

CITY OF **ORANGE**

Water and Sewer Rate Study

Final Report / April 3, 2023



April 3, 2023

Mr. Chris Cash
Director of Public Works
City of Orange
300 East Chapman Avenue
Orange, CA 92866

Subject: Water and Sewer Rate Study Report

Dear Mr. Cash,

Raftelis Financial Consultants, Inc. (Raftelis) is pleased to provide this Water and Sewer Rate Study Report which establishes equitable water and sewer rates based on cost of service principles.

The study's major objectives include the following:

- » Develop financial plans for the water and sewer enterprises that ensure financial sufficiency, meet operations and maintenance (O&M) costs, and ensure sufficient funding for capital improvement plan needs,
- » Maintain operating reserve funds, and
- » Develop rates that are equitable and fair to customer classes.

This report contains an executive summary, and the body of the report derives the rates for each utility and for each class.

It has been a pleasure working with City staff on this study. Please do not hesitate to contact us if you have questions.

Sincerely,

RAFTELIS FINANCIAL CONSULTANTS, INC.

Handwritten signature of Steve Gagnon in blue ink.

Steve Gagnon
Project Manager (PM)

Handwritten signature of Cleo Koenig in blue ink.

Cleo Koenig
Associate Consultant

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Sarah Wingfield
Associate Consultant

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1. Executive Summary

1.1. Study Background

In 2021, the City contracted with Raftelis Financial Consultants (Raftelis) to conduct a Water and Sewer Rate Study (Study). The Study includes a five-year financial plan and cost of service analysis for both water and sewer, as well as the development of water and sewer rates.

The City wishes to establish fair and equitable rates that:

- » Meet the City’s fiscal needs in terms of operational expenses and capital investment to maintain the system
- » Develop fair and equitable rates for all customer classes
- » Proportionately allocate the costs of providing service in accordance with California Constitution article XIII D, section 6 (commonly referred to as Proposition 218)

1.2. Current Rates

Table 1-1 through 1-3 show the City’s current water rates. Certain customers, at higher elevations, pay an additional pumping charge depending on their pumping zone to cover the extra costs associated with delivering water to higher elevations. Both volumetric and pumping zone rates are charged based on one hundred cubic feet (hcf)¹ of use, which is equivalent to 748 gallons. The fixed charges are bi-monthly fixed charges based on meter size. Private Fire Lines are charged a fixed bi-monthly charge based on service size. Currently, only 4” to 10” service lines are charged. Note that these rates are billed to customers on a bi-monthly basis.

Table 1-1: Current Volumetric Water Rates (Bi-monthly)

Line	Customer Class	Rates
1	Single Family and Condo	
2	Tier 1 (0-23 hcf)	\$2.87
3	Tier 2 (24-42 hcf)	\$2.95
4	Tier 3 (43+ hcf)	\$3.05
5	Multi Family	
6	Tier 1 (0-15 hcf)	\$2.87
7	Tier 2 (16-19 hcf)	\$2.91
8	Tier 3 (20+ hcf)	\$2.96
9	Commercial	\$2.93
10	Agriculture	\$2.94
11	Construction	\$2.93

Table 1-2: Current Pumping Zone Charges

Line	Pumping Zone	Rates
1	Zone 4	\$0.26
2	Zone 5	\$0.68

¹ One hcf is approximately 748 gallons

Table 1-3: Current Fixed Charges (Bi-monthly)

Line	Meter Size	Fixed Charge
1	Service Size (Inches)	
2	5/8" or 3/4"	\$32.05
3	1"	\$48.96
4	1 1/2"	\$91.24
5	2"	\$141.98
6	3"	\$260.38
7	4"	\$429.51
8	6"	\$852.35
9	8"	\$2,036.29
10	10"	\$3,220.23
11		
12	Private Fire Service Connection Size	
13	6"	\$40.97
14	8"	\$119.01
15	10"	\$253.61
16	12"	\$456.08

Sewer charges consist of: 1) a Sewer Maintenance (220) fee and 2) a Sewer Capital charge (520). Single Family, Multi-Family, and Condo classes pay a fixed charge determined on a per EDU basis; Commercial customers pay a volumetric rate dependent on bi-monthly usage in hundred cubic feet (hcf). This study focuses solely on Sewer Maintenance and Sewer Construction charges. The current rates, effective since July 2021, are shown in Table 1-4 below. Note that these rates are charged on a bi-monthly basis.

Table 1-4: Current Sewer Rates (Bi-monthly)

Line	Customer Class	Type	220 - Sanitation & Sewer	520 - Sewer Construction
1	Single Family	Fixed (\$/EDU)	\$15.85	\$7.15
2	Multi-Family/Condo	Fixed (\$/EDU)	\$9.69	\$4.37
3	Commercial	Volumetric (\$/hcf)	\$0.59	\$0.27

1.3. Proposed Water and Sewer Rates

1.3.1. Proposed Bi-monthly Water Rates

Table 1-5, Table 1-6, and Table 1-7 show the recommended rates for FY 2023-2027 for all customer classes. Private Fire Lines are charged a fixed bi-monthly charge based on service size for connections from 2-inch to 12-inch. Previously the City only charged 4-inch to 10-inch connections.

Table 1-5: Proposed Variable Water Rates (per hcf)

Line	Variable Rate (A)	Current Rate (B)	Apr 1, 2023 (C)	Jan 1, 2024 (D)	Jan 1, 2025 (E)	Jan 1, 2026 (F)	Jan 1, 2027 (G)
1	Single Family and Condo						
2	Tier 1 (0-23 hcf)	\$2.87	\$3.08	\$3.26	\$3.39	\$3.53	\$3.64
3	Tier 2 (24-42 hcf)	\$2.95	\$3.20	\$3.39	\$3.53	\$3.67	\$3.78
4	Tier 3 (43+ hcf)	\$3.05	\$3.37	\$3.57	\$3.71	\$3.86	\$3.98
5							
6	Multi Family						
7	Tier 1 (0-15 hcf)	\$2.87	\$3.07	\$3.25	\$3.38	\$3.52	\$3.63
8	Tier 2 (16-19 hcf)	\$2.91	\$3.14	\$3.33	\$3.46	\$3.60	\$3.71
9	Tier 3 (20+ hcf)	\$2.96	\$3.20	\$3.39	\$3.53	\$3.67	\$3.78
10							
11	Commercial	\$2.94	\$3.20	\$3.39	\$3.53	\$3.67	\$3.78
12	Agriculture	\$2.93	\$3.30	\$3.50	\$3.64	\$3.79	\$3.90
13	Construction	\$2.93	\$3.30	\$3.50	\$3.64	\$3.79	\$3.90

Table 1-6: Proposed Elevation Pumping Zone Rates (per hcf)

Line	Pumping Zone	Current Rate	Apr 1, 2023	Jan 1, 2024	Jan 1, 2025	Jan 1, 2026	Jan 1, 2027
1	Zone 4	\$0.26	\$0.22	\$0.23	\$0.24	\$0.25	\$0.26
2	Zone 5	\$0.68	\$0.56	\$0.59	\$0.61	\$0.63	\$0.65

Table 1-7: Proposed Fixed Water Rates

Line	Meter Size	Current Rate	Apr 1, 2023	Jan 1, 2024	Jan 1, 2025	Jan 1, 2026	Jan 1, 2027
1	5/8" or 3/4"	\$32.05	\$34.00	\$36.04	\$37.48	\$38.98	\$40.15
2	1"	\$48.96	\$52.75	\$55.92	\$58.16	\$60.49	\$62.30
3	1 1/2"	\$91.24	\$99.63	\$105.61	\$109.83	\$114.22	\$117.65
4	2"	\$141.98	\$155.88	\$165.23	\$171.84	\$178.71	\$184.07
5	3"	\$260.38	\$287.13	\$304.36	\$316.53	\$329.19	\$339.07
6	4"	\$429.51	\$474.63	\$503.11	\$523.23	\$544.16	\$560.48
7	6"	\$852.35	\$943.39	\$999.99	\$1,039.99	\$1,081.59	\$1,114.04
8	8"	\$2,036.29	\$2,255.89	\$2,391.24	\$2,486.89	\$2,586.37	\$2,663.96
9	10"	\$3,220.23	\$3,568.40	\$3,782.50	\$3,933.80	\$4,091.15	\$4,213.88
10							
11	Fire Service Size						
12	2"	NA	\$2.97	\$3.15	\$3.28	\$3.41	\$3.51
13	3"	NA	\$8.62	\$9.14	\$9.51	\$9.89	\$10.19
14	4"	\$40.97	\$18.38	\$19.48	\$20.26	\$21.07	\$21.70
15	6"	\$119.01	\$53.38	\$56.58	\$58.84	\$61.19	\$63.03
16	8"	\$253.61	\$113.75	\$120.58	\$125.40	\$130.42	\$134.33
17	10"	\$456.08	\$204.56	\$216.83	\$225.50	\$234.52	\$241.56
18	12"	NA	\$330.42	\$350.25	\$364.26	\$378.83	\$390.19
19	16"	NA	\$704.13	\$746.38	\$776.24	\$807.29	\$831.51

1.3.2. Proposed Bi-monthly Sewer Rates

Table 1-8 and Table 1-9 show the recommended rates and charges for FY 2023-2027 for all customer classes.

Table 1-8: Proposed 220 Sewer Maintenance Rates

Line	Customer Class	Type	Current	Apr 1, 2023	Jan 1, 2024	Jan 1, 2025	Jan 1, 2026	Jan 1, 2027
1	Single Family	Fixed	\$15.85	\$17.41	\$18.28	\$18.83	\$19.21	\$19.59
2	Multi-Family/Condo	Fixed	\$9.69	\$9.42	\$9.89	\$10.19	\$10.39	\$10.60
3	Commercial	Volumetric	\$0.59	\$0.61	\$0.64	\$0.66	\$0.68	\$0.69

Table 1-9: Proposed 520 Sewer Capital Rates

Line	Customer Class	Type	Current	Apr 1, 2023	Jan 1, 2024	Jan 1, 2025	Jan 1, 2026	Jan 1, 2027
1	Single Family	Fixed	\$7.15	\$7.88	\$8.28	\$8.53	\$8.70	\$8.87
2	Multi-Family/Condo	Fixed	\$4.37	\$4.27	\$4.48	\$4.61	\$4.71	\$4.80
3	Commercial	Volumetric	\$0.27	\$0.28	\$0.29	\$0.30	\$0.31	\$0.31

2. Introduction

2.1. Study Background

The City of Orange (City) was incorporated in 1888 and hosts a population of approximately 139,900 residents. The City is located within Orange County and covers approximately 38 square miles. It provides water services to approximately 34,800 customers and sewer services to approximately 32,800 customers. The City's water infrastructure covers the 24.3 square mile water service area, comprised of 12 groundwater wells, seven imported water connections, 14 pump stations, and 14 water reservoirs with 40 million gallons of storage capacity. The City additionally maintains approximately 312 miles of sewer pipeline to collect and transport sewage to two external reclamation plants for treatment. The Orange County Sanitation District owns and manages these plants. In addition, the City shares responsibility with the County for managing its storm drain and flood control facilities.

The City's last rate adjustment was effective January 1, 2022. In 2021, the City contracted with Raftelis Financial Consultants (Raftelis) to conduct a Water and Sewer Rate Study (Study). The study included five-year financial plans and cost of service analyses as well as development of water and sewer rates.

The City wishes to establish fair and equitable rates that:

- » Meet the City's fiscal needs in terms of operational expenses and capital investment to maintain the system;
- » Develop fair and equitable rates for all customer classes;
- » Proportionately allocate the costs of providing service in accordance with California Constitution article XIII D, section 6 (commonly referred to as Proposition 218).

2.2. Overview of Proposition 218

Article XIII D placed substantive limitations on the use of the revenue collected from property-related fees and on the amount of the fee that may be imposed on each parcel. Additionally, it established procedural requirements for imposing new, or increasing existing, property-related fees. The California Supreme Court has determined that water and sewer service fees are property-related fees. These provisions, as it relates to public water and sewer service, require that a property-related fee must meet the following requirements:

1. A property-related charge (such as water or sewer rates) imposed by a public agency on a parcel shall not exceed the costs required to provide the property-related service.
2. Revenues derived by the charge shall not be used for any purpose other than that for which the charge was imposed.
3. The amount of the charge imposed upon any parcel shall not exceed the proportional cost of service attributable to the parcel.
4. No charge may be imposed for a service unless that service is actually used or immediately available to the owner of property.
5. A written notice of the proposed charge shall be mailed to both the customer of record and owner of record of each parcel at least 45 days prior to the public hearing, when the agency considers all written protests against the charge.

The five substantive requirements in Article XIII D are structured to place limitations on (1) the use of the revenue collected from property-related fees and (2) the allocation of costs recovered by such fees to ensure that they are proportionate to the cost of providing the service attributable to each parcel.

As stated in the American Water Works publication, *Manual of Water Supply Practice M1, Principles of Water Rates, Fees, and Charges*, 7th Edition (AWWA Manual M1), “water rates and charges should be recovered from classes of customers in proportion to the cost of serving those customers.” Similarly, the Water Environment Federation (WEF) publication, *Financing and Charges for Sewer Systems, WEF Manual of Practice No. 27*, 4th Edition (WEF Manual 27), states, “the process of identifying the service characteristics of the utility’s customers and distributing costs in proportion to their service demands are critical steps in the development of equitable rates and charges.”

Proposition 218 requires that water rates cannot be “arbitrary and capricious,” meaning that the rate-setting methodology must be sound and that there must be a nexus between the costs and the rates charged in addition to meeting the substantive requirements set forth therein. California Courts have also made clear that, while agencies are authorized to use industry-standard rate-setting methodologies as set forth in AWWA Manual M1 and WEF Manual 27, rates for water and sewer service must meet the substantive requirements of Proposition 218. The rates and charges in this report are designed to comply with Proposition 218.

2.3. Rate-Setting Methodology

Compliance with both industry-standard principles of COS equity and Proposition 218 can be enhanced through a thoughtful and comprehensive rate-setting process that includes the following key steps:

1. **Revenue Requirement Determination:** The rate-setting process starts by determining the "test-year" (rate-setting year) revenue requirement from rates. The revenue requirement should sufficiently fund the utility’s O&M, debt service, capital expenses, and other identified costs with funding to reserves (positive cash) or using reserves (negative cash), all based on a long-term financial plan.
2. **COS Analysis:** The annual cost of providing water and sewer service is distributed among customer classes in proportion to their service requirements. A COS analysis involves the following key steps:
 - » **Assignment of Costs to Functions:** Examples of water system functions include storage, treatment, and distribution. Examples of sewer system functions include collection, conveyance, and treatment.
 - » **Allocation of Costs to Cost Causation Components:** Examples of water cost components include base demand, maximum day demand, and maximum hour demand. Examples of sewer cost causation components include flow, biochemical oxygen demand, and suspended solids.
 - » **Distribution of Costs to Customer Classes:** Costs are distributed to customer classes in proportion to the demands they place on the water and sewer systems.
3. **Rate Design/Rate Calculations:** Rates do more than simply recover costs. Properly designed rates should support and optimize a blend of various utility objectives, such as promoting cost-based water use efficiency, affordability for essential needs, and revenue stability, among other objectives.

