CITY OF BRENTWOOD

Water and Wastewater Cost of Service Study

Final DRAFT Report / June 26, 2018

RAFTELIS

RAFTELIS

April 3, 2018

Ms. Debra Galey
Senior Analyst
City of Brentwood
150 City Park Way
Brentwood, CA 94513

Subject: Water and Wastewater Cost of Service Study Report

Dear Ms. Galey:

Raftelis Financial Consultants, Inc. (Raftelis) is pleased to present this report on the Water and Wastewater Cost of Service Study Report (Study) to the City of Brentwood (City). We are confident that the results, developed based on cost of service analyses, will provide the City's water and wastewater users with fair and equitable rates. This report summarizes the methods, findings, and recommendations of the Study.

The Study involved a comprehensive review of the City's water and wastewater enterprises' financial plans, user classes, and rate structures. Raftelis reviewed the City's revenue requirements to determine appropriate reserve targets and revenue adjustments needed to maintain financial sufficiency and rate stability for the City's water and wastewater enterprises.

Rates were calculated using a cost of service approach that is consistent with current California standards and legislative requirements, including Proposition 218. All assumptions factored into the rate calculations are contained in this report. Various tables describing the calculation of the rates are included as well.

It was a pleasure working with you over the course of the Study, and we appreciate the assistance you and other City staff provided. If you have any questions, please do not hesitate to call us at (626) 583-1894.

Sincerely,

Sudhir D. Pardiwala, PE	**Hannah Phan**	**Charles Diamond**
Executive Vice President	*Manager*	*Associate Consultant*

150 N. Santa Anita Ave., Suite 470 Arcadia, CA 91006
626 583 1894 www.raftelis.com

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1. EXECUTIVE SUMMARY

In 2017, the City of Brentwood (City) engaged Raftelis Financial Consultants, Inc. (Raftelis) to conduct a comprehensive Water and Wastewater Cost of Service Study (Study) to determine user charges for the City's water and wastewater services that ensure proportionate recovery of costs from the various user classes. This report documents the resultant findings, analyses, and recommendations.

The major objectives of the Study include the following:

1. Develop Financial Plans for the water and wastewater funds to ensure financial sufficiency, to recover operation and maintenance (O&M) costs, meet debt coverage requirements, fund capital repairs and replacements (R&R), and ensure sufficient funding of City financial reserves.
2. Conduct a Cost of Service analysis for the water and wastewater systems to recover costs proportionate to service received.
3. Develop fair and equitable water and wastewater rates that provide revenue stability for recovering fixed costs, maintain affordable service, and are compliant with the requirements of Proposition 218.

The water cost of service study was prepared using the principles established by the American Water Works Association (AWWA). AWWA *"Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices M1* (sixth edition) (the "M1 Manual"). The wastewater cost of service study was prepared based on the principles established by the Water Environment Federation (WEF) and described in *Financing and Charges for Wastewater Systems*.

This executive summary provides an overview of the study and includes findings and recommendations for water and wastewater rates.

A fiscal year for the City is from July 1 to June 30 the following year. Therefore, July 1, 2017 through June 30, 2018 is identified as FY 2018; July 1, 2018 through June 30, 2019 is identified as FY 2019 and so on. The City bills are based on a thousand gallons (kgal), therefore one unit of water is a thousand gallons.

System Background

The City was incorporated in 1948 and provides potable water to approximately 19,500 connections serving a population of approximately 62,000. The City supplies potable water from the City's wells, as well as from surface water that is treated at the City of Brentwood Treatment Plant (Brentwood TP). The City contracts with Contra Cost Water District to receive water treated at the Randall Bold Water Treatment Plant (RBWTP) on a take or pay basis. Surface water originates in the Sierra Nevada mountains and is diverted from the Sacramento-San Joaquin Delta. The City's water distribution system includes about 300 miles of water mains. The cost of water supply has increased during the recent drought due to tightening water supplies and environmental

and regulatory requirements. Water usage has not rebounded as much as anticipated since the easing of recent drought conditions.

Additionally, non-potable water is available in some areas of the City for irrigation, and is supplied with untreated water pumped from the Sacramento-San Joaquin Delta by the East Contra Costa Irrigation District. The City's Wastewater Treatment Plant (WWTP) also produces recycled water suitable for non-potable reuse. Recycled and untreated water is distributed through the City's non-potable water supply system.

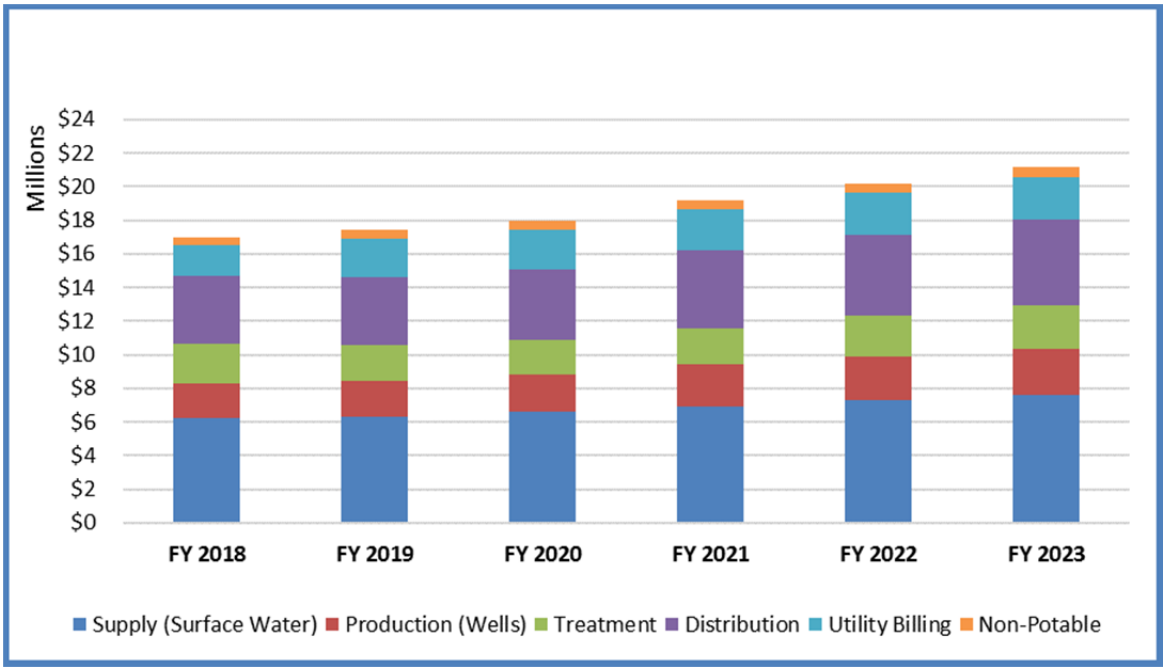
The City wastewater system collects, treats, and disposes of wastewater from over 16,800 connections. Wastewater is treated at the City's WWTP with a current capacity of 5.0 million gallons per day (MGD). The WWTP is an extended aeration/activated sludge facility. Treated effluent, if not recycled, is discharged into Marsh Creek. In addition to the treatment plant, the wastewater system includes approximately 200 miles of wastewater mains and lateral connections.

Water Enterprise Financial Plan

In order to determine the revenue adjustments needed to meet the ongoing expenses of the City's water enterprise and provide fiscal stability, Raftelis projected the revenue requirements, including operations and maintenance (O&M) expenses, capital improvement expenses, debt service costs, reserve requirements, etc., for the study period. O&M expenses include the cost of operating and maintaining water supply, treatment, storage, and distribution facilities, as well as the costs of providing technical services such as engineering services and other administrative costs of the water system such as meter reading and billing. O&M projections are based on the City's projected budgetary increases in FY 2018 and beyond. The City uses inflation factors that are indicative of industry increases for different expenditures within the budget, such as personnel, supplies, or fuel, to capture the impact of various market forces. **Figure 1-1** shows the projected water O&M expenses over the planning period.

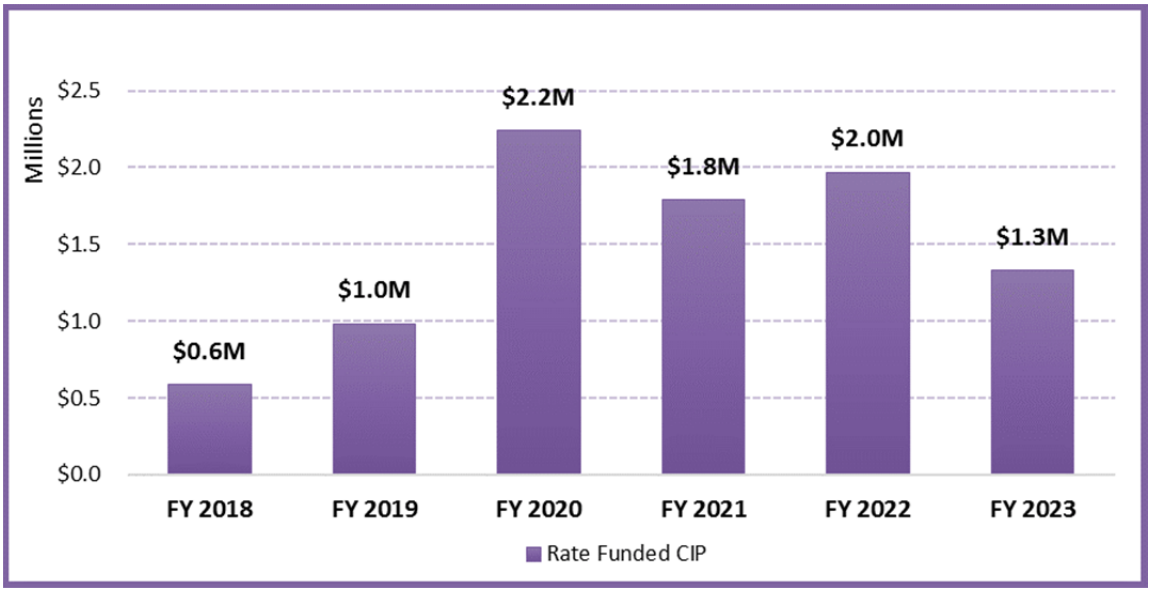
Due to the easing of recent drought conditions, potable water usage is projected to rebound by 10% in FY 2018 and remain constant thereafter (excluding usage growth due to new accounts). The proposed financial plan and water rates are based on this level of water usage.

Figure 1-1: Water Enterprise Projected O&M Expenses



In addition to operating expenses, the City is planning capital expenditures totaling about $8.9 million, to be funded by water rates from FY 2018 through 2023. Existing and anticipated annual debt service payments range from $2.8 million to $4.4 million over the planning period. **Figure 1-2** shows the water CIP that will be funded by rates over the planning period.

Figure 1-2: Water Enterprise Capital Financing Plan



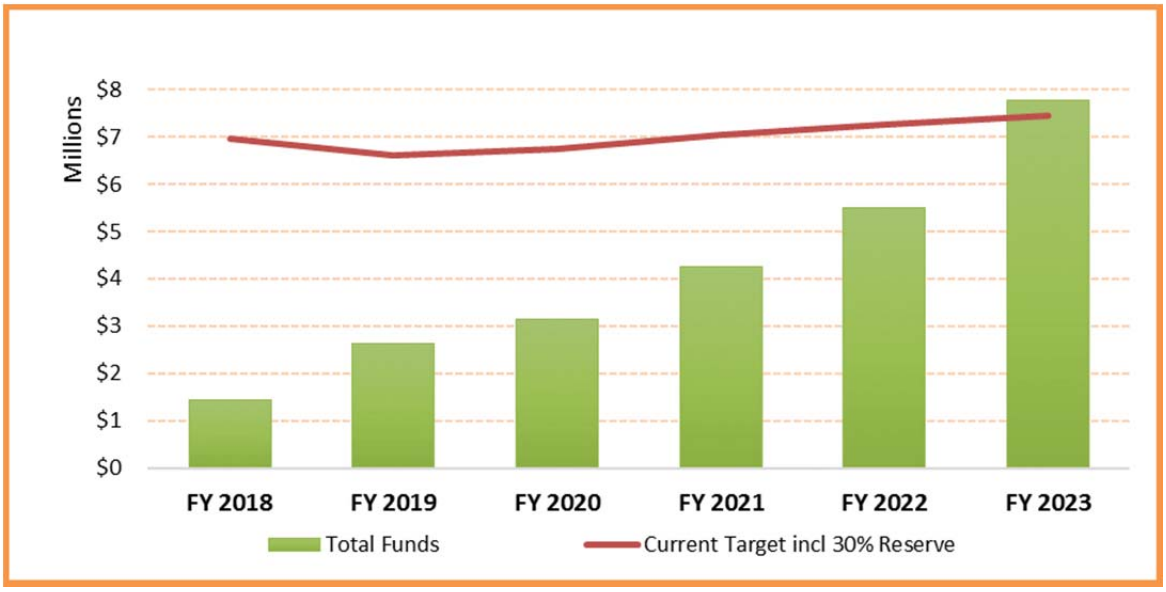
To ensure that the City will have adequate revenues to fund water operating and capital expenses and to maintain sufficient reserves, Raftelis recommends the revenue adjustments in **Table 1-1**.

Table 1-1: Annual Water Revenue Adjustments

Fiscal Year	Effective Date	Revenue Increases
FY 2019	July 2018	5.0%
FY 2020	July 2019	3.5%
FY 2021	July 2020	3.5%
FY 2022	July 2021	3.5%
FY 2023	July 2022	3.5%

Figure 1-3 shows the resulting cash balance for the water utility. The red line represents the total current target, which is equal to 30 percent of annual operating expenses and debt service payments.

Figure 1-3: Water Enterprise Total Cash Balance



Proposed Water Rates

Raftelis recommends that the City retain its current inclining rate structure, as well as current residential and non-residential tier definitions that are based upon the cost and availability of groundwater and surface water supply sources and customer usage characteristics. The current residential tiers are: Tier 1 is set at 0 to 5 thousand gallons (kgal) per month; Tier 2 is set at 6 to 14 kgal per month; Tier 3 is set at 15 to 20 kgal per month; Tier 4 is any usage above 20 kgal per month. Non-residential customers currently have two tiers, with Tier 1 set at 0 to 5 kgal per month, and Tier 2 defined as any usage 5 kgal per month. The rates are revised to be more consistent with the actual cost of service. **Table 1-2** shows the proposed rates for the next five years, effective July 1 of each year.

The City reserves the right to pass through costs that are not within the City's control, such as water purchased costs, electrical costs, chemical costs etc. to the proposed rates when such an action is deemed necessary. The financial plan has built in projected increases in these costs. However, if those costs exceed the projected amount, the additional costs may be recovered through the rates at the actual cost paid by the City.

Table 1-2: Proposed Monthly Water Rates

		Current	July 1, 2018	July 1, 2019	July 1, 2020	July 1, 2021	July 1, 2022
Monthly Base Rate							
Meter Size							
5/8" or 3/4"		$23.56	$24.03	$24.88	$25.76	$26.67	$27.61
1"		$32.52	$34.00	$35.19	$36.43	$37.71	$39.03
1 1/2"		$54.93	$58.90	$60.97	$63.11	$65.32	$67.61
2"		$81.83	$88.79	$91.90	$95.12	$98.45	$101.90
3"		$167.00	$183.44	$189.87	$196.52	$203.40	$210.52
4"		$292.65	$322.91	$292.65	$293.65	$294.65	$295.65
6"		$592.85	$656.65	$679.64	$703.43	$728.06	$753.55
Commodity Rate ($/kgal)							
Residential	Monthly (kgal)						
Tier 1	5	$2.72	$2.84	$2.94	$3.05	$3.16	$3.28
Tier 2	14	$5.41	$5.48	$5.68	$5.88	$6.09	$6.31
Tier 3	20	$6.47	$6.43	$6.66	$6.90	$7.15	$7.41
Tier 4	21+	$7.11	$6.64	$6.88	$7.13	$7.38	$7.64
Non-Residential							
Tier 1	5	$2.52	$2.93	$3.04	$3.15	$3.27	$3.39
Tier 2	6+	$5.02	$5.97	$6.18	$6.40	$6.63	$6.87
Hydrant		$5.02	$8.72	$9.03	$9.35	$9.68	$10.02
Non-Potable		$1.43	$1.43	$1.47	$1.51	$1.56	$1.60

Customer Impacts - Water

Table 1-3 below shows the impacts of the proposed rates on a typical residential customer with a 1-inch meter using an average of 9 kgal of water monthly. Actual impacts will vary per customer dependent upon water usage.

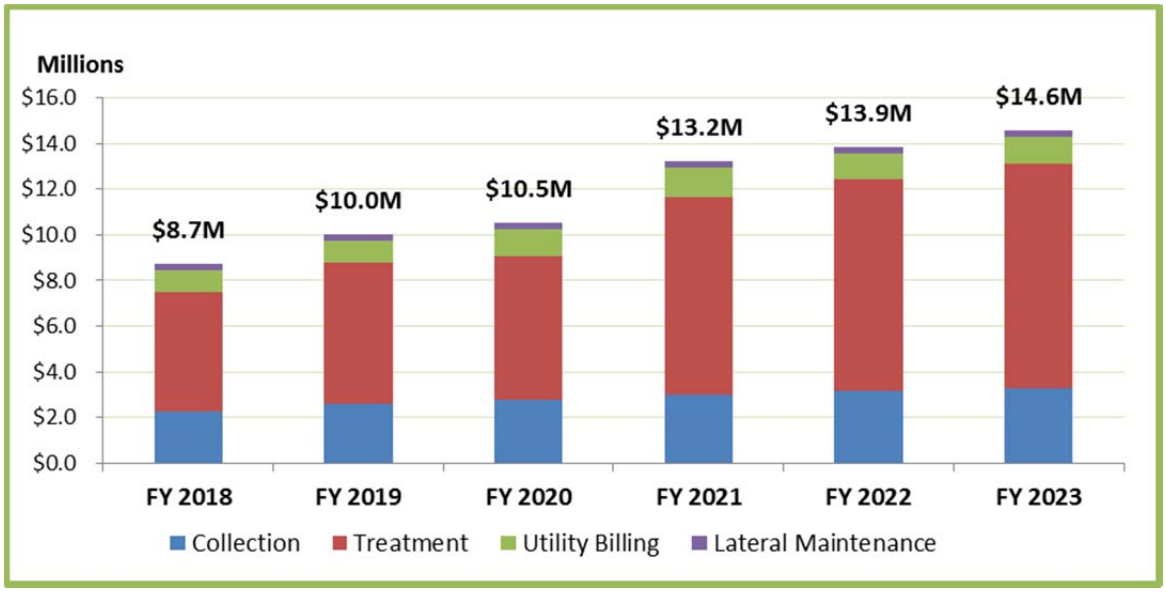
Table 1-3: Residential Water Monthly Rate Impacts

Residential	Usage (kgal)	Current Bill	Proposed Bill	Difference (%)	Difference ($)	% Bills at or below
Average	9	$67.76	$70.12	3.5%	$2.36	67.3%

Wastewater Enterprise Financial Plan

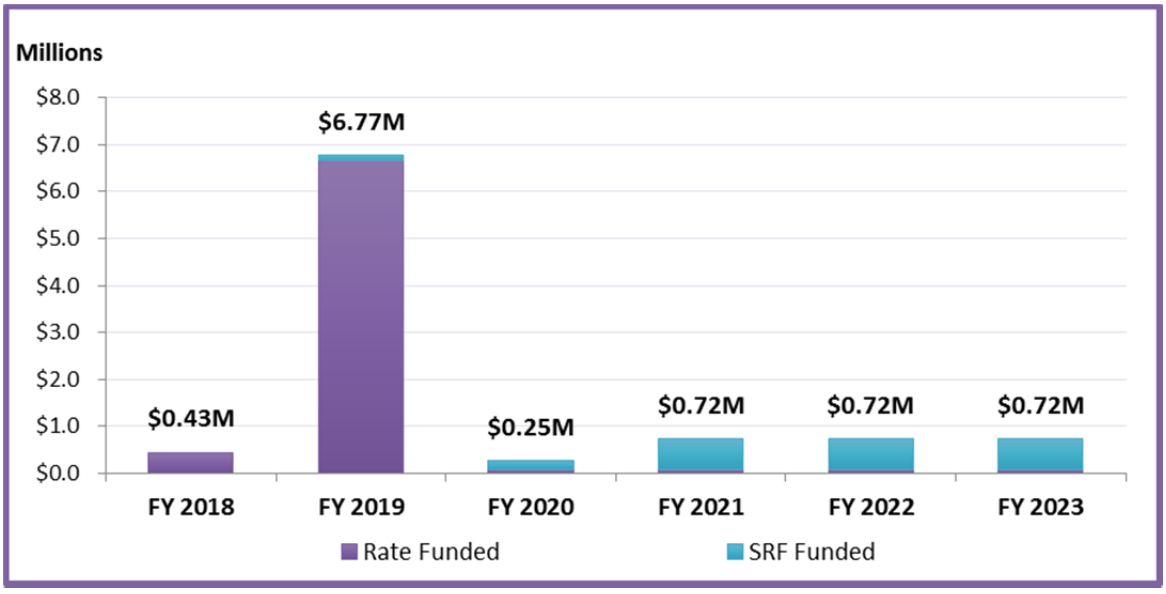
Raftelis projected the revenue requirements, including O&M expenses, capital improvement expenses, debt service costs, and reserve requirements for the wastewater enterprise over the study period. O&M expenses include wastewater collection, wastewater treatment, billing, and lateral maintenance. O&M projections are based on the City's projected budgetary increases in FY 2018 and beyond. The City uses different inflation factors for different expenditures within the budget. **Figure 1-4** shows the projected wastewater enterprise O&M expenses over the planning period.

