PLACER COUNTY WATER AGENCY

Water Cost of Service and Rate Study

Final Report / September 14, 2017

PCWA
water • energy • stewardship

RAFTELIS
FINANCIAL CONSULTANTS, INC.

RAFTELIS
FINANCIAL CONSULTANTS, INC.

445 S Figueroa St.
Suite 2270
Los Angeles CA 90071

Phone 213.262.9300
Fax 213.262.9303

www.raftelis.com

September 14, 2017

Joe Parker, Director of Financial Services
Placer County Water Agency
144 Ferguson Rd
Auburn, CA 95603

Subject: Water Cost of Service and Rate Study Report

Dear Mr. Parker,

Raftelis Financial Consultants, Inc. is pleased to provide this Water Cost of Service and Rate Study Report (Study) for Placer County Water Agency (PCWA) 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. Cost allocations between PCWA's four water services
3. Recommended revisions to the water system organizational structure
4. Recommended policy revisions and modifications to rate structures and customer classes
5. Equitable cost of service based potable water commodity rates, monthly fixed charges, and capital renewal and replacement (R&R) charges that meet the requirements of Proposition 218

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

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

Sincerely,
Raftelis Financial Consultants, Inc.

Sanjay Gaur
Vice President

Kevin Kostiuk
Senior Consultant

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

This page intentionally left blank to facilitate two-sided printing.

1. EXECUTIVE SUMMARY

1.1 STUDY BACKGROUND

In 2015, Placer County Water Agency (PCWA) contracted with Raftelis Financial Consultants, Inc. (Raftelis) to conduct a Water Cost of Service and Rate Study (Study) across all water services. This Study presents the cost allocations between water service classes, cost of service analyses for the respective service classes and customer classes, and resulting water rates for implementation in January 2018. The four service classes are: Treated Retail, Treated Resale, Untreated Retail, and Untreated Resale. Treated refers to the potable system while untreated refers to the raw[1] water system. Retail refers to water delivery to end users who are PCWA customers. Resale refers to wholesale customers who provide water to their own customers.

This Executive Summary compiles the proposed water rates and charges, and contains a description of the rate study process, methodology, results, and recommendations for PCWA rates. PCWA's last rate adjustment was effective January 2017. PCWA 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 Agency's fiscal needs in terms of operational expenses, reserve targets, and capital investment to maintain the potable and raw water systems
- Maintain affordable charges for customers
- Preserve an indirect price signal for those whose higher usage creates greater demands and burdens on PCWA's water system
- Provide revenue stability and financial sufficiency
- Are easy for customers to understand and easy for PCWA 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 water system and recommend changes to consolidate service classes and rate classes as well as proposed changes to rate structures;
2. Allocate costs between the four water services and ensure recovery of all operations and maintenance (O&M) costs, ensure sufficient funding of financial reserves, and funding of capital renewal and replacement (R&R) collectively;
3. Conduct cost-of-service analyses for the potable water system;
4. Conduct cost allocations between user classes for the raw water system
5. Develop fair and equitable potable 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

[1] The terms raw and untreated are used interchangeably in this report to describe non-potable water without treatment

edition) (the "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 LEGAL REQUIREMENTS AND RATE SETTING METHODOLOGY

1.3.1 *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.

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.

1.3.2 *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.

In addition, Section 106 of the California Water Code declares that the highest priority use of water is for domestic purposes, with irrigation secondary. To meet the objectives of Article X, Section 2, Water Code Section 375 et seq., a water purveyor may utilize its water rate design to incentivize the efficient use of water. PCWA inherited inclining tier (also known as "conservation based" or simply "tiered") water rates in 1968 when the lower system was purchased from PG&E 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.

PCWA 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, PCWA 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 PCWA 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. PCWA's rate structure is one of the means by which the Agency 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 tiered rates reasonably reflect the proportionate cost of providing service on a parcel basis in each tier.

1.3.3 *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. The revenue requirement should sufficiently fund the utility's operations and maintenance (O&M), debt service, capital expenses (Renewal 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, maximum day[2], maximum hour[2], conservation, public fire protection, meter service, and customer servicing and billing costs.
3. 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).[3] 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.

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.

1.4 RESULTS AND RECOMMENDATIONS

1.4.1 *Factors Affecting Revenue Adjustments*

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

- **Capital Funding:** PCWA requires approximately $11 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 associated with the capital program. For the purpose of this Study, capital projects are expected to be fully

[2] Collectively maximum day and maximum hour costs are known as peaking costs or capacity costs.
[3] 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.

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:** PCWA has adopted reserve policies for the water utility to meet cash flow needs (operating), ensure adequate funding of capital repairs and replacements (capital), and to fund certain liabilities and special projects (other). The defined reserve policy for the Operating Reserve is 100-150 days of cash on hand to fund short term variations in operating costs and for unanticipated changes in revenues and expenses. The Operating Reserve for FY 2018 is $10.5-15.8 million. The defined policy for the Capital Reserve is between two and five years of annual CIP. Given ongoing R&R of approximately $11 million the Capital Reserve target is between $22 million and $55 million. Other Reserves for Liabilities and Special Projects are excluded from this Study.

- **Operating & Maintenance Expenses:** PCWA incurs cost 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. PCWA estimates the inflationary pressure on O&M expenses to be 2 percent per year. This is low cost pressure relative to comparable agencies across the state and compared to the long term consumer price index (CPI) and other inflationary indices.

  Total water supply costs have increased substantially in the past several years as the cost of water from PCWA's largest purveyor has increased from $13.00 per acre foot (AF) to $41.00 per AF. While these increases have been partially accounted for in past revenue adjustments, a proportion has been covered by drawing upon reserves in the interim.

- **Conservation:** The recent drought, mandated water conservation, and public outreach efforts to reduce water use have reduced water use within PCWA's service area and therefore revenues of the utility. Customers reduced water use by up to 32 percent between FY 2013 to FY 2016. PCWA anticipates up to an eight percent permanent demand reduction 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 during the drought.

Given the factors detailed above and the current revenue requirement of $44.95 million, PCWA has proposed a revenue adjustment of 8.3 percent for FY 2018. Table 1-1 shows the proposed revenue adjustment which is then used to allocate costs to the service classes and calculate proposed rates. The revenue adjustment is proposed for implementation on January 1, 2018. The assumptions used in calculating the revenue adjustments are described in more detail in Section 2.

Table 1-1: Proposed 2018 Revenue Adjustment

Year	Revenue Requirement[4]	Revenue Adjustment
FY 2017	$45.28 Million	N/A
FY 2018	$49.05 Million	8.3%

1.4.2 *Proposed Rates and Charges*

The following subsections summarize the final rates and charges derived from the Study for each of the four service classes. All rates are proposed to be implemented on or about January 1, 2018.

1.4.2.1 Treated Retail – Proposed Rates and Charges

Table 1-2 shows the current and proposed fixed charges for Treated Retail customers. The proposed rates are applicable to all metered users. The rates for the current and proposed fixed charge are calculated on the basis of the size of the meter serving a property. All comparisons to current rates use Zone 1 as the reference. The proposed FY 2018 rates account for the revenue adjustment found in Table 1-1.

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

Meter Size	Proposed Fixed Charge (Monthly)	Current Charge Zone 1 (Monthly)	$ Difference	% Difference
5/8"	$17.92	$17.34	$0.58	3.3%
3/4"	$25.14	$24.53	$0.61	2.5%
1"	$39.58	$33.56	$6.02	17.9%
1-1/2"	$75.68	$54.06	$21.62	40.0%
2"	$119.00	$94.36	$24.64	26.1%
3"	$256.18	$175.19	$80.99	46.2%
4"	$436.68	$244.27	$192.41	78.8%
6"	$978.18	$490.38	$487.80	99.5%
8"	$1,158.68	$840.85	$317.83	37.8%
10"	$2,747.08	$0.00	$2,747.08	N/A
12"	$3,613.48	$1,313.85	$2,299.63	175.0%
14"	$5,418.48	$0.00	$5,418.48	N/A
16"	$7,223.48	$1,890.37	$5,333.11	282.1%
18"	$9,028.48	$2,178.62	$6,849.86	314.4%
MFR[5]	$14.44	$13.14	$1.30	9.9%

Table 1-3 shows the current and proposed Renewal and Replacement (R&R) charges for Treated Retail customers. The proposed rates are applicable to all metered users. The rates for the current and proposed fixed charge are calculated on the basis of the size of the meter serving a property. All

[4] Includes some miscellaneous, non-rate revenue which is not captured in the Raftelis model or accounted for when designing rates.

[5] MFR stands for Multi-Family Residential, a customer class which refers to residential users in buildings with more than one dwelling unit. Generally MFR refers to apartment complexes and similar. MFR fixed charges are determined on the basis of dwelling units, not meter size.

comparisons to current rates use Zone 1 as the reference. The proposed FY 2018 rates are inclusive of the revenue adjustment found in Table 1-1.

Table 1-3: Current and Proposed Rates for Monthly Renewal and Replacement (R&R) Charges ($/Meter Size)

Meter Size	Proposed R&R Charge (Monthly)	Current Charge Zone 1 (Monthly)	$ Difference	% Difference
5/8"	$17.74	$16.29	$1.45	8.9%
3/4"	$26.61	$24.44	$2.17	8.9%
1"	$44.35	$40.74	$3.61	8.9%
1-1/2"	$88.70	$81.47	$7.23	8.9%
2"	$141.92	$130.36	$11.56	8.9%
3"	$310.45	$260.73	$49.72	19.1%
4"	$532.20	$407.39	$124.81	30.6%
6"	$1,197.45	$814.77	$382.68	47.0%
8"	$1,419.20	$3,910.89	($2,491.69)	-63.7%
10"	$3,370.60	$3,910.89	($540.29)	-13.8%
12"	$4,435.00	$3,910.89	$524.11	13.4%
14"	$6,652.50	$3,910.89	$2,741.61	70.1%
16"	$8,870.00	$3,910.89	$4,959.11	126.8%
18"	$11,087.50	$3,910.89	$7,176.61	183.5%

Table 1-4 shows the current and proposed water rates (commodity charges) for Treated Retail customers. The rates for the current and proposed commodity charges are calculated on the basis of customer class and are expressed in dollars per hundred cubic feet ($/hcf). All comparisons to current rates use Zone 1 as the reference.

Raftelis recommends rate structure changes for Treated Retail customers 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 the new tier definitions as shown in Table 1-4. Changes to the existing customer classes and tier definitions modifications are discussed in detail in Section 7. The proposed FY 2018 rates are inclusive of the revenue adjustment found in Table 1-1.

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

Customer Class	Proposed Tier Definition	Current Tier Definition	Proposed Rate	Current Rate	$ Change	% Change
Residential[6] Tier 1	0-9	0-4	$1.52	$1.44	($0.03)	-2%
Residential Tier 2	9-28	4-10	$1.72	$1.55	($0.06)	-3%
Residential Tier 3	>28	10-20	$1.84	$1.65	($0.37)	-17%
Residential Tier 4		20-40		$1.78		
Residential Tier 5		40-58		$1.89		
Residential Tier 6		58-77		$2.21		
Residential Tier 7		>77		$2.48		
CG	Uniform		$1.62	$1.51	$0.11	8%
Landscape	Uniform		$1.72	$1.51	$0.21	14%
Construction	Uniform		$3.24	$1.50	$1.74	116%
Fire Protection	Uniform		$3.24	$1.78	$1.46	82%

Together, the three components of the proposed water service charges are structured to recover the proportionate costs of providing water service to each customer class and each parcel within the Treated Retail service class.

Industrial class is defined by customers having monthly average water use over 10,000 hcf and will be subject to the Treated Resale rate, per PCWA staff recommendation. Currently, the Agency has only one Industrial Class customer.

1.4.2.2 Treated Resale – Proposed Rates and Charges

Table 1-5 shows the current and proposed capacity charges for the Treated Resale class. Table 1-6 shows the current and proposed commodity rates for the Treated Resale class. Raftelis worked with PCWA to modify the rates charged to PCWA's wholesale customers and the definition of a resale customer. These modifications are found in detail in Section 9. The proposed FY 2018 rates are inclusive of the revenue adjustment found in Table 1-1.

Table 1-5: Current and Proposed Rates for Monthly Capacity Charges ($/Month)

Meter Size	Proposed Capacity Charge (Monthly)*	Current Capacity Charge (Monthly)	$ Difference	% Difference
City of Lincoln	$31.87	$12.49	$19.38	155.2%
CalAmerican Water	$31.87	$13.90	$17.97	129.3%

Table 1-6: Current and Proposed Rates for Commodity Charges ($/hcf)

Customer Class	Tier Definition	Proposed Rate	Current Rate	$ Change	% Change
Treated Resale	Uniform	$0.40	$1.26-1.29	($0.85)	-68.0%

[6] Residential refers to the combination of Single Family Residential (SFR) and MFR classes.

1.4.2.3 Untreated Retail – Proposed Rates and Charges

Untreated Retail is comprised of raw water users who take water directly from the PCWA canal system. A majority of users take water from an orifice in the canal and can choose to take or not take water at any time. These customers are named based on the way they take delivery in "Miners' Inches" (MI). A minority of customers have metered connections and receive pressurized, untreated water. Table 1-7 shows the proposed rates and charges for Untreated Retail – Miners' Inch customers. These charges are differentiated by the size of the orifice and the season in which water is delivered (winter or summer). All rates include the proposed capital facilities charge of $10.48 per month. Section 10 details the Miners' Inch methodology and calculations. The proposed FY 2018 rates are inclusive of the revenue adjustment found in Table 1-1.

Table 1-7: Current and Proposed Rates for Winter Miners' Inch Deliveries ($/MI/Month)

Inches	Proposed Winter	Z1[7] GI[8]	Z1 CA[9]	Z3[10] GI	Z3 CA	Z5[11] CA
Fixed	***$10.48***	*$8.61*	*$8.61*	*$6.87*	*$6.87*	*N/A*
1/2	**$74.50**	$73.58	$59.46	$62.18	$50.23	N/A
1	**$74.50**	$73.58	$59.44	$62.18	$50.23	N/A
1 1/2	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
2	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
3	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
4	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
5	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
9	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
10	**$74.50**	$75.70	$60.61	$63.67	$51.21	N/A
60	**$74.50**	$75.70	$60.61	$63.67	$51.21	N/A
61	**$74.50**	$75.70	$60.61	$63.67	$51.21	N/A
100	**$74.50**	$75.70	$60.61	$63.67	$51.21	N/A

Table 1-8: Current and Proposed Rates for Summer Miners' Inch Deliveries ($/MI/Month)

Inches	Proposed Summer	Z1 GI	Z1 CA	Z3 GI	Z3 CA	Z5 CA
Fixed	***$10.48***	*$8.61*	*$8.61*	*$6.87*	*$6.87*	*N/A*
1/2	**$62.58**	$66.54	$59.20	$56.22	$50.01	$59.20
1	**$62.58**	$60.87	$59.18	$51.44	$50.01	$59.18
1 1/2	**$62.58**	$63.55	$57.96	$53.71	$48.97	$57.96
2	**$62.58**	$63.55	$57.96	$53.71	$48.97	$57.96
3	**$62.58**	$63.55	$52.33	$53.71	$44.22	$52.33
4	**$62.58**	$63.55	$46.72	$53.71	$39.48	$46.72
5	**$62.58**	$63.55	$42.98	$53.71	$36.32	$42.98
9	**$62.58**	$63.55	$42.98	$53.71	$36.32	$42.98
10	**$62.58**	$64.75	$39.24	$54.71	$33.16	$39.24
60	**$62.58**	$64.75	$39.24	$54.71	$33.16	$39.24
61	**$62.58**	$64.75	$32.39	$54.71	$27.37	$32.39
100	**$62.58**	$64.75	$32.39	$54.71	$27.37	$32.39

Table 1-9, Table 1-10, and Table 1-11 shows the proposed rates and charges for Untreated Retail – Metered customers. These charges follow the same approach as metered customers on the treated system and are comprised of a fixed charge, R&R charge, and commodity charge for water service. Section 10 details the Untreated Retail - Metered methodology and calculations. The proposed FY 2018 rates are inclusive of the revenue adjustment found in Table 1-1.

[7] Z1 is the abbreviation for Zone 1
[8] GI is an abbreviation for General Irrigation
[9] CA is an abbreviation for Commercial Agriculture
[10] Z3 is the abbreviation for Zone 3
[11] Z5 is the abbreviation for Zone 5

Table 1-9: Current and Proposed Rates for Monthly Fixed Charges – Untreated Retail ($/Meter Size)

Meter Size	Proposed Fixed Charge (Monthly)	Current Charge Zone 1 (Monthly)	$ Difference	% Difference
5/8"	$9.14	$10.53	($1.39)	-13.2%
3/4"	$12.15	$12.13	$0.02	0.2%
1"	$18.17	$15.11	$3.06	20.3%
1-1/2"	$33.22	$21.12	$12.10	57.3%
2"	$51.28	$32.27	$19.01	58.9%
3"	$108.47	$56.74	$51.73	91.2%
4"	$183.72	$82.40	$101.32	123.0%
6"	$409.47	$138.19	$271.28	196.3%
8"	$484.72	$221.13	$263.59	119.2%
10"	$1,146.92	$0.00	N/A	N/A
12"	$1,508.12	$0.00	N/A	N/A
14"	$2,260.62	$0.00	N/A	N/A
16"	$3,013.12	$0.00	N/A	N/A
18"	$3,765.62	$0.00	N/A	N/A

Table 1-10: Current and Proposed Rates for Monthly Renewal and Replacement (R&R) Charges – Untreated Retail ($/Meter Size)

Meter Size	Proposed R&R Charge (Monthly)	Current Charge Zone 1 (Monthly)	$ Difference	% Difference
5/8"	$8.98	$8.61	$0.37	4.3%
3/4"	$8.98	$8.61	$0.37	4.3%
1"	$8.98	$8.61	$0.37	4.3%
1-1/2"	$8.98	$8.61	$0.37	4.3%
2"	$8.98	$8.61	$0.37	4.3%
3"	$8.98	$8.61	$0.37	4.3%
4"	$8.98	$8.61	$0.37	4.3%
6"	$8.98	$8.61	$0.37	4.3%
8"	$8.98	$8.61	$0.37	4.3%
10"	$8.98	$8.61	$0.37	4.3%
12"	$8.98	$8.61	$0.37	4.3%
14"	$8.98	$8.61	$0.37	4.3%
16"	$8.98	$8.61	$0.37	4.3%
18"	$8.98	$8.61	$0.37	4.3%

Table 1-11: Current and Proposed Rates for Commodity Charges – Untreated Retail ($/hcf)

Customer Class	Tier Definition	Proposed Rate	Current Rate	$ Change	% Change
Untreated Retail	Uniform	$0.19	$0.42[12]	($0.23)	-54.4%

[12] Weighted average rate from existing Zone 1 declining three tier rates.

1.4.2.1 *Untreated Resale – Proposed Rates and Charges*

Table 1-12 shows the current and proposed Untreated Resale Miners Inch fixed and R&R charges.

Table 1-12: Current and Proposed Fixed Charges – Untreated Resale Miners' Inch

	Proposed Rates		Current Rates	
Miners' Inch Days	**Winter ($/Month/MI[13])**	**Summer ($/Month/MI)**	**Zone 1**	**Zone 3**
Fixed Charge	$7.11	$7.11	$69.03	$58.33
R&R Charge	$7.11	$7.11	$8.61	$6.87

Table 1-13 shows the current and proposed miners' inch rates for the Untreated Resale class, which consists of three customers: Heather Glen CSD, Alpine Meadows CSD, and Weimar Water Company.

Table 1-13: Current and Proposed Rates for Miners' Inch Deliveries ($/MI/Month)

	Proposed Rates		Current Rates	
Miners' Inch Days	**Winter ($/Month/MI[14])**	**Summer ($/Month/MI)**	**Zone 1**	**Zone 3**
< 1,000	$202.80	$171.81	$186.00	$157.20
> 1,000	$202.80	$171.81	$191.70	$162.30

Table 1-14 and Table 1-15 show the current and proposed fixed and R&R charges for Untreated Resale – Metered customers. There are three Untreated Resale – Metered customers: Dutch Flat, Christian Valley, and Meadow Vista. The tables only show meter sizes associated with current customers. Raftelis has calculated rates up to 18 inches.

Table 1-14: Current and Proposed Rates for Monthly Fixed Charges – Untreated Resale Metered ($/Meter Size)

Meter Size	Proposed Fixed Charge (Monthly)	Current Fixed Charge (Monthly)	$ Difference	% Difference
2"	$51.28	$58.33	($11.14)	31%
6"	$409.47	$69.03	$551.51	698%
8"	$484.72	$58.33	$678.20	1026%

Table 1-15: Current and Proposed Rates for Monthly Renewal and Replacement (R&R) Charges – Untreated Resale Metered ($/Meter Size)

Meter Size	Proposed R&R Charge (Monthly)	Current Charge Zone 1 (Monthly)	$ Difference	% Difference
2"	$8.98	$6.87	($2.11)	31%
6"	$8.98	$8.61	$0.37	-4.3%
8"	$8.98	$6.87	($2.11)	31%

[13] MI = Miners' Inch
[14] MI = Miners' Inch

Table 1-16 shows the current and proposed commodity rates for Untreated Resale – Metered customers. These users are currently billed in units of miners' inch days which are converted in the table to compare to hcf. The three Untreated Resale – Metered customers will have commodity charges billed in hcf going forward.

Table 1-16: Current and Proposed Rates for Commodity Charges ($/hcf)

	Proposed Rates ($/hcf)	Current Rates ($/hcf)	
Miners' Inch Days		**Zone 1**	**Zone 3**
< 1,000	$0.28	$0.29	$0.24
> 1,000	$0.28	$0.30	$0.25

2. REVENUE REQUIREMENTS

The Study year is Fiscal Year (FY) 2018[15], with proposed revenue adjustments and rates presented for the same year. Placer County Water Agency staff provided Raftelis with draft FY 2018 budgeted operating expenditures and estimated capital expenditures. 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 the operating requirement is $38.35 million which includes an assumption of 2 percent inflation from prior year. The capital R&R requirement is $10.38 million in capital projects for FY 2018. The total revenue required from rates is $48.74 million and is summarized in Table 2-1.

Table 2-1: FY 2018 Revenue Requirement

	Adopted Budget
Operating Expenses:	
Purchased Water	$4,474,100
Water Treatment	8,346,176
Pumping Plants & Wells	875,000
Transmission and Distribution:	
Treated Water	2,990,032
Untreated Water	3,481,351
Field Administration	1,086,235
Customer Service and Collection	4,954,568
Automotive & Equipment	1,036,877
Engineering	2,936,761
General and Administrative	6,564,010
Routine Capital	861,950
Subtotal Operating Expenses	**37,607,060**
Additional 2% Operating Expense Increase	*752,141*
Subtotal Operating Expenses (with Additions)	**38,359,201**
Capital Projects:	
R&R needs (estimate)	10,380,799
Total Revenue Requirement	**$48,740,000**

[15] PCWA's fiscal year is the same as calendar year, January through December.

3. SYSTEM EVALUATION AND CHANGES

3.1 WATER SYSTEM AND SERVICE AREA CHARACTERISTICS

Placer County includes more than 130 water entities. Placer County Water Agency (PCWA) provides treated and untreated water to several of these entities. The Agency's system is comprised of four zones which historically have acted as service areas.[16] PCWA began in 1968 when what is now Zone 1 was acquired from Pacific Gas & Electric (PG&E). Zone 1 has the largest number of connections at approximately 36,000. Subsequently, Zone 2 was acquired when the groundwater wells that served the area failed. Zone 2 consists of 46 residential parcels served by Zone 1 infrastructure wheeled through the City of Roseville. Zone 3 was purchased from PG&E in the 1980s and serves approximately 1,600 accounts. Zone 5 consists of 9 untreated agricultural customers. The water system (current Zones 1, 2, 3, and 5) is serviced by two main canals. The Boardman Canal is owned and operated by PCWA with a flow capacity of 50 cubic feet per second (cfs). The Bear River Canal is owned and operated by PG&E with a flow capacity of 450 cfs. This flow from PG&E is split with Nevada Irrigation District (NID).

The original zone system was drawn by previous PG&E service area boundaries. As the zones were incorporated in to PCWA's authority, the zone distinctions were maintained. While there are different users and elevations within the water system, those differences do not necessarily fall on the existing zone boundaries.

In 2015 PCWA contracted with Raftelis to evaluate the existing water system, including service classes, customer classes, and rate structures. Raftelis conducted several meetings with PCWA staff to understand the water system, service areas, use characteristics and other information pertinent to the evaluation. The product of the evaluation was several recommendations documented in a memorandum on July 24, 2015 titled "System Evaluation and Rate Framework Meeting." The recommendations are summarized below:

- Consolidation of the existing four service area zones (Zones 1, 2, 3, and 5) to a single zone named the Western Water System (Zone 6)
- Grouping of water service into the following four categories:
  - Treated Retail
  - Treated Resale
  - Untreated Retail
  - Untreated Resale
- Consolidation of certain retail customer classes within the treated system
- New user definition for resale customers on the treated system
- Revisions to the existing rate structures across the water system

[16] PCWA's Eastern system was transferred to Northstar Community Services District September 1, 2015. Accordingly the Eastern system (Zone 4) was not part of this evaluation.

Figure 3-1 shows the existing water service design while Figure 3-2 shows the proposed water service design. Customer classes are defined in subsequent sections.

