Industry Public Utilities

Comprehensive Water Rate Study

Final Report / August 18, 2021

RAFTELIS

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August 18, 2021

Mr. Roy Frausto
General Manager
City of Industry
Industry Public Utilities Commission
15625 East Stafford Street
City of Industry, CA 91744

Subject: Comprehensive Water Rate Study Report

Dear Mr. Frausto,

Raftelis Financial Consultants, Inc. (Raftelis) is pleased to present this water rate study report (Study) for the Industry Public Utilities (IPU) water system, which is maintained, operated, and managed by the La Puente Valley County Water District (LPVCWD). The Study develops a long-term financial plan and designs water rates with technically sound methodologies which we believe meet the requirements of California Constitution Article XIII D, Section 6 (commonly referred to as "Proposition 218").

The report includes a brief Executive Summary followed by a detailed discussion of Study key findings and recommendations related to the development of the financial plan, the cost-of-service allocations, and an in-depth derivation of proposed water rates.

It was a pleasure working with you and we wish to express our thanks for your support provided during this study.

Sincerely,

Steve Gagnon, PE
Senior Manager

Lauren Demine
Senior Consultant

445 S Figueroa St, Suite 2270
Los Angeles CA 90071
www.raftelis.com

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1. Executive Summary

1.1. Study Background

In 2019, Industry Public Utilities (IPU) and La Puente Valley County Water District (LPVCWD) engaged Raftelis to conduct a Water Rate Study (Study) for its water system, which is also referred to as the City of Industry Waterworks System (CIWS). The Study was to include a five-year Financial Plan and water rate derivation. This report presents the Financial Plan and the resulting rates for implementation in November of 2021.

This Executive Summary describes the rate study methodology and resulting water rates. The detailed assumptions used in the Financial Plan, Financial Plan results, and full rate derivations are provided in Sections 2 through 5. IPU wishes to establish fair and equitable rates that:

1. Meet the CIWS's fiscal operational expenses, reserve goals and capital investment to maintain the system
2. Are fair and equitable, and therefore proportionately allocate the costs of providing service in accordance with California Constitution article XIII D, section 6 (commonly referred to as Proposition 218)
3. Result in stable charges over time for customers
4. Promote water conservation

1.2. Rate Setting Methodology and Legal Requirements

1.2.1. METHODOLOGY

The water rates presented in this report were developed using Cost of Service principles set forth by the American Water Works Association M1 Manual titled *Principles of Water Rates, Fees and Charges* (AWWA M1 Manual). Cost of Service principles endeavor to distribute costs to customer classes in accordance with the way each class uses the water system. This methodology is described in detail in Sections 4 and 5. The Base-Extra Capacity Method, described in the AWWA M1 Manual was used to distribute costs to customer classes and tiers. This method separates costs into four components[1]: (1) base costs (which include supply and delivery), (2) extra capacity costs, (3) customer costs, and (4) fire protection costs. Base costs are costs associated with meeting average daily demand needs and include Operations and Maintenance (O&M) costs and capital costs designed to meet average load conditions. Extra capacity costs are costs (both operating and capital costs) associated with meeting peak water demand. Customer costs are costs associated with serving customers, such as meter reading, billing and customer service, etc. Fire protection costs include public and private fire protection and are related solely to the fire protection function of a water system.

1.2.2. LEGAL REQUIREMENTS

1.2.2.1. 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] There can be other cost components such as conservation and supply; however, the four mentioned are the most common.

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 customer classes 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 and creates rates that do not exceed the proportionate cost of providing water services on a parcel basis.

1.2.2.2. 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 establishes the need to preserve the State's water supplies and to discourage the waste or unreasonable use of water by encouraging conservation. By definition, 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. CIWS established tiered water rates (also known as "inclining tier" or "inclining block") water rates to incentivize customers to use water in an efficient manner. The inclining tier rates (as well as rates for the classes that are charged a uniform rate[2]) 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.

"Inclining" tier rate structures (which are synonymous with "increasing" tier rate structures and "tiered" rates), when properly designed and differentiated by customer class, allow a water utility to send conservation price signals to customers while proportionately allocating the costs of service. Due to a necessity in reducing water use and increasing efficiency, tiered water rates have gained widespread use, especially in relatively water-scarce regions like California. Tiered rates meet the requirements of Proposition 218 as long as the tiered rates reasonably reflect the proportionate cost of providing water service in each tier.

[2] A uniform rate refers to a rate that does not change with water use. It is the same rate for all use measured in hundred cubic feet of water.

1.3. Results and Recommendations

Table 1-1 shows the proposed revenue adjustments[3] selected by IPU and used to calculate the proposed rates. Although this table shows anticipated revenue adjustments for FYE 2022 through 2026, IPU will review and confirm the revenue adjustments on an annual basis[4]. The revenue adjustment is the additional amount of revenue collected compared to the prior fiscal year[5]. Note that IPU's fiscal year (FY) runs from July 1 to June 30 of the following year. For example, FY 2022 runs from July 1, 2021 through June 30, 2022.

Table 1-1: Recommended Yearly Revenue Adjustments

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Effective Month	November	November	July	July	July
Revenue Adjustment	14.0%	11.0%	11.0%	10.0%	9.0%

1.3.1. FACTORS AFFECTING REVENUE ADJUSTMENTS

The following items affect CIWS's revenue requirement (i.e., costs) and thus its rates. CIWS's expenses include O&M expenses and capital expenses.

- **Capital Funding:** CIWS has approximately $10.7 million in capital expenditures over the next five fiscal years and $13.3 million over the ten-year financial planning period. All the capital replacement projects will be funded through cash reserves from rates or through internal loans from the IPU Reserve Fund. CIWS may elect to accelerate or postpone its Capital Improvement Plan (CIP) timeline based on system demand, available funds, and other conditions. A more detailed discussion of the projected capital improvement projects to be funded through the five-year CIP is provided in Section 2.2.7 and Table 2-8.

- **Reserve Funding:** IPU does not currently have a reserve policy specific to the CIWS, but does have a reserve fund for all of the IPU operations, which includes potable water, recycled water, and its electric power systems. Raftelis recommends that IPU establishes reserve policies to meet CIWS's cash flow needs, ensure adequate funding of repairs and replacements in the event of asset failure or other unforeseen circumstances or events, and protect ratepayers from rate spikes. CIWS's reserves are further discussed in Section 2.3 and reserve balances for the selected Financial Plan are shown in Figure 2-3. Raftelis recommends establishing an operating reserve policy of a minimum of 25 percent of annual operating expenses in cash to meet cash flow needs. Raftelis also recommends establishing a Capital Reserve with a reserve policy for the CIWS of a minimum target balance of one year of average replacement capital costs.

1.3.2. PROPOSED WATER RATES

Note that in this report, the terms rate and charge are often used interchangeably. There are two changes to CIWS's rates proposed in this Study; Raftelis proposes to 1) lower the Tier 1 breakpoint from 30 hundred cubic feet (hcf) to 26 hcf, and 2) create separate pumping rates for CIWS's two pumping zones, Zone 1 and Zone 2.

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[3] Revenue adjustments do not necessarily equate to customer bill impacts but describe the total increase in revenue. Bill impacts are discussed in Section 5.

[4] CIWS maintains the right to implement rates that are *lower* than adopted. If it is determined that a rate *higher* than has been adopted is required, CIWS will have to adopt new rates and will need to re-notice customers in accordance with Proposition 218.

[5] This assumes that the rates are implemented for the full fiscal year. In the case of FY 2022 with rates effective in November, CIWS will not realize the full percentage revenue adjustment.

CIWS Staff and Raftelis reduced the Tier 1 breakpoint to reflect an updated estimate of indoor water usage. Using CIWS water data, Raftelis calculated the minimum bimonthly water use for the three lowest billing periods during the year. These generally occur during the winter months and approximates indoor water use since outdoor irrigation is assumed to be minimal.

Pumping rates for CIWS's two pumping zones, Zone 1 and Zone 2, were calculated using CIWS water data. The pumping rate covers costs to pump water to higher elevations. Separate pumping rates were developed for each zone to recover the costs associated with that zone.

CIWS's rate structure is composed of two components: a fixed bimonthly Meter Service Charge and a variable Volumetric Rate (which when multiplied by a customer's water use, yields a commodity charge). Each of these charges is described below.

1.3.2.1. Fixed Charge

The proposed Meter Service Charge is composed of three components (the first which is named the same as the overall charge):

$$Total\ Fixed\ Meter\ Service\ Charge = 1)\ Meter\ Service\ Charge + 2)\ Meter\ Capacity\ Charge + 3)\ Customer\ Service\ Charge$$

The first component, the Meter Service Charge, is based on the meter size serving a property. The Meter Service Charge is calculated to recover the cost to maintain and replace meters. This cost is proportional to the cost to replace the meter and goes up with meter size. The second component, the Meter Capacity Charge, is also based on the meter size serving a property. The Meter Capacity Charge is calculated to recover a portion of extra-capacity related costs (i.e., costs associated with meeting system capacity beyond that required for average daily demand). This cost is proportional to the safe potential flow (hydraulic capacity) through the meter and goes up with meter size. The third component is the customer service component. This component recovers costs associated with answering customer calls and billing customers. These costs are not related to meter size. The full derivation of the total charge is described in Section 4.3, and the ***total*** fixed Meter Service Charge is shown in Table 1-2. CIWS proposes to collect approximately the same amount of fixed revenue from the Total Fixed Meter Charge as it currently does.

Table 1-2: Current and Proposed Bimonthly Meter Service Charge

Meter Size (inches)	Current Charges	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
5/8"	$46.20	$48.17	$53.47	$59.35	$65.29	$71.17
3/4"	$51.32	$55.96	$62.12	$68.95	$75.84	$82.67
1"	$61.56	$68.43	$75.95	$84.31	$92.74	$101.08
1.5"	$87.18	$104.48	$115.97	$128.73	$141.60	$154.34
2"	$117.91	$144.98	$160.93	$178.63	$196.49	$214.18
3"	$199.87	$255.92	$284.07	$315.32	$346.85	$378.07
4"	$292.08	$390.11	$433.02	$480.65	$528.72	$576.30
6"	$550.00	$712.82	$791.23	$878.27	$966.10	$1,053.05
8"	$850.00	$1,104.53	$1,226.03	$1,360.89	$1,496.98	$1,631.71

1.3.2.2. Private Fire Charges

CIWS's current and proposed private fire charges are shown in Table 1-3. The proposed private charges are proportional to the potential flow through each fire connection size.

Table 1-3: Current and Proposed Private Fire Charges

Private Fire Line Size (Inches)	Current Charges	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
5/8"	NA	NA	NA	NA	NA	NA
3/4"	NA	NA	NA	NA	NA	NA
1"	$61.56	$8.34	$9.26	$10.27	$11.30	$12.32
1.5"	$77.08	$12.22	$13.56	$15.05	$16.56	$18.05
2"	$85.56	$18.91	$20.99	$23.30	$25.63	$27.93
3"	$108.20	$42.92	$47.65	$52.89	$58.18	$63.41
4"	$133.66	$84.35	$93.62	$103.92	$114.31	$124.60
6"	$204.39	$233.00	$258.63	$287.08	$315.79	$344.21
8"	$289.26	$489.41	$543.24	$603.00	$663.30	$723.00
10"	$402.43	$875.09	$971.35	$1,078.20	$1,186.02	$1,292.77
12"	$515.59	$1,409.64	$1,564.70	$1,736.82	$1,910.50	$2,082.45

1.3.2.3. Volumetric Rate

Table 1-4 and Table 1-5 show the current and proposed volumetric rates by customer class, respectively. The rates are designed to recover the costs associated with serving each class and tier as discussed in Sections 4 and 5.

Table 1-4: Current Volumetric Rate ($/hcf)

Customer Class	Current Tier Definition	Current Charges
Single Family Residential		
Tier 1	0 - 30	$2.10
Tier 2	>30	$2.70
Commercial, Multi-Family & Irrigation	Uniform	$2.25

Table 1-5: Proposed Volumetric Rates ($/hcf)

	Proposed Tier	FY 2022		FY 2023		FY 2024		FY 2025		FY 2026	
Customer Class	Definition	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2
Single Family											
Tier 1	0 - 26	$2.29	$2.68	$2.54	$2.97	$2.82	$3.30	$3.10	$3.63	$3.38	$3.95
Tier 2	>26	$3.09	$3.48	$3.42	$3.86	$3.80	$4.28	$4.18	$4.71	$4.56	$5.13
Commercial, Multi-Family & Irrigation	Uniform	$2.54	$2.93	$2.82	$3.26	$3.13	$3.61	$3.45	$3.98	$3.76	$4.33

2. Financial Plan Assumptions and Results

This section describes the Financial Plan assumptions and Financial Plan results.

