply, treatment, and distribution of water, as well as routine maintenance of system facilities. To arrive at the rate revenue requirement, we subtract revenue offsets (non-rate revenues) and adjustment for

[7] This Study uses the Base-Extra Capacity methodology set forth in the M1 Manual for functionalizing and allocating costs.

annual net cash balances which fund R&R capital and District reserves. The result is the total revenue required from rates. This total is the amount that meter base charges, private fire service charges, and commodity rates are designed to collect.

Table 4-1: FY 2018-2019 Revenue Required from Rates

Revenue Requirements	Operating	Capital	Total
Operating Expenses	$8,353,991		$8,353,991
Debt Service		$1,146,744	$1,146,744
Sub-total Revenue Requirements	**$8,353,991**	**$1,146,744**	**$9,500,735**
Rate Revenue Offsets			
Property Taxes		$725,000	$725,000
Cell Site Lease Income	$165,000		$165,000
Other Non-Rate Revenue		$426,236	$426,236
Total Rate Revenue Offsets	**$165,000**	**$1,151,236**	**$1,316,236**
Adjustments			
Annual Capital Funding		$3,626,000	$3,626,000
Annual Reserve Funding[8]		($100,000)	($100,000)
Total Adjustments	**$0**	**$3,526,000**	**$3,726,000**
COS to be Recovered from Water Rates	**$8,188,991**	**$3,521,508**	**$11,710,499**

4.1 FUNCTIONALIZATION OF O&M EXPENSES

Table 4-2 shows the functionalization of CCWD O&M expenses for the rate setting year, FY 2018-2019. Functionalizing O&M expenses allows Raftelis to follow the principles of rate setting theory in which the goal is to allocate the O&M expenses to cost causation components. The totals by function are presented in Table 4-2.

Table 4-2: Functionalization of O&M Expenses

Cost Category	O&M Expenses by Function ($)
Supply	$2,238,078
Pumping	$169,247
Transmission	$74,666
Treatment	$503,347
Distribution	$424,200
Conservation	$79,900
Ops/Meters/Customer	$1,133,881
General	$3,730,672
Total	**$8,353,991**

[8] The District anticipates drawing upon $100,000 in reserves in FY 2018-2019 to help fund capital during the fiscal year. Annual Reserve Funding is, therefore, shown as a negative number.

4.2 ALLOCATION OF FUNCTIONALIZED EXPENSES TO COST COMPONENTS

After functionalizing expenses, the next step is to allocate the functionalized expenses to cost components. To do so, we must identify system-wide peaking factors. The system-wide factors for base and max day were calculated using CCWD daily water production records. Daily production record values and ratios are shown in Table 4-3. The ratio in the column furthest right is the maximum day production in million gallons per day (mgd) divided by the average production in million gallons per day.

Table 4-3: Water Production Factors

	Max Day (mgd)	Avg Day (mgd)	Min Day (mgd)	Max Day/ Avg Day
FY 2016	2.28	1.54	0.79	1.49
FY 2017	2.64	1.51	0.77	1.75
Average	**2.46**	**1.52**	**0.78**	**1.62**

Calculated water system peaking factors are shown in column B of Table 4-4. The system-wide peaking factors are used to derive the cost causation component allocation bases (i.e., percentages) shown in columns C, D, and E of Table 4-4. Line 1 "Base" represents the average day demand throughout the year and is, therefore, a factor of 1.00. Line 2 "Max day" is the ratio of maximum day demand (calculated in Table 4-3) to base demand or 1.62. The incremental responsibility due to max day is therefore 0.62 (1.62-1.00)/1.62) or 38 percent. Similarly, Line 3, "max hour" is the ratio of maximum hour demand, on the maximum day, to base demand. In the absence of hourly data, we rely on industry standards for similarly sized systems of 1.66 times the max day demand. The max hour factor is, therefore, 1.66 X 1.62 or 2.68. 1.00 out of 2.68 of the max hour factor is attributable to base demand (1.00/2.68 or 37 percent) and 0.62 out of 2.68 or 23 percent is attributable to max day. The remainder ((2.68-1.62)/2.68 or 1.06) represents the incremental amount attributable to max hour (1.06/2.68 or 40 percent). These factors indicate how much additional capacity is required to meet demand above average daily use. As demand, and therefore capacity, increases, so must the sizing of facilities and pipelines, which incur greater costs to construct, maintain, and replace. Functionalized expenses are then allocated to the cost components using these bases. To understand the interpretation of the percentages shown in columns C through E we must first establish the base use as the average daily demand during the year.

These allocation bases are used to assign certain functionalized costs to the cost causation components including reservoir, transmission, treatment, distribution, and Ops/Meters/Customer functions.

Table 4-4: System-Wide Peaking Factors

		System Wide Factors	Base	Max Day	Max Hour
	A	B	C	D	E
1	Base	1.00	100%		
2	Max Day	1.62[9]	62%	38%	
3	Max Hour	2.68[10]	37%	23%	40%

Table 4-5 shows the allocation basis for CCWD O&M costs. The top row of Table 4-5 shows the cost causation components and the leftmost column shows the cost functions. For example, transmission related costs are allocated 62 percent to base and 38 percent to max day (allocation based upon the max day calculation in Table 4-4). This means that 62 percent of transmission costs are due to meeting base customer demands and 38 percent of costs are due to meeting max day demands.

[9] Max Day to Average Day from Table 4-3

[10] Max Hour factor is estimated using the calculated Max Day factor multiplied by an industry standard of 1.66. 1.66 represents the increase in demand on the maximum day during the maximum hour

Table 4-5: Allocation of Functionalized O&M Expenses to Cost Causation Components

Function	FY 2018-2019	Supply	Base	Max Day	Max Hour	Fire Protection	Meters	Customer	Conservation	General
Supply	$2,238,078	100%								
Pumping	$169,247	100%								
Transmission	$74,666		62%	38%						
Treatment	$503,347		62%	38%						
Distribution	$424,200		31%	19%	33%	18%				
Conservation	$79,900								100%	
Ops/Meters/Customer	$1,133,881		35.3%	21.8%	37.7%			5.2%		
General	$3,730,672									100%
Total	**$8,353,991**	**$2,407,325**	**$887,686**	**$547,696**	**$565,863**	**$76,356**	**$0**	**$58,493**	**$79,900**	**$3,730,672**

4.1 ALLOCATION OF FUNCTIONALIZED EXPENSES TO COST COMPONENTS

A similar allocation is performed for the District's capitalized assets. Capital costs are allocated based on the asset base of the system in recognition that assets need to be replaced over time. Correspondingly, capital expenses over time should correlate to the asset base. This ensures that the allocations to the cost causation components, and ultimately the rates, remain relatively stable over time. Table 4-6 shows the functionalized assets allocated to the cost components in both dollar and percentage terms.

Table 4-6: Allocation of Functionalized Asset Valuation to Cost Causation Components

Function	Value ($)	Supply	Base	Max Day	Max Hour	Fire Protection	Meters	General
Supply	$1,269,937	100%	0%	0%	0%	0%	0%	0%
Treatment	$11,642,869	0%	62%	38%	0%	0%	0%	0%
Reservoir	$4,475,361	0%	51%	31%	0%	18%	0%	0%
Distribution	$20,200,260	0%	31%	19%	33%	18%	0%	0%
Transmission	$10,895,890	0%	62%	38%	0%	0%	0%	0%
Meters	$865,783	0%	0%	0%	0%	0%	100%	0%
General	$1,685,904	0%	0%	0%	0%	0%	0%	100%
Wells	$246,949	100%	0%	0%	0%	0%	0%	0%
Fire	$390,647	0%	0%	0%	0%	100%	0%	0%
Total ($)	**$51,673,601**	**$1,516,886**	**$22,379,195**	**$13,807,803**	**$6,585,772**	**$4,832,259**	**$865,783**	**$1,685,904**
Total (%)		2.9%	43.3%	26.7%	12.7%	9.4%	1.7%	3.3%

4.1 PRELIMINARY COST ALLOCATION OF REVENUE REQUIREMENT

Table 4-7 shows the revenue requirement, by cost component, before adjustments for public fire protection and capacity costs (discussed further in the next sub-section). The operating expenses come directly from the allocation in Table 4-5. The capital expense allocation uses the capital revenue requirement[11] from Table 4-1 and the percentages from the bottom of Table 4-6. General costs are distributed to the cost causation components on a pro rata basis.

Table 4-7: Preliminary Revenue Requirement by Cost Component

Cost of Service	Supply	Base	Max Day	Max Hour	Fire Protection	Meters	Customer	Conservation	General	Revenue Offsets	Total
Operating Expenses	$2,407,325	$887,686	$547,696	$565,863	$76,356	$0	$58,493	$79,900	$3,730,672		$8,353,991
Capital Expenses	$124,657	$1,839,110	$1,134,718	$541,215	$397,112	$71,150	$0	$0	$138,547		$4,246,508
Revenue Offsets	$0	$0	$0	$0	$0	$0	$0	$0	$0	($890,000)	($890,000)
Sub-total Cost of Service	**$2,531,982**	**$2,726,796**	**$1,682,413**	**$1,107,078**	**$473,468**	**$71,150**	**$58,493**	**$79,900**	**$3,869,219**	**($890,000)**	**$11,710,499**
Allocation of General Cost		$1,701,897	$1,050,059	$690,970	$295,510	$44,407	$36,507	$49,869	($3,869,219)		$0
Allocated Cost of Service	**$2,531,982**	**$4,428,693**	**$2,732,472**	**$1,798,048**	**$768,978**	**$115,557**	**$95,000**	**$129,769**	**$0**	**($890,000)**	**$11,710,499**

4.2 REVENUE RECOVERY BY COST COMPONENTS

The cost components are recovered from customers through fixed bi-monthly base service charges and variable volumetric commodity charges. Table 4-8 shows the total revenue requirement, calculated in Table 4-1, to be collected through rates in the second column from

[11] The capital revenue requirement in Table 4-1 is reduced by the amount of property taxes ($725,000), which is added back to Table 4-7 to show the gross capital requirement. The property tax and cell site lease income from Table 4-1 ($165,000) represent the revenue offset in Table 4-7 and are shown as their own cost component.

the left (and transposed from the bottom of Table 4-7). While Table 4-8 shows the allocation to rate components in percentage terms, Table 4-9 shows the allocation in dollars. The sum of all rate components under the blue header represents the revenue required from commodity charges. The sum of all rate components under the orange header represents the revenue required from service charges. Max day and max hour capacity cost recovery is split between the variable components (max day and max hour columns) and the fixed charge components (meter column) to balance between affordability and revenue stability. Service Charge components include the two fixed charge components, meter and customer, as well as the private fire protection costs. In total, commodity charge revenue represents 78.1 percent of the total revenue requirement, while bi-monthly service charges and private fire service charges account for the remaining 21.9 percent. This proposed revenue split reduces the revenue recovery from fixed charges relative to current rates. The District currently recovers approximately 22.5 percent of revenue from fixed charges.

