

CITY OF
HAYWARD

Water Rate Study

Final Report / July 2021



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

July 20, 2021

Alex Ameri
Director of Public Works
City of Hayward
77 B Street
Hayward, CA 94541

Subject: Water Rate Study Report

Dear Alex Ameri,

Raftelis Financial Consultants, Inc. (Raftelis) is pleased to provide this report for the City of Hayward's (City) Water Rate Study.

The major objectives of the Water Rate Study include:

- » Developing a long-term financial plan that sufficiently funds operating expenses, capital replacement and improvement costs, and prudent reserve balances
- » Conducting a cost of service analysis that fairly and equitably allocates costs among customer classes
- » Designing water rates that fully recover costs to serve customers, while minimizing rate impacts, and promoting affordability for essential needs
- » Preparing a Study Report, or administrative record, that clearly and comprehensively explains each step of the rate study process

This report details the long-term financial plan, cost of service analysis, and proposed rates for the City's water utility. The financial plan identifies the projected revenue needs and revenue adjustments over the next 10 years, which inform five years of proposed rates.

Sincerely,



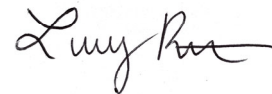
Sanjay Gaur
Vice President



Kevin Kostiuk
Manager



Nancy Phan
Senior Consultant



Lindsay Roth
Associate Consultant

Table of Contents

1 Executive Summary	1
Study Background	1
Objectives of the Study.....	1
Rate Objectives	1
Current Rates	1
Process and Approach	3
Legal Requirements.....	3
Cost-Based Rate-Setting Methodology.....	4
Financial Plan Results and Recommendations	5
Factors Affecting Revenue Requirements	5
Recommended Reserve Policy	6
Financial Plan Results	7
Recommended Rate Structure Modifications	9
Proposed Water Rates	9
Customer Impacts.....	11
Rate Survey	13
2 Financial Plan	15
Inflationary Assumptions.....	15
Current Water Rates.....	15
Customer Accounts and Usage	17
Projected Revenues at Current Rates	20
Projected Revenues	20
Estimated Purchased Water Costs	21
Projected O&M Expenses.....	22
Existing Debt Service.....	22
Capital Project Funding	22
Recommended Reserve Policy	24
Status Quo Financial Plan	24
Proposed Financial Plan.....	27
3 Rate Structure Modifications	30

Rate Objectives	30
Proposed Rate Structure Modifications	30
Proposed Tiers	31
4 Cost of Service Analysis	32
Process and Approach	32
Revenue Requirement.....	32
Water System Functions.....	33
Cost Components	37
Peaking Factors.....	38
Peak Capacity	39
Equivalent Meters and Fire Lines	41
Fire Capacity	45
Cost Allocations	46
Revenue Requirement Distribution	51
Unit Cost Derivation.....	53
Cost of Service by Customer Class	53
5 Rate Design and Derivation	56
Proposed Adjustments.....	56
Bi-Monthly Service Charges	56
Bi-Monthly Fire Service Charges	57
Water Usage Rates	57
Proposed Rate Schedule.....	62
Customer Impacts.....	63
Rate Survey	66

List of Tables

Table 1-1: Current Bi-Monthly Service Charges	2
Table 1-2: Current Bi-Monthly Fire Service Charges	2
Table 1-3: Current Water Usage Rates (\$/ccf)	2
Table 1-4: Recommended Reserve Policy	6
Table 1-5: Proposed Water Revenue Adjustments.....	7
Table 1-6: Proposed Bi-Monthly Water Service Charges	10
Table 1-7: Proposed Bi-Monthly Fire Service Charges.....	10
Table 1-8: Proposed Bi-Monthly Water Usage Rates (\$/ccf)	11
Table 2-1: Escalation Factors	15
Table 2-2: Current Bi-Monthly Service Charges	16
Table 2-3: Current Water Usage Rates (\$/ccf)	16
Table 2-4: Current Bi-Monthly Fire Service Charges	16
Table 2-5: Customer Accounts by Class (FY 2021).....	18
Table 2-6: Water Use by Class (FY 2020)	19
Table 2-7: Projected Rate Revenues.....	20
Table 2-8: Projected Revenues	21
Table 2-9: Purchased Water Costs.....	21
Table 2-10: Projected O&M Expenses.....	22
Table 2-11: Existing Debt Service.....	22
Table 2-12: Inflated Capital Improvement Plan.....	23
Table 2-13: Recommended Reserve Policy	24
Table 2-14: Projected Financial Plan (Status Quo).....	25
Table 2-15: Proposed Revenue Adjustments	27
Table 2-16: Projected Financial Plan (Proposed Adjustments).....	28
Table 3-1: Proposed Bi-Monthly Tiers	31
Table 4-1: Revenue Requirement (FY 2022).....	33
Table 4-2: O&M Expense Functions	34
Table 4-3: O&M Expense Functions Summary.....	34
Table 4-4: Capital Cost Functions.....	36
Table 4-5: Capital Cost Functions Summary	37
Table 4-6: Revenue Offset Functions	37

Table 4-7: System-Wide Peaking Factors	38
Table 4-8: Class-Specific Peaking Factors	39
Table 4-9: Peak Capacity Calculation.....	40
Table 4-10: Meter Capacity Ratios	41
Table 4-11: Meter Counts by Class	41
Table 4-12: Equivalent Meters by Class	42
Table 4-13: Fire Capacity Ratios	42
Table 4-14: Private Fire Lines and Public Fire Hydrant Counts	45
Table 4-15: Equivalent Fire Lines	45
Table 4-16: Fire Capacity Calculation.....	46
Table 4-17: Functional Allocations.....	48
Table 4-18: Operating Cost Allocation	49
Table 4-19: Capital Cost Allocation.....	49
Table 4-20: Revenue Offset Allocation	50
Table 4-21: Revenue Requirement by Cost Component	52
Table 4-22: Units of Service by Cost Component.....	54
Table 4-23: Unit Costs by Cost Component	54
Table 4-24: Cost of Service by Customer Class	55
Table 5-1: Proposed Revenue Adjustments	56
Table 5-2: Proposed Bi-Monthly Service Charge (FY 2022).....	56
Table 5-3: Proposed Bi-Monthly Fire Service Charge (FY 2022).....	57
Table 5-4: Peaking Unit Cost Calculation	58
Table 5-5: Conservation Unit Cost Calculation	60
Table 5-6: Proposed Water Usage Rates (FY 2022)	62
Table 5-7: Proposed Bi-Monthly Service Charges.....	62
Table 5-8: Proposed Bi-Monthly Fire Service Charges.....	63
Table 5-9: Proposed Water Usage Rates	63

List of Figures

Figure 1-1: Financial Plan	7
Figure 1-2: Fund Balances	8
Figure 1-3: Capital Financing Plan.....	8
Figure 1-4: Distribution of Bi-Monthly Bill Impacts (FY 2022)	11
Figure 1-5: Single Family Bill Impacts.....	12
Figure 1-6: Commercial Restaurant Bill Impacts	12
Figure 1-7: Single Family Bill Comparison with Local Non-SFPUC Agencies	13
Figure 1-8: Single Family Bill Comparison with SFPUC Agencies.....	13
Figure 1-9: Commercial Bill Comparison with Local Non-SFPUC Agencies.....	14
Figure 1-10: Commercial Bill Comparison with SFPUC Agencies	14
Figure 2-1: Projected Financial Plan (Status Quo)	26
Figure 2-2: Projected Fund Balances (Status Quo).....	26
Figure 2-3: Projected Financial Plan (Proposed Adjustments)	29
Figure 2-4: Projected Fund Balances (Proposed Adjustments).....	29
Figure 5-1: Distribution of Bi-Monthly Bill Impacts (FY 2022)	64
Figure 5-2: Single Family Bill Impacts.....	65
Figure 5-3: Commercial Restaurant Bill Impacts	65
Figure 5-4: Single Family Bill Comparison with Local Non-SFPUC Agencies	66
Figure 5-5: Single Family Bill Comparison with SFPUC Agencies.....	66
Figure 5-6: Commercial Bill Comparison with Local Non-SFPUC Agencies.....	67
Figure 5-7: Commercial Bill Comparison with SFPUC Agencies	67

List of Appendices

Appendix A: 10-Year Capital Improvement Plan

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

1 Executive Summary

Study Background

In 2021, the City of Hayward (City) contracted with Raffelis to conduct a Water Rate Study, which includes the development of a long-term financial plan, cost of service (COS) analysis, and rate design for the City’s water utility. The study culminates in five years of cost-based water rate recommendations based on the results of the financial planning exercise and the COS analysis. This Executive Summary outlines the rate proposal and contains a description of the rate study process, methodology, and recommendations for the City’s water rates.

Objectives of the Study

The major components and objectives of the water rate study include:

1. Developing a long-term financial plan that meets the water utility’s revenue requirements, including operations and maintenance (O&M) expenses and the capital improvement plan (CIP), while adequately funding reserves in accordance with industry best practices and the City’s historical practices.
2. Conducting a COS analysis that establishes a nexus between the cost to serve customers and the responsibility of each class, in compliance with Proposition 218 and based on industry standards.
3. Reviewing the current water rate structure and evaluating potential rate structure modifications, which include revising tier definitions, customer classes, and fixed and variable revenue recovery.
4. Developing five years of water rates that comply with Proposition 218 and ensure financial sufficiency to fund operating and capital costs over the study period.

Rate Objectives

Raffelis worked with City staff to prioritize objectives for the proposed water rates. These prioritized objectives include improving fairness and equity between customer classes, simplifying the rate structure to enhance customer understanding, ensuring affordability for essential needs, and minimizing impacts to customers. The COS analysis reflects the updated cost allocations based on the City’s most recent financial data, resulting in equitable and fair water rates that represent the cost to serve each customer class. The proposed rate structure modifications are recommended to best meet these rate objectives. All proposed changes to the water rate structure were analyzed to minimize financial impacts to the City’s customers to the greatest extent possible.

Current Rates

The City’s current water rates were implemented January 1, 2021 and include a bi-monthly service charge based on meter size, a bi-monthly fire protection service charge based on fire line diameter (for only those customers requiring private fire service), and a tiered usage rate charged for every hundred cubic feet (ccf¹) of water used. The City’s current rates also distinguish between two different jurisdictions: Inside City and Outside City. Currently, customers located outside city limits are charged a 15% surcharge for both their fixed charges and volumetric rates.

Table 1-1 shows the current bi-monthly service charges by meter size. **Table 1-2** shows the current bi-monthly fire service charges by fire line diameter. **Table 1-3** shows the current water usage rates by customer class and bi-monthly tiers.

¹ One ccf is equal to 748 gallons of water. The first “C” in ccf is the latin word for hundred, “centum.”

Table 1-1: Current Bi-Monthly Service Charges

Line	A Meter Size	B Inside City Charges	C Outside City Charges	D Hydrant Service
1	Low Income	\$11.20	\$12.96	
2	5/8"	\$32.00	\$36.80	
3	3/4"	\$43.51	\$50.04	\$12.00
4	1"	\$65.91	\$75.80	
5	1 1/2"	\$144.31	\$165.96	
6	2"	\$254.00	\$292.10	
7	3"	\$641.00	\$737.15	\$124.00
8	4"	\$1,269.80	\$1,460.27	\$194.00
9	6"	\$2,240.00	\$2,576.00	\$388.00
10	8"	\$3,101.00	\$3,566.15	
11	10"	\$3,734.80	\$4,295.02	

Table 1-2: Current Bi-Monthly Fire Service Charges

Line	A Fire Line Diameter	B Inside City Charges	C Outside City Charges
1	2" and smaller	\$25.00	\$28.75
2	4"	\$29.00	\$33.35
3	6"	\$42.00	\$48.30
4	8"	\$42.00	\$48.30
5	10"	\$50.00	\$57.50

Table 1-3: Current Water Usage Rates (\$/ccf)

Line	A Customer Class	B Bi-Monthly Tiers (ccf)	C Inside City Charges	D Outside City Charges
1	Single Family			
2	Tier 1	8	\$5.80	\$6.67
3	Tier 2	25	\$7.14	\$8.21
4	Tier 3	25+	\$8.41	\$9.67
5				
6	Residential 2-4			
7	Tier 1	8	\$6.43	\$7.39
8	Tier 2	25	\$7.15	\$8.22
9	Tier 3	25+	\$8.52	\$9.80
10				
11	Multi-Family 5+			
12	Tier 1	8	\$6.97	\$8.02
13	Tier 2	20	\$7.23	\$8.31
14	Tier 3	20+	\$7.94	\$9.13
15				
16	Non-Residential			
17	Tier 1	200	\$6.95	\$7.99
18	Tier 2	200+	\$8.29	\$9.53

Process and Approach

Raftelis held several meetings with City staff to discuss and understand objectives, characteristics, and challenges of the City's water utility to provide the recommendations and results detailed in this report. Raftelis confirmed various assumptions and inputs and used an iterative process to view several scenarios to determine the recommended financial plan and water rates for service. City staff discussed the capital project requirements and water purchase cost estimates over a 10-year horizon, which are two primary drivers of the future revenue needs of the utility. Raftelis then designed and presented a COS and rate model to analyze various rate scenarios to fully fund the utility's revenue requirements through fair, equitable, and defensible cost-based rates.

The proposed financial plan detailed in this report follows industry standards for long-term financial planning. The financial plan relies on reasonable assumptions based on industry indices, such as general inflation based on the Consumer Price Index (CPI), and input from City staff. Raftelis worked closely with City staff to determine the most accurate methodology to project future revenues and expenses to reinforce sound fiscal management practices.

The financial plan includes the current fiscal year (FY) 2021 and the five-year period between FY 2022 to FY 2026. Each fiscal year begins on July 1 and ends on June 30. For example, FY 2021 is defined as the year beginning on July 1, 2020 and ending on June 30, 2021. The proposed rates were developed for implementation on October 1, 2021 in FY 2022 and in October every year thereafter through FY 2026.

The COS analysis and resulting water rates are developed using the principles established by the American Water Works Association's (AWWA) *Principles of Water Rates, Fees, and Charges, 7th edition* (M1 Manual). The water rates developed in this study were designed based on the industry standard Base-Extra Capacity methodology and the legal requirements set forth in the following section. This methodology allocates costs consistent with demand patterns of each customer class and for tiered rates, the demand patterns of each tier.

Legal Requirements²

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 (Proposition 218). The principal requirements, as they relate to public water service fees and charges are as follows:

1. Revenues derived from the fee or charge shall not exceed the costs required to provide the property-related service.
2. Revenues derived by the fee or charge shall not be used for any purpose other than that for which the fee or charge was imposed.
3. The amount of the fee or charge imposed upon any parcel shall not exceed the proportional cost of service attributable to the parcel.
4. No fee or charge may be imposed for a service unless that service is actually used or immediately available to the owner of property.

² Raftelis does not practice law, nor does it provide legal advice. The above discussion provides a general overview of Raftelis' understanding as rate practitioners and is labeled "legal framework" for literary convenience only. The City should consult with its legal counsel for clarification and/or specific guidance.

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 the M1 Manual, “water rates and charges should be recovered from classes of customers in proportion to the cost of serving those customers.” Raftelis follows industry standard rate setting methodologies set forth by the AWWA M1 Manual to ensure that the results of this study meet Proposition 218 requirements and create rates that do not exceed the proportionate cost of providing water service.

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. 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 water secondary. To meet the objectives of Article X, Section 2 and the California Water Code, a water purveyor may utilize its water rate design to incentivize the efficient use of water. The City 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 uniform rate classes) need to be based on the proportionate costs incurred to provide water to, and within, each customer class to achieve compliance with Proposition 218.

Tiered water rate structures, 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 waste and increasing efficiency, tiered water rates are ubiquitous, especially in relatively water-scarce regions like California. Tiered rates meet the requirements of Proposition 218 if the tiered rates reflect the proportionate cost of providing service *within* each tier.

Cost-Based Rate-Setting Methodology

To develop water rates that comply with Proposition 218, meet industry standards, and accomplish the City’s goals for the study, Raftelis follows the four major steps discussed below.

Revenue Requirement Calculation

The first step in the rate-making process is to determine the adequate and appropriate level of funding for a given utility. This is referred to as determining the “revenue requirement” for the base year, which for this study is FY 2022 which runs from July 1, 2021 to June 30, 2022. This analysis considers the short-term and long-term service objectives of the utility over a given planning horizon, including capital facilities, O&M, and financial reserve policies to determine the adequacy of a utility’s existing rates to recover its costs. Several factors affect these projections, including the number of customers

served, water use trends, non-recurring revenues, conservation, use restrictions, inflation, interest rates, capital financing needs, and other changes in operating and economic conditions, among others.

Cost of Service Analysis

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

1. **Categorize Costs into System Functions:** Utilizing an agency’s approved budget, financial reports, operating data, engineering data, and CIP, a rate study generally categorizes (i.e., functionalizes) the operating and capital costs of the water system among major system functions. Examples of system functions include but are not limited to water supply, storage, treatment, and transmission and distribution.
2. **Allocate Functionalized Costs to the Appropriate System Cost Components:** Cost components represent the major pieces of a water system that the agency incurs specific costs related to, with one or more functions attributable to one or more system component. For example, transmission costs (system function) are allocated to base and maximum day (cost components) since transmission lines are sized to accommodate both average (base) demands and maximum day (peak) demands. The City’s water system cost components include supply, base, maximum day, maximum hour, meter servicing, fire protection, conservation, and customer service and billing.
3. **Determine Units of Service and Unit Costs for Cost Components:** Each cost component is associated with a specific unit of service; costs within each component are divided by the total units of service to determine the unit cost. For example, water supply costs are associated with total annual use. Dividing total annual costs by total annual use yields the unit cost of water supply.
4. **Distribute Cost Components to Customer Classes:** The costs of the system, allocated by system component unit costs, are distributed to customer classes and tiers in proportion to their respective demands and burdens on the system using the units of service and unit costs for each component.

Rate Design and Derivation

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

Preparation of Administrative Record and Rate Adoption

Rate adoption is the last step of the rate-making process. Raftelis documents the rate study results in this report (also known as an administrative record), which reflects the basis upon which the rates were calculated, the rationale and justifications behind the proposed charges, any changes to rate structures, and anticipated financial impacts to ratepayers.

Financial Plan Results and Recommendations

Factors Affecting Revenue Requirements

The following items affect the water utility’s revenue requirement (i.e., costs) and thus its water rates. The utility’s expenses include O&M expenses, capital project costs, debt service, and reserve funding.

- » **Water Supply Costs:** The City purchases all of its water from the San Francisco Public Utilities Commission (SFPUC). For FY 2022, the estimated cost of purchasing water from SFPUC is \$31.5 million, approximately 67% of the City’s water operating budget. This purchase cost is expected to increase to \$44.1 million by FY 2030. SFPUC costs are projected to increase on average by 5% per year during the study period. However, rate

increases implemented by SFPUC can be unpredictable. Since the cost of purchasing water from SFPUC makes up most of the City’s annual water operating budget, an unexpected rate increase has the potential to significantly impact the City’s ratepayers and financial position.

- » **Capital Funding:** The water utility has approximately \$71.8 million in planned capital expenditures from FY 2022 through FY 2026 and \$125.1 million over the study’s financial planning horizon (from FY 2022 through FY 2030). Planned capital project costs are anticipated to be entirely cash funded through net rate revenues and existing and future reserves.
- » **Reserve Funding:** The City’s water utility does not have a formally adopted reserve policy. Reserve targets are adopted to ensure enough cash on hand to meet routine cash flow needs, provide adequate funding for planned repairs and replacements (R&R) CIP, navigate emergencies in the event of asset failure or natural disaster, and to protect ratepayers from rate spikes. The current informal policy is an operating reserve target equal to approximately one year of revenue as working capital as long as achieving the target in a given year would not necessitate an uncommonly high rate increase. The recommended reserve policy is discussed in the following section.

Recommended Reserve Policy

Raftelis worked with City staff to understand the needs of the water utility and to develop a recommendation for the reserve policy, which is listed in **Table 1-4**. Our recommendation includes the following components:

- » **Operating:** The City bills customers on a bi-monthly billing cycle, which can impact cash flows since revenues are collected six times, while expenses may be incurred twelve times per year (monthly). The recommended operating reserve target allows the City to maintain adequate cash flow throughout the year and to fund planned O&M expenses, as well as any unexpected operating costs that may arise.
- » **Capital:** Capital expenditures over the planning horizon represent a significant portion of the City’s annual costs, apart from water supply purchases. However, capital spending can often be unpredictable and subject to changing schedules and cost estimates. Since the City is expecting to cash fund the entirety of the water CIP, maintaining adequate reserves is even more critical. The recommended capital reserve target provides the City with cash on hand to adequately fund each year’s planned capital projects.
- » **Rate Stabilization:** Although water purchase costs are expected to increase by 5% per year on average, City staff expressed concern over the potential financial risks of an unanticipated rate increase from SFPUC. The recommended rate stabilization reserve target will help reduce the need for unreasonable rate increases and smooth out water rates, even in the instance of an unexpected increase in water purchase costs.

In total, the recommended reserve policy calls for a target balance of approximately \$37.75 million or 353 days cash on hand. This compares similarly to the utility’s existing informal policy of one year (365 days) of working capital, while identifying specific reserve components to convey cash needs to ratepayers.

Table 1-4: Recommended Reserve Policy

Line	A Reserve Targets	B Recommended Target Policy	C FY 2022 Target
1	Operating	25% O&M Expenses	\$11,812,352
2	Capital	One Year of 5-year Average CIP	\$14,361,187
3	Rate Stabilization	25% of Commodity Revenues	\$11,579,597
4	Total		\$37,753,136
5			
6	<i>Days Cash on Hand</i>		353

Financial Plan Results

Table 1-5 shows the proposed revenue adjustments that allows the City to maintain financial sufficiency, fund operating and capital expenses, and achieve recommended cash reserves for the water utility. The proposed adjustments apply to the City’s rate revenues, which were projected for future years assuming no growth in customer accounts or demand during the study period. Water demand in FY 2020 represents estimated baseline use for the City’s customers, which has stabilized after the last multi-year drought. Other agencies throughout California have observed similar stabilization and hardening of water demand in recent years. We assume no growth in customer demand throughout the period in order to conservatively project future rate revenues and to consider the potential of near-term drought conditions.

The proposed revenue adjustments represent the increase to total rate revenues required to recover the water utility’s costs and not the expected impact to each customer class. Water rates developed for the base year (FY 2022) reflect the results of the COS analysis, which impacts each customer class, and tier, differently. The proposed revenue adjustment for FY 2022 is zero, meaning that the resulting rates shown in the following sections are revenue neutral and are intended to recover the same amount of revenue the City’s water utility currently collects. Revenue adjustments in subsequent years are applied across all charges, classes, and tiers proportional to the base year rates.

Table 1-5: Proposed Water Revenue Adjustments

Line	A	B	C	D	E	F
	Revenue Adjustments	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
1	Effective Month	October	October	October	October	October
2	Percent Adjustment	0%	3%	7%	7%	5%

Figure 1-1 shows the five-year financial plan for FY 2022 through FY 2026. The stacked bars represent the costs of the water utility: O&M expenses, which include SFPUC costs, make up the largest portion (blue bars). Debt service (orange bars) are minimal, and CIP costs (yellow bars) represent the costs of the rate funded capital program. Net cash flow (green bars) falls below zero in FY 2023 and FY 2026, meaning that the City will draw from reserves to fund a portion of expenses in those years. Current revenues (solid line) equal the projected revenues at the City’s existing water rates and proposed revenues (dotted line) equal the projected revenues with the proposed revenue adjustments in **Table 1-5** applied.