2.1. Water System Background

La Puente Valley County Water District (LPVCWD) maintains, operates, and manages the CIWS. The service area includes portions of the City of Industry and an unincorporated area of Los Angeles County know as Avocado Heights. CIWS has approximately 1,830 active connections, 34.4 miles of distribution and transmission mains, one active well, five booster pump stations, two pressure zones, and three reservoirs

CIWS's primary source of supply is from one groundwater well that produces water from the adjudicated Main San Gabriel Basin (MSGB). The MSGB is bounded by the San Gabriel Mountains to the north, San Jose Hills to the east, Puente Hills to the south, and by a series of hills and the Raymond Fault to the west. CIWS has 837.15 acre-feet of prescriptive groundwater production rights that equals 0.5581% of all adjudicated water rights in the MSGB. CIWS's annual production rights are dependent on the MSGB Annual Safe Yield. On average, approximately 40% of the water needed to meet the annual demand of CIWS customers comes from groundwater production rights. The remainder of the water needed to meet annual demand is obtained by CIWS through leases of additional groundwater production rights.

2.2. Financial Plan Assumptions

2.2.1. NUMBER OF ACCOUNTS

Raftelis created a five-year Financial Plan which models anticipated revenue and expenses. To calculate the projected revenue (without rate adjustments), the number of accounts is multiplied by the bimonthly (fixed) Meter Service Charge and the total water use in each tier is multiplied by the Volumetric Rate. Table 2-1 shows the projected number of water accounts, including private fire connections by meter size and class for the Study Period. CIWS's fiscal year (FY) runs from July 1 to June 30 of the following year and FY 2022 is the "test year". The test year is the year in which rates are developed in rate setting terminology. Raftelis projected the number of meters using FY 2018 meter data provided by CIWS. The number of accounts is used to forecast the amount of fixed revenue CIWS will receive from fixed bimonthly Meter Service Charges.

Table 2-1: Projected Accounts by Customer Class and Meter Size

Customer Class	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Single Family Residential	1,473	1,476	1,479	1,482	1,485
Multi-Family	2	2	2	2	2
Commercial	328	328	328	328	328
Industrial	1	1	1	1	1
Irrigation	25	25	25	25	25
Public Authority	11	11	11	11	11
Total	**1,840**	**1,843**	**1,846**	**1,849**	**1,852**

Meter Size	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
5/8"	1,196	1,199	1,201	1,203	1,205
3/4"	213	214	214	214	215
1"	324	325	325	325	326
1.5"	30	30	30	30	30
2"	62	62	62	62	62
3"	4	4	4	4	4
4"	7	7	7	7	7
6"	1	1	1	1	1
8"	2	2	2	2	2
10"	-	-	-	-	-
Total	**1,840**	**1,843**	**1,846**	**1,849**	**1,852**

Private Fire Connections

Meter Size	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
4"	3	3	3	3	3
6"	30	30	30	30	30
8"	23	23	23	23	23
10"	3	3	3	3	3
Subtotal	**59**	**59**	**59**	**59**	**59**

2.2.2. WATER USE GROWTH ASSUMPTIONS

The volumetric revenue calculated for each fiscal year in the Financial Plan is a function of account growth, water use trends, and existing rates. Table 2-2 shows the assumed water demand growth for residential and non-residential classes. Currently, CIWS is not anticipating any changes in water demand.

Table 2-2: Account Growth and Water Use Assumptions

Water Demand Growth	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Residential Single Family	100%	100%	100%	100%	100%
All Other Classes	100%	100%	100%	100%	100%

2.2.3. WATER USE

Table 2-3 shows estimated water use by customer class for the Study Period. The water use was projected from FY 2018 water use data by escalating the data using the water use growth trends shown in Table 2-2. The water use is shown in hcf, where one hundred cubic feet equals approximately 748 gallons. Table 2-4 shows the percent of accounts and water use by customer class.

Table 2-3: Water Use Projections in Hundred Cubic Feet by Customer Class

Customer Class	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Residential Single Family					
Tier 1	188,181	188,181	188,181	188,181	188,181
Tier 2	71,635	71,635	71,635	71,635	71,635
Subtotal	**259,816**	**259,816**	**259,816**	**259,816**	**259,816**
Multi-family	22,130	22,130	22,130	22,130	22,130
Commercial	196,607	196,607	196,607	196,607	196,607
Industrial	51	51	51	51	51
Irrigation	14,138	14,138	14,138	14,138	14,138
Public Authority	18,843	18,843	18,843	18,843	18,843
Subtotal Non-SFR	**251,770**	**251,770**	**251,770**	**251,770**	**251,770**
Total	**511,585**	**511,585**	**511,585**	**511,585**	**511,585**

Table 2-4: Percent of Accounts and Water Use by Class

Customer Class	No. of Accounts	Percent of Accounts	Water Use	Percent of Water Use
Single Family	1,473	80.1%	259,816	50.8%
Multi-family	2	0.1%	22,130	4.3%
Commercial	328	17.8%	196,607	38.4%
Industrial	1	0.1%	51	0.01%
Irrigation	25	1.4%	14,138	2.8%
Public Authority	11	0.6%	18,843	3.7%
Total	**1,840**	**100%**	**511,585**	**100%**

2.2.4. INFLATIONARY COST ASSUMPTIONS

To ensure that future Operation and Maintenance (O&M) costs are reasonably projected, Raftelis made informed assumptions about inflationary factors, water costs, and water use. CIWS provided an O&M expense budget through the Study period that included their escalated costs for salaries and benefits, supply and treatment, general and administrative, and other operating expenses. This budget was used for the Financial Plan.

CIWS pays a Water Resource Development Assessment (RDA) to the San Gabriel Basin Watermaster (SGBW) for groundwater produced. No increases in these assessments are being assumed in future years of the Study Period since the RDA started at $40 per acre-foot of water pumped in the Basin in 2016 and is now increased to its max amount of $175. CIWS also leases annual groundwater production rights. The Table 2-5 shows the assumed increases in the groundwater lease rate.

Table 2-5: Inflationary Assumptions

Groundwater Production Rights Lease Rate					
Lease 1	0.0%	7.2%	4.0%	4.0%	4.0%

2.2.5. GROUNDWATER PRODUCTION AND LEASE COSTS

The assumptions shown in Table 2-5 were incorporated into the groundwater production assessment and groundwater lease costs shown calculated in Table 2-6. Line 6 and Line 18 in Table 2-6 describe how each line was calculated in parentheses.

Table 2-6: Groundwater Production and Lease Costs

Production Assessments		FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Line No.	(A)	(B)	(C)	(D)	(E)	(F)
1	Production (AF)	1,249	1,277	1,249	1,249	1,249
2	Administrative Assessment $/AF	$15.00	$15.00	$15.00	$15.00	$15.00
3	In-Lieu Assessment $/AF	$10.00	$10.00	$10.00	$10.00	$10.00
4	Water Resource Development Assessment (RDA) $/AF	$175.00	$175.00	$185.00	$185.00	$185.00
5	Total Assessment Rate $/AF	$200.00	$200.00	$210.00	$210.00	$210.00
6	**Total Cost of Assessments (Line 5 x Line 1)**	**$249,881**	**$255,313**	**$262,375**	**$262,375**	**$262,375**
	Leased Groundwater Costs					
7	Watermaster Safe Yield (AF)	150,000	150,000	150,000	150,000	150,000
8	IPUC's Share of Safe Yield (AF)	837	837	837	837	837
9	Carryover Production Rights (AF)	720	658	668	756	794
10	Total Production Rights (AF)	1,557	1,495	1,506	1,593	1,631
11	Production (AF) (From Above)	1,249	1,277	1,249	1,249	1,249
12	Difference (Carryover)	308	218	256	344	382
13	Production Right Lease (AF)	350	450	500	450	450
14	Total Production Right Carryover (AF)	658	668	756	794	832
15	**Groundwater Production Rights Lease Rate**					
16	Lease 1	$825.00	$884.41	$919.79	$956.58	$994.84
17	**Leased Rights - Cost**					
18	Lease 1 Cost (Line 13 x Line 16)	$288,750	$397,985	$459,895	$430,461	$447,679
19	**Total Cost of Leased Groundwater**	**$288,750**	**$397,985**	**$459,895**	**$430,461**	**$447,679**

2.2.6. O&M EXPENSES

CIWS's O&M budget, including groundwater costs in Line 2, is shown by fiscal year in Table 2-7. The 5-Year Financial Plan Study Period is from FY 2022 to FY 2026. The O&M budget incorporates the inflationary factors discussed in Section 2.2.4.

Table 2-7: Projected O&M Expenses

Line No.	Total Operation and Maintenance Costs	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
1	Salaries and Benefits	$719,000	$811,130	$836,954	$858,524	$877,712
2	Supply and Treatment (includes Groundwater costs)	$762,556	$903,447	$1,212,890	$1,194,180	$1,222,339
3	Other Operating Expenses	$217,000	$235,250	$239,984	$244,831	$249,794
4	General & Administrative	$328,500	$332,500	$254,500	$257,000	$259,550
5	**Total**	**$2,027,056**	**$2,282,327**	**$2,544,327**	**$2,554,534**	**$2,609,395**

2.2.7. CAPITAL IMPROVEMENT PLAN (CIP)

Table 2-8 shows a summary of CIWS's Capital Improvement Plan (CIP). CIWS plans on funding capital investment through rate revenue (also known as PAY-GO funding) and through internal loans from the IPU Reserve Fund. Capacity fees, shown in Line 8, will also be used to fund the CIP The total CIP expenses are shown in Line 10.

Table 2-8: Detailed Capital Improvement Plan

Line No.	Project	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
1	Alternative Supply (Growth Related)	$200,000	$0	$0	$0	$0
2	R&R (Capacity, Fire Suppression)	$810,000	$0	$100,000	$100,000	$150,000
3	R&R (Gen. Fire Suppression)	$15,000	$15,000	$15,000	$15,000	$15,000
4	R&R (Source of Supply, Capacity)	$200,000	$1,200,000	$2,800,000	$4,000,000	$0
5	R&R (Capacity)	$65,000	$165,000	$265,000	$265,000	$265,000
6	R&R (Customer)	$20,000	$20,000	$20,000	$20,000	$20,000
7	Capital Outlay (Vehicles and Equipment)	$0	$0	$0	$0	$0
8	Developer Fees (Capacity Fees)	($5,000)	($5,000)	($5,000)	($5,000)	($5,000)
9	**Total CIP Expenditure**	**$1,305,000**	**$1,395,000**	**$3,195,000**	**$4,395,000**	**$445,000**

2.2.8. EXISTING AND PROPOSED DEBT SERVICE

CIWS does not currently have existing debt. However, it plans to fund approximately $9.5 million in future capital costs through internal loans from the IPU Reserve Fund. The repayment of this internal loan is anticipated to begin in FY 2022. The approximate annual repayment amounts, assuming a 30-year term at a zero percent interest rate, are shown in Line 15 of Table 2-10 below. Based on discussions with staff, we assumed a no interest loan since this is an internal loan.

2.3. Financial Plan

For the five-year Financial Plan Study Period from FY 2022 to FY 2026, Raftelis projected operating revenue using the assumed number of accounts and water use shown in Table 2-1 and Table 2-3. Operating expenses were projected using the inflationary factors and the budget provided by CIWS. Raftelis modeled debt service coverage ratios and resulting yearly cash balances. The Financial Plan helps determine overall revenue adjustments required to ensure the financial stability of the water system. Revenue adjustments represent the average increase in rates as a whole; rate changes for individual classes will depend on the Cost-of-Service analysis which allocates costs to each customer class. Therefore, the revenue adjustment may not be the same as the average bill impact for FY 2022 proposed rates for each customer class. The revenue adjustments are described below and the Cost-of-Service analysis and bill impacts are described in Sections 3 and 5, respectively.

2.3.1. REVENUE ADJUSTMENTS

The proposed revenue adjustments help ensure adequate revenue to fund operating expenses and capital expenditures. The Financial Plan model assumes the revenue (i.e., rate) adjustment will occur in November 2021. The proposed revenue adjustments would enable CIWS to cover operating costs and execute the CIP shown in Table 2-8 over the five-year Study Period.

Table 2-9 shows the proposed revenue adjustments. The rates presented in Section 4 are based on these revenue adjustments.

Table 2-9: Proposed Revenue Adjustments

	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Effective Month	November	November	July	July	July
Revenue Adjustment	14.0%	11.0%	11.0%	10.0%	9.0%

2.3.2. CASH FLOW ANALYSIS

Table 2-10 shows CIWS cash flows over the study period assuming the revenue adjustments shown in Table 2-9. Line 3 shows the additional revenue resulting from the revenue adjustments. Line 7 shows total revenue including non-operating revenue. Line 17 shows the yearly ending cash flow after subtracting expenses, debt service, and capital expenses from revenue. Note that there is a yearly operating deficit in Line 17 in some years indicating that revenues do not cover costs. CIWS is minimizing customer impacts by using reserves in these years. Additionally, CIWS anticipates receiving funds from the IPU Reserve Fund for capital projects as shown by the proposed debt service in Line 15 and the rate funded CIP shown in Line 16.