Figure 1-4: Wastewater Enterprise Projected O&M Expenses



In addition to operating expenses, the City's wastewater enterprise is planning capital expenditures totaling about $9.6 million over the study period. Wastewater rate revenue and State Revolving Fund (SRF) loans will be used to finance planned capital expenditures. Existing and anticipated annual debt service payments range from $0.65 million to $4.39 million over the planning period. **Figure 1-5** shows the wastewater enterprise's CIP that will be funded by rates and SRF loans over the planning period. (Note FY 2019 shows an initial cash payment for Wastewater Treatment Plant Expansion to receive favorable SRF loan financing over time)

Figure 1-5: Wastewater Enterprise Capital Financing Plan



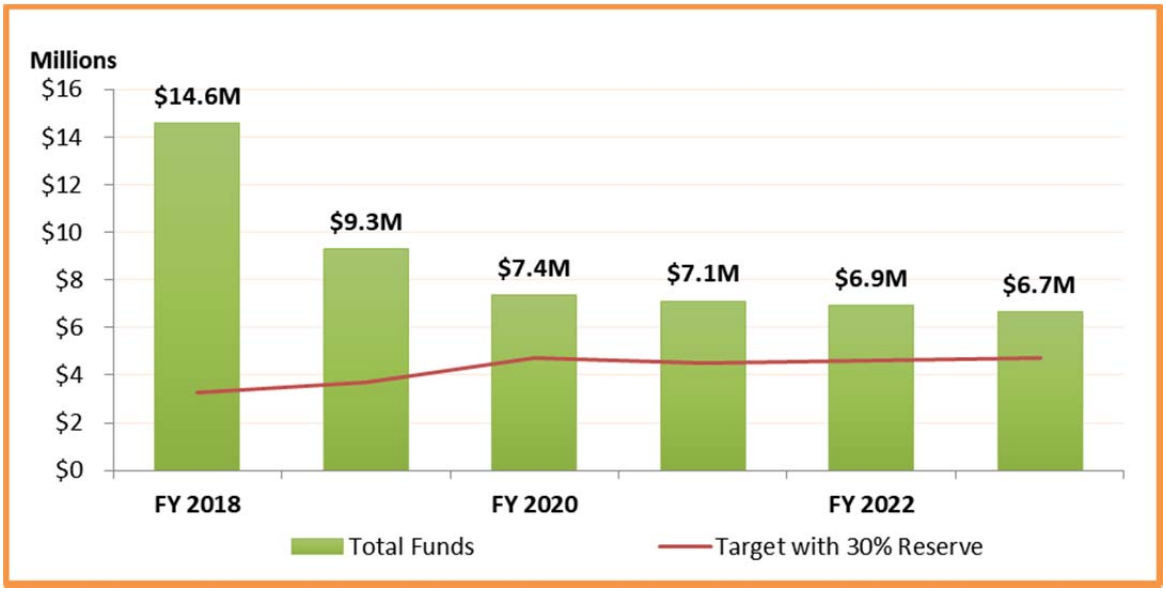
To ensure that the City will have adequate revenues to fund the wastewater enterprise's operating and capital expenses and to maintain sufficient reserves, Raftelis recommends the revenue adjustments shown in **Table 1-4**. The proposed adjustments are necessary to meet debt service coverage requirements of 110 percent for the SRF loans.

Table 1-4: Annual Wastwater Revenue Adjustments

Fiscal Year	Effective Date	Revenue Increases
FY 2019	July 2018	3.0%
FY 2020	July 2019	3.0%
FY 2021	July 2020	3.0%
FY 2022	July 2021	3.0%
FY 2023	July 2022	3.0%

Figure 1-6 shows the resulting cash balance for the wastewater enterprise. The red line represents the total current target, which is equal to 30 percent of the wastewater enterprise's annual operating expenses and debt service payments. It should be noted that while the cash balance is projected to exceed the target, SRF loan debt coverage calculations do not take into account existing cash balance when meeting coverage requirements.

Figure 1-6: Wastewater Enterprise Cash Balance



Proposed Wastewater Rates

Based on input from City staff, Raftelis recommends that the City retains the existing wastewater rate structure, but that existing non-residential customer classes be consolidated into five classes based on combined strength (BOD plus TSS). **Table 1-5** shows the proposed consolidated non-residential customer classes defined by combined strength. Many agencies choose to define customers in broader classes because wastewater strength can vary significantly from day to day and measurement of strength is not very accurate. Classifying customers into broader groups simplifies the rate structure and administration. Examples of low strength customers are retail stores and office buildings since the wastewater generated is mainly from toilets. High strength customers are usually bakeries and restaurants since the wastewater generated from these establishments require more treatment.

Table 1-5: Consolodated Non-Residential Wastewater Customer Classes

Proposed Class	Combined Strength (mg/L)
Low Strength	0-250
Medium Low Strength	251-400
Medium Strength	401-800
Medium High Strengtl	801-1400
High Strength	>1,401

Table 1-6 shows the reclassification of existing non-residential wastewater customer classes into the newly proposed consolidated classes. Combined strengths for each existing customer class are based on data from the City of Los Angeles and the County Sanitation Districts of Los Angeles County (LACSD).

Table 1-6: Reclassification of Non-Residential Wastewater Customer Classes

Existing Non-Residential Customer Classes	Combined Strength (mg/L)	Proposed Consolidated Customer Class
Auto Sales and Repair	300	Medium Low Strength
Barber & Beauty Shop	300	Medium Low Strength
Bakery	1,600	High Strength
Car Washes	170	Low Strength
Gas Stations	300	Medium Low Strength
Grocery Stores	1,600	High Strength
Hotels without Restaurants	430	Medium Strength
Institutions, Churches, HOAs	375	Medium Low Strength
Laundromats	260	Medium Low Strength
Laundry, Commercial	1,350	Medium High Strength
Office Buildings, Banks	300	Medium Low Strength
Restaurants	1,600	High Strength
Retail Stores	300	Medium Low Strength
Schools	230	Low Strength
Other Commercial	375	Medium Low Strength
Mixed Use	425	Medium Strength

Table 1-7 shows proposed wastewater rates for FY 2019 through FY 2023. Revenue adjustments of 3% occur on July 1 of each fiscal year throughout the planning period. The City reserves the right to pass through costs that are not within the City's control, such as electrical costs, chemical costs etc. to the proposed rates when such an action is deemed necessary. The financial plan has built in projected increases in these costs. However, if those costs exceed the projected amount, the additional costs may be recovered through the rates at the actual cost paid by the City.

Table 1-7: Proposed Monthly Wastewater Rates

	July 1, 2018	July 1, 2019	July 1, 2020	July 1, 2021	July 1, 2022
Monthly Base Charge (per dwelling unit)	$15.01	$15.47	$15.94	$16.42	$16.92
Monthly Lateral Maintenance Fee (per account)	$2.94	$3.03	$3.13	$3.23	$3.33
Residential Variable Charge per unit ($/kgal)*	$6.00	$6.18	$6.37	$6.57	$6.77
Residential Monthly Maximum Charge	$59.95	$61.76	$63.66	$65.64	$67.64
Non-Residential Variable Charge ($/kgal of actual water use)					
Low Strength	$4.71	$4.86	$5.01	$5.17	$5.33
Medium Low Strength	$5.36	$5.53	$5.70	$5.88	$6.06
Medium Strength	$5.90	$6.08	$6.27	$6.46	$6.66
Medium High Strength	$12.10	$12.47	$12.85	$13.24	$13.64
High Strength	$13.38	$13.79	$14.21	$14.64	$15.08

*Residential users' variable charge is based on water usage during two lowest-use winter months.

Customer Impacts - Wastewater

Table 1-8 shows the monthly bill impact for residential customers with varying levels of usage. Note that residential customers are currently billed based on water use during the two lowest-production winter months.

Table 1-8: Residential Wastewater Monthly Rate Impacts

	Monthly Usage (kgal)	Current Monthly Bill	Proposed Monthly Bill	Difference ($)	Difference %	% of Bills At or Below
Average	4	$40.18	$41.95	$1.77	4.4%	44%

Table 1-9 shows the monthly impacts of the proposed rates on a typical customer in each non-residential customer class.

Table 1-9: Non-Residential Wastewater Monthly Rate Impacts

Existing Class	New Class	Average Monthly Usage (kgal)	Current Monthly Bill	Proposed Monthly Bill	Difference ($)	Difference (%)	% of Non-Residential Accounts
Auto Sales and Repair	Medium Low Strength	7.2	$61.08	$56.43	($4.66)	-7.6%	4.1%
Barber & Beauty Shop	Medium Low Strength	3.9	$37.62	$39.00	$1.38	3.7%	2.3%
Bakery	High Strength	11.2	$189.91	$167.36	($22.55)	-11.9%	0.4%
Car Washes	Low Strength	111.5	$594.22	$542.96	($51.26)	-8.6%	1.0%
Gas Stations	Medium Low Strength	79.4	$480.13	$443.61	($36.52)	-7.6%	3.1%
Grocery Stores	High Strength	96.6	$1,284.25	$1,310.34	$26.09	2.0%	2.2%
Hotels without Restaurants	Medium Strength	111.5	$686.94	$676.92	($10.03)	-1.5%	0.6%
Institutions, Churches, HOAs	Medium Low Strength	23.2	$140.90	$142.30	$1.40	1.0%	10.1%
Laundromats	Medium Low Strength	197.7	$1,097.43	$1,077.67	($19.76)	-1.8%	0.4%
Laundry, Commercial	Medium High Strength	13.3	$111.62	$178.41	$66.79	59.8%	0.2%
Office Buildings, Banks	Medium Low Strength	17.2	$110.10	$109.93	($0.16)	-0.1%	23.4%
Restaurants	High Strength	45.9	$685.00	$631.79	($53.21)	-7.8%	15.9%
Retail Stores	Medium Low Strength	17.2	$111.93	$110.21	($1.71)	-1.5%	18.5%
Schools	Low Strength	71.2	$374.63	$353.28	($21.35)	-5.7%	6.2%
Other Commercial	Medium Low Strength	18.0	$118.73	$114.59	($4.14)	-3.5%	11.4%
Mixed Use	Medium Strength	80.8	$609.64	$495.68	($113.97)	-18.7%	0.2%

Drought Surcharge

Although the State mandated drought restrictions on water usage are no longer in effect, the City is selling less water now than it sold before the recent drought. It is expected that the sales may increase slightly under normal conditions as time passes. However, in case of another drought and further sales reductions, the City would lose revenue and fail to cover its expenses. Raftelis has developed drought rates to supplement reduced revenue due to drought. Since the level of conservation demanded will vary with water conditions and state mandates, Raftelis developed a drought surcharge of $0.06 per each unit of water used, to be assessed per each percent of required water usage reduction.

2. OVERVIEW

INTRODUCTION

In 2017, the City engaged Raftelis Financial Consultants, Inc. (Raftelis) to conduct a comprehensive Water and Wastewater Cost of Service Study (Study) that could be utilized to evaluate and optimize user charges for the City's water and wastewater services, while ensuring a proportionate recovery of costs from the various user classes. This report documents the resultant findings, analyses, and recommendations.

The major objectives of the study include the following:

1. Develop Financial Plans for the water and wastewater enterprises to ensure financial sufficiency, meet operation and maintenance (O&M) costs, ensure sufficient funding of City financial reserves, meet debt coverage requirements, and fund capital repairs and replacements (R&R).
2. Conduct a Cost of Service analysis for the water and wastewater systems.
3. Develop fair and equitable water and wastewater rates that adequately recover costs, provide revenue stability for recovering fixed costs, and maintain affordable service, while compliant with the requirements of Proposition 218.

LEGAL REQUIREMENTS AND RATE-SETTING METHODOLODY

The water cost of service study was prepared using the principles established by the American Water Works Association (AWWA). AWWA *"Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices M1* (sixth edition) (the "M1 Manual"). The wastewater cost of service study was prepared based on the principles established by the Water Environment Federation and described in *Financing and Charges for Wastewater Systems*. The general principles of rate structure design and the objectives of the Study are described below.

According to the M1 Manual, the first step in the ratemaking process is to determine the adequate and appropriate level of funding for a given utility. This is referred to as determining the "revenue requirement." This analysis considers the short-term and long-term service objectives of the utility over a given planning horizon, including capital facilities, system operations and maintenance, and financial reserve policies, to determine the adequacy of a utility's existing rates to recover its costs. A number of factors may affect these projections, including the number of customers served, water-use trends, extraordinary gains or expenses, weather, conservation, use restrictions, inflation, interest rates, capital finance needs, changes in tax laws, and other changes in operating and economic conditions.

After determining a utility's revenue requirements, the next step is determining the cost of service. Utilizing a public agency's approved budget, financial reports, operating data, and capital improvement plans, a cost of service study generally categorizes the operating system costs by

function (e.g., treatment, storage, pumping, distribution/collection, etc.). Asset costs are similarly functionalized to determine the cost of service.

After the assets and the costs of operating those assets are properly categorized by function, these "functionalized costs" are allocated first to cost causation components, and then to the various customer classes (e.g., single-family residential, multi-family residential, and commercial) by determining the characteristics of those classes and the contribution of each to incurred costs such as base costs, peaking costs, delivery costs, service characteristics, and demand patterns for water and flow and strength for wastewater.

Rate design is the final part of the rate-making procedure and uses the revenue requirement and cost of service analysis to determine appropriate rates for each customer class. Rates utilize "rate components" that build-up to rates for commodity charges, and rates for fixed charges, for the various customer classes and meter sizes servicing customers. In the case of inclining tier water rates, the rate components define the cost of service *within* each class of customer, effectively treating each tier as a sub-class and determining the cost to serve each tier.

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

Proposition 218, reflected in the California Constitution as Article XIII D, was enacted in 1996 to ensure that rates and fees are reasonable and proportional to the cost of providing service. The principal requirements, as they relate to public water service are as follows:

1. A property-related charge (such as water 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 the record owner of each parcel at least 45 days prior to the public hearing, when the agency considers all written protests against the charge.

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

California Constitution Article X, section 2 mandates that water resources be put to beneficial use and that the waste or unreasonable use of water be prevented through conservation. Section 106 of the Water Code declares that the highest priority use of water is for domestic purposes, with irrigation secondary. Thus, management of water resources is part of the property-related service provided by public water suppliers to ensure the resource is available over time. The City established inclining tiered (also known as inclining block) water rates to incentivize customers to conserve water. 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 customers to achieve compliance with Proposition 218.

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

3. WATER RATES

This section describes the long-range financial plan for the water utility, findings and results of the water rate study, and a detailed discussion of the proposed water rates, the customer impacts resulting from the proposed rates, and proposed drought surcharge. It also includes a description of the water system, the determination of annual revenues required from rates, and a detailed discussion of the Cost of Service, which includes allocation of costs to water cost causation parameters and the determination of unit costs.

WATER SYSTEM BACKGROUND

The City provides potable water to approximately 19,500 connections serving a population of approximately 62,000. In calendar year 2017 the City supplied approximately 0.67 billion gallons of water from the City's wells, as well as an additional 2.5 billion gallons of water from the City of Brentwood Treatment Plant (Brentwood TP) and the Randall Bold Water Treatment Plant (RBWTP). The City has a take or pay contract with Contra Costa Water District to receive water from the RBWTP. Potable water delivered to customers is a blend of City well water and treated surface water. Surface water originates in the Sierra Nevada mountains and is diverted from the Sacramento-San Joaquin Delta. The City's water distribution system includes about 300 miles of water mains. Based on the City's records, the cost of supplying water has increased during the recent drought due to reduced water usage and environmental and regulatory requirements. To meet water quality requirements it has been necessary for the City to reduce its supply from ground water wells and increase supply through the Brentwood TP, which is a more extensive and costly process. Potable water usage has not rebounded as much as anticipated since the easing of recent drought conditions, which further adds pressure on the revenue generated from rates.

Additionally, non-potable water is available in some areas of the City for irrigation. The City's non-potable supply is untreated water pumped from the Sacramento-San Joaquin Delta by the East Contra Costa Irrigation District, as well as recycled water produced at the City's Wastewater Treatment Plant (WWTP).

WATER ACCOUNT AND USAGE ASSUMPTIONS

Table 3-1 shows the estimated number of water accounts by meter size for FY 2018 through 2023. Raftelis estimated the number of accounts by tabulating FY 2017 (actual) account data provided by the City and escalating the number of accounts based on account growth rates shown in **Table 3-2**. Account growth rates are based on the City's General Plan population growth rates and are typically driven by new residential and nonresidential development. The number of accounts (meters) are used to forecast the amount of fixed revenue the City will receive from the meter service charge.

Table 3-1: Projected Water Accounts by Meter Size

	Actual FY 2017	*Projected* FY 2018	*Projected* FY 2019	*Projected* FY 2020	*Projected* FY 2021	*Projected* FY 2022	*Projected* FY 2023
5/8" or 3/4"	7,964	8,080	8,190	8,310	8,509	8,671	8,818
1"	10,702	10,858	11,006	11,166	11,434	11,651	11,848
1 1/2"	216	219	222	225	230	234	238
2"	392	398	403	409	418	426	433
3"	36	37	37	37	38	39	39
4"	33	33	34	34	35	36	36
6"	10	10	10	10	11	11	11
TOTAL METERS	**19,353**	**19,636**	**19,903**	**20,192**	**20,676**	**21,067**	**21,424**

Table 3-2: Water Account Growth

Fiscal Year	Account Growth
FY 2018	1.5%
FY 2019	1.4%
FY 2020	1.5%
FY 2021	2.4%
FY 2022	1.9%
FY 2023	1.7%

Table 3-3 shows actual water use in FY 2017 and projected water use for FY 2018 through FY 2023 by customer class. The revenue calculated in each fiscal year in the Water Enterprise Financial Plan is a function of the number of meters, meter size, account growth, water use, and existing rates. The rate study is designed to determine water rates for the next five years based on usage assumptions for FY 2018 through FY 2023. Due to the easing of recent drought conditions, and the analysis of water production volume and consumption habits, potable water usage is projected to rebound by 10 percent in FY 2018 and remain constant thereafter (excluding usage growth due to new accounts).