Figure 3-1 Existing Water Service Design

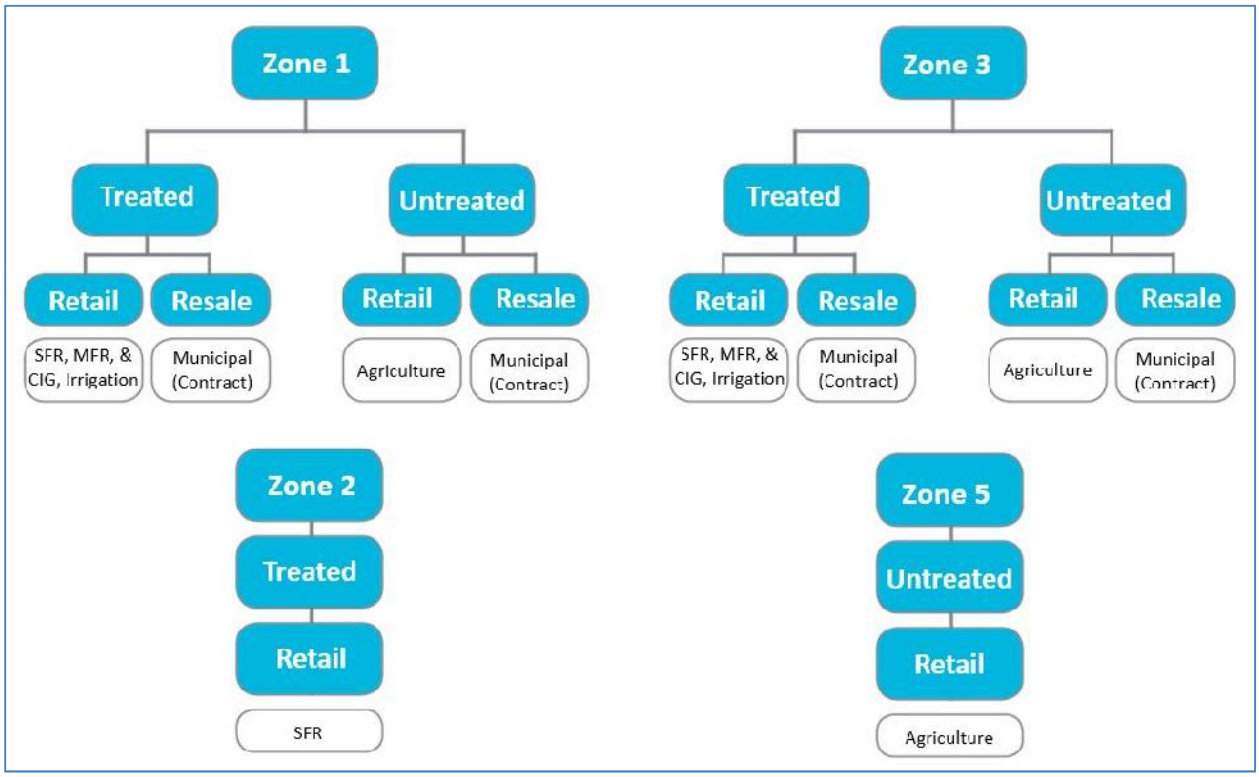
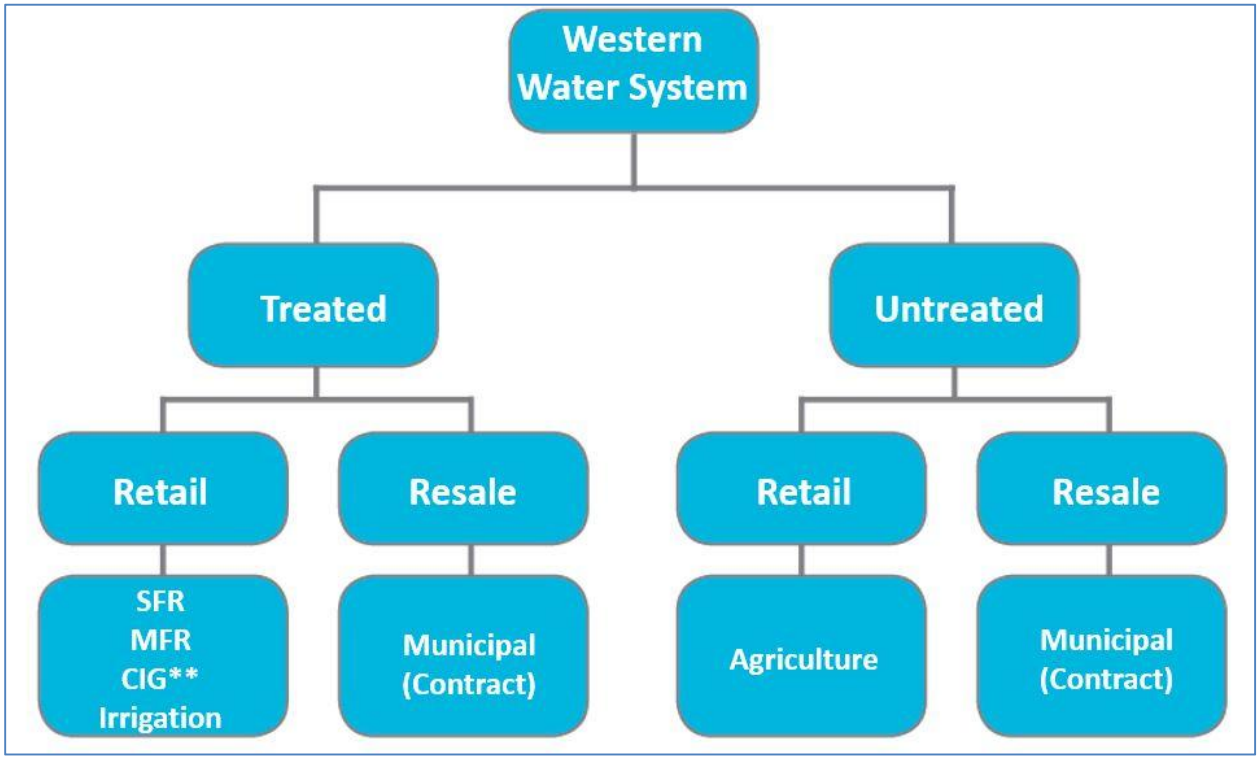


Figure 3-2 Proposed Water Service Design



The new water service design is the first step in the greater cost of service Study and serves as the foundation for the cost allocations between service classes in Section 5.

4. PROJECTED WATER DEMAND AND ACCOUNT INFORMATION

FY 2016 is the baseline consumption year within the cost of service model. The total number of accounts are anticipated to be the same (no growth) in FY 2017. Table 4-1 through Table 4-5 shows the total number of metered connections. Total potable water demand is assumed to be flat relative to FY 2016.

Table 4-1 shows the count of Treated Retail meters by customer class and meter size. SFR stands for Single Family Residential (i.e., stand-alone homes with a single dwelling unit. MFR stands for Multi-Family Residential (i.e., apartments, duplexes, triplexes, and often condominiums) CG stands for Commercial and Governmental. Landscape refers to dedicated meters for schools, parks, and other greenbelt areas. Construction refers to bulk water needs of temporary meters on construction sites and for sediment control. CIDUWS stands for Customers Involuntarily Deprived of Untreated Water Service and are customers who receive metered treated water and who used to be raw water users. The overwhelming majority of Treated Retail customers are SFR and the most common meter size is 5/8".

Table 4-1: Meter Assumptions – Treated Retail

Meter Size	SFR	MFR	CG	Landscape	Construction	CIDUWS	Total by Meter Size
5/8"	27,365	201	1,813	125	0	24	29,528
3/4"	1,578	52	299	86	0	18	2,033
1"	2,315	170	519	171	0	9	3,184
1-1/2"	15	161	303	106	0	1	586
2"	1	136	145	47	0	7	336
3"	0	38	26	15	32	0	111
4"	0	10	12	0	0	0	22
6"	0	2	8	0	0	0	10
8"	0	1	2	0	0	0	3
10"	0	0	0	0	0	0	0
12"	0	0	0	0	0	0	0
14"	0	0	0	0	0	0	0
16"	0	0	0	0	0	0	0
18"	0	0	0	0	0	0	0
Total	**31,274**	**771**	**3,127**	**550**	**32**	**59**	**35,813**

Table 4-2 show the meters and sizes associated with the Treated Resale class. The class has 5 meters between the two customers, City of Lincoln and CalAmerican Water.

Table 4-2: Meter Assumptions – Treated Resale

Meter Size	Treated Resale
5/8"	0
3/4"	0
1"	0
1-1/2"	0
2"	0
3"	0
4"	0
6"	0
8"	1
10"	0
12"	2
14"	0
16"	1
18"	1
Total	5

The Untreated Retail class is predominantly unmetered, miners' inch customers, however the class has 191 metered connections delivering pressurized raw water. Table 4-3 shows the count of meters at each size.

Table 4-3: Meter Assumptions – Untreated Retail

Meter Size	Untreated Retail
5/8"	10
3/4"	102
1"	63
1-1/2"	6
2"	5
3"	2
4"	3
6"	0
8"	0
10"	0
12"	0
14"	0
16"	0
18"	0
Total	191

Similar to the Untreated Retail service class, Untreated Resale consists of both miners' inch and metered accounts. Table 4-4 shows the count of meters at each size.

Table 4-4: Meter Assumptions – Untreated Resale

Meter Size	Untreated Resale
5/8"	0
3/4"	0
1"	0
1-1/2"	0
2"	3
3"	0
4"	0
6"	1
8"	1
10"	0
12"	0
14"	0
16"	0
18"	0
Total	5

Table 4-5 shows the summation of meter counts from Table 4-1 through Table 4-4. For the purposes of this Study there are 36,014 meters in service.

Table 4-5: Total Metered Accounts

Meter Size	Total Treated Retail	Total Treated Resale	Total Untreated Retail	Total Untreated Resale	Total by Size
5/8"	29,528	0	10	0	29,538
3/4"	2,033	0	102	0	2,135
1"	3,184	0	63	0	3,247
1-1/2"	586	0	6	0	592
2"	336	0	5	3	344
3"	111	0	2	0	113
4"	22	0	3	0	25
6"	10	0	0	1	11
8"	3	1	0	1	5
10"	0	0	0	0	0
12"	0	2	0	0	2
14"	0	0	0	0	0
16"	0	1	0	0	1
18"	0	1	0	0	1
Total	**35,813**	**5**	**191**	**5**	**36,014**

Table 4-6 shows the total number of inches at each increment from 2016 data. PCWA delineates two sub-classes: Year Round and Summer Only. Year Round consist of the same customers that change their order (size of orifice) depending on the season (Summer or Winter), as less water is required in the winter for agriculture and commercial irrigation. Summer Only consists of customers who take water in the summer season but do not take water in the winter. The summer season is April 15

through October 15 for lower country customers and May 1 through October 31 for upcountry customers. The winter season is the other six months of service.

Table 4-6: Untreated Retail – Miners' Inches

Miner's Inches	Summer Year Round	Winter Year Round	Summer Only	Total Annual Miner's Inch		Miner's Inches	Summer Year Round	Winter Year Round	Summer Only	Total Annual Miner's Inch
0.5	273	541	370.5	1,184		**13.5**	13.5	0	0	13.5
1	1,095	1,267	486	2,848		**14**	0	14	14	28
1.25	6.25	4	3.75	13.75		**15**	60	15	0	75
1.5	265.5	50	81	396		**16**	32	0	0	32
1.75	1.75	2	1.75	5.25		**17**	34	0	17	51
2	626	104	152	882		**18**	54	36	0	90
2.5	170	13	32.5	215		**19**	19	0	0	19
3	309	18	39	366		**20**	20	0	0	20
3.5	35	0	3.5	38.5		**21**	21	0	0	21
4	188	56	48	292		**22**	22	0	0	22
4.25	4.25	0	0	4.25		**23**	46	0	0	46
4.5	18	5	13.5	36		**24**	48	0	24	72
5	120	25	30	175		**24.5**	24.5	0	0	24.5
5.5	22	0	0	22		**25**	0	0	0	0
6	72	18	24	114		**26**	0	0	0	0
6.5	6.5	0	13	19.5		**30**	30	30	0	60
7	63	7	21	91		**32**	32	32	0	64
8	56	8	24	88		**34**	0	0	0	0
8.5	8.5	0	0	8.5		**36**	0	36	0	36
9	18	0	0	18		**37**	37	0	0	37
9.5	9.5	0	0	9.5		**40**	40	0	40	80
10	50	30	30	110		**45**	0	0	0	0
10.25	10.25	0	0	10.25		**60**	120	120	0	240
10.5	31.5	0	0	31.5		**75**	75	0	0	75
11	55	0	11	66		**78**	78	0	0	78
11.5	11.5	0	0	11.5		**81**	81	0	0	81
12	48	0	0	48		**90**	90	0	0	90
12.5	12.5	0	0	12.5		**96**	96	0	0	96
13	26	0	0	26		**160**	160	160	0	320
		Total					**4,845**	**2,588.5**	**1,479.5**	**8913**

Table 4-7 is similar to Table 4-6 and shows the total number of accounts at each miners' inch increment from the 2016 data. For example Summer Year Round at 0.5 miners' inch includes 546 accounts which corresponds to the 273 miners' inches at 0.5 inch in Table 4-6 (546 x 0.5 = 273).

Table 4-7: Untreated Retail – Miners' Inch Accounts

Miners' Inches	Summer Year Round	Winter Year Round	Summer Only		Miners' Inches	Summer Year Round	Winter Year Round	Summer Only
0.5	546	1,081	741		**13.5**	1	0	0
1	1,095	1,267	486		**14**	0	1	1
1.25	5	3	3		**15**	4	1	0
1.5	177	33	54		**16**	2	0	0
1.75	1	1	1		**17**	2	0	1
2	313	52	76		**18**	3	2	0
2.5	68	5	13		**19**	1	0	0
3	103	6	13		**20**	1	0	0
3.5	10	0	1		**21**	1	0	0
4	47	14	12		**22**	1	0	0
4.25	1	0	0		**23**	2	0	0
4.5	4	1	3		**24**	2	0	1
5	24	5	6		**24.5**	1	0	0
5.5	4	0	0		**25**	0	0	0
6	12	3	4		**26**	0	0	0
6.5	1	0	2		**30**	1	1	0
7	9	1	3		**32**	1	1	0
8	7	1	3		**34**	0	0	0
8.5	1	0	0		**36**	0	1	0
9	2	0	0		**37**	1	0	0
9.5	1	0	0		**40**	1	0	1
10	5	3	3		**45**	0	0	0
10.25	1	0	0		**60**	2	2	0
10.5	3	0	0		**75**	1	0	0
11	5	0	1		**78**	1	0	0
11.5	1	0	0		**81**	1	0	0
12	4	0	0		**90**	1	0	0
12.5	1	0	0		**96**	1	0	0
13	2	0	0		**160**	1	1	0
Total						**2,486**	**2,486**	**1,429**

Table 4-8 shows the total number of inches at each increment for the Treated Resale class. There are only three miners' inch customers in the class and each take water year round.

Table 4-8: Untreated Resale – Miners' Inches

Miner's Inches	Summer Year Round	Winter Year Round	Summer Only	Total Annual Miner's Inch
2		2		2
3	3			3
8		8		8
10	10			10
20		20		20
25	25			25
Total	**38**	**30**	**0**	**68**

Total demand is estimated using 2016 data for each of the four service classes. Estimated demand is calculated two different ways which is subsequently used in the cost allocations between service classes in Section 5. Table 4-9 shows estimated ordered water demand. Metered deliveries of treated and untreated water are included in total. Annual Water Demand – Ordered therefore represents potential water demand. Total estimated water ordered is 112,081 AF.

Table 4-9: Annual Water Demand in Acre Feet - Ordered

Delivery	Total Treated Retail	Total Treated Resale	Total Untreated Retail	Total Untreated Resale	Total Demand (Ordered)
Metered	20,583	8,805	207	1,402	30,997
Miners' Inch	0	0	80,456	629	81,085
Total	**20,583**	**8,805**	**80,663**	**2,031**	**112,081**

Table 4-10 shows estimated delivered water demand. Miners' inch customers are charged for what is ordered but Untreated Retail miners' inch customers often take less than the amount ordered. PCWA staff estimate that 80 percent of what is ordered is delivered. A 20 percent "no take factor" for Untreated Retail miners' inch orders is applied to estimate actual delivered water and more accurately distribute water supply costs between the service classes. Total estimated water delivered is 96,156 AF.

Table 4-10: Annual Water Demand in Acre Feet - Delivered

Delivery	Total Treated Retail	Total Treated Resale	Total Untreated Retail	Total Untreated Resale	Total Demand (Delivered)
Metered	20,583	8,805	207	1,402	30,997
Miners' Inch	0	0	64,530	629	65,159
Total	**20,583**	**8,805**	**64,737**	**2,031**	**96,156**

5. COST ALLOCATION TO SERVICE CLASSES

5.1 ALLOCATION METHODOLOGY

The revenue requirement identified in Section 2 must be recovered from the four service classes in proportion to the costs incurred to provide service to each class. To appropriately distribute costs to each service class we identify different bases for doing so. This list of possible allocation bases becomes the methodology for assigning costs from the total water system budget to each of the four service classes. Raftelis worked with PCWA staff to determine the allocation bases. Table 5-1 lists the possible bases to use in allocating operating and capital expenses. More complete descriptions follow Table 5-1.

Table 5-1: Cost Allocation Bases

Allocation Basis	Description
Projected 2018 Revenues	Rate revenues
Annual Demand (Delivered)	Annual demand less undelivered miners' inch water
Annual Demand (Ordered)	Annual potential demand
Annual Demand (Treated)	Treated water sales
Max Period (Canal)	Max period to average period
Max Period (Pumping)	Max period to average period
Max Day	Max day to average day
Max Hour	Max hour to average hour
Number of Accounts	Count of accounts
Metered Connections	Count of meters
Equivalent Connections	Count of meters normalized by the base meter
Indirect	Proportional share of all other costs

- **Projected 2018 Revenues** – PCWA estimates on rate revenues for each of the four service classes.
- **Annual Demand (Delivered) –** Annual demand is derived from the most recent year of water consumption data (FY 2016). Metered deliveries of treated and untreated water are included less a 20 percent "no take factor" for miners' inch orders. Miners' inch customers are charged for what is ordered but on average take only 80 percent of ordered water.
- **Annual Demand (Ordered)** – Includes all metered deliveries and all miners' inch ordered water. Represents PCWA's potential water demand.
- **Annual Demand (Treated)** – All water sales delivered to the treated retail and treated resale class through the potable water system.
- **Max Period (Canal)** – The ratio of water use in the maximum billing period of use to the average billing period of use. Relates a function of system peaking at a seasonal level.
- **Max Period (Pumping)** – Same as Max Period (Canal) however only relates to the Treated water system since all pumping goes to the treated system.
- **Max Day** – The ratio of use on the maximum demand day of the year relative to the average day. Ratio provided by PCWA engineering staff.
- **Max Hour** – The ratio of use at the max hour of the max day relative to average day. Ratio provided by PCWA engineering staff
- **Number of Accounts** – Count of customer accounts in each service class
- **Metered Connections** – Count of metered connections in each service class

- **Equivalent Connect** – Count of metered connections in each service class normalized with the base 5/8" meter. This allows for a calculation of total capacity, or potential capacity, within each service class.
- **Indirect** – Any costs that are unable to be assigned using one of the defined bases are allocated proportional to the share of all other costs of the service class.

Applying the values for each service class to the possible allocation bases yields Table 5-2. This table represents the possible assignments of costs and the relative share to each service class based on the selection. All values within Table 5-2 were either calculated using FY 2016 customer billing data or provided by PCWA finance or engineering staff.

Table 5-2: Cost Allocation Methodology

	Treated		Untreated	
Allocation Basis	**Retail**	**Resale**	**Retail**	**Resale**
Projected 2018 Revenues	$33,221,546	$7,476,289	$4,024,186	$223,388
Annual Demand (Delivered)	20,583 AF	8,805 AF	64,737 AF	2,031 AF
Annual Demand (Ordered)	20,583 AF	8,805 AF	80,663 AF	2,031 AF
Annual Demand (Treated)	20,583 AF	8,805 AF	N/A	N/A
Max Period (Canal)	1.64	1.64	1.37	1.60
Max Period (Pumping)	1.64	1.64	N/A	N/A
Max Day	2.00	2.00	N/A	N/A
Max Hour	3.20	2.00	N/A	N/A
Number of Accounts	35,813	2	4,325	8
Metered Connections	35,813	5	191	5
Equivalent Connect	49,673	1,705	1,192	848
Indirect	64%	20%	15%	0.4%

To assign the operating and capital expenses using the methodology above, we translate the values into percentages (Table 5-3). Projected 2018 revenues, Annual Demand (Delivered), Annual Demand (Ordered), Annual Demand (Treated), Number of Accounts, Metered Connections, and Equivalent Connections are all derived using the values in Table 5-2. Likewise with Max Day and Max Hour; however these are only assigned to treated classes. Max Period Canal uses the respective Annual Demand (Ordered) and Max Period (Canal) peaking factor to calculate a weighted demand figure which is then translated in to percentages. Max Period (Pumping) uses the same calculation steps as Max Period (Canal) but is only assigned to the two Treated classes. Lastly, Indirect assigns costs categorized as "General" in proportion to the share of all other costs already assigned and it is therefore a result of the other allocation bases. All percentages in Table 5-3 are rounded to the nearest whole number.

Table 5-3: Cost Allocation Methodology as Percentage

Allocation Basis	Treated		Untreated	
Projected 2018 Revenues	74%	17%	9%	0%
Annual Demand (Delivered)	21%	9%	67%	2%
Annual Demand (Ordered)	18%	8%	72%	2%
Annual Demand (Treated)	70%	30%	0%	0%
Max Period (Canal)	24%	10%	63%	2%
Max Period (Pumping)	70%	30%	0%	0%
Max Day	70%	30%	0%	0%
Max Hour	79%	21%	0%	0%
No. of Accounts	89%	0%	11%	0%
Metered Connections	99%	0%	1%	0%
Equivalent Connect	93%	3%	2%	2%
Projected 2018 Revenues	74%	17%	9%	0%
Indirect	64%	20%	15%	0%

5.2 FUNCTIONALIZED EXPENSES & COST COMPONENTS

The principles and methodology of a cost of service analysis were described in Section 1.3. A cost of service analysis distributes a utility's revenue requirements (costs) to each customer class. After determining a utility's revenue requirements, the next step is to functionalize the costs. The functionalization of costs allows us to better allocate costs to the **cost causation** components (plainly, cost components).[17]

While the cost allocations between the four service classes is not a cost of service study in the traditional sense, functionalizing costs and allocating to cost components in this early step allows us to carry those components through to the individual cost of service analyses for each service class.

5.2.1 *Operating Expense Functions*

PCWA operating expense **functions** (i.e., cost categories) include those shown in Table 5-4. Table 5-4 also shows the total FY 2018 costs associated with each function.

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

Table 5-4: Operating Functions and FY 2018 Costs

Function	Cost (FY 2018)
Other Operating Expenses	($676,714)
Administration	$2,247,992
Human Resources	$8,524
Customer Service	$2,361,587
Meter Reading	$986,368
Water Efficiency	$1,050,070
Facilities Maintenance	$948,117
Inventory Adjustments	-$370
Vehicle & Equipment Maintenance	$1,144,469
Warehouse	$336,964
Hydrography	$212,196
Maintenance	$5,758,352
Canal Operations	$1,800,720
Canal Cleaning	$55,943
Weed and Brush Control	$591,418
Accounting	$0
Information Technology	$0
Planning	$0
Natural Resource Management	$139,279
Engineering[18]	$3,709,816
Water Treatment	$6,528,535
Domestic Wells	$0
Operational Technology	$1,835,013
Water Quality Monitoring	$637,185
Treated Water Pumping	$44,163
Purchased Water	$3,918,070
Raw Water Pumping	$1,160
American River Pumps	$379,133
Ophir Pump Station	$176,357
Outlet Modification Facilities	$261
Mandated Safety	$366
Service Level Support	$4,207,518
Total	**$34,194,973**

[18] Allocation based on relative share of these components total value in the Asset Schedule

These functions are identified within the Agency's operating budget detail. The operating expenses detail can be found in the Excel Model which is supplemental to this report.

5.2.2 *Capital Expenses (Assets) Functions*

PCWA asset **functions** include those found in Table 5-5. Table 5-5 also shows the total FY 2018 value associated with each group of functionalized assets. These functions are identified within PCWA's asset detail. The asset detail can be found in the Excel Model supplemental to this report.

Table 5-5: Asset Functions and FY 2018 Costs

Function	Cost (FY 2018)
Canal	$13,512,979
Communication Equip	$1,100,164
Design	$0
Design WTP	$7,782,966
General Plant	$3,267,097
Lab Equipment	$62,867
Land & Land Rights	$14,036,017
Office Furniture & Equip	$1,143,850
Pipelines	$238,685,663
Pipelines Raw	$1,311,196
Power Operated Equipment	$2,368,249
Pumping	$128,069,978
Reservoir	$646,175
Safety Equipment	$92,525
Source of Supply	$2,113,031
Storage	$95,977
Structure	$7,059,453
Study	$1,059,869
Tools & Shop Equipment	$47,199
Vehicle / Equipment	$1,202,799
Water Storage	$15,141,225
Water Treatment Plant	$92,795,521
Total	**$531,594,802**

5.3 COST CAUSATION COMPONENTS

5.3.1 *Operating Cost Components*

Organizing the costs in terms of end function provides a direct correlation between the cost component and the rate. This process couples the cost incurred by the utility and the benefit delivered to the customer and 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 principal service requirements that drive costs include the annual volume of water consumed, the peak water demands incurred, and the number of customers or meter equivalents in the system.

The operating cost components include:

1. **Water Supply** costs are related to the purchase of raw water supplies.
2. **Canal** costs are associated with the operations and management of the extensive water transmission system. These costs vary with the total quantity of water used within the water system under average conditions.
3. **Treatment** costs are incurred in treating raw water to potable water standards before entering the potable distribution system. These costs include facilities, power, and chemicals among others. Treatment capabilities but must be sized to provide service during max day conditions. Maximum day demand is the maximum amount of water used in a single day in a year. Maximum hour demand is the maximum usage in an hour on the maximum usage day.
4. **Distribution** costs are related to the system of pipes, pumps, and other infrastructure between PCWA treatment plants and the service connection. Distribution and storage facilities (reservoirs), as well as 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[19] costs include the O&M and capital costs associated with meeting peak customer demand in excess of the average annual rate of use or base use requirements.
5. **Treated Supply** costs are the same as for the Water Supply component, however, these supplies are only purchased for meeting Treated Retail and/or Treated Resale demand.
6. **Treated Storage** are costs of operating and maintaining water tanks and other reservoirs as part of the treated water system to meet the max day demand of customers. For Treated Resale this component is incorporated into the Water Supply component.
7. **Pumping** are costs of moving Middle Fork American surface water from the river to treatment facilities and includes the American River pumps and Ophir Pump Station.
8. **Meter** costs include servicing and maintenance related to metered connections.
9. **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.
10. **Conservation** costs include all costs of funding, administering, and executing water conservation and efficiency related programs and services.
11. **General** costs are incurred in operating and maintaining the water system that are not otherwise recovered through the other functionalized cost components. These costs are allocated to the other cost components in proportion to the relative share of the other cost components.