Table 2-10: Five-Year Water Operating Cash Flow

Line No.		FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
1	Service Charge Revenue (Incl Private Fire)	$693,516	$694,382	$695,250	$696,120	$696,992
2	Volumetric Revenue	$1,155,076	$1,155,076	$1,155,076	$1,155,076	$1,155,076
3	Additional Revenue from Revenue Adjustments	$172,535	$413,539	$748,631	$1,009,001	$1,267,015
4	**Other Revenue**					
5	Customer Charges	$3,000	$20,000	$20,000	$20,000	$20,000
6	Contamination Reimbursement	$50,000	$50,000	$177,400	$180,900	$184,500
7	**Total Revenue**	**$2,074,127**	**$2,332,997**	**$2,796,357**	**$3,061,096**	**$3,323,582**
8	**O&M Expenses**					
9	Salaries and Benefits	$719,000	$811,130	$836,954	$858,524	$877,712
10	Supply and Treatment (includes Groundwater costs)	$762,556	$903,447	$1,212,890	$1,194,180	$1,222,339
11	Other Operating Expenses	$217,000	$235,250	$239,984	$244,831	$249,794
12	General & Administrative	$328,500	$332,500	$254,500	$257,000	$259,550
13	**Total Expenses**	**$2,027,056**	**$2,282,327**	**$2,544,327**	**$2,554,534**	**$2,609,395**
14	Existing Debt Service	$0	$0	$0	$0	$0
15	Proposed Debt Service	$20,000	$70,000	$176,667	$316,667	$316,667
16	Rate Funded CIP	$710,000	$0	$0	$100,000	$450,000
17	**Cash Flow**	**$(682,929)**	**$ (19,330)**	**$ 75,363**	**$ 89,895**	**$ (52,479)**
18	**Cash Starting Balance**	$1,285,784	$602,855	$583,525	$658,888	$748,783
19	Net Cashflow (Line 17)	($682,929)	($19,330)	$75,363	$89,895	($52,479)
20	Capital Fund Balance (Developer/Capacity Fees)	$5,000	$10,000	$115,000	$120,000	$25,000
21	**Ending Balance**	**$607,855**	**$593,525**	**$773,888**	**$868,783**	**$721,304**

2.3.3. GRAPHICAL FINANCIAL PLAN

Figure 2-1 through Figure 2-3 display the Financial Plan information shown in Table 2-10 in graphical format. Figure 2-1 shows CIWS's expenses in stacked bars and the current and proposed revenue in solid and dashed black lines, respectively. The stacked bars show the expenses broken down into the categories displayed in the legend. The red portion of the stacked bar below the x-axis shows the operating cashflow. In FY 2022 there is a deficit and CIWS will minimize customer bill impacts by drawing down reserves.

Figure 2-1: Financial Plan

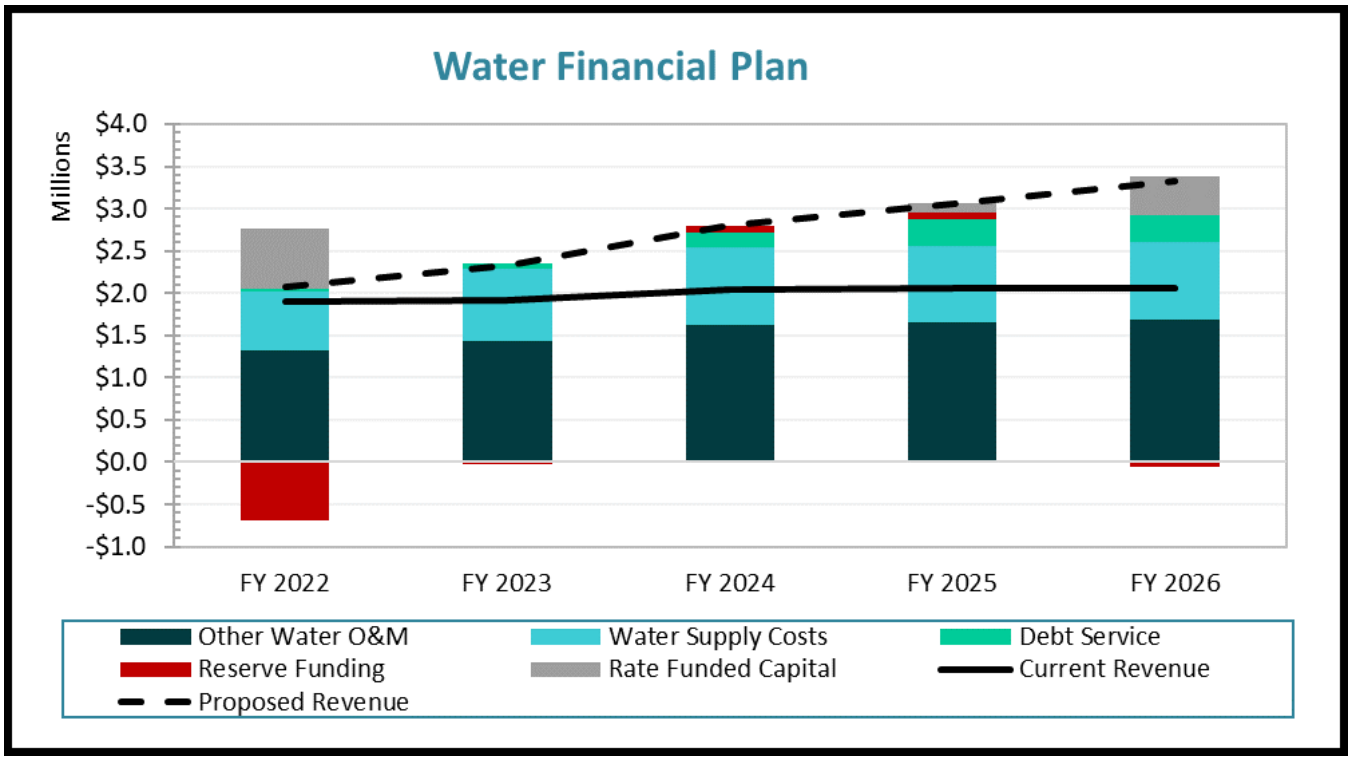


Figure 2-2 shows total annual CIP over the Study Period and designates the portion to be funded by PAY-GO (which is a term used to designate rate funded CIP) and loans from the IPU Reserve Fund. CIWS anticipates funding the capital projects through a combination of rate revenue (PAY-GO) and internal loans.

Figure 2-2: Capital Improvement Projects and Funding Sources

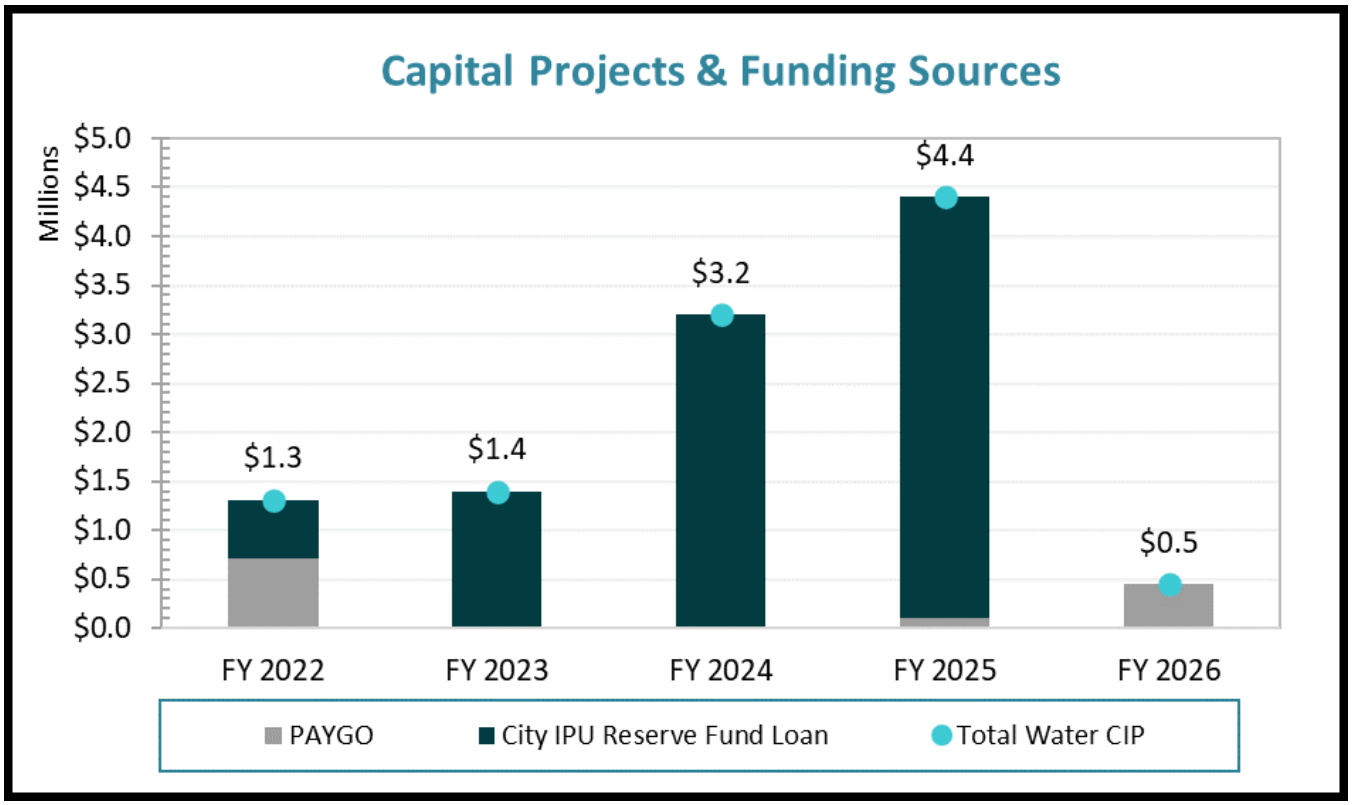
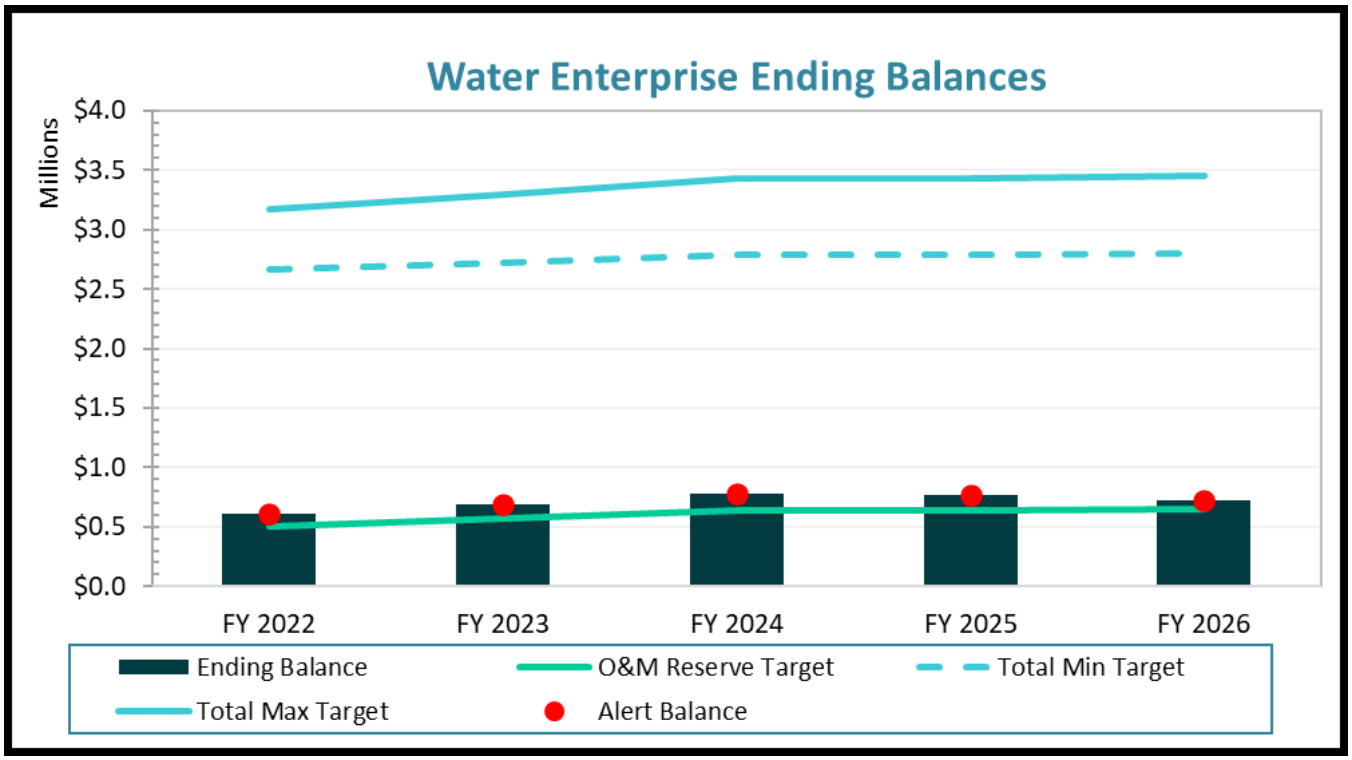


Figure 2-3 shows the ending total reserve balances. CIWS currently has an Operating Reserve. Raftelis recommends a Capital Reserve to ensure adequate funding of capital repairs and replacements. A typical minimum capital target balance is one year of average replacement capital cost.