3. Water Financial Plan

3.1. Inflationary Assumptions

The Study uses Fiscal Year (FY) 2023 as both the budget year and the test year. The test year is a term used to describe the year of revenues and expenses used to establish rates. The study period is from FY 2023 to FY 2027. To ensure that the study reasonably projects future costs, Raftelis makes informed assumptions about inflationary factors for the cost to serve water. Table 3-1 shows the cost escalation factors utilized to project expenses from FY 2023 into future years. Table 3-2 shows the wholesale water purchase cost inflationary factors, as well as the Basin Pumping Percentage (BPP) which is used to determine how much water is pumped from the City’s wells. To calculate water purchase costs, we also used forecasted rates from the Orange County Water District from FY 2023 to FY 2026. Any water that isn’t pumped from the City’s wells is supplied by the Municipal Water District of Orange County (MWDOC), Serrano Water District (SWD), and East Orange County Water District (EOCWD).

Table 3-1: Cost Escalation Factors

Line	Inflation Category	FY 2024	FY 2025	FY 2026	FY 2027
1	General	5%	4%	3%	3%
2	Personnel	3%	3%	3%	3%
3	Construction	5%	4%	3%	3%
4	Electricity Inflation	5%	5%	5%	5%
5	Fleet Services	5%	5%	5%	5%
6	Non-Escalation	0%	0%	0%	0%
7	Interest Earnings	1%	1%	1%	1%
8	Miscellaneous Revenue	1%	1%	1%	1%

Table 3-2: Water Supply Cost Inflationary Factors

Line	Inflation Category	FY 2024	FY 2025	FY 2026	FY 2027
1	MWD/MWDOC Retail Meter Charge	5%	7%	6%	6%
2	MWD/MWDOC Tier 1 Volumetric Rates	5%	7%	6%	6%
3	MWD/MWDOC Choice Program Charges	5%	7%	6%	6%
4	MWD/MWDOC Capacity Charge	6%	7%	6%	6%
5	MWD/MWDOC RTS Charge	8%	7%	6%	6%
6					
7	OCWD Basin Pumping Percentage (BPP)	77%	77%	77%	77%

3.2. Projected Annual Water Use

Table 3-3 shows projected billed consumption by customer class over the study period. Total water use is shown in hundred cubic feet (hcf).

Table 3-3: Projected Annual Water Use (hcf)

Line	Customer Class	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Residential - Single Family and Condo					
2	Tier 1 (0-23 hcf)	3,064,475	3,064,475	3,064,475	3,064,475	3,064,475
3	Tier 2 (24-42 hcf)	1,264,262	1,264,262	1,264,262	1,264,262	1,264,262
4	Tier 3 (43+ hcf)	1,026,987	1,026,987	1,026,987	1,026,987	1,026,987
5	Subtotal Residential - Single Family and Condo	5,355,724	5,355,724	5,355,724	5,355,724	5,355,724
6						
7	Residential - Multi Family					
8	Tier 1 (0-15 hcf)	1,201,137	1,201,137	1,201,137	1,201,137	1,201,137
9	Tier 2 (16-19 hcf)	135,540	135,540	135,540	135,540	135,540
10	Tier 3 (20+ hcf)	326,907	326,907	326,907	326,907	326,907
11	Subtotal Residential - Multi Family	1,663,584	1,663,584	1,663,584	1,663,584	1,663,584
12						
13	Commercial	3,126,390	3,126,390	3,126,390	3,126,390	3,126,390
14	Agricultural	52,250	52,250	52,250	52,250	52,250
15	Municipal	222,679	222,679	222,679	222,679	222,679
16	Bike Trails	3,557	3,557	3,557	3,557	3,557
17	Subtotal - Nonresidential	3,404,876	3,404,876	3,404,876	3,404,876	3,404,876
18						
19	Total	10,424,184	10,424,184	10,424,184	10,424,184	10,424,184

3.3. Projected Water Accounts

City staff provided the number of accounts by meter size for FY 2021 through FY 2022. Table 3-4 shows that this study assumes no growth in the number of accounts over the study period.

Table 3-4: Projected Water Account Growth

Line	Meter Size	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	5/8" or 3/4"	26,614	26,614	26,614	26,614	26,614
2	1"	5,952	5,952	5,952	5,952	5,952
3	1 1/2"	750	750	750	750	750
4	2"	1,218	1,218	1,218	1,218	1,218
5	3"	168	168	168	168	168
6	4"	89	89	89	89	89
7	6"	32	32	32	32	32
8	8"	9	9	9	9	9
9	10"	6	6	6	6	6
10	Total Accounts	34,837	34,837	34,837	34,837	34,837

This process was repeated for private fire line accounts, as shown in Table 3-5. There was no account growth predicted for private fire lines for the study period.

Table 3-5: Projected Fire Account Growth

Line	Service Size	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	5/8" or 3/4"	3	3	3	3	3
2	1"	22	22	22	22	22
3	1 1/2"	10	10	10	10	10
4	2"	170	170	170	170	170
5	3"	1	1	1	1	1
6	4"	164	164	164	164	164
7	6"	456	456	456	456	456
8	8"	193	193	193	193	193
9	10"	14	14	14	14	14
10	Total Fire Accounts	1,033	1,033	1,033	1,033	1,033

3.4. Projected Water O&M Expenses

Table 3-6 shows a summary of water O&M expenses. O&M expenditures include the cost of water supply, treatment, and distribution. The projected increases in O&M expenses are shown in Table 3-6 below. FY 2023 O&M expenses were provided by City staff and future years were projected based on inflationary assumptions shown in Table 3-1. Water supply costs were inflated based on assumptions in Table 3-2.

Table 3-6: Projected Water O&M Expenses by Expense Category

Line	Expense Category	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Non-Departmental	\$860,000	\$885,971	\$907,787	\$924,804	\$942,331
2	Utility Billing	\$1,194,832	\$1,238,494	\$1,279,753	\$1,318,146	\$1,357,690
3	Fleet Services	\$280,000	\$294,000	\$308,700	\$324,135	\$340,342
4	Subtotal	\$2,334,832	\$2,418,465	\$2,496,240	\$2,567,084	\$2,640,362
5						
6	Water Supply (Water Production)	\$21,953,639	\$19,741,272	\$20,976,585	\$22,435,599	\$23,768,666
7	Water Production Miscellaneous Costs	\$9,998,727	\$11,231,978	\$11,628,950	\$11,985,988	\$12,355,513
8	Pumping Electricity (Zones 4 & 5)	\$167,721	\$176,107	\$184,912	\$194,158	\$203,866
9	Conservation	\$35,000	\$36,750	\$38,220	\$39,367	\$40,548
10	Subtotal Water Production	\$32,155,087	\$31,186,107	\$32,828,667	\$34,655,111	\$36,368,592
11						
12	Water Distribution	\$5,210,605	\$5,417,426	\$5,606,462	\$5,774,656	\$5,947,896
13	Total Expenses	\$39,700,524	\$39,021,998	\$40,931,370	\$42,996,852	\$44,956,850

3.4.1. Water Supply

The City primarily sources its water from the Orange County Water District (OCWD). The proportion of water that is supplied by OCWD is also known as the Basin Pumping Percentage (BPP). The BPP is 77%. However, the City was not able to pump 77% due to PFAS contamination. The City purchases its remaining water from the Municipal Water District of Orange County (MWDOC), the Serrano Water District (SWD), and the East Orange County Water District (EOCWD). The projected water purchases by source are shown below in Table 3-7 in acre-feet.

Table 3-7: Water Purchases (Acre-feet)

Line	Supply Source	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	OCWD	15,169 AF	20,138 AF	20,138 AF	20,138 AF	20,138 AF
2	MWDOC	9,856 AF	4,887 AF	4,887 AF	4,887 AF	4,887 AF
3	EOCWD	605 AF	605 AF	605 AF	605 AF	605 AF
4	SWD	523 AF	523 AF	523 AF	523 AF	523 AF
5	Total	26,154 AF	26,154 AF	26,154 AF	26,154 AF	26,154 AF

Table 3-8 provides the projected wholesale volumetric rates (at the time the study was finalized) for the three wholesale water sources and shows if the charges are on a calendar year or fiscal year basis. Fiscal Year (FY) rates are effective from July-June of each year. Calendar Year (CY) rates are effective from January-December.

Table 3-8: Wholesale Water Purchase Costs Volumetric Rates

Line		Effective Period	FY/CY 2023	FY/CY 2024	FY/CY 2025	FY/CY 2026	FY/CY 2027
1	OCWD	FY	\$540	\$566	\$605	\$649	\$687
2	MWDOC	CY	\$1,209	\$1,256	\$1,344	\$1,425	\$1,510
3	EOCWD	CY	\$1,088	\$1,256	\$1,344	\$1,425	\$1,510
4	SWD	CY	\$1,088	\$1,130	\$1,210	\$1,282	\$1,359

Multiplying the quantities in Table 3-7 by the rates in Table 3-8 results in the water purchase costs listed below in Table 3-9. For OCWD, this is a direct multiplication of all use in the fiscal year with the matching fiscal year price. However, calculations involving calendar year rates must account for the mid-fiscal year rate change. Raffelis determined that 60% of water purchases occur from July to December and 40% occur in January to June of the fiscal year. Therefore, 60% of water use is multiplied by the previous calendar year’s rates, and 40% is multiplied by the calendar year matching the fiscal year (current fiscal year).

For example, the below equation provides the calculation for FY 2023 MWDOC water purchases:

$$60\% \times \text{FY 2023 Acre Feet} \times \text{CY 2022 MWDOC Rate} + 40\% \times \text{FY 2023 Acre Feet} \times \text{CY 2023 MWDOC Rate} = \text{Total FY 2023 MWDOC Volumetric Water Supply Cost}$$

$$60\% \times 9,856 \times \$1,143 + 40\% \times 9,856 \times \$1,209 = \$13,013,317$$

The totals derived from these calculations are shown below.

Table 3-9: Wholesale Water Purchase Expenses

Line		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	OCWD	\$8,191,338	\$11,398,304	\$12,183,700	\$13,069,787	\$13,840,905
2	MWDOC	\$11,525,749	\$6,000,160	\$6,309,834	\$6,725,252	\$7,128,767
3	EOCWD	\$637,114	\$743,257	\$781,617	\$833,076	\$883,061
4	SWD	\$550,514	\$578,007	\$607,839	\$647,857	\$686,728
5	Total	\$20,904,715	\$18,719,728	\$19,882,990	\$21,275,972	\$22,539,461

MWDOC assesses the fixed charges shown in Table 3-10. These charges are on a fiscal year schedule, with the exception of the Capacity Charge, which is on a calendar year. The City of Orange pays a MWDOC retail meter charge (Line 2) on all of its customers' meters (Line 1), resulting in a total retail meter charge shown in Line 3.

Table 3-10: MWDOC Fixed Charges

Line			CY 2022	FY/CY 2023	FY/CY 2024	FY/CY 2025	FY/CY 2026	FY/CY 2027
1	Number of Meters			34,837	34,837	34,837	34,837	34,837
2	Retail Meter Charge			\$13.65	\$14.33	\$15.34	\$16.26	\$17.23
3	Total Retail Meter Charge	FY		\$475,532	\$499,308	\$534,260	\$566,315	\$600,294
4								
5	MWDOC Choice Program Charge	FY		\$39,669	\$41,652	\$44,568	\$47,242	\$50,077
6	MWDOC RTS Charge	FY		\$356,815	\$385,360	\$412,335	\$437,075	\$463,300
7	MWDOC Capacity Charge	CY	\$189,207	\$164,610	\$174,487	\$186,701	\$197,903	\$209,777
8	Total MWDOC Fixed Charges			\$1,048,924	\$1,095,869	\$1,171,757	\$1,242,935	\$1,317,511

The City pays the MWDOC retail meter charge, and the Readiness-to-Serve (RTS) Charge per fiscal year. The fiscal year Capacity charge incorporated into the rates is calculated by assessing the CY 2022 charge on the first six months of the fiscal year, and the CY 2023 charge on the final six months. This calculation is shown below.

$$\begin{aligned}
 & \text{CY 2022 Capacity Charge} \times \left(\frac{6 \text{ months}}{12 \text{ months per FY}} \right) + \text{CY 2023 Capacity Charge} \times \left(\frac{6 \text{ months}}{12 \text{ months per FY}} \right) \\
 & = \text{FY 2023 Capacity Charge}
 \end{aligned}$$

The resulting total water supply purchase costs are shown below in Table 3-11.

Table 3-11: Total Water Purchase Costs

Line		FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	OCWD	\$8,191,338	\$11,398,304	\$12,183,700	\$13,069,787	\$13,840,905
2	MWDOC	\$11,525,749	\$6,000,160	\$6,309,834	\$6,725,252	\$7,128,767
3	MWDOC Fixed Charges	\$1,048,924	\$1,095,869	\$1,171,757	\$1,242,935	\$1,317,511
4	EOCWD	\$637,114	\$743,257	\$781,617	\$833,076	\$883,061
5	SWD	\$550,514	\$578,007	\$607,839	\$647,857	\$686,728
6	Total	\$21,953,639	\$19,815,598	\$21,054,747	\$22,518,907	\$23,856,972

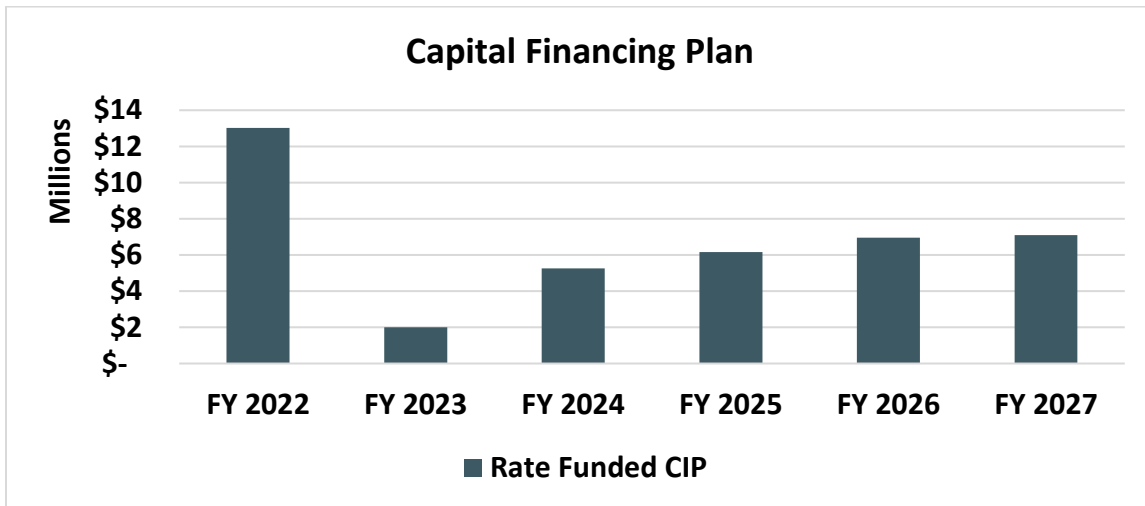
3.5. Water Capital Improvement Plan

Table 3-12 (next page) shows the City's planned capital improvement plan (CIP) for the Water Enterprise. The City plans to fund all of its CIP projects with cash reserves generated from rates (i.e. pay-as-you-go). Figure 3-1 shows a summary of total Water Enterprise CIP expenditures by funding source over the study period.