[19] *The terms extra capacity, peaking and capacity costs are used interchangeably.*

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

Table 5-6 shows the allocation of functionalized operating expenses to the cost components. The top row of Table 5-6 shows the cost causation components and the leftmost column shows the cost functions. Raftelis worked in conjunction with PCWA staff to determine the appropriate assignments of expenses to one or more cost components.

Customer service and meter reading costs are allocated 50/50 to meter and customer. Warehouse is allocated 50/50 to treatment and distribution. Engineering costs are allocated to treatment, distribution, treated storage, and pumping proportional to the share of each of those components asset values. Purchased water is allocated based on the share that is purchased for agency wide use and the share dedicated to the treated system. All other assignments are based on a one-to-one relationship between the function and cost component.

Table 5-6: Allocation of O&M Functionalized Expenses to Cost Components (%)

Functions	Water Supply	Canal	General	Treatment	Distribution	Treated Supply	Reservoir	Treated Storage	Pumping	Meter	Customer	Conservation
OTHER OPERATING EXPENSES			100%									
ADMINISTRATION			100%									
HUMAN RESOURCES			100%									
CUSTOMER SERVICE										50%	50%	
METER READING										50%	50%	
WATER EFFICIENCY												100%
FACILITIES MAINTENANCE			100%									
INVENTORY ADJUSTMENTS			100%									
VEHICLE & EQUIPMENT MAINT			100%									
WAREHOUSE				50%	50%							
HYDROGRAPHY		100%										
MAINTENANCE					100%							
CANAL OPERATIONS		100%										
CANAL CLEANING		100%										
WEED AND BRUSH CONTROL		100%										
ACCOUNTING			100%									
INFORMATION TECHNOLOGY			100%									
PLANNING		100%										
NATURAL RESOURCE MGMT			100%									
ENGINEERING				30%	65%			4%	0%			

WATER TREATMENT				100%								
DOMESTIC WELLS				100%								
OPERATIONAL TECHNOLOGY				100%								
WATER QUALITY MONITORING				100%								
TREATED WATER PUMPING					100%							
PURCHASED WATER	93%					7%						
RAW WATER PUMPING									100%			
AMERICAN RIVER PUMPS									100%			
OPHIR PUMP STATION									100%			
OUTLET MODIFICATION FACIL									100%			
MANDATED SAFETY			100%									
SERVICE LEVEL SUPPORT			100%									

Applying the assignment percentages in Table 5-6 to the functionalized totals from Table 5-4 yields the O&M schedule in Table 5-7 below. Table 5-8 summarizes the expenses by cost component

Table 5-7: Allocation of O&M Functionalized Expenses to Cost Components ($)

Functions	Water Supply	Canal	General	Treatment	Distribution	Treated Supply	Reservoir	Treated Storage	Pumping	Meter	Customer	Conserv-ation	Total FY 2018
OTHER OPERATING EXPENSES	$0	$0	**($676,714)**	$0	$0	$0	$0	$0	$0	$0	$0	$0	-$676,714
ADMINISTRATION	$0	$0	**$2,247,992**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,247,992
HUMAN RESOURCES	$0	$0	**$8,524**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$8,524
CUSTOMER SERVICE	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$1,180,793**	**$1,180,793**	$0	$2,361,587
METER READING	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$493,184**	**$493,184**	$0	$986,368
WATER EFFICIENCY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$1,050,070**	$1,050,070
FACILITIES MAINTENANCE	$0	$0	**$948,117**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$948,117
INVENTORY ADJUSTMENTS	$0	$0	**($370)**	$0	$0	$0	$0	$0	$0	$0	$0	$0	-$370
VEHICLE & EQUIPMENT MAINT	$0	$0	**$1,144,469**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,144,469
WAREHOUSE	$0	$0	$0	**$168,482**	**$168,482**	$0	$0	$0	$0	$0	$0	$0	$336,964
HYDROGRAPHY	$0	**$212,196**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$212,196
MAINTENANCE	$0	$0	$0	$0	**$5,758,352**	$0	$0	$0	$0	$0	$0	$0	$5,758,352
CANAL OPERATIONS	$0	**$1,800,720**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,800,720
CANAL CLEANING	$0	**$55,943**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$55,943
WEED AND BRUSH CONTROL	$0	**$591,418**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$591,418
ACCOUNTING	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
INFORMATION TECHNOLOGY	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
PLANNING	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
NATURAL RESOURCE MGMT	$0	$0	**$139,279**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$139,279

ENGINEERING*	$0	$0	$0	**$1,128,499**	**$2,427,337**	$0	$0	**$153,980**	$0	$0	$0	$0	$3,709,816
WATER TREATMENT	$0	$0	$0	**$6,528,535**	$0	$0	$0	$0	$0	$0	$0	$0	$6,528,535
DOMESTIC WELLS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
OPERATIONAL TECHNOLOGY	$0	$0	$0	**$1,835,013**	$0	$0	$0	$0	$0	$0	$0	$0	$1,835,013
WATER QUALITY MONITORING	$0	$0	$0	**$637,185**	$0	$0	$0	$0	$0	$0	$0	$0	$637,185
TREATED WATER PUMPING	$0	$0	$0	$0	**$44,163**	$0	$0	$0	$0	$0	$0	$0	$44,163
PURCHASED WATER	**$3,639,797**	$0	$0	$0	$0	**$278,273**	$0	$0	$0	$0	$0	$0	$3,918,070
RAW WATER PUMPING	$0	$0	$0	$0	$0	$0	$0	$0	**$1,160**	$0	$0	$0	$1,160
AMERICAN RIVER PUMPS	$0	$0	$0	$0	$0	$0	$0	$0	**$379,133**	$0	$0	$0	$379,133
OPHIR PUMP STATION	$0	$0	$0	$0	$0	$0	$0	$0	**$176,357**	$0	$0	$0	$176,357
OUTLET MODIFICATION FACIL	$0	$0	$0	$0	$0	$0	$0	$0	**$261**	$0	$0	$0	$261
MANDATED SAFETY	$0	$0	**$366**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$366
SERVICE LEVEL SUPPORT	$0	$0		$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,207,518
Total	**$3,639,797**	**$2,660,278**	**$3,811,662**	**$10,297,714**	**$8,398,334**	**$278,273**	**$0**	**$153,980**	**$556,910**	**$1,673,977**	**$1,673,977**	**$1,050,070**	**$34,194,973**

Table 5-8: Operating Expenses by Cost Component

Cost Component	Total	Percentage
Water Supply	$3,639,797	11%
Canal	$2,660,278	8%
General	$3,811,662	11%
Treatment	$10,297,714	30%
Distribution	$8,398,334	25%
Treated Supply	$278,273	1%
Reservoir	$0	0%
Treated Storage	$153,980	0%
Pumping	$556,910	2%
Meter	$1,673,977	5%
Customer	$1,673,977	5%
Conservation	$1,050,070	3%
Total	**$34,194,973**	**100%**

5.3.2 *Capital Cost Components*

The process for allocating capital expenses follows the same logic as for operating expenses. The capital cost components include:

1. **Water Supply** relates to water supply infrastructure including wells and some components of storage facilities.
2. **Canal** relates to the series of transmission conduits and the improvements of these assets.
3. **Treatment** relates to water treatment plant assets.
4. **Treated Supply** includes pumping assets for acquiring raw water for delivery to PCWA treatment plants.
5. **Treated Storage** include tanks for meeting max day demands of the treated water distribution system.
6. **Reservoirs** include surface water reservoir assets.
7. **General-Treated** are non-water assets (e.g., offices, vehicles, etc.) used by PCWA to carry out essential treated water system activities.
8. **General-Raw** are non-water assets (e.g., offices, vehicles, etc.) used by PCWA to carry out essential untreated water system activities.
9. **Land** costs include easements and land purchases for siting of tanks, reservoirs, and other critical assets.

Table 5-9 shows the allocation of functionalized assets to the cost components. The top row of Table 5-9 shows the cost causation components and the leftmost column shows the asset functions. Raftelis worked in conjunction with PCWA staff to determine the assignments of asset functions to one or more cost components.

Communication, design, office furniture, power operated equipment, study, tools and shop equipment, and vehicle/equipment assets are allocated 50/50 to General Treated and General Raw.

All other assignments are based on a one-to-one relationship between the function and cost component.

Table 5-9: Allocation of Functionalized Assets to Cost Components (%)

Asset Function	General-Treated	General-Raw	Water Supply	Canal	Distribution	Treatment	Land	Treated Supply	Reservoirs	Treated Storage
Canal				100%						
Communication Equip	50%	50%								
Design	50%	50%								
Design WTP						100%				
General Plant						100%				
Lab Equipment						100%				
Land & Land Rights							100%			
Office Furniture & Equip	50%	50%								
Pipelines					100%					
Pipelines Raw				100%						
Power Operated Equipment	50%	50%								
Pumping								100%		
Reservoir									100%	
Safety Equipment	50%	50%								
Source of Supply			100%							
Storage									100%	
Structure						100%				
Study	50%	50%								
Tools & Shop Equipment	50%	50%								
Vehicle / Equipment	50%	50%								
Water Storage										100%
Water Treatment Plant						100%				

Applying the assignment methodology in Table 5-9 with the functionalized totals from Table 5-5 yields the capital schedule in Table 5-10.

Table 5-10: Allocation of Functionalized Assets to Cost Components ($)

Asset Function	General-Treated	General-Raw	Water Supply	Canal	Distribution	Treatment	Land	Treated Supply	Reservoirs	Treated Storage	Total Valuation
Canal	$0	$0	$0	**$13,512,979**	$0	$0	$0	$0	$0	$0	$13,512,979
Communication Equip	**$550,082**	**$550,082**	$0	$0	$0	$0	$0	$0	$0	$0	$1,100,164
Design	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Design WTP	$0	$0	$0	$0	$0	**$7,782,966**	$0	$0	$0	$0	$7,782,966
General Plant	$0	$0	$0	$0	$0	**$3,267,097**	$0	$0	$0	$0	$3,267,097
Lab Equipment	$0	$0	$0	$0	$0	**$62,867**	$0	$0	$0	$0	$62,867
Land & Land Rights	$0	$0	$0	$0	$0	$0	**$14,036,017**	$0	$0	$0	$14,036,017
Office Furniture & Equip	**$571,925**	**$571,925**	$0	$0	$0	$0	$0	$0	$0	$0	$1,143,850
Pipelines	$0	$0	$0	$0	**$238,685,663**	$0	$0	$0	$0	$0	$238,685,663
Pipelines Raw	$0	$0	$0	**$1,311,196**	$0	$0	$0	$0	$0	$0	$1,311,196
Power Operated Equipment	**$1,184,125**	**$1,184,125**	$0	$0	$0	$0	$0	$0	$0	$0	$2,368,249
Pumping	$0	$0	$0	$0	$0	$0	$0	**$128,069,978**	$0	$0	$128,069,978
Reservoir	$0	$0	$0	$0	$0	$0	$0	$0	**$646,175**	$0	$646,175
Safety Equipment	**$46,263**	**$46,263**	$0	$0	$0	$0	$0	$0	$0	$0	$92,525
Source of Supply	$0	$0	**$2,113,031**	$0	$0	$0	$0	$0	$0	$0	$2,113,031
Storage	$0	$0	$0	$0	$0	$0	$0	$0	**$95,977**	$0	$95,977
Structure	$0	$0	$0	$0	$0	**$7,059,453**	$0	$0	$0	$0	$7,059,453
Study	**$529,935**	**$529,935**	$0	$0	$0	$0	$0	$0	$0	$0	$1,059,869
Tools & Shop Equipment	**$23,600**	**$23,600**	$0	$0	$0	$0	$0	$0	$0	$0	$47,199
Vehicle / Equipment	**$601,399**	**$601,399**	$0	$0	$0	$0	$0	$0	$0	$0	$1,202,799
Water Storage	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$15,141,225**	$15,141,225
Water Treatment Plant	$0	$0	$0	$0	$0	**$92,795,521**	$0	$0	$0	$0	$92,795,521
Total	**$3,507,328**	**$3,507,328**	**$2,113,031**	**$14,824,175**	**$238,685,663**	**$110,967,905**	**$14,036,017**	**$128,069,978**	**$742,152**	**$15,141,225**	**$531,594,802**

Table 5-11 summarizes the asset valuation from Table 5-10 by cost component. This methodology uses the proportional share of system assets as a proxy for capital R&R investment. Therefore, the capital R&R revenue requirement is assigned to the cost components in the same proportions. Table 5-11 summarizes the capital revenue requirement by cost component.

In addition to the capital R&R requirement, there are approximately $4.2 million in costs which are accounted for in the operating budget but are more appropriately assigned to cost components using the capital allocation. These "fixed asset offset" costs were identified with the assistance of PCWA staff.

Table 5-11: Capital Expenses by Cost Component

Cost Component	Total Valuation	Percentage	FY 2018 R&R Requirement	Fixed Asset Offset	Total Capital
General-Treated	$3,507,328	0.7%	$70,347	$28,515	$98,863
General-Raw	$3,507,328	0.7%	$70,347	$28,515	$98,863
Water Supply	$2,113,031	0.4%	$42,382	$17,179	$59,561
Canal	$14,824,175	2.9%	$297,332	$120,524	$417,856
Distribution	$238,685,663	46.1%	$4,787,375	$1,940,563	$6,727,938
Treatment	$110,967,905	21.4%	$2,225,709	$902,192	$3,127,901
Land	$14,036,017	2.6%			$0
Treated Supply	$128,069,978	24.7%	$2,568,730	$1,041,235	$3,609,965
Reservoirs	$742,152	0.1%	$14,886	$6,034	$20,919
Treated Storage	$15,141,225	2.9%	$303,691	$123,101	$426,792
Total	**$531,594,802**	100%	**$10,380,799**	**$4,207,858**	**$14,588,657**

5.4 O&M ALLOCATION OF COST COMPONENTS

Now that the operating and capital revenue requirement has been functionalized and allocated to the various cost components, the Cost Allocation Methodology from Table 5-2 is used to distribute the revenue requirement to the four service classes.

Table 5-12 shows the cost component in column A and the total expense in column G. The selection of "Allocation Method" in column B distributes the cost to each of the service classes based on the proportional share of that method. For example, the Customer component is allocated based on the number of accounts with 89 percent of costs assigned to Treated Retail, 0.005 percent to Treated Resale, 11 percent to Untreated Retail, and 0.02 percent to Untreated Resale. The same method of distributing costs is used for General, Treatment, Pumping, Meter, and Conservation.

Table 5-12: O&M Expenses Distributed to Service Classes - FY 2018 Costs

Cost Component	Allocation Method	Treated		Untreated		FY 2018
		Retail	Resale	Retail	Resale	
A	B	C	D	E	F	G
Water Supply	Annual Demand (Ordered)	$525,539	$224,817	$2,817,283	$72,158	$3,639,797
Canal	Max Period (Canal)	$639,703	$273,028	$1,685,923	$61,623	$2,660,278
General	Indirect	$2,446,208	$759,925	$588,675	$16,854	$3,811,662
Treatment	Max Day	$7,212,377	$3,085,337	$0	$0	$10,297,714
Distribution	Max Hour	$6,626,612	$1,771,722	$0	$0	$8,398,334
Treated Supply	Annual Demand (Treated)	$103,363	$174,910	$0	$0	$278,273
Reservoir	Max Period (Canal)	$0	$0	$0	$0	$0
Treated Storage	Max Day	$107,846	$46,135	$0	$0	$153,980
Pumping	Max Period (Pumping)	$390,320	$166,590	$0	$0	$556,910
Meter	Metered Connections	$1,664,635	$232	$8,878	$232	$1,673,977
Customer	No. of Accounts	$1,493,229	$83	$180,332	$334	$1,673,977
Conservation	Annual Demand (Treated)	$735,454	$314,615	$0	$0	$1,050,070
Total		**$21,945,285**	**$6,817,395**	**$5,281,091**	**$151,202**	**$34,194,973**

5.5 CAPITAL ALLOCATION OF COST COMPONENTS

Table 5-13 shows the distribution of capital revenue requirements to the service classes. Like the O&M expenses in Table 5-12, cost components are shown in column A and the total expense in column G. The selection of "Allocation Method" in column B distributes the cost to each of the service classes based on the proportional share of that method. Note that the total cost of $14,588,657 ties to the total in Table 5-11 and includes the capital R&R requirement and fixed asset offset.

Table 5-13: Capital Expenses Distributed to Service Classes - FY 2018 Costs

Cost Component	Allocation Method	Treated		Untreated		FY 2018
		Retail	Resale	Retail	Resale	
A	B	C	D	E	F	G
Water Supply	Annual Demand (Ordered)	$10,938	$4,679	$42,865	$1,079	$59,561
Canal	Max Period (Canal)	$100,480	$42,885	$264,812	$9,679	$417,856
General	Indirect	$126,894	$39,420	$30,537	$874	$197,725
Treatment	Max Day	$2,190,739	$937,162	$0	$0	$3,127,901
Distribution	Max Hour	$5,308,604	$1,419,333	$0	$0	$6,727,938
Treated Supply	Annual Demand (Treated)	$2,528,370	$1,081,595	$0	$0	$3,609,965
Reservoir	Max Period (Canal)	$5,030	$2,147	$13,257	$485	$20,919
Treated Storage	Max Day	$298,919	$127,873	$0	$0	$426,792
Total		**$10,569,974**	**$3,655,095**	**$351,471**	**$12,117**	**$14,588,657**

5.6 TOTAL COST TO SERVE EACH CLASS

The cost components of Water Supply, Canal, Distribution and Treated Storage have adjustments made beyond the allocation bases in Tables 2-3 and 2-4 and used in Table 5-12and Table 5-13. Those adjustments are described below.

Water Supply – PCWA acquires water from numerous sources. The supply mix incorporates availability, maximum allotments or yields, and new sources. Resultantly the mix changes each year and during the same year. Not all supplies of PCWA are used across the system for the benefit of all classes. PG&E purchases and "Surplus Water" serve all classes. Nevada Irrigation District (NID)/Lincoln purchases only serve the Treated Resale class. NID, City of Roseville, and Agency-wide purchases only serve the Treated classes. Lastly, South Sutter Water District water only serves raw water users. Table 5-14 summarizes the sources and FY 2018 costs associated with each source. The sources are listed in no particular order.

Table 5-14: Purchased Water Sources and Costs, FY 2018

Source	Allocable to:	FY 2018
PG&E	All Classes	$3,388,796
Nevada Irrigation District (NID)	Treated Water	$20,692
City of Roseville	Treated Water	$2,958
Agency-wide	Treated Water	$123,930
South Sutter Water District	Untreated Water	$204,000
NID/Lincoln	Treated Resale	$130,693
Surplus Water	All Classes	$47,002
Total		**$3,918,070**

Sources of Water Supply - The Agency obtains water from three primary sources:

Nearly all of the water PCWA delivers to its treated and untreated water customers in Western Placer County comes from water pursuant to a 1968 agreement with PG&E and allowed the Agency to take delivery of up to a maximum of 100,400 AF per year from the Yuba and Bear Rivers through PG&E's Drum-Spaulding Project. The price has increased substantially since 2013 from $3.93 per AF to $41.00 per AF in 2017. Cost is now adjusted annually based on the consumer price index (CPI).

In 1982 the Agency acquired treated and untreated water systems serving the portion of upper Western Placer County that is adjacent to Interstate 80 from Alta, down through Colfax, to the Eastern boundary, just above Auburn. With this acquisition, the Agency acquired the right to purchase up to 25,000 acre feet annually from PG&E for use in this area with water from PG&E's Drum-Spaulding Project;

The Agency has up to 120,000 acre feet of water available annually from appropriated water rights developed through the construction of the 1963 Middle Fork Project on the American River. Water can be diverted into the water system through the American River Pump Station to Auburn tunnel and from Folsom Reservoir.

In addition to the three primary sources above, the Agency has rights to approximately 35,000 AF of water from the United States Bureau of Reclamation's Central Valley Project. The Agency also has two wells that reliably provide up to 2,000 AF of water per year within the Sunset Industrial area located in unincorporated Western Placer County. These wells provide back-up supply to the Agency's water system and are not routinely operated to meet normal system demands.

Nevada Irrigation District (NID) surplus water is sold to South Sutter Water District (SSWD), then up to 12 AF is re-sold to PCWA for growers in Lincoln (Zone 5). Based on a current agreement, PCWA pays SSWD $200 to provide water management to PCWA's Zone 5 customers.

Additionally, based on an agreement, PCWA provides treated water to NID for its customers in the City of Lincoln. NID transports water from Rollins Reservoir through the PG&E System to PCWA's Foothill water treatment plant for treatment then sends it to serve NID customers in the City of Lincoln. Thus, PCWA pays NID for this amount as it is included in PCWA's water flow to Lincoln.

Specific sources and the classes of customers that they serve are incorporated into the distribution of water supply costs in Table 5-12.

Canal – The Canal system is dual purposed. It provides transmission of raw water to PCWA treatment facilities and it provides arterial canals for raw water users. PCWA staff has estimated that approximately 60 percent of the canal system is utilized for the treated water system. In addition, the canal provides for reliable service for the treated water system as well as PCWA's Untreated Resale users. These classes are uninterruptible whereas the Untreated Retail agricultural users are interruptible. This translates into a reliability factor of 2.4 for uninterruptible customers and the canal cost allocations are adjusted to account for reliability.

Distribution – The distribution system is designed to provide water from PCWA treatment facilities to treated water connections. Within the system there are tens of thousands of customers utilizing distribution pipe of varying sizes. The length of distribution, and the diameter of the pipe serving Treated Retail and Treated Resale customers is considered when allocating distribution costs. PCWA's two Treated Resale customers, the City of Lincoln and CalAmerican Water Company, utilize large distribution pipes but only a fraction of the entire system. PCWA staff identified that Treated Resale customers use 20 percent of the distribution system, with the other 80 percent used by Treated Retail customers. This 20/80 split is used to adjust the distribution of allocation costs between the two service classes, in addition to max hour demand characteristics.

Treated Storage – The two Treated Resale customers take delivery of water from PCWA post treatment and maintain their own storage facilities. Therefore, treated storage costs are only recovered from Treated Retail customers.

Table 5-15 combines the O&M costs from Table 5-12 and the capital costs from Table 5-13 to show the total cost to serve each service class. The total of each cost component to each class includes the adjustments for water supply, canal operations, distribution, and treated storage costs discussed in Section 5.2. Note that the total cost to serve the four classes ($48,783,630) approximates the total revenue requirement of $48,740,000 from Table 2-1 to within one tenth of one percent, with the difference due to rounding within cost allocations.

Table 5-15: Total Cost to Serve Each Service Class - FY 2018 Costs

Cost Component	Treated Retail	Treated Resale	Untreated Retail	Untreated Resale	Total 2018
A B	C	D	E	F	G
Water Supply	$536,477	$229,496	$2,860,148	$73,238	$3,699,358
Canal	$1,776,439	$758,192	$372,376	$171,126	$3,078,134
General	$2,573,102	$799,345	$619,212	$17,729	$4,009,387
Treatment	$9,403,116	$4,022,499	$0	$0	$13,425,615
Distribution	$14,488,061	$638,211	$0	$0	$15,126,272
Treated Supply	$2,631,732	$1,256,505	$0	$0	$3,888,238
Reservoir	$5,030	$2,147	$13,257	$485	$20,919
Treated Storage	$580,773	$0	$0	$0	$580,773
Pumping	$390,320	$166,590	$0	$0	$556,910
Meter	$1,664,635	$232	$8,878	$232	$1,673,977
Customer	$1,493,229	$83	$180,332	$334	$1,673,977
Conservation	$735,454	$314,615	$0	$0	$1,050,070
Total	**$36,278,367**	**$8,187,917**	**$4,054,203**	**$263,143**	**$48,783,630**

5.7 REVENUE COMPARISON –ESTIMATED 2018 REVENUE VERSUS PROPOSED 2018 COST OF SERVICE

Table 5-16 compares the existing cost of service (revenues estimated to be collected in FY 2018) to the proposed cost of service based allocations. Treated Retail and Treated Resale experience a 9 percent and 10 percent increase respectively. Untreated Retail experiences a 1 percent increase and Untreated Resale experiences an 18 percent increase. All changes are inclusive of the 8.3 percent increase in the total revenue requirement.

Table 5-16: Revenue Comparison by Service Class - Projected 2018 versus COS 2018

A	Treated Retail B	Treated Resale C	Untreated Retail D	Untreated Resale E	Total COS F
Estimated 2018 Revenues	$33,221,546	$7,476,289	$4,024,186	$223,388	$44,945,409
Cost of Service 2018	$36,278,367	$8,187,917	$4,054,203	$263,143	$48,783,630
Difference ($)	$3,056,821	$711,628	$30,017	$39,755	$3,838,221
Difference (%)	9%	10%	1%	18%	9%
Annual Demand (Delivered)	20583 AF	8805 AF	64737 AF	2031 AF	96155 AF
Estimated 2018 Revenues	$33,221,546	$7,476,289	$4,024,186	$223,388	$44,945,409
Current $/AF	$1,614	$849	$62	$110	$467
COS $/AF	$1,763	$930	$63	$130	$507

6. TREATED RETAIL COST OF SERVICE ANALYSIS

6.1 POTABLE WATER RATE REVENUE REQUIREMENT

Table 6-1 shows the revenue requirement derivation for Treated Retail customers of $36,278,367 (same as Table 5-15). The total represents all O&M and capital revenue requirements allocated to the cost components. O&M expenses include costs directly related to the supply, treatment, and distribution of water, as well as routine maintenance of system facilities. Capital expenses in Table 6-1 consist of the total capital requirements of Treated Retail from Table 5-13. The result of operating plus capital is the total revenue required from Treated Retail rates. The fixed meter charge, commodity charges, and Renewal and Replacement (R&R) charge are designed to collect the total revenue requirement.