Figure 1-1: Financial Plan

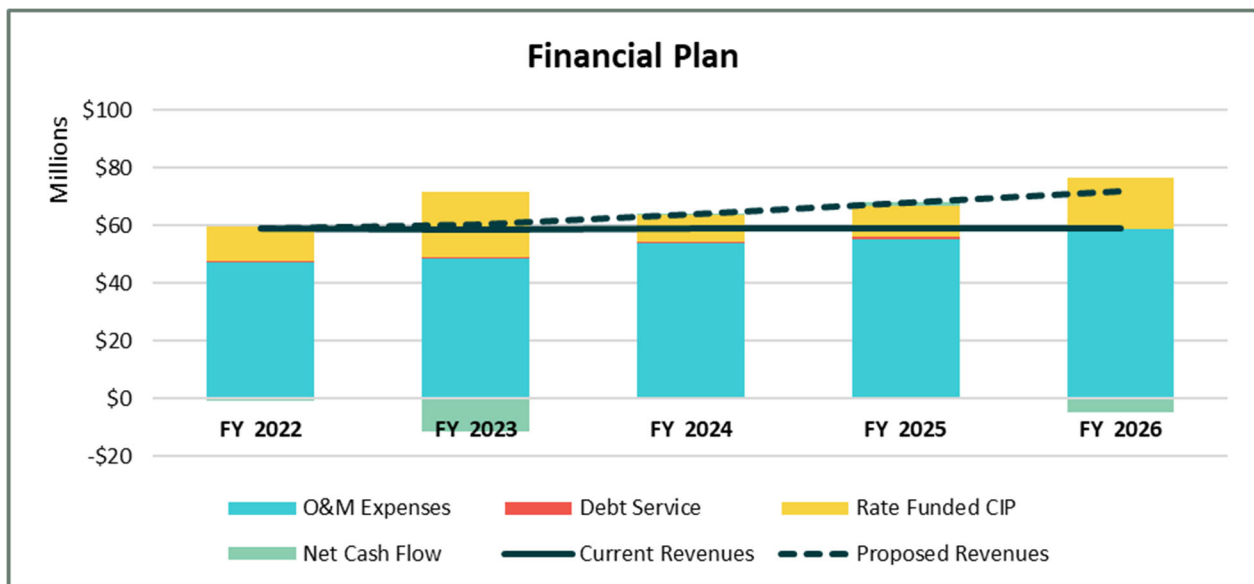


Figure 1-2 shows the combined ending fund balances (green bars) for the City’s three water funds (Operating, Capital Replacement, and Capital Improvement) from FY 2022 to FY 2030. Although the study period and resulting rate schedule is projected for five years, the City plans to build its reserves over a longer planning horizon to minimize customer impacts. The reserve target (dark blue line) is determined based on the recommended reserve policy targets in **Table 1-4**. The ending fund balances fall slightly below the reserve target in each year from FY 2023 through FY 2028 but will increase to achieve the target in FY 2029.

Figure 1-2: Fund Balances

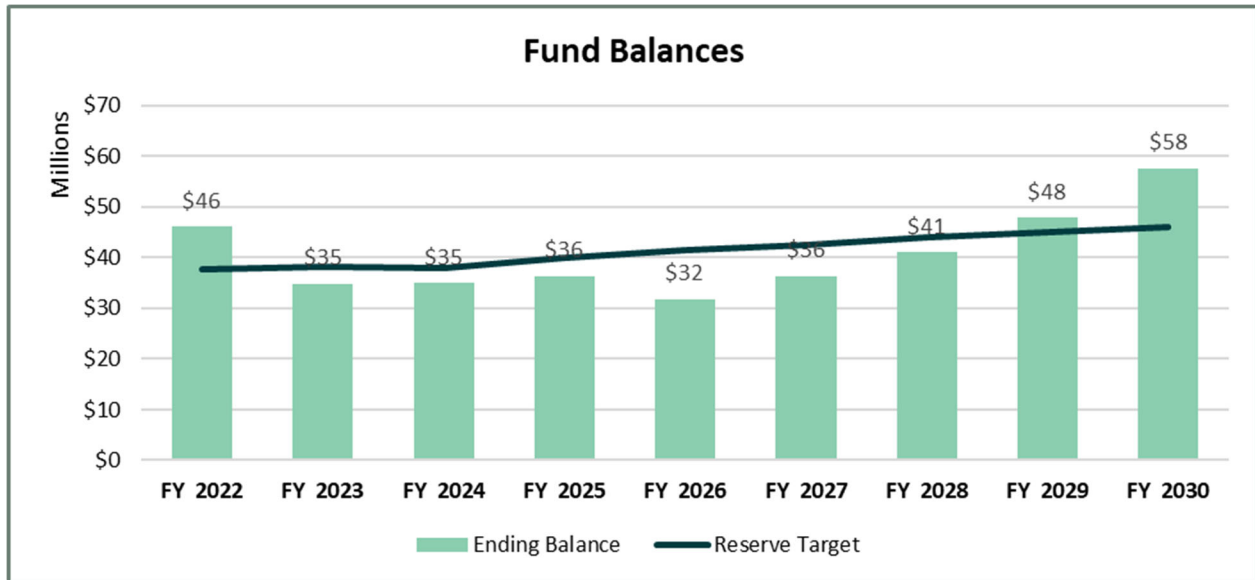
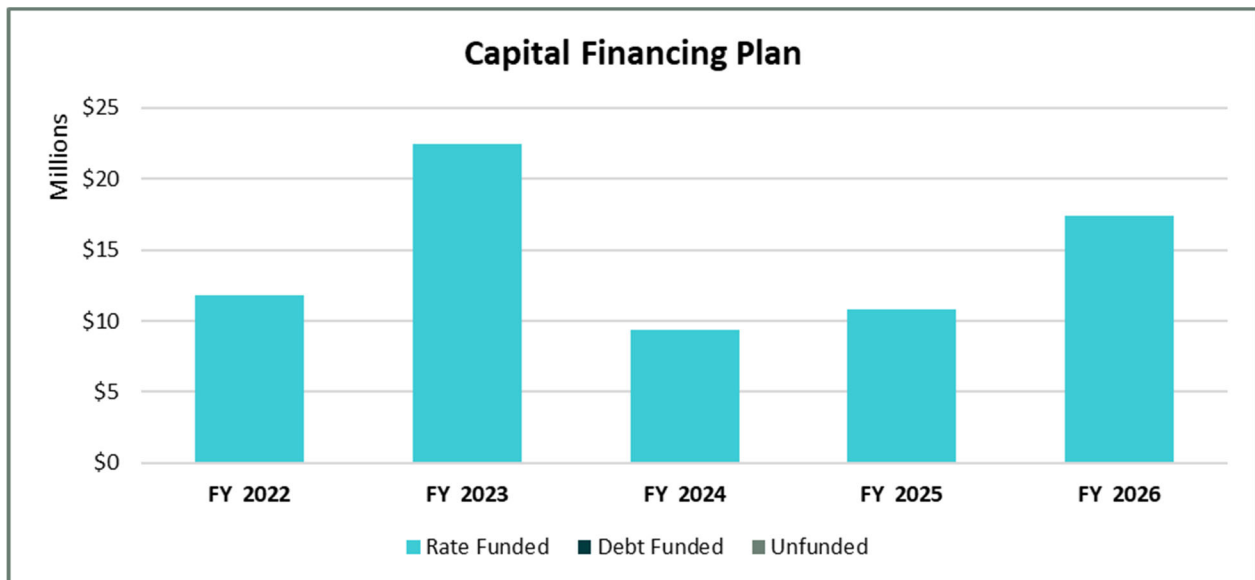


Figure 1-3 shows the five-year CIP expenditures from FY 2022 through 2026. All planned CIP expenses for the five-year period are anticipated to be entirely cash funded through rate revenues and existing capital reserves.

Figure 1-3: Capital Financing Plan



Recommended Rate Structure Modifications

Raffelis worked with City staff to determine the appropriate water rate structure to meet the City’s objectives, reflect new-normal customer demand patterns, and improve equity where possible. The existing rate structure is generally maintained (i.e., three-tier rates for Residential customers and two-tier rates for Non-Residential), however, we recommend the following rate structure modifications:

- » **Harmonize Residential Rate Classes:** Combining Single Family, Residential 2-4 Units, and Multi-Family 5+ Units into one Residential class will simplify the rate structure, which enhances customer understanding and may reduce an administrative burden on City staff. Additionally, a single Residential rate class ensures equity among groups of similar users by providing each household with the same allotment of water in each tier, and particularly the first tier, which represents the indoor needs of residential customers.
- » **Revised Tier Definitions for Residential Customer Classes:** Tier 1 is proposed to remain at 8 ccf of water bi-monthly, which represents low winter water use, on average, for the Residential class. The proposed Tier 2 is equal to 18 ccf of water, which represents peak summer use, on average, for the class. The revised Tier 2 definition reflects long-term reductions in average Residential water use. Tier 1 provides water for essential use, whereas Tier 2 provides water for irrigation purposes. All use greater than 18 ccf will fall into the proposed Tier 3.
- » **Separate Non-Residential Classes for Commercial/Industrial and Irrigation Users:** Based on our analysis of City water demand patterns, Irrigation customers produce a significantly higher peak on the water system, relative to Commercial/Industrial users. This is consistent across similar agencies, and the industry, as irrigation demands are highly seasonal. To ensure that Irrigation users pay their fair share of system capacity costs, we recommend separating Non-Residential into these two distinct classes.
- » **Revised Tier Definitions for Commercial/Industrial Users:** We propose to amend the Tier 1 definition to 110 ccf, which represents the average bi-monthly use of the Commercial/Industrial class.
- » **Revised Tier Definitions for Irrigation Users:** We propose to amend the Tier 1 definition to 170 ccf, which represents the average bi-monthly use of the Irrigation class.
- » **Eliminate Outside City Surcharge:** The City’s existing rate structure includes a 15% surcharge for Outside City customer rates, which accounts for 0.1% of the total water rate revenue. While the surcharge would be justified, eliminating the surcharge will simplify the rate structure to enhance customer understanding and reduce administrative burden. City staff currently updates the Outside City cost analysis during every rate study process. Due to the immaterial amount of revenue derived from the surcharge, implementing this change will result in negligible financial impacts.

Proposed Water Rates

Table 1-6, Table 1-7, and

Table 1-8 show the proposed bi-monthly service charges, bi-monthly fire service charges, and water usage rates, respectively, for FY 2022 through FY 2026 based on the above recommendations. Rates for FY 2022 are determined based on the results of the COS analysis and are revenue neutral (i.e., no gross revenue increase relative to FY 2021). Rates for all subsequent years are determined based on the corresponding revenue adjustments in **Table 1-5**.

The City’s existing water rates include an adopted policy to provide a discounted rate for low income customers. Customers that qualify for this discount are charged a reduced bi-monthly water service charge, equal to 35% of the service charge for the 5/8” meter size. Revenues that are not generated from rates (non-rate or miscellaneous revenues) are discretionary funds that the City may use to provide discounts to specific customers. Raftelis worked with City staff to identify the non-rate revenues used to provide a discount to eligible low income customers.

Based on the City’s historical revenues and adopted budget, it expects to receive approximately \$250,000 in water installation fees in FY 2022. Based on discussion with City staff, these fees are charged to install new services and to upsize existing services, but do not directly pay for infrastructure. This revenue is used in our analysis to provide the same discount to low income customers based on the City’s existing policy to the approximately 1,835 customers that currently qualify.

Table 1-6: Proposed Bi-Monthly Water Service Charges

Line	A Meter Size	B Proposed FY 2022	C Proposed FY 2023	D Proposed FY 2024	E Proposed FY 2025	F Proposed FY 2026
1	Low Income	\$10.95	\$11.28	\$12.07	\$12.92	\$13.56
2	5/8"	\$31.28	\$32.22	\$34.48	\$36.90	\$38.75
3	3/4"	\$43.65	\$44.96	\$48.11	\$51.48	\$54.06
4	1"	\$68.39	\$70.45	\$75.39	\$80.67	\$84.71
5	1 1/2"	\$130.25	\$134.16	\$143.56	\$153.61	\$161.30
6	2"	\$204.47	\$210.61	\$225.36	\$241.14	\$253.20
7	3"	\$439.51	\$452.70	\$484.39	\$518.30	\$544.22
8	4"	\$785.88	\$809.46	\$866.13	\$926.76	\$973.10
9	6"	\$1,614.69	\$1,663.14	\$1,779.56	\$1,904.13	\$1,999.34
10	8"	\$3,470.25	\$3,574.36	\$3,824.57	\$4,092.29	\$4,296.91
11	10"	\$5,202.11	\$5,358.18	\$5,733.26	\$6,134.59	\$6,441.32

Table 1-7: Proposed Bi-Monthly Fire Service Charges

Line	A Fire Line Diameter	B Proposed FY 2022	C Proposed FY 2023	D Proposed FY 2024	E Proposed FY 2025	F Proposed FY 2026
1	5/8"	\$6.65	\$6.85	\$7.33	\$7.85	\$8.25
2	3/4"	\$6.72	\$6.93	\$7.42	\$7.94	\$8.34
3	1"	\$6.93	\$7.14	\$7.64	\$8.18	\$8.59
4	1 1/2"	\$7.66	\$7.89	\$8.45	\$9.05	\$9.51
5	2"	\$8.93	\$9.20	\$9.85	\$10.54	\$11.07
6	3"	\$13.49	\$13.90	\$14.88	\$15.93	\$16.73
7	4"	\$21.34	\$21.99	\$23.53	\$25.18	\$26.44
8	6"	\$49.52	\$51.01	\$54.59	\$58.42	\$61.35
9	8"	\$98.13	\$101.08	\$108.16	\$115.74	\$121.53
10	10"	\$171.25	\$176.39	\$188.74	\$201.96	\$212.06

Table 1-8: Proposed Bi-Monthly Water Usage Rates (\$/ccf)

Line	A Customer Class	B Bi-Monthly Tiers (ccf)	C Proposed FY 2022	D Proposed FY 2023	E Proposed FY 2024	F Proposed FY 2025	G Proposed FY 2026
1	Residential						
2	Tier 1	8	\$6.04	\$6.23	\$6.67	\$7.14	\$7.50
3	Tier 2	18	\$7.18	\$7.40	\$7.92	\$8.48	\$8.91
4	Tier 3	18+	\$8.82	\$9.09	\$9.73	\$10.42	\$10.95
5							
6	Commercial / Industrial						
7	Tier 1	110	\$6.56	\$6.76	\$7.24	\$7.75	\$8.14
8	Tier 2	110+	\$7.70	\$7.94	\$8.50	\$9.10	\$9.56
9							
10	Irrigation						
11	Tier 1	170	\$7.76	\$8.00	\$8.56	\$9.16	\$9.62
12	Tier 2	170+	\$9.88	\$10.18	\$10.90	\$11.67	\$12.26
13							
14	Hydrant	Uniform	\$7.31	\$7.53	\$8.06	\$8.63	\$9.07

Customer Impacts

Figure 1-4 shows the proposed FY 2022 bi-monthly bill impacts for Single Family Residential and Commercial customers. Each graph shows the percentage of customer bills within a class that will experience an impact in a certain dollar range. For example, 13% of Single Family Residential bi-monthly bills will see a decrease and 43% will see an impact of \$2 or less. 87% of Commercial bills will see a decrease and 12% will see a moderate increase of \$15 or less.

Figure 1-4: Distribution of Bi-Monthly Bill Impacts (FY 2022)

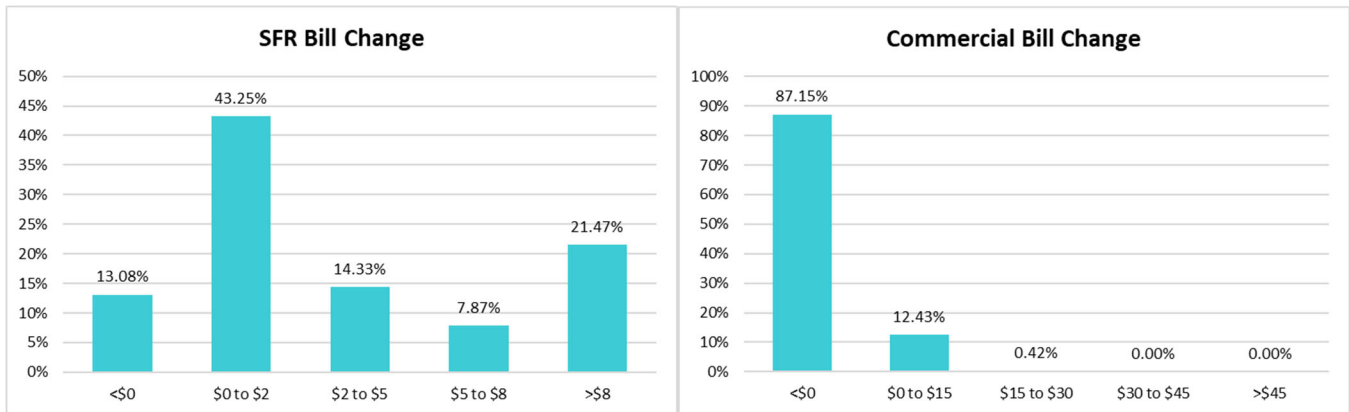
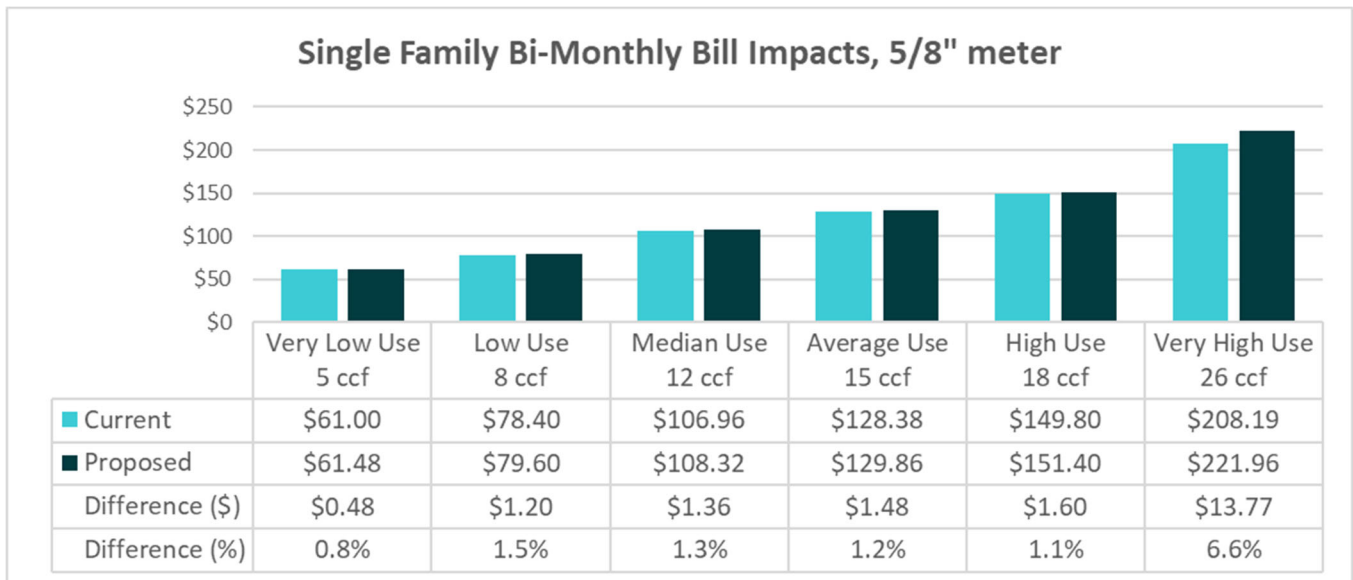


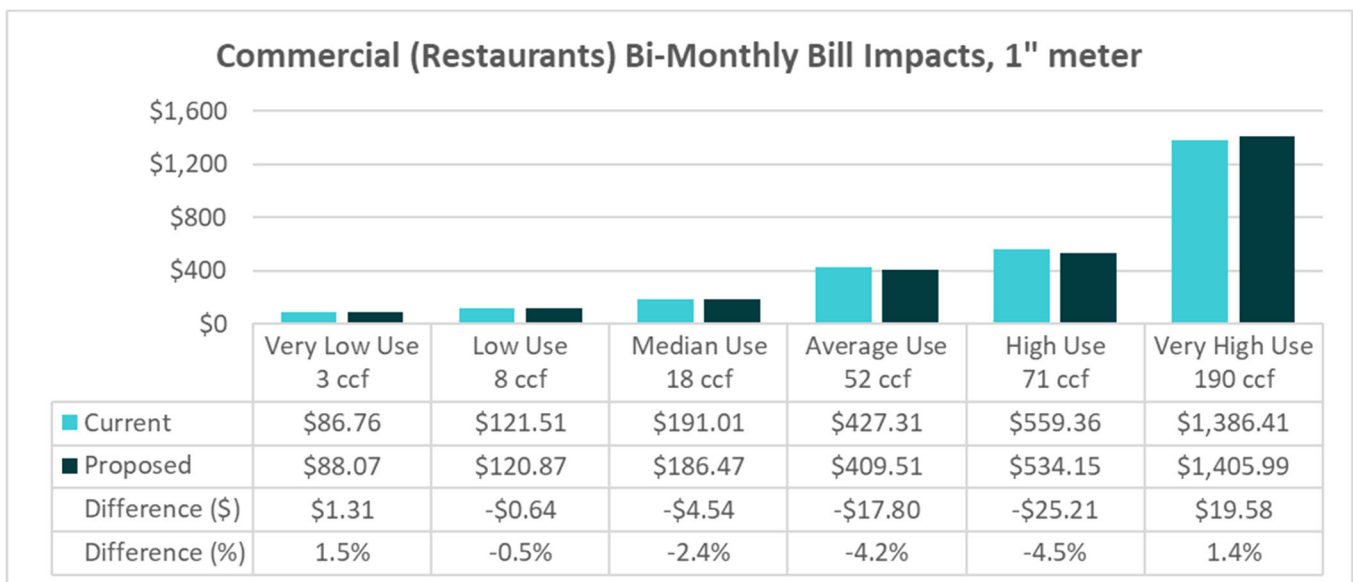
Figure 1-5 and **Figure 1-6** show the bi-monthly bill impacts at various levels of use for a typical Single Family Residential customer and a Commercial - Restaurant customer, respectively. The average Single Family Residential customer (with a 5/8" meter and using 15 ccf per bi-monthly period) will have an increase of \$1.48 in their bi-monthly bill.

Figure 1-5: Single Family Bill Impacts



Similarly, an average Commercial - Restaurant customer (with a 1" meter) will see a decrease of \$17.80 in their bi-monthly bill.

Figure 1-6: Commercial Restaurant Bill Impacts



Rate Survey

Raftelis prepared a survey of bi-monthly Single Family Residential and Commercial customer bills for several local agencies and agencies that also purchase SFPUC water. **Figure 1-7** and **Figure 1-8** show the Single Family bill comparison for a 5/8" meter using 15 ccf of water per bi-monthly billing period.