Table 4-8: Cost Recovery, Cost Components (Percentage)

Cost Components	FY 2018-2019	Commodity Rate Components (78.1%)						Service Charge Components (21.9%)		
	Revenue Requirement	Supply	Base Delivery	Max Day	Max Hour	Conservation	Rev Offsets	Meters	Customer	Fire Protection
Supply	$2,531,982	100%								
Base Delivery	$4,428,693		100%							
Max Day	$2,732,472			65%				35%		
Max Hour	$1,798,048				65%			35%		
Fire Protection	$768,978									100%
Meters	$115,557							$100		
Customer	$95,000								100%	
Conservation	$129,769					100%				
Rev. Offsets	($890,000)						100%			
Total	**$11,710,499**	**$2,531,982**	**$4,428,693**	**$1,776,107**	**$1,168,731**	**$129,769**	**($890,000)**	**$1,701,239**	**$95,000**	**$768,978**

Table 4-9: Cost Recovery, Cost Components (Values)

Cost Components	FY 2018-2019	Commodity Rate Components (78.1%)						Service Charge Components (21.9%)		
	Revenue Requirement	Supply	Base Delivery	Max Day	Max Hour	Conservation	Rev Offsets	Meters	Customer	Fire Protection
Supply	$2,531,982	$2,531,982								
Base Delivery	$4,428,693		$4,428,693							
Max Day	$2,732,472			$1,776,107				$956,365		
Max Hour	$1,798,048				$1,168,731			$629,317		
Fire Protection	$768,978									$768,978
Meters	$115,557							$115,557		
Customer	$95,000								$95,000	
Conservation	$129,769					$129,769				
Rev. Offsets	($890,000)						($890,000)			
Total	**$11,710,499**	**$2,531,982**	**$4,428,693**	**$1,776,107**	**$1,168,731**	**$129,769**	**($890,000)**	**$1,701,239**	**$95,000**	**$768,978**

4.1 ALLOCATION OF FIRE PROTECTION COSTS – PUBLIC VERSUS PRIVATE

Water systems provide two types of fire protection: public fire protection for firefighting, which is generally visible as hydrants on a street, and private fire protection which provides fire flow to building and other structure sprinkler systems for fire suppression within private improvements. To determine the share of total fire costs responsible to each, Raftelis performs an analysis of the public hydrants and private firelines. Table 4-10 shows the steps of allocating costs between public and private. Each connection size has a fire flow demand factor similar to a hydraulic capacity factor of potable meters. The diameter of the connection is raised to the 2.63 power to determine the fire flow demand factor. The count of connections of a specific size is multiplied by the fire flow demand factor to derive total equivalent connections. Total fire costs of $768,978 are allocated based on the percentage share of total equivalent fire connections between public and private. From the analysis it is determined that 82 percent of fire costs relate to public fire and will be included and recovered on the bi-monthly fixed charges. The remaining 18 percent is attributable to private fire and will be recovered through private fire protection charges.

Table 4-10: Fire Analysis

Connection Size	Demand Factor	Unit Counts	Equivalent Connections	Percent Allocation	Fire Protection Costs	Fire Exponent
					$768,978	**2.63**
Public Hydrants						
2.5"	11.1					
4"	38.3					
6"	111.3	647	72,018			
10"	426.6					
Total Public Hydrants		**647**	**72,018**	82%	**$631,127**	
(Private Fire Lines)						
3/4"	0.47	10	5			
1"	1	658	658			
1 1/2"	3	49	142			
2"	6	82	508			
3"	18	4	72			
4"	38	123	4,713			
5"	69					
6"	111	55	6,122			
8"	237	13	3,084			
10"	427	1	427			
Total Private Lines		**995**	**15,730**	18%	**$137,851**	
Total Fire Connections		**1,642**	**87,748**	100%	**$768,978**	

4.1 FINAL COST ALLOCATION OF REVENUE REQUIREMENT

The total revenue recoverable from each cost causation component through water rates is shown in Table 4-11 using the revenue requirement from Table 4-1, the O&M and asset allocations in Table 4-5 and Table 4-6, the capacity cost recovery adjustment in Table 4-8 and Table 4-9, and the fire cost analysis in Table 4-10. Public fire protection costs are reallocated to the meter component, along with a portion of the max day and max hour peaking costs.

Table 4-11: Revenue Requirement by Cost Component

Cost of Service	Supply	Base	Max Day	Max Hour	Fire Protection	Meters	Customer	Conservation	General	Revenue Offsets	Total
Operating Expenses	$2,407,325	$887,686	$547,696	$565,863	$76,356	$0	$58,493	$79,900	$3,730,672		$8,353,991
Capital Expenses	$124,657	$1,839,110	$1,134,718	$541,215	$397,112	$71,150	$0	$0	$138,547		$4,246,508
Revenue Offsets	$0	$0	$0	$0	$0	$0	$0	$0	$0	($890,000)	($890,000)
Sub-total Cost of Service	**$2,531,982**	**$2,726,796**	**$1,682,413**	**$1,107,078**	**$473,468**	**$71,150**	**$58,493**	**$79,900**	**$3,869,219**	**($890,000)**	**$11,710,499**
Allocation of General Cost		$1,701,897	$1,050,059	$690,970	$295,510	$44,407	$36,507	$49,869	($3,869,219)		$0
Allocated Cost of Service	**$2,531,982**	**$4,428,693**	**$2,732,472**	**$1,798,048**	**$768,978**	**$115,557**	**$95,000**	**$129,769**	**$0**	**($890,000)**	**$11,710,499**
Re-allocation of Public Fire					**($631,127)**	**$631,127**					
Reallocation of Capacity Components			**($956,365)**	**($629,317)**		**$1,585,682**					
Adjusted Cost of Service	**$2,531,982**	**$4,428,693**	**$1,776,107**	**$1,168,731**	**$137,851**	**$2,332,366**	**$95,000**	**$129,769**	**$0**	**($890,000)**	**$11,710,499**

4.2 UNIT COST COMPONENT DERIVATION

The end goal of a cost of service analysis is to proportionately distribute the cost components to each user class and tier. To do so, we must first calculate the cost component unit costs, which starts by assessing the total water demanded (or equivalent service units) for each cost component. Projected usage (base units of service) for FY 2018-2019 is shown in Table 4-12. Demand is detailed by proposed rate class.

Table 4-12: FY 2018-2019 Projected Water Usage by Class

Class	hcf/year
SFR	415,904
MFR	43,988
All Other Customers	328,634
Total	**788,525**

Second, peaking factors are established for the maximum day and maximum hour requirements, which become the basis for the peaking unit rate differentials developed in Section 6.

Analyzing usage characteristics gives a better understanding of how the peaking costs should be allocated. In the absence of maximum day data, the maximum billing period values are used. Since peaking costs are proportional to the peaking experienced by each tier, the relative values are more important than the actual values. Therefore, max billing period data derived from the usage patterns are a good proxy for the max day factors. The max day factor is equal to the max month factor. Similarly, since max hour factors are not available, we use the District's system wide max hour factor to approximate the max hour factor.

Table 4-13 shows the calculation of cost component units for average (daily) demand, max day demand, and max hour demand, for each class.

Daily use is calculated as annual use divided by 365 days. For example, SFR is estimated to use 415,904 hcf annually, or 1,139 hcf daily. The max day demand is then calculated as the daily demand multiplied by the max day factor (1,139 X 1.97). However, we must subtract the anticipated daily usage (1,139) from the max day usage (2,247) to calculate the incremental max day units of service (1,108). Max hour units of service are calculated similarly and the same calculations are completed for the MFR and All Other Customers classes.

Table 4-13: Derivation of Cost Component Units of Service

Tier	Annual Usage (hcf)	Daily Usage (hcf)	Max Day Factor	Max Day Demand (hcf)	Max Day Units (hcf)	Max Hour Factor	Max Hour Demand (hcf)	Max Hour Units (hcf)
SFR	415,904	1,139	1.97	2,247	1,108	3.27	3,730	1,483
MFR	43,988	121	1.73	209	88	2.88	347	138
All Other Customers	328,634	900	2.06	1,851	950	3.41	3,072	1,221
Total	**788,525**	**2,160**		**4,307**	**2,146**		**7,149**	**2,842**

Table 4-14 shows the total equivalent meters (discussed in detail in Section 6.2) and annual number of bills issued (also discussed in Section 6.2). Table 4-15 shows the total equivalent fireline connections (further discussed in Section 6.3.) These totals are used as the denominator in developing unit costs for the rate components of the bi-monthly base charges and private fire service charges.

Table 4-14: Derivation of Equivalent Meters

Meter Size	Meter Count	Hydraulic Capacity Factor	Equivalent Meters	Annual Bills
5/8"	6,000	1.00	6,000	36,000
3/4"	194	1.50	291	1,164
1"	175	2.50	438	1,050
1.5"	28	5.00	140	168
2"	34	8.00	272	204
3"	5	17.50	88	30
4”	3	31.50	95	18
Total	**6,439**		**7,323**	**38,634**

Table 4-15: Derivation of Equivalent Firelines

Fireline Size	Fireline Count	Inch-Diameter Demand Factor	Equivalent Firelines
3/4"	10	0.75	8
1"	658	1.00	658
1 1/2"	49	1.50	74
2"	82	2.00	164
3"	4	3.00	12
4"	123	4.00	492
5"	-	5.00	-
6"	55	6.00	330
8"	13	8.00	104
10"	1	10.00	10
Total	**995**		**1,851**

Utilizing the adjusted cost of service at the bottom of Table 4-11 as the numerator and Table 4-13, Table 4-14, and Table 4-15 as the denominators allows us to derive unit costs of service in Table 4-16. The total cost of service is divided by the respective units of service to calculate the unit cost of each cost component. For example, the unit cost for the base component is determined by dividing the total base cost ($4,428,693) by total water use (788,525 hcf) to derive a base unit cost of $5.62. Max day and max hour costs are divided by the total max day and max hour requirements to determine a unit rate in hcf/day. Meter costs are divided by total meter equivalencies from Table 4-14 to determine a cost per equivalent meter and annual customer costs are divided by the estimated number of annual bi-monthly bills, also from Table 4-14. Fire protection costs are divided by total fire equivalencies from Table 4-15 to determine a cost per inch of fireline. The unit costs are used to distribute the cost components to the meter classes and commodity classes and tiers.