Table 6-1: Revenue Required from Treated Retail

COS Component	Operating	Capital	Total
Water Supply	$525,539		$525,539
Canal	$1,675,959		$1,675,959
General	$2,446,208		$2,446,208
Treatment	$7,212,377		$7,212,377
Distribution	$9,179,457		$9,179,457
Treated Supply	$103,363		$103,363
Reservoir	$0		$0
Treated Storage	$281,853		$281,853
Pumping	$390,320		$390,320
Meter	$1,664,635		$1,664,635
Customer	$1,493,229		$1,493,229
Conservation	$735,454		$735,454
Allocated Costs	**$25,708,393**	**$10,569,974**	**$36,278,367**

6.1 FUNCTIONALIZATION OF O&M EXPENSES

This section describes the cost of service for Treated Retail service. The revenue requirement for the service class has been identified in Section 5, and summarized in Table 6-1.

The principles and methodology of a cost of service analysis were described in Section 1.3 and is 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, maximum day, maximum hour[20], conservation, public fire protection, meter service, and customer servicing and billing costs.
3. 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).[21] 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.

A cost of service analysis distributes costs to each customer class. The cost categories from Section 5 become the **functions** (i.e., cost categories) for the cost of service analysis. To reiterate these functions include:

1. Water Supply
2. Canal
3. General
4. Treatment
5. Distribution
6. Treated Supply
7. Reservoir
8. Treated Storage
9. Pumping
10. Meter
11. Customer
12. Conservation

The functionalized costs are then allocated to the **cost causation components** which become the rate components in Section 8.[22] The cost components include:

1. **Supply** costs are related to the purchase of raw water supplies. As explained in previous sections, PCWA acquires water from numerous sources of supply.
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.

[20] Collectively maximum day and maximum hour costs are known as peaking costs or capacity costs.
[21] 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.
[22] *This Study uses the Base-Extra Capacity methodology set forth in the M1 Manual for functionalizing and allocating costs*.

3. **Pumping** costs are incurred when acquiring and moving raw water through elevation from surface water sources.
4. **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[23] 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.
5. **Meter Service** costs include maintenance and capital costs related to meters and associated services.
6. **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.
7. **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.
8. **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.
9. **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 allocated to the base component as they are incurred across all units of water and irrespective of customer use.

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.

Table 6-2 shows the functionalization of PCWA O&M expenses for the rate setting year (FY 2018). 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 presented in Table 6-2 match the total expenses from Table 5-12 for the Treated Retail class.

[23] *The terms extra capacity, peaking and capacity costs are used interchangeably.*

Table 6-2: Functionalization of Potable Water O&M Expenses

Cost Category	O&M Expenses by Function ($)
Water Supply	$525,539
Canal	$1,675,959
General	$2,446,208
Treatment	$7,212,377
Distribution	$9,179,457
Treated Supply	$103,363
Reservoir	$0
Treated Storage	$281,853
Pumping	$390,320
Meter	$1,664,635
Customer	$1,493,229
Conservation	$735,454
Total	**$25,708,393**

6.2 ALLOCATION OF FUNCTIONALIZED EXPENSES TO POTABLE WATER 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 which are shown in column B of Table 6-3. 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 6-3. The system-wide factors for base and max day were provided by PCWA engineering staff and are the same as are used in the cost allocation between service classes in Section 5. Base represents the average day demand throughout the year and is therefore a factor of 1.00. Max day is the ratio of maximum day demand to base demand (1.00/2.00) or 50 percent. Similarly max hour is the ratio of maximum hour demand, on the maximum day, to base demand (1.20 /3.20 or 38 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 allocation 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.

As an example, the functionalized expenses that are allocated to the cost components using the maximum day basis (line 2 of Table 6-3) attribute 50 percent (1.00/2.00) of the demand (and therefore costs) to base (average daily demand) use and the remaining 50 percent (1.00/2.00) to maximum day (peaking) use. Expenses allocated using the maximum hour basis (line 3) assume 31 percent (1.00/3.20) of costs are due to base, 31 percent (1.00/3.20) are allocated to max day, and the remaining portion (100%-31%-31%, or, 1.20/3.20) of costs are allocated to the maximum hour cost component. These allocation bases are used to assign the functionalized costs to the cost causation components.

Table 6-3: System-Wide Peaking Factors and Allocation to Cost Causation Components

		System Wide Factors	Base	Max Day	Max Hour	Total
	A	B	C	D	E	F
1	Base	1.00	100%			**100%**
2	Max Day	2.00	50%	50%	0%	**100%**
3	Max Hour	3.20	31%	31%	38%	**100%**

Table 6-4 shows the allocation basis for PCWA O&M costs. The top row of Table 6-4 shows the cost causation components and the leftmost column shows the cost functions. For example, treated storage related costs are allocated 47.5 percent to base, 47.5 percent to max day, and 5 percent to fire protection cost components (a modified allocation based upon the calculation of max day costs distribution in Table 6-3 and the incorporation of fire protection). This means that 47.5 percent of costs are due to meeting base customer demands, 47.5 percent of costs are due to meeting max day demands, and 5 percent of costs are allocated to fire protection (and the need to have additional storage within the system for firefighting).

Table 6-4: Allocation of Functionalized Potable Water O&M Expenses to Cost Causation Components

Function	2018	Supply	Base	Pumping	Max Day	Max Hour	Conservation	Fire Protection	Meters	Customers
Water Supply	$525,539	100%								
Canal	$1,675,959		100%						0%	
General	$2,446,208		100%							
Treatment	$7,212,377		60%		0%	0%			40%	
Distribution	$9,179,457		0%		40%	0%		5%	55%	
Treated Supply	$103,363	100%								
Reservoir	$0		47%		47%			5%		
Treated Storage	$281,853		47%		47%			5%		
Pumping	$390,320			100%						
Meter	$1,664,635								100%	
Customer	$1,493,229									100%
Conservation	$735,454						100%			
Total	**$25,708,393**	**$628,902**	**$8,583,051**	**$390,320**	**$3,805,240**	**$0**	**$735,454**	**$501,449**	**$9,598,287**	**$1,493,229**

Distribution of O&M expenses using Table 6-4 yields the total costs by cost component in Table 6-5

Table 6-5: Treated Retail O&M Revenue Requirement by Cost Component

Cost Components	Value
Supply	$628,902
Base	$8,583,051
Pumping	$390,320
Peaking	$3,805,240
Conservation	$735,454
Fire Protection	$501,449
Meters	$9,598,287
Customers	$1,493,229
Operating COS to be Recovered from Water Rates	**$25,708,393**

6.3 ALLOCATION OF FUNCTIONALIZED EXPENSES TO RATE COMPONENTS

The cost components shown in Table 6-4 are recovered from customers through fixed meter charges, fixed R&R charges, and variable volumetric (commodity) charges. Table 6-6 shows the allocation to rate components in dollars. The sum of all rate components under the blue header represent the revenue required from the commodity charges. The sum of all rate components under the orange header represent the revenue required from the fixed meter charge. The amount under the green header represents the revenue required from R&R charges.

Commodity charge revenue collects 39 percent of the total revenue requirement, while the fixed meter charge collects 32 percent, and the R&R charge collects the remaining 29 percent. This proposed revenue split will increase the revenue recovery from fixed charges by 4 percent, from 57 percent to 61 percent.

Table 6-6: Treated Retail Cost Recovery, by Rate Components

FY 2018	Commodity Charge Components (39%)					Fixed Charge Components (32%)			Capital R&R Charge (29%)
Revenue Requirement	Supply	Base	Pumping	Peaking	Conservation	Fire Protection	Meters	Customers	R&R
$36,278,367	**$628,902**	**$8,583,051**	**$390,320**	**$3,805,240**	**$735,454**	**$501,449**	**$9,598,287**	**$1,493,229**	**$10,569,974**

7. TREATED RETAIL RATE STRUCTURE DEFINITIONS AND PROPOSED REVISIONS

PCWA has had an inclining tier rate structure since purchasing the water system from PG&E in 1968. The most recent update to these rate structures occurred in January 2014. Existing rates were implemented January 1, 2017. Current charges are different by zone.

7.1 EXISTING RATE STRUCTURE AND RATES

PCWA water service charges have three components – a fixed monthly meter service charge, a fixed monthly R&R charge, and a volumetric rate (water sales). The monthly fixed charge and R&R charge increases with meter size as larger meter sizes generally consume more water on average, and tend to have higher rates of peaking; therefore, the costs to provide service to these customers is higher.

A typical single family home with a 5/8" meter in Zone 1 has a monthly fixed charge of $17.34 and an R&R charge of $16.29. PCWA has a different monthly base charge for Multi-Family Residential (MFR) customers. Accounts with service designated as multi-family residential are charged per dwelling unit, irrespective of the size of meter serving the property. Current fixed charges by zone are shown in Table 7-1 and Table 7-2.

Table 7-1: Existing Monthly Fixed Meter Charges

	Fixed Charge		
Meter Size	**Zone 1**	**Zone 2**	**Zone 3**
5/8"	$17.34	$13.75	$14.20
3/4"	$24.53	$19.46	$20.09
1"	$33.56	$26.62	$27.49
1-1/2"	$54.06		$44.28
2"	$94.36		$77.28
3"	$175.19		$143.48
4"	$244.27		$200.06
6"	$490.38		$401.62
8"	$840.85		$688.66
10"	$0.00		$0.00
12"	$1,313.85		$1,076.03
14"	$0.00		$0.00
16"	$1,890.37		$1,548.20
18"	$2,178.62		$1,784.28
MFR	$13.14		$10.76

Table 7-2: Existing Monthly R&R Charges

	Fixed Charge		
Meter Size	**Zone 1**	**Zone 2**	**Zone 3**
5/8"	$16.29	$12.50	$13.00
3/4"	$24.44	$18.75	$19.50
1"	$40.74	$31.25	$32.50
1-1/2"	$81.47		$65.00
2"	$130.36		$104.00
3"	$260.73		$208.00
4"	$407.39		$325.00
6"	$814.77		$650.00
8"	$3,910.89		$3,120.00
10"	$3,910.89		
12"	$3,910.89		
14"	$3,910.89		
16"	$3,910.89		
18"	$3,910.89		
MFR	$40.74		$32.50

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, tier, and zone. 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. Landscape refers to properties with dedicated irrigation meters, such as parks, schools, and on the properties of offices and apartment complexes. CG (Commercial, Industrial, and Governmental) are non-residential accounts such as offices, warehouses, government buildings, school buildings, and manufacturing facilities. Table 7-3, Table 7-4, and Table 7-5 show existing rates and tier definitions for Zones 1, 2, and 3.

Table 7-3: Existing Commodity Rates and Tiers, Zone 1

Current Commodity Rates	**Existing Zone 1**			
Tier Definition	**SFR**	**MFR**	**CG**	**Landscape**
Tier 1	4	4	50	50
Tier 2	10	10	500	500
Tier 3	20	20	N/A	N/A
Tier 4	40	40		
Tier 5	58	58		
Tier 6	77	77		
Tier 7	N/A	N/A		
Tier Rate	**SFR**	**MFR**	**CG**	**Landscape**
Tier 1	$1.44	$1.44	$1.47	$1.47
Tier 2	$1.55	$1.55	$1.50	$1.50
Tier 3	$1.65	$1.65	$1.55	$1.55
Tier 4	$1.78	$1.78		
Tier 5	$1.89	$1.89		
Tier 6	$2.21	$2.21		
Tier 7	$2.48	$2.48		

Table 7-4: Existing Commodity Rates and Tiers, Zone 2

Current Commodity Rates	Existing Zone 2			
Tier Definition	**SFR**	**MFR**	**CG**	**Landscape**
Tier 1	4			
Tier 2	10			
Tier 3	20			
Tier 4	45			
Tier 5	N/A			
Tier 6				
Tier 7				
Tier Rate	**SFR**	**MFR**	**CG**	**Landscape**
Tier 1	$0.94			
Tier 2	$1.07			
Tier 3	$1.14			
Tier 4	$1.18			
Tier 5	$1.35			
Tier 6				
Tier 7				

Table 7-5: Existing Commodity Rates and Tiers, Zone 3

Current Commodity Rates	Existing Zone 3			
Tier Definition	**SFR**	**MFR**	**CG**	**Landscape**
Tier 1	4	4	50	50
Tier 2	10	10	500	500
Tier 3	20	20	N/A	N/A
Tier 4	40	40		
Tier 5	58	58		
Tier 6	77	77		
Tier 7	N/A	N/A		
Tier Rate	**SFR**	**MFR**	**CG**	**Landscape**
Tier 1	$1.25	$1.25	$1.28	$1.28
Tier 2	$1.35	$1.35	$1.31	$1.31
Tier 3	$1.44	$1.44	$1.35	$1.35
Tier 4	$1.55	$1.55		
Tier 5	$1.65	$1.65		
Tier 6	$1.92	$1.92		
Tier 7	$2.16	$2.16		

7.2 PROPOSED CHANGES TO RATE STRUCTURES

As previously discussed in Section 3, the System Evaluation Study identified several recommendations for simplifying and consolidating customer classes and rate structures within the Treated Retail service class. Throughout the Cost of Service Study, Raftelis worked with Agency staff and management input to refine the proposed revisions.

As part of the system evaluation Raftelis recommends changes to the rate structures and tier definitions for the Treated Retail class. With the requirements of Proposition 218 becoming

examined more closely, and the justification for rates more stringent, it becomes more difficult to rationalize many unique tiers. While some agencies may have many sources of supply allowing a price differential in the marginal cost of water to justify five or more tiers, PCWA maintains several sources with similar costs – purchased water, surface water, and groundwater are all within pennies per hundred cubic feet. Raftelis proposes to reduce the Residential rate structure from seven 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.

7.2.1 *Consolidation of Four Zones to New Western Water System Designation*

PCWA operates a vast interconnected system. While certain water sources and treatment facilities generally serve specific areas, the system is designed to move water to any point to ensure uninterruptible service. Further, capital renewal and replacement applies to all facilities and the bulk of water supply (PG&E contract) serves all zones. The consolidation will abolish zone designations and instead be referred to as the Western Water System.

7.2.2 *Commercial and Governmental Class*

The existing structure separates non-residential users into two rate schedules: one for "non-residential" customers including commercial and landscape; and a second schedule for industrial and resale customers. With resale customers designated as their own service class in this Study, Raftelis recommends combining the commercial governmental classes in to one class with a uniform rate structure called Commercial and Governmental (CG) class. These users exhibit disparate requirements (e.g., restaurant versus office building versus school, etc.) and it is therefore not appropriate to tier their rates.

7.2.3 *Commercial and Governmental Class*

The existing structure separates non-residential users into two rate schedules: one for "non-residential" customers including commercial and landscape, irrigation; and a second schedule for industrial and resale customers. The Industrial class is defined as customers having monthly average water use over 10,000 hcf. Industrial customers are more aligned with Treated Resale customers, thus will use the Treated Resale rate. Currently, the Agency has only one Industrial class customer.

7.2.4 *Landscape*

Landscape customers' demands vary significantly from other non-residential users, most notably in their "peaking." Landscape irrigators including parks, schools, homeowner's associations, apartment complex common areas, among others, have strong seasonal, daily, and hourly peaks which increase costs on the system. It is appropriate to have a distinct class for these users. Raftelis recommends a uniform rate structure for the Landscape class.

7.2.5 *Residential Class*

The existing residential rate structure varies by zone and class. Raftelis recommends harmonizing the tier definitions and corresponding rates between SFR and MFR classes across the system. The proposed tiers and rationale are as follows:

7.2.5.1 *Tier 1 Definition – 0-9 hcf monthly*

Raftelis recommends using average winter use as the Tier 1 definition. Average winter use approximates indoor needs and isolates the effects of outdoor irrigation. Raftelis calculated 9 hcf monthly (18 hcf bi-monthly) as the average winter use for residential customers using 2016 data.

MFR customers receive tier allotments per dwelling unit. For example, if an apartment complex is master metered and has six dwelling units, the account's Tier 1 allotment will be six times that of a single family customer or 54 units monthly (9 hcf x 6 dwelling units).

7.2.5.2 *Tier 2 Definition – 10-28 hcf monthly*

Raftelis recommends using peak summer use for the Tier 2 definition. Peak summer use represents the outdoor demands of an average customer during the irrigation season. This tier definition provides enough water for the average customer to meet indoor and outdoor needs.

7.2.5.3 *Tier 3 Definition – Greater than 28 hcf monthly*

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

7.2.6 *Multi-Family Residential Fixed Charge*

The existing rate structure charges multi-family accounts a fixed charge based on the number of dwelling units served at the connection. The charge per dwelling unit will be maintained with a slight modification: the charge will have two components: a fixed component based on the number of dwelling units and an account component charged for each bill generated. This change allows PCWA to maintain the dwelling unit based charge while recovering account based charges uniformly across customers. .Additionally, for purposes of generating the fixed component, each dwelling unit is assumed to generate the same capacity demand and water use as a base 5/8" meter. This rationale is confirmed using the most recently available US Census data and associated occupancy for single family and multi-family residences.

Table 7-6 summarizes the proposed changes to tier definitions. The tier definitions are used to distribute peaking related costs and other costs of providing service to each tier. The cost of service is then used to determine a unit price for each tier.

Table 7-6: Existing and Proposed Water Commodity Tier Definitions

Customer Class	Current Tier Definition (hcf/month)	Proposed Tier Definition (hcf/month)
Residential Tier 1	0-4	0-9
Residential Tier 2	5-10	10-28
Residential Tier 3	11-20	>28
Residential Tier 4	21-40	
Residential Tier 5	41-58	
Residential Tier 6	59-77	
Residential Tier 7	>77	
CG Tier 1	0-50	Uniform
CG Tier 2	51-500	
CG Tier 3	>500	
Landscape 1	0-50	Uniform
Landscape 2	51-500	
Landscape 3	>500	
Construction Tier 1	0-50	Uniform
Construction Tier 2	51-500	
Construction Tier 3	>500	
Fire Protection Tier 1	0-50	Uniform
Fire Protection Tier 2	51-500	
Fire Protection Tier 3	>500	

7.3 USAGE ANALYSIS AND USAGE PROJECTIONS

Figure 7-1 compares the distribution of residential usage for the current rate structure to the proposed structure. Under the revised tiers, approximately 49 percent of use will occur in Tier 1 versus 31 percent in the current structure. Since the proposed definitions more than double the allotment in Tier 1, more use will fall in the first tier. The same is true for the proposed Tier 2 versus the current Tier 2. Note, the comparisons in Figure 7-1 and beyond utilize an account's historical water use. Predicting future water use relies on several factors and is difficult to determine. Therefore, this analysis does not forecast changes by customer.

Figure 7-1: Usage Distribution in Residential Tiers

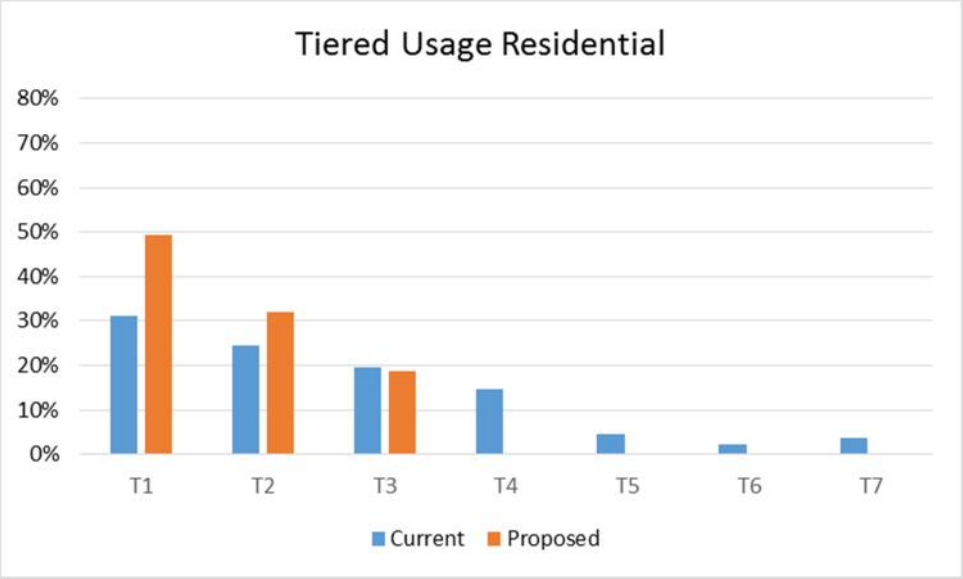


Figure 7-2, Figure 7-3, and Figure 7-4 shows the usage distribution in each zone. Tier 1 increases significantly in each zone because the allocation of water in that tier is larger. Zone 1 usage mirrors the class as a whole since the vast majority of treated retail water is used in Zone 1. Zone 2 usage increases in all proposed tiers, particularly in Tier 3 (45 percent of all water use) as Zone 2 customers use significantly more water on average. The opposite is true for Zone 3 where 67 percent of use occurs in the first tier under the revised tiers. Zone 3 customers use significantly less water than the class as a whole.

Figure 7-2: Usage Distribution in Residential Tiers, Zone 1

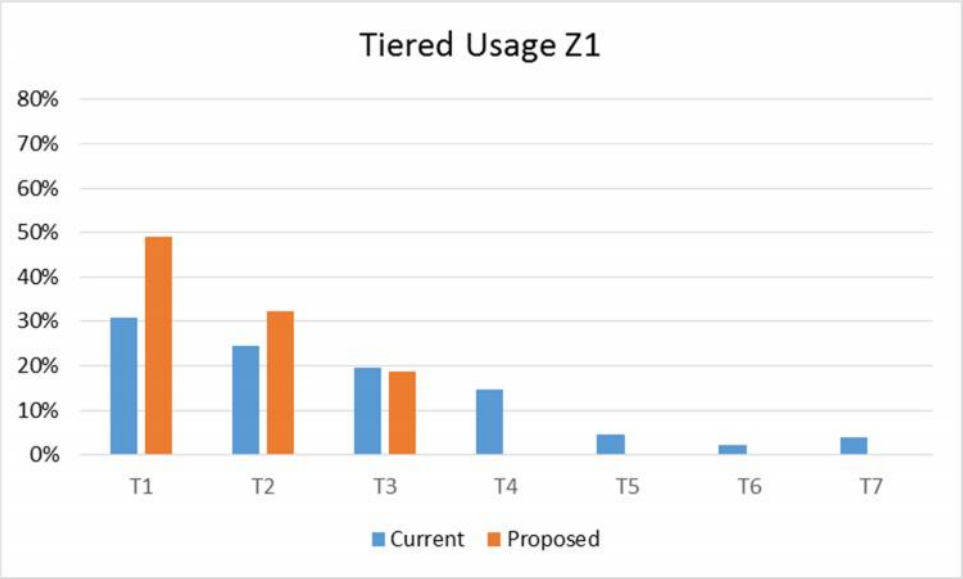


Figure 7-3: Usage Distribution in Residential Tiers, Zone 2

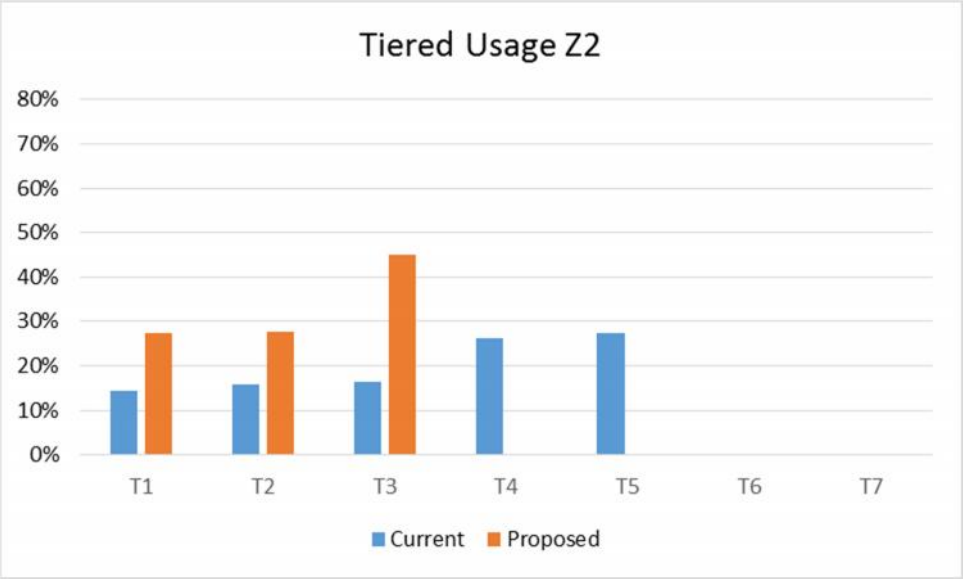
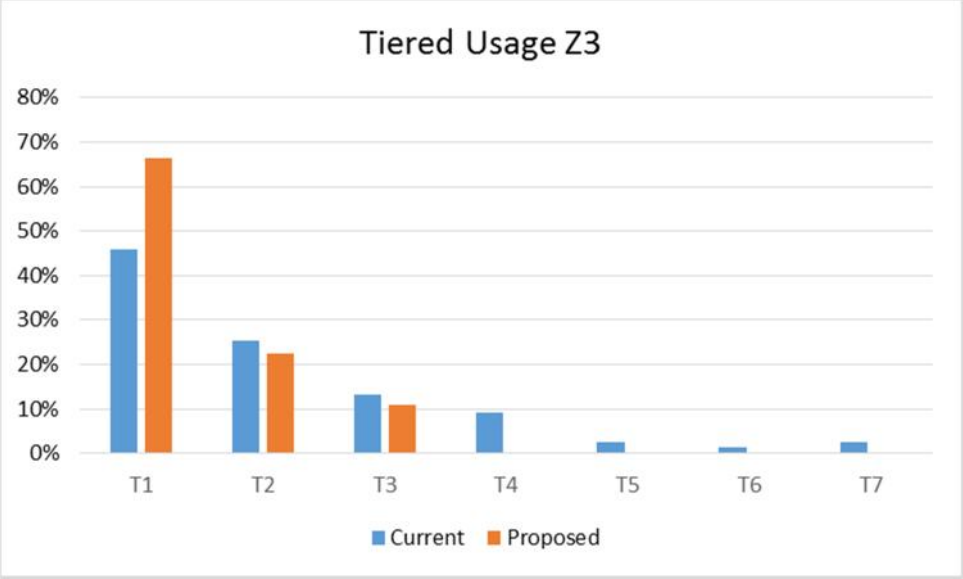


Figure 7-4: Usage Distribution in Residential Tiers, Zone 3



7.3.1 *Projected Water Use FY 2018 - Treated Retail*

Using the proposed tier definitions, projected usage in FY 2018 for all classes is shown in Table 7-7. Sales from the construction and fire protection classes is not counted as demand since revenue from these sources is unreliable.