Table 3-12: Water Capital Improvement Plan

Line	Expense	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Security Improvements	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
2	Meter Replacement Program	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000
3	Well 28 Construction	\$1,200,000					
4	Well Rehabilitation	\$125,000	\$100,000	\$150,000	\$150,000	\$150,000	\$150,000
5	Lower Serrano Pump Station					\$500,000	\$1,600,000
6	Exterior Cathodic Protection Systems	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
7	Reservoir Recoating				\$50,000	\$850,000	
8	Reservoir 3A Construction				\$300,000	\$2,000,000	
9	Reservoir 2A Site Remediation						\$1,000,000
10	Pipeline Renewal Projects	\$1,500,000	\$1,500,000	\$1,500,000	\$1,500,000	\$2,000,000	\$2,000,000
11	Water Plant Telemetry - SCADA	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
12	Emergency Generators	\$100,000		\$250,000			\$250,000
13	Well 29	\$400,000		\$2,500,000	\$3,000,000		
14	Well 30						
15	South yard NPDES Improvement	\$1,044,700					
16	Water Rate Study	\$100,000					
17	Reservoir 8A Pump Station						\$150,000
18	Reservoir 4A Construction						\$150,000
19	Reservoir 5 Pump Station Replacement						\$150,000
20	Cambridge St. Improvements	\$200,000					
21	Walnut St. Improvements	\$500,000					
22	Work Order Management System	\$151,600					
23	FY 2021 Capital Carryover	\$7,419,246					
24	Subtotal	\$13,015,546	\$1,875,000	\$4,675,000	\$5,275,000	\$5,775,000	\$5,725,000
25	Inflation	0%	7%	5%	4%	3%	3%
26	Grand Total	\$13,015,546	\$2,006,250	\$5,252,363	\$6,163,521	\$6,950,173	\$7,096,699

Figure 3-1: Water Enterprise Capital Improvement Plan



3.6. Water Financial Policies

The City has an operating reserve, which provides funds to meet ongoing cash flow requirements related to operating expenses. The current operating reserve target is equal to 25% of budgeted operating expenses. The City does not officially have a capital reserve target, however as a best practice Raftelis modeled a typical year’s capital expenditures equal to 100% of the average CIP across 5 years. These two reserves are added together to get the total target reserves on line 4. Table 3-13 below shows the projected reserve targets based on the established reserve policies. Increases in these values are based on the escalation of operating costs, which were inflated based on the escalation factors shown in Table 3-1 and Table 3-2. The difference between projected target reserves and projected ending reserves are shown in line 5.

Table 3-13: Projected Water Operating and Capital Reserves

Line	Item	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Ending Reserves	\$7,017,780	\$2,932,180	\$4,558,101	\$6,828,569	\$9,594,931	\$13,309,687
2	Capital Reserves Target	\$5,510,884	\$5,493,801	\$6,602,944	\$7,108,176	\$7,238,570	\$7,266,609
3	O&M Reserves Target	\$9,579,294	\$9,925,131	\$9,755,500	\$10,232,842	\$10,749,213	\$11,239,212
4	Total Target	\$15,090,178	\$15,418,932	\$16,358,444	\$17,341,019	\$17,987,783	\$18,505,821
5	Difference (\$)	(\$8,072,398)	(\$12,486,752)	(\$11,800,342)	(\$10,512,450)	(\$8,392,851)	(\$5,196,134)

3.7. Proposed Water Financial Plan

To adequately fund operating and capital expenditures while maintaining sufficient reserve funding, the City must increase its revenues from water rates. Raftelis worked closely with City staff to identify revenue adjustments and the resulting financial plan. The selected proposed annual revenue adjustments are shown in Table 3-14. Revenue adjustments represent annual percent increases in total rate revenue (if the rates are applied for a full fiscal year) relative to rate revenue generated by the prior year’s water rates.

Table 3-14: Proposed Water Revenue Adjustments

Line	Customer Class	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Effective Date	April 1, 2023	January 1, 2024	January 1, 2025	January 1, 2026	January 1, 2027
2	Rate Revenue Increases	7.0%	6.0%	4.0%	4.0%	3.0%

Table 3-15 shows projected net cashflow and reserves under the proposed financial plan. Beginning balances are shown on line 4. Sources of funds include rate and non-rate revenues, revenue adjustments (resulting from the revenue increases described in Table 3-14), and interest. Use of funds include O&M expenses (from Table 3-6) and CIP expenditures (from Table 3-12). All ending balances are projected values.

Table 3-15: Proposed Water Financial Plan

Line	Description	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Financing Strategy					
2	Rate Revenue Increases	7.0%	6.0%	4.0%	4.0%	3.0%
3						
4	Beginning Balance	\$2,863,132	\$2,932,180	\$4,558,101	\$6,828,569	\$9,594,931
5						
6	Summary of Cash Flows					
7	Revenues					
8	Revenue from Existing Rates	\$40,664,070	\$40,664,070	\$40,664,070	\$40,664,070	\$40,664,070
9	Revenue from Rate Increases	\$711,621	\$4,151,802	\$6,379,542	\$8,261,287	\$9,968,877
10	Total Rate Revenue	\$41,375,692	\$44,815,872	\$47,043,612	\$48,925,357	\$50,632,948
11						
12	Other Revenue					
13	"New" Pass Through Revenue	\$0	\$693,808	\$1,929,121	\$3,388,135	\$4,721,201
14	Other Rate Revenue	\$172,809	\$174,537	\$176,283	\$178,045	\$179,826
15	Non-Rate Revenue	\$213,529	\$213,541	\$213,554	\$213,566	\$213,579
16	Interest Revenue	\$13,792	\$2,524	\$2,789	\$8,284	\$20,750
17	Total Other Revenue	\$400,131	\$1,084,410	\$2,321,746	\$3,788,030	\$5,135,356
18						
19	Expenditures					
20	O&M Costs	\$39,700,524	\$39,021,998	\$40,931,370	\$42,996,852	\$44,956,850
21						
22	Rate Funded Capital Improvements	\$2,006,250	\$5,252,363	\$6,163,521	\$6,950,173	\$7,096,699
23	Total Expenditures	\$41,706,774	\$44,274,361	\$47,094,891	\$49,947,025	\$52,053,548
24						
25	Net Operating Cash Flow	\$69,048	\$1,625,921	\$2,270,468	\$2,766,362	\$3,714,756
26	Ending Cash Reserves	\$2,932,180	\$4,558,101	\$6,828,569	\$9,594,931	\$13,309,687

Figure 3-2 shows the projected reserve balances under the proposed financial plan. The bars indicate the projected ending balance. The operating reserve target is shown as the green line and the total reserve target is represented by the blue line. Under the proposed financial plan, reserve balances are expected to be below the operating reserve target until FY 2027. The City accepts this projection to minimize customer water bill impacts.

Figure 3-2: Projected Reserve Balances

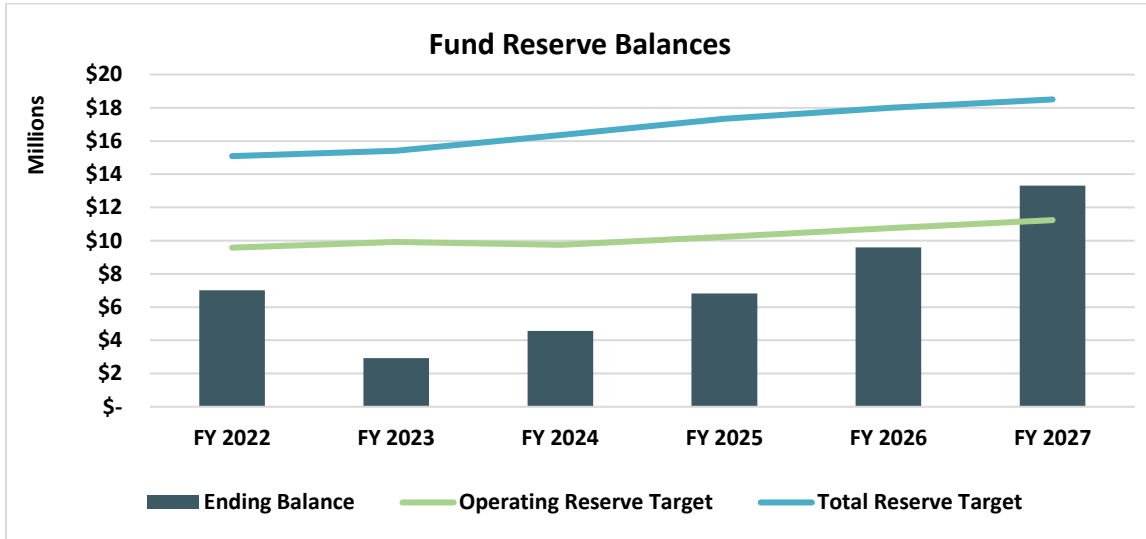
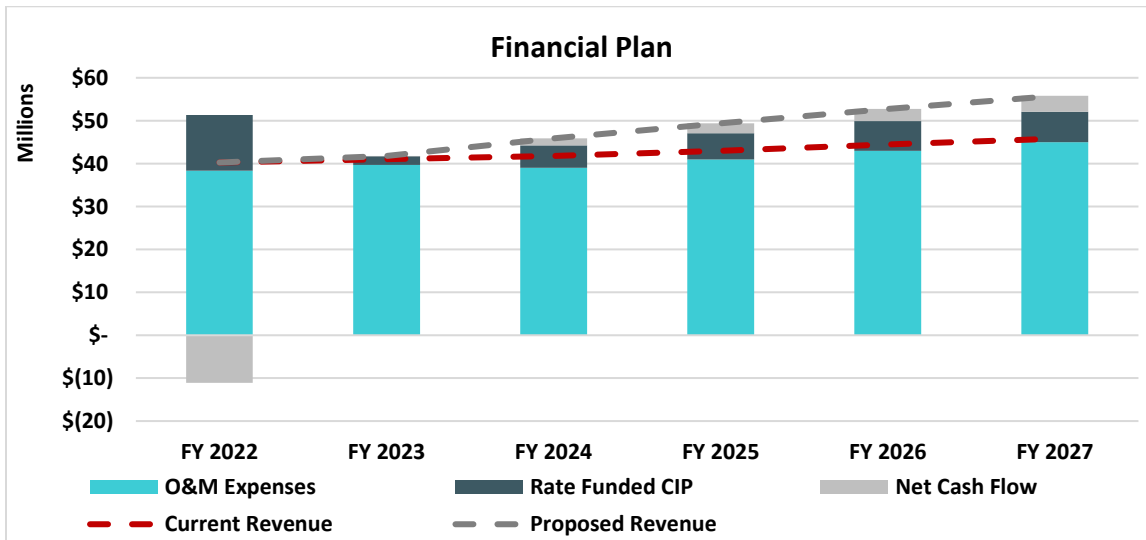


Figure 3-3 compares expenses (shown by the stacked bars) with proposed revenues and current revenue (shown by the dash lines). Net cashflow – or total revenues less total expenses – is shown as a light gray portion of the stacked bar. Revenue adjustments are required to generate sufficient revenue to recover O&M and CIP-related expenditures over the study period.

Figure 3-3: Proposed vs. Status Quo Water Financial Plan



4. Water Cost of Service Analysis

A cost of service analysis distributes a utility's revenue requirements (costs) to each customer class. The first step in a cost of service analysis is to determine the revenue requirement (costs) that need to be recovered. The next step is to functionalize O&M costs into the following functions:

1. Water Purchases
2. Production
3. Pumping Electricity
4. Pumping Zone 4
5. Pumping Zone 5
6. Customer Service
7. Distribution
8. General Administration
9. Conservation

The functionalization of costs allows us to better allocate them to the cost causation components. The cost causation components include:

1. Supply
2. Base (average)
3. Peaking (maximum day and maximum hour)
4. Fire
5. Meter Service
6. Customer Service
7. General and Administrative
8. Pumping Zone 4
9. Pumping Zone 5

Peaking costs consist of maximum day and maximum hour demand components. The maximum day demand is the maximum amount of water used in a single day in a year. The maximum hour demand is the maximum use in an hour on the maximum use day. Different facilities, such as distribution and storage facilities, as well as the O&M costs associated with those facilities, are designed to meet the peaking demands of customers. Therefore, peaking costs include the O&M and capital costs associated with meeting peak customer demand. This method is consistent with the AWWA M1 Manual, and widely used in the water industry to perform cost of service analyses.

4.1. Water Revenue Requirement

Table 4-1 shows the total revenue required from rates, shown in line 18. This is the amount that the rates, derived in Section 5, are designed to collect.

Line 7 through 11 subtract revenue from other sources such as interest revenue and other non-rate revenues. Line 14 is an adjustment for the FY 2023 cash balance and Line 18 is an adjustment to annualize the rates since the rates are

being implemented in April (3 months left in the fiscal year), it is necessary to annualize this additional revenue so that rates reflect an annual revenue requirement. The final rate revenue requirement is shown on Line 18.

Table 4-1: Water Enterprise Revenue Requirement

Line [A]	FY 2023 Categories [B]	Operating [C]	Capital [D]	Total [E]
1	Revenue Requirements			
2	Water Supply Expenses	\$21,953,639		\$21,953,639
3	All Other O&M Expenses	\$17,746,885		\$17,746,885
4	Rate Funded Capital Projects		\$2,006,250	\$2,006,250
5	Total Revenue Requirements	\$39,700,524	\$2,006,250	\$41,706,774
6				
7	Less: Revenue Offsets			
8	Other Rate Revenue	\$172,809		\$172,809
9	Non-Rate Revenue	\$213,529		\$213,529
10	Interest Revenue	\$13,792		\$13,792
11	Total Revenue Offsets	\$400,131		\$400,131
12				
13	Less: Adjustments			
14	Adjustment for Cash Balance		-\$69,048	-\$69,048
15	Adjustment for Mid-Year Rate Adjustment		-\$2,134,864	-\$2,134,864
16	Total Adjustments		-\$2,203,912	-\$2,203,912
17				
18	Revenue Requirement from Rates (Line 7-Line 14-Line 19)	\$39,300,394	\$4,210,162	\$43,510,555

4.2. Functionalization

Table 4-2 shows the functionalization of the water enterprise’s O&M expenses during the Test Year. The Test Year is used to perform a cost of service study and develop rates, then future year rates are adjusted according to the revenue adjustments shown in Table 3-14. Functionalizing O&M expenses allows Raftelis to follow the principles of rate setting theory in which the end goal is to allocate the enterprise’s O&M expenses to cost causation components which in turn form the basis for the water rates. This is further explained in Section 5.