Table 3-3: Projected Water Use by Customer Class

Water Use (KGAL)	Tier Limit (KGAL)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Residential								
Tier 1	5	1,004,587	1,121,179	1,136,427	1,153,019	1,180,691	1,203,124	1,223,578
Tier 2	14	690,073	770,163	780,637	792,034	811,043	826,453	840,502
Tier 3	20	146,232	163,203	165,423	167,838	171,866	175,132	178,109
Tier 4	21+	134,451	150,055	152,096	154,317	158,020	161,023	163,760
Subtotal Residential		**1,975,342**	**2,204,600**	**2,234,583**	**2,267,208**	**2,321,621**	**2,365,731**	**2,405,949**
Non-Residential								
Tier 1	5	40,173	44,835	45,445	46,109	47,215	48,112	48,930
Tier 2	6+	512,441	571,915	579,693	588,157	602,272	613,715	624,149
Subtotal Non-Residential		**552,614**	**616,750**	**625,138**	**634,265**	**649,488**	**661,828**	**673,079**
Hydrant		4,715	5,187	5,187	5,187	5,187	5,187	5,187
Non-Potable		314,679	351,010	355,606	358,130	362,339	365,752	368,864
TOTAL USAGE		**2,847,350**	**3,177,547**	**3,220,513**	**3,264,789**	**3,338,634**	**3,398,498**	**3,453,078**

INFLATIONARY AND OTHER ASSUMPTIONS

This subsection describes the assumptions used in projecting operating and capital expenses as well as reserve coverage requirements that determine the overall revenue adjustments required to ensure the financial stability of the City's water enterprise. Revenue adjustments represent the average increase in rates for the City as a whole. Note that rate changes for individual classes will depend upon the cost of service and actual volume of water used.

To ensure that future costs are reasonably projected, it is necessary to make informed assumptions about inflationary factors and water costs and use. Non-rate revenue and O&M projections are based on the City's FY 2018 projections and projected budgetary increases in FY 2019 through FY 2023. The City uses inflation factors that are indicative of industry increases for different expenditures within the budget, such as personnel, supplies or fuel, to capture the impact of market forces over time.

WATER ENTERPRISE FINANCIAL PLAN

The assumptions discussed above were incorporated into the Water Enterprise Financial Plan. To develop the Water Enterprise Financial Plan, Raftelis projected annual expenses and revenues and modeled reserve balances, capital expenditures and calculated debt service coverage ratios to estimate the amount of additional rate revenue needed per year. This section of the report provides a discussion of O&M expenses, the Capital Improvement Plan (CIP), reserve funding, projected revenue under existing rates, and the revenue adjustments needed to ensure the fiscal sustainability and solvency of the City.

Revenue Requirement

A utility's yearly revenue requirement is the amount of yearly revenue needed to operate, maintain, and ensure fiscal solvency. The revenue requirement includes O&M expenses, rate funded capital expenditures, debt service payments and reserve requirements (funding for reserves). Basis of the expenses are the City's Fiscal Model, Operating Budget and 5-year Capital Improvement Program.

O&M Expenses

The water enterprise's projected O&M expenses are shown in **Table 3-4**. The Water Enterprise Financial Plan study period is from FY 2018 to 2023. O&M expenses include the cost of purchased surface water, operating and maintaining groundwater wells, treatment, distribution facilities, meter reading and billing, and providing non-potable water service. **Table 3-4** summarizes the projected O&M expenses in two different ways: by function and by type of expenditures.

Table 3-4: Projected Water Enterprise O&M Expenses

	Projected FY 2018	Projected FY 2019	Projected FY 2020	Projected FY 2021	Projected FY 2022	Projected FY 2023
Supply (Surface Water)	$6,232,651	$6,341,080	$6,611,543	$6,959,131	$7,290,806	$7,626,263
Production (Wells)	$2,060,245	$2,123,786	$2,203,683	$2,447,163	$2,580,858	$2,758,922
Treatment	$2,351,787	$2,123,278	$2,039,913	$2,192,296	$2,419,107	$2,532,309
Distribution	$4,012,701	$4,055,770	$4,234,815	$4,615,718	$4,831,177	$5,090,240
Utility Billing	$1,840,695	$2,290,323	$2,314,437	$2,409,355	$2,488,302	$2,568,320
Non-Potable	$479,571	$506,739	$525,905	$547,119	$567,604	$588,263
TOTAL O&M EXPENSES	**$16,977,650**	**$17,440,975**	**$17,930,296**	**$19,170,782**	**$20,177,854**	**$21,164,316**

	Projected FY 2018	Projected FY 2019	Projected FY 2020	Projected FY 2021	Projected FY 2022	Projected FY 2023
Personnel Services	$4,285,576	$4,635,608	$4,866,107	$5,227,581	$5,440,594	$5,650,286
Supplies and Services	$8,699,539	$8,340,240	$8,515,876	$8,975,052	$9,357,942	$9,715,674
Other Supplies and Services	$2,382,092	$2,564,280	$2,810,383	$3,167,001	$3,524,091	$3,887,763
Internal Service	$849,303	$884,670	$949,994	$989,377	$1,020,324	$1,052,359
Capital Outlay	$281,568	$509,437	$262,031	$264,652	$267,298	$269,971
Non-Potable	$479,571	$506,739	$525,905	$547,119	$567,604	$588,263
TOTAL O&M EXPENSES	**$16,977,650**	**$17,440,975**	**$17,930,296**	**$19,170,782**	**$20,177,854**	**$21,164,316**

Capital Improvement Plan

Table 3-5 shows the City's CIP for FY 2018 through FY 2023, which totals approximately $8.9 million. The projects will be funded through rates.

Table 3-5: Detailed Water Enterprise Capital Improvement Plan – Inflated

	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Fund #560 - Water						
Reservoir Painting and Coating	$282,979	$422,820	$422,820	$422,820	$422,820	$0
WTP Water Master Plan (shared funding with DFP)	$0	$56,000	$8,400	$28,000	$150,080	$155,680
Water Storage Capacity at Los Vaqueros	$100,000	$200,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
Municipal Service Center	$201,988	$205,159	$194,688	$186,292	$178,022	$173,654
O'Hara Ave/Lone Tree Way water upgrade	$0	$0	$295,000	$0	$0	$0
Security Improvements	$0	$0	$0	$153,000	$219,000	$0
Underground Water System Corrosion	$0	$100,000	$0	$0	$0	$0
Zone 2 Reduced Pressure Value	$0	$0	$319,000	$0	$0	$0
Total Water CIP	**$584,967**	**$983,979**	**$2,239,908**	**$1,790,112**	**$1,969,922**	**$1,329,334**

Debt Service

The City is not planning to issue any additional debt during this planning period. **Table 3-6** shows the existing debt service payments for the Brentwood Water Treatment Plant through FY 2023. Annual debt service payments for the planning period range from $2.8 million to $4.4 million.

Table 3-6: Water Enterprise Debt Service Payments

Fund 560 Only	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Revenue Bonds Series 2008						
Principal	$1,090,750	$0	$0	$0	$0	$0
Interest	$47,025	$0	$0	$0	$0	$0
Total Debt Service	**$1,137,775**	**$0**	**$0**	**$0**	**$0**	**$0**
Water Revenue Refunding Bonds Series 2014						
Principal	$1,306,346	$997,096	$1,077,096	$1,162,096	$1,247,096	$1,337,096
Interest	$1,941,735	$1,842,810	$1,762,310	$1,677,810	$1,589,060	$1,496,060
Total Debt Service	**$3,248,081**	**$2,839,906**	**$2,839,406**	**$2,839,906**	**$2,836,156**	**$2,833,156**
TOTAL EXISTING DEBT SERVICE	**$4,385,856**	**$2,839,906**	**$2,839,406**	**$2,839,906**	**$2,836,156**	**$2,833,156**

Proposed Financial Plan and Revenue Adjustments

The proposed revenue adjustments help ensure adequate revenue to fund operating expenses, capital expenditures and compliance with bond covenants. The Financial Plan model assumes the revenue adjustments occurs on July 1 of each year. The proposed revenue adjustments would enable the City to execute the CIP shown in **Table 3-5** and comply with its debt service coverage requirements over the study period.

Table 3-7 shows the proposed revenue adjustments for FY 2019[1] through FY 2023. These increases are needed to finance the operating and capital expenses and reserves funding.

Table 3-7: Proposed Water Revenue Adjustments

Fiscal Year	Effective Date	Revenue Increases
FY 2019	July 2018	5.0%
FY 2020	July 2019	3.5%
FY 2021	July 2020	3.5%
FY 2022	July 2021	3.5%
FY 2023	July 2022	3.5%

[1] *Note that the revenue adjustment for FY 2019 occurs on July 1, 2018.*

Table 3-8 shows the cash flow detail over the next five years.

Table 3-8: Proposed Water Enterprise Cash Flow

Potable Water			FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Revenue at Current Rates			$19,676,926	$19,944,067	$20,233,953	$20,717,433	$21,109,375	$21,466,723
Additional Revenue:								
Fiscal Year	**Revenue Adjustments**	**Month Effective**						
2018	0.0%	July	$0	$0	$0	$0	$0	$0
2019	5.0%	July		$997,203	$1,011,698	$1,035,872	$1,055,469	$1,073,336
2020	3.5%	July			$743,598	$761,366	$775,770	$788,902
2021	3.5%	July				$788,013	$802,921	$816,514
2022	3.5%	July					$831,024	$845,092
2023	3.5%	July						$874,670
Additional Rate Revenue			$0	$997,203	$1,755,295	$2,585,251	$3,465,183	$4,398,513
Total Rate Revenue			$19,676,926	$20,941,271	$21,989,248	$23,302,684	$24,574,558	$25,865,236
Current Services			$253,358	$264,076	$275,519	$289,991	$303,832	$317,758
Other Revenue			$270,501	$270,501	$270,501	$270,501	$270,501	$270,501
Standby Charges			$70,509	$69,804	$69,106	$68,415	$67,731	$67,053
Operating Transfers			$53,155	$350,000	$350,000	$350,000	$350,000	$350,000
Interest Income			$7,946	$40,319	$57,208	$73,338	$96,587	$131,341
TOTAL REVENUE			**$20,332,395**	**$21,935,972**	**$23,011,581**	**$24,354,928**	**$25,663,208**	**$27,001,890**
O&M Expenses								
Supply (Surface Water)			$6,232,651	$6,341,080	$6,611,543	$6,959,131	$7,290,806	$7,626,263
Production (Wells)			$2,060,245	$2,123,786	$2,203,683	$2,447,163	$2,580,858	$2,758,922
Treatment			$2,351,787	$2,123,278	$2,039,913	$2,192,296	$2,419,107	$2,532,309
Distribution			$4,012,701	$4,055,770	$4,234,815	$4,615,718	$4,831,177	$5,090,240
Utility Billing			$1,840,695	$2,290,323	$2,314,437	$2,409,355	$2,488,302	$2,568,320
Existing Debt Service			$4,385,856	$2,839,906	$2,839,406	$2,839,906	$2,836,156	$2,833,156
Proposed Debt Service			$0	$0	$0	$0	$0	$0
Rate Funded Capital Projects*			$584,967	$983,979	$2,239,908	$1,790,112	$1,969,922	$1,329,334
Reserve Funding			$0	$0	$0	$0	$0	$0
TOTAL EXPENSES			**$21,468,902**	**$20,758,121**	**$22,483,705**	**$23,253,681**	**$24,416,328**	**$24,738,543**
Net Cash Flow			**($1,136,506)**	**$1,177,850**	**$527,877**	**$1,101,247**	**$1,246,881**	**$2,263,346**

**Non-potable water is responsible for a portion of the capital costs. Potable capital costs, in addition to non-potable capital costs, represent the total Capital Improvement Plan.*

Table 3-9 shows the calculated debt coverage calculations for primary and secondary debt coverage requirements. The City's debt service payments are shared proportionately between the water enterprise fund and the development impact fee fund when the funded capital project or facility provides service to both existing rate payers and new development. To calculate the City's primary debt coverage ratios, the total revenue, including the development impact fee revenue, is included, as well as the total debt service payments. The City's primary debt coverage requirement is 125 percent for the water utility. To calculate the City's secondary debt coverage ratios, total debt

service payments are included, but development impact facilities fees revenue is excluded from total revenue. The City's secondary debt coverage requirement is 100 percent for the water utility. The City meets and exceeds its primary and secondary debt coverage requirements throughout the study period.

Table 3-9: Water Enterprise Debt Coverage Calculation

Debt Coverage Calculation	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Projected Development Impact Fees Revenue	$1,373,770	$1,464,122	$2,338,413	$1,510,757	$2,213,877	$1,168,657
Projected Non-Potable Revenue	$479,571	$506,739	$525,905	$547,119	$567,604	$588,263
Projected Water Revenue	$20,332,395	$21,935,972	$23,011,581	$24,354,928	$25,663,208	$27,001,890
Non-Potable O&M Expenses	$479,571	$506,739	$525,905	$547,119	$567,604	$588,263
Water O&M Expenses, less depreciation	$15,687,895	$15,989,022	$16,261,646	$17,174,329	$17,855,356	$18,510,564
Total Debt Service (for coverage calculation)	$5,060,050	$3,514,100	$3,513,600	$3,514,100	$3,510,350	$3,507,350
Primary Requirement						
Calculated Debt Coverage	119%	211%	259%	247%	285%	275%
Required Debt Coverage	125%	125%	125%	125%	125%	125%
Secondary Requirement						
Calculated Debt Coverage	92%	169%	192%	204%	222%	242%
Required Debt Coverage	100%	100%	100%	100%	100%	100%

Figure 3-1 through **Figure** 3-4 display the Financial Plan in graphical format. **Figure 3-1** shows the modeled revenue adjustments (blue bars) for the next five years on the left-hand axis. The calculated and required primary debt coverage requirements are shown by the green and red lines respectively on the right-hand axis. The solid lines pertain to the primary debt coverage requirement, the dashed lines to the secondary requirement.

Figure 3-1: Proposed Water Enterprise Revenue Adjustments and Debt Coverage Ratio

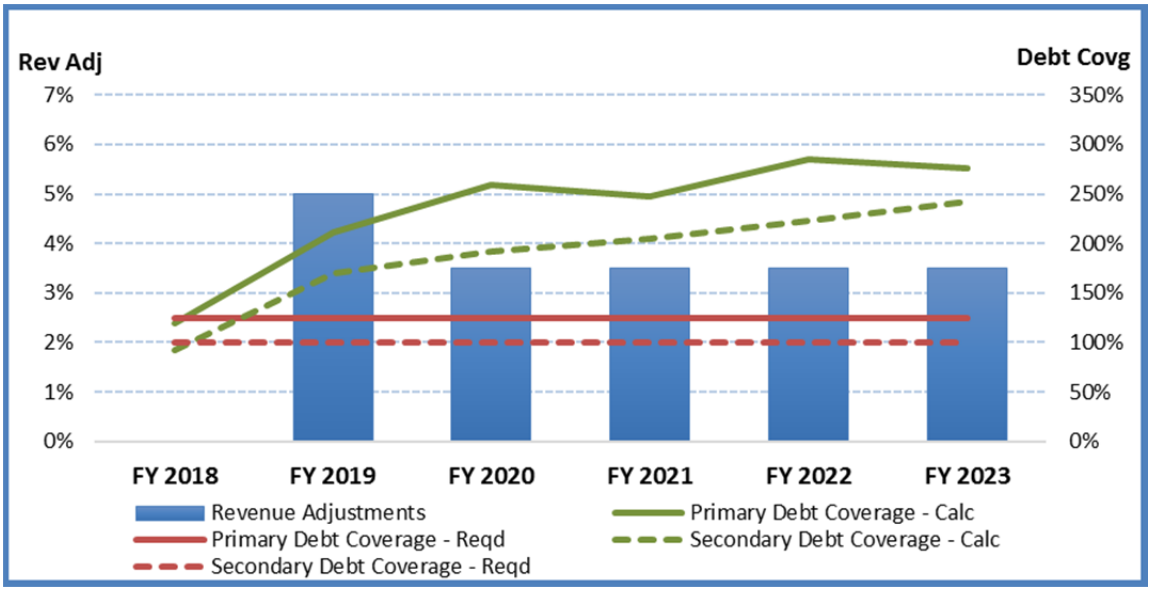


Figure 3-2 graphically illustrates the Water Enterprise Financial Plan – it compares existing and proposed revenues with projected expenses. The expenses include water supply, O&M, debt service, capital costs, and reserves transfers shown by the stacked bars. Total revenues at existing and proposed rates are shown by the horizontal orange and blue lines respectively. Current revenue from existing rates, in orange, does not meet future total expenses, and clearly demonstrates the need for revenue adjustments.

Figure 3-2: Proposed Potable Water Financial Plan

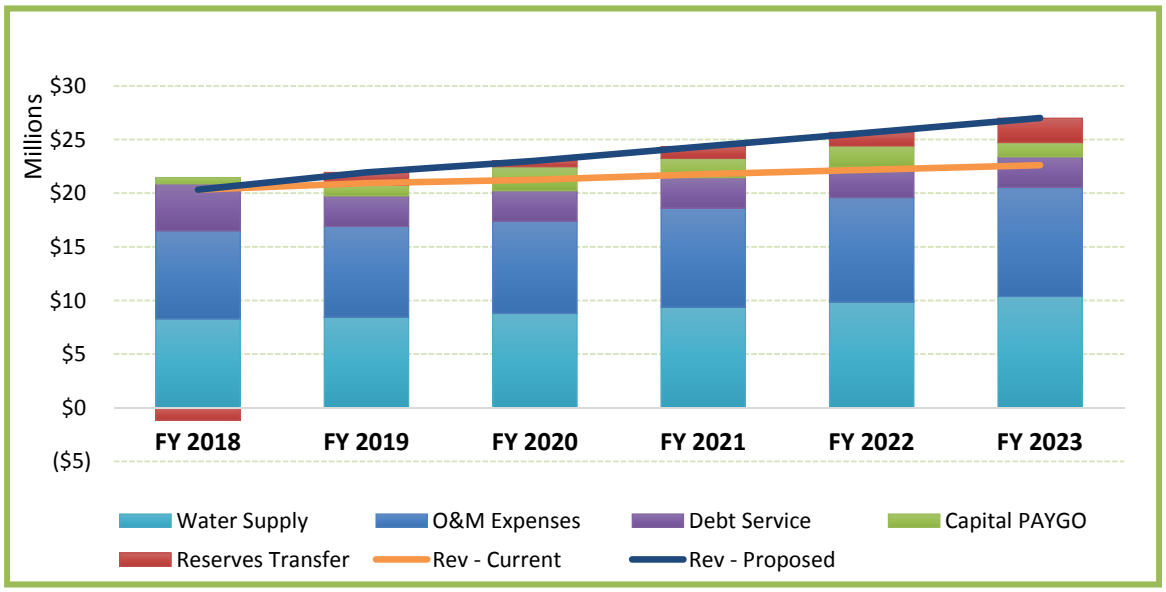


Figure 3-3 summarizes the projected CIP to be funded by water rates, from the City of Brentwood Capital Improvement Program 2018/19-2022/23 document adopted May 22, 2018.