Table 4-16: Cost Causation Component Unit Cost Calculation

Cost of Service	Supply	Base Delivery	Max Day	Max Hour	Fire Protection	Meters	Customer	Conserv -ation	Revenue Offsets	Total
Cost of Service	$2,531,982	$4,428,693	$1,776,107	$1,168,731	$137,851	$2,332,366	$95,000	$129,769	($890,000)	$11,710,499
Unit of Measure	hcf	hcf	hcf/day	hcf/day	Equivalent Firelines	Equivalent Meters	Number of Bills	hcf	hcf	
Units of Service	788,525	788,525	2,146	2,842	1,851	7,323	38,634	788,525	788,525	
Unit Cost	**$3.21**	**$5.62**	**$827.56**	**$411.19**	**$12.41**	**$53.09**	**$2.46**	**$0.16**	**($1.13)**	

4.3 DISTRIBUTION OF COST COMPONENTS TO CUSTOMER CLASSES

The final step in a cost of service analysis is to distribute the cost components to the customer classes using the unit costs derived in Table 4-16. This is the end goal of a cost of service analysis and yields the cost to serve each class. Table 4-17 shows the derivation of the cost to serve (i.e., cost of service) for each class. The cost components from Supply through Revenue Offsets are collected through the commodity (volumetric) charges ($/hcf). Fire Protection, Meters, and Customer components are collected through the District's bi-monthly base service and private fire service charges.

To derive the cost to serve each class, the unit costs from Table 4-16 are multiplied by the respective units of service for each class. For example, the base costs for the Single Family Residential (SFR) class are calculated by multiplying the base unit cost ($5.62) by the annual SFR use (415,904 hcf) to arrive at a total of $2,335,891. Similar calculations for each of the remaining user classes and cost components yield the total cost to serve each user class shown in the furthest right column of Table 4-17. Note that the total cost of service is equal to the revenue requirement in Table 4-1 as intended. With the cost to serve each user class calculated we can proceed to derive rates to collect the cost to serve each commodity class, tier, and meter size.

Table 4-17: Derivation of the Cost to Serve Each Class

Customer Class	Supply	Base	Max Day	Max Hour	Conservation	Revenue Offsets	Fire Protection	Meters	Customer	Total
SFR	$1,335,480	$2,335,891	$916,662	$609,838	$68,446	($469,426)				$4,796,891
MFR	$141,247	$247,055	$73,007	$56,647	$7,239	($49,649)				$475,546
All Other Customers	$1,055,255	$1,845,748	$786,438	$502,246	$54,084	($370,926)				$3,872,845
Meters								$2,332,366	$95,000	$2,427,366
Private Fire							$137,851			$137,851
Total	**$2,531,982**	**$4,428,693**	**$1,776,107**	**$1,168,731**	**$129,769**	**($890,000)**	**$137,851**	**$2,332,366**	**$95,000**	**$11,710,499**

5. RATE STRUCTURE DEFINITIONS AND PROPOSED REVISIONS

CCWD has an inclining tier rate structure for residential users (SFR and some MFR) and a uniform rate for all other users[12]. The most recent update to these rate structures occurred with the last Cost of Service Study in May 2015. Existing rates and charges were implemented July 1, 2017.

5.1 EXISTING RATE STRUCTURE AND RATES

CCWD water service charges have two components for most customers – a fixed bi-monthly base meter service charge and a volumetric charge (water use). Some customers requiring fire protection have a third charge related to private firelines serviced by CCWD. The bi-monthly fixed charge and private fire service charge increases with meter size or fireline size as larger meters/fire conduits consume more water on average and tend to have higher rates of peaking (required for instantaneous demand in terms of irrigation of firefighting); therefore, the costs to provide service to these customers are higher.

A typical single family home with a 5/8" meter has a bi-monthly fixed charge of $52.20. CCWD has a different bi-monthly base charge for certain Multi-Family Residential (MFR) customers with two dwelling units. Current base meter charges are shown in Table 5-1. Current private fire service charges are shown in Table 5-2.

Table 5-1: Existing Bi-Monthly Base Charges

Meter Size	Fixed Charge
5/8"	$52.20
3/4"	$78.45
1"	$130.76
1-1/2"	$252.52
2"	$418.48
3"	$915.50
4"	$3,139.22
5/8" MFR	$104.39
3/4" MFR	$156.89

[12] Multi-Family residential accounts are billed on either the tiered residential structure or the uniform "all other customer" structure dependent on the type of multi-family customer and meter type serving the connection.

Table 5-2: Existing Bi-Monthly Private Fire Service Charges

Fireline Size	Fixed Charge
3/4"	$8.57
1"	$11.43
1-1/2"	$17.15
2"	$22.86
3"	$34.29
4"	$45.72
5”	$57.15
6"	$68.58
8"	$91.44
10"	$114.30

The volumetric component of a customer’s water charge is the number of units delivered in one hundred cubic feet, or “hcf”, multiplied by rates that vary by customer class and tier. Single Family Residential (SFR) refers to stand alone houses with a single dwelling unit. MFR refers to residential housing with two or more dwelling units, such as duplexes, triplexes, certain condominiums, and apartment complexes.

Table 5-3: Existing Commodity Rates and Tiers

Current Commodity Rates	Definition (hcf)	Rate ($/hcf)
Residential		
Tier 1	0-4	$9.65
Tier 2	5-16	$10.77
Tier 3	17-30	$13.89
Tier 4	31+	$18.41
All Other Customer Classes	N/A	$11.88

5.2 PROPOSED CHANGES TO RATE STRUCTURES

Raftelis has identified several recommendations for the District. Throughout the Study, Raftelis worked with CCWD staff and Board direction to refine proposed revisions to the rate structures.

Raftelis recommends changes to the rate structures and tier definitions for the commodity charges. Raftelis proposes to reduce the Residential (proposed SFR rate class) rate structure from four tiers to three and justify those tiers based upon usage characteristics of the class consistent with how water is used. The proposed changes and rationale are detailed in the following subsections.

5.2.1 *SFR Class*

The existing Residential rate structure includes SFR and some MFR customers. While tiering works well for SFR customers due to fairly homogenous use across the class, MFR customers exhibit different characteristics. For example, MFR customers may or may not be individually metered, MFR customers may have separate domestic and landscape meters, and one domestic meter may serve many dwelling units. Therefore, a tiered rate structure for MFR customers is only fair and equitable when considering the number of dwelling units served by each metered connection. Raftelis

recommends separating the existing Residential class into one rate structure for SFR and one rate structure for MFR. The proposed tiers and rationale are as follows:

5.2.1.1 *Tier 1 Definition – 0-8 hcf monthly*

Raftelis recommends using average low winter use as the Tier 1 definition. The average low winter use isolates the effects of outdoor irrigation in the warmer and drier use periods. Raftelis calculated approximately 8 hcf bi-monthly (4 hcf monthly) as the average low winter use for residential customers using FY 2016-2017 data.

5.2.1.2 *Tier 2 Definition – 8-16 hcf monthly*

Raftelis recommends using an efficiency standard for an average user to define Tier 2. An additional eight units (16 units total in Tier 2) represents the efficient summer water demand of a median size parcel in the District's service area. To derive the volume of water for efficient outdoor use Raftelis makes assumptions of the percent of irrigated area and incorporates local evapotranspiration data and a crop coefficient

The irrigable landscape area is measured as the square footage of landscape surface on a customer's property that is being actively irrigated. The weather data are based on the reference evapotranspiration (ET_0), which is the amount of water lost to the atmosphere over a given time period at given specific atmospheric conditions. ET_0 is the amount of water (in inches of water) needed for a reference crop (in this case cool season turf grass). The ET Adjustment Factor (ETAF) is a coefficient that adjusts the ET_0 values based on plant factor and irrigation system efficiency. The formula to calculate the eight units of water is as follows:

$$\text{hcf} = \left(\frac{\text{Lot Size} * \%\ \text{Lot Size} * ET_0 * \text{ETAF}}{1200} \right)$$

Where:

- Lot Size is the median parcel area identified for the service area in square feet. The median lot size is estimated at 8,398 square feet.
- % of lot size – is the estimated area of a median sized parcel that is actively irrigated which is assumed at 25 percent. % of lot size multiplied by the median lot size yields an estimate for actively irrigated landscape area of 1,470 square feet .
- ET_0 is measured in inches of water during the billing period based on actual ET measurements taken from California Irrigation Management Information System (CIMIS) Station 253 at Pescadero, CA.
- ETAF (% of ET_0): The current California Model Water Efficient Landscape Ordinance[13] is 70 percent. It is based upon plant factor divided by irrigation efficiency.
- 1,200 is the conversion unit from inch*ft^2 to billing unit of hundred cubic feet (hcf).

5.2.1.3 *Tier 3 Definition – Greater than 16 hcf monthly*

All water use greater than Tier 2. Tier 3 represents demand in excess of peak summer demands for the average SFR user.

[13] *California Code of Regulations Title 23, Division 2, Chapter 2.7. Model Water Efficient Landscape Ordinance.*

5.2.1 *MFR*

The vast majority of MFR customers are currently billed using the All Other Customers uniform rate, with a minority billed on the tiered Residential rate structure. MFR customers have very low peaking compared to commercial or irrigation customers as most use is domestic and consistent throughout the year; and MFR customers are distinct from SFR users which have seasonal peaking due to irrigation demands. To increase equity between the customer classes, Raftelis recommends the class be charged a MFR specific uniform rate derived using MFR usage and peaking data.

