East Bay
Municipal Utility District
Wastewater Cost of Service & Capacity Fee Study

Final Report / May 6, 2019

RAFTELIS

WOODARD &CURRAN

EBMUD

RAFTELIS

May 6, 2019

Ms. Eileen White
Director of Wastewater
East Bay Municipal Utility District
375 11th Street
Oakland, CA 94607

Subject: Wastewater Cost of Service Rate Study & Capacity Fee Study Report

Dear Ms. White:

Raftelis Financial Consultants, Inc. (Raftelis) is pleased to provide this report summarizing the Wastewater Cost of Service Study (COS Study) & Wastewater Capacity Fee Study (WCF Study) for the East Bay Municipal Utility District (District) to establish wastewater rates, charges, and capacity fees that are consistent with applicable law.

The major objectives of the Cost of Service Study include the following:

- Review the District's current wastewater rate structures.
- Conduct a cost of service analysis for wastewater rates and charges subject to Proposition 218.
- Review and update the detailed cost allocations for the unit processes at the Main Wastewater Treatment Plant (MWWTP).
- Evaluate alternative methods of measuring wastewater strength and recommend a method.
- Review domestic strength concentration to reflect reduced flows at plant.
- Review allocation of wet weather costs to reflect the costs of I&I into the plant.
- Develop fair and equitable wastewater user charges.
- Validate cost of service methodology and calculation of wastewater charges.
- Demonstrate the impacts of the proposed wastewater user charges on typical customer bills.

The major objectives of the Wastewater Capacity Fee Study include the following:

- Review the existing Wastewater Capacity Fee (WCF) and update as needed.
- Increase transparency and simplify the administration of the WCF.

The Report summarizes the key findings and recommendations related to the development of the Wastewater Cost of Service Study and the Wastewater Capacity Fee Study.

It has been a pleasure working with you, and we thank you and the District staff for the support provided during the course of these studies.

Sincerely,

Sanjay Gaur
Vice President

Hannah Phan
Manager

Lauren Demine
Consultant

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Glossary

Ad Valorem Bond Levy	A tax based on the assessed value of real estate with the proceeds designated to pay for municipal bonds
American Water Works Association (AWWA)	American Water Works Association is the largest nonprofit, scientific and educational association dedicated to managing and treating water
BCC	Business Classification Code. EBMUD classification system of non-residential customers based on the type of business operated, and on the 1972 Standard Industrial Classification Manual
Capacity Charges	A fee assessed for new connections to the wastewater system to recover the appropriate share of the cost of capital improvements to serve new and expanded connections
Capital Expenses	Expenditures for capital assets
CCF	Centum Cubic Feet. Volume equal to 100 cubic feet or 748 gallons.
Chemical Oxygen Demand (COD)	Measurement of the amount of organic compounds in wastewater that can be oxidized chemically, typically expressed in milligrams per liter (mg/l)
Chemical Oxygen Demand Filtered (CODf)	Measurement of the amount of organic compounds in wastewater expressed in milligrams per liter (mg/l). CODf is the fraction of total COD measured from a wastewater sample filtered through a 1.5 micron filter..
Commodity Charge	Charge for per unit of water (ccf) consumed
COS	Cost of Service
Debt Service	The principal and interest payments on debt issued
Depreciation	A reduction in the value of an asset with the passage of time.
Domestic Strength - Wastewater	Concentration of COD/CODf and TSS assigned to domestic strength discharges
EBMUD	East Bay Municipal Utility District
Effluent	Outflow from a wastewater treatment plant
Fixed Charge	Portion of the customer monthly charge that does not vary with water use. For wastewater charges, sometimes referred to as the service charge.
Flow - Wastewater	Volume (ccf) for a given billing period that is used to calculate the wastewater charge
Headworks	"Head of the works" of a wastewater treatment plant, which serves as the first step in treatment and incorporates a system of screens, filters, detritors, and classifiers to remove large solids, grit, and other debris from the influent wastewater.
Infiltration	Water other than wastewater that enters a sewer system during wet weather conditions from the ground through such means as defective pipes, pipe joints, connections or Maintenance Holes.
Inflow	Water other than wastewater that enters a sewer system during wet weather conditions from illicit or unpermitted sources other than Infiltration, such as, but not limited to, roof leaders, foundation drains, yard drains, area drains, drains from springs and swampy areas, Maintenance Hole covers, cross connections between storm sewers and sanitary sewers, catch basins, cooling towers, storm water, surface runoff, street wash waters, or drainage.