Figure 3-3: Projected Water Enterprise Capital Projects

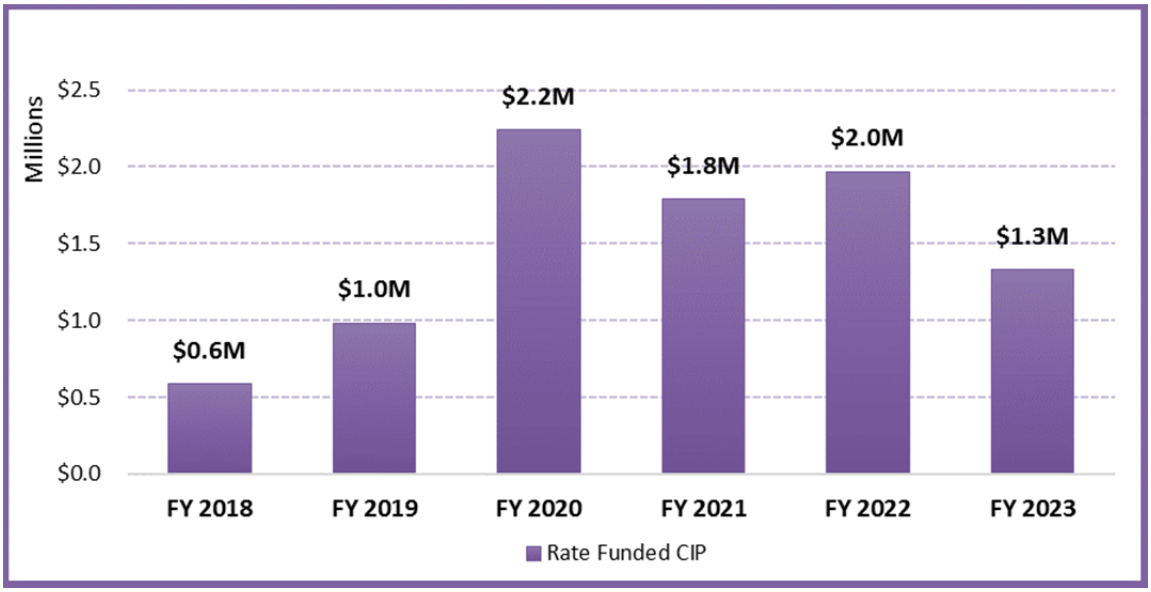


Figure 3-4 displays the resulting fund balance for the water utility. The red line represents the total current target, which is equal to 30 percent of annual operating expenses and debt service payments, based on Budget and Fiscal Policy 2.7.3, adopted April 25, 2017.

Figure 3-4: Water Enterprise Total Cash Balance

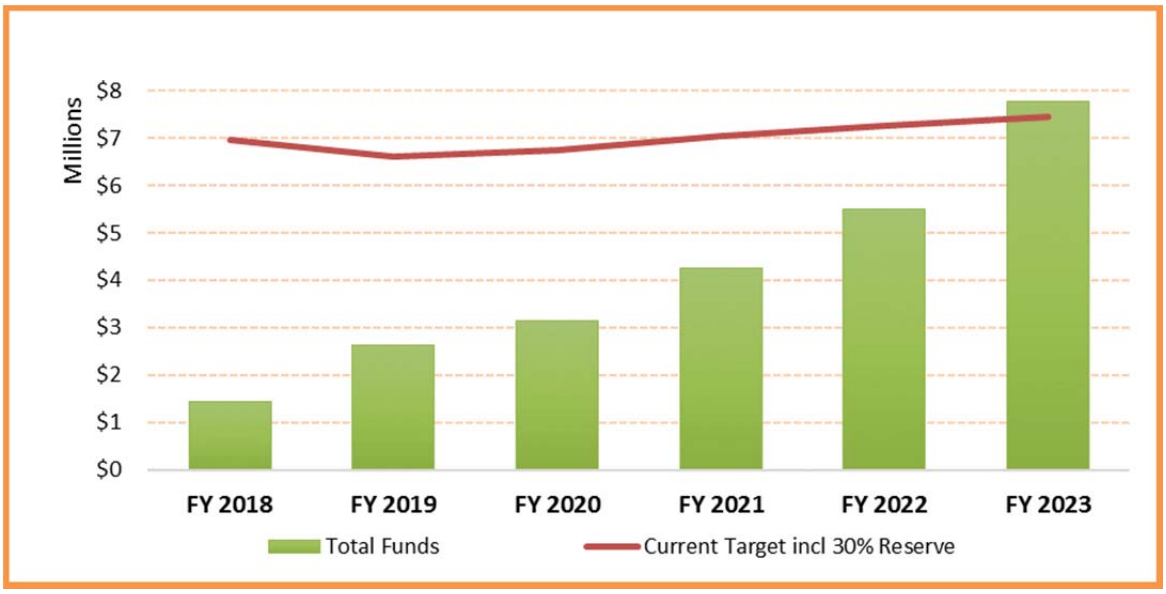


Table 3-10 shows the projected cash balance for the water enterprise. This table corresponds with **Figure 3-4**.

Table 3-10: Projected Water Enterprise Cash Balance

Water Fund	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Beginning Balance	$2,583,715	$1,447,209	$2,625,059	$3,152,935	$4,254,183	$5,501,063
Net Cash Flow	($1,136,506)	$1,177,850	$527,877	$1,101,247	$1,246,881	$2,263,346
Ending Balance	**$1,447,209**	**$2,625,059**	**$3,152,935**	**$4,254,183**	**$5,501,063**	**$7,764,410**
Interest Income	*$20,115*	*$40,319*	*$57,208*	*$73,338*	*$96,587*	*$131,341*

WATER COST OF SERVICE ANALYSIS

A cost of service analysis distributes a utility's revenue requirements (costs) to each customer class in proportion to the service received. After determining a utility's revenue requirements, the next step in a cost of service analysis is to functionalize its O&M costs as follows:

1. Supply – represents the cost of purchasing surface water and production from groundwater wells
2. Treatment – represents the cost of treating the water
3. Storage – represents the cost of the reservoirs
4. Distribution – represents the operating and maintenance cost of the water distribution system
5. Utility Billing – represents the costs associated with meter reading, billing and customer service
6. Non-Potable – represents the cost of operating and maintaining the non-potable water system

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

1. Supply – costs that are associated with providing water supply to all customers
2. Base Delivery costs – costs that are associated with providing service under average conditions
3. Peaking costs (maximum day and maximum hour) – costs that are associated with meeting the peak demand in excess of the average rate of use
4. Fire flow capacity – costs that are associated with providing capacity within the water system to supply water flow to fire sprinkler systems. Fire sprinkler systems are required for all new residential and nonresidential structures per California Building Standards Codes.
5. Meter service – costs that are associated with maintenance and capital costs of meters and services
6. Billing and customer service – costs that are incurred to provide meter reading, billing and customer service
7. General and administrative costs – costs that cannot be specifically allocated to one of the other cost causation components

Peaking costs are further divided into maximum day and maximum hour demand. The maximum day demand is the maximum amount of water used in a single day in a year. The maximum hour demand is the maximum usage in an hour on the maximum usage day. Different facilities, such as distribution and storage facilities (and the O&M costs associated with those facilities), are designed to meet the peaking demands of customers. Therefore, extra capacity[2] costs include the O&M and capital costs associated with meeting peak customer demand. This method is consistent with the AWWA M1 Manual, and is widely used in the water industry to perform cost of service analyses.

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

Allocation of Functionalized Expenses to Cost Components

After functionalizing expenses, the next step is to allocate the functionalized expenses to cost causation components. To do so we must identify system wide peaking factors which were provided by the City and are shown in **Table 3-11**. The system-wide peaking factors, based on the City Water Master Plan, are used to derive the cost component allocation bases (i.e., percentages) shown in **Table 3-11**. Functionalized expenses are then allocated to the cost components using these allocation bases. To understand the interpretation of the percentages, we must first establish the base use as the average daily demand during the year.

To determine the relative proportion of costs to assign to Base Delivery, Max Day and Max Hour, allocations are calculated based on these factors. Cost components that are related to the provision of average day demand (ADD), such as source of supply, are allocated 100 percent to Base Delivery. Cost components that are designed to meet Max Day peaks, such as reservoirs and transmission facilities, are allocated to Base Delivery and Max Day factors. Since facilities such as reservoirs and distribution systems are also designed to provide capacity for fire supply, an allocation is also provided for fire flow, which is subtracted from the Base Delivery and Max Day components. The Max Day allocation is as follows:

Base Delivery:	43%	= (1.00/2.10) x 100 – 5% (half the fire allocation)
Max Day:	47%	= (2.10-1.00)/2.10 x 100 – 5% (half the fire allocation)
Fire Supply:	10%	

Cost components such as those related to the distribution system that are designed for Max Hour peaks are allocated similarly. The allocation of Max Hour facilities is shown below:

Base Delivery:	22% = (1.00/4.00) x 100 – 3.33% (1/3 fire allocation)
Max Day:	24% = (2.10-1.00)/4.00 x 100 – 3.33% (1/3 fire allocation)
Max Hour:	44% = (4.00-2.10)/4.00 x 100 – 3.33% (1/3 fire allocation)
Fire Supply:	10%

Collectively the maximum day and hour cost components are known as peaking costs. These allocation bases are used to assign the functionalized costs to the cost causation components.

Table 3-11: System-Wide Peaking Factors and Allocation to Cost Causation Components

	Factor	Base Delivery	Max Day	Max Hour	Fire
Base	1.00	100%	0%	0%	0%
Max Day	2.10	43%	47%	0%	10%
Max Hour	4.00	22%	24%	44%	10%

Source: City of Brentwood Water Master Plan

In the absence of daily and hourly peaking factors, we use monthly peaks for the different customer classes. For the analysis to spread the costs among the different classes equitably it is important to get the relative ratios of the peaks, which is provided by the monthly peaks. **Table 3-12** shows the

derivation of the peaking factors by customer class and tier by dividing the total maximum monthly usage by the average monthly usage for each customer class and tier based on monthly water usage records provided by the City. These peaking factors are used to allocate the peaking costs to each customer class and tier in the rate derivation section.

Table 3-12: Peaking Factors by Customer Class

Customer Class	Proposed Tiers (kgal)	Max Monthly (kgal)	Average Monthly (kgal)	Peaking Factor
Residential		255,152	164,612	1.55
Tier 1	5	92,990	83,737	1.11
Tier 2	14	101,724	57,484	1.77
Tier 3	20	29,681	12,186	2.44
Tier 4	21+	30,757	11,204	2.75
Non-Residential		83,806	46,051	1.82
Tier 1	5	4,123	3,330	1.24
Tier 2	6+	79,683	42,721	1.87
Hydrant		2,331	393	5.93

To allocate meter-related costs appropriately, the concept of equivalent meters needs to be understood. By using equivalent meters instead of a straight meter count, the analysis accounts for the fact that larger meters impose larger demands and are more expensive to install, maintain, and replace than smaller meters and commit a greater capacity in the system. Equivalent meters are used in calculating meter service costs.

Equivalent meters are based on meter hydraulic capacity. Equivalent meters represent the potential demand on the water system in terms of the base or smallest meter size. A ratio of hydraulic capacity is calculated by dividing large meter capacities by the base meter capacity. The base meter is the smallest meter, in our case, a 3/4-inch meter. The actual number of meters by size is multiplied by the corresponding capacity ratio to calculate equivalent meters. The capacity ratio is calculated using the meter capacity in gallons per minute (gpm) provided in the AWWA M22 Manual. **Table 3-13** shows the equivalent meters for FY 2019.

Table 3-13: Equivalent Meters

Meter Size	Capacity (gpm)	AWWA Ratio	Number of Meters	Equivalent Meters
5/8" or 3/4"	30	1.00	8,190	8,190
1"	50	1.67	11,006	18,343
1 1/2"	100	3.33	222	740
2"	160	5.33	403	2,150
3"	350	11.67	37	432
4"	630	21.00	34	713
6"	1,300	43.33	10	446
TOTAL			**19,903**	**31,014**

Table 3-14 allocates the O&M and capital expenses to each cost component. The functional costs are allocated according to industry standards based on the nature of the water function. For example: water supply and production costs are allocated 100 percent to the Supply component. Treatment costs are allocated on the basis of Max Day because plants are designed to meet Max Day demand. Distribution costs are allocated on the basis of Max Hour and fire supply because distribution systems are designed to meet instantaneous peaks (Max hour) and fire flow requirements. Utility billing costs are allocated 100 percent to the Customer component. Some costs which cannot be readily classified into one of the functions are allocated to General and then spread amongst all the other cost causation components proportionate to the overall cost allocation.

Table 3-14 shows the total resulting cost causation component allocation for O&M expenses. This resulting allocation is used to allocate the City's operating revenue requirement to the cost causation components.

Table 3-14 also shows the total allocation for the City's assets. The resulting total asset allocation is derived in a similar manner as the O&M allocation - first, Raftelis functionalized the City's assets and then allocated them to the cost causation components based upon asset function and utilization resulting in the asset total allocation shown at the bottom of **Table 3-14**.

Table 3-14: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components – Water

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Supply (Surface Water)	100%									100%
Production (Wells)	100%									100%
Treatment		48%	52%							100%
Distribution		22%	24%	44%	10%					100%
Utility Billing								100%		100%

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Supply (Surface Water)	$6,341,080	$0	$0	$0	$0	$0	$0	$0	$0	$6,341,080
Production (Wells)	$2,123,786	$0	$0	$0	$0	$0	$0	$0	$0	$2,123,786
Treatment	$0	$1,011,085	$1,112,193	$0	$0	$0	$0	$0	$0	$2,123,278
Distribution	$0	$878,750	$980,144	$1,791,298	$405,577	$0	$0	$0	$0	$4,055,770
Utility Billing	$0	$0	$0	$0	$0	$0	$0	$2,290,323	$0	$2,290,323
TOTAL O&M EXPENSES	**$8,464,866**	**$1,889,835**	**$2,092,338**	**$1,791,298**	**$405,577**	**$0**	**$0**	**$2,290,323**	**$0**	**$16,934,236**
TOTAL O&M Allocation, %	50%	11%	12%	11%	2%	0%	0%	14%	0%	100%

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Land									100%	100%
Well		100%								100%
Reservoir		43%	47%	0%	10%					100%
Distribution		22%	24%	44%	10%					100%
Transmission		43%	47%	0%	10%					100%
Buildings									100%	100%
Machinery & Equipment							100%			100%
Vehicles									100%	100%
Pumps		48%	52%							100%
Treatment Plant		48%	52%							100%

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Land	$0	$0	$0	$0	$0	$0	$0	$0	$62,556	$62,556
Well	$0	$5,513,697	$0	$0	$0	$0	$0	$0	$0	$5,513,697
Reservoir	$0	$5,034,309	$5,596,802	$0	$1,181,235	$0	$0	$0	$0	$11,812,346
Distribution	$0	$13,114,915	$14,628,174	$26,734,250	$6,053,038	$0	$0	$0	$0	$60,530,377
Transmission	$0	$3,505,242	$3,896,889	$0	$822,459	$0	$0	$0	$0	$8,224,591
Buildings	$0	$0	$0	$0	$0	$0	$0	$0	$765,954	$765,954
Machinery & Equipment	$0	$0	$0	$0	$0	$0	$1,363,907	$0	$0	$1,363,907
Vehicles	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pumps	$0	$1,319,204	$1,451,124	$0	$0	$0	$0	$0	$0	$2,770,328
Treatment Plant	$0	$30,151,414	$33,166,555	$0	$0	$0	$0	$0	$0	$63,317,969
TOTAL ASSETS	**$0**	**$58,638,782**	**$58,739,545**	**$26,734,250**	**$8,056,731**	**$0**	**$1,363,907**	**$0**	**$828,510**	**$154,361,725**
Total Asset Allocation, %	0%	38%	38%	17%	5%	0%	1%	0%	1%	100%

Revenue Requirement Determination

Table 3-15 shows the revenue requirement derivation with the total revenue required from rates. The totals shown in the "Operating" and "Capital" columns are the total O&M and capital revenue requirements, respectively, that are allocated to the cost causation components using the allocation percentages shown in **Table 3-14**.

Raftelis calculated the revenue requirement using FY 2019 expenses, which include O&M expenses, rate funded capital expenses and existing and proposed debt service. To arrive at the rate revenue requirement, we subtract revenue offsets from other expenses and adjust for annual cash balances (transfers to or from reserves). The adjustments are added to arrive at the total revenue requirement from rates. This is the amount that fixed charge and commodity rates are designed to collect.

Table 3-15: Water Revenue Requirement Determination

FY 2019	Operating	Capital	Total
Revenue Requirements			
O&M Expenses	$16,934,236		$16,934,236
Existing Debt Service		$2,839,906	$2,839,906
Proposed Debt Service		$0	$0
Rate Funded Capital Projects		$983,979	$983,979
Reserve Funding		$0	$0
Total Revenue Requirements	**$16,934,236**	**$3,823,885**	**$20,758,121**
Less: Revenue Offsets			
Current Services	$264,076		$264,076
Other Revenue	$270,501		$270,501
Standby Charges		$69,804	$69,804
Operating Transfers	$350,000		$350,000
Interest Income	$40,319		$40,319
Total Revenue Offsets	**$924,897**	**$69,804**	**$994,701**
Adjustments			
Transfer to (from) Reserves		$1,177,850	$1,177,850
Adjustment for Midyear Increase	$0		$0
Total Adjustments	**$0**	**$1,177,850**	**$1,177,850**
Revenue Requirement from Rates	**$16,009,339**	**$4,931,931**	**$20,941,271**

Unit Cost Component Derivation

Our end goal is to proportionately distribute the cost causation components to each user class. To do so we must calculate the cost causation component unit costs, which starts by assessing the total service units demanded by each class for each cost causation component. This is shown in **Table 3-16**. The capacity or peaking factor for each customer class is taken from **Table 3-12**. The total equivalent meters are from **Table 3-13**.

Table 3-16: Derivation of Service Units - Water

	Monthly Tiers (kgal)	Annual Use (kgal)	Average Daily Use (kgal/day)	Maximum Day Requirements Capacity Factor	Maximum Day Requirements Total Capacity (kgal/day)	Maximum Day Requirements Extra Capacity (kgal/day)	Maximum Hour Requirements Capacity Factor	Maximum Hour Requirements Total Capacity (kgal/day)	Maximum Hour Requirements Extra Capacity (kgal/day)	No. of Meters (Equiv.)	No. of Bills (No.)
Residential											
Tier 1	5	1,136,427	3,113	1.11	3,456	342	2.11	6,583	3,127		
Tier 2	14	780,637	2,139	1.77	3,786	1,647	3.37	7,211	3,425		
Tier 3	20	165,423	453	2.44	1,106	653	4.65	2,106	1,001		
Tier 4	21+	152,096	417	2.75	1,146	729	5.24	2,183	1,037		
Non-Residential											
Tier 1	5	45,445	125	1.24	154	30	2.36	294	140		
Tier 2	6+	579,693	1,588	1.87	2,970	1,382	3.56	5,657	2,687		
Hydrant		5,187	14	5.93	84	70	11.30	161	76		
TOTAL		**2,864,907**				**4,853**			**11,492**	**31,014**	**238,831**

Table 3-17 shows the cost causation component unit cost derivation. The operating revenue requirement shown in **Table 3-15** is allocated to the cost causation components using the total O&M allocation from **Table 3-14**. Similarly, the capital revenue requirement in **Table 3-15** is allocated to the cost causation components using the total asset allocation from **Table 3-14**. General and Administrative costs, which cannot be tied to a specific function, are redistributed in proportion to the resulting allocation of the other cost causation components, except Supply. The Fire cost component represents capacity available in the water system to supply water flow to fire sprinkler systems that are required in all new residential and nonresidential structures per California Building Code, not actual fire protection services, and are reallocated to the meter component since all customers share in this capacity cost. To provide revenue stability a portion of the extra capacity costs are allocated to the meter component in order to collect approximately 36 percent of the rate revenue from fixed charges. This also covers the City's fixed costs that are not dependent upon water volume. The total adjusted cost of service is divided by the units of service to calculate the unit cost. For example, the unit cost for the base component is determined by dividing the total base cost by total water use in kgal, annual billing and customer service costs are divided by the estimated number of annual monthly bills. The unit costs are used to distribute the cost causation components to the customer classes. **Table 3-16** through **Table 3-18** are reproduced in **APPENDIX A**: WATER COST OF SERVICE TABLES in a larger font format.