5.2.2 *All Other Customer Classes*

The existing structure charges a uniform rate to all customer classes that are not residential. These accounts consist of commercial users, landscape irrigators, and agricultural users. Raftelis analyzed water use and peaking characteristics of non-residential customers. The usage patterns and peaking characteristics among commercial, irrigation, and agricultural users are very similar and we propose to keep the existing uniform rate structure for all users that are not SFR or MFR.

5.2.3 *Multi-Family Residential Fixed Charge*

The existing rate structure charges two dwelling unit (duplex) multi-family accounts a fixed charge that is two times that of a comparable 5/8" or 3/4" meter. Raftelis proposes to eliminate the per-dwelling unit charge in favor of a charge based solely on the size of the meter. This eliminates the conflict of some customers being charged by capacity (i.e, meter size) and some by dwelling unit counts. The effect is to simplify the rate structure so that all connections are charged based on the capacity- utilized or potential- of their connection.

Table 5-4 summarizes the proposed changes to the commodity rate structures.

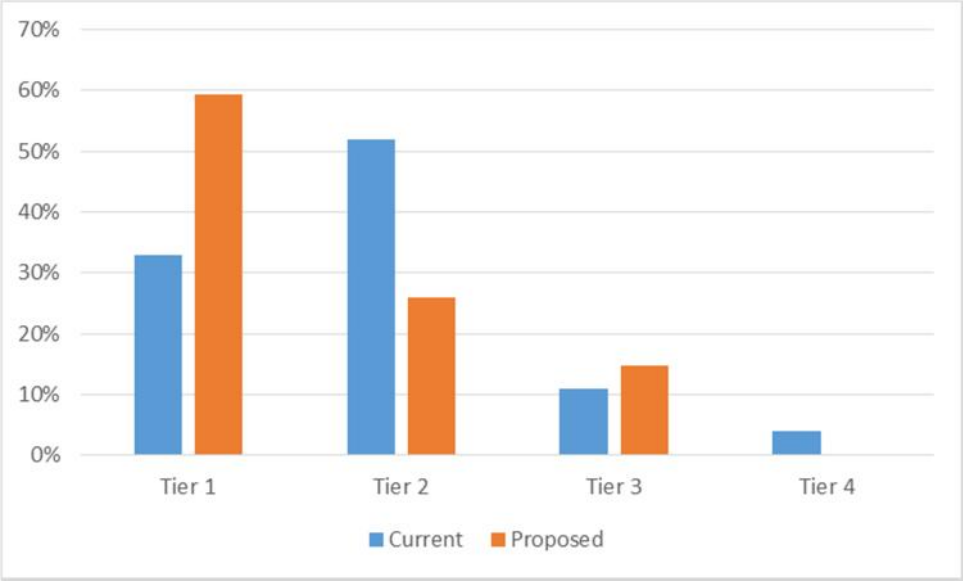
Table 5-4: Existing and Proposed Water Commodity Definitions

Proposed Rate Classes	Current Definition (hcf)	Proposed Definition (hcf)
SFR		
Tier 1	0-4	0-8
Tier 2	5-16	8-16
Tier 3	17-30	17+
Tier 4	31+	N/A
MFR		
Tier 1	0-4	Uniform
Tier 2	5-16	
Tier 3	17-30	
Tier 4	31+	
All Other Customer Classes (Commercial, Irrigation, Agriculture)	Uniform	Uniform

5.3 USAGE ANALYSIS AND USAGE PROJECTIONS

Figure 5-1 compares the distribution of SFR usage under the existing rate structure to the proposed structure. Under the revised tiers, 59 percent of use will occur in Tier 1 versus 33 percent in the current structure. Since the proposed definition doubles the allotment in Tier 1, more use will fall in the first tier. The opposite is true for the proposed Tier 2 versus the current Tier 2, since Tier 2 will now have a width of eight hcf versus the current 12 hcf. The proposed Tier 3 includes all the use in the current Tier 3 and Tier 4 (15 percent). Note, the comparisons in Figure 5-1 utilize historical water use. Predicting future water use relies on several factors and is difficult to determine. Therefore, this analysis does not attempt to forecast changes by customers due to changes in tier definition or price.

Figure 5-1: Current and Proposed SFR Usage Distribution



5.3.1 *Projected Water Use FY 2018-2019*

Using the proposed tier definitions, projected usage in FY 2018-2019 for all classes and tiers is shown in Table 5-5. FY 2018-2019 demand includes an assumed seven and a half percent demand increase from FY 2016-2017 water use. Any sales from fire flow or construction/temporary meters is not counted since revenue from these sources is variable and unreliable.

Table 5-5: Projected FY 2018-2019 Demand by Customer Class (Proposed Tier Definitions)

Class	FY 2018-2019 Demand (hcf)
SFR	
Tier 1	246,360
Tier 2	108,265
Tier 3	61,278
MFR	43,988
All Other Customers	328,634
Total	**788,525**

6. WATER RATE DERIVATION

6.1 EXISTING RATE STRUCTURE AND RATES

As previously explained, the rate structure for CCWD's water service charges have three components – a fixed base charge by meter size, a variable volumetric commodity charge, and, for certain customers, a fixed charge by fireline diameter. The rates for the bi-monthly fixed meter charge are determined on the basis of the size of the water meter serving a property and increase with meter size. Larger meters generally consume more water on average and tend to have higher rates of peaking. Therefore, the costs to provide service to these customers are higher. The rates for the current commodity charges are calculated on the basis of the amount of water delivered in hcf.

6.2 PROPOSED FIXED METER CHARGES

Utilities invest in and continuously maintain facilities to provide capacity to meet all levels of water consumption, including peak demand plus fire protection. These costs must be recovered regardless of the amount of water used during a given period. Generally, an agency with access to a significant portion of local water sources have high fixed costs. In many cases, greater than 80 percent of total costs are fixed water system costs and do not vary based on the amount of water sold. To balance between affordability and revenue stability, it is a common practice that a portion of the capacity related costs are recovered in the bi-monthly service charge, along with customer-related costs and meter-related costs. The cost of service analysis allocates 35 percent of peak capacity costs (max day and max hour) to the base meter charge, along with all meter, customer, and public fire protection costs.

There are two components that comprise the fixed meter charge: meter servicing costs and customer service costs. The meter service charge recognizes the fact that even when a customer does not use water, CCWD incurs ongoing costs in order to operate and maintain the system for each connection at all times.

6.2.1 *Meter Services Component*

The meter services component collects service related costs as well as a portion of system capacity costs. Larger meters are more expensive to maintain and replace and have the potential to demand more capacity, or, said differently, larger meters exert greater peaking demand compared to smaller meters. The capacity (peaking) is proportional to the potential flow through each meter size as established by the American Water Works Association (AWWA) hydraulic capacity ratios. For example, the flow through a 4" meter is 31.5 times that of a 5/8" meter and, therefore, the meter capacity component of the fixed meter charge should be 31.5 times that of the 5/8" meter.

In order to create parity across the various meter sizes, each meter size is assigned a factor relative to a 5/8" meter, which has a value of 1.00. This establishes the "base" meter size. A given meter size's ratio of meter servicing costs relative to the base (that of a 5/8" meter) determines the *meter equivalency*. Summation of all meter equivalencies for a given size yields total equivalent meters. For this Study, Raftelis uses standard AWWA hydraulic capacity ratios as found in the *Manual M22 – Sizing Water Service Lines and Meters, Third Edition*.

Table 6-1 shows total meter equivalencies in the system. The total equivalent meters are derived by multiplying the number of meters at each size by the respective capacity ratio (relative to the 5/8" base meter) and summing across all meter sizes. The total number of equivalent meters within CCWD's system is 7,323.

Table 6-1: Meter Equivalents Calculation

Meter Size	Meter Count (a)	Capacity Ratio (5/8" Base) (b)	Equivalent Meters (Capacity) (a)*(b)
5/8"	6,000	1.00	6,000
3/4"	194	1.50	291
1"	175	2.50	438
1-1/2"	28	5.00	140
2"	34	8.00	272
3"	5	17.50	88
4"	3	31.50	95
Total Count/ Equivalencies	**6,439**		**7,323**

Table 6-2 shows the calculation of the meter service component of the fixed meter charge. It is calculated by dividing the total meter costs (inclusive of meter servicing costs and the portion of capacity costs previously discussed) from Table 4-16 by the total number of equivalent meters in Table 6-1 and the total number of billing periods (six). The cost is $53.09 per equivalent meter per billing period rounded up to the nearest penny.

Table 6-2: Fixed Base Charge Meter Service Component Calculation

	FY 2018-2019
Meter Services Costs	$2,332,366
Equivalent Meters	7,323
Cost per Equivalent Meter (per bill)	**$53.09**

6.2.2 *Billing and Customer Service Component*

The customer service component recovers costs associated with meter reading, customer billing and collection, as well as answering customer service calls. These costs are uniform for all meter sizes as it costs the same to bill a small meter as it does a large meter.

Table 6-3 shows the customer service component calculation. To calculate the customer component, Raftelis divides the total billing and customer service costs from Table 4-16 by the total annual bills (active meters multiplied by six billing periods) prepared by CCWD to determine the bi-monthly customer service charge component of $2.46.

Table 6-3: Billing and Customer Service Component Calculation

	FY 2018-2019
Customer Service Costs	$95,000
Annual Bills	38,634
Customer Component (per bill)[14]	**$2.46**

[14] Billing & Customer Service calculation includes all potable water accounts.

Table 6-4 shows the calculation of the proposed FY 2018-2019 rates for the fixed meter charges. The proposed rates are the sum of the meter service component and the billing and customer service component (shown as customer component). The customer component is uniform for all meter sizes. The meter services component is the cost per equivalent meter calculated in Table 6-2 multiplied by the respective meter ratio in Table 6-1. The rate comparison is relative to existing rates implemented in July 2017. The most common meter size of 5/8" experiences an increase of $3.35 relative to the current charge. All other meter sizes other than the 4" also experience increases due to recovering more rate revenue overall. The varying differences are due to harmonizing the hydraulic capacity ratios across all meter sizes using the most current industry guidance as well as the inclusion of the uniform customer component which is currently not included in the District's fixed charge calculation. While Raftelis has calculated meter charges up to 8", charges are only shown up to 4", the largest meter size currently active in the water system.