Infiltration and Inflow (I&I)	All water from both Infiltration and Inflow without distinguishing the source.
Influent	Inflow to a wastewater treatment plant.
Loadings - Wastewater	Amount of wastewater flow and strength in the influent
MWWTP	Main Wastewater Treatment Plant
Million Gallons Per Day (MGD)	Equal to 1 million gallons over the period of one day
MFR	Multi-Family Residential. Customer Class for multi-dwelling residential buildings (up to 4 dwelling units per building) without individual water meters. Multi-dwelling residential units with 5 or more dwelling units per building without individual meters are considered non-residential for wastewater billing purposes.
Non-Residential - Wastewater	Customers who are not in the Single Family or Multi-Family customer classes for wastewater billing purposes
Operations and Maintenance (O&M) Expenses	Expenditures for daily operations and maintenance of the wastewater system
Plant Balance	An estimation of the wastewater flow and wastewater strength from all types of wastewater customers that is then aggregated and checked (balanced) against the total flow and strength measured at the plant.
Proposition 218	Constitutional amendment passed in 1996 that creates procedural and substantive limitations for adopting new or increased property related fees, charges, or assessments, and reinforces voter approval requirements for new, increased, or extended taxes.
Proposition 26	Constitutional amendment passed in 2010 that exempts certain fees and charges from the definition of a "tax" for purposes of voter approval, including fees or charges for services or products provided by a local government.
Rate Revenue Requirement	The portion of annual operating, maintenance and capital-related expenses that must be recovered from annual wastewater rates and charges
RCLD	Replacement Cost Less Depreciation
Reserves	District cash that is not part of current year revenues
Residential - Wastewater	Customers in the single-family residential or multi-family residential customer class for the purpose of wastewater billing
Resource Recovery (R2)	Trucked waste program
Revenue Offsets	Non-wastewater revenue that is used to pay a portion of the annual operating, maintenance and capital related expenses
Revenue Requirement	The annual revenue needed to fund operating, maintenance, and capital-related expenses that are required to provide wastewater service
Raftelis	Raftelis Financial Consultants
Service Charge - Wastewater	Fixed monthly wastewater charge
Sewer Lateral	Pipe or pipes and appurtenance that carry sewage and liquid waste from any building or facility that is required to be provided with public sewer service, or that is actually provided with public sewer service, to the sanitary sewer main
SFR	Single Family Residential. Residential customers with one dwelling unit with an individual water meter

Strength - Wastewater	COD/CODf and TSS component of a wastewater customer's discharge
Test Year	A full year of actual functionalized expense data available at the time the study commenced and a representative year for the District.
Total Suspended Solids (TSS)	Measurement of solid materials, including organic and inorganic, that are suspended in wastewater, typically expressed in mg/l
WEF	Water Environment Federation. The Water Environment Federation provides technical education and training for water quality professionals who clean water and return it safely to the environment
WCF	Wastewater Capacity Fee
Wet Weather Facilities Charge	Wastewater charge collected on the property tax bill to fund the capital facilities designed to meet peak wet weather flows that are in excess of normal wastewater discharge
W&C	Woodard & Curran

1. Executive Summary

1.1. Introduction

In June 2018, East Bay Municipal Utility District (District) engaged Raftelis Financial Consultants, Inc. (Raftelis) to conduct two studies: (1) a cost of service (COS) study for the District's wastewater rates and charges subject to Proposition 218; and (2) and a capacity fee study of the District's Wastewater Capacity Fee (WCF), which is not subject to Proposition 218, but is governed by other laws including Government Code Section 66013.

This report documents the resultant findings, analyses, and proposed changes to the wastewater rates, charges and capacity fees from these studies in two Parts:

- Part I of this report summarizes the COS Study. The purpose of the COS Study is to evaluate and update wastewater rates and charges to reflect increased costs and/or new or changed conditions, in accordance with the requirements of Proposition 218.
- Part II of this report summarizes the WCF Study. The purpose of the WCF Study is to review and update the Wastewater Capacity Fee in accordance with the rules and regulations of California State Assembly Bill 1600 (AB 1600) applicable to capacity fees and connection fees and, specifically, Government Code Section 66013.