Table 4-2: Functionalization of O&M Expenses

Line	O&M Allocation (\$)	Allocation (\$)	Allocation (%)
1	Water Purchases	\$21,953,639	55.3%
2	Water Production	\$9,998,727	25.2%
3	Pumping Zone Electricity	\$167,721	0.4%
4	Distribution	\$5,210,605	13.1%
5	Customer Service	\$1,194,832	3.0%
6	General & Admin	\$1,140,000	2.9%
7	Total O&M Expenses	\$39,700,524	100%

4.3. Allocation of Functionalized Expenses to Cost Components

After functionalizing expenses, the next step is to allocate expenses to cost causation components. We do so using the system-wide peaking factors shown in Table 4-3 which derive the cost component allocation bases (i.e., percentages) shown in Columns D-F. Functionalized expenses are then allocated to the cost components using these allocation bases. As shown in Line 1 of Table 4-3, base use is assigned 100% to Base – meaning costs allocated using “base” are entirely associated with meeting average day demand. Collectively the Maximum Day and Hour cost components are known as Peaking Costs. These allocation bases are used to assign the functionalized costs in Table 4-2 to the cost components. The Max Day percentages for base is equal to $1/1.93$ (52%) and for max day is equal to $(1.93-1)/1.93$ (48%).

Table 4-3: System Wide Peaking Factors

Line [A]	Allocation Basis [B]	Peaking Factors [C]	Base [D]	Max Day [E]	Max Hour [F]	Total [G]
1	Base	1.00	100%			100%
2	Max Day	1.93	52%	48%		100%
3	Max Hour	2.72	37%	34%	29%	100%

Table 4-4 allocates the functionalized O&M expenses identified in Table 4-2 to the cost components. The functionalized expenses are allocated to the cost components according to industry standards based on the nature of the water treatment function. The top portion of Table 4-3 shows the basis (%) used to allocate the functionalized expenses to the cost causation components. The bottom half of the table then applies these percentages to the total O&M from the expenses shown in Table 4-2 to calculate each cost component. The result of allocating the functionalized costs to each cost component are shown in Line 19 and converted to percentages in Line 20. This resulting percent spread across the cost causation components will be used to allocate the operating revenue requirement for the enterprise.

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

Line	O&M Function	Allocation Basis	Supply	Base	Max Day	Max Hour	Zone 4	Zone 5	Meter	Customer	Gen & Admin	TOTAL
1	O&M Allocation (%)											
2	Water Purchases	Base	100%									100.000%
3	Water Production	Max Day		52%	48%	0%						100.000%
4	Pumping Electricity	Max Day		52%	48%	0%			0%			100.000%
5	Pumping Zone Electricity	Pumping Zone					52%	48%				100.000%
6	Distribution	Max Hour		35%	33%	28%	1.5%	1.5%	1.6%			100.000%
7	Customer Service	Customer Service								100%		100.000%
8	General & Admin	100% General									100%	100.000%
9	Conservation	100% General									100%	100.000%
10												
11	O&M Allocation (\$)											
12	Water Purchases	Base	\$21,953,639	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$21,953,639
13	Water Production	Max Day	\$0	\$5,180,688	\$4,818,039	\$0	\$0	\$0	\$0	\$0	\$0	\$9,998,727
14	Pumping Zone Electricity	Pumping Zone	\$0	\$0	\$0	\$0	\$87,941	\$79,779	\$0	\$0	\$0	\$167,721
15	Distribution	Max Hour	\$0	\$1,827,926	\$1,699,971	\$1,444,062	\$78,159	\$78,159	\$82,328	\$0	\$0	\$5,210,605
16	Customer Service	Customer Service	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,194,832	\$0	\$1,194,832
17	General & Admin	100% General	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,140,000	\$1,140,000
18	Conservation	100% General	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$35,000	\$35,000
19	Total O&M Expenses		\$21,953,639	\$7,008,614	\$6,518,011	\$1,444,062	\$166,101	\$157,938	\$82,328	\$1,194,832	\$1,175,000	\$39,700,524
20	Percent Allocation		55.3%	17.7%	16.4%	3.6%	0.4%	0.4%	0.2%	3.0%	3.0%	100.000%

Raftelis similarly allocated the asset valuation to cost components to derive their percentage allocation. This distribution is shown in Table 4-5. Raftelis used the asset allocation to assign interest revenue offsets to the cost components.

Table 4-5: Asset Allocation

Capital	Supply	Base	Max Day	Max Hour	Zone 4	Zone 5	Meter	Customer	Gen. & Admin	Asset Summary
Functionalized Asset Percentages	11.1%	38.6%	35.9%	2.9%	0.2%	0.2%	0.0%	0.0%	11.2%	100.0%

4.4. Water Peaking Factors and Meter Equivalencies

To properly allocate costs to each customer class, Raftelis calculated peaking factors. Table 4-6 shows the peaking factors for each customer class. Peaking factors were calculated as the average yearly bi-monthly use divided by the maximum bi-monthly use in a given bi-monthly period.

Table 4-6: Peaking Factors by Customer Class

Line	Customer Class	Bi-Monthly Peaking Factor
1	Single Family Residential	
2	Tier 1	1.08
3	Tier 2	1.34
4	Tier 3	1.72
5		
6	Multi-Family Residential	
7	Tier 1	1.05
8	Tier 2	1.22
9	Tier 3	1.35
10		
11	Commercial	1.34
12	Agriculture	1.57
13	Municipal (& Bike Trails)	1.34

Raftelis also calculated the number of 5/8" or 3/4" equivalent meter units (EMU), shown below in Table 4-7. Equivalent meter units account for the potential flow through larger meters and equate this flow to the total flow through the smallest meter, in this case the 5/8 or 3/4"-inch meter on line 1. Equivalent meter units are calculated by multiplying the number of meters (column E) by the American Water Works Association (AWWA) capacity ratios in Column D to yield equivalent meters in column F.

Table 4-7: Potable Meter Equivalents

Line [A]	Meter Size (inches) [B]	AWWA Operating Capacity (gpm) [C]	Ratio [D]	Number of Meters [E]	Total Equivalent Meter Units [F=D*E]
1	5/8" or 3/4"	30	1.00	26,614	26,614
2	1"	50	1.67	5,952	9,921
3	1 1/2"	100	3.33	750	2,499
4	2"	160	5.33	1,218	6,498
5	3"	300	10.00	168	1,684
6	4"	500	16.67	89	1,478
7	6"	1,000	33.33	32	1,051
8	8"	2,400	80.00	9	709
9	10"	3,800	126.67	6	749
10	Total			34,837	51,202

To allocate fire protection costs between public and private fire connections, the potential flow through all public and private fire connections is calculated. The potential flow through private fire connections is derived in Table 4-8.

Fire Demand ratios, shown in Column C were calculated using the Hazen-Williams equation for flow, where potential flow is equal to the diameter of the connection raised to the power of 2.63.

Table 4-8: Fire Line Equivalent Meters

Line [A]	Private Fire Connection Size [B]	Fire Demand Ratio [C=B ^{2.63}]	Number of Lines [D]	Private Fire Potential Demand [E=C*D]
1	3/4"	0.47	3	1.4
2	1"	1.00	22	22.0
3	1.5"	2.90	10	29.0
4	2"	6.19	170	1,052.3
5	3"	17.98	1	18.0
6	4"	38.32	164	6,284.4
7	6"	111.31	456	50,757.8
8	8"	237.21	193	45,780.9
9	10"	426.58	14	5,972.1
10	12"	689.04	0	0.0
11	16"	1,468.37	0	0.0
12	Total		1,030	109,916

4.5. Allocation of Expenses to Cost Components

The O&M revenue requirement calculated in Table 4-1 is then distributed to the cost components based on the allocations determined in Table 4-4, Line 20. Table 4-9, Line 1 distributes the total O&M requirement before adjustments and line 2 distributes the capital revenue requirement.

Line 5 reallocates the general expenses to the other cost components based on the proportion of each to their total value. Lines 7, 8 and 9 reallocate public fire, private fire, and peaking costs to other cost components in columns I and J. A portion of the Peaking costs (Columns E and F in Line 5) as well as Base costs (Column D) are allocated to the Meter Maintenance & Capacity component. Peaking costs are shown as max day and max hour costs in Table 4-9. A portion of capacity (peaking) related costs were allocated to the meter service component so that it can be collected through the fixed bi-monthly charge and allow the City to reach its fixed revenue goals. Allocating extra capacity costs by meter size is a common way to provide greater revenue stability, especially in light of decreasing revenues during a drought or other reasons for sales declines. Stated in another way – it is quite common to reallocate peaking costs (max day and max hour) to be collected through the service charge.

Line 10 shows the final revenue requirement distribution to the cost components. The Fire, Meter Service, and Customer cost components (Column I, J, and K) will be recovered through fixed charges by meter size. The Pumping Zone 4 and 5 costs, shown in Column G and H, are the basis for the volumetric-based elevation rates. The remaining cost components are recovered through the water volumetric rate. These rates are derived in Section 5.

Table 4-9: Revenue Requirement Allocation to Cost Components

Line [A]	Allocation to Cost Components [B]	Supply [C]	Base [D]	Max Day [E]	Max Hour [F]	Pumping Zone 4 [G]	Pumping Zone 5 [H]	Meter Maintenance & Capacity [I]	Customer Service [J]	Private Fire Protection [K]	Gen. & Admin [L]	Total [M]
1	Operating Expenses	\$21,732,375	\$6,937,976	\$6,452,318	\$1,429,507	\$164,426	\$156,347	\$81,498	\$1,182,790		\$1,163,158	\$39,300,394
2	Capital Expenses	\$467,623	\$1,624,022	\$1,510,341	\$122,255	\$6,509	\$6,509	\$0	\$0		\$472,903	\$4,210,162
3	Total Cost of Service	\$22,199,998	\$8,561,998	\$7,962,658	\$1,551,762	\$170,936	\$162,856	\$81,498	\$1,182,790		\$1,636,060	\$43,510,555
4												
5	Allocation of General Cost	\$867,367	\$334,522	\$311,106	\$60,628	\$6,679	\$6,363	\$3,184	\$46,212		-\$1,636,060	
6	Subtotal	\$23,067,365	\$8,896,520	\$8,273,764	\$1,612,390	\$177,614	\$169,219	\$84,682	\$1,229,002		\$0	\$43,510,555
7	Allocation of Public Fire to Meter			-\$300,133	-\$271,149			\$571,281				
8	Allocation to Private Fire			-\$166,072	-\$150,034					\$316,106		
9	Allocation Peak or Base Cost to Meter Capacity		-\$2,135,165	-\$5,074,914	-\$774,285			\$7,984,363				
10	Adjusted Cost of Service	\$23,067,365	\$6,761,355	\$2,732,646	\$416,923	\$177,614	\$169,219	\$8,640,327	\$1,229,002	\$316,106	\$0	\$43,510,555

4.6. Unit Rate Derivation

The cost-by-cost component is used to develop unit rates, shown in Table 4-10, by dividing the revenue requirement for each cost component by the units of service.

Table 4-10: Unit Cost per Cost Component

Line [A]	Cost Component [B]	Revenue Requirement [C]	Units of Service [D]	Unit [E]	Unit Cost [F=C/D]
1	Supply	\$23,067,365	10,424,184	hcf	\$2.21
2	Base (Delivery)	\$6,761,355	10,424,184	hcf	\$0.65
3	Max Day	\$2,732,646	26,865	hcf/day	\$101.72
4	Max Hour	\$416,923	22,687	hcf/hour	\$18.38
5	Pumping Zone 4-Power & Maintenance	\$177,614	794,032	hcf (Zone 4 & 5)	\$0.22
6	Pumping Zone 5-Power & Maintenance	\$169,219	302,106	hcf (Zone 5)	\$0.56
7	Conservation	\$0	10,424,184	hcf	\$0.00
8	Meter Maintenance & Capacity	\$8,640,327	51,202	Equivalent Meters	\$168.75
9	Customer Service	\$1,229,002	34,837	No. of Customers	\$35.28
10	Private Fire Protection	\$316,106	827	Private Fire Potential Demand	\$382.23
11	Total	\$43,510,555			

The unit costs in Table 4-10 for each are multiplied by the units of service for each class. These costs are then added together for each class to develop the final total cost to serve each class, as shown in Table 4-11. Note that the total cost to serve each class is the same as the revenue requirement in Table 4-1.

Table 4-11: Cost to Serve Each Class

Line [A]	Customer Class [B]	Variable Cost Components [C]	Fixed Cost Components [D]	Total Cost to Serve [E=C+D]
1	Single Family Residential		\$6,189,471	\$6,189,471
2	Tier 1	\$9,576,358		\$9,576,358
3	Tier 2	\$4,106,139		\$4,106,139
4	Tier 3	\$3,518,879		\$3,518,879
5				
6	Multi-Family Residential		\$1,201,698	\$1,201,698
7	Tier 1	\$3,683,119		\$3,683,119
8	Tier 2	\$425,845		\$425,845
9	Tier 3	\$1,046,741		\$1,046,741
10				
11	Commercial	\$10,069,163	\$2,304,573	\$12,373,736
12	Agriculture	\$175,925	\$12,606	\$188,532
13	Municipal (& Bike Trails)	\$722,952	\$160,980	\$883,932
14	Private Fire		\$316,106	\$316,106
15	Total	\$33,325,121	\$10,185,434	\$43,510,555

5. Water Rate Derivation

5.1. Fixed Charges

There are two cost components that comprise the bi-monthly service charge: meter service and customer service. This charge recognizes the fact that the City incurs fixed costs related to maintaining meters and billing customers. It also collects a portion of capacity and base costs through the service charge to attain revenue stability. The derivation of these components for 5/8" or 3/4" meters is shown below in Table 5-1.