Table 6-4: Calculation of Fixed Base Charges

Meter Size	Meter Service Component	Customer Component	Proposed FY 2018-2019 Fixed Charge	Current Charge	Difference ($)	Difference (%)
5/8"	$53.09	$2.46	$55.55	$52.20	$3.35	6%
3/4"	$79.63	$2.46	$82.09	$78.45	$3.64	5%
1"	$132.72	$2.46	$135.18	$130.76	$4.42	3%
1 1/2"	$265.43	$2.46	$267.90	$252.52	$15.38	6%
2"	$424.69	$2.46	$427.16	$418.48	$8.68	2%
3"	$929.02	$2.46	$931.48	$915.50	$15.98	2%
4"	$1,672.23	$2.46	$1,674.70	$3,139.22	($1,464.52)	-47%

6.3 PROPOSED PRIVATE FIRE SERVICE CHARGES

Table 6-5 shows the derivation of the private fire service charges. The private fire costs are determined to be $137,851 (see Table 4-16). This cost is divided by the total equivalent firelines calculated in Table 4-15. Similar to rates for the fixed meter charges, private firelines use the count of total firelines (995 lines) and the ratio between the various fireline sizes to determine total equivalent lines. The fireline ratios are similar to the hydraulic capacity ratios used to determine the fixed meter charges. The fireline factor is the ratio of the specific fireline diameter relative to the base fireline diameter of 3/4". The calculated total equivalent fireline inches is 1,851.

Table 6-5: Fireline Equivalents Calculation

Fireline Diameter	Fireline Count (a)	Fire Ratio (3/4" Base) (b)	Equiv. Lines (Capacity) (a)*(b)
3/4"	10	0.75	8
1"	658	1.00	658
1 1/2"	49	1.50	74
2"	82	2.00	164
3"	4	3.00	12
4"	123	4.00	492
5"	-	5.00	-
6"	55	6.00	330
8"	13	8.00	104
10"	1	10.00	10
Total Count/ Equivalencies	**995**		**1,851**

Table 6-6 shows the calculation of the fireline service component. Dividing the total private fireline costs ($137,851) by total equivalent lines (1,851) yields the bi-monthly cost per equivalent fireline inch of $12.42 (rounded up to the nearest whole penny).

Table 6-6: Fire Service Component Calculation

	FY 2018-2019
Fire Protection Costs	$137,851
Equivalent Lines	1,851
Cost per Equivalent Fireline Inch (per bill)	**$12.42**

Table 6-7 shows the derivation of the bi-monthly rates by fireline size for the fire service charges. The cost per inch ($12.42) is multiplied by the respective fireline ratio to derive the charge for each fireline size. All firelines experience the same increase in rates due to using the same methodology in the fire flow analysis as from the prior rate study.

Table 6-7: Calculation of Private Fire Service Charges

Fireline Size	Fire Ratio (1" Base)	Proposed Fire Service Charge FY 2018-2019	Current Fire Service Charge	Difference ($)	Difference (%)
3/4"	0.75	$9.31	$8.57	$0.74	9%
1"	1.00	$12.42	$11.43	$0.99	9%
1 1/2"	1.50	$18.62	$17.15	$1.48	9%
2"	2.00	$24.83	$22.86	$1.97	9%
3"	3.00	$37.24	$34.29	$2.95	9%
4"	4.00	$49.65	$45.72	$3.93	9%
5"	5.00	$62.07	$57.15	$4.92	9%
6"	6.00	$74.48	$68.58	$5.90	9%
8"	8.00	$99.30	$91.44	$7.86	9%
10"	10.00	$124.13	$114.30	$9.83	9%

6.4 PROPOSED RATES FOR COMMODITY CHARGES

6.4.1 *Unit Cost Components Definitions*

The rates for the commodity charges for each customer class and tier are derived by summation of the unit rates ($/hcf) for:

1. Supply costs (Variable Supply cost component)
2. Delivery costs (Base cost component)
3. Max Day and Max Hour capacity costs (Peaking component)
4. Conservation costs (Conservation component)
5. Revenue Offsets (Non-Rate revenue component)

Variable Supply are costs related to the production of local water and purchase of imported water to meet customer demand. CCWD maintains two sources of supply. These variable supply costs form the foundation of the rate components.

Delivery, also known as base, are the costs associated with obtaining and treating water to make it ready for transmission and distribution, as well as the operating costs associated with delivering water to all customers at a constant and average rate of use – also known as serving customers under average daily demand conditions. Therefore, base costs are spread over all units of water uniformly, irrespective of customer class or tier.

Peaking, or extra-capacity, costs are costs incurred to meet customer peak demands in excess of base use (or average daily demand). Total extra capacity costs are comprised of maximum day and maximum hour demands. The peaking costs are distributed to each class and tier using peaking factors derived from customer use data.

Conservation costs cover water conservation and efficiency programs and efforts. These programs are targeted to high volume water users. Allocation of conservation costs to the commodity rates helps provide a price signal for conservation, consistent with Article X Section 2 of the State of California Constitution

Revenue Offsets are the non-rate revenues available to the District to reduce the commodity rates in the lower tiers to promote affordability and efficient use. Revenue offsets consist of direct property tax revenue and cell site lease income. These funds allow flexibility in the rate design process to achieve policy objectives while maintaining cost of service principles.

6.4.1.1 Variable Supply Unit Cost

The variable supply cost is the cost to produce and purchase water supply. The costs in Table 6-8 are based on FY 2018-2019 water supply costs from the respective sources and were provided by CCWD staff as part of the draft budget. The water unit cost is the cost of purchasing SFPUC water and includes estimated fixed and variable charges from the purveyor. Additional supply costs to SFPUC relate to Crystal Springs Reservoir pump station. Additional supply costs to surface water and groundwater represent the remainder of the supply component from Table 4-16 not attributable to SFPUC purchases. These costs include operations and maintenance of the District's local intakes and wells as well as capital facilities associated with the Denniston water supplies.

Table 6-8: Water Supply Costs, FY 2018-2019

Source of Supply	Average Production/ Purchase (AF)	Average Production/ Purchase (hcf)	Water Cost ($)	Additional Supply Costs ($/AF)	Total Cost ($/AF)
Surface Water	598	260,556	$0	$203,964	$341
Groundwater	264	114,896	$0	$89,940	$341
SFPUC	1,039	452,500	$1,900,998	$337,080	$2,155

The water supply unit cost converts the cost per AF to cost per hcf (748 gallons). The unit cost for each source is calculated to include a five percent water system loss. The water supply costs and water availability in Table 6-9 are used in the water supply unit cost calculation for each class and tier.

Table 6-9: Water Supply Unit Costs, FY 2018-2019

	Surface Water	Groundwater	Purchased SFPUC
Supply to Meet Demand (hcf)	260,556	114,896	452,500
Cost ($/AF)	$341	$341	$2,155
Unit Cost ($/hcf)	$0.78	$0.78	$4.95
Unit Cost ($/hcf) after loss[15]	$0.83	$0.83	$5.21

Table 6-10 shows estimated total demand in FY 2018-2019 for all customer classes and tiers.

Table 6-10: Estimated Water Demand in FY 2018-2019

Class	hcf
SFR	
Tier 1	246,360
Tier 2	108,265
Tier 3	61,278
MFR	43,988
All Other Customers	328,634
Total	**788,525**

Given the water available from each source (Table 6-9), and allocating available water proportional to the demands of each class, the estimated water required to meet demand for each class is shown in Table 6-11.

Table 6-11: Supply to Meet Demand, by Source

	Annual Usage	Surface Water	Groundwater	Purchased SFPUC
SFR	415,904	130,557	57,571	227,775
MFR	43,988	13,808	6,089	24,091
All Other Customers	328,634	103,162	45,491	179,981
Total	**788,525**	**247,528**	**109,151**	**431,846**

[15] Unit cost accounts for an estimated 5 percent system-wide water loss. The loss is allocated to all sources.

The unit rates for variable supply costs are derived in Table 6-12. Total costs are determined as the sum-products of the unit rates (after loss) from Table 6-9 and the water required in each tier from Table 6-12. For example, meeting demand in SFR Tier 1 requires all local surface and groundwater allocated to the class (130,557 hcf surface and 57,571 hcf groundwater) as well as SFPUC purchased water (58,231 hcf) with respective unit costs of $0.83, $0.83, and $5.21 per hcf, respectively. The blended cost of meeting demand in Tier 1 is $1.87 per hcf.

Table 6-12: Variable Supply Unit Cost Calculation, by Class and Tier ($/hcf)

Class	Annual Usage	Surface Water	Groundwater	Purchased SFPUC	Unit Cost ($/hcf)
Unit Cost of Supply		$0.83	$0.83	$5.21	
SFR					
Tier 1	246,360	130,557	57,571	58,231	$1.87
Tier 2	108,265	-	-	108,265	$5.21
Tier 3	61,278	-	-	61,278	$5.21
Total	**415,904**	**130,557**	**57,571**	**227,775**	
MFR	**43,988**	**13,808**	**6,089**	**24,091**	**$3.23**
All Other Customers	**328,634**	**103,162**	**45,491**	**179,981**	**$3.23**
Total	**788,525**	**247,528**	**109,151**	**431,846**	

6.4.1.2 *Delivery Unit Cost*

Base delivery costs are the costs to deliver water under average daily demand conditions. Dividing estimated annual usage by total base costs (Table 4-16) derives the cost to provide water delivery during average conditions. The calculated base unit cost is presented in Table 6-13. The base unit cost is the same for all classes and tiers. The unit cost is rounded up to the nearest whole penny.

Table 6-13: Base Delivery Unit Cost Calculation

Class and Tier	Projected Demand
SFR	
Tier 1	246,360
Tier 2	108,265
Tier 3	61,278
MFR	43,988
All Other Customers	328,634
Total	**788,525**
Delivery Costs ($)	**$4,763,701**
Delivery Unit Cost ($/hcf)	**$5.62**

6.4.1.3 *Peaking Unit Cost*

Table 6-14 provides customer class peaking factors. These factors are determined by analyzing FY 2016-2017 data and identifying the maximum billing period of use and dividing that amount by the average period use. For the derivation of intra-class peaking cost components, we must derive peaking factors *within* the tiers. The peaking ratios shown are derived by analyzing CCWD water

usage while utilizing the revised tier definitions (Table 5-4). As with calculating the class peaking factor, the tier factors are calculated by dividing the maximum period of use by the average period of use. For each tier, Raftelis determined the average use within the tier throughout the year (six billing periods). Next, Raftelis identified the maximum use period for the tier during the year. Dividing the maximum and average gives a factor of max-to-average. Table 6-14 shows the calculated class and tier peaking factors.