This report is formal technical documentation in support of modifications to the wastewater rates and capacity fees.

1.2. Part I: Wastewater Cost of Service Study

1.2.1. INTRODUCTION

The District's wastewater charges have defined three customer classes: single-family residential (SFR), multi-family residential (MFR), and non-residential. Non-residential customers are further classified based on the type of business operated and assigned into Business Classification Codes (BCC) based on common characteristics of wastewater contributed to the system, including flow and strength. Together, the rates for the components of the wastewater service fees are structured to proportionately recover the costs of providing wastewater services among the various customer classes.

As described in this report, the rates for the wastewater fees have five components: a Service Charge, a Flow Charge, a Strength Charge, a San Francisco (SF) Bay Pollution Prevention Fee, and a Wet Weather Facilities Charge.

1.2.2. LEGAL FRAMEWORK FOR COST OF SERVICE STUDY

In November 1996, California voters approved Proposition 218, which amended the California Constitution by adding Article XIII C and Article XIII D. Article XIII D placed substantive limitations on the use of the revenue collected from property-related fees and on the amount of the fee that may be imposed on each parcel. Additionally, it established procedural requirements for imposing new, or increasing existing, property-related fees. The California Supreme Court has determined that water and wastewater service fees are property-related fees subject to Proposition 218. The COS Study evaluated and updated the wastewater rates and charges in accordance with the requirements of Proposition 218, as summarized in Sections 2.2 herein.

1.2.3. COST OF SERVICE PROCESS AND METHODOLOGY

For the wastewater COS analysis, Raftelis followed the guidelines for allocating costs detailed in the Water Environment Federation (WEF) Manual of Practice No. 27, Financing and Charges for Wastewater Systems, 2004. The wastewater COS analysis consists of six major steps, as outlined below:

1. Conduct a plant balance analysis to estimate the flows and strength characteristics of each customer class.
2. Functionalize Operations and Maintenance (O&M) expenses and capital costs into functional categories such as Treatment, Billing and Customer Service.
3. Allocate each functional category into cost components such as Infiltration and Inflow (I&I), Flow, Strength, Billing and Customer Service.
4. Develop customer class characteristics by cost component.
5. Calculate the cost component unit rates by dividing the total cost in each cost component in Step 3 by the customer class characteristics in Step 4.
6. Calculate the cost for each customer class by multiplying the unit cost in Step 5 by the customer class characteristics in Step 4.

The COS analyses were performed using the data from the District for fiscal year 2017 (FY 2017)[1], henceforth referred to as the Test Year. This was a full year of actual functionalized expense data available at the time the COS Study commenced and was a representative year for the District. Required adjustments were made to Test Year rates and charges based on the District FY 2017 actuals for development of updated FY 2017 rates and charges presented here. The results of the COS analyses were used for the new revenue requirements for FY 2020 and FY 2021 to calculate the proposed FY 2020 and FY 2021 rates and charges.

1.2.4. COST OF SERVICE ANALYSIS

To calculate fair and equitable rates so that users pay in proportion to the cost of providing service, Raftelis allocated the total revenue requirements to wastewater flow, chemical oxygen demand (COD), and total suspended solids (TSS) consistent with the previously identified WEF/industry guidelines. Since wastewater flow or volumes are not directly measured for each customer, District staff estimated the wastewater flows and loadings (flow, COD, and TSS) for each customer class through a plant balance analysis, which is used to estimate and validate the wastewater loadings (flow, COD, and TSS) generated by each customer class. Unit costs are calculated for flow, COD, and TSS and cost responsibility is assigned to various customer classes in proportion to their loadings. Costs to serve different customer classes are determined; rates are then designed to proportionately recover the costs in compliance with Proposition 218 requirements, which are described in more detail in Section 2.2.1.

1.2.5. OBJECTIVES OF THE COST OF SERVICE STUDY

In reviewing the District's existing rates and charges, Raftelis discussed a number of considerations with staff and the following items were identified as primary objectives of the cost of service study.

1. Review the District's current wastewater rate structures.
2. Conduct a cost of service analysis for wastewater rates and charges subject to Proposition 218.
3. Review and update the detailed cost allocations for the unit processes at the Main Wastewater Treatment Plant (MWWTP).