Figure 1-7: Single Family Bill Comparison with Local Non-SFPUC Agencies

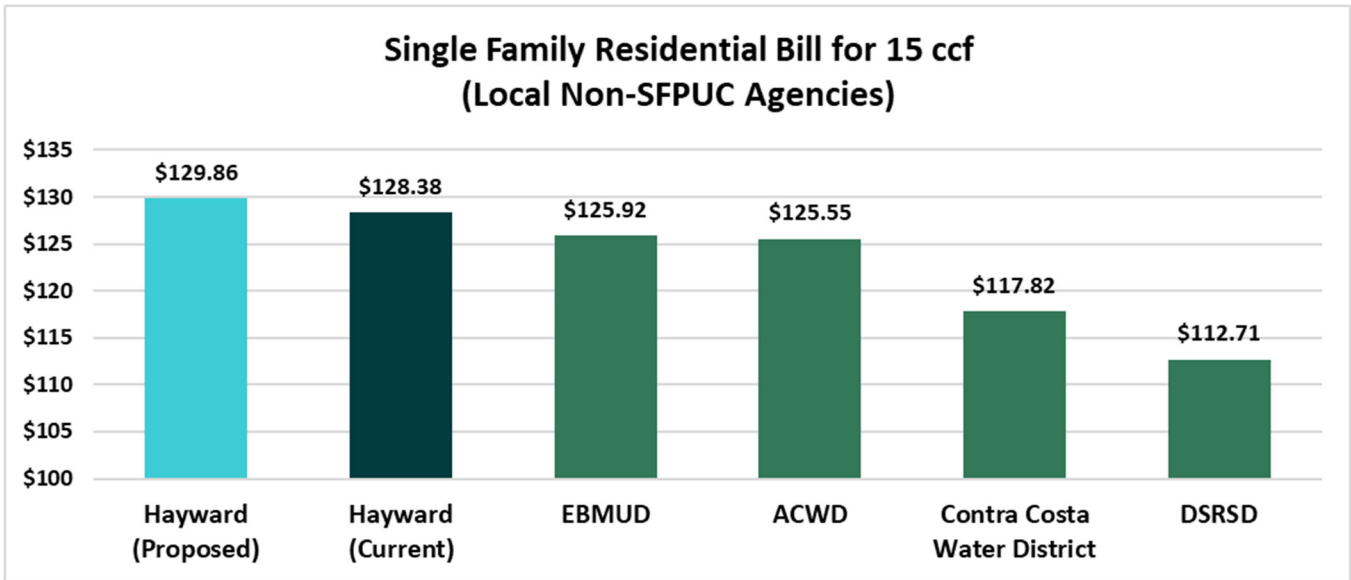


Figure 1-8: Single Family Bill Comparison with SFPUC Agencies

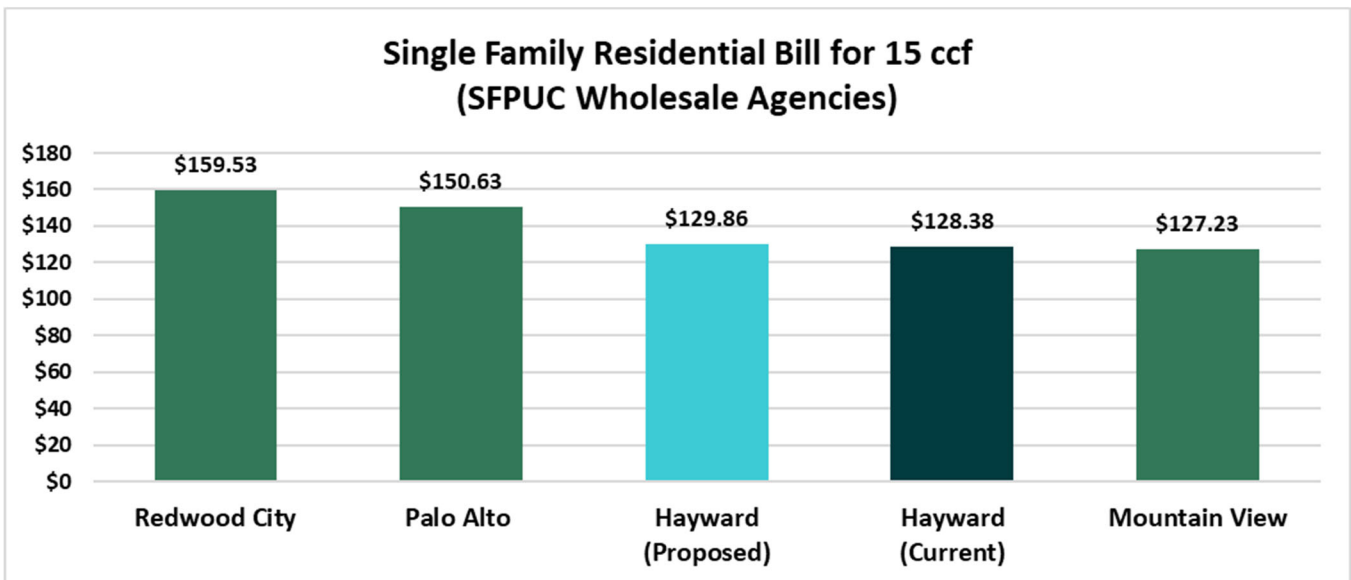


Figure 1-9 and **Figure 1-10** show the Commercial bill comparison for a 1” meter using 110 ccf of water per bi-monthly billing period. Water bills for the City’s customers are generally higher than those of the local agencies. However, this is mainly due to the cost of purchasing SFPUC water. Compared to the agencies in the area that also deliver SFPUC water, the City’s water bills are on the lower end.

Figure 1-9: Commercial Bill Comparison with Local Non-SFPUC Agencies

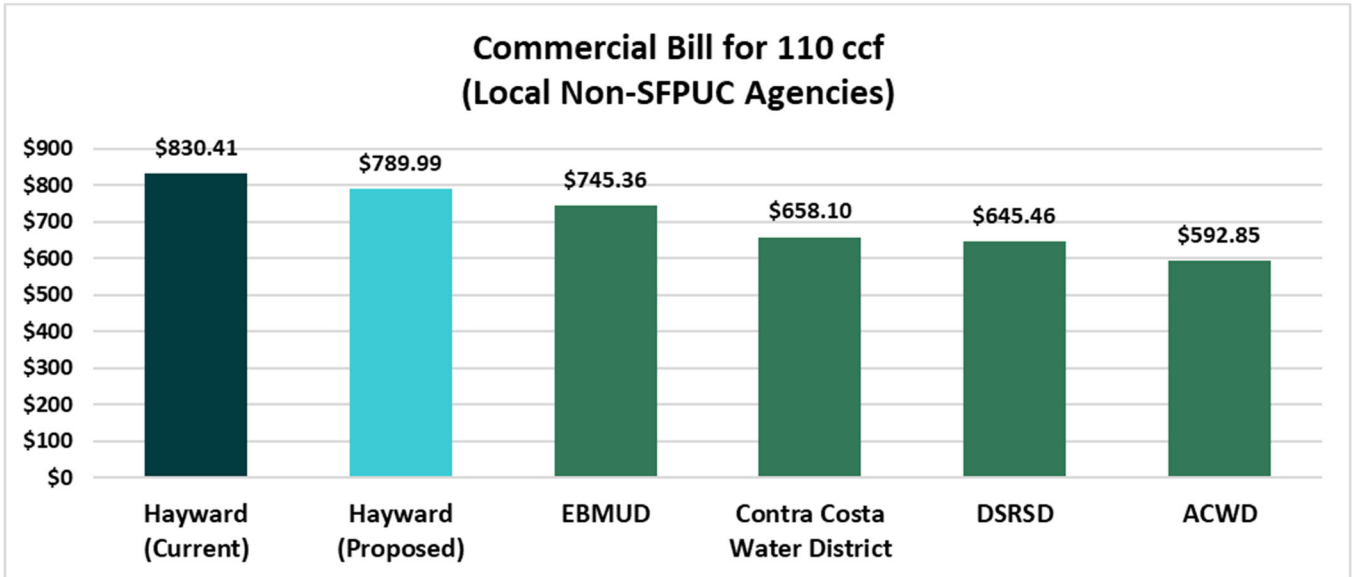
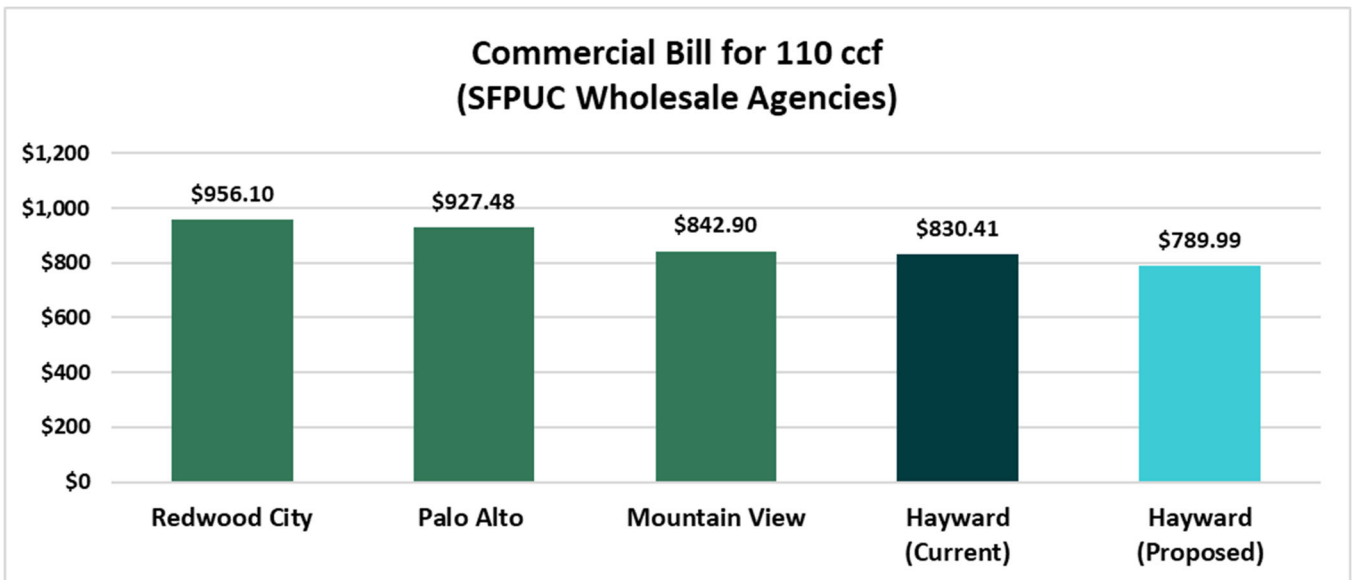


Figure 1-10: Commercial Bill Comparison with SFPUC Agencies



2 Financial Plan

This section of the report describes the water fund and proposed financial plan. To develop the financial plan, Raftelis projected annual revenues and expenses, modeled reserve balances, projected capital expenditures, and calculated debt service coverage to estimate the amount of additional rate revenue needed each year. Numbers shown in the tables of this section are rounded. Therefore, hand calculations based on the displayed numbers, such as summing or multiplying, may not equal the exact results shown.

Inflationary Assumptions

Inflationary factors are used to escalate the revenue and cost categories across the planning period, which for this study is from FY 2021 to FY 2026. The City’s most recent adopted revenue and expense budgets are for FY 2021. Raftelis worked with City staff to escalate individual budget line items according to the appropriate escalation factor. The escalation factors used to project revenues and expenses for the study period are shown in **Table 2-1**. These factors are based on industry indices, such as general inflation based on the CPI, and input from City staff.

Table 2-1: Escalation Factors

Line	A Escalation Factors	B FY 2022	C FY 2023	D FY 2024	E FY 2025	F FY 2026
1	Revenues					
2	Miscellaneous Revenues	0%	0%	0%	0%	0%
3	Interest Income	0.5%	0.5%	0.5%	0.5%	0.5%
4	Expenses					
5	General	3%	3%	3%	3%	3%
6	Salary	3%	3%	3%	3%	3%
7	Benefits	5%	5%	5%	5%	5%
8	Utilities	3%	3%	3%	3%	3%
9	Capital	4%	4%	4%	4%	4%
10	Water Purchase	5%	5%	5%	5%	5%

Current Water Rates

The City’s existing water rate structure includes a bi-monthly service charge based on meter size, tiered usage rates by customer class, and a bi-monthly fire service charge based on fire line diameter. Outside City customers are charged a 15% surcharge for each of the rates. Additionally, customers that qualify for a low income discount will pay a bi-monthly service charge equal to 35% of the charge for a ½” meter.

Table 2-2, **Table 2-3**, and **Table 2-4** shows the City’s current bi-monthly service charges, tiered usage rates, and bi-monthly fire service charges, respectively. The most recent water rates were adopted on January 1, 2021.

Table 2-2: Current Bi-Monthly Service Charges

Line	A Meter Size	B Inside City Charges	C Outside City Charges	D Hydrant Service
1	Low Income	\$11.20	\$12.96	
2	5/8"	\$32.00	\$36.80	
3	3/4"	\$43.51	\$50.04	\$12.00
4	1"	\$65.91	\$75.80	
5	1 1/2"	\$144.31	\$165.96	
6	2"	\$254.00	\$292.10	
7	3"	\$641.00	\$737.15	\$124.00
8	4"	\$1,269.80	\$1,460.27	\$194.00
9	6"	\$2,240.00	\$2,576.00	\$388.00
10	8"	\$3,101.00	\$3,566.15	
11	10"	\$3,734.80	\$4,295.02	

Table 2-3: Current Water Usage Rates (\$/ccf)

Line	A Customer Class	B Bi-Monthly Tiers (ccf)	C Inside City Charges	D Outside City Charges
1	Single Family			
2	Tier 1	8	\$5.80	\$6.67
3	Tier 2	25	\$7.14	\$8.21
4	Tier 3	25+	\$8.41	\$9.67
5	Residential 2-4			
6	Tier 1	8	\$6.43	\$7.39
7	Tier 2	25	\$7.15	\$8.22
8	Tier 3	25+	\$8.52	\$9.80
9	Multi-Family 5+			
10	Tier 1	8	\$6.97	\$8.02
11	Tier 2	20	\$7.23	\$8.31
12	Tier 3	20+	\$7.94	\$9.13
13	Non-Residential			
14	Tier 1	200	\$6.95	\$7.99
15	Tier 2	200+	\$8.29	\$9.53

Table 2-4: Current Bi-Monthly Fire Service Charges

Line	A Fire Line Diameter	B Inside City Charges	C Outside City Charges
1	2" and smaller	\$25.00	\$28.75
2	4"	\$29.00	\$33.35
3	6"	\$42.00	\$48.30
4	8"	\$42.00	\$48.30
5	10"	\$50.00	\$57.50

Customer Accounts and Usage

City staff provided detailed customer billing data for FY 2020, which included information such as customer class, billed consumption in ccf, meter size, and jurisdiction (Inside or Outside City) for each of the bi-monthly billing periods.

Table 2-5 shows the meter counts by customer class, meter size, and jurisdiction for FY 2021, which was provided by City staff. FY 2021 meter count data was used to represent the data most accurately for the starting fiscal year and to account for the customers that have stopped service in FY 2020.

Table 2-6 shows the water usage in ccf by customer class, tier, and jurisdiction for FY 2020. Water demand in FY 2020 is representative of the estimated baseline use for the City's customers. Water use in the City has largely stabilized after the last multi-year drought, which is consistent with the stabilization and hardening of demand that other agencies throughout California have observed.

We assume no growth in either customer demand or accounts throughout the study period to conservatively project future rate revenues and to consider the potential of near-term drought conditions.

Table 2-5: Customer Accounts by Class (FY 2021)

Line	A Customer Accounts	B Single Family	C Residential 2-4	D Multi- Family 5+	E Commercial / Industrial	F Irrigation	G Hydrant	H Private Fire	I Total (Less Fire)
1	Inside City								
2	Low Income	1,825	6	0	0	0	0	0	1,831
3	5/8"	21,921	281	20	834	94	0	0	23,150
4	3/4"	2,594	121	12	316	161	16	0	3,220
5	1"	3,016	191	163	634	376	0	5	4,380
6	1 1/2"	60	5	145	401	385	0	31	996
7	2"	4	3	165	430	209	0	30	811
8	3"	0	0	36	67	2	62	8	167
9	4"	0	0	19	32	1	0	264	52
10	6"	0	0	19	9	1	0	404	29
11	8"	0	0	4	4	0	0	408	8
12	10"	0	0	0	0	0	0	76	0
13	Subtotal - Inside City	29,420	607	583	2,727	1,229	78	1,226	34,644
14									
15	Outside City								
16	Low Income	4	0	0	0	0	0	0	4
17	5/8"	148	1	0	0	0	0	0	149
18	3/4"	25	0	0	0	0	0	0	25
19	1"	23	0	0	2	3	0	0	28
20	1 1/2"	4	0	0	2	1	0	0	7
21	2"	2	0	0	1	2	0	0	5
22	3"	0	0	0	1	1	0	0	2
23	4"	0	0	0	2	0	0	1	2
24	6"	0	0	0	0	0	0	4	0
25	8"	0	0	0	0	0	0	6	0
26	10"	0	0	0	0	0	0	0	0
27	Subtotal - Outside City	206	1	0	8	7	0	11	222
28									
29	Total - Accounts	29,626	608	583	2,735	1,236	78	1,237	34,866

Table 2-6: Water Use by Class (FY 2020)

Line	Tier	A	B	C	D	E	F	G	H	I
		Water Usage (ccf)								
		Single Family	Residential 2-4	Multi-Family 5+	Commercial / Industrial	Irrigation	Hydrant	Private Fire	Total	
1	Inside City									
2	Tier 1	1,243,875	77,022	803,840	770,067	416,290	37,523	13,569	3,362,186	
3	Tier 2	1,030,386	52,279	392,588	963,324	429,417			2,867,994	
4	Tier 3	219,012	5,185	32,129					256,326	
5	Subtotal - Inside City	2,493,273	134,486	1,228,557	1,733,391	845,707	37,523	13,569	6,486,506	
6										
7	Outside City									
8	Tier 1	9,189	96	0	2,272	0	0	0	11,557	
9	Tier 2	10,876	60	0	246	0			11,182	
10	Tier 3	7,393	0	0					7,393	
11	Subtotal - Outside City	27,458	156	0	2,518	0	0	0	30,132	
12										
13	Total - Water Usage (ccf)	2,520,731	134,642	1,228,557	1,735,909	845,707	37,523	13,569	6,516,638	

Projected Revenues at Current Rates

Table 2-7 shows the calculated rate revenues for FY 2022 through FY 2026 based on the City’s current water rates. The projected annual rate revenues for the bi-monthly service charges (Lines 1-9) are determined using the current bi-monthly service charges (**Table 2-2**) and bi-monthly fire service charges (**Table 2-4**) multiplied by the meter counts for each customer class and jurisdiction (**Table 2-5**) for six months. Similarly, the projected annual rate revenues for the usage rates (Lines 11-18) are determined using the current tiered usage rates (**Table 2-3**) multiplied by water use in ccf for each customer class and jurisdiction (**Table 2-6**). Note that the projected rate revenues stay constant from FY 2022 through FY 2026, which is a result of maintaining the same amount of customer accounts and level of water demand throughout the study period.

Table 2-7: Projected Rate Revenues

Line	A Projected Rate Revenues	B FY 2022	C FY 2023	D FY 2024	E FY 2025	F FY 2026
1	Service Charges					
2	Single Family	\$6,317,861	\$6,317,861	\$6,317,861	\$6,317,861	\$6,317,861
3	Residential 2-4	\$170,598	\$170,598	\$170,598	\$170,598	\$170,598
4	Multi-Family 5+	\$1,061,440	\$1,061,440	\$1,061,440	\$1,061,440	\$1,061,440
5	Commercial / Industrial	\$2,219,342	\$2,219,342	\$2,219,342	\$2,219,342	\$2,219,342
6	Irrigation	\$899,683	\$899,683	\$899,683	\$899,683	\$899,683
7	Hydrant	\$47,280	\$47,280	\$47,280	\$47,280	\$47,280
8	Private Fire	\$287,558	\$287,558	\$287,558	\$287,558	\$287,558
9	Subtotal - Service Charges	\$11,003,762	\$11,003,762	\$11,003,762	\$11,003,762	\$11,003,762
10						
11	Usage Rates					
12	Single Family	\$16,635,395	\$16,635,395	\$16,635,395	\$16,635,395	\$16,635,395
13	Residential 2-4	\$914,425	\$914,425	\$914,425	\$914,425	\$914,425
14	Multi-Family 5+	\$8,696,280	\$8,696,280	\$8,696,280	\$8,696,280	\$8,696,280
15	Commercial / Industrial	\$13,358,419	\$13,358,419	\$13,358,419	\$13,358,419	\$13,358,419
16	Irrigation	\$6,453,082	\$6,453,082	\$6,453,082	\$6,453,082	\$6,453,082
17	Hydrant	\$260,785	\$260,785	\$260,785	\$260,785	\$260,785
18	Subtotal - Usage Rates	\$46,318,387	\$46,318,387	\$46,318,387	\$46,318,387	\$46,318,387
19						
20	Total - Rate Revenue	\$57,322,148	\$57,322,148	\$57,322,148	\$57,322,148	\$57,322,148

Projected Revenues

Table 2-8 shows the water enterprise’s projected revenues for the study period. City staff provided the budgeted revenues for FY 2021 (Column B). Water rate revenues (Line 2) are equal to the calculated rate revenues at current rates (**Table 2-7**, Line 20) for FY 2022 and beyond.

Miscellaneous, non-rate revenues (Lines 3-7) are inflated using the corresponding revenue escalation factor (**Table 2-1**, Line 2). Interest income (Line 8) is calculated based on the reserve interest rate (**Table 2-1**, Line 3) and projected fund balances. The water enterprise receives a reimbursement from the sewer enterprise for billing costs (Line 9); these revenues are escalated based on O&M expenses.

Table 2-8: Projected Revenues

Line	A Projected Revenues	B FY 2021	C FY 2022	D FY 2023	E FY 2024	F FY 2025	G FY 2026
1	Operating Revenues						
2	Water Rate Revenues	\$54,000,000	\$57,322,148	\$57,322,148	\$57,322,148	\$57,322,148	\$57,322,148
3	Water Installation Fees	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000
4	Other Fees	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000
5							
6	Non-Operating Revenue						
7	ISF - Fleet	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
8	Interest Income	\$105,000	\$231,884	\$202,154	\$174,326	\$178,075	\$170,109
9	Reimbursement for Billing	\$819,970	\$848,669	\$878,372	\$909,115	\$940,934	\$973,867
10							
11	Total - Revenue	\$55,434,970	\$58,912,702	\$58,912,675	\$58,915,589	\$58,951,158	\$58,976,125

Estimated Purchased Water Costs

The City purchases all of its water from the San Francisco Public Utilities Commission. The water utility’s annual purchased water cost includes a variable rate per ccf of water, a fixed meter charge, and a fixed debt refinance surcharge paid to the Bay Area Water Supply and Conservation Agency (BAWSCA), of which the City is a member agency.

Table 2-9 shows the purchased water cost calculations for the study period. The City estimates 6% water loss (Line 1), which is based on the four-year average water loss from 2016 through 2019. Water demand (Line 3) is equal to the total water use for all customers (**Table 2-6**, Column I, Line 13). The amount of water produced (Line 4) is based on water demand accounting for water loss.

City staff provided current and estimated future SFPUC water costs by ccf of water produced (Line 6); the rate for FY 2022 has been adopted by SFPUC, whereas all other rates are estimates from staff. Fixed meter charges (Line 8) are inflated by the expense escalation factor for water purchases (**Table 2-1**, Line 10). City staff provided the amount for the BAWSCA refinance surcharge (Line 9), which is expected to stay constant for the study period. SFPUC water costs (Line 10) are calculated by multiplying the water produced (Line 4) by the variable water cost (Line 6) for each year.

Table 2-9: Purchased Water Costs

Line	A Water Purchases	B FY 2022	C FY 2023	D FY 2024	E FY 2025	F FY 2026
1	Water Loss	6.0%	6.0%	6.0%	6.0%	6.0%
2						
3	Water Demand (ccf)	6,516,638	6,516,638	6,516,638	6,516,638	6,516,638
4	Water Produced (ccf)	6,932,594	6,932,594	6,932,594	6,932,594	6,932,594
5						
6	SFPUC Water Cost (\$/ccf)	\$4.10	\$4.19	\$4.87	\$5.03	\$5.45
7						
8	Fixed Meter Charges	\$267,271	\$280,635	\$294,666	\$309,400	\$324,870
9	BAWSCA Refinance Surcharge	\$2,772,684	\$2,772,684	\$2,772,684	\$2,772,684	\$2,772,684
10	SFPUC Water Cost	\$28,423,634	\$29,047,567	\$33,761,731	\$34,870,946	\$37,782,635
11	Purchased Water Cost	\$31,463,589	\$32,100,886	\$36,829,081	\$37,953,030	\$40,880,189

Projected O&M Expenses

Table 2-10 summarizes the projected O&M expenses for the study period. City staff provided the adopted budget for FY 2021, which was inflated for future years using the expense escalation factors (**Table 2-1**). Water purchase costs (Line 4) is equal to the calculated costs (**Table 2-9**, Line 11) from FY 2022 and beyond. Water purchase costs, which are mostly comprised of direct purchases from SFPUC, represent 68% of the City’s water operating budget, on average.

Table 2-10: Projected O&M Expenses

Line	A Operating Expenses	B FY 2021	C FY 2022	D FY 2023	E FY 2024	F FY 2025	G FY 2026
1	Personnel Services	\$8,430,601	\$8,751,324	\$9,084,834	\$9,431,673	\$9,792,406	\$10,167,626
2	Operations	\$3,865,433	\$3,981,396	\$4,100,838	\$4,223,863	\$4,350,579	\$4,481,096
3	Internal Service Charges	\$1,155,758	\$1,193,850	\$1,233,222	\$1,273,917	\$1,315,981	\$1,359,460
4	Water Purchase Cost	\$33,500,000	\$31,463,589	\$32,100,886	\$36,829,081	\$37,953,030	\$40,880,189
5	Other Expenditures	\$1,811,419	\$1,859,249	\$1,908,513	\$1,959,256	\$2,011,521	\$2,065,354
6	Total - O&M Expenses	\$48,763,211	\$47,249,408	\$48,428,293	\$53,717,790	\$55,423,517	\$58,953,726

Existing Debt Service

Table 2-11 shows the City’s existing debt service. The water enterprise currently has one outstanding debt for a Certificate of Participation issued in 2004, which will retire at the end of FY 2025. The City does not expect to issue any additional debt to fund capital projects for this study period.