Table 3-17: Unit Cost Calculation - Water

	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Operating Expenses	$8,002,540	$1,786,618	$1,978,060	$1,693,463	$383,426	$0	$0	$2,165,232	$0	$16,009,339
Capital Expenses	$0	$1,873,537	$1,876,757	$854,172	$257,416	$0	$43,577	$0	$26,471	$4,931,931
Total Cost of Service	**$8,002,540**	**$3,660,155**	**$3,854,817**	**$2,547,635**	**$640,842**	**$0**	**$43,577**	**$2,165,232**	**$26,471**	**$20,941,271**
Allocation of General Cost		$7,504	$7,903	$5,223	$1,314	$0	$89	$4,439	($26,471)	$0
Fire Flow/Supply Capacity					($642,156)		$642,156			$0
Allocation of Peaking Cost to Meter			($2,935,667)	($1,940,172)			$4,875,839			$0
Total Adjusted Cost of Servic	**$8,002,540**	**$3,667,659**	**$927,053**	**$612,686**	**$0**	**$0**	**$5,561,662**	**$2,169,671**	**$0**	**$20,941,271**
Unit of Service	2,864,907	2,864,907	4,853	11,492			31,014	238,831		
Unit	kgal	kgal	kgal/day	kgal/day			equiv meters	bills		
Unit Cost	$2.79	$1.28	$191.03	$53.31			$14.94	$9.08		

Distribution of Cost Causation Components to Customer Classes

The final step in a cost of service analysis is to distribute the cost causation components to the user classes using the unit costs derived in **Table 3-17** to arrive at the cost to serve each customer class. The classes are categorized based upon similar land use and water usage habits. **Table 3-18** shows the derivation of the cost to serve (i.e., cost of service for) each class. The Supply, Base Delivery, Max Day, and Max Hour cost components are collected through the commodity (volumetric) rates ($/kgal) for potable water. The Meter and Customer cost components are collected through the City's monthly meter service charge, thereby providing fixed revenue. The proposed fixed revenue from rates is retained at approximately 36 percent, to match the current fixed revenue and provide budget stability.

To derive the variable cost to serve each class, the unit costs from Table 3-17 are multiplied by the corresponding service units shown in **Table 3-16** for each customer class. For example, the supply cost for the residential class is calculated by multiplying the supply unit cost ($2.79 per kgal) by the annual residential use in each tier (**Table 3-16**). Similar calculations for each of the remaining user classes and tiers and cost components yield the total variable cost to serve each user class shown in **Table 3-18**. Costs charged to meters including meter and customer costs are applied to customers based on their meter size. Note that the total cost of service is equal to the revenue requirement in **Table 3-15** as intended. We have now calculated the cost to serve each user class and can proceed to design rates to collect the cost to serve each class.

Table 3-18: Allocation of Variable Cost to Customer Class - Water

	Supply	Base Delivery	Max Day	Max Hour	Fire	Meter	Customer	General	TOTAL
Residential									
Tier 1	$3,174,379	$1,454,855	$65,426	$166,702					$4,861,363
Tier 2	$2,180,551	$999,372	$314,598	$182,599					$3,677,121
Tier 3	$462,075	$211,775	$124,674	$53,341					$851,865
Tier 4	$424,850	$194,714	$139,307	$55,275					$814,145
Non-Residential									
Tier 1	$126,942	$58,179	$5,708	$7,447					$198,276
Tier 2	$1,619,255	$742,124	$263,957	$143,257					$2,768,594
Hydrant	$14,487	$6,640	$13,383	$4,064					$38,574
Base Meters						$5,561,662	$2,169,671		$7,731,333
TOTAL	**$8,002,540**	**$3,667,659**	**$927,053**	**$612,686**	**$0**	**$5,561,662**	**$2,169,671**	**$0**	**$20,941,271**

WATER RATE DESIGN

Existing Rate Structure and Rates

The City's existing rate structure consists of a monthly base charge, which is a fixed charge determined on the basis of the size of the meter serving a property. In addition, the City has a four-tiered commodity rate structure for residential customers, and a two-tiered rate structure for non-residential customers. Non-potable water customers and customers using water from hydrants, typically for construction purposes, have a uniform rate. **Table 3-19** shows the existing rate structure and rates.

Table 3-19: Existing Monthly Water Rates

		Existing Rates
Monthly Base Rate		
Meter Size		
5/8" or 3/4"		$23.56
1"		$32.52
1 1/2"		$54.93
2"		$81.83
3"		$167.00
4"		$292.65
6"		$592.85
Commodity Rate ($/kgal)		
Residential	Monthly (kgal)	
Tier 1	5	$2.72
Tier 2	14	$5.41
Tier 3	20	$6.47
Tier 4	21+	$7.11
Non-Residential		
Tier 1	5	$2.52
Tier 2	6+	$5.02
Hydrant		$6.59
Non-Potable		$1.43

Proposed Monthly Fixed Charge

Table 3-20 shows the derivation of the monthly base charge. The cost of service analysis derived in **Table 3-18** feeds into the meter charge derivation, as the meter charge is designed to collect the amount of revenue shown in the "Meter" and "Customer" columns of **Table 3-20**.

Fixed Meter Charge Components

There are two components that comprise the fixed meter charges: meter capacity and customer service (or billing), both which are described below. This charge recognizes the fact that even when a customer does not use any water, the City incurs fixed costs in connection with maintaining the ability or readiness to serve each connection.

Meter Capacity Component

The meter capacity component collects capacity (also known as peaking) related costs. Capacity related costs can be allocated to and collected through the meter service charge by meter size. This reflects the fact that larger meters have the potential to demand more capacity compared to smaller meters. The potential capacity demanded is proportional to the potential flow through each meter size as established by the AWWA hydraulic capacity ratios, discussed earlier in **Table 3-13**, and shown in the "Meter Ratio" column of **Table 3-20**. The ratios show the potential flow through each meter size compared to the flow through a 3/4-inch meter. For example, the "Meter Ratio" column in **Table 3-20** shows that the flow through a 2-inch meter is 5.33 times that of a 3/4-inch and therefore the meter capacity component of the base charge is 5.33 times that of the 3/4-inch meter. The meter capacity component for a 3/4-inch meter is derived in the "Meter" column of **Table 3-20** and the capacity component for larger meters is scaled up using the AWWA capacity ratios shown in the "Meter Ratio" column of **Table 3-20**.

Allocating capacity costs by meter size is a common way to ensure capacity costs are passed on to customers requiring greater capacity in the system. Meter charges provide revenue stability, especially in light of decreasing revenues during a drought or other water shortage.

Customer/Billing Component

The customer/billing component recovers costs associated with meter reading, customer billing and collection as well as customer service costs. These costs are the same for all meter sizes as it costs the same to provide billing and customer services to a small meter as it does a larger meter. The customer/billing component is derived in the "Customer/Billing" column of **Table 3-20.**

Table 3-20: Derivation of the Monthly Fixed Charge

Meter Size	Meter Ratio	Meter	Customer/ Billing	Total Charges	Current Charges	Difference
5/8" or 3/4"	1.00	$14.94	$9.08	**$24.03**	$23.56	2%
1"	1.67	$24.91	$9.08	**$34.00**	$32.52	5%
1 1/2"	3.33	$49.81	$9.08	**$58.90**	$54.93	7%
2"	5.33	$79.70	$9.08	**$88.79**	$81.83	9%
3"	11.67	$174.35	$9.08	**$183.44**	$167.00	10%
4"	21.00	$313.82	$9.08	**$322.91**	$292.65	10%
6"	43.33	$647.57	$9.08	**$656.65**	$592.85	11%

Proposed Commodity Rates

Residential Tier Definitions

- The City's current rate structure includes four tiers for residential customers. Tier 1 is from 0 to 5 kgal per month, Tier 2 is 6 to 14 kgal per month, Tier 3 is 15 to 20 kgal per month, and Tier 4 is 21 kgal per month or more. Based on the previous rate study, using the last normal consumption patterns, the first tier provided water from the lowest cost source. Tier 2 (6 to 14 kgal per month) represents the FY 2013 and 2014 average monthly water usage for residential customers. Tier 3 (15 to 20 kgal per month) represents the FY 2013 and 2014 average summer water usage between June and September for residential customers. This allocation provides sufficient outdoor water for an average residential customer. Tier 4 represents usage over 20 kgal per month.

Raftelis is proposing that the City retain its existing residential tier definitions to minimize customer impacts and provide rate stability.

Non-Residential Tier Definitions

The City's current rate structure includes two tiers for non-residential customers. Tier 1 is from 0 to 5 kgal per month. Tier 2 is 6 kgal per month or more. Raftelis is proposing that the City retains its existing non-residential tier definitions.

The first tier for both residential and non-residential customers was based on the available local ground water during the last rate study. The total groundwater production spread on all the users resulted in an allocation of five kgal per month per residential dwelling unit and non-residential account.

Unit Cost Definitions

The commodity rates for each class and tier are derived by summing the unit rates ($/kgal) for:

1. Supply
2. Base Delivery
3. Peaking

Supply costs are costs related to the cost of purchasing and producing water. The City has three sources of water, each incurring different costs, as shown in **Table 3-21**. The City wishes to provide the minimum 5 kgal of water to each residential unit and non-residential account for essential use, however, because of quality considerations, groundwater alone cannot provide the 5 kgal per account. Water from the BWTP will be used to meet this requirement. Since this is incremental water required from BWTP, only the incremental operating cost is considered along with the fixed cost based on the treatment capacity at BWTP. The incremental variable cost of BWTP is $223per ac-ft and the fixed cost of $3.8 million based on the treatment capacity of 16 mgd results is $149 per ac-ft for a net cost of $372/ac-ft or $0.85 per kgal. The resultant unit cost shown on Line 8 of **Table 3-21** is $1.36 per kgal. It should be noted that every single account benefits from this water in Tier 1.

Each source of supply is allocated to each customer class based on the proportional amount of water usage in each class. Within each customer class, each available supply is allocated to each tier based on the usage in each tier, with priority given to the lower tiers. For example, the residential class is allocated 1,246,329 kgal of Tier 1 water. This principle applies to the non-residential customer class as well.

Table 3-21: Allocation of Water Supply

Line No.	Sources	Tier 1 Sales	Brentwood WTP	RBWTP	Total
1	Sales Capacity at Source (kgal)	640,168	1,613,315	611,425	**2,864,907**
2	Production Costs at Source	$986,195	$4,632,312	$2,384,033	**$8,002,540**
3	Unit Cost by Source, $/kGal	$1.54	$2.87	$3.90	
4	Actual Addn Sales, Tier 1 Requirements, kgal	668,914			
5	Total Sales	1,309,082	944,401	611,425	
6	Marginal Cost of BWTP	$787,714	$3,844,598	$2,384,033	**$7,016,345**
7	Adjusted Cost	$1,773,909	$3,844,598	$2,384,033	**$8,002,540**
8	Unit Cost ($/kgal)	$1.36	$4.07	$3.90	**$2.79**
9	Unit Cost ($/AF)	$441.52	$1,326.43	$1,270.45	$910.14

	Sources (after transfers)	Tier 1 Sales	RBWTP	Brentwood WTP	Total
10	Sales (kgal)	1,309,082	611,425	944,401	**2,864,907**
11	Cost	**$1,773,909**	**$2,384,033**	**$3,844,598**	**$8,002,540**
12	Unit Cost ($/kgal)	$1.36	$3.90	$4.07	**$2.79**

		Account	Usage (kgal)	Tier 1 Sales	RBWTP	Brentwood WTP	Total	Unit Cost
13	Residential	20,772	2,234,583	1,246,329	582,116	406,139	2,234,583	$2.51
14	Non-Residential	1,046	625,138	62,753	29,310	533,076	625,138	$3.79
15	Hydrant	0	5,187	0	0	5,187	5,187	$4.07
16	**TOTAL**	**21,818**	**2,864,907**	**1,309,082**	**611,425**	**944,401**	**2,864,907**	**$2.79**
17			TRUE					

			Usage (kgal)	Tier 1 Sales	RBWTP	Brentwood WTP	Total	Unit Cost
18	Residential							
19	Tier 1	5	1,136,427	1,136,427	0	0	1,136,427	$1.36
20	Tier 2	14	780,637	109,902	582,116	88,620	780,637	$3.56
21	Tier 3	20	165,423	0	0	165,423	165,423	$4.07
22	Tier 4	21+	152,096	0	0	152,096	152,096	$4.07
23	**Subtotal Residential**		**2,234,583**	**1,246,329**	**582,116**	**406,139**	**2,234,583**	**$2.51**
24	Non-Residential							
25	Tier 1	5	45,445	45,445	0	0	45,445	$1.36
26	Tier 2	6+	579,693	17,308	29,310	533,076	579,693	$3.98
27	**Subtotal Non-Residential**		**625,138**	**62,753**	**29,310**	**533,076**	**625,138**	**$3.79**
28	Hydrant		5,187	0	0	5,187	5,187	$4.07
29	**TOTAL**		**2,864,907**	**1,309,082**	**611,425**	**944,401**	**2,864,907**	**$2.79**

Base Delivery costs are the operating and capital costs associated with delivering water to all customers at a constant average rate of use – also known as serving customers under average daily demand conditions. Therefore, base delivery costs are spread over all units of water irrespective of customer class or tiers. Based on **Table 3-17,** the delivery or base unit cost is $1.28 per kgal.

Peaking costs, or extra-capacity costs, represent costs incurred to meet customer peak demands in excess of base use (or average daily demand). Total extra capacity costs are comprised of maximum day and maximum hour demands. The peaking costs are distributed to each tier and class using peaking factors derived from customer use data. **Table 3-22** shows the peaking unit cost for each customer class and tier, which is calculated by dividing the total peaking (max day plus max hour) costs for each class and tier, from **Table 3-18**, by the total usage in each class and tier, from **Table 3-16**.

Table 3-22: Peaking Cost Calculation

Customer Class	Monthly Tier (kgal)	Peaking Costs	Usage (kgal)	Unit Cost
Residential				
Tier 1	5	$232,128	1,136,427	$0.20
Tier 2	14	$497,197	780,637	$0.64
Tier 3	20	$178,015	165,423	$1.08
Tier 4	21+	$194,582	152,096	$1.28
Non-Residential				
Tier 1	5	$13,155	45,445	$0.29
Tier 2	6+	$407,214	579,693	$0.70
Hydrant		$17,447	5,187	$3.36

Table 3-23 shows the proposed commodity rate for FY 2019, which is the sum of the three previously discussed rate components, for each customer class. The Supply component is from **Table 3-21**; the Delivery component is from **Table 3-17**; and the Peaking component is from **Table 3-22**. The non-potable water rate is based on the calculation shown in **Table 3-24**.

Table 3-23: Proposed Commodity Rates

Customer Class	Monthly Tier (kgal)	Supply	Delivery	Peaking	Total Rate
Residential					
Tier 1	5	$1.36	$1.28	$0.20	**$2.84**
Tier 2	14	$3.56	$1.28	$0.64	**$5.48**
Tier 3	20	$4.07	$1.28	$1.08	**$6.43**
Tier 4	21+	$4.07	$1.28	$1.28	**$6.64**
Subtotal Residential					
Non-Residential					
Tier 1	5	$1.36	$1.28	$0.29	**$2.93**
Tier 2	6+	$3.98	$1.28	$0.70	**$5.97**
Subtotal Non-Residential					
Hydrant		$4.07	$1.28	$3.36	**$8.72**
Non-Potable					**$1.43**

Non-Potable Water

Non-potable water rates are calculated to recover costs associated with providing non-potable water service. **Table 3-24** shows the calculation for the City's retail non-potable water customers.

Table 3-24: Non-Potable Water Rate Calculation

Non-Potable Water	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
O&M Expenses	$506,739	$525,905	$547,119	$567,604	$588,263
Capital Expenses	$0	$0	$0	$0	$0
Total Expenses	**$506,739**	**$525,905**	**$547,119**	**$567,604**	**$588,263**
Non-Potable Usage	355,606	358,130	362,339	365,752	368,864
Non-Potable Rate ($/kgal)	$1.43	$1.47	$1.51	$1.56	$1.60

Table 3-25 shows the proposed rates for the next five years. These rates are effective on July 1 of each fiscal year. The City reserves the right to pass through costs that are not within the City's control, such as water purchased costs, electrical costs, chemical costs etc. to the proposed rates when such an action is deemed necessary. The financial plan has built in projected increases in these costs. However, if those increases exceed the projected amount, the additional costs may be recovered through the rates at the actual cost paid by the City.

Table 3-25: Proposed Monthly Water Rates

		Current	July 1, 2018	July 1, 2019	July 1, 2020	July 1, 2021	July 1, 2022
Monthly Base Rate							
Meter Size							
5/8" or 3/4"		$23.56	$24.03	$24.88	$25.76	$26.67	$27.61
1"		$32.52	$34.00	$35.19	$36.43	$37.71	$39.03
1 1/2"		$54.93	$58.90	$60.97	$63.11	$65.32	$67.61
2"		$81.83	$88.79	$91.90	$95.12	$98.45	$101.90
3"		$167.00	$183.44	$189.87	$196.52	$203.40	$210.52
4"		$292.65	$322.91	$292.65	$293.65	$294.65	$295.65
6"		$592.85	$656.65	$679.64	$703.43	$728.06	$753.55
Commodity Rate ($/kgal)							
Residential	Monthly (kgal)						
Tier 1	5	$2.72	$2.84	$2.94	$3.05	$3.16	$3.28
Tier 2	14	$5.41	$5.48	$5.68	$5.88	$6.09	$6.31
Tier 3	20	$6.47	$6.43	$6.66	$6.90	$7.15	$7.41
Tier 4	21+	$7.11	$6.64	$6.88	$7.13	$7.38	$7.64
Non-Residential							
Tier 1	5	$2.52	$2.93	$3.04	$3.15	$3.27	$3.39
Tier 2	6+	$5.02	$5.97	$6.18	$6.40	$6.63	$6.87
Hydrant		$5.02	$8.72	$9.03	$9.35	$9.68	$10.02
Non-Potable		$1.43	$1.43	$1.47	$1.51	$1.56	$1.60

WATER BILL IMPACTS

Table 3-26 shows the impacts of an average residential customer with a 1-inch meter using an average 9 kgal of water monthly.

Table 3-26: Residential Water Monthly Rate Impacts

Residential	Usage (kgal)	Current Bill	Proposed Bill	Difference (%)	Difference ($)	% Bills at or below
Average	9	$67.76	$70.12	3.5%	$2.36	67.3%

4. WASTEWATER RATES

The following subsections present the findings and recommendations of the wastewater rate study, including system background information, study assumptions, financial plan, cost of service analysis, rate design, and projected customer impacts.

WASTEWATER SYSTEM BACKGROUND

The City wastewater system collects, treats, and disposes of wastewater from over 16,800 connections as of FY 2017. Wastewater is treated at the City's Wastewater Treatment Plant (WWTP) with a current capacity of 5.0 million gallons per day (MGD). The WWTP is an extended aeration/activated sludge facility. Its treatment system includes preliminary screening and grit removal, oxidation ditches and denitrification basins providing biological treatment, secondary clarification, tertiary filtration, chlorine disinfection, dechlorination, and a cascade aeration system.[3] Treated effluent, if not recycled, is discharged into Marsh Creek. In addition to the treatment plant, the wastewater system includes approximately 200 miles of sewer mains and lateral connections.

WASTEWATER ACCOUNT AND USAGE ASSUMPTIONS

Table 4-1 shows that the majority of the City's wastewater accounts are residential customers. Both number of accounts and dwelling units are shown for multi-family residential customers, as residential customers are assessed a base and variable charge per dwelling unit but are charged a lateral maintenance fee per account. For single-family residential customers, each dwelling unit typically corresponds to a single account. The wastewater accounts are projected to increase by approximately 1,500 accounts from FY 2019 to 2023, based on the City's General Plan population growth rates and are typically driven by new residential and nonresidential development, shown in **Table 4-2**.