The total Operating minimum reserve target is represented by the solid green line and is equal to 25% of operating expenses. The total minimum reserve target for both the Operating and Capital reserves is represented by the dashed blue line in Figure 2-3 and is equal to the minimum Operating Reserve target plus the recommended Capital Reserve target equal to an average year of replacement capital. The solid blue line is the maximum reserve target and is equal to 50% of Operating expenses plus the recommended Capital Reserve target. As shown in this figure, CIWS will meet the Operating reserve target in each year of the Study period. The red dots signify that the ending balance is below the suggested minimum Operating and Capital reserve target.

Figure 2-3: Ending Reserve Balances



3. Cost of Service (COS) Analysis

A COS analysis distributes a utility's revenue requirement (yearly revenue needed) to each customer class. To do so the revenue requirement is allocated to the cost causation components. The cost causation components include:

1. Base (average) costs[6]
2. Peaking costs (maximum day and maximum hour)
3. Meter service
4. Billing and customer service
5. Fire protection
6. Conservation
7. General and administrative costs

Additional cost components can include pumping zone costs and supply costs. Peaking costs are further 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 hour usage on the maximum usage day. Both maximum day and maximum hour peaking demand are used to calculate peaking unit rates to distribute costs to customer classes. Peaking costs are allocated in proportion to how the different customer classes use water during peak day and hour demands. Different facilities such as distribution and storage facilities are designed to meet the peaking demands of customers. Therefore, extra capacity[7] costs include the O&M and capital costs associated with meeting peak customer demand. This method is consistent with the AWWA M1 Manual and is widely used in the water industry to perform COS analyses.

3.1. Allocation of Expenses to Cost Components

In a Cost-of-Service analysis, a utility's functionalized expenses are allocated to the cost causation components. To do so, system-wide peaking factors must be identified (shown in Column B, Table 3-1). The system-wide peaking factors are used to derive the cost component allocation bases (i.e., percentages) shown in Columns C through E of Table 3-1. Functionalized[8] expenses are then allocated to the cost components using the allocation basis shown in Column A. To understand the interpretation of the percentages shown in Columns C through E, base use must first be established as the average daily demand during the year, which is assigned an allocation basis of 1 as shown in line 2 of Table 3-1. If the base allocation basis is used to allocate an expense, it means that the costs associated with that expense are to meet average daily demand related costs.

Expenses that are allocated to the cost causation components using the maximum day basis (Line 2) attribute 41% (1.00/2.41) of the demand (and therefore costs) to base use (average daily demand) and the remaining 59% to maximum day (peaking) use. Expenses allocated using the maximum hour basis (Line 3) assume 28% (1.00/3.61) of costs are due to base demands, 39% due to max day ((2.41-1.00)/3.61), and 33% ((3.61-2.41)/3.61) are due to max hour costs. Collectively the maximum day and hour cost components are known as peaking costs. These allocation

[6] The base component can be further divided into supply and base/delivery cost components as discussed in Section 4.5.
[7] The terms extra capacity, peaking, and capacity costs are used interchangeably.
[8] Functions of a water utility are supply, treatment, transmission and distribution, storage, meter service, customer billing, general, conservation, and administration and fire protection.

basis are used to assign functionalized O&M expenses, shown in Column A of Table 3-2, to the cost causation components shown across the top of Table 3-2.

Table 3-1: System-Wide Peaking Factors

Line No.	Allocation Basis	Peaking Factor	Base	Max Day	Max Hour	Total
	(A)	(B)	(C)	(D)	(E)	(F)
1	Base	1.00	100%			100%
2	Max Day	2.41	41%	59%		100%
3	Max Hour	3.61	28%	39%	33%	100%

Table 3-2 shows the allocation of functionalized O&M expenses (in Column A) to the cost causation components. The resulting allocation to each cost component is shown in Line 13. The amounts shown in Line 13 are the summation of the percentages in each column multiplied by the amounts in Column B for each line (also known as the sum product).

The allocation basis, in Column C, are chosen based on the type of cost for each line item and the proportion of those costs associated with each cost causation component (max day, max hour, general, conservation, etc.). For example, treatment costs (Line 2) are allocated using the max day basis since treatment costs are associated with serving average day and peak day demands in proportion to max day allocations identified in Table 3-1. Certain cost bases are identical to the cost causation components, such as meter and conservation, and, therefore, are easily allocated to the cost component with the same name. Line 11 shows the percentage allocation of all expenses to the cost causation components.

The total O&M expenses in Line 13, Column O equals the total FY 2022 O&M in Line 13 of Table 2-10. This resulting allocation is used to allocate CIWS's operating revenue requirement (discussed in Section 3.2) to the cost components.

Table 3-2: Allocation of O&M Expenses to Cost Causation Components

Line No.	Functions	FY 2022 Budget	Allocation Basis	Supply	Base	Max Day	Max Hour	Meter Service	Customer Billing	Con-servation	Direct Fire Protectio	Gen & Admin	Pump Zones 1	Pump Zones 2	Sub -Total
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)
1	Supply	$729,051	Base	89.0%	0.0%	10.0%					1.0%				100.0%
2	Treatment	$48,802	Max Day		41.5%	58.5%									100.0%
3	Transmission & Distribution	$384,070	Max Hour		27.7%	39.1%									100.0%
4	Storage	$61,800	Max Day		41.5%	58.5%	0.0%								100.0%
5	Meter Service	$108,030	Meter					100.0%							100.0%
6	Customer Billing	$217,560	Customer						97.0%		3.0%				100.0%
7	Direct Fire Protection	$57,070	Direct Fire								100.0%				100.0%
8	Gen & Admin	$256,810	General								2.0%	96.0%			100.0%
9	Conservation	$29,988	Conservation							100.0%					100.0%
10	Pump Zone Costs														
11	Zone 1	$120,488											100.0%		100.0%
12	Zone 2	$13,388												100.0%	100.0%
13	**Total**	**$2,027,056**		**$653,991**	**$152,284**	**$287,625**	**$127,669**	**$108,030**	**$211,033**	**$29,988**	**$76,024**	**$246,538**	**$120,488**	**$13,388**	**$2,027,056**
14	O&M Expense Allocation			32%	8%	14%	6%	5%	10%	1%	4%	12%	6%	1%	100%

The CIP expenses are also allocated to the cost causation components as shown in Table 3-3. The resulting total CIP allocation is derived in the same manner as the O&M allocation in the previous paragraph. Raftelis, with assistance from LPVCWD Staff, functionalized CIWS's CIP expenses (shown in Lines 1 through 4 of Table 3-3) and then allocated them to the cost causation components in the same manner as O&M expenses. Part of CIWS's revenue requirement includes rate funded capital, which will be discussed in Section 3.2. This capital portion of the revenue requirement is allocated to the cost causation components using the asset allocation shown in Line 6 of Table 3-3.

Table 3-3: Allocation of CIP to Cost Causation Components

Line No.	Functions	CIP	Allocation Basis	Supply	Base	Max Day	Max Hour	Meter Service	Customer Billing	Con-servation	Direct Fire	Gen & Admin	Pump Zones 1	Pump Zones 2	Sub -Total
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)
1	Treatment	$4,320,000	Max Day		41.5%	58.5%									100.0%
2	Distribution	$4,184,500	Max Hour		27.7%	39.1%	33.2%								100.0%
3	Fire	$141,300	Direct Fire								100.0%				100.0%
4	Meters	$192,000	Meter Service							0.0%					100.0%
5	**Total**	**$8,837,800**		**$0**	**$2,951,672**	**$4,161,858**	**$1,390,970**	**$192,000**	**$0**	**$0**	**$141,300**	**$0**	**$0**	**$0**	**$8,837,800**
6	Allocation			0%	33%	47%	16%	2%	0%	0%	2%	0%	0%	0%	100.0%

3.2. Revenue Requirement Determination

Table 3-4 shows the revenue requirement determination. The total revenue required from rates is shown in Line 21, Column D. The total in Line 21, Column B is the O&M revenue requirement that is allocated to the cost components using the percentages derived in Line 14 of Table 3-2. The capital revenue requirement in Line 21, Column C is allocated to the cost components using the percentages derived in Line 6 of Table 3-3.

Raftelis calculated the revenue requirement using budgeted FY 2022 expenses, which includes groundwater production, O&M expenses, capital expenses, and existing debt service as shown in Lines 1 through 7. To arrive at the rate revenue requirement in Line 21, Column D, revenue offsets from other (non-rate) revenues are subtracted and an adjustment for annual cash balances and for the impending rate adjustment that will take place five months into the fiscal year. The rate increase must, therefore, be annualized so that the rates collect the correct amount of revenue (Line 18). The adjustments, shown as negative values, are subtracted (hence added as a result of subtracting a negative number) to arrive at the total revenue required from CIWS rates in Line 21, Column D. This is the total amount that CIWS's fixed meter charges and volumetric rates are designed to collect if applied over a full fiscal year.

Note that Line 8, Column B, is the same as the value for FY 2022 in Line 13 of Table 2-10. The revenue offsets are taken from the other revenues for FY 2022 in Lines 5 and 6 in Table 2-10. These non-rate revenues lower the revenue required from rates. The adjustment for cash balance in Line 17 is the net cash balance taken from Line 17 of Table 2-10. The adjustment for mid-year increase in Line 18 adjusts the additional revenue from revenue adjustments that were modeled in the cash flow table (Line 3 of Table 2-10). Since this revenue adjustment is implemented five months into the fiscal year, it annualizes the revenue adjustment in Line 18, Column B of Table 3-4, so that the rates are calculated based on a full year's revenue needs.

Table 3-4: Revenue Requirement Determination

Line No.	FY 2022	Operating	Capital	Total
	(A)	(B)	(C)	(D)
1	**Revenue Requirement**			
2	Salaries and Benefits	$719,000		$719,000
3	Supply and Treatment	$762,556		$762,556
4	All Other Expenses	$545,500		$545,500
5	Existing Debt Service			$0
6	Proposed Debt Service		$20,000	$20,000
7	Rate Funded Capital Expeditures		$710,000	$710,000
8	**Total - Revenue Requirement**	**$2,027,056**	**$730,000**	**$2,757,056**
9				
10	**Revenue Offsets**			
11	Customer Charges	$3,000		$3,000
12	Contamination Reimbursement	$50,000		$50,000
13	Miscellaneous Income	$0		$0
14	**Total - Revenue Offsets**	**$53,000**	**$0**	**$53,000**
15				
16	**Adjustments**			
17	Adjustment for Cash Balance		$682,929	$682,929
18	Adjustment for Mid-Year Increase	($86,268)		($86,268)
19	**Total - Adjustments**	**($86,268)**	**$682,929**	**$596,661**
20				
21	**Revenue Required from Rates**	**$2,060,323**	**$47,071**	**$2,107,394**

3.3. Allocation of Costs to Cost Components

The total revenue requirement in Table 3-4 can now be now allocated to the cost causation components. However, first the revenue offsets, shown in Lines 11 through 13 in Table 3-4, must be allocated to the cost components as shown in Table 3-5. As shown in the top portion of Table 3-5, the revenue offsets are allocated based on the capital allocation percentages shown in Line 6 of Table 3-3.

Table 3-5: Allocation of Revenue Offsets to Cost Components

Line No.		Allocation Basis	Supply	Base	Max Day	Max Hour	Meter Service	Customer Billing	Con-servation	Direct Fire Protectio	Gen & Admin	Pump Zones 1	Pump Zones 2	Sub -Total
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
1	Customer Charges	Capital Allocation	0%	33%	47%	16%	2%	0%	0%	2%	0%	0%	0%	100%
2	Contamination Reimbursement	Capital Allocation	0%	33%	47%	16%	2%	0%	0%	2%	0%	0%	0%	100%
3	Miscellaneous Income	Capital Allocation	0%	33%	47%	16%	2%	0%	0%	2%	0%	0%	0%	100%
4														
5	Customer Charges		$0	$1,002	$1,413	$472	$65	$0	$0	$48	$0	$0	$0	$3,000
6	Contamination Reimbursement		$0	$16,699	$23,546	$7,869	$1,086	$0	$0	$799	$0	$0	$0	$50,000
7	Miscellaneous Income		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
8	**Total**		**$0**	**$17,701**	**$24,959**	**$8,342**	**$1,151**	**$0**	**$0**	**$847**	**$0**	**$0**	**$0**	**$53,000**

Line 1 in Table 3-6 allocates the operating revenue requirement to the cost components by distributing the total amount in Column M to the cost components using the percentages shown in Line 14 of Table 3-2. Similarly, the capital revenue requirement in Line 2 is allocated to the cost components using the percentages shown in Line 6 of Table 3-3. Line 3 subtracts the revenue offsets that were allocated to the cost components in Table 3-5. Note that Line 3 in Table 3-6 is equal to the negative value of Line 8 in Table 3-5 because these are offsetting revenues.