[1] The District's fiscal year begins on July 1st and ends on June 30th. "FY 2017" refers to the 12-months ending June 30, 2017.

4. Evaluate alternative methods of measuring wastewater strength and recommend a method.
5. Review domestic strength concentration to reflect reduced flows at plant.
6. Review allocation of wet weather costs to reflect the costs of I&I into the plant.
7. Develop fair and equitable wastewater user charges.
8. Validate cost of service methodology and calculation of wastewater charges.
9. Demonstrate the impacts of the proposed wastewater user charges on typical customer bills.

1.2.6. COST OF SERVICE RESULTS

Through the COS analysis process described in Section 1.2.3 above, the significant outcomes of the wastewater COS analysis are as follows:

1. The detailed cost allocations for the unit processes at the MWWTP were reviewed and updated by Woodard & Curran (W&C) to ensure that they were accurate. This update resulted in very minor changes.
2. The District changed the wastewater strength measure from Chemical Oxygen Demand filtered (CODf) to Chemical Oxygen Demand (COD). CODf was originally used for industrial high strength customers; however, the majority of these customers have left the District's service area. A survey of major wastewater agencies determined that most use COD as their strength measurement. The decision to switch to COD makes the District more consistent with other larger agencies and allows for easier rate comparisons with neighboring communities.
3. Sampling results indicated that residential strengths are lower than those assumed in the 2015 COS Study. Lower influent strength measured at the MWWTP also confirmed lower strength for residential customers and non-residential customers. However, the decrease in the residential strengths were larger than those for non-residential which resulted in a shift in the proportion of costs from residential to non-residential users causing non-residential flow and strength charges to increase.
4. Adjustments were made to the Wet Weather Facilities Charge to more accurately reflect the costs of the program. The COS analysis indicated a small increase in the I&I costs relative to the treatment flow and strength for the Test Year.

1.2.7. PROPOSED WASTEWATER RATES

Based on our review, Raftelis recommends that the District retain its current wastewater user charge structure. This structure includes monthly fixed service and strength charges, a flow charge per ccf based on water usage with a maximum of nine (9) hundred cubic feet (ccf) per month for residential customers. A maximum charge of nine (9) ccf per month is used because an analysis of the District's billing records shows that about 97 percent of all residential customers' winter water use is at or below this amount. As such, this amount provides a reasonable estimate of wastewater discharge.

Residential customers consist of SFR and MFR up to a fourplex. The current rate structure is familiar to customers and encourages conservation while providing revenue stability to the District.

Under the current rate structure, non-residential customers are assessed a monthly fixed service charge and a flow charge per ccf based on their BCC.

Table 1-1 and Table 1-2 show the proposed wastewater rates for residential and non-residential customers, respectively, with the COS adjustments for FY 2017 and proposed rates for FY 2020 and FY 2021.

Table 1-1: Proposed Updated FY 2017 and Proposed FY 2020 & FY 2021 Wastewater User Charges – Residential (Single Family and Multi-Family up to a fourplex)

	FY 2017	FY 2020	FY 2021
Service Charge (per account)	$6.12	$7.02	$7.30
Strength Charge (per dwelling unit)	$6.37	$7.31	$7.60
Minimum monthly charge per household	$12.49	$14.33	$14.90
Plus: A flow charge per ccf (maximum of 9 ccf)	$1.11	$1.27	$1.32
Minimum monthly charge at 0 units	$0.00	$0.00	$0.00
Maximum monthly charge at 9 units	$9.99	$11.43	$11.88
Total Residential Charge			
Minimum monthly charge	$12.49	$14.33	$14.90
Maximum monthly charge	$22.48	$25.76	$26.78
Average monthly charge at 6 ccf	$19.15	$21.95	$22.82

Table 1-2: Proposed Updated FY 2017 and Proposed FY 2020 & FY 2021 Wastewater User Charges – Non-Residential