Table 2-11: Existing Debt Service

Line	A Existing Debt Service	B FY 2021	C FY 2022	D FY 2023	E FY 2024	F FY 2025	G FY 2026
1	2004 COP						
2	Principal	\$479,467	\$487,444	\$505,529	\$523,594	\$526,603	\$0
3	Interest	\$66,069	\$52,812	\$39,687	\$26,117	\$12,128	\$0
4	Total	\$545,536	\$540,256	\$545,216	\$549,711	\$538,731	\$0

Capital Project Funding

Table 2-12 details the City’s capital improvement plan for the water enterprise. City staff provided the 10-year adopted CIP based on current year dollars. From FY 2022 onward, CIP costs are inflated using the expense escalation factor for capital (**Table 2-1**, Line 9). The full 10-year CIP is shown in **Appendix A**. The City expects to fully fund its water capital program using cash from rate revenues and reserves.

Table 2-12: Inflated Capital Improvement Plan

Line	A Capital Projects	B FY 2021	C FY 2022	D FY 2023	E FY 2024	F FY 2025	G FY 2026
1	Replacement Projects						
2	Miscellaneous Hydrant Replacement Program	\$35,000	\$36,400	\$37,856	\$39,370	\$40,945	\$42,583
3	AMI Customer Portal	\$150,000	\$104,000	\$108,160	\$112,486	\$116,986	\$121,665
4	Project Predesign Services	\$25,000	\$26,000	\$27,040	\$28,122	\$29,246	\$30,416
5	City Irrigation System Backflow Replacements	\$10,000	\$10,400	\$10,816	\$11,249	\$11,699	\$12,167
6	Water Efficiency Program	\$100,000	\$104,000	\$108,160	\$112,486	\$116,986	\$121,665
7	Annual System Replacement Program	\$150,000	\$156,000	\$162,240	\$168,730	\$175,479	\$182,498
8	Water Pump Station Valve Repair & Upgrade	\$75,000	\$0	\$0	\$0	\$0	\$0
9	Cast Iron Water Pipeline Replacement - Local Streets	\$500,000	\$520,000	\$540,800	\$562,432	\$584,929	\$608,326
10	250' P/S Motor Starter Replacements	\$150,000	\$0	\$0	\$0	\$0	\$0
11	Annual Line Repairs FY21	\$500,000	\$0	\$0	\$0	\$0	\$0
12	Annual Line Replacements - FY 21	\$2,500,000	\$0	\$0	\$0	\$0	\$0
13	Annual Line Replacements - FY22-30	\$0	\$3,640,000	\$3,785,600	\$3,937,024	\$4,094,505	\$4,258,285
14	Annual Line Repairs FY22-30	\$0	\$312,000	\$324,480	\$337,459	\$350,958	\$364,996
15	Annual Pavement Patching FY21-30	\$25,000	\$26,000	\$27,040	\$28,122	\$29,246	\$30,416
16	Hesperian P/S Main Breaker Replacement	\$100,000	\$0	\$0	\$0	\$0	\$0
17	Hesperian P/S VFD & Motor Drive Replacement	\$250,000	\$0	\$0	\$0	\$0	\$0
18	Water System RRA Mitigation Measures	\$50,000	\$52,000	\$0	\$0	\$0	\$0
19	Main Street Water Main Replacement	\$500,000	\$0	\$0	\$0	\$0	\$0
20	Subtotal - Replacement Projects	\$5,120,000	\$4,986,800	\$5,132,192	\$5,337,480	\$5,550,979	\$5,773,018
21							
22	Improvement Projects						
23	Project Predesign Services	\$15,000	\$15,600	\$16,224	\$16,873	\$17,548	\$18,250
24	GIS Data Development and Conversion	\$75,000	\$52,000	\$54,080	\$56,243	\$58,493	\$60,833
25	Safety Improvements to Utility Center Corp. Yard Storage	\$25,000	\$0	\$0	\$0	\$0	\$0
26	New Pressure Regulating Stations at New 265' Zone	\$500,000	\$2,350,400	\$2,444,416	\$2,542,193	\$2,643,880	\$2,749,636
27	SCADA Replacement & Upgrade	\$60,000	\$20,800	\$21,632	\$22,497	\$23,397	\$24,333
28	Seismic Retrofit Maitland Reservoir and Appurtenances	\$0	\$1,667,120	\$0	\$0	\$0	\$0
29	New 3 MG Reservoir at High School Reservoir Site	\$0	\$0	\$0	\$0	\$1,052,873	\$7,299,917
30	New Alternative Feed Pipelines	\$150,000	\$156,000	\$0	\$0	\$0	\$0
31	New Emergency Well B2 (TBD-FY22)	\$0	\$520,000	\$4,326,400	\$0	\$0	\$0
32	New 2 MG Reservoir & Booster Station at Hesperian Site	\$0	\$1,560,000	\$9,193,600	\$0	\$0	\$0
33	Weather Based Irrigation Controllers at Various Locations	\$20,000	\$20,800	\$21,632	\$22,497	\$23,397	\$24,333
34	Groundwater Sustainability Plan Projects (TBD-FY23)	\$0	\$416,000	\$1,297,920	\$1,349,837	\$1,403,830	\$1,459,983
35	Subtotal - Improvement Projects	\$845,000	\$6,778,720	\$17,375,904	\$4,010,140	\$5,223,418	\$11,637,285
36							
37	Total - Capital Projects	\$5,965,000	\$11,765,520	\$22,508,096	\$9,347,620	\$10,774,397	\$17,410,303

Recommended Reserve Policy

Raftelis worked with City staff to understand the needs of the water utility and to develop a recommendation for the reserve policy, which is listed in **Table 2-13**. Our recommendation includes the following components:

- » **Operating:** The City bills customers on a bi-monthly billing cycle, which can impact cash flows since revenues are collected six times, while expenses may be incurred twelve times per year (monthly). The recommended operating reserve target allows the City to maintain adequate cash flow throughout the year and to fund planned O&M expenses, as well as any unexpected operating costs that may arise.
- » **Capital:** Capital expenditures over the planning horizon represent a significant portion of the City’s annual costs, apart from water supply purchases. However, capital spending can often be unpredictable and subject to changing schedules and cost estimates. Since the City is expecting to cash fund the entirety of the water CIP, maintaining adequate reserves is even more critical. The recommended capital reserve target provides the City with cash on hand to adequately fund each year’s planned capital projects.
- » **Rate Stabilization:** Although water purchase costs are expected to increase by 5% per year on average, City staff expressed concern over the potential financial risks of an unanticipated rate increase from SFPUC. The recommended rate stabilization reserve target will help reduce the need for unreasonable rate increases and smooth out water rates, even in the instance of an unexpected increase in water purchase costs.

In total, the recommended reserve policy calls for a target balance in FY 2022 of approximately \$37.75 million or 353 days cash on hand. The resulting reserve target is similar to the City’s existing informal policy of 365 days of working capital, while identifying specific reserve components to convey cash needs more clearly to the City’s customers.

Table 2-13: Recommended Reserve Policy

Line	A Reserve Targets	B Recommended Target Policy	C FY 2022 Target
1	Operating	25% O&M Expenses	\$11,812,352
2	Capital	One Year of 5-year Average CIP	\$14,361,187
3	Rate Stabilization	25% of Commodity Revenues	\$11,579,597
4	Total		\$37,753,136
5			
6	<i>Days Cash on Hand</i>		353

Status Quo Financial Plan

Table 2-14 shows the projected financial plan based on revenues at existing rates with no adjustments, or the “status quo” scenario. Revenues (Lines 1-7) are derived from **Table 2-8**. Note that revenues from interest income in the status quo scenario is lower, due to a decrease in fund balances. O&M expenses (Lines 9-12) are derived from **Table 2-10**. Existing debt service (Line 16) and cash funded CIP (Line 18) are derived from **Table 2-11** and **Table 2-12**, respectively.

Net revenue (Line 14) is equal to total revenues (Line 7) less O&M expenses (Line 12). Net cash flow (Line 20) is equal to net revenue less debt service (Line 16) and cash funded CIP (Line 18). Debt coverage (Line 23) is calculated by dividing net revenue by debt service. The water utility is expected to meet coverage requirements even without additional revenue adjustments. City staff provided beginning fund balances for FY 2021 (Column B, Line 26). Ending balances (Line 27) are calculated by adding beginning balances to net cash flow (Line 20). The reserve target is derived from the recommendations provided in **Table 2-13**. Under the status quo scenario, the water fund will not meet reserve targets from FY 2023 onward.

Table 2-14: Projected Financial Plan (Status Quo)

Line	A Financial Plan	B FY 2021	C FY 2022	D FY 2023	E FY 2024	F FY 2025	G FY 2026
1	Revenues						
2	Water Rate Revenue	\$54,000,000	\$57,322,148	\$57,322,148	\$57,322,148	\$57,322,148	\$57,322,148
3	Revenue Adjustments	\$0	\$0	\$0	\$0	\$0	\$0
4	Other Operating Revenue	\$450,000	\$450,000	\$450,000	\$450,000	\$450,000	\$450,000
5	Non-Operating Revenue	\$879,970	\$908,669	\$938,372	\$969,115	\$1,000,934	\$1,033,867
6	Interest Income	\$105,000	\$231,884	\$198,930	\$155,812	\$124,498	\$61,316
7	Total - Revenues	\$55,434,970	\$58,912,702	\$58,909,451	\$58,897,076	\$58,897,581	\$58,867,332
8							
9	O&M Expenses						
10	Water Purchase Cost	\$33,500,000	\$31,463,589	\$32,100,886	\$36,829,081	\$37,953,030	\$40,880,189
11	Other O&M Expenses	\$15,263,211	\$15,785,819	\$16,327,407	\$16,888,709	\$17,470,487	\$18,073,537
12	Total - O&M Expenses	\$48,763,211	\$47,249,408	\$48,428,293	\$53,717,790	\$55,423,517	\$58,953,726
13							
14	Net Revenue	\$6,671,759	\$11,663,293	\$10,481,157	\$5,179,286	\$3,474,064	(\$86,394)
15							
16	Existing Debt Service	\$545,536	\$540,256	\$545,216	\$549,711	\$538,731	\$0
17							
18	Cash Funded CIP	\$5,965,000	\$11,765,520	\$22,508,096	\$9,347,620	\$10,774,397	\$17,410,303
19							
20	Net Cash Flow	\$161,223	(\$642,483)	(\$12,572,154)	(\$4,718,045)	(\$7,839,064)	(\$17,496,697)
21							
22	Debt Coverage						
23	Calculated	12.23	21.59	19.22	9.42	6.45	N/A
24	Required	1.10	1.10	1.10	1.10	1.10	N/A
25							
26	Beginning Balance	\$46,652,814	\$46,814,037	\$46,171,554	\$33,599,400	\$28,881,355	\$21,042,291
27	Ending Balance	\$46,814,037	\$46,171,554	\$33,599,400	\$28,881,355	\$21,042,291	\$3,545,594
28							
29	Reserve Target	\$35,842,526	\$37,753,136	\$37,924,245	\$37,063,672	\$38,031,999	\$38,914,551
30	<i>Operating</i>	<i>\$12,190,803</i>	<i>\$11,812,352</i>	<i>\$12,107,073</i>	<i>\$13,429,448</i>	<i>\$13,855,879</i>	<i>\$14,738,431</i>
31	<i>Replacement Capital</i>	<i>\$5,225,490</i>	<i>\$5,356,094</i>	<i>\$5,686,053</i>	<i>\$6,040,027</i>	<i>\$6,408,160</i>	<i>\$6,408,160</i>
32	<i>Improvement Capital</i>	<i>\$6,846,637</i>	<i>\$9,005,094</i>	<i>\$8,551,522</i>	<i>\$6,014,601</i>	<i>\$6,188,362</i>	<i>\$6,188,362</i>
33	<i>Rate Stabilization</i>	<i>\$11,579,597</i>	<i>\$11,579,597</i>	<i>\$11,579,597</i>	<i>\$11,579,597</i>	<i>\$11,579,597</i>	<i>\$11,579,597</i>

Figure 2-1 shows the projected status quo financial plan in graphical format. The bars represent the water utility’s cash needs: water purchases (light blue), O&M expenses (medium blue), debt service (red), capital projects (yellow), and reserve funding (light green). The solid line represents the current revenues, which is below the stacked bars for all years of the period, signifying that the City’s water revenues are not sufficient to fund its costs.

Figure 2-1: Projected Financial Plan (Status Quo)

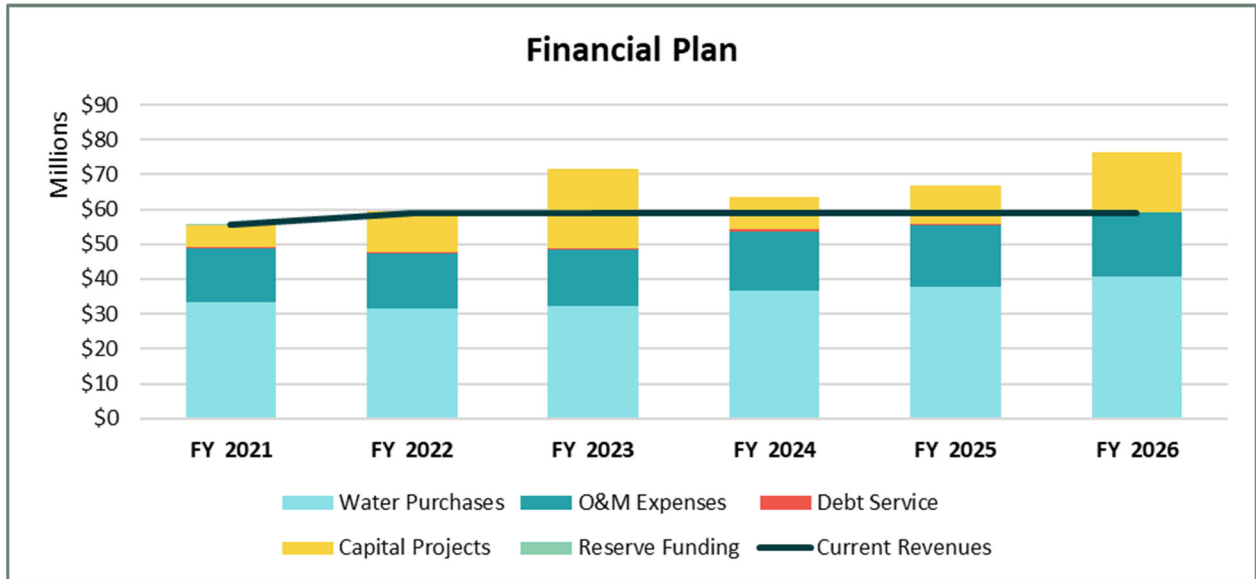
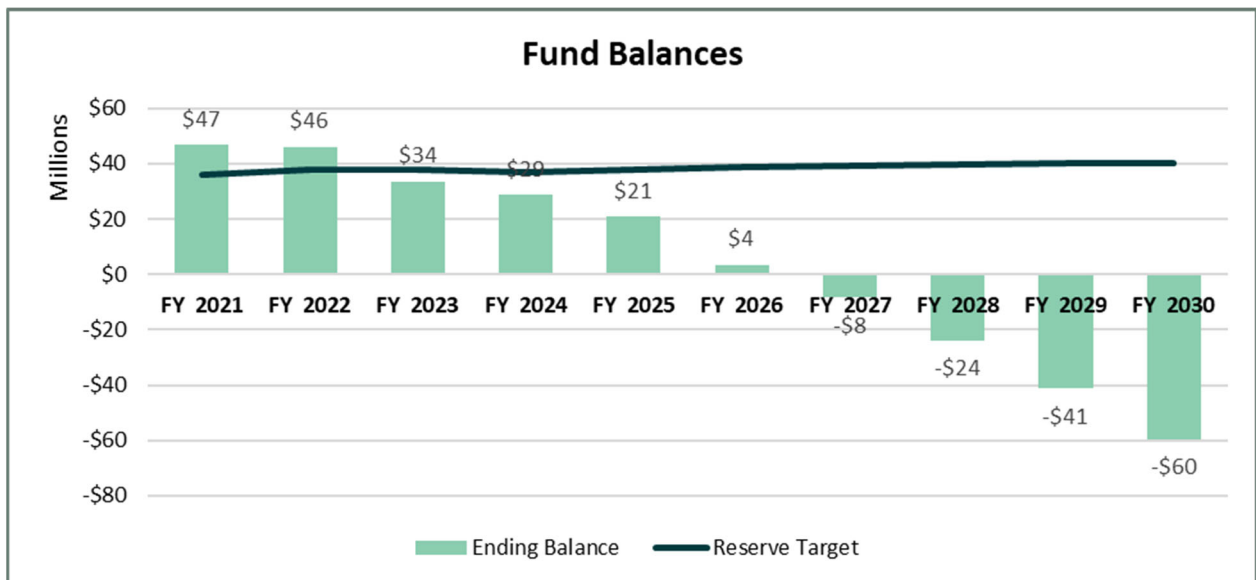


Figure 2-2 shows the projected fund balances under the status quo scenario for a 10-year period. The light green bars represent the ending balances of the water fund, and the solid line represents the reserve target amounts. The water fund will be depleted following FY 2026 and become negative in FY 2027.

Figure 2-2: Projected Fund Balances (Status Quo)



Proposed Financial Plan

Table 2-15 shows the proposed revenue adjustments that allows the City to maintain financial sufficiency, fund operating and capital expenses, and build up cash reserves over a 10-year period to achieve the recommended target. The planning period for the study includes five years of projections, which is reflected in the tables of the report that show information for FY 2021 to FY 2026. However, the City has opted to build up its water reserves over a 10-year period (as opposed to over five years) to minimize customer impacts; thus, the fund balance graphs shown in this section of the report will show information for the longer planning period of FY 2021 to FY 2030.

The proposed revenue adjustments represent the increase to total rate revenues required to recover the water utility’s costs and not the expected impact to each customer class. The proposed revenue adjustment for FY 2022 is zero, meaning that the resulting rates shown in later sections of this report are revenue neutral and are intended to recover the same amount of revenue the City’s water utility currently collects. Revenue adjustments in subsequent years are applied across all charges, classes, and tiers proportional to the base year rates developed for FY 2022. The revenue adjustments are effective on October 1 of every year.

Table 2-15: Proposed Revenue Adjustments

Line	A Revenue Adjustments	B FY 2022	C FY 2023	D FY 2024	E FY 2025	F FY 2026
1	Effective Month	October	October	October	October	October
2	Percent Adjustment	0%	3%	7%	7%	5%

Table 2-16 shows the projected financial plan with the proposed revenue adjustments in **Table 2-15** applied to the water rate revenues. Revenues from interest income (Line 6) are greater than those shown in the status quo scenario (**Table 2-14**, Line 6) due to additional cash from the proposed adjustments. O&M expenses (Line 12), debt service (Line 16), and cash funded CIP (Line 18) are the same as the status quo scenario.

Net cash flow (Line 20) is positive in FY 2021, FY 2024, and FY 2025, which means that the City will be funding its reserves in those years. Net cash flow is negative for all other years, which means that the City will be drawing down its water fund to pay for capital costs. The ending balances (Line 27) will not meet the recommended reserve target (Line 29) from FY 2023 onward. The City will instead build up its water reserves over a 10-year period, as shown in **Figure 2-4**, to reduce the financial impact to customers to the extent possible while ensuring long-term financial sufficiency.

Table 2-16: Projected Financial Plan (Proposed Adjustments)

Line	A Financial Plan	B FY 2021	C FY 2022	D FY 2023	E FY 2024	F FY 2025	G FY 2026
1	Revenues						
2	Water Rate Revenue	\$54,000,000	\$57,322,148	\$57,322,148	\$57,322,148	\$57,322,148	\$57,322,148
3	Revenue Adjustments	\$0	\$0	\$1,289,748	\$4,819,360	\$9,169,265	\$12,809,710
4	Other Operating Revenue	\$450,000	\$450,000	\$450,000	\$450,000	\$450,000	\$450,000
5	Non-Operating Revenue	\$879,970	\$908,669	\$938,372	\$969,115	\$1,000,934	\$1,033,867
6	Interest Income	\$105,000	\$231,884	\$202,154	\$174,326	\$178,075	\$170,109
7	Total - Revenues	\$55,434,970	\$58,912,702	\$60,202,423	\$63,734,949	\$68,120,423	\$71,785,834
8							
9	O&M Expenses						
10	Water Purchase Cost	\$33,500,000	\$31,463,589	\$32,100,886	\$36,829,081	\$37,953,030	\$40,880,189
11	Other O&M Expenses	\$15,263,211	\$15,785,819	\$16,327,407	\$16,888,709	\$17,470,487	\$18,073,537
12	Total - O&M Expenses	\$48,763,211	\$47,249,408	\$48,428,293	\$53,717,790	\$55,423,517	\$58,953,726
13							
14	Net Revenue	\$6,671,759	\$11,663,293	\$11,774,130	\$10,017,159	\$12,696,906	\$12,832,108
15							
16	Existing Debt Service	\$545,536	\$540,256	\$545,216	\$549,711	\$538,731	\$0
17							
18	Cash Funded CIP	\$5,965,000	\$11,765,520	\$22,508,096	\$9,347,620	\$10,774,397	\$17,410,303
19							
20	Net Cash Flow	\$161,223	(\$642,483)	(\$11,279,182)	\$119,828	\$1,383,779	(\$4,578,195)
21							
22	Debt Coverage						
23	Calculated	12.23	21.59	21.60	18.22	23.57	N/A
24	Required	1.10	1.10	1.10	1.10	1.10	N/A
25							
26	Beginning Balance	\$46,652,814	\$46,814,037	\$46,171,554	\$34,892,373	\$35,012,201	\$36,395,979
27	Ending Balance	\$46,814,037	\$46,171,554	\$34,892,373	\$35,012,201	\$36,395,979	\$31,817,785
28							
29	Reserve Target	\$35,842,526	\$37,753,136	\$38,184,786	\$38,037,227	\$39,884,274	\$41,502,229
30	<i>Operating</i>	<i>\$12,190,803</i>	<i>\$11,812,352</i>	<i>\$12,107,073</i>	<i>\$13,429,448</i>	<i>\$13,855,879</i>	<i>\$14,738,431</i>
31	<i>Replacement Capital</i>	<i>\$5,225,490</i>	<i>\$5,356,094</i>	<i>\$5,686,053</i>	<i>\$6,040,027</i>	<i>\$6,408,160</i>	<i>\$6,408,160</i>
32	<i>Improvement Capital</i>	<i>\$6,846,637</i>	<i>\$9,005,094</i>	<i>\$8,551,522</i>	<i>\$6,014,601</i>	<i>\$6,188,362</i>	<i>\$6,188,362</i>
33	<i>Rate Stabilization</i>	<i>\$11,579,597</i>	<i>\$11,579,597</i>	<i>\$11,840,138</i>	<i>\$12,553,151</i>	<i>\$13,431,872</i>	<i>\$14,167,275</i>

Figure 2-3 shows the projected financial plan with the proposed revenue adjustments. The dotted line represents the proposed revenues with adjustments applied.