Line 4 of Table 3-6 shows the cost allocation before reallocating general and administrative costs in Line 6. Line 6 reallocates general costs (Column J) to the other cost components in proportion to the share of total costs. This reflects the fact that general and administrative costs support the other functions in proportion to their share of costs.

Line 12 shows the unit cost for most cost components and is derived by dividing Line 7 by Line 9. The max day and max hour unit costs are used to derive total fire protection costs in the next section of the report. The units of service in Line 9 are derived in Appendix A.

Table 3-6: Expense Allocation to Cost Components

Line No.	Expense	Allocation Basis	Supply	Base	Max Day	Max Hour	Meter Service	Customer Billing	Con-servation	Direct Fire Protectio	Gen & Admin	Pump Zones 1	Pump Zones 2	Sub Total
		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)
1	Operating Expenses	O&M	$681,824	$158,764	$299,866	$133,102	$112,628	$220,014	$31,264	$79,259	$257,030	$125,615	$13,957	$2,113,323
2	Capital Expenses	Capital	$0	$15,721	$22,167	$7,408	$1,023	$0	$0	$753	$0	$0	$0	$47,071
3	Revenue Offset	Revenue Offsets	$0	($17,701)	($24,959)	($8,342)	($1,151)	$0	$0	($847)	$0	$0	$0	($53,000)
4	**Total Cost of Service**		**$681,824**	**$156,784**	**$297,074**	**$132,169**	**$112,499**	**$220,014**	**$31,264**	**$79,164**	**$257,030**	**$125,615**	**$13,957**	**$2,107,394**
5	Percent Excluding Gen & Admin		39.9%	9.2%	17.4%	7.7%	6.6%	12.9%	1.8%	4.6%	0.0%	0.0%	0.0%	100.0%
6	Allocation of General Admin		$102,437	$23,555	$44,632	$19,857	$16,902	$33,055	$4,697	$11,894	($257,030)	$0	$0	$0
7	**Total Adjusted Cost of Service**		**$784,261**	**$180,340**	**$341,706**	**$152,026**	**$129,401**	**$253,069**	**$35,961**	**$91,058**	**$0**	**$125,615**	**$13,957**	**$2,107,394**
8														
9	Units of Service		511,585	511,585	3,335	8,136	2,288	1,840	511,585	3,422	2,288	511,585	35,809	
10	Units		hcf	hcf	hcf/day	hcf/day	equivalent meters	bills	hcf	NA	NA	hcf	hcf	
11														
12	**Unit Cost of Service**		**$1.53**	**$0.35**	**$102.47**	**$18.68**	**$56.55**	**$137.55**	**$0.07**			**$0.25**	**$0.39**	

3.4. Fire Protection Costs

Line 12 of Table 3-6 shows the max day and max hour unit costs in dollars per hundred cubic feet per day ($/hcf /day). Converting these costs into dollars per thousand gallons ($/1,000 gal/day) yields the unit cost of service shown in Line 1 of Table 3-7. The total costs to maintain fire capacity in the water system is derived assuming a four-hour fire needing 4,000 gallons per minute and, therefore, requiring a max day and max hour capacity in 1,000 gallons per day as shown in Line 4 of Table 3-7. Line 5, which is the total cost to maintain the capacity to fight a 4-hour fire, is Line 4 multiplied by Line 1. The total fire protection costs are allocated to public and private fire costs in proportion to the potential flow to fire hydrants and private fire connections. The potential flow for public and private fire connections is shown in Table 3-8.

Table 3-7: Derivation of Total, Public, and Private Fire Protection Costs

Line No.	Fire Protection Cost Allocation	Max Day	Max Hour	Total
1	Unit Cost of Service	$137.00	$24.98	
		$ / 1,000 gal	$ / 1,000 gal	
2	Unit	/day	/day	
3	Fire Protection Service			
4	Units of Service (1,000 gallons)	960	4,800	
5	**Allocated Cost of Service**	**$131,517**	**$119,903**	**$251,419**
6	Public Fire Protection	$66,382	$60,520	$126,901
7	**Private Fire Service**	**$65,135**	**$59,383**	**$124,518**

The potential fire demand (known as equivalent demand) of public and private fire accounts is calculated in Lines 3 and 14 of Table 3-8, respectively. Lines 1 and 2 calculate the potential flow through public fire hydrants using the Hazen William equation for pipe flow.[9] Lines 5 through 13 calculate the potential flow through private fire connections also using the Hazen Williams equation. The resulting potential fire demand and, therefore, cost allocation for public fire and private fire costs, is shown in Lines 16 and 17 of Table 3-8. The total equivalent demand units in Column D are calculated by multiplying the potential demand (Column B) by the number of connections/hydrants in service (Column C). This shows that public fire protection is 50% of the total fire costs calculated in Line 5 of Table 3-7. The corresponding public and private fire costs are shown in Lines 6 and 7 of Table 3-7, respectively.

[9] The potential flow is the diameter of the outlet/connection raised to the 2.63 power, known as the Hazen Williams equation for pipe flow. For a 2" outlet, the demand factor would be 2^2.63 = 6.19.

Table 3-8: Derivation of Potential Flow to Private and Public Fire Connections

Line No.	Fire Line Size - Public Hydrants	Fire Demand Potential	Number of Fire Hydrants	Equivalent Demand
	(A)	(B)	(C)	(D)
1	6" x 4"x 2.5" Type	49.45	210	10,385
2	4" x 2.5" Type	11.13	0	0
3	**Total**		**210**	**10,385**
4	**Fire Line Size - Private Fire**	**Fire Demand Potential**	**Number of Lines**	**Equivalent Demand**
5	1"	1.00	0	0
6	1.5"	2.90	0	0
7	2"	6.19	0	0
8	3"	17.98	0	0
9	4"	38.32	3	115
10	6"	111.31	30	3,339
11	8"	237.21	23	5,456
12	10"	426.58	3	1,280
13	12"	689.04	0	0
14	**Total**		**59**	**10,190**
15				
16	**Percent Allocated to Public Fire Protection**			**50%**
17	Percent Allocated to Private Fire Protection			**50%**
18	**Total**			**100%**

The cost-of-service allocation to the cost components can now be completed by making final adjustments shown in Table 3-9.

In Line 2, the private fire protection costs derived in Line 7 of Table 3-7 above are reallocated to the private fire cost component in Column M. Similarly, in Line 3 public fire protection costs, derived in Line 6 of Table 3-7, are reallocated to the meter service component so that public fire protection costs will be collected through the Meter Service Charge. Direct fire protection costs (such as hydrant maintenance), shown in Column I, are allocated to the meter service component. Note that a small portion of direct fire protection costs remain in the direct fire protection cost component as this is the cost to maintain backflow prevention devices. This cost will be collected through private fire protection charges and will be derived in Section 4.4.

The last adjustment is shown in Line 4 of Table 3-9. A portion of max day and max hour costs are reallocated to the meter component so that these costs can be collected through a fixed charge. These costs are reallocated so that CIWS can meet revenue stability goals and maintain approximately 37% of revenue collection through a fixed charge. This is further discussed in Section 4.3. The final Cost of Service allocation to the cost components is shown in Line 5 of Table 3-9.

Once CIWS's expenses have been allocated to the cost causation components, rates for each customer class can be derived to collect the total amount shown in Column N of Table 3-9. This is discussed in detail in Section 4.

Table 3-9: Final Cost of Service Allocation to Cost Components

Line No.	Cost of Service Allocation	Supply	Base	Max Day	Max Hour	Meter Service	Meter Capacity	Customer Billing	Con-servation	Direct Fire Protection/ Backflow Maintenance	Gen & Admin	Pump Zones 1	Pump Zones 2	Private Fire Protection	Sub Total
		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
1	Cost of Service	$784,261	$180,340	$341,706	$152,026	$129,401		$253,069	$35,961	$91,058	$0	$125,615	$13,957	$0	$2,107,394
2	Private Fire Protection			($65,135)	($59,383)									$124,518	$0
3	Allocation of Public Fire to Meter Service					$88,827				($88,827)					$0
4	Allocation of Peaking to Meter	$0	$0	($143,817)	($48,174)	$0	$191,991	$0	$0	$0	$0	$0	$0	$0	$0
5	**Total Adjusted Cost of Service**	**$784,261**	**$180,340**	**$132,754**	**$44,469**	**$218,227**	**$191,991**	**$253,069**	**$35,961**	**$2,231**	**$0**	**$125,615**	**$13,957**	**$124,518**	**$2,107,394**
6															
7	Unit of Service	511,585	511,585	2,051	1,719	2,288	3,422	1,840	511,585	59		511,585	35,809	10,190	
8	Units	hcf	hcf	hcf/day	hcf/day	Cost Equivalent Meters/Yr	Capacity Equivalent Meters/Yr	bills/yr	hcf			Total hcf in Zone	Total hcf in Zone	Priv Fire Demand Unit	
9															
10	**Unit Cost of Service**	**$1.53**	**$0.35**	**$64.72**	**$25.87**	**$95.37**	**$56.11**	**$137.55**	**$0.07**	**$37.81**		**$0.25**	**$0.39**	**$12.22**	
		hcf	hcf	hcf/day	hcf/day	cost equivalent meter/yr	equivalent meter/yr	per year	hcf					Yrly Charge per demand unit	
						$15.90	**$9.35**	**$22.93**							
						Per Bi-Month	Per Bi-Month	er Bi-Month							

4. Rate Derivation

4.1. Existing Rate Structure and Rates

CIWS's existing rate structure consists of a fixed bimonthly meter charge by meter size and a two-tiered volumetric rate for Single Family customers and a uniform rate for all other customer classes, shown in Table 4-1.

The lower portion of the table shows the current bimonthly total Meter Service Charge and the current Private Fire Charges.

Table 4-1: Existing Rate Structure and Rates (Bimonthly)

Customer Class	Current Tier Definition	Current Charges
Single Family Residential		
Tier 1	0 - 30	$2.10
Tier 2	>30	$2.70
Commercial, Multi-Family & Irrigation	Uniform	$2.25

Meter Size (inches)	Meter Service Charge	Private Fire
5/8"	$46.20	NA
3/4"	$51.32	NA
1"	$61.56	$61.56
1.5"	$87.18	$77.08
2"	$117.91	$85.56
3"	$199.87	$108.20
4"	$292.08	$133.66
6"	$550.00	$204.39
8"	$850.00	$289.26
10"	NA	$402.43
12"	NA	$515.59

4.2. Proposed Rate Structure

In Table 3-9 CIWS's revenue requirement was allocated to each cost causation component. Table 4-2 shows how each cost component will be collected, either through a fixed meter charge or a volumetric charge. It also restates the amount allocated to each cost component from the Cost-of-Service section. Total fixed revenue collection is 37% of total revenue. Note that the total revenue collected matches the total in Column N of Table 3-9.

Table 4-2: Cost of Service and Fixed/Volumetric Revenue Collection

Line No.	Cost Component	Amount	Fixed/ Volumetric
1	Supply	$784,261	Volumetric
2	Base	$180,340	Volumetric
3	Peaking (Max Day and Hour)	$177,223	Volumetric
4	Meter Service	$218,227	Fixed
5	Meter Capacity	$191,991	Fixed
6	Customer Billing	$253,069	Fixed
7	Conservation	$35,961	Volumetric
8	Backflow Maintenance	$2,231	Fixed
9	Pump Zones	$139,572	Volumetric
10	Private Fire Protection	$124,518	Fixed
11	**Total**	**$2,107,394**	100%
12	Total Fixed	$790,037	37%
13	Total Volumetric	$1,317,357	63%

4.3. Proposed Bimonthly Meter Service Charge

To derive the total bimonthly Meter Service Charge so that it collects the amount shown in Table 4-2, the number of equivalent meter units must first be calculated, as shown in Table 4-3Table 4-2 Columns E and F. Equivalent meter units account for the potential flow through larger meters and equate this flow to the flow through the smallest meter, in this case the 5/8-inch meter. Similarly, cost equivalent meter units account for the cost to replace different meter sizes and equate this replacement cost to the cost to replace the smallest meter. The number of equivalent units are calculated by multiplying the number of meters (Column D) by the American Water Works Association (AWWA) capacity ratios in Column B to yield equivalent meters in Column E. The number of cost equivalent units are calculated by multiplying the number of meters (Column D) by the cost equivalent ratio in Column C to yield cost equivalent meters in Column F.