	FY 2017	FY 2020	FY 2021
Monthly Service Charge (per meter)	$6.12	$7.02	$7.30
Treatment charge including flow processing (per ccf of sewage discharge)			
BUSINESS CLASSIFICATION CODE (BCC)			
Meat Products	$7.74	$8.90	$9.24
Slaughterhouses	$7.41	$8.50	$8.83
Dairy Product Processing	$6.07	$6.98	$7.25
Fruit and Vegetable Canning	$4.89	$5.61	$5.83
Grain Mills	$4.87	$5.58	$5.80
Bakeries (including Pastries)	$8.41	$9.65	$10.03
Sugar Processing	$4.81	$5.53	$5.74
Rendering Tallow	$14.61	$16.74	$17.40
Beverage Manufacturing & Bottling	$3.65	$4.19	$4.36
Specialty Foods Manufacturing	$15.70	$18.05	$18.75
Pulp and Paper Products	$4.18	$4.79	$4.98
Inorganic Chemicals Mfgr.	$5.38	$6.16	$6.40
Synthetic Material Manufacturing	$1.26	$1.44	$1.50
Drug Manufacturing	$2.71	$3.11	$3.23
Cleaning and Sanitation Products	$5.48	$6.30	$6.54
Paint Manufacturing	$10.57	$12.14	$12.61
Ink and Pigment Manufacturing	$3.82	$4.39	$4.56
Leather Tanning and Finishing	$14.60	$16.77	$17.43
Earthenware Manufacturing	$2.97	$3.40	$3.53
Primary Metals Manufacturing	$2.35	$2.69	$2.80
Metal Products Fabricating	$1.38	$1.57	$1.64
Drum and Barrel Manufacturing	$14.86	$17.08	$17.74
Metal Coating	$1.49	$1.71	$1.77
Air Transportation	$1.96	$2.25	$2.34
Food Service Establishments	$5.09	$5.83	$6.06
Apartment Buildings (5 or more units)	$2.47	$2.83	$2.94
Hotels, Motels with Food Service	$3.66	$4.19	$4.36
Commercial Laundries	$3.29	$3.77	$3.92
Coin Operated Laundromats	$2.47	$2.83	$2.94
Industrial Laundries	$9.34	$10.73	$11.15
Laboratories	$1.77	$2.02	$2.11
Automobile Washing and Polishing	$2.34	$2.68	$2.79
Hospitals	$2.25	$2.57	$2.68
Schools	$1.66	$1.89	$1.97
All Other BCC (includes dischargers of only segregated domestic wastes from sanitary conveniences)	$2.47	$2.83	$2.94

In addition to the fixed and flow charges described above, the District imposes the Wet Weather Facilities Charge (WWFC). The WWFC funds capital expenses for the I&I facilities (wet weather facilities, interceptors, pumping stations and storage basins) that are required to handle the wet weather flows that enter the wastewater system through the local wastewater collection systems and sewer connections. Under the Consent Decree entered into

amongst the District, certain state and federal water quality regulatory agencies, and seven local public entities which own and operate wastewater collection systems in the District's wastewater service area, which became effective on September 22, 2014, the District and the participating agencies are required to demonstrate by 2036 that sufficient rehabilitation work has been performed on the East Bay regional wastewater collection and transmission system to eliminate discharges from the District's Wet Weather Facilities except during storm events of exceptional magnitude. The Consent Decree requires the District and the participating agencies to meet certain pre-established interim benchmark percentage reductions for Wet Weather Facilities discharges.

The District's goal in entering into the Consent Decree was to achieve a plan that serves the interests of the District and its ratepayers by adequately reducing wet weather flows while ensuring any necessary financial investments are apportioned and scheduled in the most cost-effective and equitable manner possible. The District's investment in its I&I facilities are an important component of its ability to address wet weather flows and meet the requirements of the Consent Decree. The costs of the I&I facilities are recovered through the District's WWFC.

The volume of wet weather flows that enter the wastewater system from each property is proportional to the size of the collection system needed to serve each property. Properties with larger lots require more linear feet of collection system which presents more opportunity for storm water and ground water to enter through defects in the collection system. The volume of wet weather flows in the collection system has no direct relationship to a customer's monthly water use or if the wastewater discharge is from a residential or non-residential customer. For these reasons, lot size rather than water service use is used as basis of the WWFC. The structure of the WWFC is based on the rationale that larger lots contribute proportionally more to the wet weather flows than smaller lots. Accordingly, the WWFC is structured into three generalized lot sizes (or bins): 0 to 5,000 square feet (sq ft), 5,001 to 10,000 sq ft, and over 10,001 sq ft. The WWFC is based on median lot size for each of these bins.