Figure 2-3: Projected Financial Plan (Proposed Adjustments)

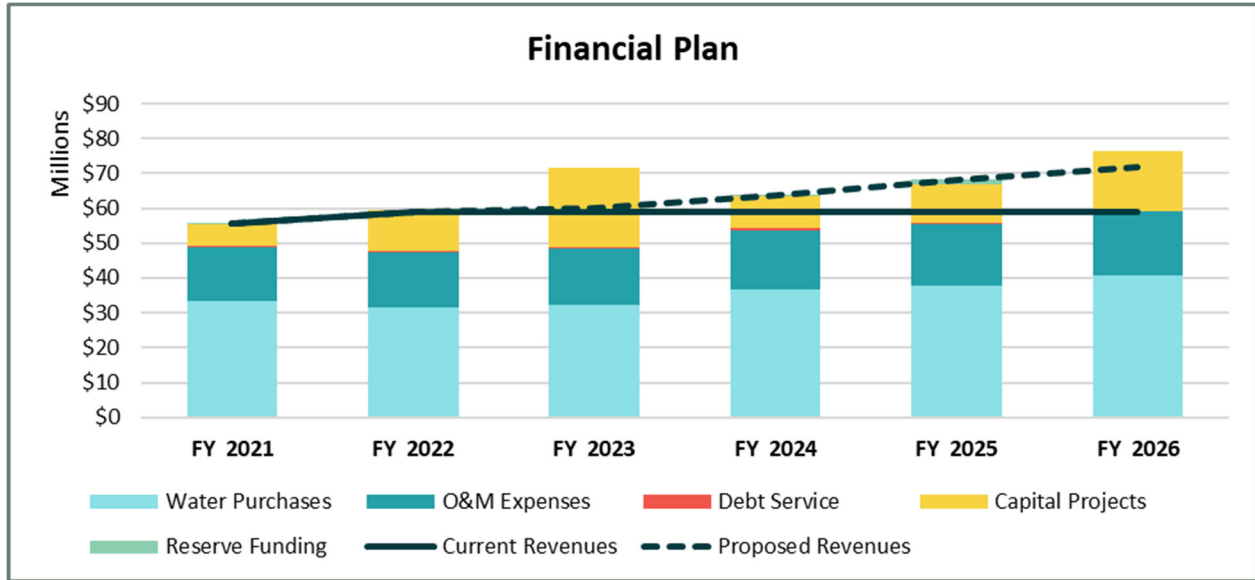
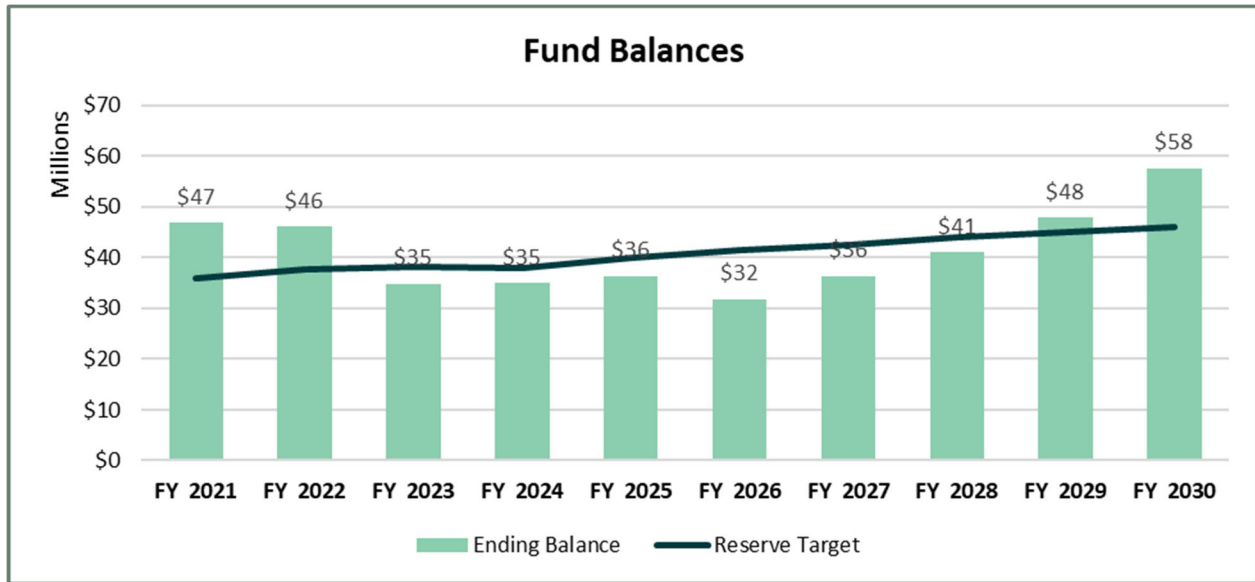


Figure 2-4 shows the projected fund balances with the proposed adjustments in Table 2-15 applied over a 10-year period³. The City’s water fund is expected to meet its recommended reserve target starting in FY 2029.

Figure 2-4: Projected Fund Balances (Proposed Adjustments)



³ Table 2-15 shows revenue adjustments for FY 2022 through FY 2026. The results in Figure 2-4 assume that the City will implement a 5% revenue adjustment from FY 2027 through FY 2030.

3 Rate Structure Modifications

This section of the report describes the City’s water rate objectives, proposed rate structure modifications, and proposed tier definitions. These modifications to the water rate structure are reflected in the COS analysis and rate derivation shown in **Sections 4** and **5** of the report.

Rate Objectives

Raftelis worked with City staff to prioritize objectives for the proposed water rates, which include:

- » Improving fairness and equity between customer classes
- » Simplifying the rate structure to enhance customer understanding
- » Ensuring affordability for essential needs
- » Minimizing impacts to customers to the extent possible

Proposed Rate Structure Modifications

Raftelis worked with City staff to determine the most appropriate water rate structure to meet the City’s rate objectives and reflect new-normal customer demand patterns. The existing rate structure is generally maintained (i.e., three-tier rates for Residential customers and two-tier rates for Non-Residential), however, we recommend the following rate structure modifications:

- » **Harmonize Residential Rate Classes:** Combining Single Family, Residential 2-4 Units, and Multi-Family 5+ Units into one Residential class will simplify the rate structure, which enhances customer understanding and may reduce an administrative burden on City staff. Additionally, a single Residential rate class ensures equity among groups of similar users by providing each household with the same allotment of water in each tier, and particularly the first tier, which represents the indoor needs of residential customers.
- » **Separate Non-Residential Classes for Commercial/Industrial and Irrigation Users:** Based on our analysis of City water demand patterns, Irrigation customers produce a significantly higher peak on the water system, relative to Commercial/Industrial users. This is consistent across similar agencies, and the industry, as irrigation demands are highly seasonal. To ensure that Irrigation users pay their fair share of system capacity costs, we recommend separating Non-Residential into these two distinct classes.
- » **Eliminate Outside City Surcharge:** The City’s existing rate structure includes a 15% surcharge for Outside City customer rates, which accounts for 0.1% of the total water rate revenue. While the surcharge would be justified, eliminating the surcharge will simplify the rate structure to enhance customer understanding and reduce administrative burden. City staff currently updates the Outside City cost analysis during every rate study process. Due to the immaterial amount of revenue derived from the surcharge, implementing this change will result in negligible financial impacts.
- » **Revised Tier Definitions for Residential, Commercial/Industrial, and Irrigation Users:** The following subsection describes the proposed tier definitions and rationale. The revised tiers represent the City’s new baseline use and were developed by analyzing the water demand patterns in FY 2020 for each customer class. The existing tier definitions were developed in 2009.

Proposed Tiers

Table 3-1 shows the proposed bi-monthly tiers for the Residential, Commercial/Industrial, and Irrigation customer classes.

For Residential classes (Single Family, Residential 2-4, and Multi-Family 5+), Tier 1 is proposed to remain at 8 ccf of water for a bi-monthly billing period, which represents low winter water use, on average, for the class. The proposed Tier 2 is equal to 18 ccf of water, which represents peak summer use, on average, for the class. The revised Tier 2 definition reflects long-term reductions in Residential water use, particularly for irrigation purposes. Tier 1 provides water for essential indoor use, whereas Tier 2 provides water for outdoor needs. All use greater than 18 ccf will fall into the proposed Tier 3.

For Non-Residential customer classes (Commercial/Industrial and Irrigation), the proposed Tier 1 definition represents the average bi-monthly water use for each class. For Commercial/Industrial customers, the average bi-monthly water use for the class is 110 ccf. All use higher than 110 ccf will fall into the proposed Tier 2. For Irrigation customers, the average bi-monthly water use for the class is 170 ccf. All use higher than 170 ccf will fall into the proposed Tier 2.

Table 3-1: Proposed Bi-Monthly Tiers

Line	Bi-Monthly Tiers	A	B	C	D
			Current Tiers (ccf)	Proposed Tiers (ccf)	Rationale
1	Single Family				
2	Tier 1		8	8	Low winter use
3	Tier 2		25	18	Peak summer use
4	Tier 3		25+	18+	Above Tier 2
5					
6	Residential 2-4 (avg. use per dwelling unit)				
7	Tier 1		8	8	Low winter use
8	Tier 2		25	18	Peak summer use
9	Tier 3		25+	18+	Above Tier 2
10					
11	Multi-Family 5+ (avg. use per dwelling unit)				
12	Tier 1		8	8	Low winter use
13	Tier 2		20	18	Peak summer use
14	Tier 3		20+	18+	Above Tier 2
15					
16	Commercial / Industrial				
17	Tier 1		200	110	Average use
18	Tier 2		200+	110+	Above Tier 1
19					
20	Irrigation				
21	Tier 1		200	170	Average use
22	Tier 2		200+	170+	Above Tier 1

4 Cost of Service Analysis

This section of the report describes the COS analysis. The purpose of a COS analysis is to proportionately allocate costs to the various customer classes and tiers based on their cost burden on the water system. Numbers shown in the tables of this section are rounded. Therefore, hand calculations based on the displayed numbers, such as summing or multiplying, may not equal the exact results shown.

Process and Approach

The COS analysis was developed using the principles established by the AWWA's M1 Manual, using the Base-Extra Capacity methodology, and are in line with industry standards and comply with legal requirements for water rate-setting (namely, Proposition 218). The Base-Extra Capacity methodology allocates costs consistent with demand patterns of each customer class and for tiered rates, the demand patterns of each tier.

The purpose of a COS analysis is to align the annual cost of providing water service with the customer classes and tiers commensurate with their service requirements. A COS analysis involves the following steps:

- 1. Determine Revenue Requirement:** The first step in the COS analysis is determining the adequate and appropriate level of funding for the water utility. This is referred to as determining the “revenue requirement” for the base year, which for this study is FY 2022. This analysis considers the short-term and long-term service objectives of the water utility over a given planning horizon, including capital facilities, O&M, and financial reserve policies to determine the adequacy of a utility’s existing rates to recover its costs.
- 2. Categorize Costs into System Functions:** Utilizing an agency’s approved budget, financial reports, operating data, engineering data, and CIP, a rate study generally categorizes (i.e., functionalizes) the operating and capital costs of the water system among major system functions. Examples of system functions include but are not limited to water supply, storage, treatment, and transmission and distribution.
- 3. Allocate Functionalized Costs to the Appropriate System Cost Components:** Cost components represent the major pieces of a water system that the agency incurs specific costs related to, with one or more functions attributable to one or more system components. For example, transmission costs (system function) are allocated to base and maximum day (cost components) since transmission lines are sized to accommodate both average (base) demands and maximum day (peak) demands. The City’s water system cost components include supply, base, maximum day, maximum hour, meter servicing, fire protection, conservation, and customer service and billing.
- 4. Determine Units of Service and Unit Costs for Cost Components:** Each cost component is associated with a specific unit of service; costs within each component are divided by the total units of service to determine the unit cost. For example, water supply costs are associated with total annual use. Dividing total annual costs by total annual use yields the unit cost of water supply.
- 5. Distribute Cost Components to Customer Classes:** The costs of the system, allocated by system component unit costs, are distributed to customer classes and tiers in proportion to their respective demands and burdens on the system using the units of service and unit costs for each component.

Revenue Requirement

Table 4-1 shows the revenue requirement for the base year, FY 2022. The revenue requirements (Line 1-5) are comprised of the O&M expenses (**Table 2-16**, Column C, Line 12), debt service (**Table 2-16**, Column C, Line 16), and cash funded CIP costs (**Table 2-16**, Column C, Line 18). The revenue offsets (Lines 7-12) represent the miscellaneous, non-rate

revenues (**Table 2-8**, Column C, Lines 4-9) that are used to offset the revenue requirements. The adjustment for cash balance (Line 15) is equal to the net cash flow for FY 2022 (**Table 2-16**, Column C, Line 20) and represents the amount that is drawn down from reserves to fund costs.

The total rate revenue requirement (Line 18) is equal to revenue requirements (Line 5) less revenue offsets (Line 12) and adjustments (Line 16). The rate revenue requirement without offsets (Line 19) is equal to the revenue requirements less adjustments only.

The revenue requirement is comprised of two components: operating costs (Column B) and capital costs (Column C). These components form the operating and capital revenue requirements, which will be allocated based on O&M expenses and the 10-year CIP, respectively.

Table 4-1: Revenue Requirement (FY 2022)

Line	A Revenue Requirement - FY 2022	B Operating	C Capital	D Total
1	Revenue Requirements			
2	O&M Expenses	\$47,249,408	\$0	\$47,249,408
3	Debt Service	\$0	\$540,256	\$540,256
4	Cash Funded CIP	\$0	\$11,765,520	\$11,765,520
5	Total - Revenue Requirements	\$47,249,408	\$12,305,776	\$59,555,184
6				
7	Revenue Offsets			
8	Other Fees	\$200,000	\$0	\$200,000
9	ISF - Fleet	\$0	\$60,000	\$60,000
10	Reimbursement for Billing	\$848,669	\$0	\$848,669
11	Interest Income	\$0	\$231,884	\$231,884
12	Total - Revenue Offsets	\$1,048,669	\$291,884	\$1,340,553
13				
14	Adjustments			
15	Adjustment for Cash Balance	\$0	\$642,483	\$642,483
16	Total - Adjustments	\$0	\$642,483	\$642,483
17				
18	Total Rate Revenue Requirement	\$46,200,739	\$11,371,409	\$57,572,148
19	Revenue Requirement without Offsets	\$47,249,408	\$11,663,293	\$58,912,702

Water System Functions

After determining the water utility’s revenue requirement, the next step in a COS analysis is to categorize operating and capital costs into system functions. Raftelis worked with City staff to determine the appropriate functions for the operating and capital costs. The functions used for this study include:

- » Meters
- » Hydrants
- » Fire Protection
- » Customer Service (CS) and Billing
- » Wells
- » Delivery
- » Storage
- » Pumping
- » Transmission
- » Distribution
- » Transmission & Distribution (T&D)
- » Backflow/Leak Detection
- » Water Supply
- » Resource Planning
- » Conservation
- » Revenue Offset
- » General/Administrative (Admin)
- » Capital

Operating costs are functionalized based the FY 2021 budget, as shown in **Table 4-2** and summarized by function in **Table 4-3**.

Table 4-2: O&M Expense Functions

Line	A O&M Expenses	B Function	C FY 2021 Budget
1	Utility Billing	CS and Billing	\$1,639,940
2	Water Resource Planning	Resource Planning	\$382,630
3	Water Purchases	Water Supply	\$33,500,000
4	Water System - Other Expenses	General/Admin	\$476,821
5	Advanced Meter Infrastructure	Meters	\$154,500
6	Water O&M	T&D	\$906,085
7	Water Reservoirs O&M	Storage	\$73,612
8	Water Pump Stations O&M	Pumping	\$993,308
9	Water Emergency Wells O&M	Wells	\$22,585
10	Water Field Service Management	General/Admin	\$40,700
11	Water Distribution Mains Maintenance	Distribution	\$3,480,194
12	Water Customer Service	Backflow and Leak Detection	\$774,718
13	Water Cross Connection Program	General/Admin	\$366,392
14	Water Hydrant Maintenance	Hydrants	\$170,619
15	Water Meter Reading	CS and Billing	\$406,020
16	Water Install Residential Service	Meters	\$203,032
17	Water Install Commercial Service	Meters	\$99,214
18	Water Install Industrial Service	Meters	\$122,640
19	Water Install Govt Service	Meters	\$18,355
20	Water Work for Others	General/Admin	\$94,924
21	Water Repair Property	General/Admin	\$67,013
22	Water Conservation	Conservation	\$1,077,317
23	Undefined	General/Admin	\$1,594,330
24	Administration	General/Admin	\$2,098,262
25	Total		\$48,763,211

Table 4-3: O&M Expense Functions Summary

Line	A O&M Expense Functions	B FY 2021 Budget
1	CS and Billing	\$2,045,960
2	Resource Planning	\$382,630
3	Water Supply	\$33,500,000
4	General/Admin	\$4,738,442
5	Meters	\$597,741
6	T&D	\$906,085
7	Storage	\$73,612
8	Pumping	\$993,308
9	Wells	\$22,585
10	Distribution	\$3,480,194
11	Backflow and Leak Detection	\$774,718
12	Hydrants	\$170,619
13	Conservation	\$1,077,317
14	Total	\$48,763,211

Capital costs are functionalized based the adopted 10-year CIP, as shown in **The** detailed 10-year CIP is shown in **Appendix A**.

Table 4-4 and summarized by function in

Table 4-5. The detailed 10-year CIP is shown in **Appendix A**.

Table 4-4: Capital Cost Functions

Line	Capital Costs	A	B Function	C 10-Year CIP
1	Replacement Projects			
2	Miscellaneous Hydrant Replacement Program		Hydrants	\$420,214
3	AMI Customer Portal		General/Admin	\$1,250,611
4	Project Predesign Services		General/Admin	\$300,153
5	City Irrigation System Backflow Replacements		Meters	\$120,061
6	Water Efficiency Program		Conservation	\$1,200,611
7	Annual System Replacement Program		General/Admin	\$1,800,916
8	Water Pump Station Valve Repair & Upgrade		Pumping	\$75,000
9	Cast Iron Water Pipeline Replacement - Local Streets		Distribution	\$6,003,054
10	250' P/S Motor Starter Replacements		General/Admin	\$150,000
11	Annual Line Repairs FY21		T&D	\$500,000
12	Annual Line Replacements - FY 21		T&D	\$2,500,000
13	Annual Line Replacements - FY22-30		T&D	\$41,207,941
14	Annual Line Repairs FY22-30		T&D	\$3,301,832
15	Annual Pavement Patching FY21-30		General/Admin	\$300,153
16	Hesperian P/S Main Breaker Replacement		Distribution	\$100,000
17	Hesperian P/S VFD & Motor Drive Replacement		Distribution	\$250,000
18	Water System RRA Mitigation Measures		General/Admin	\$102,000
19	Main Street Water Main Replacement		T&D	\$500,000
20	Improvement Projects			
21	Project Predesign Services		General/Admin	\$180,092
22	GIS Data Development and Conversion		General/Admin	\$625,305
23	Safety Improvements to Utility Center Corp. Yard Storage		General/Admin	\$25,000
24	New Pressure Regulating Stations at New 265' Zone		Pumping	\$25,373,802
25	SCADA Replacement & Upgrade		General/Admin	\$280,122
26	Seismic Retrofit Maitland Reservoir and Appurtenances		Storage	\$1,667,120
27	New 3 MG Reservoir at High School Reservoir Site		Storage	\$8,352,790
28	New Alternative Feed Pipelines		T&D	\$306,000
29	New Emergency Well B2 (TBD-FY22)		Wells	\$4,846,400
30	New 2 MG Reservoir & Booster Station at Hesperian Site		Storage	\$10,753,600
31	Weather Based Irrigation Controllers at Various Locations		Delivery	\$240,122
32	Groundwater Sustainability Plan Projects (TBD-FY23)		Delivery	\$12,375,329
33	Total			\$125,108,226

Table 4-5: Capital Cost Functions Summary

Line	A Capital Cost Functions	B 10-Year CIP
1	General/Admin	\$5,014,351
2	Meters	\$120,061
3	Conservation	\$1,200,611
4	Pumping	\$25,448,802
5	Distribution	\$6,353,054
6	T&D	\$48,315,773
7	Storage	\$20,773,510
8	Wells	\$4,846,400
9	Delivery	\$12,615,451
10	Hydrants	\$420,214
11	Total	\$125,108,226

Table 4-6 shows the functions for the revenue offsets. Some revenues, such as those from miscellaneous fees (Line 1), are not directly linked to the costs to provide service to any specific customer group. These revenues can therefore be allocated to the revenue offset function, which can be utilized at the City’s discretion to provide offsets to specific customer classes and tiers. The reimbursement for billing (Line 3) is used to offset the customer service and billing function. The remaining revenue offsets (Lines 2 and 4) are indirectly reallocated based on the capital allocations, which is discussed in a later subsection.

Table 4-6: Revenue Offset Functions

Line	A Revenue Offsets	B Function	C Total
1	Other Fees	Revenue Offset	\$200,000
2	ISF - Fleet	Capital	\$60,000
3	Reimbursement for Billing	CS and Billing	\$848,669
4	Interest Income	Capital	\$231,884
5	Total		\$1,340,553

Cost Components

The next step in the COS analysis involves allocating the functionalized operating and capital costs to each cost causation components (also called cost components). The cost components represent the link between the costs of the various system functions and the reason why those costs are incurred. The cost components used in this study include:

- » **Meter:** represents the costs of purchasing, servicing, and replacing meters
- » **Fire Protection:** represents the costs of providing water service for public and private fire protection
- » **Customer:** represents the costs of providing customer service and billing customers
- » **Base (Average Delivery):** represents the costs of delivering water to customers under average demand conditions
- » **Maximum Day (Max Day):** represents the costs of delivering water to customers on the day with highest demand
- » **Maximum Hour (Max Hour):** represents the costs of delivering water to customers on the hour with the highest demand on the day with the highest demand
- » **Supply:** represents the costs of supplying water to customers, including water purchases from SFPUC
- » **Conservation:** represents the costs of the City’s conservation program
- » **Revenue Offset:** represents the miscellaneous revenues that can be used to offset specific customers
- » **General:** represents all other costs that have either a general or administrative function

Before allocating functionalized costs to each cost component, we must determine the allocation bases for certain components. These allocation bases are derived in the following subsections.

Peaking Factors

Peaking factors represent water demand during peak times of use. As customer classes peak demands increase, so must the size of facilities and pipelines to meet their demands. The larger facilities cost more to construct, maintain, and replace. The point of identifying peaking factors is to charge each class in proportion to the peak demands they place on the water system. Functionalized costs are then allocated to the Base, Max Day, and Max Hour cost components using the allocation bases derived from the peaking factors, shown in **Table 4-7**.

City staff provided the Max Day and Max Hour peaking factors (Column B, Lines 2-3) for the water system, normalized to average day (Base) demand. The allocation bases (Columns C to E) are calculated using the equations outlined in this section. Columns are represented in these equations as letters and rows are represented as numbers. For example, Column C, Line 2 is shown as C2.

The Max Day allocations are calculated as follows:

- » Base: $B1 / B2 \times 100\% = C2$
- » Max Day: $(B2 - B1) / B2 \times 100\% = D2$

The Max Hour allocations are calculated as follows:

- » Base: $B1 / B3 \times 100\% = C3$
- » Max Day: $(B2 - B1) / B3 \times 100\% = D3$
- » Max Hour: $(B3 - B2) / B3 \times 100\% = E3$

Average Max Day/Max Hour allocations (Columns C to E, Line 4) are equal to the average of the two allocation bases derived above. These allocations are used when system costs are not distinguished between a Max Day or Max Hour function; for example, T&D costs are allocated based on this average.

Table 4-7: System-Wide Peaking Factors

Line	A	B	C	D	E	F
	System-Wide Peaking Factors	Peaking Factor	Base	Max Day	Max Hour	Total
1	Base	1.00	100.0%			100.0%
2	Max Day	1.60	62.5%	37.5%		100.0%
3	Max Hour	2.24	44.6%	26.8%	28.6%	100.0%
4	Average Max Day/Max Hour		53.6%	32.1%	14.3%	100.0%

Table 4-8 shows the customer class-specific peaking factors based on the maximum bi-monthly usage divided by average bi-monthly usage for each class and tier. This peaking factor is used as a proxy for the class and tier-specific Max Day peaking factors (Column B), which are based on the proposed tiers (**Table 3-1**). The Max Hour peaking factor is calculated based on the relative factor from the system-wide peaking factors.

For example, the Residential class Max Hour peaking factor (Column C, Line 1) is calculated as follows:

$$\text{Residential Max Day peaking factor [B1]} \times (\text{System-wide Max Hour peaking factor [Table 4-7, B3]} / \text{System-wide Max Day peaking factor [Table 4-7, B2]}) = \text{Residential Max Hour peaking factor [C1]}$$

Table 4-8: Class-Specific Peaking Factors

Line	A Customer Class	B Max Day Peaking Factor	C Max Hour Peaking Factor
1	Residential	1.08	1.52
2	Tier 1	1.02	1.42
3	Tier 2	1.12	1.57
4	Tier 3	1.35	1.89
5			
6	Commercial / Industrial	1.19	1.67
7	Tier 1	1.10	1.54
8	Tier 2	1.24	1.74
9			
10	Irrigation	1.48	2.08
11	Tier 1	1.34	1.88
12	Tier 2	1.66	2.32

Peak Capacity

Table 4-9 shows the calculation of additional capacity required to meet Max Day and Max Hour demands. The Max Day (Column D) and Max Hour (Column G) were derived in the previous subsection (**Table 4-8**) for each customer class and tier.