Table 4-3: Derivation of Equivalent Meter Units

Line No.	Meter Size	Meter Ratio	Cost Equivalent Ratio	Number of Meters	Equivalent Meters	Cost Equivalent Meters	Meter Service	Meter Capacity	Customer Bill	Proposed Bimonthly Fixed Charge
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
1	5/8"	1.00	1.00	1,196	1,196	1,196	$15.90	$9.35	$22.93	**$48.17**
2	3/4"	1.50	1.20	213	320	255	$19.01	$14.03	$22.93	**$55.96**
3	1"	2.50	1.39	324	811	451	$22.12	$23.38	$22.93	**$68.43**
4	1.5"	5.00	2.19	30	150	66	$34.79	$46.76	$22.93	**$104.48**
5	2"	8.00	2.97	62	496	184	$47.24	$74.81	$22.93	**$144.98**
6	3"	16.00	5.24	4	64	21	$83.37	$149.63	$22.93	**$255.92**
7	4"	25.00	8.39	7	175	59	$133.39	$233.79	$22.93	**$390.11**
8	6"	50.00	13.99	1	50	14	$222.32	$467.58	$22.93	**$712.82**
9	8"	80.00	20.98	2	160	42	$333.48	$748.13	$22.93	**$1,104.53**
10	**Total**			**1,840**	**3,422**	**2,288**				**$663,288**

4.3.1. BIMONTHLY METER SERVICE CHARGE COMPONENTS

There are three cost components that comprise the ***total*** proposed bimonthly Meter Service Charge: 1) meter service, 2) meter capacity, and 3) customer service. The total bimonthly Meter Service Charge recognizes the fact that CIWS incurs fixed costs related to maintaining/replacing meters and billing customers. It also collects a portion of capacity costs through the meter capacity charge. Table 4-4 shows the derivation of all three components for the smallest meter size (5/8 inch). Note that the amounts in Lines 2, 6, and 9 of Table 4-4 equal Lines 4, 5, and 6 in Table 4-2.

Table 4-4: Bimonthly Meter and Customer Charge Derivation

	Bimonthly Meter Service Charge	
Line No.	**(A)**	**(B)**
1	**Meter Service Charge Component**	
2	Meter Service Costs	$218,227
3	Cost Equivalent Meter Units	2,288
4	**Bimonthly Meter Service Charge**	**$15.90**
5	**Meter Capacity Charge Component**	
6	Meter Capacity Costs	$191,991
7	Equivalent Meter Units	3,422
	Bimonthly Meter Capacity Charge	**$9.35**
8	**Customer Service Charge Component**	
9	Customer Service Costs	$253,069
10	Number of Meters	1,840
11	**Bimonthly Customer Service Charge**	**$22.93**

4.3.2. METER SERVICE CHARGE COMPONENT

The meter service component recovers costs associated with maintaining and servicing meters. The cost to replace and maintain the meter is proportional to the cost equivalent ratios shown in Column C of Table 4-3. The cost equivalent ratios, which are a function of a meter's replacement cost, are used to increase the meter service component for larger meters, as shown in Column G of Table 4-3. The 5/8-inch meter is used as the base since it is the most numerous meter size among CIWS's customers. For example, Column C of Table 4-3 shows that the replacement cost of a 2-inch meter is 2.97 times that of a 5/8-inch meter and, therefore, the meter service component is 2.97 times that of the 5/8-inch meter. The meter service component for a 5/8-inch meter was derived in Table 4-4. As shown in Column G of Table 4-3, the meter service component for larger meters is scaled up using the cost equivalent ratios shown in Column C.

The total expense recovered through the meter service charge component is shown on Line 2 of Table 4-4 (Line 2 is the same as Line 4 in Table 4-2). Public fire protection costs are also recovered through the meter service charge component. Public and private fire protection costs are derived in Section 4.4

4.3.3. METER CAPACITY CHARGE COMPONENT

The meter capacity component recovers extra capacity costs in proportion with meter capacity (also known as peaking). Extra capacity costs are costs related to serving water during peak system flows. It is assumed that larger

meters can demand more capacity and, therefore, this charge is proportional to the AWWA hydraulic capacity ratios shown in Column B of Table 4-3. The capacity ratios, which are a function of a meter's safe maximum flow rate, are used to increase the meter capacity component for larger capacity meters, as shown in Column H of Table 4-3. This assumes that the potential capacity (peaking) demand is proportional to the potential flow through each meter size as established by the AWWA hydraulic capacity ratios. The ratios shown in Column B of Table 4-3 are the ratio of potential flow through each meter size compared to the flow through a 5/8-inch meter. As with the meter service component, the 5/8-inch meter is used as the base since it is the most numerous meter size among CIWS's customers. Larger meters have the potential to demand more peak capacity. For example, Column B of Table 4-3 shows that the hydraulic capacity of a 2-inch meter is 8.0 times that of a 5/8-inch meter and, therefore, the meter capacity component is 8.0 times that of the 5/8-inch meter. The meter capacity component for a 5/8-inch meter was derived in Table 4-4. As shown in Column H of Table 4-3, the meter capacity component for larger meters is scaled up using the AWWA capacity ratios shown in Column B.

Peaking costs (shown as max day and max hour costs) are shown in Line 4 of Table 3-9. A portion of total capacity (peaking) related costs are allocated to the meter capacity component, as shown in Table 3-9, so that it can be collected through the fixed bimonthly Meter Service Charge and allow CIWS to reach its fixed revenue goals. Allocating extra capacity costs by meter size (instead of allocating these costs using peaking factors as discussed in Section 4.5) is a common way to provide greater revenue stability, especially in-light of decreasing revenues during a drought or period of declining sales. Stated in another way, it is quite common to reallocate peaking costs (max day and max hour) to be collected through the meter charge; this is the basis for the reallocation in Line 4 of Table 3-9.

4.3.4. CUSTOMER COMPONENT

The customer component derivation, shown in the bottom portion of Table 4-4, recovers costs associated with meter reading, customer billing and collection, as well as answering customer calls. These costs are the same for all meter sizes as it costs the same to bill a small meter as it does a larger meter.

4.3.5. TOTAL BIMONTHLY METER SERVICE CHARGE FOR ALL METERS

Table 4-3 shows the derivation of the bimonthly Meter Service Charge by meter size in Column J, which is the addition of the meter service component (Column G), meter capacity component (Column H), and the customer component (Column I). Note that the total estimated revenue, shown in Line 11 Column J, is equal to the sum of Lines 4, 5, and 6 in Table 4-2.

Table 4-5 shows the total bimonthly fixed Meter Service Charge for the next five years. They are derived by applying the revenue adjustments shown in Table 2-9 to the meter charges shown in Table 4-3. The Financial Plan, discussed in Section 2, assumes the rates shown are implemented in April of each year.

Table 4-5: Five Year Fixed Meter Service Charges

Line No.	Meter Size (inches)	Current Charges	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
1	5/8"	$46.20	$48.17	$53.47	$59.35	$65.29	$71.17
2	3/4"	$51.32	$55.96	$62.12	$68.95	$75.84	$82.67
3	1"	$61.56	$68.43	$75.95	$84.31	$92.74	$101.08
4	1.5"	$87.18	$104.48	$115.97	$128.73	$141.60	$154.34
5	2"	$117.91	$144.98	$160.93	$178.63	$196.49	$214.18
6	3"	$199.87	$255.92	$284.07	$315.32	$346.85	$378.07
7	4"	$292.08	$390.11	$433.02	$480.65	$528.72	$576.30
8	6"	$550.00	$712.82	$791.23	$878.27	$966.10	$1,053.05
9	8"	$850.00	$1,104.53	$1,226.03	$1,360.89	$1,496.98	$1,631.71

4.4. Proposed Private Fire Charges

Table 4-6 shows the derivation of private fire charges. The total amount associated with private fire protection is shown on Line 10 of Table 4-2. Line 3 calculates the yearly private fire charge for one unit of private fire demand by dividing Line 1 by Line 2. Line 4 divides Line 3 by six billing periods per year to create a bimonthly charge.

Line 8 calculates the backflow maintenance charge in the same manner. The total backflow maintenance costs were established in Line 8 of Table 4-2. Line 8 calculates the yearly backflow maintenance charge (which is associated with all private fire connections) by dividing Line 6 by Line 7. Line 9 divides Line 8 by six billing periods per year to calculate a bimonthly charge. This charge is applied to all accounts regardless of potential demand.

Table 4-6: Calculation of Private Fire Charge Components

Line No.	Private Fire Protection	
	(A)	(B)
1	Private Fire Protection Costs	$124,518
2	Equivalent Demand	10,190
3	Yearly Charge	$12.22
4	**Bimonthly Charge**	**$2.04**
5		
6	Backflow Maintenance Costs	$2,231
7	Number of Accounts	59
8	Yearly Charge	$37.81
9	**Bimonthly Charge**	**$6.30**

Table 4-7 shows the derivation of the bimonthly Private Fire Charge in Column H. Column H is the summation of Columns E and F. The private fire charge for one-inch connections, shown in Column F, was derived in Table 4-6 and is then scaled up using the potential demand ratios shown in Column C.

The backflow charge was also derived in Table 4-6. The proposed private fire charges are based on the potential flow through each private fire connection and are calculated in accordance with principles set forth in the AWWA M1

Manual.[10] The proposed private fire charges are lower than the current charges with the exception of the 6-inch through 12-inch meters. The total private fire revenue equals the sum of Lines 8 and 10 in Table 4-2, which is equal to the revenue shown in Line 11 Column H of Table 4-7.

Table 4-7: Calculation of Private Fire Charge

Line No.	Meter Size	Number of Meters	Potential Demand	Equivalent Demand	Backflow Maintenance	Bimonthly Private Fire	Potential Demand Ratio	Total Bimonthly Rate
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
1	1"	0	1.00	-	$6.30	$2.04		**$8.34**
2	1.5"	0	2.90	-	$6.30	$5.92		**$12.22**
3	2"	0	6.19	-	$6.30	$12.61		**$18.91**
4	3"	0	17.98	-	$6.30	$36.62		**$42.92**
5	4"	3	38.32	115	$6.30	$78.04		**$84.35**
6	6"	30	111.31	3,339	$6.30	$226.70		**$233.00**
7	8"	23	237.21	5,456	$6.30	$483.11		**$489.41**
8	10"	3	426.58	1,280	$6.30	$868.79	38%	**$875.09**
9	12"	0	689.04	-	$6.30	$1,403.34	62%	**$1,409.64**
10		**59**		**10,190**				
11	**Total Revenue Collected**							**$126,749**

Table 4-8 shows the proposed private fire charges for the five-year Study Period.

Table 4-8: Proposed Five Year Private Fire Charges

Private Fire Line Size (Inches)	Current Charges	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
5/8"	NA	NA	NA	NA	NA	NA
3/4"	NA	NA	NA	NA	NA	NA
1"	$61.56	$8.34	$9.26	$10.27	$11.30	$12.32
1.5"	$77.08	$12.22	$13.56	$15.05	$16.56	$18.05
2"	$85.56	$18.91	$20.99	$23.30	$25.63	$27.93
3"	$108.20	$42.92	$47.65	$52.89	$58.18	$63.41
4"	$133.66	$84.35	$93.62	$103.92	$114.31	$124.60
6"	$204.39	$233.00	$258.63	$287.08	$315.79	$344.21
8"	$289.26	$489.41	$543.24	$603.00	$663.30	$723.00
10"	$402.43	$875.09	$971.35	$1,078.20	$1,186.02	$1,292.77
12"	$515.59	$1,409.64	$1,564.70	$1,736.82	$1,910.50	$2,082.45

4.5. Volumetric Rates

Table 4-2, Line 13 shows the total amount of revenue the Volumetric Rates are designed to collect. Each component of the Volumetric Rate will be derived for each customer class to collect this amount. First, the proposed Single Family Residential tier breakpoints must be defined.

[10] Section VII of the fifth edition.

4.5.1. CUSTOMER CLASSES

CIWS proposes to maintain two main customer classes: 1) Single Family Residential customers and 2) Non-Single Family Residential, which includes Multi-Family Residential, Commercial, Irrigation, and Public Authority customers.

These classes are based on analyzing each class's peaking factors using FY 2018 data. The classes are based on grouping customers together based on how they use the water system as evidenced by each class's peaking factors. Peaking factors were calculated for each class and were very similar for Multi-Family, Commercial, and Irrigation customers. Therefore, it is reasonable to combine these customers into one class. Appendix B shows the derivation of peaking factors.

4.5.2. TIER DEFINITIONS

Table 4-9 shows the proposed tier breakpoints. The proposed Tier 1 breakpoint was set equal to the average winter consumption (average water use over the three billing periods with the lowest use) which is a common method to establish Tier 1 breakpoints. This method assumes that the majority of winter water use is for indoor water use, thus this is a proxy for an indoor water budget. Tier 2 is use beyond the Tier 1 breakpoint. The revised lower Tier 1 breakpoint reflects recent conservation mandates and public outreach efforts during the drought which ended in FY 2016. The last two columns show the projected water use in each tier and the percent of bills that fall within each tier.