Table 5-1: Meter and Customer Charge Derivation (Bi-monthly)

Line		
1	Meter Service Charge Component	
2	Meter Cost	\$8,640,327
3	Total EMUs	51,202
4	Yearly Meter Charge	\$168.75
5	Bi-Monthly Meter Service Charge	\$28.13
6		
7	Customer Service Component	
8	Customer Service Cost	\$1,229,002
9	Total Accounts	34,837
10	Bills per year	\$209,024.88
11	Bi-Monthly Customer Service Charge	\$5.88

The meter service charge component recovers two types of costs: 1) costs associated with maintaining and servicing meters (meter service component) and 2) capacity (also known as peaking) costs. Both costs increase as the meter size increases and are proportional to the AWWA hydraulic capacity shown in column C of Table 4-7. This assumes that the potential capacity (peaking) demand is proportional to the potential flow through each meter size as established by the AWWA hydraulic capacity. The ratios shown in column D (of Table 4-7) are the ratio of potential flow through each meter size compared to the flow through a 5/8" or 3/4" meter. The 5/8" or 3/4" meter is used as the base since it is the smallest and most numerous meter size. Larger meters have the potential to demand more peak capacity.

The customer component derivation, shown in the bottom portion of Table 5-1, recovers costs associated with meter reading, customer billing and collection, as well as answering customer calls. These costs are the same for all meter sizes as it costs the same to bill a small meter as it does a larger meter. These two components are added together for each meter size, resulting in the rates in Table 5-2.

Table 5-2: Proposed Fixed Meter Charges

Line [A]	Meter Size [B]	Equivalent Meter Ratio [C]	Number of Meters [D]	Equivalent Meter [E=C*D]	Meter Service [F=C*\$28.13]	Customer Service [G]	Proposed Bi-Monthly Fixed Charge [H=F+G]
1	Unit Cost				\$28.13	\$5.88	\$34.00
2	5/8" or 3/4"	1.00	26,614	26,614	\$28.13	\$5.88	\$34.00
3	1"	1.67	5,952	9,921	\$46.88	\$5.88	\$52.75
4	1 1/2"	3.33	750	2,499	\$93.75	\$5.88	\$99.63
5	2"	5.33	1,218	6,498	\$150.00	\$5.88	\$155.88
6	3"	10.00	168	1,684	\$281.25	\$5.88	\$287.13
7	4"	16.67	89	1,478	\$468.75	\$5.88	\$474.63
8	6"	33.33	32	1,051	\$937.51	\$5.88	\$943.39
9	8"	80.00	9	709	\$2,250.01	\$5.88	\$2,255.89
10	10"	126.67	6	749	\$3,562.52	\$5.88	\$3,568.40
11	Total		34,837	51,202			

Fireline Charges (per equivalent demand unit) are calculated in Table 5-3. The total private fire costs are shown in column K in Table 4-9. The equivalent fire demands are calculated in Table 4-8. However, this results in a yearly rate. To develop a bi-monthly rate, the charge for each service size is divided by the number of bills per year, resulting in the proposed Fireline rates in Table 5-4.

Table 5-3: Fire Line Charge Derivation

Line	Fire Charge Component	
1	Fire Service Line Cost	\$316,106
2	Yearly Equivalent Demand	109,865
3	Yearly Fire Service Charge	\$2.88

Table 5-4: Proposed Fixed Fireline Charges (Bi-monthly)

Line [A]	Meter Size [B]	Number of Meters [C]	Potential Demand Ratio [D]	Equivalent Demand [E]	Yearly Rate [F=\$2.88*D]	Proposed Rate [G=F/6]
1	Unit Rate				\$2.88	
2						
3	5/8" or 3/4"	3	0.5	1.4	\$1.36	\$0.23
4	1"	22	1.0	22.0	\$2.91	\$0.48
5	1 1/2"	10	2.9	29.0	\$8.44	\$1.41
6	2"	170	6.2	1,052.3	\$17.81	\$2.97
7	3"	1	18.0	18.0	\$51.74	\$8.62
8	4"	164	38.3	6,284.4	\$110.25	\$18.38
9	6"	456	111.3	50,757.8	\$320.26	\$53.38
10	8"	193	237.2	45,780.9	\$682.49	\$113.75
11	10"	14	426.6	5,972.1	\$1,227.36	\$204.56
12	12"	0	689.0	-	\$1,982.52	\$330.42
13	16"	0	1468.4	-	\$4,224.81	\$704.13
14	Total	1,033		109,865		

5.2. Volumetric Rates

The total volumetric rate is the summation of unit rates for each cost component: Supply, Delivery, Peaking (Max day and hour), and Pumping. There are separate unit rates for pumping to zones 4 and zone 5 to account for the extra costs associated with pumping to higher elevation. Each unit rate will be derived and added together to get the total volumetric rate for each tier and customer class. Each cost component is defined below.

5.2.1. Cost Component Definitions

The volumetric rates for each class and tier are derived by summing the unit rates (\$ / hcf) for:

1. Water Supply
2. Delivery
3. Peaking
4. Conservation
5. Pumping (for zones 4 and 5)

Water Supply costs are costs associated with obtaining and treating water to make it ready for delivery from each City source.

Delivery costs are the operating and capital costs associated with delivering water to all customers through the distribution system (pipelines and storage reservoirs) at a constant average rate of use – also known as serving customers under average daily demand conditions. Therefore, delivery costs are spread over all units of water which results in an equal delivery unit cost for all classes and tiers.

Peaking costs, or extra-capacity costs, represent costs incurred to meet customer peak demands in excess of base use (or in excess of average daily demand). Peaking costs are the sum of max day and max hour demands in Table 4-9. Some of the peaking costs are collected through the service charge and the remainder through the volumetric rate. Table 4-9, in line 9, shows the max day and max hour amounts that are reallocated to the meter component – so that they can be collected through the service charge. For the portion of peaking costs collected through the volumetric rate, peaking costs are distributed to each tier and class using peaking factors derived from customer use data shown in Table 4-6. For the portion of peaking costs collected through the fixed charge, AWWA hydraulic capacity factors are used to distribute peaking costs to the various meter sizes – as derived in Table 5-1.

5.2.2. Supply Component

The supply component is the same for all customers. The supply component recovers costs associated with obtaining and treating water to ready it for transmission and distribution. Total water purchased is shown below, which includes water lost in the system before being delivered. We calculate the supply rate by dividing the supply costs by the total water sold in hcf, as shown in Table 4-10 and Table 5-5 below.

Table 5-5: Proposed Volumetric Rates

Line	Source	FY 2023
1	Total Purchased Water	11,392,551 hcf
2	Total Supply Costs	\$23,067,365
3	Total Sold Water	10,424,184 hcf
4	Supply Unit Rate	\$2.21

5.2.3. Delivery (Base) Component

The Delivery component represents costs associated with delivering water to customers at a constant average rate of use, i.e. servicing customers under average daily demand conditions. Therefore, delivery costs- shown in Table 4-9, column D, line 10 are spread over all units of water irrespective of customer class or tier as calculated in Table 4-10, line 2.

5.2.4. Peaking Component

The Peaking rate component recovers costs associated with Max Day and Max Hour (Peaking) cost components in Table 4-9. Peaking costs are distributed to each tier and class using peaking factors derived from customer data. Raftelis calculated the peaking factors by dividing the maximum bimonthly use of a class or tier by the average bimonthly use for that class or tier. These peaking factors are shown in Table 4-6. The derivation of the peaking rate by class and tier are shown below in Table 5-6.

Table 5-6: Peaking Factor Derivation

Line [A]	Customer Class [B]	Use (hcf) [C]	Peaking Factor [D]	Use Weighted by Peaking Factor [E=C*D]	Percentage of Weighted Use [F]	Peaking Costs (\$) [G=F*\$3,149,568]	Peaking Unit Cost (\$ / hcf)
1	Single Family & Condo						
2	Tier 1	3,064,475	1.08	3,309,633	25%	\$663,237	\$0.22
3	Tier 2	1,264,262	1.34	1,694,111	13%	\$424,311	\$0.34
4	Tier 3	1,026,987	1.72	1,766,418	13%	\$523,582	\$0.51
5	Multi-Family						
6	Tier 1	1,201,137	1.05	1,266,939	10%	\$246,074	\$0.20
7	Tier 2	135,540	1.22	165,284	1%	\$37,999	\$0.28
8	Tier 3	326,907	1.35	441,507	3%	\$111,299	\$0.34
9	Commercial	3,352,626	1.34	4,481,207	34%	\$1,120,021	\$0.33
10	Agriculture	52,250	1.57	82,032	1%	\$23,045	\$0.44
11	Total	10,424,184		13,207,131	100%	\$3,149,568	\$0.24

5.2.5. Total Volumetric Rate

The total water volumetric rate, excluding the elevation pumping zone charges, combines each of the components derived above and is shown in column G.

Table 5-7: Proposed Volumetric Rates

Line [A]	Customer Classes [B]	Tier Breakpoints [C]	Supply Component (\$ / hcf) [D]	Delivery Component (\$/ hcf) [E]	Peaking Component [F]	Proposed Total Rate (\$ / hcf) [G=D+E+F]
1	Single Family & Condo					
2	Tier 1 (0-23 hcf)	0-23	\$2.21	\$0.65	\$0.22	\$3.08
3	Tier 2 (24-42 hcf)	24-42	\$2.21	\$0.65	\$0.34	\$3.20
4	Tier 3 (43+ hcf)	43+	\$2.21	\$0.65	\$0.51	\$3.37
5	Multi-Family					
6	Tier 1 (0-15 hcf)	0-15	\$2.21	\$0.65	\$0.20	\$3.07
7	Tier 2 (16-19 hcf)	16-19	\$2.21	\$0.65	\$0.28	\$3.14
8	Tier 3 (20+ hcf)	20+	\$2.21	\$0.65	\$0.34	\$3.20
9						
10	Commercial		\$2.21	\$0.65	\$0.33	\$3.20
11	Agriculture		\$2.21	\$0.65	\$0.44	\$3.30
12	Construction		\$2.21	\$0.65	\$0.44	\$3.30

5.2.6. Pass-Through of Wholesale Water Purchase Costs

The City will continue to pass through wholesale charges levied on the City by its wholesale water agencies. This is allowed under Section 53756 of the California Government Code. As discussed in Section 3.4.1, the City has four

water sources, including the pumped water from Orange County Water District (OCWD). The Municipal Water District of Orange County (MWDOC) sells water from the Metropolitan Water District to its wholesale customers which includes the City of Orange. The City also purchases water from the Serrano Water District and East Orange County Water District. Most charges are assessed on a calendar year (CY), while other charges assessed on a fiscal year (FY). The City will assess a pass-through rate which will be based on its estimated wholesaler water purchase costs at the start of the fiscal year.

5.2.7. Pumping Zones 4 & 5 Elevation Rates

Customers in Zones 4 and 5 reside at higher elevations and will pay an elevation rate. This rate recovers the costs of pumping water to these higher elevation zones as well as the maintenance costs of the associated pumping facilities. Since Zone 5 flows through Zone 4, the Zone 5 flow is added to the Zone 4 flows as shown in Table 5-8.

Table 5-8: Zone 4 and 5 Flows

Line		Zone 4 Flow (hcf)	Zone 5 Flow (hcf)	Total Flow Through Zone (hcf)	Total Flow Through Zone (%)
1	Zone 4	491,926	302,106	794,032	72%
2	Zone 5		302,106	302,106	28%
3	Total			1,096,137	100%

The maintenance expense is allocated between the two zones based on the percent of total flow through each zone as identified above in Table 5-8. The total pumping expenses are taken from Table 4-9.

Table 5-9: Allocation of Zone Expenses

Line		Total Flow Through Zone (%)	Expense Allocation
1	Zone 4	72%	\$177,614
2	Zone 5	28%	\$169,219
3	Total	100%	\$346,833

Table 5-10 shows the derivation of the pumping zone elevation rates, where the total expense allocated to each zone is divided by the water flowing through each respective zone to yield the final proposed rate.

Table 5-10: Pumping Zone Elevation Rates

Line [A]	Zone [B]	Total Expense [C]	Flow (hcf) [D]	Elevation Rate [E=C/D]
1	Zone 4	\$177,614	794,032	\$0.22
2	Zone 5	\$169,219	302,106	\$0.56

5.3. Rate Summary

Table 5-11 and Table 5-12 show the recommended five-year rate schedules for fixed and volumetric rates for each customer class. The rates shown for April 1, 2023 are based on the cost of service described above. The rates from Jan 1, 2024 to Jan 1, 2027 increase based on proposed revenue increases in Table 3-14.

Table 5-11: Five-Year Fixed Rate Schedule (Bi-monthly)

Line	Meter Size	Current Rate	Apr 1, 2023	Jan 1, 2024	Jan 1, 2025	Jan 1, 2026	Jan 1, 2027
1	5/8" or 3/4"	\$32.05	\$34.00	\$36.04	\$37.48	\$38.98	\$40.15
2	1"	\$48.96	\$52.75	\$55.92	\$58.16	\$60.49	\$62.30
3	1 1/2"	\$91.24	\$99.63	\$105.61	\$109.83	\$114.22	\$117.65
4	2"	\$141.98	\$155.88	\$165.23	\$171.84	\$178.71	\$184.07
5	3"	\$260.38	\$287.13	\$304.36	\$316.53	\$329.19	\$339.07
6	4"	\$429.51	\$474.63	\$503.11	\$523.23	\$544.16	\$560.48
7	6"	\$852.35	\$943.39	\$999.99	\$1,039.99	\$1,081.59	\$1,114.04
8	8"	\$2,036.29	\$2,255.89	\$2,391.24	\$2,486.89	\$2,586.37	\$2,663.96
9	10"	\$3,220.23	\$3,568.40	\$3,782.50	\$3,933.80	\$4,091.15	\$4,213.88
10							
11	Fire Service Size						
12	2"	\$0.00	\$2.97	\$3.15	\$3.28	\$3.41	\$3.51
13	3"	\$0.00	\$8.62	\$9.14	\$9.51	\$9.89	\$10.19
14	4"	\$40.97	\$18.38	\$19.48	\$20.26	\$21.07	\$21.70
15	6"	\$119.01	\$53.38	\$56.58	\$58.84	\$61.19	\$63.03
16	8"	\$253.61	\$113.75	\$120.58	\$125.40	\$130.42	\$134.33
17	10"	\$456.08	\$204.56	\$216.83	\$225.50	\$234.52	\$241.56
18	12"	\$0.00	\$330.42	\$350.25	\$364.26	\$378.83	\$390.19
19	16"	\$0.00	\$704.13	\$746.38	\$776.24	\$807.29	\$831.51

Table 5-12: Five-Year Volumetric Rate Schedule

Line	Customer Class	Current Rate	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Single Family & Condo						
2	Tier 1	\$2.87	\$3.08	\$3.26	\$3.39	\$3.53	\$3.64
3	Tier 2	\$2.95	\$3.20	\$3.39	\$3.53	\$3.67	\$3.78
4	Tier 3	\$3.05	\$3.37	\$3.57	\$3.71	\$3.86	\$3.98
5	Multi-Family						
6	Tier 1	\$2.87	\$3.07	\$3.25	\$3.38	\$3.52	\$3.63
7	Tier 2	\$2.91	\$3.14	\$3.33	\$3.46	\$3.60	\$3.71
8	Tier 3	\$2.96	\$3.20	\$3.39	\$3.53	\$3.67	\$3.78
9	Commercial	\$2.94	\$3.20	\$3.39	\$3.53	\$3.67	\$3.78
10	Agriculture	\$2.93	\$3.30	\$3.50	\$3.64	\$3.79	\$3.90
11	Construction	\$2.93	\$3.30	\$3.50	\$3.64	\$3.79	\$3.90

6. Water Bill Impacts

This section compares current customer bills to proposed customer bills under the new rates. Current water rates for a typical single-family home include a:

1. Fixed meter charge, and
2. A volumetric charge based on a customer’s water use.

The current and proposed bills are based on both of these charges. The bill impacts assumes the most common meter size for each class and the average demand for an account. Table 6-1 shows the bill impact by class. The difference between the current and proposed rates, for different use points, are also shown in Figure 6-1 through Figure 6-4.