[3] *2015 Urban Water Management Plan.*

Table 4-1: Projected Wastewater Accounts by existing Customer Class

Line No.		FY 2017 *Actual*	FY 2018 *Projected*	FY 2019 *Projected*	FY 2020 *Projected*	FY 2021 *Projected*	FY 2022 *Projected*	FY 2023 *Projected*
1	Single-Family Residential	18,128	18,392	18,642	18,915	19,369	19,737	20,072
2	Multi-Family Residential (accounts)	56	57	58	59	60	61	62
3	Multi-Family Residential (units)	1,880	1,907	1,933	1,962	2,009	2,047	2,082
4	Auto Sales and Repair	20	20	21	21	21	22	22
5	Barber & Beauty Shop	12	12	12	12	12	13	13
6	Bakery	2	2	2	2	2	2	2
7	Car Washes	5	5	5	5	5	5	6
8	Gas Stations	15	15	16	16	16	16	17
9	Grocery Stores	11	11	11	11	12	12	12
10	Hotels without Restaurants	3	3	3	3	3	3	3
11	Institutions, Churches, HOAs	50	50	51	52	53	54	55
12	Laundromats	2	2	2	2	2	2	2
13	Laundry, Commercial	1	1	1	1	1	1	1
14	Office Buildings, Banks	115	117	119	120	123	125	128
15	Restaurants	78	79	80	82	84	85	87
16	Retail Stores	91	92	93	95	97	99	101
17	Schools	31	31	32	32	33	33	34
18	Other Commercial	56	57	58	59	60	61	62
19	Mixed Use	1	1	1	1	1	1	1
20	**Total Accounts**	**18,677**	**18,949**	**19,207**	**19,487**	**19,955**	**20,334**	**20,680**

Table 4-2: Wastewater Account Growth

Fiscal Year	Account Growth
FY 2018	1.5%
FY 2019	1.4%
FY 2020	1.5%
FY 2021	2.4%
FY 2022	1.9%
FY 2023	1.7%

Table 4-3 shows the projected billed wastewater flow over the study period by customer class. The revenue calculated for each of the fiscal years in the Financial Plan is a function of the number of dwelling units/accounts, billed wastewater flow, and existing rates. Note that billed wastewater flow for residential customers is based on monthly water usage during the two lowest water production winter months, when irrigation water is typically not used and indoor water makes its way to the treatment plant, and is capped at 7 kgal per dwelling unit per month. Non-residential billed wastewater flow is based on actual monthly water use since nonresidential customers typically have separate "irrigation only" water service and water usage does not fluctuate seasonally. Although billed wastewater flow is projected to increase due to account growth, wastewater generation per account is assumed to stay constant throughout the study period since

wastewater flow is generated by "indoor" use and does not tend to fluctuate as would "outdoor" or irrigation usage.

Table 4-3: Projected Billed Wastewater Flow by existing Customer Class

Billed Wastewater Flow (kgal)	Actual FY 2017	Projected FY 2018	Projected FY 2019	Projected FY 2020	Projected FY 2021	Projected FY 2022	Projected FY 2023
SFR	914,276	927,624	940,240	953,968	976,863	995,423	1,012,345
MFR	81,942	83,139	84,269	85,500	87,552	89,215	90,732
Auto Sales and Repair, (actual water use)	1,730	1,755	1,779	1,805	1,848	1,884	1,916
Barber & Beauty Shop	542	550	557	566	579	590	600
Bakery	268	272	276	280	286	292	297
Car Washes	6,688	6,786	6,878	6,978	7,146	7,282	7,405
Gas Stations	14,374	14,584	14,782	14,998	15,358	15,650	15,916
Grocery Stores	12,750	12,936	13,112	13,304	13,623	13,882	14,118
Hotels without Restaurants	4,014	4,073	4,128	4,188	4,289	4,370	4,445
Institutions, Churches, HOAs	13,850	14,052	14,243	14,451	14,798	15,079	15,336
Laundromats	4,745	4,814	4,880	4,951	5,070	5,166	5,254
Laundry, Commercial	159	161	164	166	170	173	176
Office Buildings, Banks	23,734	24,081	24,408	24,764	25,359	25,841	26,280
Restaurants	43,079	43,708	44,302	44,949	46,028	46,903	47,700
Retail Stores	18,780	19,054	19,313	19,595	20,066	20,447	20,794
Schools	26,200	26,583	26,944	27,337	27,994	28,525	29,010
Other Commercial	12,170	12,348	12,516	12,698	13,003	13,250	13,475
Mixed Use	970	984	998	1,012	1,036	1,056	1,074
TOTAL BILLED FLOW	**1,180,271**	**1,197,503**	**1,213,789**	**1,231,511**	**1,261,067**	**1,285,027**	**1,306,873**

INFLATIONARY AND OTHER ASSUMPTIONS

This subsection describes the assumptions used in projecting operating and capital expenses as well as reserve coverage requirements that determine the overall revenue adjustments required to ensure the financial stability of the City's wastewater enterprise. Revenue adjustments represent the average increase in wastewater rates for the City as a whole. Note that rate changes for individual classes will depend on the cost of service.

As with the water rate study, non-rate revenue and O&M projections are based on the City's FY 2018 projections and projected budgetary increases in FY 2019 through FY 2023. The City uses different inflation factors that are indicative of industry increases for different expenditures within the budget, such as personnel, supplies, or fuel, to capture the impact of market forces over time.

WASTEWATER ENTERPRISE FINANCIAL PLAN

This subsection of the report provides a discussion of the O&M and capital expenditures, capital improvement financing plan, debt service requirements, and revenue adjustments required to ensure the financial stability of the wastewater enterprise.

Revenue Requirement

A utility's yearly revenue requirement is the amount of yearly revenue needed to operate, maintain, and ensure fiscal solvency. The revenue requirement includes O&M expenses, rate funded capital expenditures, debt service payments, and reserve funding.

O&M Expenses

The City wastewater enterprise's projected O&M expenses are shown in **Table 3-4**. The Wastewater Financial Plan study period is from FY 2018 to 2023. O&M expenses include the cost of wastewater collection, wastewater treatment, billing, and providing lateral maintenance. **Table 4-4** summarizes the projected O&M expenses by function.

Table 4-4: Projected Wastewater Enterprise O&M Expenses

	Projected FY 2018	Projected FY 2019	Projected FY 2020	Projected FY 2021	Projected FY 2022	Projected FY 2023
Collection	$2,246,228	$2,600,573	$2,753,275	$2,994,039.33	$3,136,896	$3,279,995
Treatment	$5,251,328	$6,160,728	$6,310,684	$8,685,195	$9,286,450	$9,829,779
Utility Billing	$957,649	$973,604	$1,182,704	$1,267,853	$1,142,586	$1,184,881
Lateral Maintenance	$260,617	$270,392	$282,279	$294,563	$306,195	$317,809
TOTAL O&M EXPENSES	**$8,715,823**	**$10,005,297**	**$10,528,942**	**$13,241,650**	**$13,872,127**	**$14,612,464**

Capital Improvement Plan

Table 4-5 shows the City's wastewater enterprise CIP for FY 2018 through FY 2023, which totals approximately $9.6 million. The majority of CIP costs over the planning period are associated with a second phase of WWTP expansion as well as expansion of the non-potable water storage and distribution system. The projects will be funded through rates and State Revolving Fund (SRF) loans.

Table 4-5: Detailed Wastewater Enterprise Capital Improvement Plan – Inflated

Capital Improvement Plan (CIP)	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Fund #590 - Wastewater						
WWTP Effluent Chloride	$0	$160,000	$0	$0	$0	$0
WWTP Groundwater Well Abandonment	$170,000	$0	$0	$0	$0	$0
WWTP Security	$200,000	$0	$0	$0	$0	$0
Wastewater Treatment Plant Expansion II	$0	$6,420,395	$0	$416,409	$416,409	$416,409
Non-Potable Storage Facility	$0	$112,825	$112,825	$112,825	$112,825	$112,825
Citywide Non-Potable Water Distribution System	$0	$0	$65,136	$65,136	$65,136	$65,136
Secondary Non-Potable Water Storage Facility	$0	$0	$0	$55,265	$55,264	$55,264
Municipal Service Center	$62,116	$75,746	$76,860	$72,933	$69,785	$66,683
Total Wastewater CIP	**$432,116**	**$6,768,966**	**$254,821**	**$722,568**	**$719,419**	**$716,317**

Debt Service

In addition to debt service associated with an existing SRF loan used to finance an initial WWTP expansion, the City plans to utilize new SRF loan funding to finance a second phase of WWTP expansion as well as three recycled water projects. **Table 4-6** shows the City's debt service payments associated with the wastewater enterprise through FY 2023. Annual debt service payments for the planning period range from $0.65 million to $4.39 million.

Table 4-6: Wastewater Enterprise Debt Service Payments

	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Wastewater Treatment Plant Note						
Principal	$895,049	$911,206	$3,812,300	$0	$0	$0
Interest	$232,191	$195,202	$397,388	$0	$0	$0
Total Wastewater Treatment Plant Note	**$1,127,240**	**$1,106,408**	**$4,209,688**	**$0**	**$0**	**$0**
Wastewater Treatment Plant Expansion II						
Principal	$0	$0	$0	$416,409	$416,409	$416,409
Interest	$0	$0	$0	$0	$0	$0
Total Wastewater Treatment Plant Expansion II	**$0**	**$0**	**$0**	**$416,409**	**$416,409**	**$416,409**
Non-Potable Storage Facility						
Principal	$0	$83,707	$84,544	$85,390	$86,244	$87,106
Interest	$0	$29,118	$28,280	$27,435	$26,581	$25,719
Total Non-Potable Storage Facility	**$0**	**$112,825**	**$112,825**	**$112,825**	**$112,825**	**$112,825**
Citywide Non-Potable Water Distribution System						
Principal	$0	$0	$48,326	$48,809	$49,297	$49,790
Interest	$0	$0	$16,810	$16,327	$15,839	$15,346
Total Citywide Non-Potable Water Distribution System	**$0**	**$0**	**$65,136**	**$65,136**	**$65,136**	**$65,136**
Secondary Non-Potable Water Storage Facility						
Principal	$0	$0	$0	$41,002	$41,412	$41,826
Interest	$0	$0	$0	$14,263	$13,852	$13,438
Total Secondary Non-Potable Water Storage Facility	**$0**	**$0**	**$0**	**$55,265**	**$55,264**	**$55,264**
TOTAL EXISTING & PROPOSED DEBT SERVICE	**$1,127,240**	**$1,219,233**	**$4,387,648**	**$649,634**	**$649,633**	**$649,633**

Proposed Financial Plan and Revenue Adjustments

The proposed wastewater revenue adjustments help ensure adequate revenue to fund operating expenses, capital expenditures and compliance with bond covenants. The Financial Plan model assumes the revenue adjustment occurs on July 1 of each year. The proposed revenue adjustments would enable the City to execute the CIP shown in **Table 4-5** and meet its debt service coverage requirements over the study period. Debt coverage would not be met by the existing rate schedule and without the proposed increase, the necessary capital projects would not be funded.

Table 4-7 shows the proposed wastewater enterprise revenue adjustments for FY 2019 through FY 2023. These increases are needed to finance the operating and capital expenses and reserve funding, as well as meeting the debt coverage requirements for the SRF loans.

Table 4-7: Proposed Wastewater Revenue Adjustments

Fiscal Year	Effective Date	Revenue Increases
FY 2019	July 2018	3%
FY 2020	July 2019	3%
FY 2021	July 2020	3%
FY 2022	July 2021	3%
FY 2023	July 2022	3%

Table 4-8 shows the City's wastewater enterprise cash flow detail over the next five years.

Table 4-8: Proposed Wastewater Enterprise Cash Flow

			FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Revenue from Existing Rates			$11,722,785	$11,893,938	$12,179,393	$12,410,801	$12,621,785
Additional Revenue Required from Rates							
Fiscal Year	**Revenue Adjustment**	**Month Effective**					
FY 2019	3.0%	July	$351,684	$356,818	$365,382	$372,324	$378,654
FY 2020	3.0%	July		$367,523	$376,343	$383,494	$390,013
FY 2021	3.0%	July			$387,634	$394,999	$401,714
FY 2022	3.0%	July				$406,849	$413,765
FY 2023	3.0%	July					$426,178
Total Additional Revenue from Rates			$351,684	$724,341	$1,129,359	$1,557,665	$2,010,323
Total Rate Revenue			$12,074,469	$12,618,279	$13,308,751	$13,968,466	$14,632,108
Current Services			$32,376	$33,800	$35,606	$37,330	$39,063
Other Revenue			$137,609	$142,753	$149,266	$155,491	$161,752
Standby Charges			$96,990	$96,020	$95,060	$94,110	$93,168
Operating Transfers			$0	$0	$0	$0	$0
Interest Income			$236,478	$164,789	$143,304	$139,053	$134,446
TOTAL REVENUES			**$12,577,922**	**$13,055,642**	**$13,731,986**	**$14,394,449**	**$15,060,538**
O&M Expenses							
Collection			$2,600,573	$2,753,275	$2,994,039	$3,136,896	$3,279,995
Treatment			$6,160,728	$6,310,684	$8,685,195	$9,286,450	$9,829,779
Utility Billing			$973,604	$1,182,704	$1,267,853	$1,142,586	$1,184,881
Lateral Maintenance			$270,392	$282,279	$294,563	$306,195	$317,809
Existing and Proposed Debt Service			$1,219,233	$4,387,648	$649,634	$649,633	$649,633
Rate Funded Capital Projects			$6,656,141	$76,860	$72,933	$69,785	$66,683
TOTAL EXPENSES			**$17,880,671**	**$14,993,451**	**$13,964,217**	**$14,591,545**	**$15,328,780**
Net Income			**($5,302,749)**	**($1,937,809)**	**($232,231)**	**($197,096)**	**($268,242)**

Table 4-9 shows the calculated debt coverage for the City's wastewater enterprise. The City's debt service payments associated with the wastewater enterprise are split between the wastewater rate fund and the development impact fee fund. To calculate debt coverage ratios for the wastewater enterprise, total revenue (including development impact fee revenue) and total debt service payments are included. The wastewater enterprise's debt coverage requirement is 110 percent. With the proposed increases, the City meets and exceeds its debt coverage requirement throughout the study period.

Table 4-9: Wastewater Enterprise Debt Coverage Calculation

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Projected Wastewater Revenue	$12,577,922	$13,055,642	$13,731,986	$14,394,449	$15,060,538
Development Impact Fee Revenue	$1,139,941	$1,933,357	$970,671	$1,912,851	$758,764
Projected O&M Expenses, less depreciation	$9,310,221	$9,610,869	$11,589,319	$11,926,121	$12,388,457
Total Debt Service (for coverage)	$2,506,945	$2,637,206	$2,300,849	$2,300,849	$2,300,847
Calculated Debt Coverage	176%	204%	135%	190%	149%
Required Debt Coverage	110%	110%	110%	110%	110%

Figure 4-1 through **Figure 4-4** display the Wastewater Enterprise Financial Plan in graphical format. **Figure 4-1** shows the modeled revenue adjustments (blue bars) for the next five years on the left-hand axis and the calculated and required debt coverage requirements shown by the green and red lines respectively on the right-hand axis. The green line, representing debt coverage calculations with proposed increases is above the required debt coverage as shown by the red line. Without the proposed increases, the calculated coverage would be below the requirement.

Figure 4-1: Proposed Wastewater Enterprise Revenue Adjustments and Debt Coverage Ratio

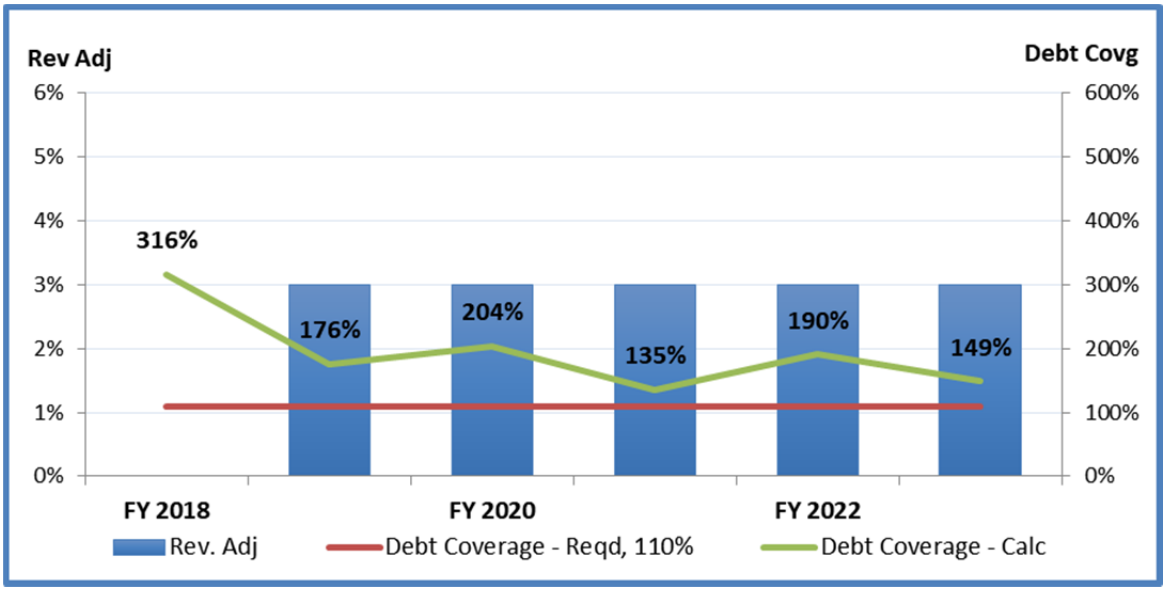


Figure 4-2 graphically illustrates the Wastewater Enterprise Financial Plan – it compares existing and proposed revenues with projected expenses. The expenses include O&M, debt service, capital costs, and reserves transfer are shown by the stacked bars; and total revenues at existing and proposed rates are shown by the horizontal orange and blue lines, respectively. Current revenue from existing rates (in orange) does not meet future total expenses, and clearly demonstrates the need for revenue adjustments.

Figure 4-2: Proposed Wastewater Enterprise Financial Plan

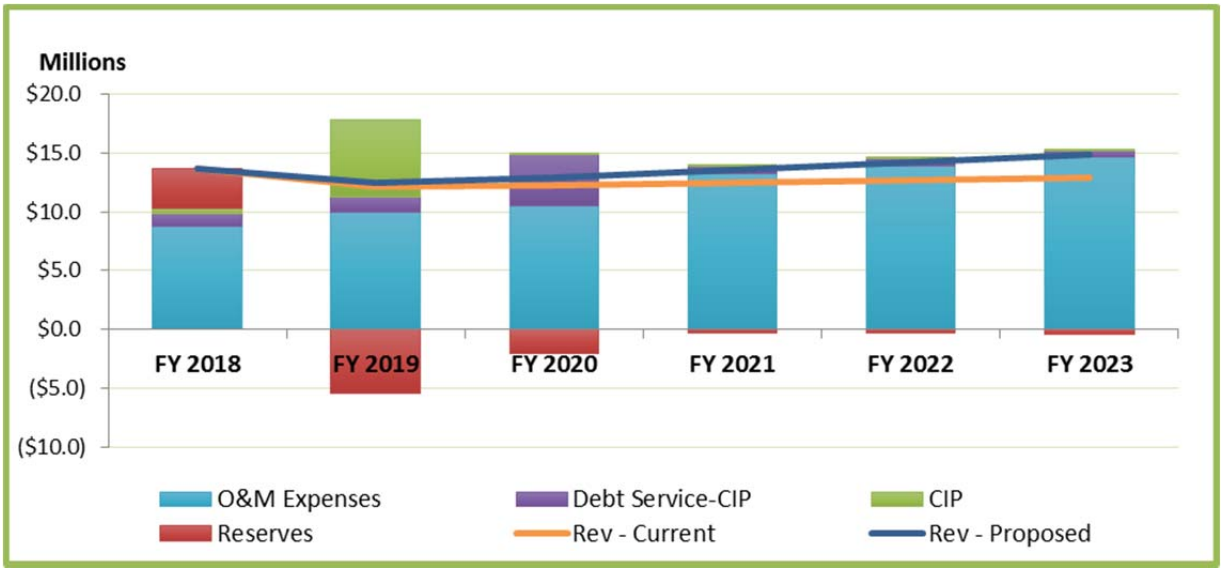


Figure 4-3 summarizes the projected CIP to be funded by wastewater rates and SRF loans. Rate-funded CIP is shown in purple. SRF-funded CIP is shown in light blue. (Note FY 2019 shows an initial cash payment for Wastewater Treatment Plant Expansion to receive favorable SRF loan financing over time)

Figure 4-3: Projected Wastewater Enterprise CIP and Funding Sources

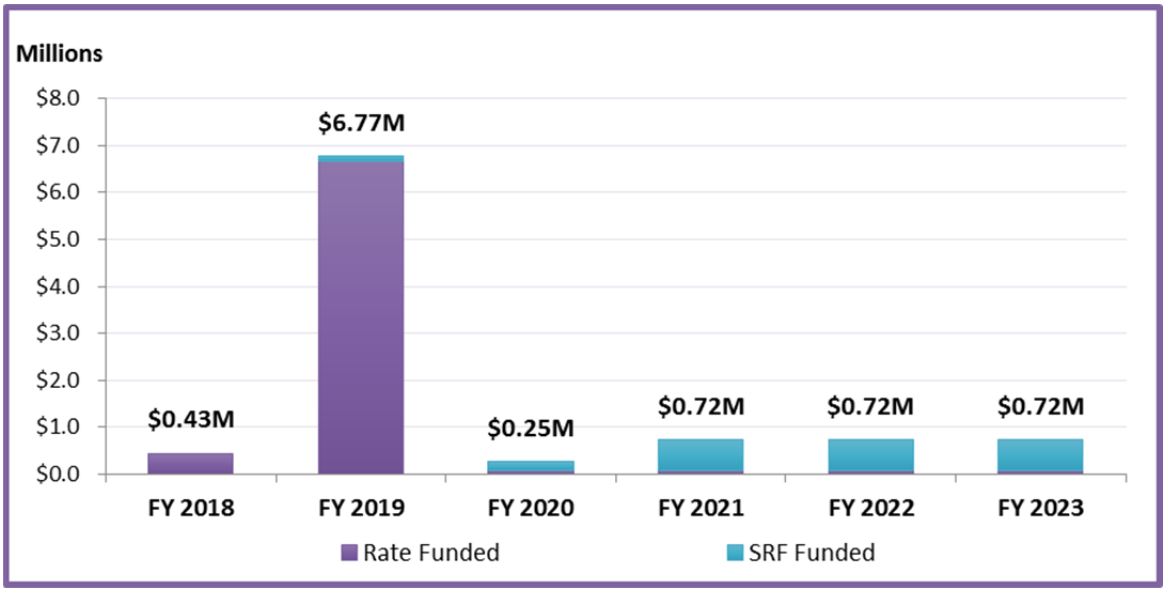


Figure 4-4 displays the resulting fund balance for the wastewater utility. The red line represents the total current target, which is equal to 30 percent of annual operating expenses and debt service payments, based on Budget and Fiscal Policy 2.7.3, adopted April 25, 2017.