Table 6-14: Class and Tier Peaking Factors

Usage	Max Billing Period Use	Average Billing Period Use	Max / Average
Residential			
Tier 1	39,777	38,195	1.04
Tier 2	21,644	16,785	1.29
Tier 3	17,221	9,500	1.81
MFR	7,305	6,820	1.07
All Other Customers[16]	51,983	40,890	1.27

Table 6-15 shows the unit cost calculation for peaking. Projected demand in each class (Column A) is multiplied by the respective peaking factor (Column B) to derive total weighted units (peaking units) in Column C for each class. The relative share of peaking units (Column D) is calculated for each class which allows the total peaking costs ($2,944,838) to be distributed in proportion to peak demand. Once the peaking costs are distributed to each class, the unit cost is calculated by dividing the revenue required (column E) by the water demanded by each class (Column A). The same process is repeated to determine the unit cost for each tier of the SFR class. Unit costs are rounded to the nearest whole penny.

[16] Excludes demand from the District's single raw water customer as their use is highly variable and not representative of other commercial or irrigation users.

Table 6-15: Peaking Unit Cost Calculation

Customer Class/Tier	Annual Usage	Peaking Factor	Weighted Use	% Allocated	Revenue Requirement	Unit Rate ($/hcf)
	A	B	C = A x B	D = C_i/C_{Total}	E = D_i x Peaking Costs[17]	F = E/A
SFR	415,904	1.97	820,205	52.2%	$1,536,601	$3.70
MFR	43,988	1.73	76,188	4.8%	$142,734	$3.25
All Other Customers	328,634	2.06	675,499	43.0%	$1,265,503	$3.86
Total	**788,525**		**1,571,892**	**100%**	**$2,944,838**	**$3.73**
Residential	**Usage by Tier**	**Peaking Factor**	**Weighted Use**	**% Allocated**	**Revenue Requirement**	**Unit Rate ($/hcf)**
SFR Tier 1	246,360	1.04	256,562	50.6%	$777,210	$3.16
SFR Tier 2	108,265	1.29	139,604	27.5%	$422,906	$3.91
SFR Tier 3	61,278	1.81	111,075	21.9%	$336,484	$5.50
Total	**415,904**		**507,241**	**100%**	**$1,536,601**	**$3.69**

6.4.1.4 Conservation Unit Cost

CCWD's water conservation programs offer a variety of solutions to reduce water use for all customers served by the District. Water conservation offsets the demand for potable water and more expensive imported water and is a low-cost water supply available to all utilities. These programs ensure reliable future water supply for all rate payers and reduce expensive imported water purchases. Accordingly, CCWD finds it appropriate to allocate conservation costs to SFR Tier 3 use, MFR use, and All Other Customers use. Conservation unit costs are derived similarly to peaking unit costs by distributing the conservation revenue requirement first to the class and then to the SFR tier based on units demanded. Table 6-16 shows the calculation for the conservation unit cost, with each unit rate rounded to the nearest whole penny.

[17] Max Day and Max Hour costs from Table 4-16

Table 6-16: Conservation Unit Cost Calculation

Customer Class/Tier	Annual Usage	% Allocated	Revenue Requirement	Unit Rate ($/hcf)
	A	B	C = B_i x Conserv. Costs[18]	D = C/A
SFR	415,904	53%	$68,446	$0.17
MFR	43,988	6%	$7,239	$0.17
All Other Customers	328,634	42%	$54,084	$0.17
Total	**788,525**	**100%**	**$129,769**	
Residential	**Usage by Tier**	**% Allocated**	**Revenue Requirement**	**Unit Rate ($/hcf)**
SFR Tier 1		0%	$0	$0.00
SFR Tier 2		0%	$0	$0.00
SFR Tier 3	61,278	100%	$68,446	$1.12
Total	**61,278**	**100%**	**$68,446**	

[18] Max Day and Max Hour costs from Table 4-16

6.4.1.5 *Revenue Offset Unit Cost*

Revenue offsets are applied to all units of water demanded by all classes and tiers. Table 6-17 shows the revenue offset unit cost and revenue offset component rate calculation. Revenue offsets are allocated based on the share of accounts in each of the three customer classes. For example, SFR accounts represent 85 percent of total accounts and, therefore, receive 85 percent of the revenue offset value. The amount of revenue offset for each class is divided by the respective annual usage to derive the unit cost. Unit costs are rounded to the nearest whole penny.

Table 6-17: Revenue Offset Unit Cost Calculation

Class and Tier	Allocation %	Revenue Offset ($)	Annual Usage (hcf)	Unit Cost ($/hcf)
SFR	85%	($758,837)	415,904	($1.82)
MFR	3%	($22,257)	43,988	($0.50)
All Other Customers	12%	($108,907)	328,634	($0.33)
Total	**100%**	**($890,000)**	**788,525**	

6.4.2 *Final Commodity Rates Derivation*

The cost of service based rates are shown in Column H of Table 6-18. To determine the commodity rates, the components detailed above are added together. The summation of columns C through G of Table 6-18 constitutes the final rates. Note the COS rates represent FY 2018-2019 rates inclusive of the proposed increase in revenue over FY 2017-2018.

Table 6-18: Proposed Commodity Rates ($/hcf)

Class and Tier	Tier Definition	Supply	Base	Peaking	Conservation	Revenue Offset	COS Rates ($/hcf)
A	B	C	D	E	F	G	H
	Table 5-4	Table 6-12	Table 6-13	Table 6-15	Table 6-16	Table 6-17	
SFR							
Tier 1	0-8	$1.87	$5.62	$3.16	$0.00	($1.82)	**$8.83**
Tier 2	9-16	$5.21	$5.62	$3.91	$0.00	($1.82)	**$12.92**
Tier 3	>16	$5.21	$5.62	$5.50	$1.12	($1.82)	**$15.63**
MFR	Uniform	$3.23	$5.62	$3.25	$0.17	($0.50)	**$11.77**
All Other Customers	Uniform	$3.23	$5.62	$3.86	$0.17	($0.33)	**$12.55**

6.5 WATER CUSTOMER IMPACTS

The rate model calculates water customer impacts for all classes and meter sizes. Customer impacts from the proposed new rates are presented below for each class.

Figure 6-1 illustrates the current and proposed tier breakpoints and corresponding rate per hcf. The proposed structure has three tiers versus the existing structure of four tiers. The proposed rate structure doubles Tier 1 from 4 hcf to 8 hcf bi-monthly and has the same breakpoint for Tier 2 (16 hcf bi-monthly). The proposed Tier 3 is all units greater than 16 hcf bi-monthly with a price that is between that of the existing Tier 3 and Tier 4.

Figure 6-1: Current and Proposed SFR Tiers

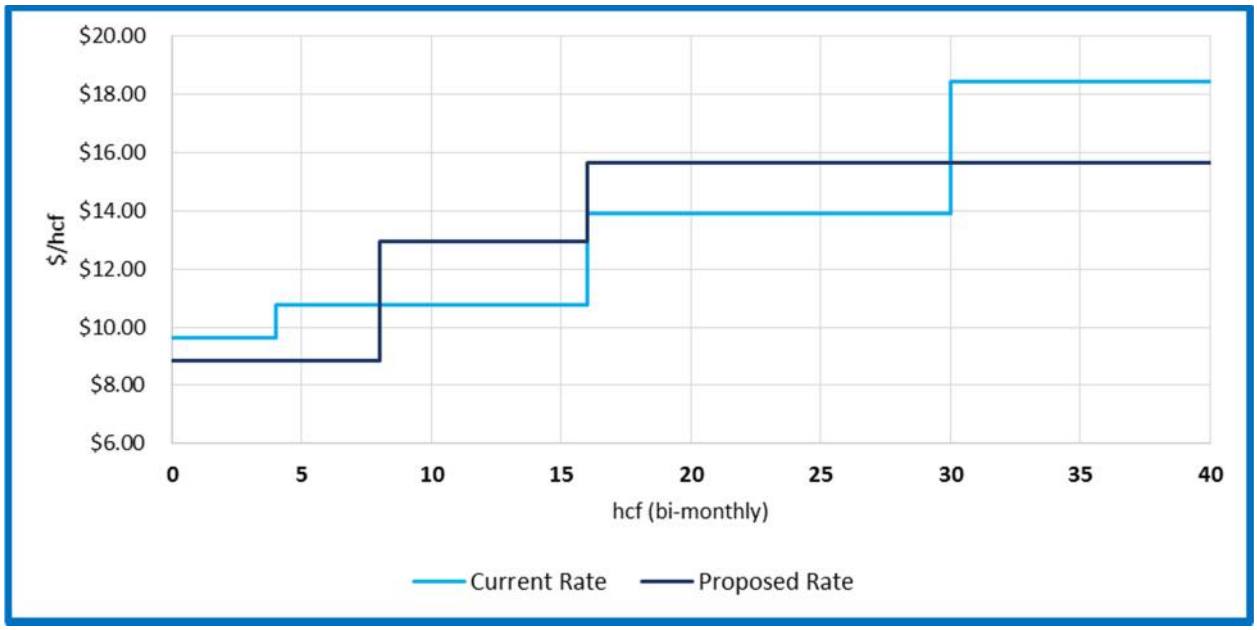


Figure 6-2 shows a range of bill impacts to SFR customers. Raftelis recalculates each bill for every customer using FY 2017-2018 rates to determine the billed amount under current and proposed rates. This allows us to calculate the difference between the two for every bill generated and provide a distribution across the class.