Table 7-7: Projected FY 2018 Demand by Customer Class with Revised Tier Definitions

Class	FY 2018 Demand (hcf)
Residential	
Tier 1	3,120,265
Tier 2	2,031,777
Tier 3	1,174,174
CG	1,634,565
Landscape	834,508
Total	**8,795,289**

8. TREATED RETAIL WATER RATE DERIVATION

8.1 EXISTING RATE STRUCTURE AND RATES

As previously explained, the rate structure for PCWA's water service charges have three components – a fixed meter charge, a fixed capital R&R charge, and a variable volumetric commodity charge. The rates for the monthly fixed meter charge and capital R&R 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.

8.2 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 relatively cheap sources of supply 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 commodity costs are recovered in the monthly service charge, along with customer-related costs and meter-related costs. The cost of service analysis allocates 40 percent of treatment costs and 55 percent of distribution costs to the fixed meter charge, along will 100 percent of the meter and customer costs. The remainder of treatment and distribution costs are recovered on the commodity charges.

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, PCWA incurs fixed costs in connection with operating and maintaining the system for each connection at all times.

8.2.1 *Meter Services Component*

The meter services component collects service-related costs as well as the portion of treatment and distribution 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 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 21 times that of a 3/4" meter and therefore the meter capacity component of the fixed meter charge should be 21 times that of the 3/4"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*.

Multi-family residential customers are assessed based on dwelling units rather than account meter size. Each dwelling unit in a multi-family residential account is considered to be the equivalent of one 5/8" meter, which is also the base meter. Therefore, a four-unit complex is the equivalent of four 5/8" meters or four dwelling units. These units are added to the 5/8" count in Table 8-1 below. Multi-family residential dwelling units are included with a one-to-one ratio of dwelling unit to 5/8" base meter. Single Family Residential and Multi-family Residential customers use water to meet indoor needs similarly and have similar household densities as identified in the most recent US Census housing demographics for the service area.

Table 8-1 shows total potable meter equivalencies in the system. The total equivalent meters are derived by multiplying the number of meters at a specific size by their respective capacity ratio to the 5/8" base meter and adding the total number of multi-family dwelling units, per above. The total number of equivalent meters within PCWA's Treated Retail system is determined to be 55,406.

Table 8-1: Meter Equivalencies Calculation

Meter Size	Count of Meters/Dwelling Units (a)	Capacity Ratio (5/8" Base) (b)	Equiv. Meters (Capacity) (a)*(b)
5/8"	29,327	1.0	29,327
3/4"	1,981	1.5	2,972
1"	3,014	2.5	7,535
1-1/2"	425	5.0	2,125
2"	200	8.0	1,600
3"	73	17.5	1,277
4"	12	30.0	360
6"	8	67.5	540
8"	2	80.0	160
10"	-	190.0	-
12"	-	250.0	-
14"	-	375.0	-
16"	-	500.0	-
18"	-	625.0	-
MFR	9,510	1.0	9,510
Total Count/ Equivalencies	**44,552**		**55,406**

Table 8-2 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 treatment and distribution costs previously discussed) from Table 6-6 by the total number of equivalent meters in Table 8-1 and the total number of months in the year. The cost is $14.44 per equivalent meter per month rounded up to the nearest penny.

Table 8-2: Fixed Meter Charge Meter Service Component Calculation

	FY 2018
Meter Services Costs[24]	$9,598,287
Equivalent Meters	55,406
Cost per Equivalent Meter (per month)	**$14.44**

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 8-3 shows the customer service component calculation. To calculate the customer component Raftelis divided the total billing and customer service costs from Table 6-6 by the total annual bills (accounts multiplied by 12 billing periods) prepared by PCWA to determine the monthly customer service charge component of $3.48.

Table 8-3: Customer Component Calculation

	FY 2018
Customer Service Costs[25]	$1,493,229
Annual Bills	429,756
Customer Component (per month)[26]	**$3.48**

Table 8-4 shows the calculation of the proposed FY 2018 rates for the fixed meter charges. The proposed rates are the sum of the meter services 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 8-2 multiplied by the respective meter ratio in Table 8-1. The rate comparison is relative to existing rates implemented in January 2017 in Zone 1. The most common size of 5/8" meter experiences an increase of $0.58 relative to the current charge. All other meters experience between a $0.61 increase and a $487.80 increase depending on meter size. The varying differences is due to harmonizing the hydraulic capacity ratios across all meter sizes using the most current industry guidance. MFR charges compare the current fixed charge with the proposed meter service component. The customer component of a MFR bill will only be charges once. While RFC has calculated meter charges up to 18" charges are only shown up to 8", the largest meter size currently in the treated retail system.

[24] *Table 6-7.*
[25] *Table 6-7.*
[26] Billing & Customer Service calculation includes all bills including private fire protection, potable water, and reclaimed water accounts.

Table 8-4: Calculation of Fixed Meter Charges

Meter Size	Meter Service Component	Customer Component	Proposed FY 2018 Fixed Charge	Current Charge	Difference ($)	Difference (%)
5/8"	$14.44	$3.48	$17.92	$17.34	$0.58	3.3%
3/4"	$21.66	$3.48	$25.14	$24.53	$0.61	2.5%
1"	$36.10	$3.48	$39.58	$33.56	$6.02	17.9%
1 1/2"	$72.20	$3.48	$75.68	$54.06	$21.62	40.0%
2"	$115.52	$3.48	$119.00	$94.36	$24.64	26.1%
3"	$252.70	$3.48	$256.18	$175.19	$80.99	46.2%
4"	$433.20	$3.48	$436.68	$244.27	$192.41	78.8%
6"	$974.70	$3.48	$978.18	$490.38	$487.80	99.5%
8"	$1,155.20	$3.48	$1,158.68	$840.85	$317.83	37.8%
MFR	$14.44	$3.48	$14.44[27]	$13.14	$1.30	9.9%

8.3 PROPOSED CAPITAL RENEWAL AND REPLACEMENT (R&R) CHARGES

PCWA makes a policy decision to recover all capital costs via a separate fixed charge. The capital R&R charge provides funds for annual capital projects to maintain PCWA treatment facilities, distribution lines, transmission canals, pump stations, and other capital assets. Routine investment ensures that the system continues to provide the same level of service to all customers. Similar to the fixed meter charge, capital costs must be recovered regardless of the amount of water used during a given period. As previously stated, larger meters are able to draw upon the system at a higher rate, both in continuous flow and instantaneous demand. Distribution lines, reservoirs, and treatment plants among other assets must be upsized in part to meet capacity needs of customers. With capital expenditures dependent on the capacity requirements of a system it is appropriate to recover the costs based on the size of the meter serving a connection. And just like the meter service charge, even when a customer does not use water, PCWA incurs fixed costs in connection with repair and replacement of system assets to serve each connection.

Calculating the capital R&R charge uses the same approach as the meter services component of the fixed meter charge as the rationale is the same: larger meters have the potential to demand more capacity and the capacity is proportional to the potential flow through each meter size. Table 8-5 is the same as Table 8-1 save for the MFR dwelling units which has been replaced with the actual meter sized serving MFR properties. Total potable meter equivalencies for the R&R charge are 49,673.

[27] Proposed charge shows capacity component only for like comparison to existing charge. Total proposed charge will include the customer component of $3.48.

Table 8-5: Meter Equivalencies Calculation

Meter Size	Count of Meters (a)	Capacity Ratio (5/8" Base) (b)	Equiv. Meters (Capacity) (a)*(b)
5/8"	29,528	1.0	29,528
3/4"	2,033	1.5	3,050
1"	3,184	2.5	7,960
1-1/2"	586	5.0	2,930
2"	336	8.0	2,688
3"	111	17.5	1,943
4"	22	30.0	660
6"	10	67.5	675
8"	3	80.0	240
10"	-	190.0	-
12"	-	250.0	-
14"	-	375.0	-
16"	-	500.0	-
18"	-	625.0	-
Total Count/ Equivalencies	**35,813**		**49,673**

Table 8-6 shows the calculation of the capital R&R component per equivalent meter. The capital R&R component is calculated by dividing the total capital costs from Table 6-6 by the total number of equivalent meters in Table 8-5 and the total number of months in the year. The cost is $17.74 per equivalent meter per month and is rounded up to the nearest penny.

Table 8-6: Capital R&R Charge Equivalent Calculation

	FY 2018
Meter Services Costs[28]	$10,569,974
Equivalent Meters	49,673
Cost per Equivalent Meter (per month)	**$17.74**

Table 8-7 shows the calculation of the proposed FY 2018 rates for the capital R&R charges. The capital R&R charges are applicable to all Treated Retail customer classes. The capital R&R component is the cost per equivalent meter calculated in Table 8-6 multiplied by the respective meter ratio in Table 8-5. Comparisons in rates are relative to existing rates implemented in January 2017 in Zone 1. The most common size, a 5/8" meter, experiences an increase of $1.45 relative to the current charge. All other meters experience increases between $2.17 for a 3/4" meter and $382.68 for a 6" meter. The 8" meter sees a $2,491.69 decrease due to harmonizing the capital R&R charge with AWWA hydraulic capacity ratios.

[28] *Table 6-7.*

Table 8-7: Calculation of Cost of Service Capital R&R Charges

Meter Size	Proposed FY 2018 Fixed Charge	Current Charge	Difference ($)	Difference (%)
5/8"	$17.74	$16.29	$1.45	8.9%
3/4"	$26.61	$24.44	$2.17	8.9%
1"	$44.35	$40.74	$3.61	8.9%
1 1/2"	$88.70	$81.47	$7.23	8.9%
2"	$141.92	$130.36	$11.56	8.9%
3"	$310.45	$260.73	$49.72	19.1%
4"	$532.20	$407.39	$124.81	30.6%
6"	$1,197.45	$814.77	$382.68	47.0%
8"	$1,419.20	$3,910.89	($2,491.69)	-63.7%

8.4 PROPOSED PRIVATE FIRE PROTECTION CHARGES

Table 8-8 shows the derivation of the Private Fire Protection Charge. The fire costs are determined to be $501,449 (see Table 6-6). This cost will be divided by the total equivalent firelines calculated in Table 8-8. Similar to rates for the fixed meter and capital R&R charges, private firelines use the count of total firelines (923 lines) and the ratio between the various fireline sizes to determine total equivalent lines. The fireline ratios, or fire flow demand factors, are similar to the hydraulic capacity ratios used to determine the fixed meter and capital R&R charges. The fire flow demand factors account for the diameter of the line and the flow of water through a conduit to determine the ratio between fireline sizes. The calculated total equivalent firelines is 146,632.

Table 8-8: Fireline Equivalencies Calculation

Fireline Diameter	Fireline Count (a)	Fire Flow Ratio (1" Base) (b)	Equiv. Lines (Capacity) (a)*(b)
1"	-	1.0	-
2"	37	6.2	229
3"	-	18.0	-
4"	216	38.3	8,277
6"	346	111.3	38,514
8"	226	237.2	53,609
10"	82	426.6	34,980
12"	16	689.0	11,025
14"		1,033.5	-
16"		1,468.4	-
Total Count/ Equivalencies	**923**		**146,632**

Table 8-9 shows the calculation of the fireline service component. Dividing the total private fireline costs ($501,449) by total equivalent lines (146,632) yields the monthly cost per equivalent fireline of $0.29.

Table 8-9: Fireline Service Component Calculation

	FY 2018
Fire Protection Costs[29]	$501,449
Equivalent Lines	146,632
Months per year	**12**
Cost per Equivalent Fireline (per month)	**$0.29**

Table 8-10 shows the derivation of the monthly rates by fireline size for the Private Fire Protection Charge. The cost per equivalent line ($0.29) is multiplied by the respective fireline ratio to derive the fire protection charge for that fireline size. Smaller firelines experience a significant decrease in rates while larger lines experience increases resulting from the fire flow analysis, updated cost of service cost allocations, and associated fire flow factors.

Table 8-10: Calculation of 2018 Cost of Service Private Fire Protection Charges

Fireline Size	Fire Flow Ratio (1" Base)	Proposed Fireline Charges FY 2018	Current Charge	Difference ($)	Difference (%)
1"	1.0	$0.29	N/A	N/A	N/A
2"	6.2	$1.77	$18.82	($17.05)	-91%
3"	18.0	$5.13	$21.75	($16.62)	-76%
4"	38.3	$10.93	$24.16	($13.23)	-55%
6"	111.3	$31.73	$30.10	$1.63	5%
8"	237.2	$67.60	$57.19	$10.41	18%
10"	426.6	$121.57	$100.74	$20.83	21%
12"	689.0	$196.37	$161.30	$35.07	22%
14"	1033.5	$294.54	$358.90	($64.36)	-18%
16"	1468.4	$418.46	$358.90	$59.56	17%

8.5 PROPOSED RATES FOR COMMODITY CHARGES

8.5.1 *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. Base or delivery costs (Base Fixed cost component)
3. Pumping costs (Pumping component)
4. Peaking costs (Peaking component)
5. Conservation costs (Conservation component)

Variable Supply are costs related to the purchase of water to meet customer demand. PCWA maintains numerous sources of supply detailed in Table 5-14. These variable supply costs form the foundation of the rate components for each tier within the rate structure.

[29] *Table 6-7.*

Base also known as delivery 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 average rate of use – also known as serving customers under average daily demand conditions. Therefore base costs are spread over all units of water irrespective of customer class or tier.

Pumping are costs incurred to move raw water from source to treatment. In the context of the PCWA system pumping relates directly to raw water pumping, the American River pumps, and the Ophir Pump Station. Raw water pumping benefits all customers therefore pumping costs are spread over all units of water irrespective of customer class or tier.

Peaking, or extra-capacity, costs represent 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 tier and class 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

8.5.1.1 Variable Supply Unit Cost

The variable supply cost is the cost to purchase and supply water from various sources. The water supply costs in Table 8-11 are based on FY 2018 water supply costs from the respective sources and were provided by PCWA staff. 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 an 8 percent water system loss. The water supply costs and water availability in Table 8-11 are used in the water supply unit cost calculation for each class and tier.

Table 8-11: Water Supply and Unit Costs FY 2018

	Middle Fork	Purchased PG&E
Supply to Meet Demand (hcf)	1,398,746	8,873,739
Cost ($/AF)	$28.00	$37.12[30]
Unit Cost ($/hcf)	$0.06	$0.09
Unit Cost ($/hcf) after loss[31]	$0.07	$0.09

Table 8-12 shows estimated total demand in FY 2018 for all Treated Retail customer classes.

[30] Weighted cost of PG&E purchases: Western contract of 18,443 AF at $41.00 per AF and Zone 3 contract of 1,927 AF at $0.00 per AF. Values represent the proportional share of water to the Treated Retail service class to meet class demand.

[31] Unit cost accounts for an estimated 8 percent system-wide water loss. The loss is allocated to all sources.

Table 8-12: Estimated Water Usage in FY 2018

Class	FY 2018 Demand (hcf)
Residential	
Tier 1	3,120,265
Tier 2	2,031,777
Tier 3	1,174,174
CG	1,634,565
Landscape	834,508
Total	**8,795,289**

Given the water available from each source (Table 8-11), and allocating available water proportional to the demands of each class, the estimated water required to meet demand in each tier is shown in Table 8-13.

Table 8-13: Estimated Water Demand by Source, FY 2018

	Annual Usage	Middle Fork Available Water	Purchased PG&E Available Water
Residential	6,326,216	925,594	5,872,032
CG	1,634,565	239,155	1,517,213
Landscape	834,508	122,098	774,595
Total	**8,795,289**	**1,286,847**	**8,163,840**

The unit rates for variable supply costs are derived in Table 8-14. Total costs are determined as the sum-products of the unit rates from Table 8-11 and the water required in each tier from Table 8-14. For example meeting demand in Residential Tier 1 requires all available Middle Fork Water for the Residential class (925,594 hcf) plus 2,194,671 hcf of PG&E water with respective process of $0.07 and $0.09 per hcf. The blended cost of meeting demand is $0.084 per hcf which is rounded up to the nearest penny ($0.09/hcf).

Table 8-14: Variable Supply Unit Cost ($/hcf)

Class	Annual Usage	Middle Fork	Purchased PG&E	Unit Cost ($/hcf)
Unit Cost of Supply		$0.07	$0.09	
Residential				
Tier 1	3,120,265	925,594	2,194,671	$0.09
Tier 2	2,031,777		2,031,777	$0.09
Tier 3	1,174,174	-	-1,174,174	$0.09
Total	**6,326,216**	**392,640**	**5,400,622**	**$0.09**
CG	1,634,565	**239,155**	**1,395,410**	$0.09
Landscape	834,508	**122,098**	**712,410**	$0.09
Total	**8,795,289**	**1,286,847**	**7,508,442**	**$0.09**

8.5.1.2 Base Unit Cost

Base costs are the costs to deliver water under average daily demand conditions. Dividing estimated annual usage by total base costs (Table 6-6) derives the cost to provide water delivery during average conditions. The calculated base unit cost is presented in Table 8-15. The base unit cost is the same for all classes and tiers. The unit cost is rounded up to the nearest whole penny.

Table 8-15: Base Unit Cost Calculation

Class and Tier	Projected Demand
Residential	
Tier 1	3,120,265
Tier 2	2,031,777
Tier 3	1,174,174
Total	**6,326,216**
CG	**1,634,565**
Landscape	**834,508**
Total (ccf)	**8,795,289**
Delivery Costs[32] ($)	**$8,576,427**
Delivery Unit Cost ($/hcf)	**$0.98**

8.5.1.3 Pumping Unit Cost

Pumping costs are related to the American River pumps and Ophir Pump Station. Dividing estimated annual usage by total pumping costs (Table 6-6) derives the unit cost of pumping. The calculated pumping unit cost is presented in Table 8-16. The pumping unit cost is the same for all classes and tiers. The unit cost is rounded up to the nearest whole penny.

Table 8-16: Pumping Unit Cost Calculation

Class and Tier	Projected Demand
Residential	
Tier 1	3,120,265
Tier 2	2,031,777
Tier 3	1,174,174
Total	**6,326,216**
CG	**1,634,565**
Landscape	**834,508**
Total (ccf)	**8,795,289**
Pumping Costs[33] ($)	**$390,320**
Pumping Unit Cost ($/hcf)	**$0.05**

[32] *Table 6-6.*
[33] *Table 6-6.*

8.5.1.4 Peaking Unit Cost

Table 8-17 provides customer class peaking factors. These factors are determined by analyzing FY 2016 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 costs shown are derived by analyzing PCWA water usage while utilizing the revised tier definitions (Table 7-6). Same as 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 (6 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 8-17 shows the calculated class and tier peaking factors.

Table 8-17: Treated Retail Peaking Factors

Usage	Max BP Use	Average BP Use	Max / Average
Residential			
Tier 1	600,451	520,044	1.15
Tier 2	652,656	338,629	1.93
Tier 3	468,064	195,696	2.39
CG	421,367	272,428	1.55
Landscape	289,724	139,085	2.08

Table 8-18 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 percentage of peaking units (Column D) is calculated for each class which allows the total peaking costs ($3,798,616) 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 Residential class. Unit costs are rounded to the nearest whole penny.

Table 8-18: Peaking Unit Cost Calculation

Customer Class/Tier	Annual Usage	Peaking Factor	Weighted Use	% Allocated	Rev. Req.	Unit Rate ($/hcf)
	A	B	C=A x B	D = C_i/C_{Total}	E = D_i x Peaking Costs	F = E/A
Residential	6,326,216	1.63	10,327,026	70.8%	$2,688,061	**$0.43**
CG	1,634,565	1.55	2,528,202	17.3%	$658,075	**$0.41**
Landscape	834,508	2.08	1,738,344	11.9%	$452,480	**$0.55**
Total	**8,795,289**		**14,593,572**	**100.0%**	**$3,798,616**	
Residential	**Usage by Tier**	**Peaking Factor**	**Weighted Use**	**% Allocated**	**Rev. Req**	**Unit Rate**
Residential Tier 1	3,120,265	1.15	3,602,706	35%	$937,762	**$0.31**
Residential Tier 2	2,031,777	1.93	3,915,936	38%	$1,019,294	**$0.51**
Residential Tier 3	1,174,174	2.39	2,808,384	27%	$731,005	**$0.63**
Total	**6,326,216**		**10,327,026**	**100%**	**$2,688,061**	
CG Uniform	1,634,565	1.55	2,528,202	100%	$658,075	**$0.41**
Total	**1,634,565**		**2,528,202**	**100%**	**$658,075**	
Landscape Uniform	834,508	2.08	1,738,344	100%	$452,480	**$0.55**
Total	**834,508**		**1,738,344**	**100%**	**$452,480**	

8.5.1.5 *Conservation Unit Cost*

PCWA's water conservation programs offer a variety of solutions to reduce water use for all customers served by the Agency. Water conservation offsets the demand for potable water and therefore is a low-cost water supply available to all water utilities. These programs ensure reliable future water supply for all rate payers and reduce the likelihood of fines for non-compliance with state conservation mandates. Accordingly, PCWA finds it appropriate to allocate conservation costs to all units of water served. Table 8-19 shows the calculation for the conservation unit cost, rounded to the nearest whole penny.

Table 8-19: Conservation Unit Cost Calculation

Class and Tier	Projected Demand
Residential	
Tier 1	3,120,265
Tier 2	2,031,777
Tier 3	1,174,174
Total	**6,326,216**
CG	**1,634,565**
Landscape	**834,508**
Total (ccf)	**8,795,289**
Conservation Costs[34] ($)	**$735,454**
Conservation Unit Cost ($/ccf)	**$0.09**

8.5.2 *Final Commodity Rates Derivation*

The cost of service based rates are shown in Column H of Table 8-20. To determine the commodity rates, the components detailed above are added together. The summation of columns C through G of Table 8-20 constitutes the final rates.

[34] *Table 6-6.*

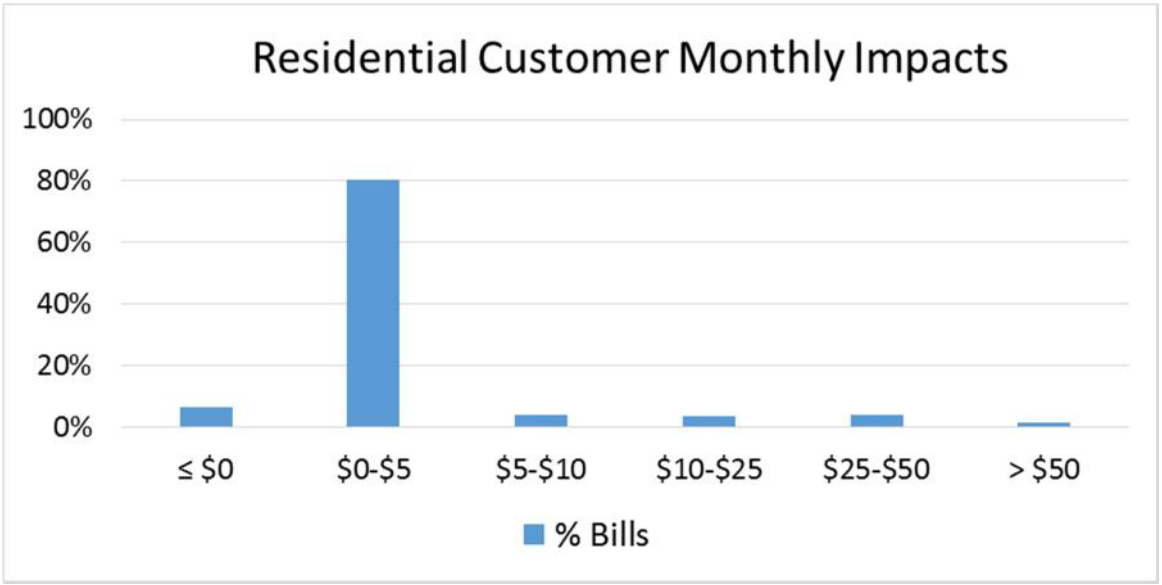
Table 8-20: Proposed Commodity Rates ($/hcf)

Class and Tier	Tier Definition	Supply	Base	Pumping	Peaking	Conservation	COS Rates ($/hcf)
A	B	C	D	E	F	G	H
	Table 7-6	Table 8-14	Table 8-15	Table 8-16	Table 8-18	Table 8-19	
Residential							
Tier 1	0-9	$0.09	$0.98	$0.05	$0.31	$0.09	**$1.52**
Tier 2	10-28	$0.09	$0.98	$0.05	$0.51	$0.09	**$1.72**
Tier 3	>28	$0.09	$0.98	$0.05	$0.63	$0.09	**$1.84**
CG	Uniform	$0.09	$0.98	$0.05	$0.41	$0.09	**$1.62**
Landscape	Uniform	$0.09	$0.98	$0.05	$0.51[35]	$0.09	**$1.72**
Other Rates							
Construction	Uniform						**$3.24[36]**
Fire Protection	Uniform						**$3.24[37]**

8.6 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 the existing zones. Figure 8-1 shows bill impacts to Residential class customers across all zones.