Annual use (Column B) is derived from the water usage projections (**Table 2-6**) based on the proposed tiers (**Table 3-1**). Note that the total annual use for each class (Column B, Lines 1, 6, 10, and 14) are equal to the total water use for each class in the projections. Annual use is then converted to average daily use (Column C), assuming 365 days in a year.

The Max Day capacity in ccf per day (Column E) is calculated by multiplying the average daily use (Column C) by the Max Day peaking factors (Column D). The Max Day extra capacity in ccf per day (Column F) is equal to the Max Day capacity (Column E) less average daily use (Column C).

Similarly, the Max Hour capacity in ccf per day (Column H) is calculated by multiplying the average daily use (Column C) by the Max Hour peaking factors (Column G). The Max Hour extra capacity in ccf per day (Column I) is equal to the Max Hour capacity (Column H) less Max Day capacity (Column E).

Table 4-9: Peak Capacity Calculation

Line	A Customer Class	B Annual Use (ccf)	C Average Daily Use (ccf/day)	D Max Day Peaking Factor	E Max Day Capacity (ccf/day)	F Max Day Extra Capacity (ccf/day)	G Max Hour Peaking Factor	H Max Hour Capacity (ccf/day)	I Max Hour Extra Capacity (ccf/day)
1	Residential	3,883,930	10,641	1.08	11,644	1,003	1.52	16,302	4,658
2	Tier 1	2,134,022	5,847	1.02	5,941	95	1.42	8,318	2,377
3	Tier 2	1,244,371	3,409	1.12	3,832	423	1.57	5,365	1,533
4	Tier 3	505,537	1,385	1.35	1,871	486	1.89	2,619	748
5									
6	Commercial / Industrial	1,735,909	4,756	1.19	5,673	917	1.67	7,943	2,269
7	Tier 1	591,805	1,621	1.10	1,784	162	1.54	2,497	713
8	Tier 2	1,144,104	3,135	1.24	3,890	755	1.74	5,446	1,556
9									
10	Irrigation	845,707	2,317	1.48	3,514	1,197	2.08	4,920	1,406
11	Tier 1	378,732	1,038	1.34	1,391	353	1.88	1,947	556
12	Tier 2	466,975	1,279	1.66	2,123	844	2.32	2,972	849
13									
14	Hydrant	37,523	103	1.19	123	20	1.67	172	49
15									
16	Total	6,503,069	17,817		20,954	3,138		29,336	8,382

Equivalent Meters and Fire Lines

Equivalent meter units (EMUs) are used to allocate meter-related costs appropriately and equitably. Larger meters have the capacity to impose larger demands on the system and are more expensive to install, maintain, and replace than smaller meters.

EMUs are based on meter hydraulic capacity and are calculated to represent the potential demand on the water system compared to a base meter size. A ratio of hydraulic capacity is calculated by dividing larger meter capacities by the base meter capacity. The base meter in this study is the 5/8" meter, which is also the most common meter size. Raftelis worked with City staff to identify the most common meter type for each meter size in the City's water system.

Table 4-10 shows the calculation of meter capacity ratios for each meter size. The capacity in gallons per minute (gpm) were derived from the AWWA M1 Manual for the various meter types and sizes.

Table 4-10: Meter Capacity Ratios

Line	A Meter Size	B Capacity (gpm)	C Meter Type	D Capacity Ratio
1	5/8"	20	Displacement	1.00
2	3/4"	30	Displacement	1.50
3	1"	50	Displacement	2.50
4	1 1/2"	100	Displacement	5.00
5	2"	160	Displacement	8.00
6	3"	350	Turbine	17.50
7	4"	630	Turbine	31.50
8	6"	1,300	Turbine	65.00
9	8"	2,800	Turbine	140.00
10	10"	4,200	Turbine	210.00

Table 4-11 shows the meter counts by customer class and meter size, derived from the customer account data (**Table 2-5**). **Table 4-12** shows the derivation of equivalent meters based on the capacity ratios (**Table 4-10**, Column D) and the meter counts by class (**Table 4-11**). The capacity ratio for each meter size is multiplied by the meter count in each class to determine the equivalent meters per class.

Table 4-11: Meter Counts by Class

Line	A Meter Size	B Residential	C Commercial / Industrial	D Irrigation	E Hydrant	F Total
1	5/8"	24,206	834	94	0	25,134
2	3/4"	2,752	316	161	16	3,245
3	1"	3,393	636	379	0	4,408
4	1 1/2"	214	403	386	0	1,003
5	2"	174	431	211	0	816
6	3"	36	68	3	62	169
7	4"	19	34	1	0	54
8	6"	19	9	1	0	29
9	8"	4	4	0	0	8
10	10"	0	0	0	0	0
11	Total	30,817	2,735	1,236	78	34,866

Table 4-12: Equivalent Meters by Class

	A	B	C	D	E	F
Line	Meter Size	Residential	Commercial / Industrial	Irrigation	Hydrant	Total
1	5/8"	24,206	834	94	0	25,134
2	3/4"	4,128	474	242	24	4,868
3	1"	8,483	1,590	948	0	11,020
4	1 1/2"	1,070	2,015	1,930	0	5,015
5	2"	1,392	3,448	1,688	0	6,528
6	3"	630	1,190	53	1,085	2,958
7	4"	599	1,071	32	0	1,701
8	6"	1,235	585	65	0	1,885
9	8"	560	560	0	0	1,120
10	10"	0	0	0	0	0
11	Total	42,302	11,767	5,050	1,109	60,228

Similar to equivalent water meters, private fire lines and public fire hydrants are also converted to equivalent fire line units based on the fire capacity ratios shown in **Table 4-13**. The fire capacity ratios are determined based on the Hazen-Williams equation for flow through pressure conduits, as explained in the M1 Manual. The flow potential is dependent on the diameter of the fire line raised to the power of 2.63.

Table 4-13: Fire Capacity Ratios

	A	B
Line	Fire Line Diameter	Fire Ratio
1	5/8"	0.29
2	3/4"	0.47
3	1"	1.00
4	1 1/2"	2.90
5	2"	6.19
6	3"	17.98
7	4"	38.32
8	6"	111.31
9	8"	237.21
10	10"	426.58

Table 4-14 shows the private fire line and public fire hydrant counts. Private fire lines are derived from the customer account data (**Table 2-5**, Column H). City staff provided the count of public fire hydrants (Column C) with a 6” fire conduit. **Table 4-15** shows the derivation of equivalent fire lines based on the fire capacity ratios (**Table 4-13**, Column B) and the private fire line and public fire hydrant counts (

Table 4-14). The fire capacity ratio for each fire line diameter is multiplied by the count to determine the equivalent fire lines (ELs) by service type. The percent of total equivalent fire lines (Line 12) is then used to allocate fire protection costs between private and public fire service.

Table 4-14: Private Fire Lines and Public Fire Hydrant Counts

	A	B	C
Line	Fire Line Diameter	Private Fire	Public Fire
1	5/8"	0	0
2	3/4"	0	0
3	1"	5	0
4	1 1/2"	31	0
5	2"	30	0
6	3"	8	0
7	4"	265	0
8	6"	408	4,327
9	8"	414	0
10	10"	76	0
11	Total	1,237	4,327

Table 4-15: Equivalent Fire Lines

	A	B	C
Line	Fire Line Diameter	Private Fire	Public Fire
1	5/8"	0	0
2	3/4"	0	0
3	1"	5	0
4	1 1/2"	90	0
5	2"	186	0
6	3"	144	0
7	4"	10,155	0
8	6"	45,415	481,642
9	8"	98,204	0
10	10"	32,420	0
11	Total	186,618	481,642
12	<i>Percent of Total</i>	<i>27.9%</i>	<i>72.1%</i>

Fire Capacity

Peak capacity, represented as Max Day and Max Hour, also include capacity to meet demands for fire protection. Max Day and Max Hour costs encompass capacity required to meet peak customer demands as well as public and private fire service.

Table 4-16 derives the allocation of Max Day and Max Hour costs to these components, as outlined in the M1 Manual. The capacity demanded for a fire assumes a two hour fire with 2,000 gpm of capacity required, which is often used for utilities that serve a largely residential customer base.

The capacity demanded for fire in ccf per day for Max Day and Max Hour are calculated as follows:

- » Max Day: 2,000 gpm x 60 min/hour x 2 hours x 1 ccf/748 gallons
- » Max Hour: (2,000 gpm x 60 min/hour x 24 hours/day x 1 ccf/748 gallons) - Max Day fire capacity [B1]

The Max Day and Max Hour capacity demanded for fire are allocated between public and private fire service using the percent of total equivalent fire lines for each service type (**Table 4-15**, Line 12). The total system capacity is equal to the public fire (Line 6), private fire (Line 7), and customer demand capacity (**Table 4-9**, Columns F and I, Line 16). The

proportion of system capacity (Lines 11-15) are equal to the percent of total capacity for each service type. These allocations are used to distribute the Max Day and Max Hour costs between the public fire protection, private fire service, and water service.

Table 4-16: Fire Capacity Calculation

Line	A Fire Capacity Estimate	B Max Day	C Max Hour
1	Capacity Demanded for Fire (ccf/day)	321	3,529
2	Allocation to Public Fire	72.1%	72.1%
3	Allocation to Private Fire	27.9%	27.9%
4			
5	System Capacity		
6	Public Fire Capacity	231	2,544
7	Private Fire Capacity	90	986
8	Customer Demand Capacity	3,138	8,382
9	Total	3,459	11,911
10			
11	Proportion of System Capacity		
12	Public Fire Capacity	6.7%	21.4%
13	Private Fire Capacity	2.6%	8.3%
14	Customer Demand Capacity	90.7%	70.4%
15	Total	100.0%	100.0%

Note that costs to maintain public fire flows is included in the cost of service recovered from rates. Providing water in the volume and at the pressure required to operate fire hydrants that protect structures is a statutory mandate of public water systems in California and such cost recovery is authorized by California Government Code sections 53069.9 and 53750.5. Moreover, charging water users for the portion of the cost of water service associated with fire flows appropriately assigns those cost to those who benefit from them. Sprinklers serve and are within structures served by water meters. Hydrants serve parcels improved with structures, as they are not suitable to address fire service calls involving individuals in need of medical aid or vehicle fires (which are fought with fire extinguishers) and are not typically used to fight wildland fires because hydrants rarely serve such land. The California Fire Code requires hydrants near structures, not elsewhere. Thus, those who pay water fees which recover fire flow costs also own or occupy structures protected by fire sprinklers and fire hydrants and therefore benefit from that service. Finally, fire hydrants are used to flush water mains periodically and serve a water system function, as well as the fire suppression function noted here.

Cost Allocations

After determining the various allocation bases in the previous subsections, we can then determine the operating and capital cost allocations. **Table 4-17** shows the allocation of water system functions to the cost components. The functions are allocated as follows:

- » **Meters:** allocated directly to Meter component
- » **Hydrants:** allocated directly to Fire Protection component
- » **Fire Protection:** allocated directly to Fire Protection component
- » **CS and Billing:** allocated directly to Customer component
- » **Wells:** allocated to Base (Average Delivery) component because these costs do not vary based on peaking
- » **Delivery:** allocated to Base (Average Delivery) component because these costs do not vary based on peaking
- » **Storage:** allocated based on Max Day (**Table 4-7**, Columns C and D, Line 2) because storage facilities, such as reservoirs or water tanks, are sized to accommodate Max Day demand

- » **Pumping:** allocated based on Max Day (**Table 4-7**, Columns C and D, Line 2) because pumping facilities, such as pump stations, are sized to accommodate Max Day demand
- » **Transmission:** allocated based on Max Day (**Table 4-7**, Columns C and D, Line 2) because transmission assets, such as water mains, are sized to accommodate Max Day demand
- » **Distribution:** allocated based on Max Hour (**Table 4-7**, Columns C through E, Line 3) because distribution assets, such as water distribution lines, are sized to accommodate Max Hour demand
- » **T&D:** allocated based on average Max Day/Max Hour (**Table 4-7**, Columns C through E, Line 4) because these costs represent both transmission (Max Day) and distribution (Max Hour)
- » **Backflow/Leak Detection:** allocated based on Meter (50%) and Max Hour (50% proportion to Max Hour allocation bases) to represent the proportion total full time employees in a specific department that fulfill each function, based on discussion with City staff
- » **Water Supply:** allocated directly to Supply component
- » **Resource Planning:** allocated directly to Conservation component
- » **Conservation:** allocated directly to Conservation component
- » **Revenue Offset:** allocated directly to Revenue Offset component
- » **General/Admin:** allocated directly to General component (which will be reallocated to all other components)
- » **Capital:** indirectly allocated based on resulting capital allocation percentages (**Table 4-19**)

Table 4-18 shows the operating cost allocation derived from the O&M expenses by system function (**Table 4-3**) and the functional cost allocations (**Table 4-17**). The resulting operating allocation percentages (Line 15) will be used to allocate the operating revenue requirement.

Table 4-19 shows the capital cost allocation derived from the 10-year CIP by system function (**Table 4-5**) and the functional cost allocations (**Table 4-17**). The resulting operating allocation percentages (Line 12) will be used to allocate the capital revenue requirement.

Table 4-20 shows the revenue offset allocation derived from the functionalized revenue offsets (**Table 4-6**) and the functional cost allocations (**Table 4-17**).

Table 4-17: Functional Allocations

Line	A Function	B Rationale	C Meter	D Fire Protection	E Customer	F Base	G Max Day	H Max Hour	I Supply	J Conservation	K Revenue Offset	L General	M Total
1	Meters	Meter	100.0%										100.0%
2	Hydrants	Fire Protection		100.0%									100.0%
3	Fire Protection	Fire Protection		100.0%									100.0%
4	CS and Billing	Customer			100.0%								100.0%
5	Wells	Base				100.0%							100.0%
6	Delivery	Base				100.0%							100.0%
7	Storage	Max Day				62.5%	37.5%						100.0%
8	Pumping	Max Day				62.5%	37.5%						100.0%
9	Transmission	Max Day				62.5%	37.5%						100.0%
10	Distribution	Max Hour				44.6%	26.8%	28.6%					100.0%
11	T&D	Avg. MD/MH				53.6%	32.1%	14.3%					100.0%
12	Backflow/Leak Detection	Meter/MH	50.0%			22.3%	13.4%	14.3%					100.0%
13	Water Supply	Supply							100.0%				100.0%
14	Resource Planning	Conservation								100.0%			100.0%
15	Conservation	Conservation								100.0%			100.0%
16	Revenue Offset	Offset									100.0%		100.0%
17	General/Admin	General										100.0%	100.0%
18	Capital	Capital	0.1%	0.3%	0.0%	60.0%	27.6%	7.0%	0.0%	1.0%	0.0%	4.0%	100.0%

Table 4-18: Operating Cost Allocation

Line	A O&M Expenses	B Meter	C Fire Protection	D Customer	E Base	F Max Day	G Max Hour	H Supply	I Conservation	J Revenue Offset	K General	L Total
1	CS and Billing	\$0	\$0	\$2,045,960	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,045,960
2	Resource Planning	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$382,630	\$0	\$0	\$382,630
3	Water Supply	\$0	\$0	\$0	\$0	\$0	\$0	\$33,500,000	\$0	\$0	\$0	\$33,500,000
4	General/Admin	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,738,442	\$4,738,442
5	Meters	\$597,741	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$597,741
6	T&D	\$0	\$0	\$0	\$485,403	\$291,242	\$129,441	\$0	\$0	\$0	\$0	\$906,085
7	Storage	\$0	\$0	\$0	\$46,008	\$27,605	\$0	\$0	\$0	\$0	\$0	\$73,612
8	Pumping	\$0	\$0	\$0	\$620,818	\$372,491	\$0	\$0	\$0	\$0	\$0	\$993,308
9	Wells	\$0	\$0	\$0	\$22,585	\$0	\$0	\$0	\$0	\$0	\$0	\$22,585
10	Distribution	\$0	\$0	\$0	\$1,553,658	\$932,195	\$994,341	\$0	\$0	\$0	\$0	\$3,480,194
11	Backflow/Leak Detection	\$387,359	\$0	\$0	\$172,928	\$103,757	\$110,674	\$0	\$0	\$0	\$0	\$774,718
12	Hydrants	\$0	\$170,619	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$170,619
13	Conservation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,077,317	\$0	\$0	\$1,077,317
14	Total	\$985,099	\$170,619	\$2,045,960	\$2,901,399	\$1,727,289	\$1,234,456	\$33,500,000	\$1,459,947	\$0	\$4,738,442	\$48,763,211
15	<i>Operating Allocation</i>	<i>2.0%</i>	<i>0.3%</i>	<i>4.2%</i>	<i>5.9%</i>	<i>3.5%</i>	<i>2.5%</i>	<i>68.7%</i>	<i>3.0%</i>	<i>0.0%</i>	<i>9.7%</i>	<i>100.0%</i>

Table 4-19: Capital Cost Allocation

Line	A 10-Year CIP	B Meter	C Fire Protection	D Customer	E Base	F Max Day	G Max Hour	H Supply	I Conservation	J Revenue Offset	K General	L Total
1	General/Admin	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,014,351	\$5,014,351
2	Meters	\$120,061	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$120,061
3	Conservation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,200,611	\$0	\$0	\$1,200,611
4	Pumping	\$0	\$0	\$0	\$15,905,501	\$9,543,301	\$0	\$0	\$0	\$0	\$0	\$25,448,802
5	Distribution	\$0	\$0	\$0	\$2,836,185	\$1,701,711	\$1,815,158	\$0	\$0	\$0	\$0	\$6,353,054
6	T&D	\$0	\$0	\$0	\$25,883,450	\$15,530,070	\$6,902,253	\$0	\$0	\$0	\$0	\$48,315,773
7	Storage	\$0	\$0	\$0	\$12,983,444	\$7,790,066	\$0	\$0	\$0	\$0	\$0	\$20,773,510
8	Wells	\$0	\$0	\$0	\$4,846,400	\$0	\$0	\$0	\$0	\$0	\$0	\$4,846,400
9	Delivery	\$0	\$0	\$0	\$12,615,451	\$0	\$0	\$0	\$0	\$0	\$0	\$12,615,451
10	Hydrants	\$0	\$420,214	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$420,214
11	Total	\$120,061	\$420,214	\$0	\$75,070,430	\$34,565,148	\$8,717,411	\$0	\$1,200,611	\$0	\$5,014,351	\$125,108,226
12	<i>Capital Allocation</i>	<i>0.1%</i>	<i>0.3%</i>	<i>0.0%</i>	<i>60.0%</i>	<i>27.6%</i>	<i>7.0%</i>	<i>0.0%</i>	<i>1.0%</i>	<i>0.0%</i>	<i>4.0%</i>	<i>100.0%</i>

Table 4-20: Revenue Offset Allocation

Line	A Revenue Offsets	B Meter	C Fire Protection	D Customer	E Base	F Max Day	G Max Hour	H Supply	I Conserv- ation	J Revenue Offset	K General	L Total
1	Other Fees	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$200,000	\$0	\$200,000
2	ISF - Fleet	\$58	\$202	\$0	\$36,003	\$16,577	\$4,181	\$0	\$576	\$0	\$2,405	\$60,000
3	Reimbursement for Billing	\$0	\$0	\$848,669	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$848,669
4	Interest Income	\$223	\$779	\$0	\$139,141	\$64,065	\$16,157	\$0	\$2,225	\$0	\$9,294	\$231,884
5	Total	\$280	\$980	\$848,669	\$175,143	\$80,642	\$20,338	\$0	\$2,801	\$200,000	\$11,699	\$1,340,553

Revenue Requirement Distribution

Table 4-21 shows the distribution of the revenue requirement to each cost component and all reallocation of costs, resulting in the final cost of service by component (Line 12).

The operating costs (Column L, Line 1) are equal to the operating revenue requirement less offsets (**Table 4-1**, Column B, Line 19) and are allocated based on the operating allocation percentages (**Table 4-18**, Line 15). The capital costs (Column L, Line 2) are equal to the capital revenue requirement less offsets (**Table 4-1**, Column C, Line 19) and are allocated based on the capital allocation percentages (**Table 4-19**, Line 12). The revenue offsets (Line 3) are subtracted from the operating and capital revenue requirements based on the offsets allocated to each cost component (**Table 4-20**, Line 5). This results in the cost of service prior to any adjustments (Line 4).

Next, we determine the cost of service with reallocations for public and private fire service. A portion of Max Day and Max Hour costs are reallocated to Meter (Line 5) based on the proportion of system capacity associated with public fire protection (**Table 4-16**, Line 12). Similarly, a portion of Max Day and Max Hour costs are reallocated to Fire Protection (Line 6) based on the proportion of system capacity associated with private fire service (**Table 4-16**, Line 13). A portion of fire protection costs (Column C, Line 4) are reallocated to Meter (Line 7) based on the percentage of equivalent fire lines for public fire hydrants (**Table 4-15**, Column C, Line 12). This results in the cost of service with adjustments for fire (Line 8).

Then, we reallocate General costs (Column K, Line 8) based on the proportion of costs associated with each remaining cost component (Line 8), less Revenue Offset and Supply costs. Revenue Offsets are omitted from this analysis because there are limitations on what kind of revenue the City can use to offset specific customers. Supply costs are also omitted because they represent the proportionate cost of providing water supply from SFPUC purchases. This results in the cost of service after indirect adjustments (Line 10).

For example, the General cost allocation to the Meter cost component (Column B, Line 9) is derived as follows:

$$\text{Total General costs [K8]} \times \text{Total Meter costs [B8]} / \text{All costs less General, Supply, and Revenue Offsets [L8-K8-H8-J8]}$$

Finally, we reallocate 55% of Base costs to Meter (Line 11) to maintain the City's existing proportion of fixed and variable revenue recovery. The City currently collects 19% of its rate revenues from the fixed service charges. This results in the final cost of service by cost component (Line 12).

Table 4-21: Revenue Requirement by Cost Component

Line	A Revenue Requirement	B Meter	C Fire Protection	D Customer	E Base	F Max Day	G Max Hour	H Supply	I Conservation	J Revenue Offset	K General	L Total
1	Operating Revenue Requirement	\$954,518	\$165,322	\$1,982,445	\$2,811,328	\$1,673,667	\$1,196,134	\$32,460,027	\$1,414,624	\$0	\$4,591,342	\$47,249,408
2	Capital Revenue Requirement	\$11,193	\$39,175	\$0	\$6,998,488	\$3,222,358	\$812,686	\$0	\$111,928	\$0	\$467,466	\$11,663,293
3	Revenue Offsets	(\$280)	(\$980)	(\$848,669)	(\$175,143)	(\$80,642)	(\$20,338)	\$0	(\$2,801)	(\$200,000)	(\$11,699)	(\$1,340,553)
4	Total - Cost of Service	\$965,431	\$203,517	\$1,133,776	\$9,634,673	\$4,815,382	\$1,988,482	\$32,460,027	\$1,523,751	(\$200,000)	\$5,047,110	\$57,572,148
5	Allocation of Capacity for Public Fire	\$746,650	\$0	\$0	\$0	(\$321,981)	(\$424,669)	\$0	\$0	\$0	\$0	\$0
6	Allocation of Capacity for Private Fire	\$0	\$289,298	\$0	\$0	(\$124,755)	(\$164,543)	\$0	\$0	\$0	\$0	\$0
7	Allocation of Fire Protection Costs	\$146,683	(\$146,683)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8	Total - Cost of Service with Fire	\$1,858,764	\$346,132	\$1,133,776	\$9,634,673	\$4,368,645	\$1,399,270	\$32,460,027	\$1,523,751	(\$200,000)	\$5,047,110	\$57,572,148
9	Allocation of General Costs	\$462,935	\$86,206	\$282,373	\$2,399,567	\$1,088,035	\$348,496	\$0	\$379,498	\$0	(\$5,047,110)	\$0
10	Total - Cost of Service with Indirect	\$2,321,699	\$432,338	\$1,416,149	\$12,034,240	\$5,456,680	\$1,747,766	\$32,460,027	\$1,903,249	(\$200,000)	\$0	\$57,572,148
11	Allocation of Base to Meter	\$6,618,832	\$0	\$0	(\$6,618,832)	\$0	\$0	\$0	\$0	\$0	\$0	\$0
12	Total - Final Cost of Service	\$8,940,531	\$432,338	\$1,416,149	\$5,415,408	\$5,456,680	\$1,747,766	\$32,460,027	\$1,903,249	(\$200,000)	\$0	\$57,572,148

Unit Cost Derivation

After deriving the cost of service by cost component, we then determine the unit cost for each component. The unit cost is derived by dividing the revenue requirement for each cost component by the corresponding units of service. Note that the Fire Protection cost component is renamed to Private Fire after reallocating all public fire protection costs from that component into Meter.