Figure 6-2: Bill Impacts - SFR

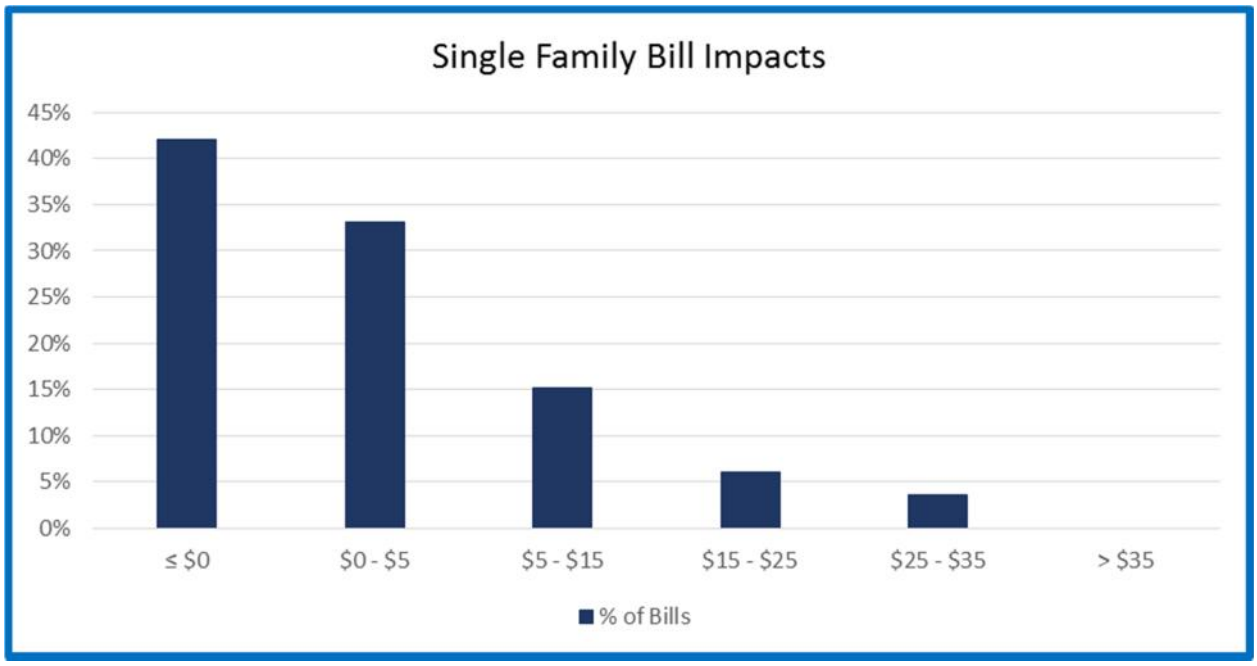


Figure 6-3 shows the impacts to a SFR customer with a 5/8" meter using 12 hcf bi-monthly, near the District' median. With the proposed rates, the customer will experience an increase of $0.91 or 0.5 percent bi-monthly compared to existing rates. This is due to a $3.35 increase in the base charge and a $2.44 decrease in the commodity charge.

Figure 6-3: Bill Impacts – Median SFR Use

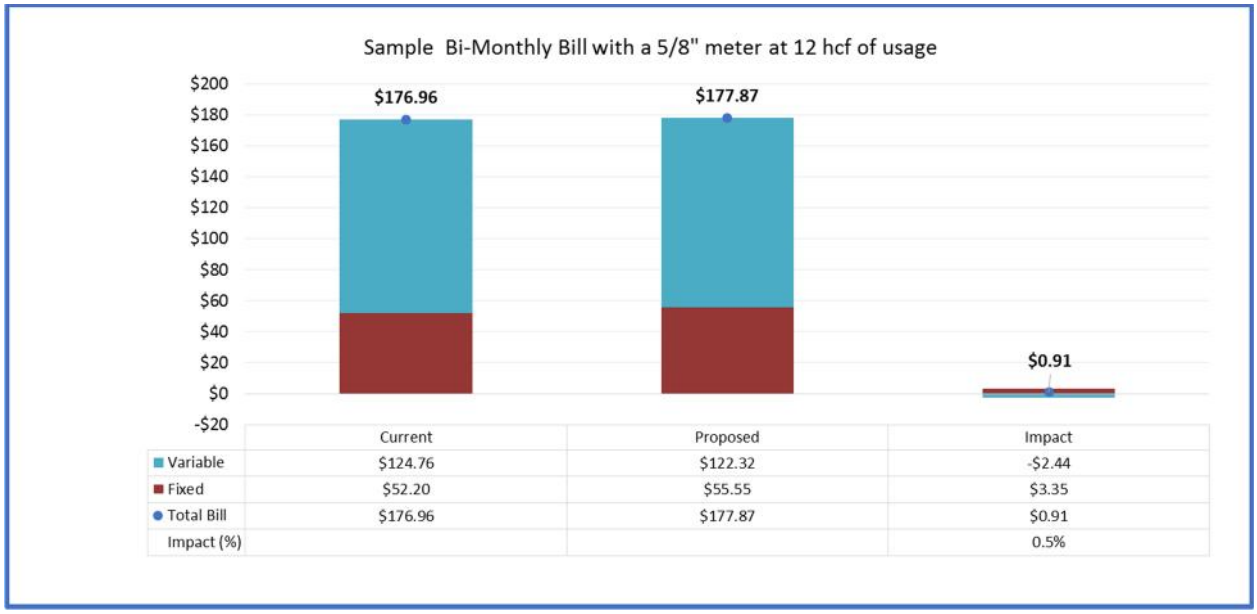
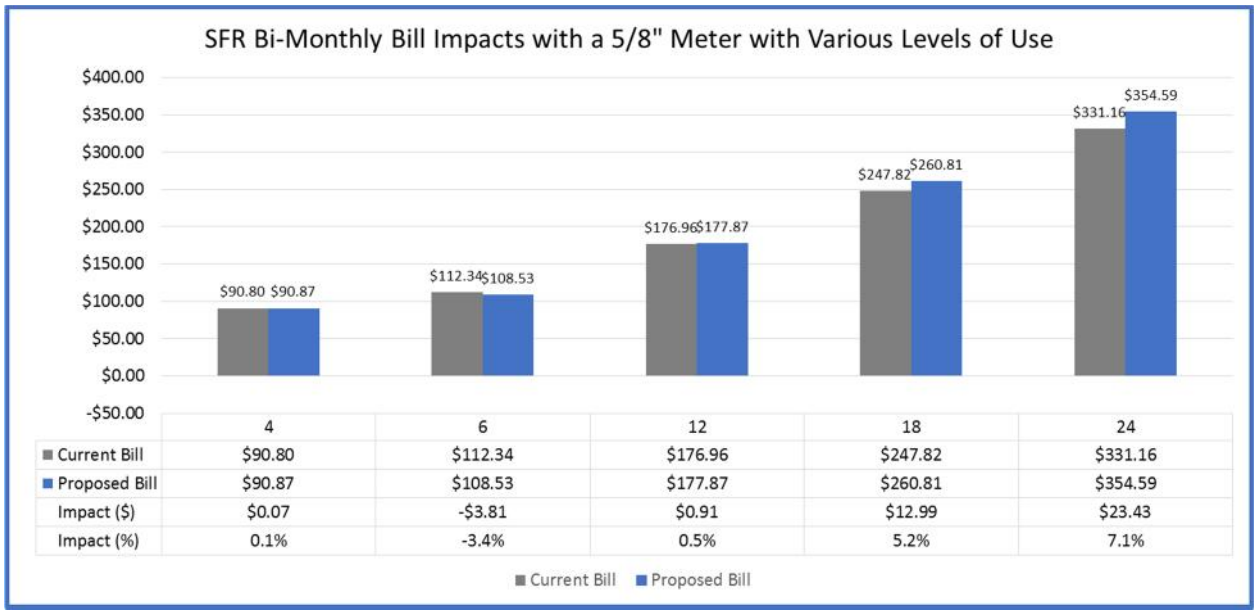


Figure 6-4 calculates bills for a SFR account with a 5/8" meter at different levels of use. Bills are calculated at current rates and tiers and compared to proposed rates and tiers. The figure shows the percentage and dollar change between current and proposed rates and tiers. The levels of use shown represent very low, low, median, high, and very high users.

Figure 6-4: Bill Impacts - Single Family Residential with 5/8" Meter



	4	6	12	18	24
Current Bill	$90.80	$112.34	$176.96	$247.82	$331.16
Proposed Bill	$90.87	$108.53	$177.87	$260.81	$354.59
Impact ($)	$0.07	-$3.81	$0.91	$12.99	$23.43
Impact (%)	0.1%	-3.4%	0.5%	5.2%	7.1%

7. SECOND YEAR RATES

The District has adopted a budget for FY 2019-2020 which estimates a four percent increase in revenue requirement. This increase is due in part to inflationary pressures on operating and capital costs and in part due to additional reserve funding to achieve the District's financial reserves policies over the long term.

The second year rates will use the cost of service and rates developed in Section 4 and Section 6 as the basis and will increase all rates "across the board" by four percent relative to FY 2018-2019 rates. Major cost drivers of an agency generally do not change year to year. That is, sources of supply, supply mix, customer base, and usage characteristics among others may change slowly over time necessitating an updated cost of service. From our experience, a best practice is to perform an updated cost of service every three to five years to ensure system costs are recovered appropriately and adequately.

Table 7-1, Table 7-2, and Table 7-3 show all proposed rates and charges for FY 2018-2019 and FY 2020.