Table 6-1: Water Bill Impacts

Line [A]	Customer Class [B]	Meter Size [C]	Average Water Use (hcf) [D]	Proposed Bill [E]	Current Bill [F]	Difference (\$) [G]	Difference (%) [H]
1	Single Family & Condo	3/4"	32	\$133.57	\$124.61	\$8.96	7.2%
2	Multi-Family (assuming 4 units)	1"	95	\$348.08	\$324.16	\$23.92	7.4%
3	Commercial	2"	198	\$788.60	\$724.10	\$64.50	8.9%
4	Agricultural (billed monthly)	2"	143	\$626.96	\$559.92	\$67.04	12.0%

Figure 6-1: Water Bill Impacts for Single Family and Condo Residential

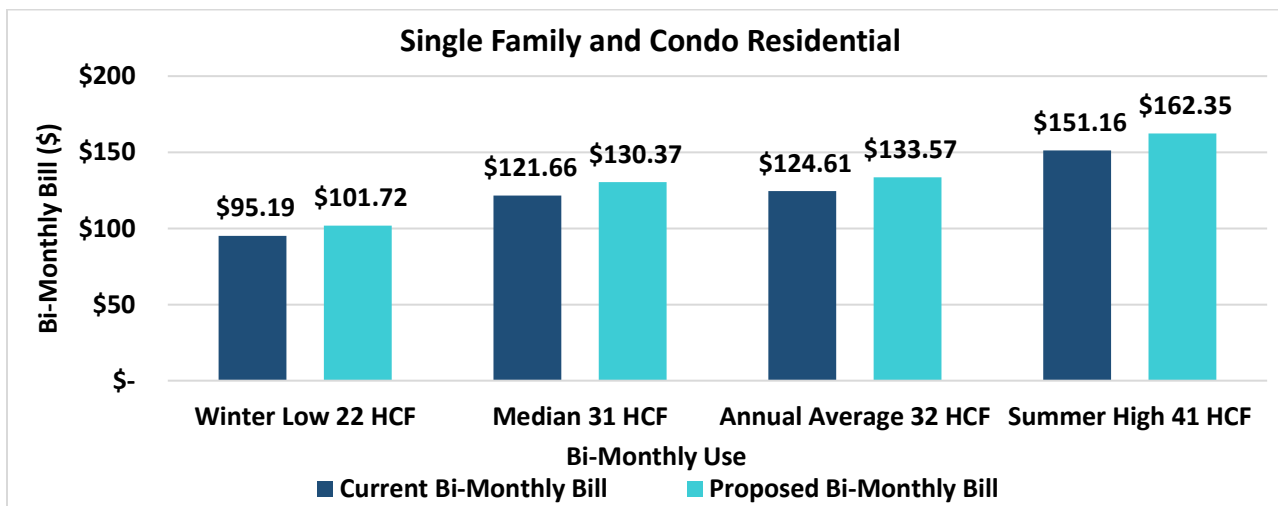


Figure 6-2: Water Bill Impacts for Multi-Family Residential

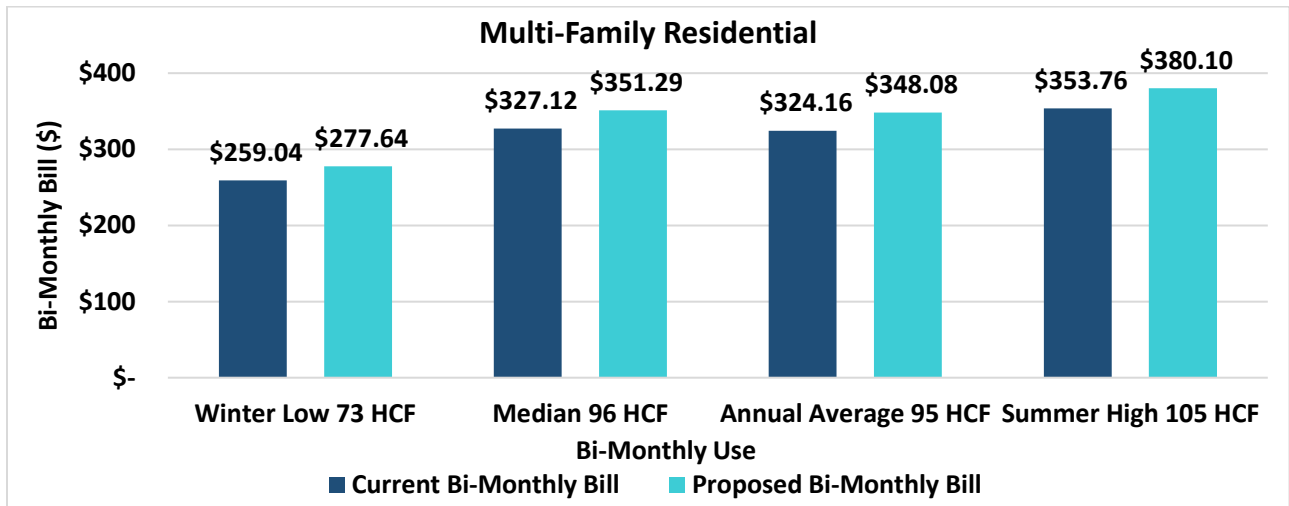


Figure 6-3: Water Bill Impacts for Commercial

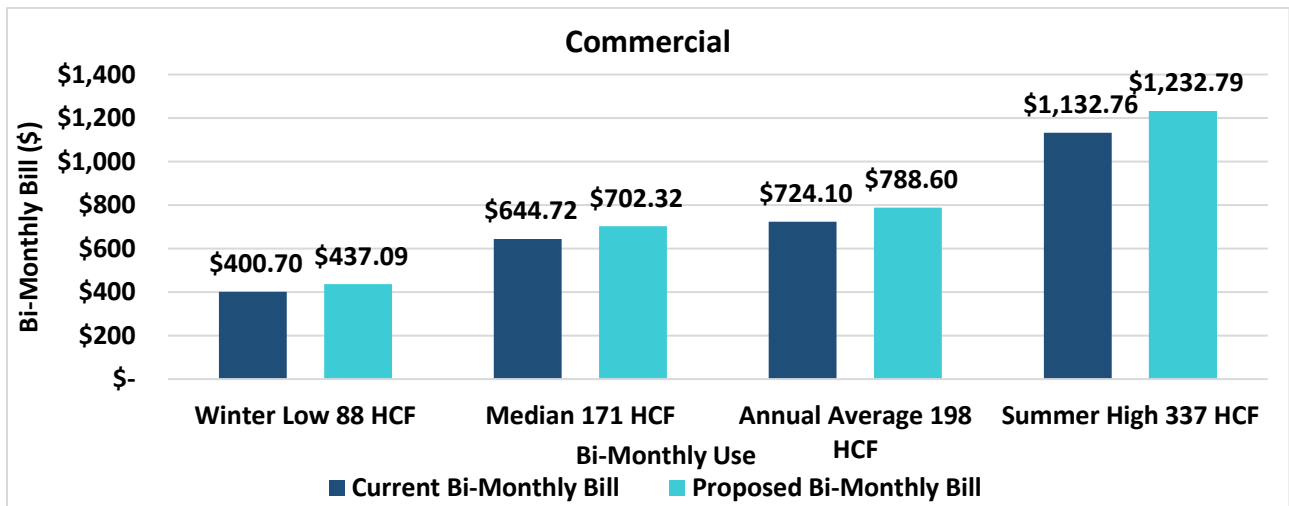
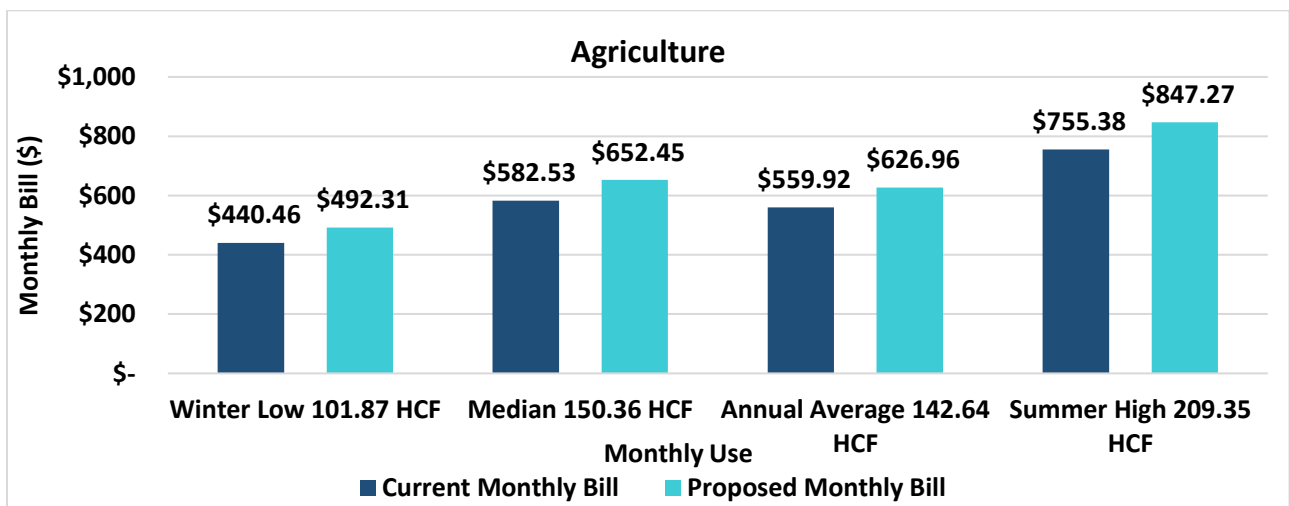


Figure 6-4: Water Bill Impacts for Agricultural



7. Sewer Financial Plan

7.1. Inflationary and Other Assumptions

As with the water study, The Sewer study uses Fiscal Year (FY) 2023 as both the budget year and the test year. The test year is a term used to describe the year's expenses with which we set rates. The Study period is FY 2023-FY 2027. To ensure that the study reasonably projects future costs, Raftelis makes informed assumptions about inflationary factors to apply to the sewer budget. Table 7-1 shows the cost escalation factors used to project expenses with FY 2023 as the base year.

Table 7-1: Cost Escalation Factors

Line	Customer Class	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	General	Budget	5.0%	4.0%	3.0%	3.0%
2	Personnel	Budget	3.0%	3.0%	3.0%	3.0%
3	Construction	Budget	5.0%	4.0%	3.0%	3.0%
4	Electricity	Budget	5.0%	5.0%	5.0%	5.0%
5	No Escalation	Budget	0.0%	0.0%	0.0%	0.0%
6	Interest Earnings	Budget	1.0%	1.0%	1.0%	1.0%
7	Miscellaneous Revenue	Budget	1.0%	1.0%	1.0%	1.0%

7.2. Projected Annual Sewer Flow

City staff provided total annual sewer flow data for each customer class for FY 2018-19 through FY 2020-21. Raftelis worked closely with City staff to develop sewer billed consumption projections over the study period. Sewer demand projections depend on two key assumptions: new connection growth and sewer discharge per connection. Since the City is mostly built-out, and due to water saving devices/appliances, we assumed no changes to flow during the study period.

7.3. Projected Sewer Billing Units

Sewer connection growth projections are necessary to estimate sewer rate revenues over the study period. City staff provided the number of billing units by customer class for FY 2018-19 through FY 2020-21. Since the City is mostly built-out, we assumed no growth in connections over the study period.

7.4. Projected Sewer O&M Expenses

Table 7-2 shows a summary of Sewer Enterprise O&M expenses over the study period. O&M expenditures include the cost of operating and maintaining the sewer collection system. The projected increases in O&M expenses are shown in Table 7-2 below. FY 2023 expenses were provided by City staff and Raftelis projected future expenses by inflating the FY 2023 budget with the inflationary assumptions shown in Table 7-1.

Table 7-2: Projected Sewer O&M Expenses

Line	O&M Expenses	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	220.5001 General Administration and Support	\$324,162	\$340,370	\$353,985	\$364,604	\$375,543
2	220.5022 Refuse & Sanitation Services	\$2,702,586	\$2,800,326	\$2,893,099	\$2,979,925	\$3,069,357
3	220.5024 Surface Water Quality	\$913,075	\$947,807	\$980,095	\$1,009,498	\$1,039,783
4	220.6000 Community Development	\$117,944	\$121,482	\$125,127	\$128,881	\$132,747
5	Total	\$4,057,767	\$4,209,985	\$4,352,306	\$4,482,908	\$4,617,430
6						
7	Annual % Change		3.8%	3.4%	3.0%	3.0%

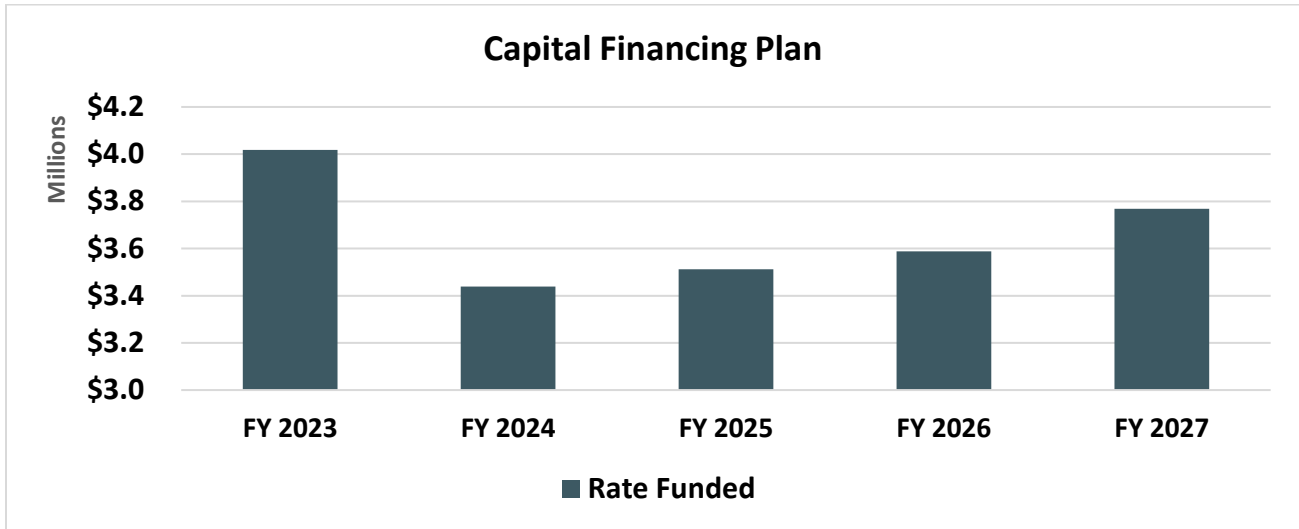
7.5. Sewer Capital Improvement Plan

Table 7-3 shows the City’s planned capital improvement plan (CIP) for the Sewer Enterprise. The City plans to fund all of its CIP projects with cash reserves generated from rates (i.e. pay-as-you-go). Figure 7-1 shows a summary of total Sewer Enterprise CIP expenditures by funding source over the study period.