Table 4-22 shows the units of service for each customer class and tier for each cost component. The units of service are derived as follows:

- » **Meter:** EMUs by customer class (**Table 4-12**)
- » **Private Fire:** equivalent fire lines for private fire customers (**Table 4-15**, Column B)
- » **Customer:** accounts by customer class (**Table 4-11**)
- » **Base:** annual water use by class and tier (**Table 4-9**, Column B)
- » **Max Day:** Max Day extra capacity (**Table 4-9**, Column F)
- » **Max Hour:** Max Hour extra capacity (**Table 4-9**, Column I)
- » **Supply:** annual water use by class and tier (**Table 4-9**, Column B)
- » **Conservation:** annual water use by class (**Table 4-9**, Column B)
- » **Revenue Offset:** Residential Tier 1 use only (**Table 4-9**, Column B, Line 2)

Table 4-23 derives the unit cost by cost component. The cost of service (**Table 4-21**, Line 12), is divided by the units of service for each cost component (**Table 4-22**, Line 18). Note that the units of service for Meter, Private Fire, and Customer components (Columns B through D, Line 3) are multiplied by six bi-monthly bills per year to determine the annual units. The unit cost for each component (Line 6) is derived by dividing the cost of service (Line 1) by the units of service (Line 3).

Cost of Service by Customer Class

The final step in the COS analysis is to distribute the revenue requirement to each customer class and tier based on their burden on the water system, shown in **Table 4-24**. The unit costs for each cost component (**Table 4-23**, Line 6) are multiplied by the units of service for each class and tier (**Table 4-22**) to derive the final revenue requirement distribution. Note that the Meter, Private Fire, and Customer unit costs are multiplied by six bi-monthly billing periods per year to determine the annual cost to serve each class for those components. The final proposed revenue (Column K, Line 18) is equal to the total revenue requirement (**Table 4-1**, Column D, Line 18), and the final costs in each cost component (Line 18) are equal to their corresponding costs of service (**Table 4-21**, Line 12).

Table 4-22: Units of Service by Cost Component

Line	A Customer Class	B Meter	C Private Fire	D Customer	E Base	F Max Day	G Max Hour	H Supply	I Conservation	J Revenue Offset
1	Residential	42,302		30,817					3,883,930	
2	Tier 1				2,134,022	95	2,377	2,134,022		2,134,022
3	Tier 2				1,244,371	423	1,533	1,244,371		
4	Tier 3				505,537	486	748	505,537		
5										
6	Commercial / Industrial	11,767		2,735					1,735,909	
7	Tier 1				591,805	162	713	591,805		
8	Tier 2				1,144,104	755	1,556	1,144,104		
9										
10	Irrigation	5,050		1,236					845,707	
11	Tier 1				378,732	353	556	378,732		
12	Tier 2				466,975	844	849	466,975		
13										
14	Hydrant	1,109		78	37,523	20	49	37,523	37,523	
15										
16	Private Fire	0	186,618	1,237						
17										
18	Total	60,228	186,618	36,103	6,503,069	3,138	8,382	6,503,069	6,503,069	2,134,022
19	Units of Service	EMUs	ELs	accounts	ccf	ccf/day	ccf/day	ccf	ccf	ccf

Table 4-23: Unit Costs by Cost Component

Line	A Unit Costs	B Meter	C Private Fire	D Customer	E Base	F Max Day	G Max Hour	H Supply	I Conservation	J Revenue Offset
1	Cost of Service	\$8,940,531	\$432,338	\$1,416,149	\$5,415,408	\$5,456,680	\$1,747,766	\$32,460,027	\$1,903,249	(\$200,000)
2										
3	Units of Service	361,368	1,119,706	216,618	6,503,069	3,138	8,382	6,503,069	6,503,069	2,134,022
4		annual EMUs	annual ELs	annual bills	ccf	ccf/day	ccf/day	ccf	ccf	ccf
5										
6	Unit Cost	\$24.74	\$0.39	\$6.54	\$0.83	\$1,739.10	\$208.52	\$4.99	\$0.29	(\$0.09)
7		EMU	EL	bill	ccf	ccf/day	ccf/day	ccf	ccf	ccf

Table 4-24: Cost of Service by Customer Class

Line	A Customer Class	B Meter	C Private Fire	D Customer	E Base	F Max Day	G Max Hour	H Supply	I Conserv- ation	J Revenue Offset	K Proposed Revenue
1	Residential	\$6,279,510	\$0	\$1,208,804	\$3,234,329	\$1,744,985	\$971,233	\$19,386,612	\$1,136,708	(\$200,000)	\$33,762,182
2	<i>Tier 1</i>				<i>\$1,777,099</i>	<i>\$164,771</i>	<i>\$495,562</i>	<i>\$10,651,957</i>		<i>(\$200,000)</i>	
3	<i>Tier 2</i>				<i>\$1,036,246</i>	<i>\$735,676</i>	<i>\$319,643</i>	<i>\$6,211,270</i>		<i>\$0</i>	
4	<i>Tier 3</i>				<i>\$420,984</i>	<i>\$844,539</i>	<i>\$156,028</i>	<i>\$2,523,385</i>		<i>\$0</i>	
5											
6	Commercial / Industrial	\$1,746,749	\$0	\$107,281	\$1,445,572	\$1,595,542	\$473,207	\$8,664,779	\$508,047	\$0	\$14,541,179
7	<i>Tier 1</i>				<i>\$492,824</i>	<i>\$282,072</i>	<i>\$148,766</i>	<i>\$2,953,991</i>		<i>\$0</i>	
8	<i>Tier 2</i>				<i>\$952,749</i>	<i>\$1,313,470</i>	<i>\$324,442</i>	<i>\$5,710,788</i>		<i>\$0</i>	
9											
10	Irrigation	\$749,646	\$0	\$48,482	\$704,260	\$2,081,663	\$293,096	\$4,221,341	\$247,513	\$0	\$8,346,001
11	<i>Tier 1</i>				<i>\$315,388</i>	<i>\$614,610</i>	<i>\$116,024</i>	<i>\$1,890,438</i>		<i>\$0</i>	
12	<i>Tier 2</i>				<i>\$388,872</i>	<i>\$1,467,053</i>	<i>\$177,073</i>	<i>\$2,330,903</i>		<i>\$0</i>	
13											
14	Hydrant	\$164,625	\$0	\$3,060	\$31,247	\$34,489	\$10,229	\$187,296	\$10,982	\$0	\$441,927
15											
16	Private Fire	\$0	\$432,338	\$48,522	\$0	\$0	\$0	\$0	\$0	\$0	\$480,859
17											
18	Total	\$8,940,531	\$432,338	\$1,416,149	\$5,415,408	\$5,456,680	\$1,747,766	\$32,460,027	\$1,903,249	(\$200,000)	\$57,572,148

5 Rate Design and Derivation

This section of the report details the calculation of the proposed water rates that were developed in the study. Numbers shown in the tables of this section are rounded. Therefore, hand calculations based on the displayed numbers, such as summing or multiplying, may not equal the exact results shown in this report. All rates shown in this section are rounded up to the nearest cent.

Proposed Adjustments

Table 5-1 shows the proposed revenue adjustments from the financial plan. Water rates developed for the base year (FY 2022) reflect the results of the COS analysis, which impacts each customer class and tier differently. The proposed revenue adjustment for FY 2022 is zero, meaning that the proposed water rates are revenue neutral and are intended to recover the same amount of revenue that the City would collect in FY 2022 in absence of any adjustments. Revenue adjustments in subsequent years are applied across all charges, classes, and tiers proportional to the base year rates.

Table 5-1: Proposed Revenue Adjustments

Line	A Revenue Adjustments	B FY 2022	C FY 2023	D FY 2024	E FY 2025	F FY 2026
1	Effective Month	October	October	October	October	October
2	Percent Adjustment	0%	3%	7%	7%	5%

Bi-Monthly Service Charges

Table 5-2 shows the bi-monthly service charge calculation, which consists of the Meter and Customer cost components. The Meter cost component is derived based on total EMUs. Therefore, the Meter unit cost (**Table 4-23**, Column B, Line 6) is multiplied by the capacity ratio for each meter size (Column B) to appropriately reflect the share of cost by meter size (Column C). A connection's share of the Customer cost does not vary with meter size, and therefore the Customer unit cost (**Table 4-23**, Column D, Line 6) is applied uniformly across all meter sizes (Column D). These components added together arrive at the proposed bi-monthly service charge (Column E). Current charges (Column F) are shown for Inside City customers.

Table 5-2: Proposed Bi-Monthly Service Charge (FY 2022)

Line	A Meter Size	B Capacity Ratio	C Meter	D Customer	E Proposed Charge	F Current Charge	G Difference (\$)
1	5/8"	1.00	\$24.74	\$6.54	\$31.28	\$32.00	(\$0.72)
2	3/4"	1.50	\$37.11	\$6.54	\$43.65	\$43.51	\$0.14
3	1"	2.50	\$61.85	\$6.54	\$68.39	\$65.91	\$2.48
4	1 1/2"	5.00	\$123.70	\$6.54	\$130.25	\$144.31	(\$14.06)
5	2"	8.00	\$197.93	\$6.54	\$204.47	\$254.00	(\$49.53)
6	3"	17.50	\$432.96	\$6.54	\$439.51	\$641.00	(\$201.49)
7	4"	31.50	\$779.33	\$6.54	\$785.88	\$1,269.80	(\$483.92)
8	6"	65.00	\$1,608.15	\$6.54	\$1,614.69	\$2,240.00	(\$625.31)
9	8"	140.00	\$3,463.71	\$6.54	\$3,470.25	\$3,101.00	\$369.25
10	10"	210.00	\$5,195.57	\$6.54	\$5,202.11	\$3,734.80	\$1,467.31

The City’s existing water rates include an adopted policy to provide a discounted rate for low income customers. Customers that qualify for this discount are charged a reduced bi-monthly water service charge, equal to 35% of the service charge for the ½” meter size. Revenues that are not generated from rates (non-rate or miscellaneous revenues) are discretionary funds that the City may use to provide discounts to specific customers. Raftelis worked with City staff to identify the non-rate revenues used to provide a discount to eligible low income customers.

Based on the City’s historical revenues and adopted budget, it expects to receive approximately \$250,000 in water installation fees in FY 2022 (Table 2-8, Column C, Line 3). Based on discussion with City staff, these fees are charged to install new services and to upsize existing services, but do not directly pay for infrastructure. This revenue is used in our analysis to provide the same discount to low income customers based on the City’s existing policy to the approximately 1,835 customers that currently qualify.

Bi-Monthly Fire Service Charges

Table 5-3 bi-monthly fire service charge calculation, which consists of the Private Fire and Customer cost components. The Meter cost component is derived based on total equivalent fire lines. Therefore, the Private Fire unit cost (Table 4-23, Column C, Line 6) is multiplied by the fire ratio for each fire line diameter (Column B) to appropriately reflect the share of cost by fire line (Column C). A connection’s share of the Customer cost does not vary with meter size, and therefore the Customer unit cost (Table 4-23, Column D, Line 6) is applied uniformly across all meter sizes (Column D). These components added together arrive at the proposed bi-monthly fire service charge (Column E). Current charges (Column F) are shown for Inside City customers.

Table 5-3: Proposed Bi-Monthly Fire Service Charge (FY 2022)

Line	A Fire Line Diameter	B Fire Ratio	C Private Fire	D Customer	E Proposed Charge	F Current Charge	G Difference (\$)
1	5/8"	0.29	\$0.11	\$6.54	\$6.65	\$25.00	(\$18.35)
2	3/4"	0.47	\$0.18	\$6.54	\$6.72	\$25.00	(\$18.28)
3	1"	1.00	\$0.39	\$6.54	\$6.93	\$25.00	(\$18.07)
4	1 1/2"	2.90	\$1.12	\$6.54	\$7.66	\$25.00	(\$17.34)
5	2"	6.19	\$2.39	\$6.54	\$8.93	\$25.00	(\$16.07)
6	3"	17.98	\$6.94	\$6.54	\$13.49	\$25.00	(\$11.51)
7	4"	38.32	\$14.80	\$6.54	\$21.34	\$29.00	(\$7.66)
8	6"	111.31	\$42.98	\$6.54	\$49.52	\$42.00	\$7.52
9	8"	237.21	\$91.59	\$6.54	\$98.13	\$42.00	\$56.13
10	10"	426.58	\$164.71	\$6.54	\$171.25	\$50.00	\$121.25

Water Usage Rates

The City’s water usage rates consist of five components: Base, Peaking, Supply, Conservation, and Offset. The following subsections will present the calculations for each of the components.

Base Component

The Base component is applied uniformly across all units of water and is equal to the Base unit cost (Table 4-23, Column E, Line 6).

Peaking Component

Table 5-4 shows the Peaking unit cost calculation for each customer class and tier. Peaking costs (Column C) are the sum of Max Day and Max Hour costs for each class and tier (**Table 4-24**, Columns F and G). Peaking costs are divided by annual use (Column B) to determine the Peaking unit cost for each class and tier (Column D).

Table 5-4: Peaking Unit Cost Calculation

Line	A Customer Class	B Annual Use (ccf)	C Peaking Costs	D Unit Cost
1	Residential	3,883,930		
2	Tier 1	2,134,022	\$660,333	\$0.31
3	Tier 2	1,244,371	\$1,055,319	\$0.85
4	Tier 3	505,537	\$1,000,567	\$1.98
5				
6	Commercial / Industrial	1,735,909		
7	Tier 1	591,805	\$430,838	\$0.73
8	Tier 2	1,144,104	\$1,637,912	\$1.43
9				
10	Irrigation	845,707		
11	Tier 1	378,732	\$730,634	\$1.93
12	Tier 2	466,975	\$1,644,125	\$3.52
13				
14	Hydrant	37,523	\$44,718	\$1.19
15				
16	Total	6,503,069	\$7,204,446	\$1.11

Supply Component

The Supply component is applied uniformly across all units of water and is equal to the Supply unit cost (**Table 4-23**, Column H, Line 6).

Conservation Component

Table 5-5 shows the Conservation unit cost calculation. In the COS analysis, Conservation costs are distributed to each customer class and not the tiers (**Table 4-24**, Column I) to ensure that each customer class pays for its fair share of Conservation costs. However, Conservation costs within each class are allocated to the upper tiers (Column C), since the water use in these tiers represent use above indoor needs (for Residential classes) or above average (for Non-Residential classes). The class-level Conservation costs are distributed to each tier (Column F) within the class based on the adjusted use (Column D). The Conservation unit cost (Column G) is derived by dividing the tier-level Conservation costs (Column F) by the annual use in each class and tier (Column B).

Table 5-5: Conservation Unit Cost Calculation

Line	A Customer Class	B Annual Use (ccf)	C % of Use Applicable	D Adjusted Use (ccf)	E % of Total Costs	F Conservation Costs	G Unit Cost
1	Residential	3,883,930		1,127,723		\$1,136,708	\$0.29
2	Tier 1	2,134,022	0%	0	0%	\$0	\$0.00
3	Tier 2	1,244,371	50%	622,186	55%	\$627,143	\$0.50
4	Tier 3	505,537	100%	505,537	45%	\$509,565	\$1.01
5							
6	Commercial / Industrial	1,735,909		1,144,104		\$508,047	\$0.29
7	Tier 1	591,805	0%	0	0%	\$0	\$0.00
8	Tier 2	1,144,104	100%	1,144,104	100%	\$508,047	\$0.44
9							
10	Irrigation	845,707		466,975		\$247,513	\$0.29
11	Tier 1	378,732	0%	0	0%	\$0	\$0.00
12	Tier 2	466,975	100%	466,975	100%	\$247,513	\$0.53
13							
14	Hydrant	37,523	100%	37,523	100%	\$10,982	\$0.29
15							
16	Total	6,503,069				\$1,903,249	\$0.29

Offset Component

The Offset component is applied to Residential Tier 1 use and is equal to the Revenue Offset unit cost (Table 4-23, Column J, Line 6) for that class and tier only.

Water Usage Rates

Table 5-6 shows the calculation of proposed water usage rates (Column G) for each customer class and tier based on the five rate components (Columns B through F) described previously. Note that all Residential rates are the same after harmonizing the different classes; the three distinct classes are shown for the comparison between current and proposed charges only. Current charges (Column H) are shown for Inside City customers.

Table 5-6: Proposed Water Usage Rates (FY 2022)

Line	A Water Usage Rates \$/ccf	B Base	C Peaking	D Supply	E Conservation	F Offset	G Proposed Charge	H Current Charge	I Difference (\$)
1	Single Family								
2	Tier 1	\$0.83	\$0.31	\$4.99	\$0.00	(\$0.09)	\$6.04	\$5.80	\$0.24
3	Tier 2	\$0.83	\$0.85	\$4.99	\$0.50	\$0.00	\$7.18	\$7.14	\$0.04
4	Tier 3	\$0.83	\$1.98	\$4.99	\$1.01	\$0.00	\$8.82	\$8.41	\$0.41
5									
6	Residential 2-4								
7	Tier 1	\$0.83	\$0.31	\$4.99	\$0.00	(\$0.09)	\$6.04	\$6.43	(\$0.39)
8	Tier 2	\$0.83	\$0.85	\$4.99	\$0.50	\$0.00	\$7.18	\$7.15	\$0.03
9	Tier 3	\$0.83	\$1.98	\$4.99	\$1.01	\$0.00	\$8.82	\$8.52	\$0.30
10									
11	Multi-Family 5+								
12	Tier 1	\$0.83	\$0.31	\$4.99	\$0.00	(\$0.09)	\$6.04	\$6.97	(\$0.93)
13	Tier 2	\$0.83	\$0.85	\$4.99	\$0.50	\$0.00	\$7.18	\$7.23	(\$0.05)
14	Tier 3	\$0.83	\$1.98	\$4.99	\$1.01	\$0.00	\$8.82	\$7.94	\$0.88
15									
16	Commercial / Industrial								
17	Tier 1	\$0.83	\$0.73	\$4.99	\$0.00	\$0.00	\$6.56	\$6.95	(\$0.39)
18	Tier 2	\$0.83	\$1.43	\$4.99	\$0.44	\$0.00	\$7.70	\$8.29	(\$0.59)
19									
20	Irrigation								
21	Tier 1	\$0.83	\$1.93	\$4.99	\$0.00	\$0.00	\$7.76	\$6.95	\$0.81
22	Tier 2	\$0.83	\$3.52	\$4.99	\$0.53	\$0.00	\$9.88	\$8.29	\$1.59
23									
24	Hydrant	\$0.83	\$1.19	\$4.99	\$0.29	\$0.00	\$7.31	\$6.95	\$0.36

Proposed Rate Schedule

The rates shown in this subsection are increased for FY 2023 and beyond based on the proposed revenue adjustments shown in **Table 5-1**. **Table 5-7** shows the five-year rate schedule for the proposed bi-monthly service charges. The Low Income charge (Line 1) for all years is equal to 35% of the service charge for the 5/8" meter. **Table 5-8** shows the five-year rate schedule for bi-monthly fire service charges. **Table 5-9** shows the five-year rate schedule for water usage rates.

Table 5-7: Proposed Bi-Monthly Service Charges

Line	A Meter Size	B Proposed FY 2022	C Proposed FY 2023	D Proposed FY 2024	E Proposed FY 2025	F Proposed FY 2026
1	Low Income	\$10.95	\$11.28	\$12.07	\$12.92	\$13.56
2	5/8"	\$31.28	\$32.22	\$34.48	\$36.90	\$38.75
3	3/4"	\$43.65	\$44.96	\$48.11	\$51.48	\$54.06
4	1"	\$68.39	\$70.45	\$75.39	\$80.67	\$84.71
5	1 1/2"	\$130.25	\$134.16	\$143.56	\$153.61	\$161.30
6	2"	\$204.47	\$210.61	\$225.36	\$241.14	\$253.20
7	3"	\$439.51	\$452.70	\$484.39	\$518.30	\$544.22
8	4"	\$785.88	\$809.46	\$866.13	\$926.76	\$973.10
9	6"	\$1,614.69	\$1,663.14	\$1,779.56	\$1,904.13	\$1,999.34
10	8"	\$3,470.25	\$3,574.36	\$3,824.57	\$4,092.29	\$4,296.91
11	10"	\$5,202.11	\$5,358.18	\$5,733.26	\$6,134.59	\$6,441.32

Table 5-8: Proposed Bi-Monthly Fire Service Charges

Line	A Fire Line Diameter	B Proposed FY 2022	C Proposed FY 2023	D Proposed FY 2024	E Proposed FY 2025	F Proposed FY 2026
1	5/8"	\$6.65	\$6.85	\$7.33	\$7.85	\$8.25
2	3/4"	\$6.72	\$6.93	\$7.42	\$7.94	\$8.34
3	1"	\$6.93	\$7.14	\$7.64	\$8.18	\$8.59
4	1 1/2"	\$7.66	\$7.89	\$8.45	\$9.05	\$9.51
5	2"	\$8.93	\$9.20	\$9.85	\$10.54	\$11.07
6	3"	\$13.49	\$13.90	\$14.88	\$15.93	\$16.73
7	4"	\$21.34	\$21.99	\$23.53	\$25.18	\$26.44
8	6"	\$49.52	\$51.01	\$54.59	\$58.42	\$61.35
9	8"	\$98.13	\$101.08	\$108.16	\$115.74	\$121.53
10	10"	\$171.25	\$176.39	\$188.74	\$201.96	\$212.06

Table 5-9: Proposed Water Usage Rates

Line	A Customer Class	B Bi-Monthly Tiers (ccf)	C Proposed FY 2022	D Proposed FY 2023	E Proposed FY 2024	F Proposed FY 2025	G Proposed FY 2026
1	Residential						
2	Tier 1	8	\$6.04	\$6.23	\$6.67	\$7.14	\$7.50
3	Tier 2	18	\$7.18	\$7.40	\$7.92	\$8.48	\$8.91
4	Tier 3	18+	\$8.82	\$9.09	\$9.73	\$10.42	\$10.95
5							
6	Commercial / Industrial						
7	Tier 1	110	\$6.56	\$6.76	\$7.24	\$7.75	\$8.14
8	Tier 2	110+	\$7.70	\$7.94	\$8.50	\$9.10	\$9.56
9							
10	Irrigation						
11	Tier 1	170	\$7.76	\$8.00	\$8.56	\$9.16	\$9.62
12	Tier 2	170+	\$9.88	\$10.18	\$10.90	\$11.67	\$12.26
13							
14	Hydrant	Uniform	\$7.31	\$7.53	\$8.06	\$8.63	\$9.07

Customer Impacts

Figure 5-1 shows the distribution of bi-monthly bill impacts for FY 2022 for each customer class. Each graph shows the percentage of customer bills within a class that will experience an impact in a certain dollar range.

For Residential classes, 13% of Single Family Residential bi-monthly bills will see a decrease and 43% will see an impact of \$2 or less. 80% of Residential 2-4 Units bi-monthly bills will see a decrease and 6% will see an impact of \$5 or less. 87% of Multi-Family 5+ Units bi-monthly bills will see a decrease and 2% will see an impact of \$5 or less.

For Non-Residential classes, 87% of Commercial bills will see a decrease and 12% will see a moderate increase of \$15 or less. 85% of Industrial bills will see a decrease and 14% will see a moderate increase of \$15 or less. 44% of Irrigation bills will see a decrease and 30% will see a moderate increase of \$15 or less.