Figure 8-1: Bill Impacts - Residential



[35] PCWA staff determined that the peaking characteristics for Residential outdoor use (Tier 2) and Landscape were similar enough to warrant using the same peaking cost component given that the water is used for the same purpose (outdoor irrigation).
[36] PCWA policy decision to charge construction water at two times the CG rate.
[37] PCWA policy decision to charge fire protection water at two times the CG rate.

Figure 8-2 shows the impacts to Residential users in Zone 1. The majority experience an increase of $0 to $5 per month. The Zone 1 impacts follow the distribution of impacts to all Residential users in Figure 8-1 closely because the vast majority of total accounts are in Zone 1.

Figure 8-2: Bill Impacts - Zone 1

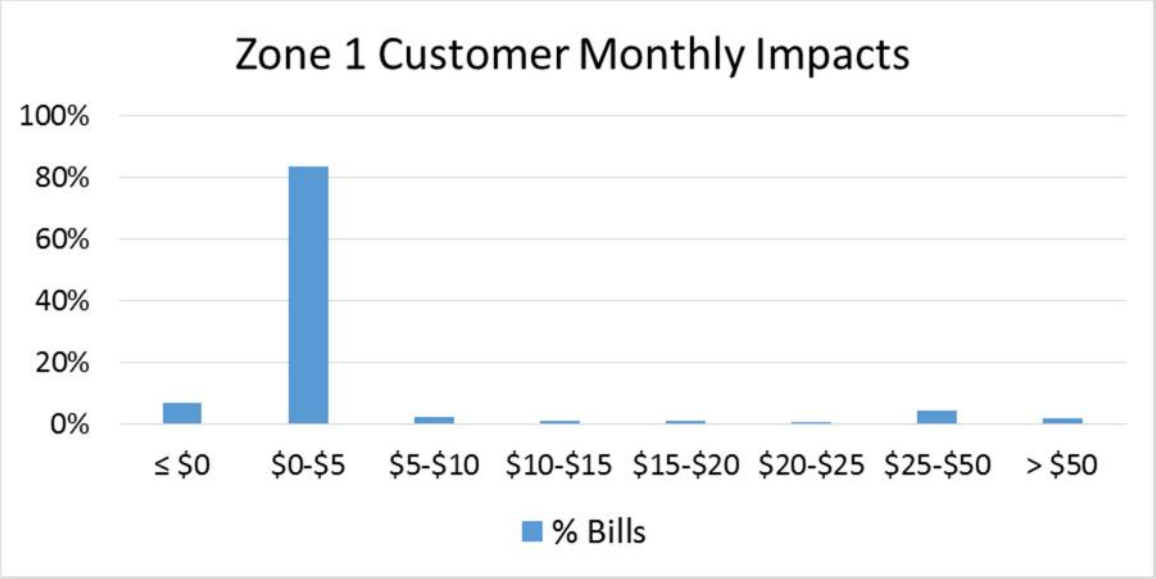
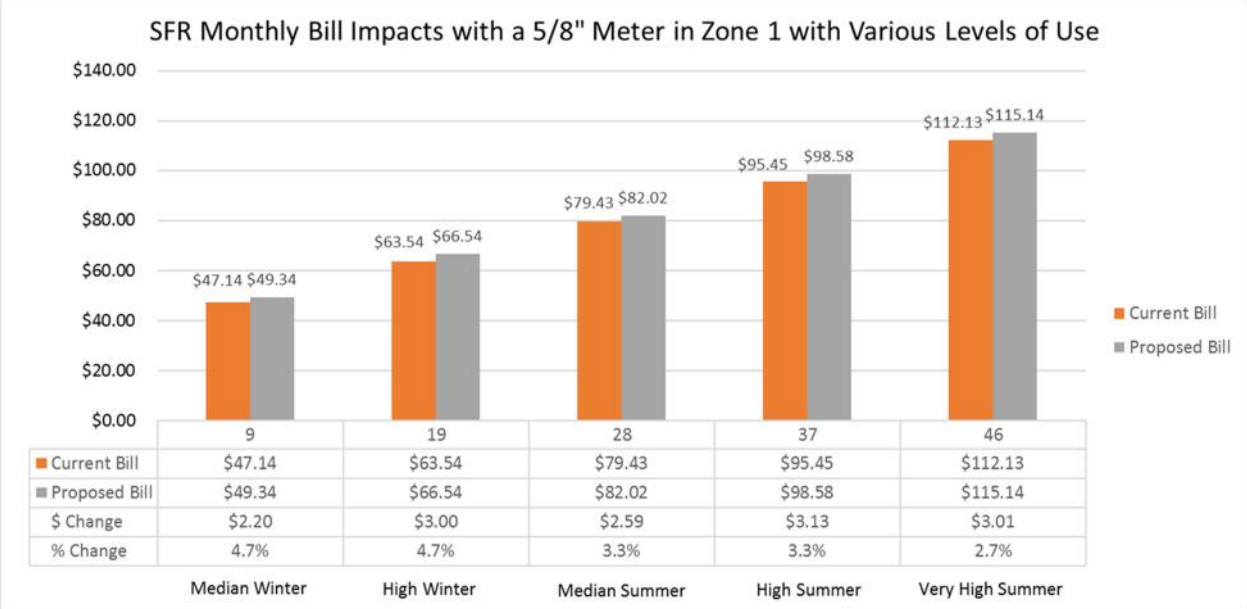


Figure 8-3 calculates bills for a SFR account in Zone 1 at different levels of use. Bills are calculated at current rates and tiers and compared to proposed rates and tiers. The figure also shows the percentage and dollar change between current and proposed rates and tiers. SFR customers with a 5/8" meter using water between the approximate median winter (9 hcf) and very high summer (46 hcf) will experience a $2.20 increase and a $3.01 increase in their respective monthly bill.

Figure 8-3: Bill Impacts - Zone 1 Single Family Residential with 5/8" Meter



	9	19	28	37	46
Current Bill	$47.14	$63.54	$79.43	$95.45	$112.13
Proposed Bill	$49.34	$66.54	$82.02	$98.58	$115.14
$ Change	$2.20	$3.00	$2.59	$3.13	$3.01
% Change	4.7%	4.7%	3.3%	3.3%	2.7%
	Median Winter	High Winter	Median Summer	High Summer	Very High Summer

Figure 8-4 shows the impacts to Residential users in Zone 2. All users experience an increase in bills due to the change in rate structure- Zone 2 currently has a lower fixed charge than Zone 1 and significantly lower tiered water rates. Nearly 80 percent of bill increases are less than $25 per month.

Figure 8-4: Bill Impacts - Zone 2

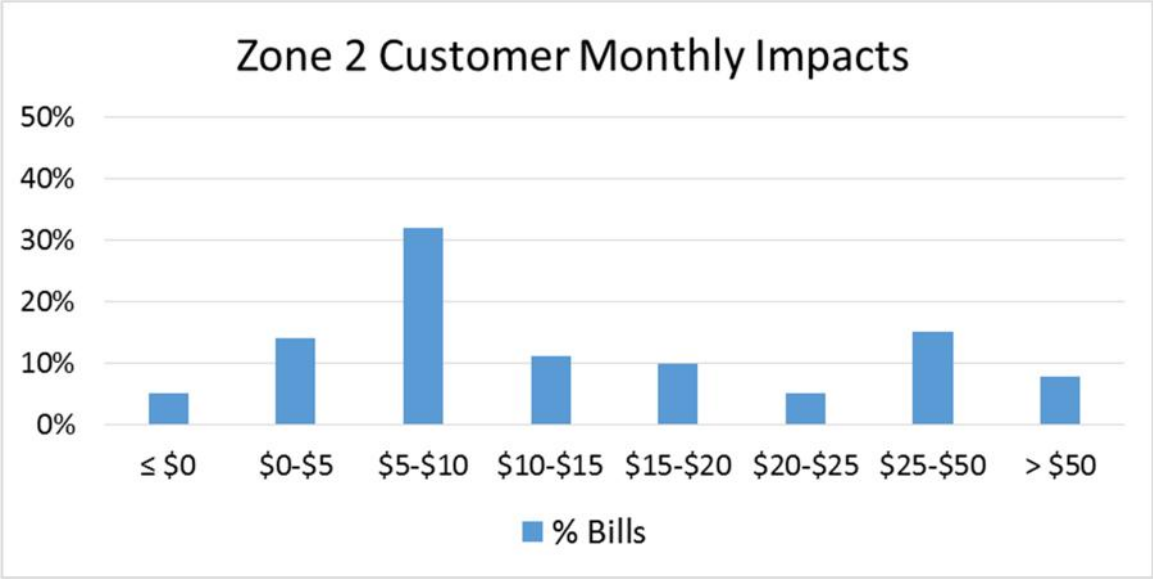
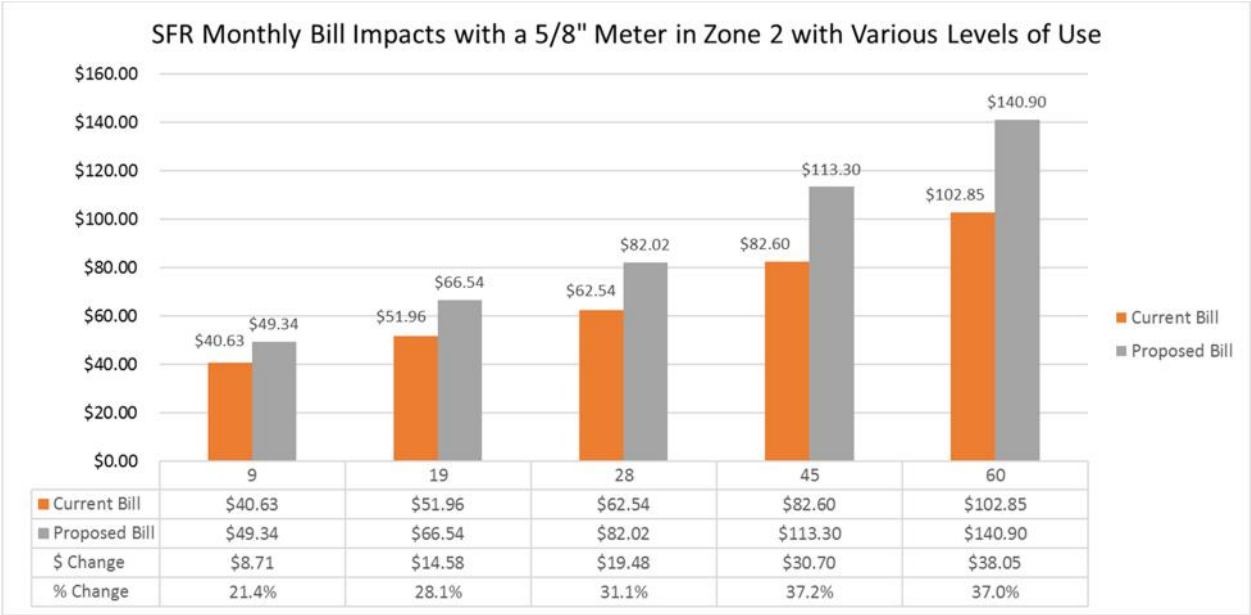


Figure 8-5 calculates bills for a SFR account in Zone 2 at different levels of use. Bills are calculated at current rates and tiers and compared to proposed rates and tiers. The figure also shows the percentage and dollar change between current and proposed rates and tiers. Showing a similar range of usages as in Figure 8-3 tailored to Zone 2 use characteristics, customers experience between a $8.71 increase for 9 hcf (median winter) and $38.05 increase at 60 hcf (very high summer) in their monthly bills due to the increase in both commodity rates as well as the fixed and R&R charges.

Figure 8-5: Bill Impacts - Zone 2 Single Family Residential with 5/8" Meter



	9	19	28	45	60
Current Bill	$40.63	$51.96	$62.54	$82.60	$102.85
Proposed Bill	$49.34	$66.54	$82.02	$113.30	$140.90
$ Change	$8.71	$14.58	$19.48	$30.70	$38.05
% Change	21.4%	28.1%	31.1%	37.2%	37.0%

Figure 8-6 shows the impacts to Residential users in Zone 3. 88 percent of customers experience an increase in bills less than $15 per month due to the change in rate structure- Similar to Zone 2, Zone 3 currently has a lower fixed charge than Zone 1 and lower tiered water rates.

Figure 8-6: Bill Impacts - Zone 3

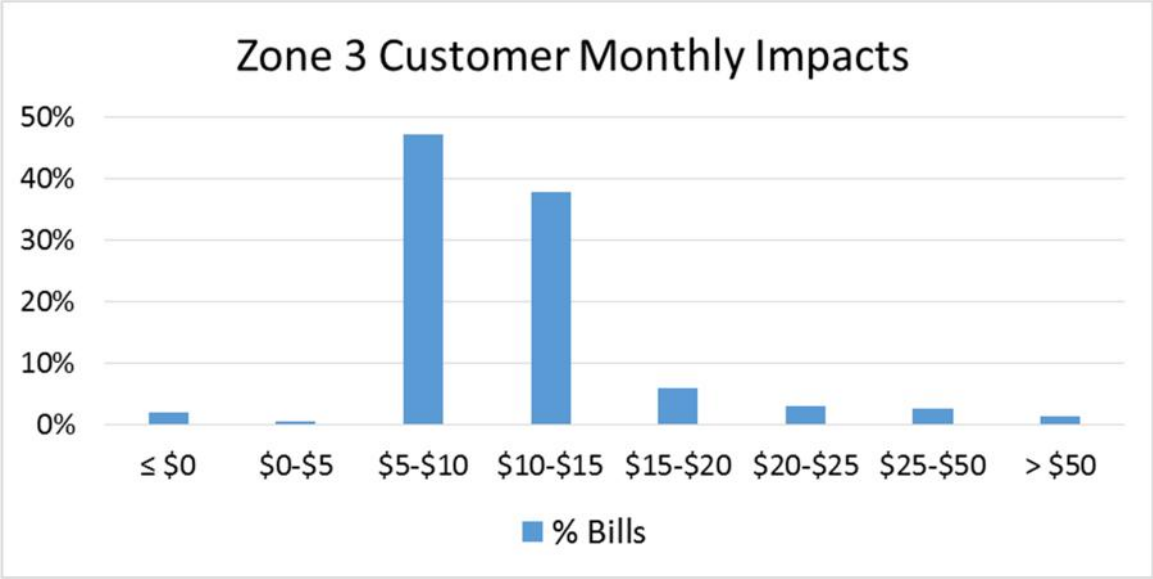
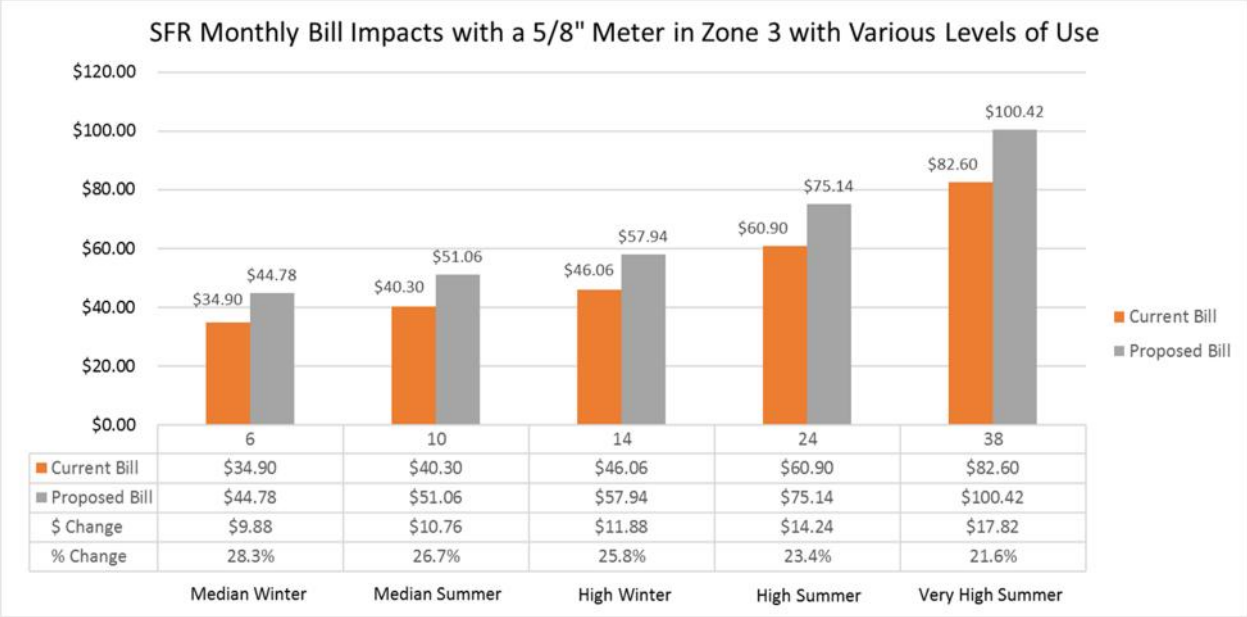


Figure 8-5 calculates bills for a SFR account in Zone 3 at different levels of use. Bills are calculated at current rates and tiers and compared to proposed rates and tiers. The figure also shows the percentage and dollar change between current and proposed rates and tiers. Users between 6 hcf (median winter) and 38 hcf (very high summer) experience increases between $9.88 and $17.82 per month respectively.

Figure 8-7: Bill Impacts - Zone 3 Single Family Residential with 5/8" Meter



	6	10	14	24	38
Current Bill	$34.90	$40.30	$46.06	$60.90	$82.60
Proposed Bill	$44.78	$51.06	$57.94	$75.14	$100.42
$ Change	$9.88	$10.76	$11.88	$14.24	$17.82
% Change	28.3%	26.7%	25.8%	23.4%	21.6%
	Median Winter	Median Summer	High Winter	High Summer	Very High Summer

9. TREATED RESALE SERVICE

9.1 CLASS REORGANIZATION

The existing Treated Resale class consists of seven users. Two of these users are a neighboring municipality which provides retail service to customers within its service area and a private water utility. These two entities have contracts with PCWA dictating their fixed charges and pay the existing "Metered Industrial and Resale Service" commodity charge. The other five users are large commercial and industrial users.

9.2 COST TO SERVE

Table 9-1 shows the cost to serve the Treated Resale class. Note the total cost in column B is equal to the Treated Resale revenue requirement in Table 5-15. Additionally Table 9-1 shows how each cost function is recovered, either on the fixed charges or the variable commodity rate. All costs except for the two supply functions are allocated to fixed charges (column D). Water supply and treated supply are variable costs incurred by PCWA (column E). Al other costs incurred to service Treated Resale customers are fixed. This results in a cost recovery of 82 percent through fixed charges and 18 percent from commodity charges.

Table 9-1: Treated Resale Cost to Serve and Revenue Recovery

Component	Cost	Fixed/Variable	Fixed Charges	Variable Charges
A	B	C	D	E
Water Supply	$229,496	0%	$0	$229,496
Canal	$758,192	100%	$758,192	$0
General	$799,345	100%	$799,345	$0
Treatment	$4,022,499	100%	$4,022,499	$0
Distribution	$638,211	100%	$638,211	$0
Treated Supply	$1,256,505	0%	$0	$1,256,505
Reservoir	$2,147	100%	$2,147	$0
Pumping	$166,590	100%	$166,590	$0
Meter	$232	100%	$232	$0
Customer	$83	100%	$83	$0
Conservation	$314,615	100%	$314,615	$0
Total	**$8,187,917**		**$6,701,915**	**$1,486,001**
Fixed/Variable Recovery			82%	18%

Table 9-2 further breaks down the fixed charge costs in column D of Table 9-1 into an operating (O&M) component and a renewal and replacement (R&R) component. To determine the amount recovered through O&M fixed charges and R&R fixed charges Raftelis determined the amount of capital costs relative to total Treated Resale costs.

Table 9-2: Proposed Fixed and Variable Revenue Recovery

Component	Fixed (Operating)	Fixed (Capital R&R)	Variable Charges
Water Supply	$0	$0	$229,496
Canal	$603,144	$155,048	$0
General	$635,881	$163,464	$0
Treatment	$3,199,910	$822,589	$0
Distribution	$507,699	$130,512	$0
Treated Supply	$0	$0	$1,256,505
Reservoir	$1,708	$439	$0
Pumping	$132,523	$34,067	$0
Meter	$185	$48	$0
Customer	$66	$17	$0
Conservation	$250,277	$64,338	$0
Total	**$5,331,394**	**$1,370,522**	**$1,486,001**
Percent O&M/R&R	*80%*	*20%*	

9.3 EXISTING RATE STRUCTURE

The current rates and charges for the Treated Resale class include a fixed meter charge based on meter size, a renewal and replacement charge based on the units of capacity purchased, and a commodity charge based on water sales.

Table 9-3 shows the existing meter based fixed charge for existing customers. The City of Lincoln has one 8" and one 18" connection. CalAmerican has two 12" and one 16" connections.

Table 9-3: Existing Fixed Meter Charges ($/Meter/Month)

Customer	Meter Size	Fixed Charge
Lincoln	8"	$840.85
Lincoln	18"	$2,178.62
CalAmerican	12"	$1,313.85
CalAmerican	12"	$1,313.85
CalAmerican	16"	$1,890.37

Table 9-4 shows the current R&R charge for Lincoln and CalAmerican. The rate is charged for each unit of capacity purchased. See the 2017 PCWA Rules, Regulations, Rates and Charges, as well as the individual contracts governing these customers, for more detail.

Table 9-4: Existing R&R Charges ($/Equivalency/Month)

Customer	R&R Charge/EU
Lincoln	$12.49
CalAmerican	$13.90

Table 9-5 shows the current commodity rates charged to Treated Resale customers. Users pay the Metered Industrial and Resale Service rates found in Zone 1 Schedule 1 of the 2017 Rules and Regulations.

Table 9-5: Existing Commodity Rates ($/hcf)

Tier	Tier Definition (hcf)	Rate ($/hcf)
Tier 1	500	$1.26
Tier 2	501-10,000	$1.27
Tier 3	>10,000	$1.29

9.4 UNITS OF SERVICE

The units of service to derive the fixed charges and the commodity rates are units of capacity and annual demand respectively. Units of capacity refer to the number of equivalent units of demand that each customer (Lincoln and CalAmerican) has purchased. The unit is also known as an equivalent dwelling unit and represents the demands of a residential Treated Retail customer with a base 5/8" meter. Annual demand is measured in hundred cubic feet (hcf).

Table 9-6 shows the estimated annual demand for the Treated Resale class. The City of Lincoln is estimated to demand 3,372,743 hcf or 90 percent of total units of service. CalAmerican is estimated at 374,228 hcf or 10 percent of class demand.

Table 9-6: Estimated Treated Resale Demand (hcf)

Customer	hcf/year
Lincoln	3,372,743
CalAmerican	374,228
Total	**3,746,971**

Table 9-7 shows the units of capacity that each of the two Treated resale customers have purchased in the system. Again, each unit of capacity represents the equivalency of a standard 5/8" metered Treated Retail residential customer. The total capacity units purchased is 17,527.

Table 9-7: Existing R&R Capacity Units ($/Equivalency/Month)

Customer	Capacity Units	R&R Charge/EU
Lincoln	16,089	$12.49
CalAmerican	1,439	$13.90
Total	**17,527**	

9.5 PROPOSED RATE STRUCTURE REVISIONS

The following recommendations are made to the Treated Resale rates and charges to better align cost recovery, simplify the rate structure, and create parity between the two customers in the class.

9.5.1 *Meter Based Fixed Charges*

Raftelis recommends to eliminate the meter based fixed charge and recover fixed charges on the renewal and replacement charge on the basis of capacity in the system.

9.5.2 *Capacity Charges*

Raftelis recommends to harmonize the existing R&R charge between the two customers which currently pay a different rate per unit of capacity. With the elimination of the meter based fixed charge, fixed costs will be recovered wholly on the capacity based charge. The capacity charges are proposed to be divided into an operating (O&M) component and a renewal and replacement (R&R) component to identify for customers the portion associated with system operations and the portion associated with routine capital repair and replacement.

9.5.3 *Commodity Rates*

Raftelis recommends converting the existing three tier structure to a uniform rate. The current structure is effectively a tiered structure in name only with a three cent difference between Tier 1 and Tier 3 (the majority of water sales are in Tiers 2 and 3 for Lincoln and CalAmerican).

9.6 RATES AND CHARGES DERIVATION

To derive the fixed charges and the commodity charges, total costs are divided by the total units of service; and for the fixed charges are divided by the 12 months of the year to calculate a monthly charge. The fixed cost recovery is divided into two parts: a monthly O&M fixed charge per unit of capacity and a monthly R&R charge per unit of capacity. Table 9-8 and Table 9-9 show the calculations for the O&M capacity-based charge and the R&R capacity-based charge. Table 9-10 shows the combined monthly charge per unit of capacity for comparison with existing charges.

Table 9-8: Proposed O&M Fixed Charge ($/Capacity Unit/Month)

O&M Costs	$5,331,394
Capacity Units	17,527
$/Capacity Unit/Month	**$25.35**

Table 9-9: Proposed R&R Charge ($/Capacity Unit/Month)

Capital R&R Costs	$1,370,522
Capacity Units	17,527
$/Capacity Unit/Month	**$6.52**

Table 9-10: Proposed Combined Fixed Charges ($/Capacity Unit/Month)

Fixed Costs (O&M and R&R)	$6,701,915
Capacity Units	17,527
$/Capacity Unit/Month	**$31.87**

Table 9-11 shows the calculation of the uniform commodity charge. Total variable costs are divided by estimated demand to derive the uniform commodity rate of $0.40/hcf.

Table 9-11: Proposed Commodity Rates ($/hcf)

Variable Costs	$1,486,001
Annual Demand (hcf)	3,746,971
$/hcf	**$0.40**

9.7 IMPACTS

The following section identifies the impacts to each of the two Treated Resale customers individually and to the class as a whole. Impacts are due to the updated cost allocation between the four service classes, changes in fixed and variable cost recovery, and changes to the methodology or calculating fixed and variable charges.