Figure 4-4: Wastewater Enterprise Total Cash Balance

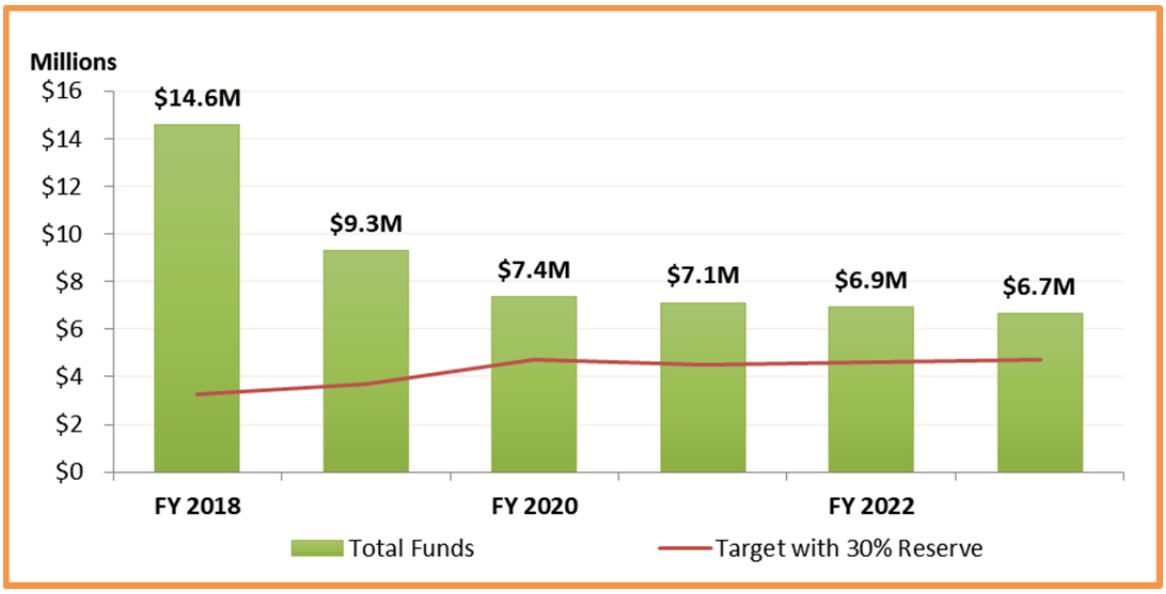


Table 4-10 shows the projected cash balance for the wastewater enterprise. This table corresponds with **Figure 4-4**.

Table 4-10: Wastewater Enterprise Projected Cash Balance

WW Fund	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Beginning Balance	$11,099,505	$14,593,506	$9,290,757	$7,352,948	$7,120,717	$6,923,621
Net Cash Flow	$3,494,001	($5,302,749)	($1,937,809)	($232,231)	($197,096)	($268,242)
Ending Balance	**$14,593,506**	**$9,290,757**	**$7,352,948**	**$7,120,717**	**$6,923,621**	**$6,655,379**
Interest Income	*$127,826*	*$236,478*	*$164,789*	*$143,304*	*$139,053*	*$134,446*

WASTEWATER COST OF SERVICE ANALYSIS

The total revenue requirement is, by definition, the net cost of providing service. This cost of service is then used as the basis to develop unit rates for the wastewater parameters and to allocate costs to the various user classes. The concept of proportionate allocation to user classes implies that allocations should take into consideration the quantity of wastewater a user contributes as well as the strength (i.e., treatment requirements) of the wastewater.

The cost of service analysis and rate calculations consist of the following steps:

1. Determination of the total costs to be recovered from rates (cost of service)
2. Determination of the wastewater loadings for each customer class, to ensure costs are allocated to each class proportionately
3. Allocation of the cost of service to the loading parameters- Flow, Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS)
4. Calculation of unit costs for the three parameters, and the costs to serve the various user classes based on their loadings
5. Calculation of rates for each user class

This section of the report discusses the allocation of operating and capital costs to the Flow, BOD, and TSS parameters, the determination of unit rates, and the calculation of user class cost responsibility.

In this study, wastewater rates were calculated for FY 2019, and accordingly FY 2019 revenue requirements are used in the cost allocation process.

Costs of Service to Be Allocated

The annual cost of service to be recovered from wastewater rates (i.e., revenue requirement) includes O&M expenses (**Table 4-4**), costs associated with annual renewal and replacements, and other capital-related costs (**Table 4-5**). O&M expenses include costs directly related to the collection, treatment, and disposal of wastewater and maintenance of system facilities. Renewals and replacements represent the annual recurring capital outlay for minor system improvements and purchase of equipment.

The total FY 2019 net cost of service to be recovered from the City's wastewater users, as shown on the last line in **Table 4-11**, is estimated at $12.1 million, of which $9.6 million are operating costs and the remaining $2.5 million are net capital costs including debt service costs. The cost of service analysis is based on the need to generate revenues adequate to meet this estimated revenue requirement. As part of the cost of service analysis, revenues from sources other than wastewater rates and charges are deducted from the appropriate cost elements. Additional deductions are made for interest income and other non-operating income during FY 2019. Adjustments are also made for transfers from reserves.

Table 4-11: Allocation of Wastewater Revenue Requirements

	FY 2019		
	Operating	**Capital**	**Total**
Revenue Requirements			
O&M Expenses	$10,005,297		$10,005,297
Transfers to Water Fund	$0		$0
Existing and Proposed Debt Service		$1,219,233	$1,219,233
Rate Funded Capital Projects		$6,656,141	$6,656,141
Total Revenue Requirements	**$10,005,297**	**$7,875,374**	**$17,880,671**
Revenue Offsets			
Current Services	$32,376		$32,376
Other Revenue	$137,609		$137,609
Standby Charges	$96,990		$96,990
Operating Transfers	$0		$0
Interest Income	$236,478		$236,478
Total Revenue Offsets	**$503,453**	**$0**	**$503,453**
Adjustments			
Transfer to (from) reserves	$0	($5,302,749)	($5,302,749)
Midyear Increase	$0		$0
Total Adjustments	**$0**	**($5,302,749)**	**($5,302,749)**
Cost of Service to be Recovered from Rate	**$9,501,844**	**$2,572,625**	**$12,074,469**

To allocate the cost of service to the various user classes in proportion to their flow and strength contributions, costs first need to be allocated to selected wastewater cost causation parameters. The following subsection describes the allocation of the operating and capital cost of service amounts to the parameters of Flow, BOD, and TSS.

Cost Allocation to Wastewater Cost Causation Parameters

The cost of service allocations in this study are based on Raftelis' experience with secondary/tertiary treatment plants and are consistent with the revenue program guidelines of the State Water Resources Control Board (SWRCB) and the Water Environment Federation (WEF).

The three main cost causation parameters are Flow, BOD, and TSS. BOD and TSS constitute the strength components of the wastewater discharge. Additional parameters include infiltration and inflow, customers and laterals. Costs are assigned based on the parameters which dictate the design of each process. The allocation of costs to the three main parameters involves:

- Detailed breakdown and functionalization of O&M costs.
- Itemization of the capital costs by functions such as collection, treatment, outfall, etc.
- Allocation of the functional costs to the wastewater cost causation parameters.

In the absence of a detailed breakdown of fixed assets by process, the WWTP costs are allocated to flow, BOD, and TSS at 50 percent, 25 percent, and 25 percent, respectively. This allocation is representative of other similar treatment plants. Pipelines, outfall, and pumping stations costs are all allocated to flow. Similarly, operating costs identified with the collection system are allocated to infiltration and inflow (I&I) and wastewater flow, and operating treatment costs are allocated in the same manner as the fixed asset costs. Costs that could not be specifically identified were allocated as general costs. General costs are ultimately reallocated based on the proportions of other costs (see **Table 4-13** below). Costs of lateral maintenance are allocated to laterals and costs of utility billing to customers. The allocation of O&M and capital costs is shown in **Appendix B**.

Unit Cost of Service

The next step of the cost of service analysis is to calculate unit costs for Flow, BOD, and TSS. The unit costs of service are developed by dividing the total annual costs allocated to each parameter by the total annual loadings for each parameter. Raftelis determined the total billed residential wastewater flow based on City data for the lowest two winter water production months, when most usage is typically "indoor" and generates wastewater to be treated, and estimated the non-residential flow at 100 percent of the water use since separate irrigation meters measure the "outdoor" use that does not generate wastewater. The remaining influent was assumed to be infiltration and inflow (I&I) that comes from storm or irrigation runoff or groundwater leakage into the pipes. Raftelis calculated an I&I of just under 10 percent of the total plant influent, based on the estimated wastewater flow from customers. The net plant loadings (total influent less I&I) provide a basis for determining unit costs.

The strength of different types of non-residential customers is based on data from the City of Los Angeles and the County Sanitation Districts of Los Angeles County (LACSD). **Table 4-12** shows the calculation of the units of service for I&I, residential and non-residential customers using the method described above.

Table 4-12: Mass Balance

		Flow (MG/yr)	BOD (lbs/yr)	TSS (lbs/yr)
Total Plant Influent		1,309.36	3,472,863	3,579,075
Less: I&I	9.9%	129.09	739,900	1,668,788
Net Plant Influent		1,180.27	2,732,964	1,910,287
Total Non-Residential		184.05	612,933	455,364
Residential		996.22	2,120,030	1,454,923

To verify the validity of the assumptions made, the net calculated strength for a residential account is compared against the expected flow and strength from a residential customer. There are 20,008 residential units served by the City in FY 2017. The calculated loading for each residential unit is:

Flow	44 gal/capita/day*
BOD	255mg/L
TSS	175 mg/L

**Based on an average density of 3.1 persons per household from the 2011-2015 American Community Survey for the City of Brentwood*

The calculated strengths for a residential customer are reasonable given the emphasis on conservation and reductions in water usage achieved by residential customers in recent years.

The residential and non-residential wastewater loadings are used in **Table 4-13** to develop the FY 2019 unit costs for each of the wastewater parameters. These unit costs are then used along with the loadings to develop the cost to be collected from the different customer classes. Note that general costs are reallocated based on the proportions of the other costs. Since the majority of the collection system costs are fixed, to ensure fairness and revenue stability, a portion of the costs allocated to flow are moved to the fixed category under customers. The resultant fixed revenue, which also covers the City's fixed costs that are not dependent upon water volume, is 37 percent of the total rate revenue which compares with the current fixed rate revenue of 38 percent.

Table 4-13: Development of Unit Costs

	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Operating Expenses	$243,487	$5,151,593	$1,462,682	$1,462,682	$924,613	$256,786	$0	$9,501,844
Capital Expenses	$115,129	$1,664,229	$334,991	$334,991	$0	$58,388	$64,897	$2,572,625
Total Cost of Service	**$358,616**	**$6,815,822**	**$1,797,673**	**$1,797,673**	**$924,613**	**$315,174**	**$64,897**	**$12,074,469**
Allocation of General Cost	$1,938	$36,831	$9,714	$9,714	$4,996	$1,703	($64,897)	$0
Allocated Cost of Service	**$360,554**	**$6,852,653**	**$1,807,387**	**$1,807,387**	**$929,610**	**$316,877**	**$0**	**$12,074,469**
Adjustments to Fixed Charges	$0	($2,867,330)			$2,867,330			$0
Adjusted Cost of Service	**$360,554**	**$3,985,323**	**$1,807,387**	**$1,807,387**	**$3,796,940**	**$316,877**	**$0**	**$12,074,469**
Unit of Service	19,207	1,213,789	2,810,576	1,964,536	252,990	19,207		
Units	accounts	kgal	lbs/yr	lbs/yr	bills/yr	Accounts		
Unit Cost	$1.56	$3.283	$0.643	$0.920	$15.01	$1.37		
	per month	per kgal	per lb	per lb	per month	per month		

WASTEWATER RATE DERIVATION

Existing Rate Structure and Rates

The current wastewater rate structure consists of a base charge, a variable charge, and a lateral maintenance fee. Customers are currently billed monthly. The base charge is levied per dwelling unit for residential customers and per account for non-residential customers. The lateral maintenance fee is levied per account for residential customers only.

Residential customers are subject to a monthly variable charge per unit (kgal) of the water used in the two lowest winter water production months subject to a cap of 7 kgal/mo. Variable charges for new residential customers in new construction are based on the citywide residential average wastewater usage. Variable charges for new residential customers in existing dwellings are based on the previous wastewater usage at the service address. Residential monthly billed flow is recalculated each July. A maximum charge currently caps monthly residential wastewater bills at $56.86 per month.

Non-residential customers are subject to a monthly variable charge per unit (kgal) of monthly water usage. There are currently 16 non-residential customer classes, each with a unique uniform variable charge. Existing rates and fees are shown in **Table 4-14**.

Table 4-14: Existing Monthly Wastewater Rates

	FY 2018
Monthly Base Charge (per dwelling unit)	$15.97
Monthly Lateral Maintenance Fee (per account)	$1.97
Residential Variable Charge per unit ($/kgal)*	$5.56
Residential Monthly Maximum Charge	$56.86
Non-Residential Variable Charge ($/kgal of actual water use)	
Auto Sales and Repair	$6.01
Barber & Beauty Shop	$5.01
Bakery	$15.40
Car Washes	$5.17
Gas Stations	$5.82
Grocery Stores	$13.11
Hotels without Restaurants	$6.00
Institutions, Churches, HOAs	$5.30
Laundromats	$5.46
Laundry, Commercial	$7.07
Office Buildings, Banks	$5.37
Restaurants	$14.54
Retail Stores	$5.46
Schools	$5.01
Other Commercial	$5.59
Mixed Use	$7.32

*Residential users' variable charge is based on water usage during two lowest-use winter months.

Proposed Rate Structure and Rates

Based on input and direction from City staff, Raftelis recommends that the City's existing wastewater rate structure be retained, but that non-residential customer classes be consolidated into five categories based on strength and similarity of treatment costs – higher strength wastewater requires more treatment to remove the contaminants, which results in higher costs. Many agencies choose to define customers in broader classes as defined here because wastewater strength can vary significantly from day to day and measurement of strength is not very accurate. Classifying customers into broader groups simplifies the rate structure and administration. **Table 4-15** shows each of the five consolidated non-residential customer classes defined by combined strength (the sum of BOD and TSS in mg/L).

Table 4-15: Consolodated Non-Residential Wastewater Customer Classes

Proposed Class	Combined Strength (mg/L)
Low Strength	0-250
Medium Low Strength	251-400
Medium Strength	401-800
Medium High Strengtl	801-1400
High Strength	>1,401

Table 4-16 shows the reclassification of existing non-residential wastewater customer classes into the newly proposed consolidated strength-based classes. Combined strengths for each existing customer class are based on data from the City of Los Angeles and LACSD.

Table 4-16: Reclassification of Non-Residential Wastewater Customer Classes

Existing Non-Residential Customer Classes	Combined Strength (mg/L)	Proposed Consolidated Customer Class
Auto Sales and Repair	300	Medium Low Strength
Barber & Beauty Shop	300	Medium Low Strength
Bakery	1,600	High Strength
Car Washes	170	Low Strength
Gas Stations	300	Medium Low Strength
Grocery Stores	1,600	High Strength
Hotels without Restaurants	430	Medium Strength
Institutions, Churches, HOAs	375	Medium Low Strength
Laundromats	260	Medium Low Strength
Laundry, Commercial	1,350	Medium High Strength
Office Buildings, Banks	300	Medium Low Strength
Restaurants	1,600	High Strength
Retail Stores	300	Medium Low Strength
Schools	230	Low Strength
Other Commercial	375	Medium Low Strength
Mixed Use	425	Medium Strength

Table 4-17 shows the proposed wastewater rates for the next five years. Rates are increased by three percent on July 1 of each fiscal year throughout the five-year planning period.

Table 4-17: Proposed Monthly Wastewater Rates

	July 1, 2018	July 1, 2019	July 1, 2020	July 1, 2021	July 1, 2022
Monthly Base Charge (per dwelling unit)	$15.01	$15.47	$15.94	$16.42	$16.92
Monthly Lateral Maintenance Fee (per account)	$2.94	$3.03	$3.13	$3.23	$3.33
Residential Variable Charge per unit ($/kgal)*	$6.00	$6.18	$6.37	$6.57	$6.77
Residential Monthly Maximum Charge	$59.95	$61.76	$63.66	$65.64	$67.64
Non-Residential Variable Charge ($/kgal of actual water use)					
Low Strength	$4.71	$4.86	$5.01	$5.17	$5.33
Medium Low Strength	$5.36	$5.53	$5.70	$5.88	$6.06
Medium Strength	$5.90	$6.08	$6.27	$6.46	$6.66
Medium High Strength	$12.10	$12.47	$12.85	$13.24	$13.64
High Strength	$13.38	$13.79	$14.21	$14.64	$15.08

*Residential users' variable charge is based on water usage during two lowest-use winter months.

WASTEWATER BILL IMPACTS

Table 4-18 shows the monthly bill impact of the proposed rates on a residential customer billed the residential average of 4 kgal per month.

Table 4-18: Average Residential Wastewater Monthly Rate Impact

	Monthly Usage (kgal)	Current Monthly Bill	Proposed Monthly Bill	Difference ($)	Difference %	% of Bills At or Below
Average	4	$40.18	$41.95	$1.77	4.4%	44%

Table 4-19 shows the monthly impacts of the proposed rates on a typical customer based on average monthly usage in each non-residential customer class.