Figure 5-1: Distribution of Bi-Monthly Bill Impacts (FY 2022)

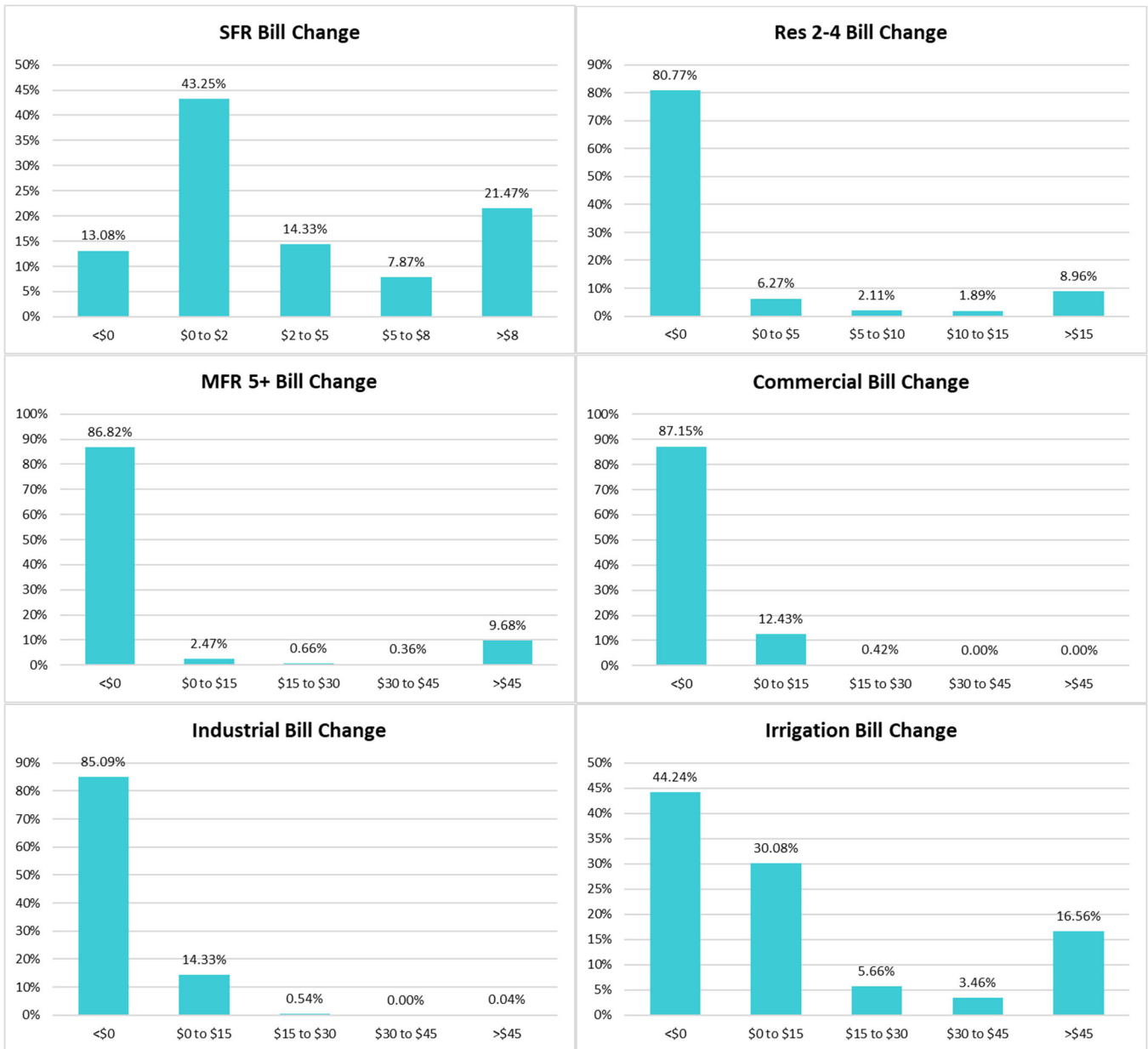
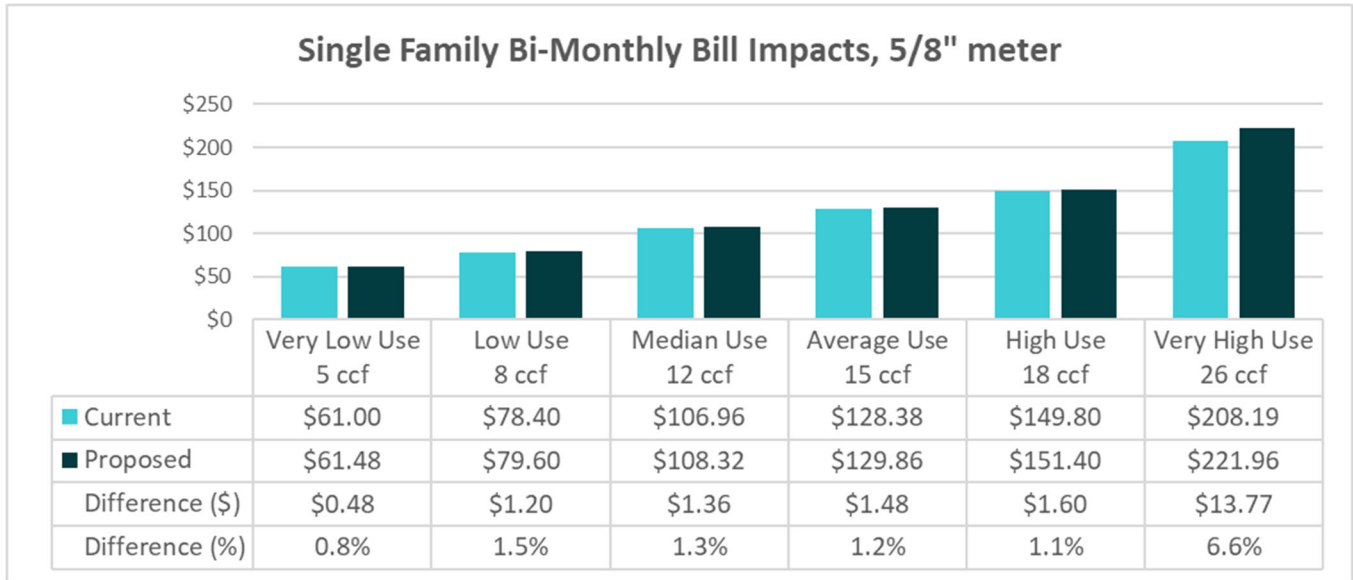


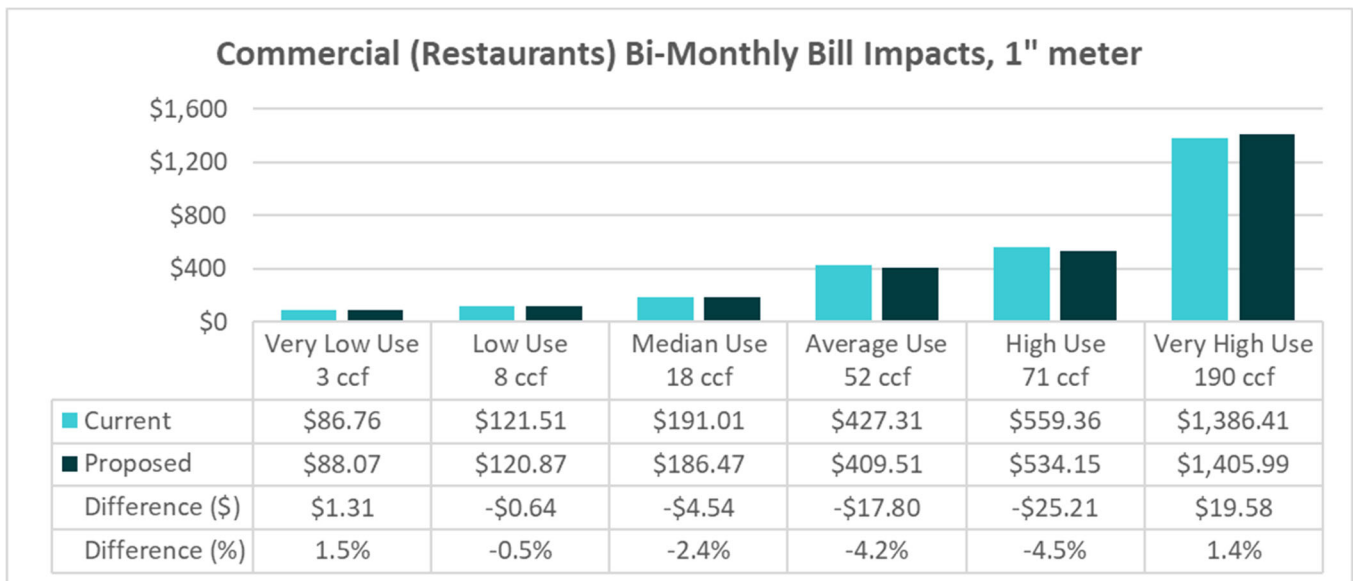
Figure 5-2 and **Figure 5-3** show the bi-monthly bill impacts at various levels of use for a typical Single Family Residential customer and a Commercial - Restaurant customer, respectively. The average Single Family Residential customer (with a 5/8" meter and using 15 ccf per bi-monthly period) will have an increase of \$1.48 in their bi-monthly bill.

Figure 5-2: Single Family Bill Impacts



Similarly, an average Commercial - Restaurant customer (with a 1" meter) will see a decrease of \$17.80 in their bi-monthly bill.

Figure 5-3: Commercial Restaurant Bill Impacts



Rate Survey

Raftelis prepared a survey of bi-monthly Single Family Residential and Commercial customer bills for several local agencies and agencies that also purchase SFPUC water. **Figure 5-4** and **Figure 5-5** show the Single Family bill comparison for a 3/8" meter using 15 ccf of water per bi-monthly billing period.

Figure 5-4: Single Family Bill Comparison with Local Non-SFPUC Agencies

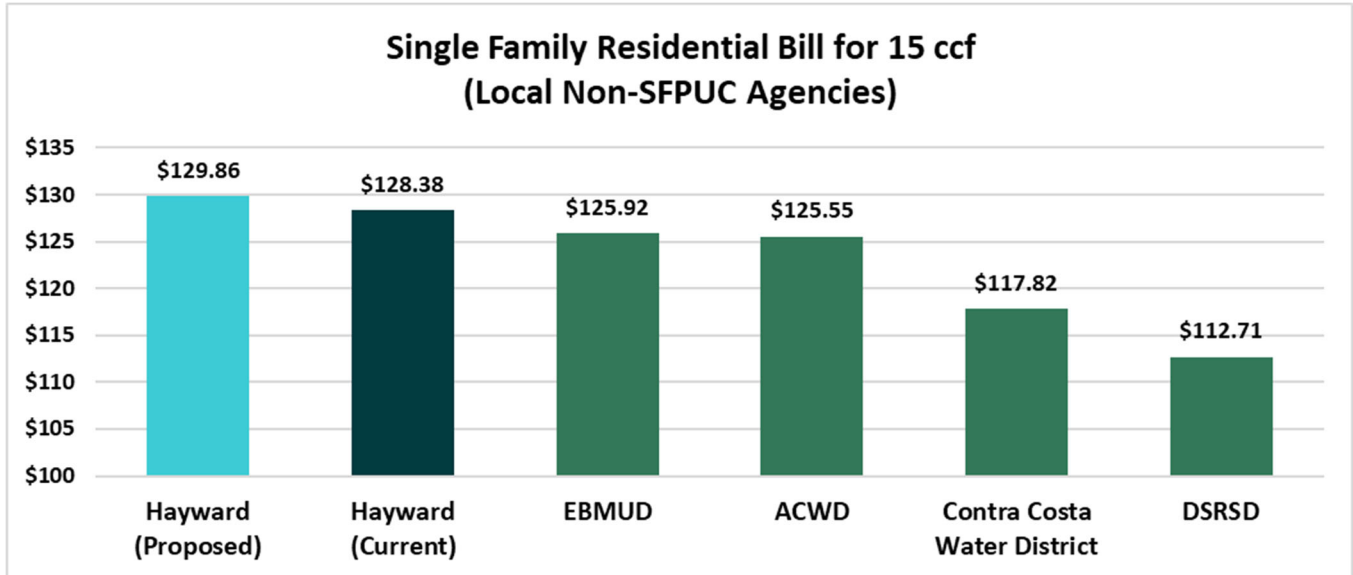


Figure 5-5: Single Family Bill Comparison with SFPUC Agencies

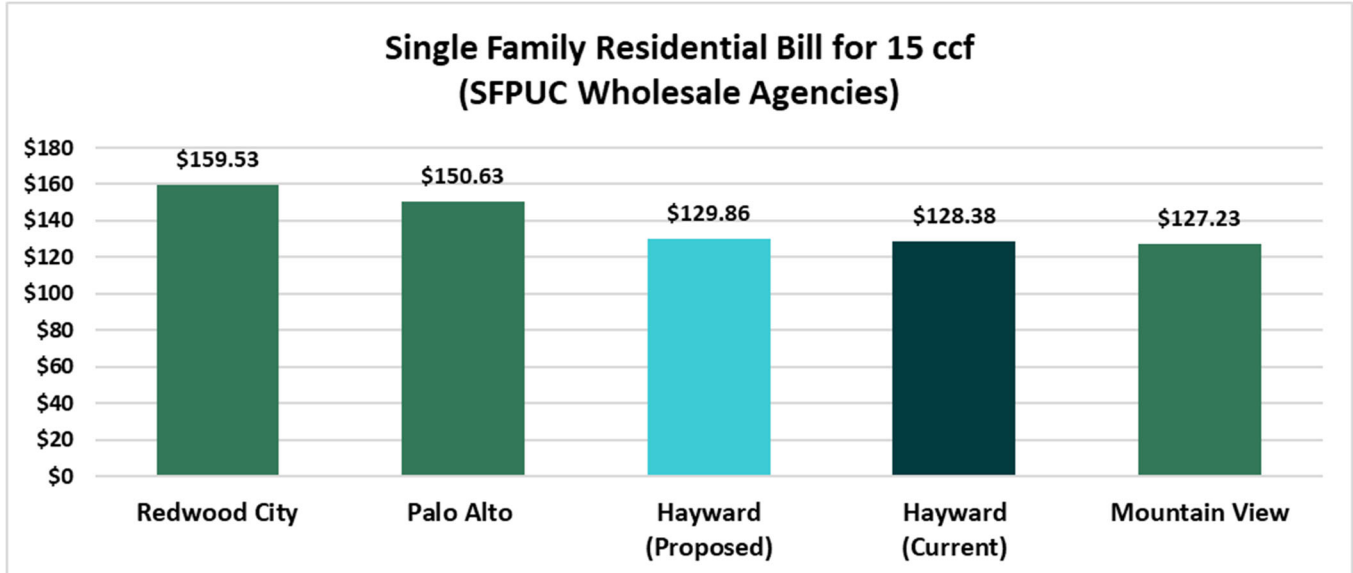


Figure 5-6 and Figure 5-7 show the Commercial bill comparison for a 1” meter using 110 ccf of water per bi-monthly billing period. Water bills for the City’s customers are generally higher than those of the local agencies. However, this is mainly due to the cost of purchasing SFPUC water. Compared to the agencies in the area that also deliver SFPUC water, the City’s water bills are on the lower end.

Figure 5-6: Commercial Bill Comparison with Local Non-SFPUC Agencies

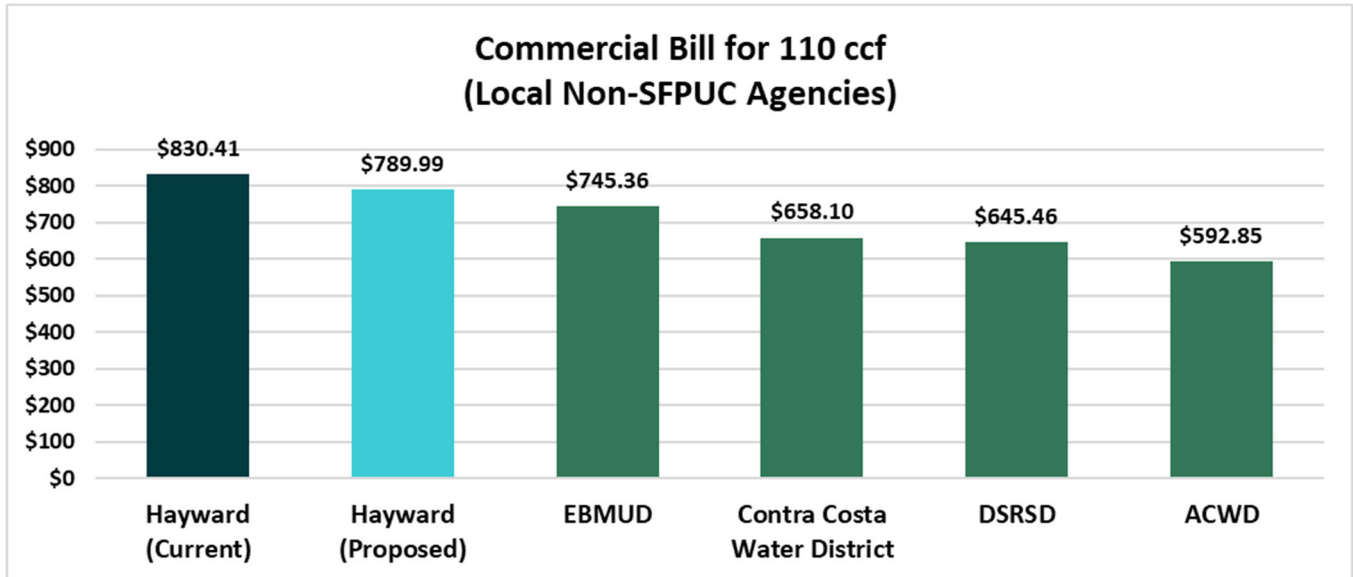
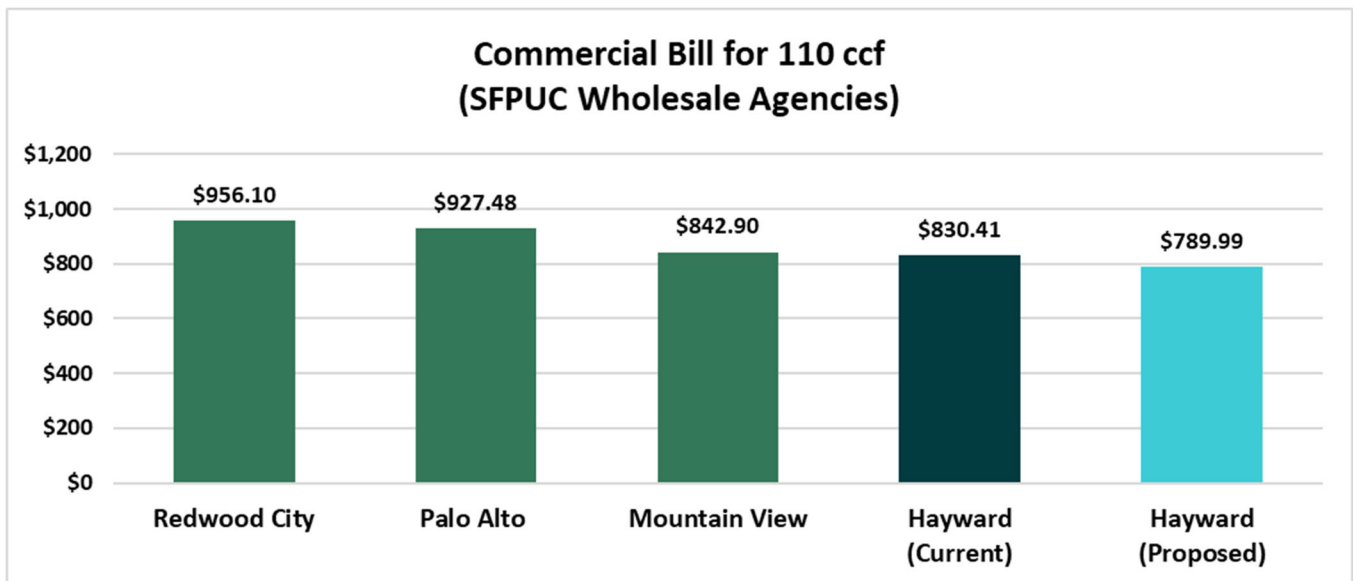


Figure 5-7: Commercial Bill Comparison with SFPUC Agencies



APPENDIX A:

10-Year Capital Improvement Plan

Line	A	B	C	D	E	F	G	H	I	J	K	K
	Capital Projects (\$1,000)	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	Total (\$)
1	Replacement Projects											
2	Miscellaneous Hydrant Replacement Program	\$35	\$36	\$38	\$39	\$41	\$43	\$44	\$46	\$48	\$50	\$420,214
3	AMI Customer Portal	\$150	\$104	\$108	\$112	\$117	\$122	\$127	\$132	\$137	\$142	\$1,250,611
4	Project Predesign Services	\$25	\$26	\$27	\$28	\$29	\$30	\$32	\$33	\$34	\$36	\$300,153
5	City Irrigation System Backflow Replacements	\$10	\$10	\$11	\$11	\$12	\$12	\$13	\$13	\$14	\$14	\$120,061
6	Water Efficiency Program	\$100	\$104	\$108	\$112	\$117	\$122	\$127	\$132	\$137	\$142	\$1,200,611
7	Annual System Replacement Program	\$150	\$156	\$162	\$169	\$175	\$182	\$190	\$197	\$205	\$213	\$1,800,916
8	Water Pump Station Valve Repair & Upgrade	\$75	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$75,000
9	Cast Iron Water Pipeline Replacement - Local Streets	\$500	\$520	\$541	\$562	\$585	\$608	\$633	\$658	\$684	\$712	\$6,003,054
10	250' P/S Motor Starter Replacements	\$150	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$150,000
11	Annual Line Repairs FY21	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500,000
12	Annual Line Replacements - FY 21	\$2,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,500,000
13	Annual Line Replacements - FY22-30	\$0	\$3,640	\$3,786	\$3,937	\$4,095	\$4,258	\$5,061	\$5,264	\$5,474	\$5,693	\$41,207,941
14	Annual Line Repairs FY22-30	\$0	\$312	\$324	\$337	\$351	\$365	\$380	\$395	\$411	\$427	\$3,301,832
15	Annual Pavement Patching FY21-30	\$25	\$26	\$27	\$28	\$29	\$30	\$32	\$33	\$34	\$36	\$300,153
16	Hesperian P/S Main Breaker Replacement	\$100	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$100,000
17	Hesperian P/S VFD & Motor Drive Replacement	\$250	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$250,000
18	Water System RRA Mitigation Measures	\$50	\$52	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$102,000
19	Main Street Water Main Replacement	\$500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500,000
20	Subtotal - Replacement Projects	\$5,120	\$4,987	\$5,132	\$5,337	\$5,551	\$5,773	\$6,637	\$6,902	\$7,178	\$7,465	\$60,082,544
21												
22	Improvement Projects											
23	Project Predesign Services	\$15	\$16	\$16	\$17	\$18	\$18	\$19	\$20	\$21	\$21	\$180,092
24	GIS Data Development and Conversion	\$75	\$52	\$54	\$56	\$58	\$61	\$63	\$66	\$68	\$71	\$625,305
25	Safety Improvements to Utility Center Corp. Yard Storage	\$25	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$25,000
26	New Pressure Regulating Stations at New 265' Zone	\$500	\$2,350	\$2,444	\$2,542	\$2,644	\$2,750	\$2,860	\$2,974	\$3,093	\$3,217	\$25,373,802
27	SCADA Replacement & Upgrade	\$60	\$21	\$22	\$22	\$23	\$24	\$25	\$26	\$27	\$28	\$280,122
28	Seismic Retrofit Maitland Reservoir and Appurtenances	\$0	\$1,667	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,667,120
29	New 3 MG Reservoir at High School Reservoir Site	\$0	\$0	\$0	\$0	\$1,053	\$7,300	\$0	\$0	\$0	\$0	\$8,352,790
30	New Alternative Feed Pipelines	\$150	\$156	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$306,000
31	New Emergency Well B2 (TBD-FY22)	\$0	\$520	\$4,326	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,846,400
32	New 2 MG Reservoir & Booster Station at Hesperian Site	\$0	\$1,560	\$9,194	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$10,753,600
33	Weather Based Irrigation Controllers at Various Locations	\$20	\$21	\$22	\$22	\$23	\$24	\$25	\$26	\$27	\$28	\$240,122
34	Groundwater Sustainability Plan Projects (TBD-FY23)	\$0	\$416	\$1,298	\$1,350	\$1,404	\$1,460	\$1,518	\$1,579	\$1,642	\$1,708	\$12,375,329
35	Subtotal - Improvement Projects	\$845	\$6,779	\$17,376	\$4,010	\$5,223	\$11,637	\$4,511	\$4,691	\$4,879	\$5,074	\$65,025,682
36												
37	Total - Capital Projects	\$5,965	\$11,766	\$22,508	\$9,348	\$10,774	\$17,410	\$11,147	\$11,593	\$12,057	\$12,539	\$125,108,226