Table 9-12 shows the impacts to the City of Lincoln between estimated revenue generated from current rates and estimated revenue generated by proposed rates. The impacts are detailed for each charge type (meter, capacity, and water sales) to illustrate the changes between components of the customer's bill. Raftelis estimates that Lincoln will pay approximately $775,000 more in annual charges with the new rates and structures. This is due primarily to the change in weight given to capacity charges versus water sales.

Table 9-12: Customer Impacts – City of Lincoln

	Current Revenue (2016)	Proposed Revenue (2018)	$ Change	% Change
Meter Charges	$36,257	#N/A	($36,257)	-100%
Capacity Charges	$2,413,729	$6,152,936	$3,739,207	154.9%
Water Sales Charges	$4,276,319	$1,349,097	($2,927,222)	-68.5%
Total	**$6,726,304**	**$7,502,033**	**$775,729**	**11.5%**

Table 9-13 shows the same information as Table 9-12 for CalAmerican. Raftelis estimates that CalAmerican will pay approximately $59,000 less in annual charges with the new rates and structures. This is due primarily from the elimination of the meter based charges.

Table 9-13: Customer Impacts – CalAmerican Water

	Current Revenue (2016)	Proposed Revenue (2018)	$ Change	% Change
Meter Charges	$54,251	#N/A	($54,251)	-100.0%
Capacity Charges	$233,710	$550,140	$316,430	135.4%
Water Sales Charges	$471,236	$149,691	($321,545)	-68.2%
Total	**$759,197**	**$699,831**	**($59,366)**	**-7.8%**

Table 9-14 aggregates the impacts from Table 9-12 and Table 9-13 to show impacts to the Treated Resale class. Raftelis estimates the class will collect an additional $716,000 in revenue in 2018, or approximately 10 percent. This includes the proposed revenue adjustment from Table 1-1 of 8.4 percent.

Table 9-14: Customer Impacts – Treated Resale Class

	Lincoln	CalAmerican	Total
Current Revenue (2018)	$6,726,304	$759,197	**$7,485,501**
Proposed Revenue (2018)	$7,502,033	$699,831	**$8,201,864**
$ Change	$775,729	($59,366)	**$716,363**

10. UNTREATED RETAIL

10.1 COST ALLOCATION – MINERS' INCH AND METERED CONNECTIONS

The Untreated Retail service class consists of both metered and unmetered raw water users. The majority of class customers order water in miners' inches. A minority receive metered raw water deliveries. Similar to the cost allocation between the four service classes in Section 5, costs are assigned between miners' inch and metered connections within the Untreated Retail class using the same methodology.

Table 10-1 shows the pertinent values for the allocation bases used to distribute costs between the two sub-classes. The values are converted into percentages which are used to distribute the total costs of Untreated Retail service between metered and miners' inch connections.

Table 10-1: Allocation between Metered and Miners' Inch Accounts

Allocation Basis	Metered	Miner's Inches
Annual Demand	207	64,530
Max Month (Canal)	2.00	2.00
No. of Accounts	191	4,325
Metered Only	1	0
Miner's Inches Only	0	1
Indirect	N/A	N/A
Allocation %		
Annual Demand	0.3%	100%
Max Month (Canal)	0.3%	99.7%
No. of Accounts	4%	96%
Metered Only	100%	0%
Miner's Inches Only	0%	100%
Indirect	1%	99%

Table 10-2 shows the total costs of Untreated Retail service from Table 5-15 distributed to the two sub-classes. Water supply is distributed based on annual demand; canal and reservoir costs are based on max month (canal); meter costs are assigned to metered accounts only; and customer costs are distributed on the basis of accounts. General costs are distributed indirectly to all other components based on the relative share of each.

Table 10-2: Distribution of Costs to Metered and Miners' Inch Accounts ($)

Component	Cost	Allocation	Metered Accounts	Miner's Inches
Water Supply	$2,860,148	Annual Demand	$9,127	$2,851,021
Canal	$372,376	Max Month (Canal)	$1,188	$371,188
General	$619,212	Indirect	$4,842	$614,370
Reservoir	$13,257	Max Month (Canal)	$42	$13,215
Meter	$8,878	Metered Only	$8,878	$0
Customer	$180,332	No. of Accounts	$7,627	$172,705
Total COS	**$4,054,203**		**$31,704**	**$4,022,499**

PCWA staff determined that $43,000 in general and administrative costs are incurred in serving metered customers. The General cost component in Table 10-3 is modified to account for these additional costs. Table 10-3 represents the cost to serve each of the two sub-classes: $74,704 for metered customers and $3,979,499 for miners' inch customers.

Table 10-3: Modified Distribution of Costs to Metered and Miners' Inch Accounts ($)

Component	Cost	Allocation	Metered Accounts	Miner's Inches
Water Supply	$2,860,148	Annual Demand	$9,127	$2,851,021
Canal	$372,376	Max Month (Canal)	$1,188	$371,188
General	$619,212	Indirect	$47,842	$571,370
Reservoir	$13,257	Max Month (Canal)	$42	$13,215
Meter	$8,878	Metered Only	$8,878	$0
Customer	$180,332	No. of Accounts	$7,627	$172,705
Total COS	**$4,054,203**		**$74,704**	**$3,979,499**

10.2 MINERS' INCHES - RATES AND CHARGES

Table 10-4 shows the total costs allocable to Miners' Inch customers from Table 10-3 as well as the percentage of each individual cost associated with the fixed component, the seasonal component, or the variable component. The components are described in more detail in the subsequent sub-sections. Fourteen percent of water supply costs are recovered on the fixed component, all canal costs are differentiated by the seasonal component, and twenty percent of general costs are differentiated by the seasonal component. All other costs are recovered through the variable component.

Table 10-4: Distribution of Miners' Inch Costs to Rate Components

Component	Cost	% Fixed	% Seasonal	% Variable	Fixed Component	Seasonal Component	Variable
Water Supply	$2,851,021	14%	0%	86%	$402,495	$0	$2,448,526
Canal	$371,188	0%	100%	0%	$0	$371,188	$0
General	$571,370	0%	20%	80%	$0	$113,131	$458,239
Reservoir	$13,215	0%	0%	100%	$0	$0	$13,215
Meter	$0	0%	0%	100%	$0	$0	$0
Customer	$172,705	0%	0%	100%	$0	$0	$172,705
Total COS	**$3,979,499**				**$402,495**	**$484,319**	**$3,092,684**

10.2.1 *Fixed Component Derivation*

Similar to the customer component when deriving fixed meter charges, the fixed component of miners' inch service does not vary with the amount of water delivered. These costs are incurred year-round in maintaining service to canal customers and are spread equally across the customer base.

Table 10-5 shows the total number of miners' inch accounts. Miners' inch rates are differentiated by two seasons: summer and winter. Summer is designated as May through October. Winter is November through April. The total number of accounts receiving service during the year us is 6,401 (2,486 in winter and 3,915 in summer).

Table 10-5: Miners' Inch Accounts

	Accounts
Winter Accounts	2,486
Summer Accounts	3,915
Total Accounts	**6,401**

The fixed component is derived by dividing the total fixed costs in Table 10-4 by the total accounts in Table 10-5. The fixed cost per season is $62.88 or $10.48 per month.

Table 10-6: Miners' Inch Fixed Component

	Accounts
Fixed Costs	$402,495
Total Accounts	6,401
$/Season	**$62.88**
Months in Season	6
$/Month	**$10.48**

10.2.2 *Variable Component Derivation*

The variable component of the miners' inch rate represents the cost to purchase water and maintain any capital facilities required to transport the water. This excludes canal costs, which are recovered

in the seasonal component. Table 10-7 shows the total inches ordered. The total number of inches ordered is 8,913 (2,589 in winter and 6,325 in summer).

Table 10-7: Miners' Inches

	Inches
Winter Inches	2,589
Summer Inches	6,325
Total Inches	**8,913**

The variable component is derived by dividing the total variable costs in Table 10-4 by the total inches ordered. The variable cost per season is $346.99 per miners' inch, or $57.83 per month.

Table 10-8: Miners' Inch Variable Component

Variable Costs	$3,092,684
Total Inches	8,913
$/Season	**$346.99**
Months in Season	6
$/Month	**$57.83**

10.2.1 *Seasonal Component Derivation*

The seasonal component of the miners' inch rate represents the costs incurred to operating and maintenance of the canal systems as well as general costs. PCWA performs the vast majority of canal cleaning and routine maintenance in the winter time. At this time, demand is lowest for irrigation water and sections of the canal can be interrupted to perform work. PCWA incurs additional costs when this maintenance has to be delayed or to find work arounds to keep customers in water service.

To determine the seasonal component for the two seasons, Raftelis first derives the cost for winter service. Total seasonal costs from Table 10-4 are divided equally between summer and winter. The semi-annual cost of $242,160 is divided by the number of inches served in the winter season to derive the cost per miners' inch of $93.56 ($15.59 per month) shown in Table 10-9. The same approach is followed for summer rates with derivation shown in Table 10-10.

Table 10-9: Miners' Seasonal Component - Winter

	Inches
Total Seasonal Costs	$484,319
Seasonal Costs (Winter)	$242,160
Winter Inches	2,589
$/Winter Season	**$93.56**
Months in Season	6
$/Month Winter	**$15.59**

Table 10-10: Miners' Seasonal Component - Summer

	Inches
Total Seasonal Costs	$484,319
Seasonal Costs (Summer)	$242,160
Summer Inches	6,325
$/Summer Season	**$38.29**
Months in Season	6
$/Month Summer	**$6.38**

10.2.1 *Rates Derivation*

Having calculated the fixed, variable, and seasonal cost components, the rates for each 1/2" increment can be derived. Table 10-11 shows the proposed rates for winter water service for sizes from 1/2" to 100". For reference, 90 percent of accounts order either 1/2" or 1" of water throughout the year. In Table 10-11, the fixed component is shown in the top row as a uniform charge to all users irrespective of inches ordered. The variable and seasonal components from Table 10-8 and Table 10-9 are summed to calculate the total cost per month per miners' inch for winter water service ($73.43). Subsequent PCWA staff analysis has modified the calculated rates marginally to $74.50 for winter water service. The rate schedule in Table 10-11 shows rates at existing breakpoints of water service.

Table 10-11: Miners' Inch Rates - Winter

		Current Charges				
Inches	**Proposed Winter**	Z1 GI	Z1 CA	Z3 GI	Z3 CA	Z5 CA
Fixed	***$10.48***	*$8.61*	*$8.61*	*$6.87*	*$6.87*	*N/A*
0.5	**$74.50**	$73.58	$59.46	$62.18	$50.23	N/A
1	**$74.50**	$73.58	$59.44	$62.18	$50.23	N/A
1.5	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
2	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
3	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
4	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
5	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
9	**$74.50**	$75.34	$60.61	$63.67	$51.21	N/A
10	**$74.50**	$75.70	$60.61	$63.67	$51.21	N/A
60	**$74.50**	$75.70	$60.61	$63.67	$51.21	N/A
61	**$74.50**	$75.70	$60.61	$63.67	$51.21	N/A
100	**$74.50**	$75.70	$60.61	$63.67	$51.21	N/A

Table 10-12 shows the miners' inch rates for summer water service. The fixed component remains the same as winter service at $10.48. The variable and seasonal components from Table 10-8 and Table 10-10 are summed to derive the total cost per month for summer water service ($64.21). Subsequent PCWA staff analysis has modified the calculated rates to $62.58 for summer water service.

Table 10-12: Miners' Inch Rates - Summer

		Current Charges				
Inches	**Proposed Summer**	Z1 GI	Z1 CA	Z3 GI	Z3 CA	Z5 CA
Fixed	***$10.48***	*$8.61*	*$8.61*	*$6.87*	*$6.87*	*N/A*
0.5	**$62.58**	$66.54	$59.20	$56.22	$50.01	$59.20
1	**$62.58**	$60.87	$59.18	$51.44	$50.01	$59.18
1.5	**$62.58**	$63.55	$57.96	$53.71	$48.97	$57.96
2	**$62.58**	$63.55	$57.96	$53.71	$48.97	$57.96
3	**$62.58**	$63.55	$52.33	$53.71	$44.22	$52.33
4	**$62.58**	$63.55	$46.72	$53.71	$39.48	$46.72
5	**$62.58**	$63.55	$42.98	$53.71	$36.32	$42.98
9	**$62.58**	$63.55	$42.98	$53.71	$36.32	$42.98
10	**$62.58**	$64.75	$39.24	$54.71	$33.16	$39.24
60	**$62.58**	$64.75	$39.24	$54.71	$33.16	$39.24
61	**$62.58**	$64.75	$32.39	$54.71	$27.37	$32.39
100	**$62.58**	$64.75	$32.39	$54.71	$27.37	$32.39

10.2.2 *Customer Impacts*

The current rate and class structure differentiates between two user types: commercial agriculture and general irrigation. Under proposed rates, these designations will be abolished and all users referred to simply as Untreated Retail Miners' Inch customers. The series of charts and tables that follow illustrate the impact to commercial agriculture and general irrigation customers in the existing zones.

Figure 10-1 shows the impacts to commercial agriculture users in Zone 1. The majority of customers experience a $25-50 increase per month. These are primarily winter water customers who take 1" or more of water.

Figure 10-1: Commercial Agriculture Zone 1 Monthly Impacts

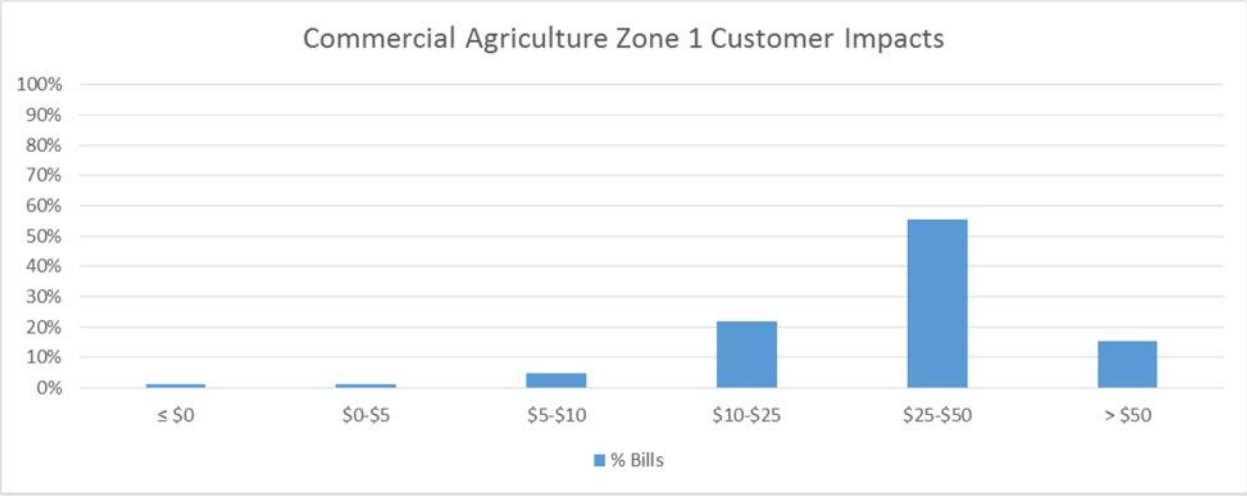


Table 10-13 shows an example bill at 1" in winter and 1" in summer for a commercial agriculture customer in Zone 1. This hypothetical customer experiences a $15.86 increase in their winter monthly bill and a $6.90 increase in their summer monthly bill.

Table 10-13: Commercial Agriculture Zone 1 Example Bill at 1 Miners' Inch

Current Bill	Winter	Summer
Miner's Inch (MI)	1	1
MI Rate	$59.44	$59.18
MI Charge ($/Month)	$59.44	$59.18
Capital Facilities Charge	$8.61	$8.61
Total Bill	**$68.05**	**$67.79**
Proposed Bill		
Miner's Inch (MI)	1	1
Charge per MI	$73.43	$64.21
Capital Facilities Charge	$10.48	$10.48
Total Bill	**$83.91**	**$74.69**
$ Change	$15.86	$6.90
% Change	23.3%	10.2%

Figure 10-2 shows the impacts to commercial agriculture users in Zone 3. The majority of customers experience a $25-50 increase per month. Similar to Zone 1, these are generally winter water customers who take 1" or more of water; however the impacts are more pronounced as Zone 3 currently has lower rates than Zone 1.

Figure 10-2: Commercial Agriculture Zone 3 Monthly Impacts

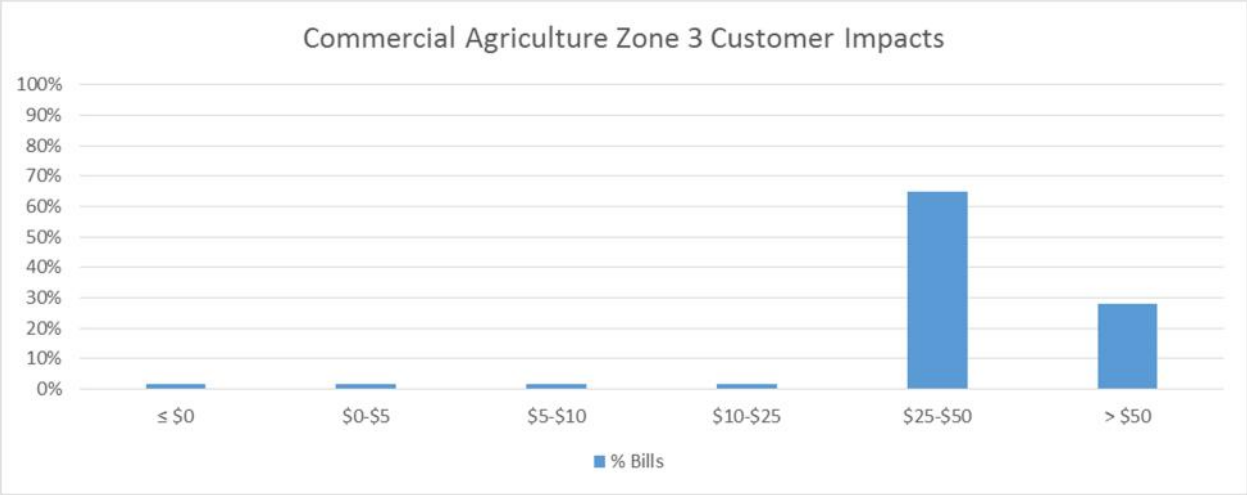


Table 10-14 shows an example bill at 1" in winter and 1" in summer for a commercial agriculture customer in Zone 3. This hypothetical customer experiences a $25.07 increase in their winter monthly bill and a $16.07 increase in their summer monthly bill.

Table 10-14: Commercial Agriculture Zone 3 Example Bill at 1 Miners' Inch

Current Monthly Bill	Winter	Summer
Miner's Inch (MI)	1	1
MI Rate	$50.23	$50.01
MI Charge ($/Month)	$50.23	$50.01
Capital Facilities Charge	$8.61	$8.61
Total Bill	**$58.84**	**$58.62**
Proposed Bill		
Miner's Inch (MI)	1	1
Charge per MI	$73.43	$64.21
Capital Facilities Charge	$10.48	$10.48
Total Bill	**$83.91**	**$74.69**
$ Change	$25.07	$16.07
% Change	42.6%	27.4%

Figure 10-3 shows the impacts to general irrigation users in Zone 3. The majority of customers experience a $0-5 increase per month. These are predominantly 1" summer and winter water customers. Customers in both seasons ordering greater than 1" see monthly savings compared to their existing bill.

Figure 10-3: General Irrigation Zone 1 Monthly Impacts

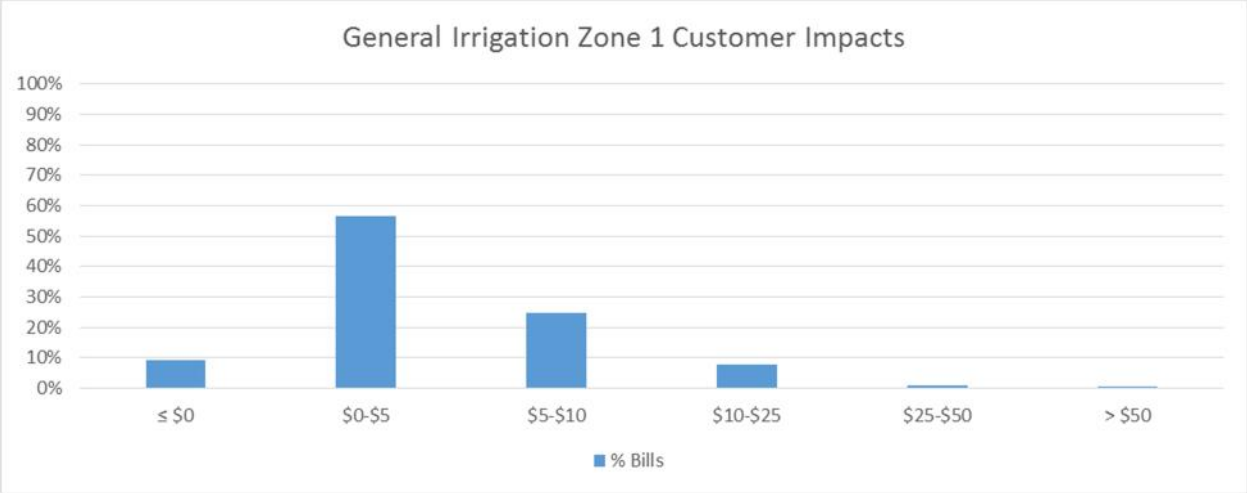


Table 10-15 shows an example bill at 1" in winter and 1" in summer for a general irrigation customer in Zone 1. This hypothetical customer experiences a $1.72 increase in their winter monthly bill and a $5.21 increase in their summer monthly bill.

Table 10-15: General Irrigation Zone 1 Example Bill at 1 Miners' Inch

Current Bill	Winter	Summer
Miner's Inch (MI)	1	1
MI Rate	$73.58	$60.87
MI Charge ($/Month)	$73.58	$60.87
Capital Facilities Charge	$8.61	$8.61
Total Bill	**$82.19**	**$69.48**
Proposed Bill		
Miner's Inch (MI)	1	1
Charge per MI	$73.43	$64.21
Capital Facilities Charge	$10.48	$10.48
Total Bill	**$83.91**	**$74.69**
$ Change	$1.72	$5.21
% Change	2.1%	7.5%

Figure 10-4 shows the impacts to general irrigation users in Zone 3. Approximately half of all customers experience a $5-10 increase per month. Similar to differences between Zone 1 and Zone 3 commercial agriculture customers, the Zone 3 general irrigation impacts are more pronounced as this zone currently has lower rates than Zone 1.

Figure 10-4: General Irrigation Zone 3 Monthly Impacts

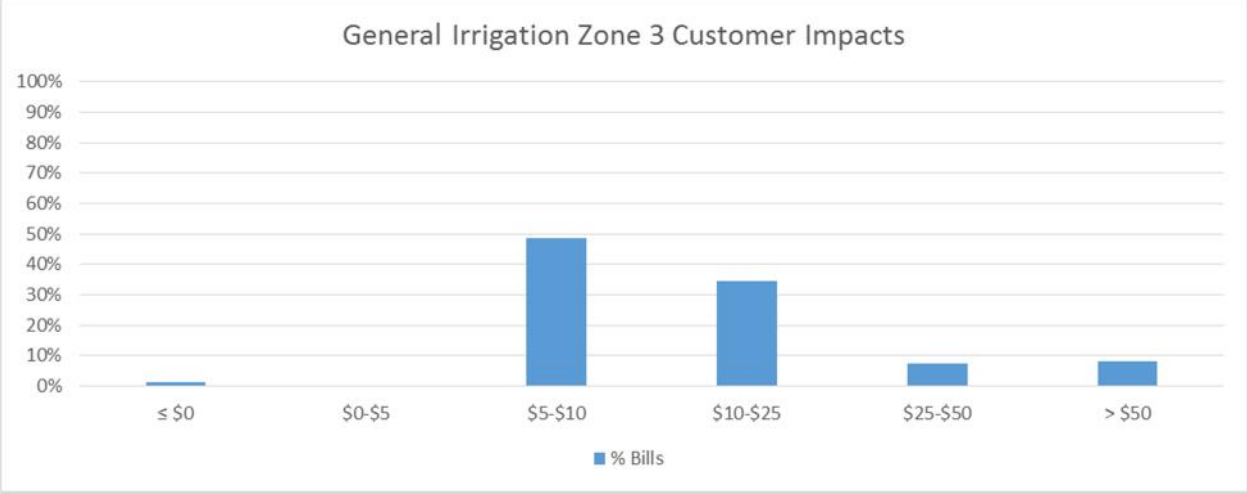


Table 10-16 shows an example bill at 1" in winter and 1" in summer for a general irrigation customer in Zone 3. This hypothetical customer experiences a $13.12 increase in their winter monthly bill and a $14.64 increase in their summer monthly bill.

Table 10-16: General Irrigation Zone 3 Example Bill at 1 Miners' Inch

Current Monthly Bill	Winter	Summer
Miner's Inch (MI)	1	1
MI Rate	$62.18	$51.44
MI Charge ($/Month)	$62.18	$51.44
Capital Facilities Charge	$8.61	$8.61
Total Bill	**$70.79**	**$60.05**
Proposed Bill		
Miner's Inch (MI)	1	1
Charge per MI	$73.43	$64.21
Capital Facilities Charge	$10.48	$10.48
Total Bill	**$83.91**	**$74.69**
$ Change	$13.12	$14.64
% Change	18.5%	24.4%

10.3 METERED – RATES AND CHARGES

Similar to metered customers within the Treated Retail system, Untreated Retail metered customers' charges consist of a meter-based fixed charge, capital charge (i.e. capital facilities charge), and a variable commodity charge. The following subsections detail the proposed rates and charges calculations.