Table 7-1: Proposed Two-Year Rates for Bi-Monthly Base Charges ($/Meter Size)

Meter Size	FY 2018-2019	FY 2020	$ Difference	% Difference
5/8"	$55.55	$57.78	$2.23	4%
3/4"	$82.09	$85.38	$3.29	4%
1"	$135.18	$140.59	$5.41	4%
1-1/2"	$267.90	$278.62	$10.72	4%
2"	$427.16	$444.25	$17.09	4%
3"	$931.48	$968.74	$37.26	4%
4"	$1,674.70	$1,741.69	$66.99	4%

Table 7-2: Proposed Two-Year for the Water Commodity Rates ($/hcf)

Customer Class & Tier	FY 2018-2019	FY 2020	$ Difference	% Difference
SFR				
Tier 1	$8.83	$9.19	$0.36	4%
Tier 2	$12.92	$13.44	$0.52	4%
Tier 3	$15.63	$16.26	$0.63	4%
MFR	$11.77	$12.25	$0.48	4%
All Other Customers	$12.55	$13.06	**$0.51**	4%

Table 7-3: Proposed Two-Year Rates for Private Fire Service Charges ($/Line Size)

Fireline Size	FY 2018-2019	FY 2020	$ Difference	% Difference
3/4"	$9.31	$9.69	$0.38	4%
1"	$12.42	$12.92	$0.50	4%
1-1/2"	$18.62	$19.37	$0.75	4%
2"	$24.83	$25.83	$1.00	4%
3"	$37.24	$38.73	$1.49	4%
4"	$49.65	$51.64	$1.99	4%
5”	$62.07	$64.56	$2.49	4%
6"	$74.48	$77.46	$2.98	4%
8"	$99.30	$103.28	$3.98	4%
10"	$124.13	$129.10	$4.97	4%

8. APPENDICES

8.1 FY 2018-2019 O&M EXPENSE ALLOCATION DETAIL

Description	Function	Supply	Base	Max Day	Max Hour	Fire Protection	Meters	Customer	Conservation	General	Total
Water Purchased	Supply	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Electrical Exp. Nunes WTP	Treatment	0%	62%	38%	0%	0%	0%	0%	0%	0%	100%
Electrical Expenses, CSP	Supply	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Electrical Expenses/Trans. & Dist.	Transmission	0%	62%	38%	0%	0%	0%	0%	0%	0%	100%
Elec Exp/Pilarcitos Cyn	Pumping	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Electrical Exp., Denn	Pumping	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%
CSP - Operation	Transmission	0%	62%	38%	0%	0%	0%	0%	0%	0%	100%
CSP - Maintenance	Transmission	0%	62%	38%	0%	0%	0%	0%	0%	0%	100%
Nunes WTP Oper	Treatment	0%	62%	38%	0%	0%	0%	0%	0%	0%	100%
Nunes WTP Maint	Treatment	0%	62%	38%	0%	0%	0%	0%	0%	0%	100%
Denn. WTP Oper.	Treatment	0%	62%	38%	0%	0%	0%	0%	0%	0%	100%
Denn WTP Maint	Treatment	0%	62%	38%	0%	0%	0%	0%	0%	0%	100%
Laboratory Expenses	Treatment	0%	62%	38%	0%	0%	0%	0%	0%	0%	100%
Maintenance Expenses	Distribution	0%	31%	19%	33%	18%	0%	0%	0%	0%	100%
Maintenance, Wells	Treatment	0%	62%	38%	0%	0%	0%	0%	0%	0%	100%
Uniforms	Distribution	0%	31%	19%	33%	18%	0%	0%	0%	0%	100%
Studies/Surveys/Consulting	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Water Resources	Conservation	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%
Community Outreach	Conservation	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%
Legal	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Engineering	Distribution	0%	31%	19%	33%	18%	0%	0%	0%	0%	100%
Financial Services	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Computer Services	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Salaries, Admin.	Ops/Meters/Customer	0%	35%	22%	38%	0%	0%	5%	0%	0%	100%
Salaries - Field	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Payroll Taxes	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Employee Medical Insurance	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Retiree Medical Insurance	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Employee Retirement	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
SIP 401a Plan	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Motor Vehicle Exp.	Distribution	0%	31%	19%	33%	18%	0%	0%	0%	0%	100%
Office & Billing Expenses	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Meetings/Training/Seminars	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Insurance	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Memberships & Subscriptions	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Election Expense	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Union Expenses	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
County Fees	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
State Fees	General	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%

8.1 FY 2018-2019 O&M EXPENSE ALLOCATION DETAIL

Description		Supply	Base	Max Day	Max Hour	Fire Protection	Meters	Customer	Conservation	General	Total
Water Purchased	Supply	$1,900,998	$0	$0	$0	$0	$0	$0	$0	$0	$1,900,998
Electrical Exp. Nunes WTP	Treatment	$0	$26,405	$16,292	$0	$0	$0	$0	$0	$0	$42,697
Electrical Expenses, CSP	Supply	$337,080	$0	$0	$0	$0	$0	$0	$0	$0	$337,080
Electrical Expenses/Trans. & Dist.	Transmission	$0	$16,677	$10,290	$0	$0	$0	$0	$0	$0	$26,966
Elec Exp/Pilarcitos Cyn	Pumping	$39,248	$0	$0	$0	$0	$0	$0	$0	$0	$39,248
Electrical Exp., Denn	Pumping	$130,000	$0	$0	$0	$0	$0	$0	$0	$0	$130,000
CSP - Operation	Transmission	$0	$6,617	$4,083	$0	$0	$0	$0	$0	$0	$10,700
CSP - Maintenance	Transmission	$0	$22,882	$14,118	$0	$0	$0	$0	$0	$0	$37,000
Nunes WTP Oper	Treatment	$0	$48,145	$29,705	$0	$0	$0	$0	$0	$0	$77,850
Nunes WTP Maint	Treatment	$0	$75,758	$46,742	$0	$0	$0	$0	$0	$0	$122,500
Denn. WTP Oper.	Treatment	$0	$29,066	$17,934	$0	$0	$0	$0	$0	$0	$47,000
Denn WTP Maint	Treatment	$0	$62,987	$38,863	$0	$0	$0	$0	$0	$0	$101,850
Laboratory Expenses	Treatment	$0	$44,187	$27,263	$0	$0	$0	$0	$0	$0	$71,450
Maintenance Expenses	Distribution	$0	$89,112	$54,981	$95,101	$52,506	$0	$0	$0	$0	$291,700
Maintenance, Wells	Treatment	$0	$24,737	$15,263	$0	$0	$0	$0	$0	$0	$40,000
Uniforms	Distribution	$0	$3,819	$2,356	$4,075	$2,250	$0	$0	$0	$0	$12,500
Studies/Surveys/Consulting	General	$0	$0	$0	$0	$0	$0	$0	$0	$160,000	$160,000
Water Resources	Conservation	$0	$0	$0	$0	$0	$0	$0	$25,200	$0	$25,200
Community Outreach	Conservation	$0	$0	$0	$0	$0	$0	$0	$54,700	$0	$54,700
Legal	General	$0	$0	$0	$0	$0	$0	$0	$0	$100,000	$100,000
Engineering	Distribution	$0	$18,329	$11,309	$19,561	$10,800	$0	$0	$0	$0	$60,000
Financial Services	General	$0	$0	$0	$0	$0	$0	$0	$0	$20,000	$20,000
Computer Services	General	$0	$0	$0	$0	$0	$0	$0	$0	$163,600	$163,600
Salaries, Admin.	Ops/Meters/Customer	$0	$400,635	$247,189	$427,564	$0	$0	$58,493	$0	$0	$1,133,881
Salaries - Field	General	$0	$0	$0	$0	$0	$0	$0	$0	$1,400,505	$1,400,505
Payroll Taxes	General	$0	$0	$0	$0	$0	$0	$0	$0	$177,733	$177,733
Employee Medical Insurance	General	$0	$0	$0	$0	$0	$0	$0	$0	$444,246	$444,246
Retiree Medical Insurance	General	$0	$0	$0	$0	$0	$0	$0	$0	$50,659	$50,659
Employee Retirement	General	$0	$0	$0	$0	$0	$0	$0	$0	$598,859	$598,859
SIP 401a Plan	General	$0	$0	$0	$0	$0	$0	$0	$0	$35,000	$35,000
Motor Vehicle Exp.	Distribution	$0	$18,329	$11,309	$19,561	$10,800	$0	$0	$0	$0	$60,000
Office & Billing Expenses	General	$0	$0	$0	$0	$0	$0	$0	$0	$261,600	$261,600
Meetings/Training/Seminars	General	$0	$0	$0	$0	$0	$0	$0	$0	$26,000	$26,000
Insurance	General	$0	$0	$0	$0	$0	$0	$0	$0	$129,000	$129,000
Memberships & Subscriptions	General	$0	$0	$0	$0	$0	$0	$0	$0	$75,970	$75,970
Election Expense	General	$0	$0	$0	$0	$0	$0	$0	$0	$25,000	$25,000
Union Expenses	General	$0	$0	$0	$0	$0	$0	$0	$0	$6,000	$6,000
County Fees	General	$0	$0	$0	$0	$0	$0	$0	$0	$20,000	$20,000
State Fees	General	$0	$0	$0	$0	$0	$0	$0	$0	$36,500	$36,500
Total O&M Allocated		**$2,407,325**	**$887,686**	**$547,696**	**$565,863**	**$76,356**	**$0**	**$58,493**	**$79,900**	**$3,730,672**	**$8,353,991**
% O&M Allocated		28.8%	10.6%	6.6%	6.8%	0.9%	0.0%	0.7%	1.0%	44.7%	100%
		Supply	Base	Max Day	Max Hour	Fire Protection	Meters	Customer	Conservation	General	Total

8.1 ASSET SCHEDULE SUMMARY (AS OF FY 2018-2019)

Asset Category	Function	Original Cost (OC)	Accumulated Depreciation (AD)	Book Value (OC -AC)	Work In Progress	Net Value
breakout	GENERAL	$0	$0	$0		$0
BUILDINGS	GENERAL	$1,006,051	$310,014	$696,037		$696,037
DISTRIBUTION	DISTRIBUTION	$26,439,163	$8,772,503	$17,666,659	$2,533,601	$20,200,260
FIRE	HYDRANTS	$526,726	$136,078	$390,647		$390,647
GENERAL	GENERAL	$1,400,458	$495,638	$904,821		$904,821
Land/Easements	N/A	$138,975	$0	$138,975		$138,975
METERS	METERS	$546,266	$125,715	$420,552	$445,231	$865,783
TANKS	RESERVOIR	$5,267,330	$1,539,410	$3,727,920	$747,441	$4,475,361
TRANSMISSION	TRANSMISSION	$19,111,820	$8,683,403	$10,428,416	$467,474	$10,895,890
TREATMENT	TREATMENT	$19,499,091	$8,366,281	$11,132,810	$510,059	$11,642,869
VEHICLES	GENERAL	$491,834	$406,787	$85,046		$85,046
WATER SUPPLY	PUMPING	$188,217	$111,913	$76,304	$1,193,633	$1,269,937
WELLS	PUMPING	$568,499	$321,550	$246,949		$246,949
	Total	**$75,184,429**	**$29,269,292**	**$45,915,136**	**$5,897,439**	**$51,812,575**
		TRUE	TRUE	TRUE	Less Land	$51,673,601