Table 4-9: Proposed Single Family Residential Tiers

Tier	Current Tier Breakpoint (hcf)	Proposed Tier Breakpoint (hcf)	Use (hcf)	Percent of Single Family Use	Percent of Single Family Bills
1	30	26	173,789	67%	78%
2	>30	>26	86,026	33%	22%
				100%	**100%**

4.5.3. VOLUMETRIC RATE DERIVATION

The total volumetric rate is the summation of unit rates for each cost component. These include:

1. Supply
2. Delivery
3. Peaking (Max day and hour)
4. Conservation
5. Pumping (Pump Zones).

Each unit rate is derived and summed to get the total Volumetric Rate for each tier and customer class. First, each cost component (unit rate component) must be derived.

4.5.3.1. Cost Component Definitions

Water Supply costs are costs associated with obtaining and treating water to make it ready for delivery from each water source including groundwater from the San Gabriel Basin Watermaster (SGBW) and leased groundwater:

Delivery costs are the operating and capital costs associated with delivering water to all customers through the distribution system (not including distribution storage) at a constant average rate of use, also known as serving

customers under average daily demand conditions (base use). Therefore, delivery costs are spread over all units of water which results in an equal delivery unit cost for all classes and tiers.

Peaking costs, or extra-capacity costs, are costs incurred to meet customer peak demands in excess of base use (or in excess of average daily demand). Peaking costs are shown in Line 3 of Table 4-2, which is the sum of maximum day and maximum hour costs shown in Columns C and D in Table 3-9. For the portion of peaking costs collected through the Volumetric Rate (Line 3 of Table 4-2), peaking costs are distributed to each tier and class using peaking factors derived from customer use data, which are discussed later in this section. For the portion of peaking costs collected through the Monthly Service Charge, AWWA hydraulic capacity factors are used to distribute peaking costs to the various meter sizes, as derived and discussed in Section 4.3.

Conservation costs are costs which cover water conservation and efficiency programs and efforts. These costs were allocated equally to all customer classes.

4.5.3.2. Derivation of the Unit Cost by Cost Component

Supply Unit Costs

Table 4-10 shows the supply cost derivation by source**.** The unit costs are shown in Line 16 and are derived by dividing Line 15 by Line 4. The total water supply revenue requirement, shown in Line 15, is equal to the water supply cost component shown in Line 1 of Table 4-2. This is the total cost of water supply including general and administrative costs. The actual water supply costs are shown in Lines 6 through 13. The total water supply revenue requirement, Line 15 Column D, is allocated to each water source in proportion to the water supply cost shown in Line 14. As shown in Line 16, the unit supply cost for leased groundwater is higher than groundwater from SGBW.

Table 4-10: Supply Cost Derivation

Line No.	(A)	Groundwater - San Gabriel Basin Watermaster (SGBW) (B)	Leased Groundwater (Replacement Water) (C)	Total (D)
1	**Water Supplies**			
2	Acre Feet (AF) *(From Table 2-6)*	899	350	1,249
3	Percent of Supply	72%	28%	100%
4	Water Use by Source (hcf) *(Total from Table 2-3 x Line 3)*	368,273	143,312	511,585
5	**Water Supply Costs**			
6	Purchased Water - Other Expenses	$17,860	$6,950	$24,810
7	Power Cost	$96,372	$37,503	$133,875
8	Treatment	$5,039	$1,961	$7,000
9	Well Pump Maintenance	$32,394	$12,606	$45,000
10	Water Quality Assessments	$9,531	$3,709	$13,240
11	Water Purchase Cost - Assessments	$179,881	$70,000	$249,881
12	Water Purchase Cost - Leased Water		$288,750	$288,750
13	**Total Water Supply Cost**	**$341,077**	**$421,479**	**$762,556**
14	Proportion of Water Supply Cost	45%	55%	100%
15	Water Supply Revenue Requirement *(Line 1 of Table 4-2 x Line 14)*	$350,785	$433,476	$784,261
16	**Unit Cost ($/ hcf)** ***(Line 15 / Line 4)***	**$0.95**	**$3.02**	**$1.53**

Allocating Water to Each Class and Tier

The amount and percentage of water available from each supply source is shown in Lines 2 and 3 of Table 4-10 above. Line 4, Columns B and C of Table 4-10 are calculated by multiplying Line 3, Columns B and C by the total use in Line 4, Column D.

The supply from each source (Line 4 of Table 4-10) is then allocated to each customer class in proportion to overall demand as shown in Table 4-11. For example, the Single Family Residential (SFR) customer class uses 50.8% of water annually (Column B of Table 4-11). The percent of annual use (Column B) is multiplied by the total amount of water available from each source (Line 4, Columns B and C in Table 4-10) to determine the water supply allocation by source shown in Columns C and D of Table 4-11. Note that the total amount of water available from each source in Line 6 of Table 4-11 is equal to the amount in Line 4 of Table 4-10.

Table 4-11: Customer Class Water Supply Allocations

Line No.	Customer Class	Annual Use (hcf) (A)	% of Annual Use (B)	Groundwater - San Gabriel Basin Watermaster (SGBW) (C)	Leased Groundwater (Replacement Water) (D)
1	Single Family Residential	**259,816**	50.8%	**187,032**	**72,783**
2	Tier 1	173,789			
3	Tier 2	86,026			
2	Multi-family	**22,130**	4.3%	**15,931**	**6,199**
3	Commercial/Industrial	**196,659**	38.4%	**141,568**	**55,091**
4	Irrigation	**14,138**	2.8%	**10,177**	**3,961**
5	Public Authority	**18,843**	3.7%	**13,565**	**5,279**
6	**Total Use**	**511,585**	100%	**368,273**	**143,312**

For the SFR customer class, the water supply must be further allocated to each tier. The first step in allocating the water supply to each tier is to determine each customers' proportional share of the economical water (groundwater from SGBW). This calculation is shown in Table 4-12 below. The total groundwater from SGBW for SFR customers (Line 1, Column C of Table 4-11) is divided by the total number of SFR accounts (Table 2-1) to determine how many units of SGBW water are allocated to each account annually (Line 3 of Table 4-12). This amount is then divided by six billing periods per year to determine the bimonthly SGBW groundwater allocated to each account (Line 5 of Table 4-12). The units of SGBW groundwater available to each SFR account are then compared to the proposed Tier 1 breakpoint (26 hcf) in Line 6 to determine the percentage of economical water available to meet Tier 1 needs (Line 7 of Table 4-12).

Table 4-12: Allocation of Groundwater to Tiers

Line No.	SGBW Supply Allocation for Tiers	
1	Single Family Residential SGBW Allotment (hcf)	187,032
2	Single Family Residential Accounts	1,473
3	Annual Units of SGBW water per Account (hcf)	127
4	Billing periods per Year	6
5	**Bimontly Units of SGBW water per Account (hcf)**	**21**
6	Tier 1 Break Point	26
7	**Percent of Tier 1 Water from SGBW**	**81%**

Using the information from Table 4-10 through Table 4-12, Raftelis derived the supply cost for each tier as shown in Table 4-13. The SGBW groundwater available to serve Tier 1 (Line 3, Column B of Table 4-13) is calculated by taking the annual use in Line 3 Column A and multiplying by the percentage shown in Line 7 of Table 4-12. The remaining groundwater available from SGBW is allocated to Tier 2 use. The remainder of Tier 1 and 2's water needs is met from leased groundwater supplies (shown in Column C). The unit cost for each tier, shown in Column D, is calculated by taking the weighted average rate for each source shown in Line 1 (weighted by the water use from each source in Line 3). For example, the Tier 1 rate is as follows: (141,472 x $0.95 + 32,317 x $3.02)/173,789 = $1.34, as shown in Line 3 Column D of Table 4-13. The same calculation is performed for Tier 2. The average supply rate for all tiers is shown in Line 5.

Table 4-13: Derivation of Supply Cost by Tier

Line No.	SFR Supply Allocation	Annual Use (hcf) (A)	Groundwater - San Gabriel Basin Watermaster (SGBW) (B)	Leased Groundwater (Replacement Water) (C)	Unit Cost (D)
1	**Unit Cost**	*(From Table 4-10)*	**$0.95**	**$3.02**	
2	**Amount of Supply Available**		**187,032**	**72,783**	
3	Tier 1	173,789	141,472	32,317	**$1.34**
4	Tier 2	86,026	45,560	40,466	**$1.93**
5	**Total**	**259,816**	**187,032**	**72,783**	**$1.53**

Delivery Cost

The delivery rate is derived in Table 4-14 by dividing the delivery (Base) costs identified in Table 4-2, by the total water use. The delivery rate is the unit cost to deliver water under ***average daily demand (ADD)*** conditions. This delivery cost is the same for all classes and for all tiers.

Table 4-14: Derivation of the Delivery Unit Cost

Delivery Rate Derivation	
Delivery Costs	$180,340
Total Use	511,585
Delivery Rate	**$0.35**

Peaking Rate

Table 4-15 shows the peaking rate derivation by class and tier. The total peaking costs for each class and tier were derived by calculating peaking unit rates (Columns C and D in Table 3-9) and multiplying this rate by the max day and max hour use for each tier and class. The max day and max hour use for each customer class are shown in Columns H and K of Appendix A-1, respectively, and the peaking costs from multiplying the peaking unit rate times the max day and max hour use are shown in Columns C and D in Appendix A-2. The peaking costs from Column C and D of Appendix A-2 are summed to determine the total peaking costs by customer class shown in Column B of **Table 4-15**. The peaking factors, shown in Column E were derived using water use data provided by CIWS and are the ratio of peak water use during the maximum bimonthly summer billing cycle divided by the average bimonthly water use. The full derivation of peaking factors is shown in Appendix B. The peaking unit rate, shown in Column D, is calculated by dividing the peaking costs (Column B) by annual water use (Column C) for each class and tier. Note that the peaking rate is correlated with the peaking factor and a higher peaking factor correlates to a higher peaking rate. Also note that the total peaking costs in Line 9 Column B of Table 4-15 matches the total peaking costs shown in Table 4-2. The weighted average peaking rate for all classes is shown in Line 9 Column D.

Table 4-15: Derivation of Peaking Rate

Line No.	Customer Class (A)	Peaking Costs (B)	Annual Use (hcf) (C)	Peaking Rates ($/hcf) (D)	Max Day Peaking Factor (E)
1	Single Family				
2	Tier 1	$48,873	173,789	**$0.28**	1.08
3	Tier 2	$42,152	86,026	**$0.49**	1.58
4	Non-Single Family				
5	Multi-family	$7,577	22,130	**$0.34**	1.23
6	Commercial/Industrial	$67,330	196,659	**$0.34**	1.23
7	Irrigation	$4,840	14,138	**$0.34**	1.23
8	Public Authority	$6,451	18,843	**$0.34**	1.23
9	**Total**	**$177,223**	**511,585**	**$0.35**	

Conservation Rate

Table 4-16 shows the conservation rate derivation for all customers. The conservation rate is derived by dividing the conservation costs shown in Line 1 (equal to Line 7 of Table 4-2) by CIWS's annual use in Line 2 of Table 4-16.

Table 4-16: Derivation of Peaking Rate

Line No.	Conservation Rate	
1	Conservation Cost	$35,961
2	Total Use (hcf)	511,585
3	**Conservation Rate**	**$0.07**

4.5.4. FINAL RATE DERIVATION

The rates for each cost component have been calculated: supply, delivery, peaking, and conservation. Pumping rates are derived in the next section.

Table 4-17 shows the total Volumetric Rate derivation for all customer classes. This is the summation of all rate components derived in earlier tables in this section. The total Volumetric Rate shown in Column G is designed to collect the volumetric costs (before pump zone costs for Zone 2 are added) shown in Table 4-2. Note that the pumping costs associated with Zone 1 have been included in Column F because all customers benefit from pumping in this zone. Adding the total revenue in Line 8, Column G to the revenue from pump Zone 2, shown in Lines 3, Column C of Table 4-18, yields the total volumetric revenue requirement in Line 13 of Table 4-2 ($1.343 million).

Table 4-17: Derivation of Rates by Tier and Class

Line No.	Customer Class	Supply	Base Delivery	Peaking	Conservation	Zone 1 Pumping Rate	Total Rate ($/hcf)
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
1	Single Family						
2	Tier 1	$1.34	$0.35	$0.28	$0.07	$0.25	**$2.29**
3	Tier 2	$1.93	$0.35	$0.49	$0.07	$0.25	**$3.09**
4	Multi-family	$1.53	$0.35	$0.34	$0.07	$0.25	**$2.54**
5	Commercial/Industrial	$1.53	$0.35	$0.34	$0.07	$0.25	**$2.54**
6	Irrigation	$1.53	$0.35	$0.34	$0.07	$0.25	**$2.54**
7	Public Authority	$1.53	$0.35	$0.34	$0.07	$0.25	**$2.54**
8	**Total Revenue**	**$784,261**	**$180,340**	**$177,223**	**$35,961**	**$125,615**	**$1,303,400**

4.5.5. PUMPING RATES

Table 4-18 shows the derivation of the pumping rates by pumping zone. The rate for Zone 1 is included in the rates derived earlier since all customers benefit from pumping in this zone. The rate for each zone, shown in Column D, are calculated by dividing Column C by Column B. If a customer resides in Zone 2, then the Zone 2 pumping rate is added to the rates derived in Table 4-17.