10.3.1 *Fixed and Variable Cost Recovery*

The first step in designing Untreated Retail metered rates and charges is determining the portion of costs recovered on the fixed (or meter charges) and the variable commodity charges. Working in consultation with PCWA staff, Raftelis identified the fixed/variable cost recovery shown in Table 10-17. Water supply costs, canal costs, reservoir costs and a portion of general and meter costs are recovered through the variable commodity charges. 90 percent of general costs, 80 percent of meter costs, and 100 percent of customer costs are recovered on the meter charges.

Table 10-17: Fixed and Variable Cost Recovery – Metered Connections

Component	Metered (Modified)	% Fixed	% Variable	Meter Charge	Variable Charge
Water Supply	$9,127	0%	100%	$0	$9,127
Canal	$1,188	0%	100%	$0	$1,188
General	$47,842	90%	10%	$43,058	$4,784
Reservoir	$42	0%	100%	$0	$42
Meter	$8,878	80%	20%	$7,102	$1,776
Customer	$7,627	100%	0%	$7,627	$0
Total COS	**$74,704**			**$57,787**	**$16,917**

10.3.1 *Fixed Charges Derivations*

To derive the meter charge and the capital facilities charge, the total fixed costs from Table 10-17 are apportioned. The monthly capital facilities charge of $8.98 per month was derived by PCWA staff analysis. The monthly capital charge is multiplied by the number of service connections and months of the year to identify the total revenue collected for capital. The remainder between the total fixed costs in Table 10-17 and the amount collected from the capital facilities fee is recovered by the monthly meter-based fixed charge.

Table 10-18: Fixed Charge Allocation between Operating and Capital R&R

Fixed Charges	Fixed Costs
Total Fixed Costs	**$57,787**
Proposed Capital Facilities Charge (Monthly)	$8.98
Service Connections	191
Months	12
Fixed Cost Recovery - Capital	**$20,582**
Fixed Cost Recovery – Meter Charges	**$37,205**

10.3.1 *Monthly Fixed Meter Charge*

The fixed meter charge consists of two components: a customer component and a meter capacity component. To derive the customer component, the majority of customer costs from Table 10-17are divided by the total number of metered connections and the number of months in the year. The cost per bill for the customer component is $3.12.

Table 10-19: Fixed Meter Charge – Customer Component Calculation

Customer Costs	$7,151[38]
Metered Connections	191
Months	12
Customer Charge per Bill	$3.12

The capacity component follows a similar methodology as the meter capacity component derived for Treated Retail customers in Section 8.2. The cost per equivalent meter is $6.02, as identified by PCWA staff. The cost per equivalent meter is multiplied by the AWWA capacity ratio at each meter size to determine the capacity component for each meter size up to 18".

Table 10-20: Fixed Meter Charge – Capacity Component Calculation

Meter Size	Capacity	Capacity Ratio	Count	Total Equivalencies	Capacity Component
5/8"	20	1	10	10	$6.02
3/4"	30	1.5	102	153	$9.03
1"	50	2.5	63	158	$15.05
1-1/2"	100	5	6	30	$30.10
2"	160	8	5	40	$48.16
3"	350	17.5	2	35	$105.35
4"	600	30	3	90	$180.60
6"	1350	67.5	0	0	$406.35
8"	1600	80	0	0	$481.60
10"	3800	190	0	0	$1,143.80
12"	5000	250	0	0	$1,505.00
14"	7500	375	0	0	$2,257.50
16"	10000	500	0	0	$3,010.00
18"	12500	625	0	0	$3,762.50
Total			**191**	**516**	

Table 10-21 shows the proposed monthly fixed meter charges for Untreated Retail metered customers. The proposed charges are the sum of the customer component and the capacity component from Table 10-19 and Table 10-20.

[38] The remaining $476 of the customer costs are recovered from the capital facilities fee.

Table 10-21: Proposed Fixed Meter Charges

Meter Size	Capacity Component [A]	Customer Component [B]	Proposed Meter Charge [A+B]	Current Meter Charge
5/8"	$6.02	$3.12	$9.14	$10.53
3/4"	$9.03	$3.12	$12.15	$12.13
1"	$15.05	$3.12	$18.17	$15.11
1-1/2"	$30.10	$3.12	$33.22	$21.12
2"	$48.16	$3.12	$51.28	$32.27
3"	$105.35	$3.12	$108.47	$56.74
4"	$180.60	$3.12	$183.72	$82.40
6"	$406.35	$3.12	$409.47	$138.19
8"	$481.60	$3.12	$484.72	$221.13
10"	$1,143.80	$3.12	$1,146.92	N/A
12"	$1,505.00	$3.12	$1,508.12	N/A
14"	$2,257.50	$3.12	$2,260.62	N/A
16"	$3,010.00	$3.12	$3,013.12	N/A
18"	$3,762.50	$3.12	$3,765.62	N/A

10.3.1 *Monthly R&R Charge (Capital Facilities Fee)*

The capital R&R costs of the class are recovered through a capital facilities fee. Each metered connection pays for capital costs equally irrespective of meter size. The monthly capital facilities charge derived by PCWA staff analysis is $8.98 per month.

Table 10-22: Proposed R&R Charges

Commodity Unit Cost	
R&R Charge per Bill	$8.98
Metered Connections	191
Months	12
Capital Cost Recovery	$20,582

Table 10-23 shows the proposed and current capital facilities fee as well as the dollar and percentage change.

Table 10-23: Proposed R&R Charges

	Proposed R&R Charge	Current R&R Charge	$ Change	% Change
Per Metered Connection"	$8.98	$8.61	$0.37	4.3%

Commodity Charge Derivation

To derive the commodity rate per unit of water, total variable costs from Table 10-17 are divided by the Untreated Retail metered annual demand estimate. The estimated demand is 207 AFY, which converts to 89,989 hcf. The calculated uniform rate is $0.19 per hcf.

Table 10-24: Proposed Untreated Retail Metered Commodity Rate

Commodity Unit Cost	
Variable Costs	$16,917
Annual Demand (AFY)	207
AF to hcf conversion Factor	435.6[39]
hcf/year	89,989
$/hcf	$0.19

Table 10-25 compares the proposed uniform rate with the existing declining tier rates. The majority of water use occurs in Tier 3 of the existing rate structure. Untreated Retail metered customers will see a reduction in their commodity charges across all units of water.

Table 10-25: Comparison of Current and Proposed Commodity Rates

Tier	Tier Definition (hcf)	Proposed Rate	Current Rate	$ Change
Tier 1/Uniform	0-30	$0.19	$0.46	($0.27)
Tier 2	30-100	$0.19	$0.44	($0.25)
Tier 3	>100	$0.19	$0.35	($0.16)

10.3.2 *Metered Impacts*

Table 10-26 shows the current and proposed revenue from the Untreated Retail metered customer class. Overall, PCWA will recover approximately $11,600 less from this class due to the new cost of service analysis.

Table 10-26: Current Versus Proposed Revenue

	Metered Connections
Current Revenue	$86,295
Proposed Revenue	$74,704
Difference	($11,590)
% Change	-13%

Figure 10-5 shows the class-wide impacts to Untreated Retail metered customers in Zone 1. 37 percent of customers experience savings between $0-25 per month and 58 percent of customers experience an increases of $0-25 per month.

[39] 325,851 gallons per acre foot and 748 gallons per hcf. 325,851 gallons divided by 748 gallons equals 435.6.

Figure 10-5: Untreated Retail Metered Zone 1 Impacts

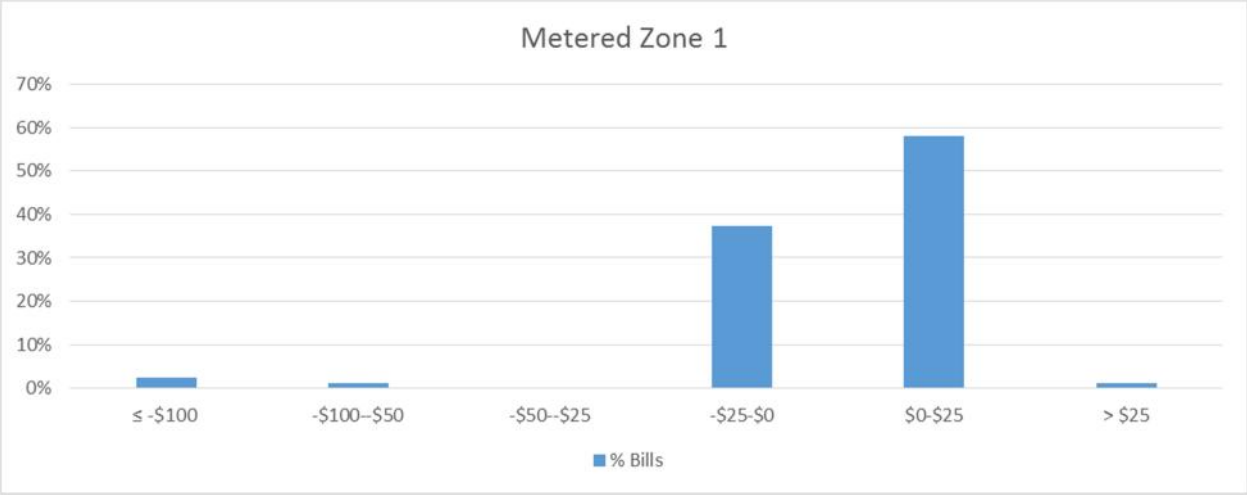
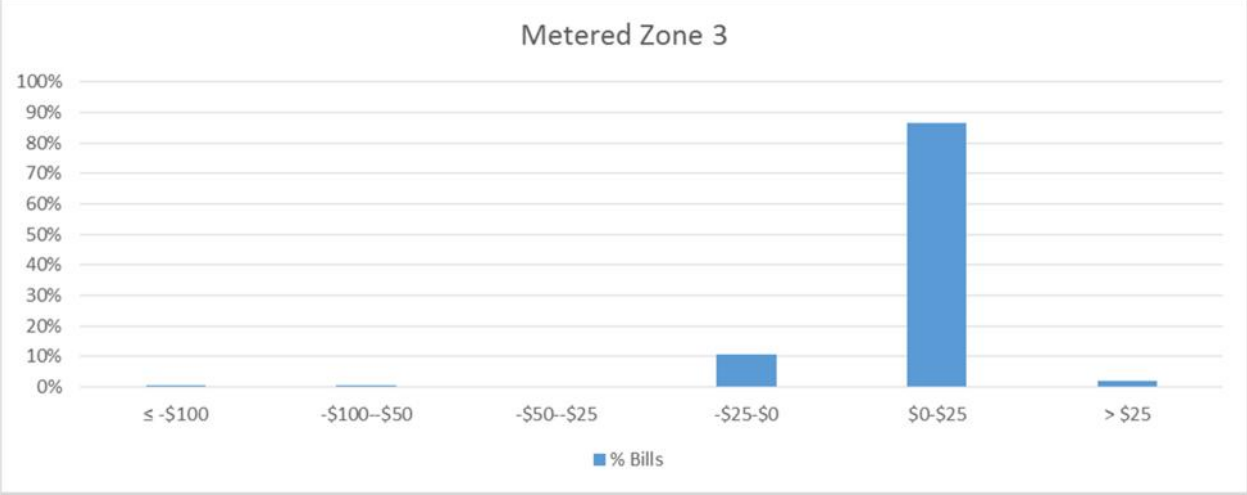


Figure 10-6 shows the class-wide impacts to Untreated Retail metered customers in Zone 3. 91 percent of customers experience an increase between $0-25 per month.

Figure 10-6: Untreated Retail Metered Zone 3 Impacts



10.3.1 *Untreated Retail Class Impacts*

The updated cost of service reassigns costs between the two Untreated Retail sub-classes: miners' inch and metered customers. Table 10-27 shows the current and proposed revenue from each sub-class. PCWA will recover 13 percent less from metered customers and 1 percent more from miners' inch customers for a total increase in Untreated Retail class revenue of 1 percent or approximately $30,000 per year.

Table 10-27: Current Versus Proposed Revenue

	Meter	MI	Total
Current	$86,295	$3,937,891	$4,024,186
Proposed	$74,704	$3,979,499	$4,054,203
Difference	($11,590)	$41,607	$30,017
% Change	-13%	1%	1%

11. UNTREATED RESALE

11.1 COST ALLOCATION – MINERS' INCH AND METERED CONNECTIONS

The Untreated Resale service class consists of both metered and unmetered raw water users. The service class consists of six customers. Three customers order water in miners' inches and three customers receive metered raw water deliveries. Costs are allocated between miners' inch and metered connections within the Untreated Resale class using the same methodology as the Untreated Retail service class. Table 11-1 shows the pertinent values for the allocation bases used to distribute costs between the two sub-classes. The values are converted into percentages, which are used to distribute the total costs of Untreated Resale service between metered and miners' inch connections.

Table 11-1: Allocation between Metered and Miners' Inch Accounts

Allocation Basis	Metered	Miner's Inches
Annual Demand	1,402	629
Max Month (Canal)	2.00	2.00
No. of Accounts	5	3
Metered Only	1	0
Miner's Inches Only	0	1
Allocation %		
Annual Demand	69%	31%
Max Month (Canal)	69%	31%
No. of Accounts	63%	38%
Metered Only	100%	0%
Miner's Inches Only	0%	100%

Table 11-2 shows the total costs of Untreated Resale service from Table 5-15 distributed to the two sub-classes. Water supply is distributed based on annual demand, canal and reservoir costs are based on max month (canal), meter costs are assigned to metered accounts only, and customer costs are distributed on the basis of accounts. General costs are recovered from metered customers only.

Table 11-2: Distribution of Costs to Metered and Miners' Inch Accounts ($)

Component	Cost	Allocation	Metered Accounts	Miner's Inches
Water Supply	$73,238	Annual Demand	$50,556	$22,682
Canal	$171,126	Max Month (Canal)	$118,128	$52,998
General	$17,729	Metered Only	$17,729	$0
Reservoir	$485	Max Month (Canal)	$335	$150
Meter	$232	Metered Only	$232	$0
Customer	$334	No. of Accounts	$208	$125
Total COS	**$263,143**		**$187,188**	**$75,955**

11.2 MINERS' INCHES - RATES AND CHARGES

Table 11-3 shows the total costs allocable to Miners' Inch customers from Table 11-2 as well as the percentage of each individual cost associated with the fixed component, the seasonal component, or the variable component. The components are described in more detail in the subsequent sub-sections. Two percent of water supply costs are recovered on the fixed component, all canal costs are differentiated by the seasonal component, and twenty percent of general costs are differentiated by the seasonal component. All other costs are recovered through the variable component.

Table 11-3: Distribution of Miners' Inch Costs to Rate Components

Component	Cost	% Fixed	% Seasonal	% Variable	Fixed Component	Seasonal Component	Variable
Water Supply	$22,682	2%	0%	98%	$512	$0	$22,170
Canal	$52,998	0%	100%	0%	$0	$52,998	$0
General	$0	0%	20%	80%	$0	$0	$0
Reservoir	$150	0%	0%	100%	$0	$0	$150
Meter	$0	0%	0%	100%	$0	$0	$0
Customer	$125	0%	0%	100%	$0	$0	$125
Total COS	**$75,955**				**$512**	**$52,998**	**$22,445**

11.2.1 *Fixed Component Derivation*

The fixed component of miners' inch service does not vary with the amount of water delivered. These costs are incurred year-round in maintaining service to canal customers and are spread equally across the customer base. Table 11-4 shows the total number of miners' inch accounts. Miners' inch rates are differentiated by two seasons: summer and winter. Summer is designated as May through October. Winter is November through April. Accounts are shown for both seasons. The total number of accounts receiving service during the year is 6 (3 in winter and 3 in summer).

Table 11-4: Miners' Inch Accounts

	Accounts
Winter Accounts	3
Summer Accounts	3
Total Accounts	**6**

The fixed component is derived by dividing the total fixed costs in Table 11-3 by the number of annual accounts in Table 11-4. The fixed cost per season is $85.29 or $14.22 per month.

Table 11-5: Miners' Inch Fixed Component

	Accounts
Fixed Costs	$512
Total Accounts	6
$/Season	**$85.29**
Months in Season	6
$/Month	**$14.22**

11.2.2 *Variable Component Derivation*

The variable component of the miners' inch rate represents the cost to purchase water and maintain any capital facilities required to transport the water (not including canal costs, which are recovered in the seasonal component). Table 11-6 shows the total number of inches ordered, split between winter (30) and summer (38).

Table 11-6: Miners' Inches

	Inches
Winter Inches	30
Summer Inches	38
Total Inches	**68**

The variable component is derived by dividing the total variable costs in Table 11-3 by the annual number of inches ordered in Table 11-6. The variable cost per season is $330.08 per miners' inch, or $55.01 per month.

Table 11-7: Miners' Inch Variable Component

Variable Costs	$22,445
Total Inches	68
$/Season	**$330.08**
Months in Season	6
$/Month	**$55.01**

11.2.3 *Seasonal Component Derivation*

The seasonal component of the miners' inch rate represents the costs incurred to operating and maintenance of the canal systems as well as general costs. PCWA performs the vast majority of canal cleaning and routine maintenance in the winter time when demand is lowest for irrigation water and sections of the canal can be interrupted to perform work. PCWA incurs additional costs when this maintenance has to be delayed or to find work arounds to keep customers in water service.

To determine the seasonal component for the two seasons, Raftelis first divides the seasonal costs equally between the two seasons. The semi-annual cost of $26,499 is divided by the number of inches served in the winter season to derive the cost per miners' inch of $883.30 ($147.22 per month). The same calculation is performed for summer service. The seasonal cost per miners' inch in summer is $697.34 ($116.22 per month). Table 11-8 and Table 11-9 show the calculation steps for the seasonal components.

Table 11-8: Miners' Seasonal Component - Winter

	Inches
Total Seasonal Costs	$52,998
Seasonal Costs (Winter)	$26,499
Winter Inches	30
$/Winter Season	**$883.30**
Months in Season	6
$/Month Winter	**$147.22**

Table 11-9: Miners' Seasonal Component - Summer

	Inches
Total Seasonal Costs	$52,998
Seasonal Costs (Summer)	$26,499
Summer Inches	38
$/Summer Season	**$697.34**
Months in Season	6
$/Month Summer	**$116.22**

11.2.4 *Rates Derivation*

Having calculated the fixed, variable, and seasonal cost components, the rates can now be derived. Table 11-10 shows the proposed rates for winter water service for sizes at amounts less than 1,000 miners' inch days (MID) - the current unit of measurement – and values greater than 1,000 MID.

In Table 11-10 the fixed component is shown in the top two rows as uniform charges to all users irrespective of inches ordered. It is divided equally into two parts: fixed (operating) and R&R (capital) to mirror the existing structure. The variable component from Table 11-7 and seasonal components from Table 11-8 and Table 11-9 are summed to calculate the total cost per month per miners' inch for summer and winter water service ($171.24 and $202.23 respectively). Subsequent PCWA staff analysis has modified these rates marginally and they are presented in Table 11-10. The rate schedule in Table 11-10 shows rates at existing breakpoints of water service.

Table 11-10: Miners' Inch Rates – Untreated Resale

Inches	Proposed Summer	Proposed Winter	Current Z1	Current Z3
Fixed	**$7.11**	**$7.11**	$69.03	$58.33
R&R	**$7.11**	**$7.11**	$8.61	$6.87
< 1,000 MID	**$171.81**	**$202.80**	$186.00	$157.20
> 1,000 MID	**$171.81**	**$202.80**	$191.70	$162.30

11.2.5 *Customer Impacts*

Table 11-11 illustrates the impact to untreated resale miners' inch customers.

Table 11-11: Untreated Resale Miners' Inch Annual Impacts

Zone	LID	CID	Current Charges (Estimate)	Proposed Charges (Estimated)	Impact ($)	Impact (%)
Z3	29858	15291	$17,742	$19,811	$2,069	12%
Z3	29860	15293	$5,433	$5,514	$81	2%
Z3	29946	15402	$46,609	$52,855	$6,247	13%
Total			**$69,784**	**$78,441**	**$8,658**	**$78,181**

11.3 METERED – RATES AND CHARGES

Similar to metered customers within the untreated retail class, untreated resale metered customers' charges consist of a meter-based fixed charge, capital charge (called a capital facilities charge), and a variable commodity charge. The following subsections detail the proposed rates and charges calculations.

11.3.1 *Fixed and Variable Cost Recovery*

The first step in designing untreated resale metered rates and charges is determining the portion of costs recovered on the fixed (or meter) charges and the variable commodity charges. Working in consultation with PCWA staff, Raftelis identified the fixed/variable cost recovery shown in Table 11-12. Water supply and canal costs are recovered through the variable commodity charges. General, reservoir, meter, and customer costs are recovered through the fixed charges.

Table 11-12: Fixed and Variable Cost Recovery – Metered Connections

Component	Metered	% Fixed	% Variable	Fixed Charge	Variable Charge
Water Supply	$50,556	0%	100%	$0	$50,556
Canal	$118,128	0%	100%	$0	$118,128
General	$17,729	100%	0%	$17,729	$0
Reservoir	$335	100%	0%	$335	$0
Meter	$232	100%	0%	$232	$0
Customer	$208	100%	0%	$208	$0
Total COS	**$187,188**			**$18,504**	**$168,684**

11.3.2 *Fixed Charges Derivations*

To derive the meter charge and the capital facilities charge, the total fixed costs from Table 11-12 are apportioned. The monthly capital facilities charge of $8.98 per month was derived by PCWA staff analysis. The monthly capital charge is multiplied by the number of service connections and months of the year to identify the total revenue collected for capital. The remainder between the total fixed costs in Table 11-12 and the amount collected from the capital facilities fee is recovered by the monthly meter-based fixed charge.

Table 11-13: Fixed Charge Allocation between Operating and Capital R&R

Fixed Charges	Fixed Costs
Total Fixed Costs	**$18,504**
Proposed Capital Facilities Charge (Monthly)	$8.98
Service Connections	5
Months	12
Fixed Cost Recovery - Capital	**$539**
Fixed Cost Recovery – Meter Charges	**$17,965**

11.3.3 *Monthly Fixed Meter Charge*

The fixed meter charge schedule for untreated resale service will be the same as the schedule for untreated retail service. The charge consists of two components: a customer component and a meter capacity component.

Table 11-14 shows the proposed monthly fixed meter charges for untreated resale metered customers. The proposed charges are the sum of the customer component and the capacity component from Table 10-19 and Table 10-20.

Table 11-14: Proposed Fixed Meter Charges

Meter Size	Capacity Component	Customer Component	Proposed Meter Charge	Current Meter Charge
5/8"	$6.02	$3.12	$9.14	$69.03
3/4"	$9.03	$3.12	$12.15	$69.03
1"	$15.05	$3.12	$18.17	$69.03
1-1/2"	$30.10	$3.12	$33.22	$69.03
2"	$48.16	$3.12	$51.28	$69.03
3"	$105.35	$3.12	$108.47	$69.03
4"	$180.60	$3.12	$183.72	$69.03
6"	$406.35	$3.12	$409.47	$69.03
8"	$481.60	$3.12	$484.72	$69.03
10"	$1,143.80	$3.12	$1,146.92	N/A
12"	$1,505.00	$3.12	$1,508.12	N/A
14"	$2,257.50	$3.12	$2,260.62	N/A
16"	$3,010.00	$3.12	$3,013.12	N/A
18"	$3,762.50	$3.12	$3,765.62	N/A

11.3.4 *Monthly R&R Charge*

The capital costs are recovered through a capital facilities fee. Each metered connection pays for capital costs equally irrespective of meter size. Untreated resale metered customers will pay the same monthly capital facilities fee of $8.98 untreated retail service.

Table 11-15: Proposed R&R Charges

Commodity Unit Cost	
R&R Charge per Bill	$8.98
Metered Connections	5
Months	12
Capital Cost Recovery	$539

Table 10-23 shows the proposed and current capital facilities fee.

Table 11-16: Proposed R&R Charges

	Proposed R&R Charge	Current R&R Charge	$ Change	% Change
Per Metered Connection"	$8.98	$8.61	$0.37	4.3%

Commodity Charge Derivation

To derive the commodity rate per unit of water total variable costs from Table 11-12 are divided by the untreated resale metered annual demand estimate. The estimated demand is 1,402 AFY, which converted to 610,753 hcf. The calculated uniform rate shown in Table 11-17 is $0.28 per hcf.

Table 11-17: Proposed Untreated Retail Metered Commodity Rate

Commodity Unit Cost	
Variable Costs	$168,684
Annual Demand (AFY)	1,402
AF to hcf Conversion Factor	435.6[40]
hcf/year	610,753
$/hcf	**$0.28**

Table 11-18 compares the proposed uniform rate with the existing MID rates.

Table 11-18: Comparison of Current and Proposed Commodity Rates

Miners' Inch Days	Proposed Rate ($/hcf)	Current Rate Zone 1	Current Rate Zone 3
< 1,000	$0.28	$0.29[41]	$0.24
> 1,000	$0.28	$0.30	$0.25

11.3.5 *Metered Impacts*

Table 11-19 shows the current and proposed revenue from the untreated resale metered customer class. Overall, PCWA will recover $28,510 more from this class due to the new cost of service analysis.

[40] 325,851 gallons per acre foot and 748 gallons per hcf. 325,851 gallons divided by 748 gallons equals 435.6.
[4141] Current water sales are billed in miners' inch days. Raftelis converted miners' inch days to hcf to compare to the proposed rate and unit of measure.

Table 11-19: Current Versus Proposed Revenue – Untreated Resale Metered

	Metered Connections
Current Revenue	$158,678
Proposed Revenue	$187,188
Difference	$28,510
% Change	18%

11.3.6 *Untreated Resale Class Impacts*

The updated cost of service reassigns costs between the two untreated resale sub-classes: miners' inch and metered customers. Table 11-20 shows the current and proposed revenue from each sub-class. PCWA will recover 18 percent more from metered customers and 9 percent more from miners' inch customers for a total increase in revenues from the untreated resale class of 15 percent or approximately $34,700 per year.

Table 11-20: Current Versus Proposed Revenue – Untreated Resale

	Meter	MI	Total
Current	$158,678	$69,783	$228,461
Proposed	$187,188	$75,955	$263,143
Difference	$28,510	$6,171	$34,682
% Change	18%	9%	15%