Table 7-3: Sewer Capital Improvement Plan

Line	CIP Expenses	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Fund 220 - Sanitation Maintenance Projects					
2						
3	12982--Corp Yard Reno.	\$650,000	\$650,000			
4	15509--Sewer Cleaning and Video	\$450,000	\$500,000	\$500,000	\$500,000	\$500,000
5	20430--Storm Drain Imp.	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000
6	Subtotal	\$1,600,000	\$1,650,000	\$1,000,000	\$1,000,000	\$1,000,000
7						
8	Fund 520 - Sewer Infrastructure Projects					
9	CIP Carryover					
10	15508--Sewer Line Repl./Maint.	\$2,255,000	\$2,367,750	\$2,438,783	\$2,511,946	\$2,587,304
11	30168--Walnut Ave Infra. Imp.	\$428,982	\$-	\$-	\$-	\$-
12	Subtotal	\$2,683,982	\$2,367,750	\$2,438,783	\$2,511,946	\$2,587,304
13						
14	Grand Total	\$4,283,982	\$4,017,750	\$3,438,783	\$3,511,946	\$3,587,304
15	Annual % Change		-6.2%	-14.4%	2.1%	2.1%

Figure 7-1: Sewer Enterprise Capital Improvement Plan



7.6. Sewer Financial Policies

The City currently maintains two funds in its Sewer Enterprise: a 220 Fund for Sewer Maintenance and Operation and a 520 Fund for Sewer Infrastructure.

The 220 Fund has an operating target and a capital target. Operating reserves provide funding to meet ongoing cash flow requirements related to operating expenses. The current operating reserve target for the City’s 220 Sewer Maintenance Fund is equal to 25 percent of annual O&M expenses (for the Sewer Maintenance Fund). Capital reserves for this fund are to finance maintenance related projects. This study models the capital reserve target as 100% of typical 1-year maintenance related capital expenditures. The overall target for the 220 Sewer Maintenance Fund is a combination of these two values.

The Sewer Infrastructure reserve target for this study is 100% of typical 1-year capital expenditures relevant to capital improvements.

Table 7-4 summarizes the operating and capital reserve targets described above.

Table 7-4: Sewer Reserve Policies

Line	Reserve	Target	Policy
1	Fund 220	Operating	25% of typical O&M expenditures
2		Capital	100% of typical 1-yr capital expenditures
3	Fund 520	Capital	100% of typical 1-yr capital expenditures

7.7. Proposed Sewer Financial Plan

The Sewer Enterprise must increase its revenues from sewer rates over the study period to adequately fund its operating and capital expenditures while also maintaining sufficient reserve funding. Raftelis worked closely with City staff to identify financial plan options for the City Council’s consideration. The selected proposed annual revenue adjustments are shown in Table 7-5. Revenue adjustments represent annual percent increases in total rate revenue, if applied for the full fiscal year, relative to rate revenue generated by the prior year’s sewer rates.

Table 7-5: Proposed Sewer Revenue Adjustments

Line	Customer Class	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Effective Date	January 1, 2023	January 1, 2024	January 1, 2025	January 1, 2026	January 1, 2027
2	Rate Revenue Increases	5.0%	5.0%	3.0%	2.0%	2.0%

Figure 7-2 shows the financial plan for the Sewer Enterprise. Revenues under the current rates and status quo rates are represented by the red and gray dashed lines, respectively. Expenses including O&M expenses, and CIP are represented by the various stacked bars. Net cashflow – or total revenues less total expenses – is also shown by the light gray. Revenue adjustments are required to generate sufficient revenue to recover O&M and CIP-related expenditures over the study period.

Figure 7-2: Sewer Financial Plan

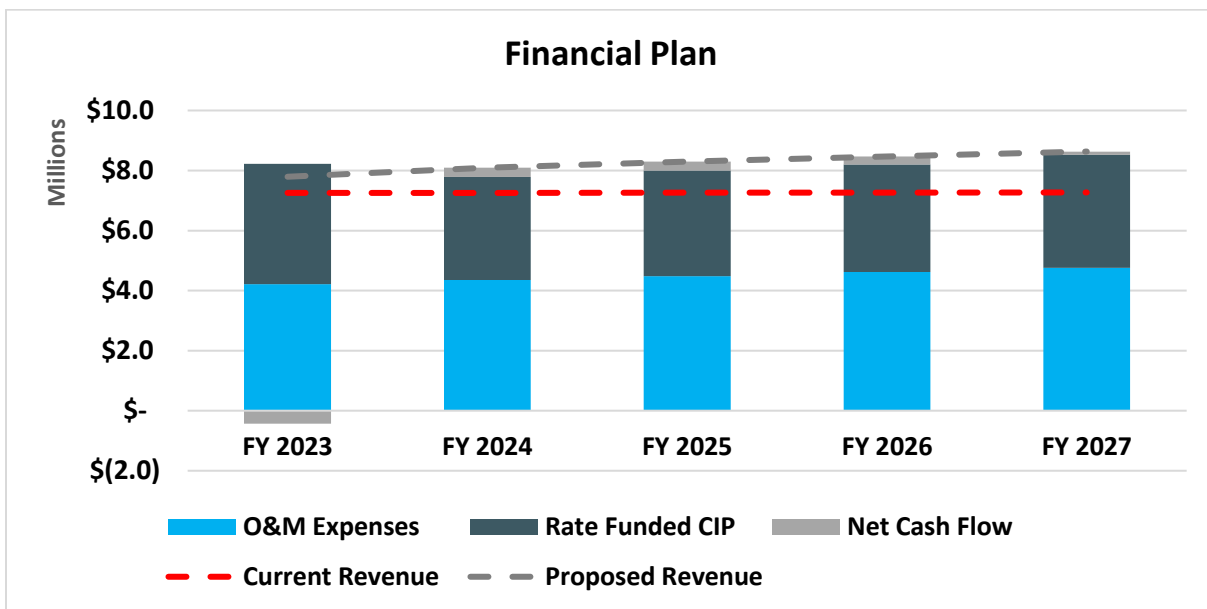


Table 7-6 and Table 7-7 show projected expenses and cash balances for each of its operating and capital reserves under the proposed financial plan. Sources of funds include rate and non-rate revenues, revenue adjustments (resulting from the revenue increases described in Table 7-5), and interest. Use of funds include O&M expenses (from Table 7-2) and CIP expenditures (from Table 7-3). The FY 2022-23 beginning balance reflects actual Sewer Enterprise reserve balances for each reserve as of July 1, 2022. All ending balances are projected values.

Table 7-6: Proposed Sewer Operating Reserve Balances

Line	Description	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Operating Reserve Beginning Balance	\$5,636,886	\$2,700,000	\$2,141,792	\$1,687,253	\$1,948,672	\$2,219,127
2							
4	O&M Expenses						
5	220.5001 General Admin & Support	\$225,305	\$324,162	\$340,370	\$353,985	\$364,604	\$375,543
6	220.5022 Refuse & Sanitation Services	\$3,016,164	\$2,702,586	\$2,800,326	\$2,893,099	\$2,979,925	\$3,069,357
7	220.5024 Surface Water Quality	\$897,834	\$913,075	\$947,807	\$980,095	\$1,009,498	\$1,039,783
8	220.6032 Code Enforcement	\$113,138	\$117,944	\$121,482	\$125,127	\$128,881	\$132,747
9	Total O&M Expenses	\$4,252,441	\$4,057,767	\$4,209,985	\$4,352,306	\$4,482,908	\$4,617,430
10							
11	Less: Non-Rate Revenues	\$ 201,856	\$ 187,240	\$ 183,833	\$ 184,520	\$ 188,830	\$ 193,108
12	Revenue Required from Rates	\$4,050,585	\$3,870,527	\$4,026,153	\$4,167,786	\$4,294,078	\$4,424,322
13							
14	Ending Balance	\$ 1,674,535	\$ 2,141,792	\$ 1,687,253	\$ 1,948,672	\$ 2,219,127	\$ 2,470,630
15	Total Fund Target	\$ 1,063,110	\$ 1,014,442	\$ 1,052,496	\$ 1,088,076	\$ 1,120,727	\$ 1,154,357

Table 7-7: Proposed Sewer Capital Reserve Balances

Line	Description	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
1	Total Capital Reserve Beginning Balance	\$3,818,439	\$1,848,600	\$1,729,431	\$1,749,540	\$1,792,996	\$1,825,006
2							
4	520 Rate-Funded Capital Projects						
5	CIP Carryover	\$1,647,974					
6	15508--Sewer Line Repl/Maint	\$2,200,000	\$2,255,000	\$2,367,750	\$2,438,783	\$2,511,946	\$2,587,304
7	30166--Cambridge St Infrstrct Imp	\$236,000	\$0	\$0	\$0	\$0	\$0
8	30168--Walnut Ave Infrstrct Imp	\$127,000	\$428,982	\$0	\$0	\$0	\$0
9	Total Rate-Funded Expenses	\$4,210,974	\$2,683,982	\$2,367,750	\$2,438,783	\$2,511,946	\$2,587,304
10							
11	Less: Non-Rate Revenues	\$44,172	\$25,378	\$23,378	\$23,755	\$24,192	\$24,449
12	Revenue Required from Rates	\$4,166,802	\$2,658,604	\$2,344,372	\$2,415,028	\$2,487,754	\$2,562,855
13							
14	Ending Balance	\$1,848,600	\$1,729,431	\$1,749,540	\$1,792,996	\$1,825,006	\$1,832,311
15	Total Fund Target	\$2,513,092	\$2,517,953	\$2,484,747	\$2,514,788	\$2,530,622	\$2,531,823

Figure 7-3 shows the combined projected reserve balances for the entire Sewer Enterprise under the proposed financial plan. The bars indicate the projected ending balance. The total reserve target is represented by the blue line. By the end of the study period, the Sewer Enterprise’s reserves are projected to begin approaching the overall reserve target under the proposed rate increases.

Figure 7-3: Sewer Combined Projected Reserve Balances

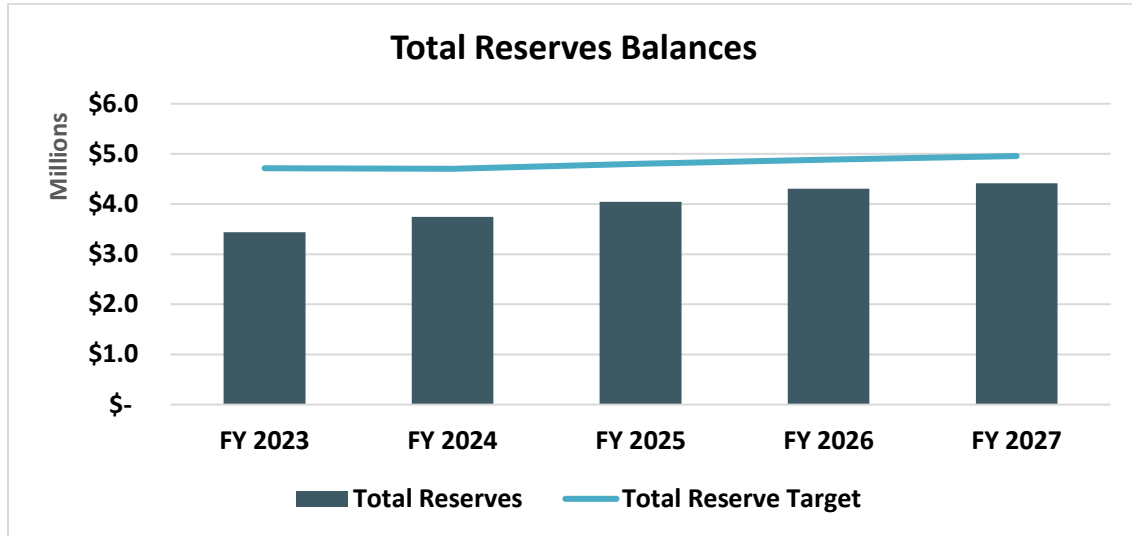


Figure 7-4 and Figure 7-5 show the individual projected reserve balances (gray bars) for the 220 Sewer Maintenance and 520 Sewer Infrastructure Funds, respectively. In addition, target reserve balances for each fund are shown as blue and orange lines in the graph, respectively. The combined operating and capital target is shown as a dotted blue line. The 220 fund reaches its reserve targets by the end of the study and the 520 fund is at approximately 70 to 75% of its target.