Table 4-19: Non-Residential Wastewater Monthly Rate Impacts

Existing Class	New Class	Average Monthly Usage (kgal)	Current Monthly Bill	Proposed Monthly Bill	Difference ($)	Difference (%)	% of Non-Residential Accounts
Auto Sales and Repair	Medium Low Strength	7.2	$61.08	$56.43	($4.66)	-7.6%	4.1%
Barber & Beauty Shop	Medium Low Strength	3.9	$37.62	$39.00	$1.38	3.7%	2.3%
Bakery	High Strength	11.2	$189.91	$167.36	($22.55)	-11.9%	0.4%
Car Washes	Low Strength	111.5	$594.22	$542.96	($51.26)	-8.6%	1.0%
Gas Stations	Medium Low Strength	79.4	$480.13	$443.61	($36.52)	-7.6%	3.1%
Grocery Stores	High Strength	96.6	$1,284.25	$1,310.34	$26.09	2.0%	2.2%
Hotels without Restaurants	Medium Strength	111.5	$686.94	$676.92	($10.03)	-1.5%	0.6%
Institutions, Churches, HOAs	Medium Low Strength	23.2	$140.90	$142.30	$1.40	1.0%	10.1%
Laundromats	Medium Low Strength	197.7	$1,097.43	$1,077.67	($19.76)	-1.8%	0.4%
Laundry, Commercial	Medium High Strength	13.3	$111.62	$178.41	$66.79	59.8%	0.2%
Office Buildings, Banks	Medium Low Strength	17.2	$110.10	$109.93	($0.16)	-0.1%	23.4%
Restaurants	High Strength	45.9	$685.00	$631.79	($53.21)	-7.8%	15.9%
Retail Stores	Medium Low Strength	17.2	$111.93	$110.21	($1.71)	-1.5%	18.5%
Schools	Low Strength	71.2	$374.63	$353.28	($21.35)	-5.7%	6.2%
Other Commercial	Medium Low Strength	18.0	$118.73	$114.59	($4.14)	-3.5%	11.4%
Mixed Use	Medium Strength	80.8	$609.64	$495.68	($113.97)	-18.7%	0.2%

5. DROUGHT SURCHARGE

As part of the Study, Raftelis calculated the demand reduction surcharge to recover the revenue shortfall that occurs as a result of demand reduction during water shortage situations.

A Drought Surcharge may be imposed during times of a declared drought when a certain level of reduction from the base usage has been mandated. A Drought Surcharge is charged on each unit of water used and is calculated to recover costs resulting from loss of revenue due to reduced water use. The amount of the Drought Surcharge at different levels of usage reduction is based upon the City's projected revenue shortfall adjusted for changes in costs.

To determine the demand reduction surcharge, the first step is to project the water demand reduction for each customer class under different levels of shortage. **Table 5-1** shows the projected water demand for each customer class and tier at different levels of reduction. Raftelis analyzed individual customer usage data, assuming that customers using more water are expected to reduce more since they have more discretionary water use. The analysis shows the increase in commodity rates that need to be applied to all usage including the tiers for each percentage reduction in usage.

Table 5-1: Projected Water Demand by Percent Usage Reduction

Usage Data (kgal)	Monthly Tier	Proposed Rates	FY 2019	% Reduction	1% Reduction	% Reduction	7% Reduction	% Reduction	10% Reduction
Residential									
Tier 1	5	$2.84	1,136,427	0%	1,136,427	-3%	1,102,334	-5%	1,079,606
Tier 2	14	$5.48	780,637	0%	780,637	-7%	725,992	-10%	702,573
Tier 3	20	$6.43	165,423	-4%	158,806	-15%	140,609	-20%	132,338
Tier 4	21+	$6.64	152,096	-7%	141,449	-30%	106,467	-40%	91,258
Subtotal Residential			**2,234,583**	**-1%**	**2,217,319**	**-7%**	**2,075,403**	**-10%**	**2,005,775**
Non-Residential									
Tier 1	5	$2.93	45,445	0%	45,565	0%	45,565	-1%	45,158
Tier 2	6+	$5.97	579,693	-2%	568,099	-5%	550,708	-10%	521,724
Subtotal Non-Residential			**625,138**	**-2%**	**613,664**	**-5%**	**596,273**	**-9%**	**566,882**
Hydrant		$8.72	5,187	0%	5,187	0%	5,187	0%	5,187
Total Potable Water (kgal)			**2,864,907**		**2,836,170**		**2,676,863**		**2,577,843**
Total Potable Water (AF)			8,793		8,704		8,216		7,912
% Total Reduction					-1.00%		-7%		-10%

The next step is to estimate the water supply cost savings that result when there is a reduction in demand. The City has a take or pay contract with CCWD; therefore, the City would continue to take its full allotment from CCWD. Proportional reduction in supply from BWTP and groundwater is used to ensure water quality. The variable costs associated with each supply are used to determine the cost savings. Almost all other costs are fixed and will not vary based on water demand.

Table 5-2 shows the estimated cost savings in the water supply costs for each Stage due to the reduction in usage. The total supply assumes a five percent water loss from the water usage shown in **Table 5-1**.

For each water supply source, there are some fixed costs, which do not vary by the amount of water purchased but remain constant, as shown in the middle section of **Table 5-2**. The variable unit cost for each source is assumed to remain the same at all levels of demand reduction. Since the amount of water purchased or produced decreases, the total variable cost decreases. This results in a cost saving, shown in the last line of **Table 5-2**, for different levels of demand compared to the normal year cost.

Table 5-2: Estimated Cost Savings by Percent Usage Reduction

	FY 2019	1% Reduction	7% Reductkion	10% Reduction
SUPPLY (AF)				
Groundwater Wells	2,068	2,047	1,932	1,842
CCWD Randall-Bold Treatment Plant	1,975	1,975	1,975	1,975
Surface Water	5,212	5,140	4,741	4,511
Total Potable Supply	**9,255**	**9,163**	**8,648**	**8,328**
FIXED COST ($)				
Groundwater Wells	$0			
CCWD Randall-Bold Treatment Plant	$1,969,602			
Surface Water	$2,663,128			
TOTAL FIXED COSTS	**$4,632,730**	**$4,632,730**	**$4,632,730**	**$4,632,730**
VARIABLE COST ($/AF)				
Groundwater Wells	$394	$394	$394	$394
CCWD Randall-Bold Treatment Plant				
Surface Water	$223	$223	$223	$223
TOTAL VARIABLE COSTS	**$1,978,824**	**$1,954,550**	**$1,819,986**	**$1,733,160**
TOTAL WATER SUPPLY COSTS	**$6,611,554**	**$6,587,280**	**$6,452,716**	**$6,365,890**
Cost Savings		$24,274	$158,838	$245,663

The final step is to calculate the drought surcharge, shown in **Table 5-3**. First, the projected potable water revenue is calculated by multiplying the demand projections from **Table 5-1** for each level of reduction in use or scenario and the proposed water rates in FY 2019. The revenue shortfall is determined by comparing this revenue for each scenario with the FY 2019 revenues. Next, we add the estimated cost savings from **Table 5-2** for each scenario. The total shortfall is divided by the projected demand in each scenario to arrive at a uniform dollar increase per unit of water for each scenario. To provide flexibility, we have calculated the increase in rate for 1 percent

reduction in water usage at the different levels of cutbacks. Using the conservative figure of $0.06 per kgal figure means that for a 20 percent reduction, each rate would need to increase by $1.20 per kgal. **Table 5-3** shows the proposed surcharge that would be effective July 1, 2018. Surcharges for subsequent years would increase by the overall revenue percentage increase shown in **Table 3-7.**

Table 5-3: Drought Surcharge by Percent Usage Reduction

	FY 2019	1% Reduction	7% Reductkion	10% Reduction
Projected Potable Revenue	**$13,218,078**	**$13,035,973**	**$12,186,589**	**$11,665,297**
Revenue Shortfall		($182,105)	($1,031,489)	($1,552,781)
Cost Savings		$24,274	$158,838	$245,663
Net Drought Related Expenses		$0	$0	$0
Net Revenue Shortfall to be Recovered		**($157,831)**	**($872,651)**	**($1,307,117)**
% Increase per unit		1%	7%	11%
$ Increase per unit - July 1, 2018		$0.06	$0.33	$0.51
Surcharge per each 1% Water Usage Reduction		**$0.06**	**$0.05**	**$0.05**

6. APPENDIX A: WATER COST OF SERVICE TABLES

Table 6-1: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components – WaterTable 3-14: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Supply (Surface Water)	100%									100%
Production (Wells)	100%									100%
Treatment		48%	52%							100%
Distribution		22%	24%	44%	10%					100%
Utility Billing								100%		100%

O&M Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Supply (Surface Water)	$6,341,080	$0	$0	$0	$0	$0	$0	$0	$0	$6,341,080
Production (Wells)	$2,123,786	$0	$0	$0	$0	$0	$0	$0	$0	$2,123,786
Treatment	$0	$1,011,085	$1,112,193	$0	$0	$0	$0	$0	$0	$2,123,278
Distribution	$0	$878,750	$980,144	$1,791,298	$405,577	$0	$0	$0	$0	$4,055,770
Utility Billing	$0	$0	$0	$0	$0	$0	$0	$2,290,323	$0	$2,290,323
TOTAL O&M EXPENSES	**$8,464,866**	**$1,889,835**	**$2,092,338**	**$1,791,298**	**$405,577**	**$0**	**$0**	**$2,290,323**	**$0**	**$16,934,236**
TOTAL O&M Allocation, %	50%	11%	12%	11%	2%	0%	0%	14%	0%	100%

Table 6-1: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components – Water (cont'd)

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Land									100%	100%
Well		100%								100%
Reservoir		43%	47%	0%	10%					100%
Distribution		22%	24%	44%	10%					100%
Transmission		43%	47%	0%	10%					100%
Buildings									100%	100%
Machinery & Equipment							100%			100%
Vehicles									100%	100%
Pumps		48%	52%							100%
Treatment Plant		48%	52%							100%

Capital Allocation	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Land	$0	$0	$0	$0	$0	$0	$0	$0	$62,556	$62,556
Well	$0	$5,513,697	$0	$0	$0	$0	$0	$0	$0	$5,513,697
Reservoir	$0	$5,034,309	$5,596,802	$0	$1,181,235	$0	$0	$0	$0	$11,812,346
Distribution	$0	$13,114,915	$14,628,174	$26,734,250	$6,053,038	$0	$0	$0	$0	$60,530,377
Transmission	$0	$3,505,242	$3,896,889	$0	$822,459	$0	$0	$0	$0	$8,224,591
Buildings	$0	$0	$0	$0	$0	$0	$0	$0	$765,954	$765,954
Machinery & Equipment	$0	$0	$0	$0	$0	$0	$1,363,907	$0	$0	$1,363,907
Vehicles	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pumps	$0	$1,319,204	$1,451,124	$0	$0	$0	$0	$0	$0	$2,770,328
Treatment Plant	$0	$30,151,414	$33,166,555	$0	$0	$0	$0	$0	$0	$63,317,969
TOTAL ASSETS	**$0**	**$58,638,782**	**$58,739,545**	**$26,734,250**	**$8,056,731**	**$0**	**$1,363,907**	**$0**	**$828,510**	**$154,361,725**
Total Asset Allocation, %	0%	38%	38%	17%	5%	0%	1%	0%	1%	100%

Table 6-2: Derivation of Service Units - Water

	Monthl Tiers (kg	Annual Use (kgal)	Average Daily Use (kgal/day)	Maximum Day Requirements Capacity Factor	Maximum Day Requirements Total Capacity (kgal/day)	Maximum Day Requirements Extra Capacity (kgal/day)	Maximum Hour Requirements Capacity Factor	Maximum Hour Requirements Total Capacity (kgal/day)	Maximum Hour Requirements Extra Capacity (kgal/day)	No. of Fire Meters (Equiv.)	No. of Meters (Equiv.)	No. of Bills (No.)
Residential												
Tier 1	5	1,136,427	3,113	1.11	3,456	342	2.11	6,583	3,127			
Tier 2	14	780,637	2,139	1.77	3,786	1,647	3.37	7,211	3,425			
Tier 3	20	165,423	453	2.44	1,106	653	4.65	2,106	1,001			
Tier 4	21+	152,096	417	2.75	1,146	729	5.24	2,183	1,037			
Non-Residential												
Tier 1	5	45,445	125	1.24	154	30	2.36	294	140			
Tier 2	6+	579,693	1,588	1.87	2,970	1,382	3.56	5,657	2,687			
Hydrant		5,187	14	5.93	84	70	11.30	161	76			
TOTAL		**2,864,907**				**4,853**			**11,492**	**0**	**31,014**	**238,831**

Table 6-3: Unit Cost Calculation - Water

	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Operating Expenses	$8,002,540	$1,786,618	$1,978,060	$1,693,463	$383,426	$0	$0	$2,165,232	$0	$16,009,339
Capital Expenses	$0	$1,873,537	$1,876,757	$854,172	$257,416	$0	$43,577	$0	$26,471	$4,931,931
Total Cost of Service	**$8,002,540**	**$3,660,155**	**$3,854,817**	**$2,547,635**	**$640,842**	**$0**	**$43,577**	**$2,165,232**	**$26,471**	**$20,941,271**
Allocation of General Cost		$7,504	$7,903	$5,223	$1,314	$0	$89	$4,439	($26,471)	$0
Allocation of Public Fire Protection Cost					($642,156)		$642,156			$0
Allocation of Peaking Cost to Meter			($2,935,667)	($1,940,172)			$4,875,839			$0
Total Adjusted Cost of Service	**$8,002,540**	**$3,667,659**	**$927,053**	**$612,686**	**$0**	**$0**	**$5,561,662**	**$2,169,671**	**$0**	**$20,941,271**
Unit of Service	2,864,907	2,864,907	4,853	11,492			31,014	238,831		
Unit	kgal	kgal	kgal/day	kgal/day			equiv meters	bills		
Unit Cost	$2.79	$1.28	$191.03	$53.31			$14.94	$9.08		

Table 6-4: Allocation of Cost to Customer Class - Water

	Supply	Base Delivery	Max Day	Max Hour	Fire	Pumping	Meter	Customer	General	TOTAL
Residential										
Tier 1	$3,174,379	$1,454,855	$65,426	$166,702						$4,861,363
Tier 2	$2,180,551	$999,372	$314,598	$182,599						$3,677,121
Tier 3	$462,075	$211,775	$124,674	$53,341						$851,865
Tier 4	$424,850	$194,714	$139,307	$55,275						$814,145
Non-Residential										
Tier 1	$126,942	$58,179	$5,708	$7,447						$198,276
Tier 2	$1,619,255	$742,124	$263,957	$143,257						$2,768,594
Hydrant	$14,487	$6,640	$13,383	$4,064						$38,574
Base Meters							$5,561,662	$2,169,671		$7,731,333
TOTAL (less WW Transfer)	**$8,002,540**	**$3,667,659**	**$927,053**	**$612,686**	**$0**	**$0**	**$5,561,662**	**$2,169,671**	**$0**	**$20,941,271**

7. APPENDIX B: WASTEWATER COST OF SERVICE TABLES

Table 7-1: Allocation of Functionalized O&M and Capital Expenses to Cost Causation Components – Wastewater

O&M Allocation	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Collection	9.9%	90.1%						100.0%
Treatment		50.0%	25.0%	25.0%				100.0%
Utility Billing					100.0%			100.0%
Lateral Maintenance						100.0%		100.0%

O&M Allocation	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Collection	$256,388	$2,344,184	$0	$0	$0	$0	$0	$2,600,573
Treatment	$0	$3,080,364	$1,540,182	$1,540,182	$0	$0	$0	$6,160,728
Utility Billing	$0	$0	$0	$0	$973,604	$0	$0	$973,604
Lateral Maintenance	$0	$0	$0	$0	$0	$270,392	$0	$270,392
TOTAL O&M EXPENSES	**$256,388**	**$5,424,549**	**$1,540,182**	**$1,540,182**	**$973,604**	**$270,392**	**$0**	**$10,005,297**
% allocation	2.6%	54.2%	15.4%	15.4%	9.7%	2.7%	0.0%	100.0%

Capital Allocation	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Land							100.0%	100.0%
Treatment		50.0%	25.0%	25.0%				100.0%
Collection	9.9%	85.1%				5.0%		100.0%
Buildings							100.0%	100.0%
Machinery & Equipment							100.0%	100.0%
Recycled Water							100.0%	100.0%

Capital Allocation	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Land	$0	$0	$0	$0	$0	$0	$97,376	$97,376
Treatment	$0	$20,288,244	$10,144,122	$10,144,122	$0	$0	$0	$40,576,488
Collection	$3,486,312	$30,107,587	$0	$0	$0	$1,768,100	$0	$35,361,999
Buildings	$0	$0	$0	$0	$0	$0	$19,242	$19,242
Machinery & Equipment	$0	$0	$0	$0	$0	$0	$27,485	$27,485
Recycled Water	$0	$0	$0	$0	$0	$0	$1,821,088	$1,821,088
TOTAL ASSETS	**$3,486,312**	**$50,395,831**	**$10,144,122**	**$10,144,122**	**$0**	**$1,768,100**	**$1,965,192**	**$77,903,678**
% allocation	4.5%	64.7%	13.0%	13.0%	0.0%	2.3%	2.5%	100.0%

Table 7-2: Derivation of Service Units - Wastewater

Customer Class		Flow (kgal)	BOD (lbs/yr)	TSS (lbs/yr)	Units	Accounts	Bills/Year
Residential		**1,024,509**	**2,180,236**	**1,496,240**	**20,576**	**18,700**	**246,909**
SFR	(cap at 7 kgal/mo)	945,995	2,013,151	1,381,574	18,642	18,642	223,709
MFR	(cap at 7 kgal/mo)	78,515	167,085	114,666	1,933	58	23,201
						6084	
Non-Residential Alternative Rate Classes							
Low Strength		33,822	30,380	31,096	37	37	440
Medium Low Strength		92,479	126,932	119,720	371	371	4,453
Medium Strength		5,126	12,553	5,799	4	4	49
Medium High Strength		164	914	928	1	1	12
High Strength		57,690	459,562	310,753	94	94	1,126

Table 7-3: Unit Cost Calculation - Wastewater

	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Operating Expenses	$243,487	$5,151,593	$1,462,682	$1,462,682	$924,613	$256,786	$0	$9,501,844
Capital Expenses	$115,129	$1,664,229	$334,991	$334,991	$0	$58,388	$64,897	$2,572,625
Total Cost of Service	**$358,616**	**$6,815,822**	**$1,797,673**	**$1,797,673**	**$924,613**	**$315,174**	**$64,897**	**$12,074,469**
Allocation of General Cost	$1,938	$36,831	$9,714	$9,714	$4,996	$1,703	($64,897)	$0
Allocated Cost of Service	**$360,554**	**$6,852,653**	**$1,807,387**	**$1,807,387**	**$929,610**	**$316,877**	**$0**	**$12,074,469**
Adjustments to Fixed Charges	$0	($2,867,330)			$2,867,330			$0
Adjusted Cost of Service	**$360,554**	**$3,985,323**	**$1,807,387**	**$1,807,387**	**$3,796,940**	**$316,877**	**$0**	**$12,074,469**
Unit of Service	19,207	1,213,789	2,810,576	1,964,536	252,990	19,207		
Units	accounts	kgal	lbs/yr	lbs/yr	bills/yr	Accounts		
Unit Cost	$1.56	$3.283	$0.643	$0.920	$15.01	$1.37		
	per month	per kgal	per lb	per lb	per month	per month		

Table 7-4: Allocation of Cost to Customer Class - Wastewater

Customer Class	I&I	Flow	BOD	TSS	Customer	Laterals	General	TOTAL
Residential	$351,042	$3,363,847	$1,402,037	$1,376,552	$3,705,676	$308,517		$10,507,670
SFR	$349,957	$3,106,054	$1,294,590	$1,271,058	$3,357,474	$307,564		$9,686,697
MFR	$1,084	$257,793	$107,447	$105,494	$348,202	$953		$820,972
Non-Residential Alternative Rate Classes								
Low Strength	$689	$111,050	$19,536	$28,608	$6,606	$605		$167,094
Medium Low Strength	$6,966	$303,642	$81,625	$110,143	$66,831	$6,122		$575,330
Medium Strength	$77	$16,829	$8,072	$5,335	$741	$68		$31,122
Medium High Strength	$19	$537	$588	$854	$185	$17		$2,200
High Strength	$1,762	$189,418	$295,529	$285,895	$16,901	$1,548		$791,053