Table 4-18: Derivation of Pumping Rates by Zone

Line No.	Zone (A)	Total Flow Through Zone* (hcf) (B)	Cost Associated with Pumping in Zone ($) (C)	Pumping Rate for Each Zone ($ / hcf) (D)	Total Pumping Rate ($ / hcf) (F)
1	1	511,585	$125,615	$0.25	**Included in Rates**
2	2	35,809	$13,957	$0.39	**$0.39**
3			**$139,572**		

* The flow shown includes the flow from zones that are above it - for example Zone 1 includes flow from Zone 2

Table 5-17 shows the proposed five- year pumping rates by zone.

Table 4-19: Five Year Pumping Rate Charge by Zone

Line No.	Zone	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
1	2	$0.39	$0.39	$0.44	$0.49	$0.55

4.5.6. 5-YEAR RATES

Table 4-20 shows the proposed five-year Volumetric Rates for each customer class and tier by zone. The rates shown include the pumping rates for each zone. The rates in FY 2021 through FY 2024 are derived by escalating the rates derived in Table 4-17 and Table 4-18 by the proposed revenue adjustments shown in Table 2-9. Customer bill impacts are discussed in Section 5.

Table 4-20: Five Year Volumetric Rates

Customer Class	Proposed Tier	FY 2022 Zone 1	FY 2022 Zone 2	FY 2023 Zone 1	FY 2023 Zone 2	FY 2024 Zone 1	FY 2024 Zone 2	FY 2025 Zone 1	FY 2025 Zone 2	FY 2026 Zone 1	FY 2026 Zone 2
Single Family											
Tier 1	0 - 26	$2.29	$2.68	$2.54	$2.97	$2.82	$3.30	$3.10	$3.63	$3.38	$3.95
Tier 2	>26	$3.09	$3.48	$3.42	$3.86	$3.80	$4.28	$4.18	$4.71	$4.56	$5.13
Commercial, Multi-Family & Irrigation	Uniform	$2.54	$2.93	$2.82	$3.26	$3.13	$3.61	$3.45	$3.98	$3.76	$4.33

5. Bill Impacts

Note that all bill impacts shown below are for Zone 1 customers. Also note that exact customer bill impacts will vary with each customers' meter size and volumetric water use.

5.1. Single Family Bimonthly Bill Impacts

Table 5-1 shows the Single-Family Residential customer bill impacts for various use points and assuming a 5/8-inch meter, which is the most common meter size for Single Family Residential customers. Column F shows the percent of bills (customers) that fall within a certain water use level during a bimonthly billing period. For example, 56% of the annual bills are for 20 hcf or less. Note that the overall revenue adjustment in FY 2022 is 14%, which means that on average one could expect a 14% increase for customers. However, customers who use 40 hcf or less per month will see a lower bill impact than the overall revenue adjustment. Table 5-1 also shows the approximate average water use.

Table 5-1: Single Family Bill Impact (5/8" Meter)

Single Family 5/8 inch meter	Use (hcf) (A)	Current Bill (B)	Proposed Bill (C)	Dollar Difference (D)	Percent Difference (E)
	5	$56.70	$59.61	$2.91	5.1%
	10	$67.20	$71.05	$3.85	5.7%
	15	$77.70	$82.48	$4.78	6.2%
	20	$88.20	$93.92	$5.72	6.5%
	25	$98.70	$105.36	$6.66	6.7%
Approximate Average (31)	30	$111.60	$119.99	$8.39	7.5%
	35	$125.10	$135.42	$10.32	8.2%
	40	$138.60	$150.84	$12.24	8.8%

5.2. Multi-family Bill Impacts

Table 5-2 shows monthly Multi-family customer bill impacts for various use points, assuming a 6-inch meter, which is the most common meter size for Multi-family customers. The average Multi-family use is approximately 3,900 hcf.

Table 5-2: Multi-family Bill Impacts (6” Meter)

Multi-family 6 inch meter	Use (hcf) (A)	Current Bill (B)	Proposed Bill (C)	Dollar Difference (D)	Percent Difference (E)
	2,700	$6,625.00	$7,580.86	$955.86	14.4%
	2,900	$7,075.00	$8,089.60	$1,014.60	14.3%
	3,100	$7,525.00	$8,598.34	$1,073.34	14.3%
	3,300	$7,975.00	$9,107.09	$1,132.09	14.2%
	3,500	$8,425.00	$9,615.83	$1,190.83	14.1%
	3,700	$8,875.00	$10,124.57	$1,249.57	14.1%
	3,900	$9,325.00	$10,633.32	$1,308.32	14.0%
	4,100	$9,775.00	$11,142.06	$1,367.06	14.0%

5.3. Commercial/Industrial

Table 5-3 shows the Commercial/Industrial customer bill impacts for various use points and assuming a 1-inch meter, the most common meter size for this class. The average Commercial/Industrial use is approximately 110 hcf.

Table 5-3: Commercial/Industrial Bill Impacts (1” Meter)

Commercial/ Industrial 1 inch meter	Use (hcf) (A)	Current Bill (B)	Proposed Bill (C)	Dollar Difference (D)	Percent Difference (E)
	70	$84.06	$93.86	$9.80	11.7%
	80	$106.56	$119.30	$12.74	12.0%
	90	$129.06	$144.74	$15.68	12.1%
	100	$151.56	$170.17	$18.61	12.3%
	110	$174.06	$195.61	$21.55	12.4%
	120	$196.56	$221.05	$24.49	12.5%
	130	$219.06	$246.49	$27.43	12.5%
	140	$241.56	$271.92	$30.36	12.6%
	150	$264.06	$297.36	$33.30	12.6%
	160	$286.56	$322.80	$36.24	12.6%

5.4. Irrigation and Public Authority

Error! Reference source not found. shows the Irrigation customer bill impacts and Table 5-5 shows the Public Authority customer bill impacts. Both tables assume a 2-inch meter, the most common meter size both classes. The average use for each class is 115 hcf and 365 hcf, respectively.

Table 5-4: Irrigation Bill Impacts (2" Meter)

Irrigation 2 inch meter	Use (hcf) (A)	Current Bill (B)	Proposed Bill (C)	Dollar Difference (D)	Percent Difference (E)
	55	$241.66	$284.89	$43.23	17.9%
	70	$275.41	$323.04	$47.63	17.3%
	85	$309.16	$361.20	$52.04	16.8%
	100	$342.91	$399.35	$56.44	16.5%
	115	$376.66	$437.51	$60.85	16.2%
	130	$410.41	$475.66	$65.25	15.9%
	145	$444.16	$513.82	$69.66	15.7%
	160	$477.91	$551.98	$74.07	15.5%

Table 5-5: Public Authority Bill Impacts (2" Meter)

Public Authority 2 inch meter	Use (hcf) (A)	Current Bill (B)	Proposed Bill (C)	Dollar Difference (D)	Percent Difference (E)
	240	$657.91	$755.47	$97.56	14.8%
	265	$714.16	$819.07	$104.91	14.7%
	290	$770.41	$882.66	$112.25	14.6%
	315	$826.66	$946.25	$119.59	14.5%
	340	$882.91	$1,009.84	$126.93	14.4%
	365	$939.16	$1,073.44	$134.28	14.3%
	390	$995.41	$1,137.03	$141.62	14.2%
	415	$1,051.66	$1,200.62	$148.96	14.2%

APPENDIX A:

Units of Service and Allocation of Costs to Customer Classes

A-1: Units of Service Derivation

Line No.	Customer Class (A)	Tier Breakpoint (B)	Annual Use (hcf) (C)	Average Daily Use (hcf) (D)	Bi-monthly Peaking Factor (E)	Maximum Day Requirements: Capacity Factor (F)	Maximum Day Requirements: Total Capacity (hcf/day) (G)	Maximum Day Requirements: Extra Capacity (hcf/day) (H)	Maximum Hour Requirements: Capacity Factor (I)	Maximum Hour Requirements: Total Capacity (hcf/day) (J)	Maximum Hour Requirements: Extra Capacity (hcf/day) (K)	Number of Equivalent Meters (L)	Number of Cost Equivalent Meters (M)	Number of Accounts (N)	Percent of Total Usage (O)	Private Fire Accounts (P)
1	Single Family Residential		259,816			2.48						1,878	1,591	1,473	51%	
2	Tier 1	26	173,789	476	1.08	2.16	1,027	551	3.23	1,538	511					
3	Tier 2	26+	86,026	236	1.58	3.14	740	504	4.70	1,108	368					
4	Multi-family		22,130	61	1.23	2.44	148	88	3.66	222	74	53	15	2	4%	-
5	Commercial/Industrial		196,659	539	1.23	2.44	1,317	778	3.66	1,973	656	1,258	588	329	38%	-
6	Irrigation		14,138	39	1.23	2.44	95	56	3.66	142	47	144	59	25	3%	-
7	Public Authority		18,843	52	1.23	2.44	126	75	3.66	189	63	90	35	11	4%	-
8	Total Fire Protection															
9	Private Fire Accounts															
10	**Total Units of Service**		**511,585**	**1,402**		**2.46**	**3,453**	**3,335**		**5,172**	**8,136**	**3,422**	**2,288**	**1,840**	**100%**	**59**

A-2: Allocation of Costs to Customer Classes

Line No.	Customer Class	Supply (A)	Base (B)	Max Day (C)	Max Hour (D)	Meter Service (E)	Meter Capacity (F)	Customer Billing (G)	Con-servation (H)	Direct Fire (I)	Pump Zones 1 (J)	Pump Zones 2 (K)	Private Fire Protection (L)	Total (M)
1	Single Family Residential	**$398,297**	**$91,588**	**$68,271**	**$22,753**	$151,779	$105,386	$202,588	**$18,263**	$0	**$63,795**	$483		**$1,123,205**
2	Tier 1	$266,419	$61,263	$35,647	$13,226				$12,216		$42,672			$431,443
3	Tier 2	$131,878	$30,325	$32,624	$9,527				$6,047		$21,123			$231,525
4	Multi-family	$33,926	$7,801	$5,668	$1,909	$1,467	$2,946	$275	$1,556	$0	$5,434			$60,981
5	Commercial/Industrial	$301,478	$69,324	$50,368	$16,962	$56,039	$70,558	$45,255	$13,824	$0	$48,288	$12,297		$684,392
6	Irrigation	$21,673	$4,984	$3,621	$1,219	$5,638	$8,052	$3,439	$994	$0	$3,471	$122		$53,213
7	Public Authority	$28,887	$6,642	$4,826	$1,625	$3,305	$5,050	$1,513	$1,325	$0	$4,627	$1,055		$58,855
8	Private Fire Protection									$2,231			$124,518	$126,749
9	**Total**	**$784,261**	**$180,340**	**$132,754**	**$44,469**	**$218,227**	**$191,991**	**$253,069**	**$35,961**	**$2,231**	**$125,615**	**$13,957**	**$124,518**	**$2,107,394**

APPENDIX B:

Derivation of Peaking Factors

A-1: Bimonthly Peaking Factors by Customer Class

FYE 2018 Bimonthly Peaking Factors

	FYE 2018															Peaking Factor
Customer Class	7	8	9	10	11	12	1	2	3	4	5	6	Line No.	Total	Max	Average	Max / Average
SFR		56,829		53,462		45,221		38,912		34,020		45,046	1	273,490	56,829	45,582	
Tier 1		33,033		32,341		30,531		28,821		27,053		31,157	2	182,936	33,033	30,489	1.08
Tier 2		23,796		21,121		14,690		10,091		6,967		13,889	3	90,554	23,796	15,092	1.58
													4				
MFR		4,390		4,219		3,735		3,190		2,969		4,792	5	23,295	4,792	3,883	
Commercial/Industrial		37,130		41,409		35,224		33,023		28,414		32,654	6	207,854	41,409	34,642	
Irrigation		3,430		3,113		2,653		1,507		1,545		2,634	7	14,882	3,430	2,480	
Public Authority		4,688		4,117		3,748		3,250		1,090		2,942	8	19,835	4,688	3,306	
Total Non-SFR		49,638		52,858		45,360		40,970		34,018		43,022	9		**54,319**	**44,311**	**1.23**
													10		52,858		
Total		**106,467**		**106,320**		**90,581**		**79,882**		**68,038**		**88,068**		**539,356**	**106,467**	**89,893**	**1.18**