Figure 7-4: Sewer Fund 220 Projected Reserves Balances

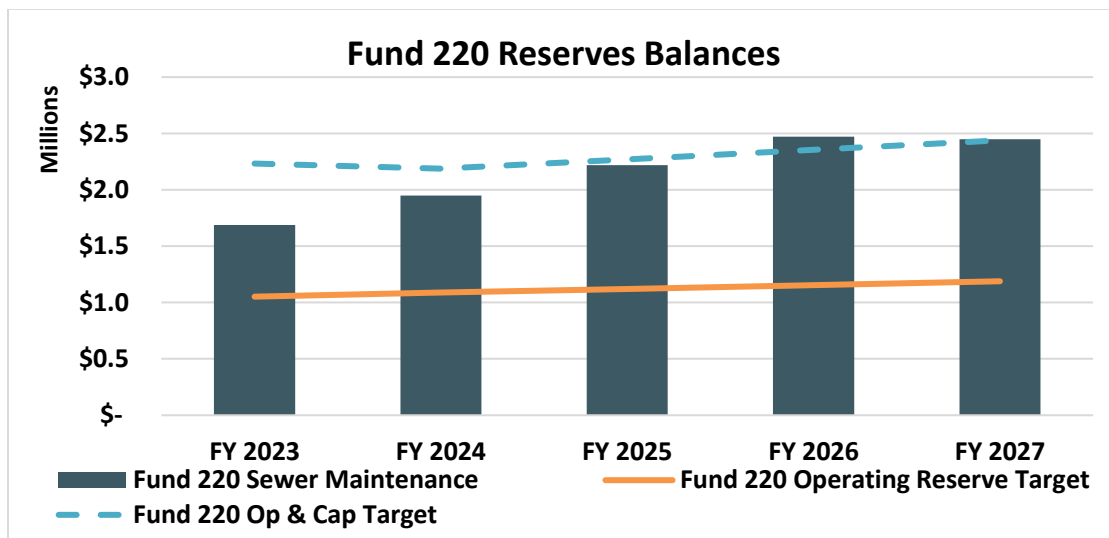
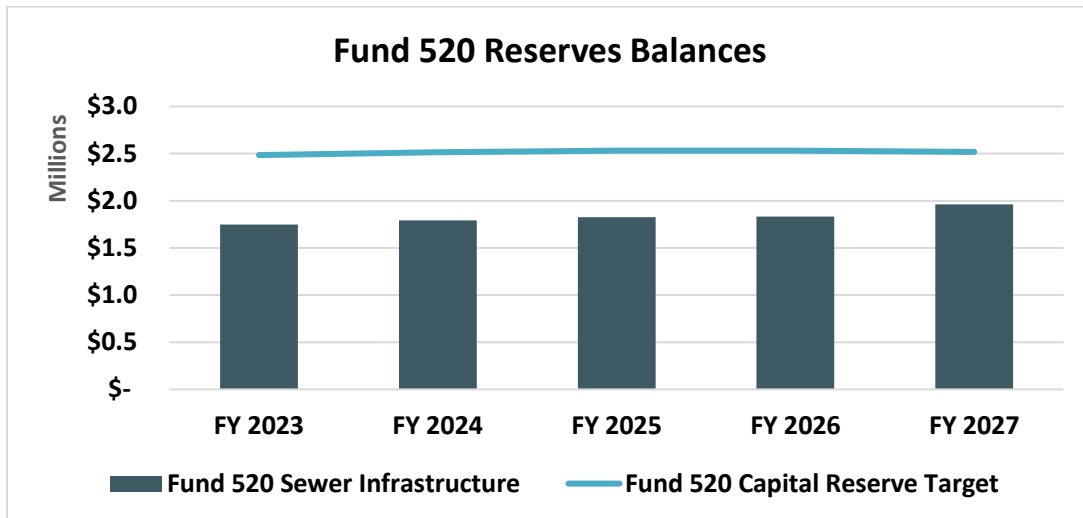


Figure 7-5: Sewer Fund 520 Projected Reserves Balances



8. Sewer Cost of Service Analysis

8.1. Sewer Flow Estimate

To properly allocate costs to each customer class, Raftelis estimated the sewer flow for each class. For Single Family residential customers, Raftelis assumed that January/February winter water use approximates indoor water use, which returns to the sewer system, since outdoor irrigation is at its lowest during the winter. Table 8-1 shows the calculation of the return to sewer (RTS) percentage for the Single Family residential class.

Table 8-1: Single Family Residential Class Sewer Flow Calculation (hcf)

Line	Customer Class	Lowest Month Water Use	Annualized Lowest Month Water Use	Total Actual Flow	Selected Return to Sewer %
1	Single Family	688,380	4,130,280	5,241,277	79%

Raftelis assumed that 100% of water use returns to the sewer as wastewater flow for the Multi-Family Residential, Condominium, and Commercial classes. In the previous 2015 rate study conducted by Raftelis, water use data suggested that outdoor water use for these classes is minimal since annualized winter use for these classes nearly equaled their actual yearly use - thus their return to sewer factor was nearly 100%. Staff and Raftelis decided to maintain the return to sewer calculations from the prior study since the pandemic severely affected commercial water use and temporarily altered commercial sewer flow. It is common practice to assume 90-100% return to sewer for commercial users.

8.2. Sewer Operations (220) Revenue Requirement

Table 8-2 shows the sewer enterprise revenue requirement to fund sewer operations – shown in line 16. Line 4 shows the total revenue requirement. Line 9 shows the total revenue from other sources which is subtracted. Line 12 is an adjustment for the yearly cash balance and line 13 is an adjustment to annualize the revenue since the rates will be implemented in April with two months left in the fiscal year. We must annualize this revenue to calculate rates that will recover a full year’s revenue. This is added to the revenue requirement since we subtract these adjustments. The total revenue required from rates is shown in line 16. This is the amount the sewer maintenance (220) rates are designed to collect.

Table 8-2: Sewer Operations (220) Operating Revenue Requirement

Line	Fund 220 Sewer Maintenance Fund	Operating	Capital	Total
1	Revenue Requirement			
2	220 O&M Expenses	\$4,057,767		\$4,057,767
3	Rate Funded Capital Projects		\$1,600,000	\$1,600,000
4	Total Revenue Requirement	\$4,057,767	\$1,600,000	\$5,657,767
5				
6	Revenue Offsets			
7	Miscellaneous/Non-Rate Revenues	\$163,151		\$163,151
8	Interest Income	\$24,089		\$24,089
9	Total Revenue Offsets	\$187,240		\$187,240
10				
11	Adjustments			
12	Adjustment for Cash Balance		\$558,208	\$558,208
13	Adjustment for Mid-year Increase		(\$181,938)	(\$181,938)
14	Total Adjustments		\$376,270	\$376,270
15				
16	Revenue Required from Rates	\$3,870,527	\$1,223,730	\$5,094,257

8.3. Sewer Infrastructure (520) Revenue Requirement

Table 8-3 shows the Sewer Infrastructure fund revenue requirement, which is calculated analogously to the 220 fund.

Table 8-3: Sewer Infrastructure (520) Revenue Requirement

Line	Fund 520 Sewer Infrastructure Fund	Operating	Capital	Total
1	Revenue Requirement			
2	Rate Funded Capital Projects		\$2,683,982	\$2,683,982
3	Total Revenue Requirement	\$0	\$2,683,982	\$2,683,982
4				
5	Revenue Offsets			
6	Miscellaneous/Non-Rate Revenues	\$6,010		\$6,010
7	Interest Income	\$19,368		\$19,368
8	Total Revenue Offsets	\$25,378	\$0	\$25,378
9				
10	Adjustments			
11	Adjustment for Cash Balance		\$434,179	\$434,179
12	Adjustment for Mid-year Increase		(\$82,386)	(\$82,386)
13	Total Adjustments	\$0	\$351,793	\$351,793
14				
15	Revenue Required from Rates	(\$25,378)	\$2,332,189	\$2,306,811

8.4. Unit Rate Derivation

Next, Raftelis calculated the unit rate for operations and maintenance (O&M) and capital, shown in Table 8-4. Raftelis derived the rates by dividing the revenue requirement, which was derived in Table 8-2 and Table 8-3, by the estimated sewer flow as shown in Table 8-4, column E.

Table 8-4: Sewer Flow Calculation by Customer Class (hcf)

Line	Cost Type	Revenue Requirement [C]	FY 2023 Estimated Sewer Flow	Unit Cost (\$/hcf)
------	-----------	-------------------------	------------------------------	--------------------

[A]	[B]		[D]	[E=C/D]
1	O&M	\$5,094,257	8,317,666	\$0.61
2	Capital (Infrastructure)	\$2,306,811	8,317,666	\$0.28

The Operations & Maintenance (O&M) rate is the per hcf unit cost to collect sewage. We apply these unit rates to the flow for each class to derive the cost to serve each class as shown in Table 8-5. Note that the total cost to serve each class in column E equals the revenue required from rates for O&M shown in Table 8-4 for FY 2023.

Table 8-5: Operations and Maintenance (220) Cost to Serve Each Class

Line [A]	Customer Class [B]	FY 2023 Estimated WW Flow (hcf) [C]	O&M Rate Component (\$/hcf) [D]	Cost to Serve Each Class [E=C*D]
1	Single Family	4,140,609	\$0.61	\$2,535,967
2	Multi-Family	1,760,684	\$0.61	\$1,078,353
3	Condo	206,062	\$0.61	\$126,205
4	Commercial	2,210,311	\$0.61	\$1,353,732
5	Total	8,317,666	\$0.61	\$5,094,257

The capital rate in Table 8-6 is the per hcf cost to fund the capital rehabilitation projects in FY 2023. As performed for O&M, we apply these unit rates to the flow for each class to derive the cost to serve each class in Table 8-6. Note that the total cost to serve each class in column E equals the revenue required from rates for capital shown in Table 8-4 for FY 2023.

Table 8-6: Sewer Infrastructure (520) Cost to Serve Each Class

Line [A]	Customer Class [B]	FY 2023 Estimated WW Flow (hcf) [C]	Capital Rate Component (\$/hcf) [D]	Cost to Serve Each Class [E=C*D]
1	Single Family	4,140,609	\$0.28	\$1,148,351
2	Multi-Family	1,760,684	\$0.28	\$488,306
3	Condo	206,062	\$0.28	\$57,149
4	Commercial	2,210,311	\$0.28	\$613,005
5	Total	8,317,666	\$0.28	\$2,306,811

9. Sewer Rate Derivation

9.1. Rate Structure

The City proposes the following rate structure for the 220 - Operations & Maintenance fund (O&M) and 520 - Infrastructure capital charges:

Table 9-1: Proposed Rate Structure

Line	Customer Class	O&M Charge/Rate	Capital Charge/Rate
1	Single Family Residential	Flat Charge	Flat Charge
2	Multi-Family/Condo	Flat Charge	Flat Charge
3	Commercial	Volumetric Rate	Volumetric Rate

9.2. Rate Derivation

9.2.1. Operations & Maintenance (220) Rates and Charges

Raftelis calculated the residential O&M rates (applicable to Single Family and Multi-Family/Condo customer classes) by dividing the cost to serve each class (derived in Table 8-5 and Table 8-6) by the total number of dwelling units and the total number of billing periods per year. In doing so, we arrive at the proposed bimonthly flat rate for the residential customer classes. For commercial customer classes, the O&M charge is based on a volumetric, dollar per hcf charge. Raftelis calculated the volumetric O&M rate by dividing the total cost to serve the commercial customer class (derived in Table 8-5) by the total sewer flow discharged by commercial customers. This is also the volumetric rate derived in Table 8-5. The resulting rates for O&M charges are shown below in Table 9-2.

Table 9-2: Proposed O&M Rates (Fund 220)

Line [A]	Customer Class [B]	Cost to Serve Class [C]	Total Dwelling Units [D]	Billing Periods [E]	Proposed Bimonthly Flat Rate [F=C/D/E]
1	Single Family Residential	\$2,535,967	24,277	6	\$17.41
2	Multi-Family/Condo	\$1,204,558	21,308	6	\$9.42
			Sewer Flow (hcf)		Proposed Volumetric Rate (\$/hcf) [F=C/D]
3	Commercial	\$1,353,732	2,210,311	N/A	\$0.61

9.2.2. Sewer Infrastructure (520) Rates and Charges

Raftelis divided the total capital cost to each residential class (calculated in Table 8-6) by the total number of dwelling units in each category. The resulting values were then divided by the total number of billing periods to yield a bi-monthly flat rate for the City's residential customer classes (Single Family and Multi-Family/Condo). To derive the commercial volumetric rate, Raftelis divided the total capital cost to serve the commercial class by total billed sewer flow. The resulting volumetric and fixed rates are shown in Table 9-3 below.

Table 9-3: Proposed Capital Rates

Line [A]	Customer Class [B]	Cost to Serve Class [C]	Total Dwelling Units [D]	Billing Periods [E]	Proposed Bimonthly Flat Rate [F=C/D/E]
1	Single Family Residential	\$1,148,351	24,277	6	\$7.88
2	Multi-Family/Condo	\$545,455	21,308	6	\$4.27
			Sewer Flow (hcf)		Proposed Volumetric Rate (\$/hcf) [F=C/D]
3	Commercial	\$613,005	2,210,311	N/A	\$0.28

9.3. Rate Summary

Table 9-4 and Table 9-5 show the recommended five-year rate schedules for O&M (fund 220) and Sewer Infrastructure fund (fund 520) for each customer class.

Table 9-4: Five-Year O&M Rate Schedule

Line	Customer Class	Current	Apr 1, 2023	Jan 1, 2024	Jan 1, 2025	Jan 1, 2026	Jan 1, 2027
1	Bimonthly Fixed Rates						
2	Single Family Residential	\$15.85	\$17.41	\$18.28	\$18.83	\$19.21	\$19.59
3	Multi-Family/Condo	\$9.69	\$9.42	\$9.89	\$10.19	\$10.39	\$10.60
4	Variable Rate (\$/hcf)						
5	Commercial	\$0.59	\$0.61	\$0.64	\$0.66	\$0.68	\$0.69

Table 9-5: Five-Year Capital Rate Schedule

Line	Customer Class	Current	Apr 1, 2023	Jan 1, 2024	Jan 1, 2025	Jan 1, 2026	Jan 1, 2027
1	Bimonthly Fixed Rates						
2	Single Family Residential	\$7.15	\$7.88	\$8.28	\$8.53	\$8.70	\$8.87
3	Multi-Family/Condo	\$4.37	\$4.27	\$4.48	\$4.61	\$4.71	\$4.80
4	Variable Rate (\$/hcf)						
5	Commercial	\$0.27	\$0.28	\$0.29	\$0.30	\$0.31	\$0.31

10. Sewer Bill Impacts

Section 10 describes the estimated bill impact for each customer class due to the new rates. We compare current customer bills to proposed customer bills under the new rates. The proposed sewer rates do not include the Street Tree Maintenance or Street Sweeping charges.

The current and proposed bills for the residential customer classes (Single Family, Multi-Family, and Condo) are based on a fixed charge applied on a per EDU-basis. The results of this comparison are shown as a dollar (\$) and percentage (%) difference is shown in Columns G and H of Table 10-1 below, respectively.

For commercial customers, bills are based on a volumetric rate derived in Section 9. The bill impacts developed below for commercial customers apply a 3-year average water use for each of the two most common meter sizes: 1" and 2" meters. The resulting bill impacts are shown in Table 10-1 below. The multi-family customer bill impacts decrease because the data provided by the City indicated that there are more multi-family accounts than the prior study and the water use for these multi-family accounts has increased marginally compared to the prior study. This makes sense due to low-flow appliances and showerheads.

Table 10-1: Sewer Bill Impacts

Line [A]	Customer Class [B]	Meter Size [C]	3-Year Avg. Water Use (hcf) [D]	Proposed Bill (per unit) [E]	Current Bill [F]	Difference (\$) [G]	Difference (%) [H]
1	Single Family	-	-	\$25.29	\$23.00	\$2.29	9.97%
2	Multi-Family	-	-	\$13.69	\$14.06	(\$0.37)	-2.64%
3	Condo	-	-	\$13.69	\$14.06	(\$0.37)	-2.64%
4	Commercial	1"	44	\$39.15	\$37.84	\$1.31	3.47%
5	Commercial	2"	182	\$161.94	\$156.52	\$5.42	3.47%