The wet weather capital facilities are designed to handle wet weather flows that are in excess of the normal wastewater discharges from wastewater customers. Because the WWFC is based on the size of the property and is unrelated to water or wastewater usage at the property, the District collects the WWFC on the property tax bill for all parcels that have connections to the local wastewater collection systems within the District's wastewater service area. The WWFC for public agencies that are exempt from property taxes is collected through the District's billing process.

The WWFC was reviewed as part of the 2019 COS Study. With adjustment for the 2019 COS Study and the proposed overall four percent (4%) FY 2020 wastewater rate increase, the WWFC will increase 7.2 percent (7.2%) in FY 2020 when compared to the FY 2019 charge. The proposed increase for FY 2021 is four percent (4%).

Table 1-3 shows the proposed updated FY 2017 and proposed FY 2020 and FY 2021 Wet Weather Facilities Charge, based on median lot size for each lot size bin.

Table 1-3: Proposed Updated FY 2017 and Proposed FY 2020 & FY 2021 Wet Weather Facilities Charge

Lot Size (sq ft)	FY 2017	FY 2020	FY 2021
0 – 5,000	$97.00	$111.24	$115.70
5,001 – 10,000	$151.56	$173.78	$180.74
>10,001	$346.39	$397.20	$413.10

1.2.8. CUSTOMER IMPACTS

Table 1-4 shows the bill impacts for different customers with typical water usage with the proposed updated FY 2017 rates.

Table 1-4: Typical Customers' Wastewater Bill Impacts for FY 2017

Customer Class	Monthly Flow (ccf)	FY 2017 Current Bill	FY 2017 Proposed Bill	Difference ($)	Difference (%)
SFR	6	$19.73	$19.15	($0.58)	-2.9%
MFR – Fourplex	25	$63.36	$59.35	($4.01)	-6.3%
Commercial – Office	50	$129.55	$129.62	$0.07	0.1%
Commercial – Restaurant	50	$253.05	$260.62	$7.57	3.0%
Industrial – Food Manufacturing	500	$7,255.55	$7,856.12	$600.57	8.3%

Note: Bill does not include SF Pollution Prevention Fee

Table 1-5 shows the bill impacts for different customers with typical water usage with the proposed FY 2020 rates compared to the current FY 2019 rates.

Table 1-5: Typical Customers' Wastewater Bill Impacts for FY 2020

Customer Class	Monthly Flow (ccf)	FY 2019 Current Bill	FY 2020 Proposed Bill	Difference ($)	Difference (%)
SFR	6	$21.75	$21.95	$0.20	0.9%
MFR – Fourplex	25	$69.84	$68.01	($1.83)	-2.6%
Commercial – Office	50	$142.62	$148.52	$5.90	4.1%
Commercial – Restaurant	50	$279.62	$298.52	$18.90	6.8%
Industrial – Food Manufacturing	500	$8,001.12	$9,032.02	$1,030.90	12.9%

Note: Bill does not include SF Pollution Prevention Fee

Table 1-6 shows the bill impacts for different customers with typical water usage with the proposed FY 2021 rates compared to the proposed FY 2020 rates.

Table 1-6: Typical Customers' Wastewater Bill Impacts for FY 2021

Customer Class	Monthly Flow (ccf)	FY 2020 Proposed Bill	FY 2021 Proposed Bill	Difference ($)	Difference (%)
SFR	6	$21.95	$22.82	$0.87	4.0%
MFR – Fourplex	25	$68.01	$70.70	$2.69	4.0%
Commercial – Office	50	$148.52	$154.30	$5.78	3.9%
Commercial – Restaurant	50	$298.52	$310.30	$11.78	3.9%
Industrial – Food Manufacturing	500	$9,032.02	$9,382.30	$350.28	3.9%

Note: Bill does not include SF Pollution Prevention Fee

1.3. Part II: Wastewater Capacity Fee Study

1.3.1. INTRODUCTION

The District levies WCFs on new developments that connect to and existing users that expand their use of the wastewater system. The WCF is based on the cost of facilities required to provide capacity for new development. The wastewater system capacity is expressed in terms of wastewater flow volume (Flow) and strength factors for COD and TSS.

The WCF is designed to recover the reasonable cost of the capital facilities necessary to provide wastewater treatment capacity to new and expanded development. When a property is developed or redeveloped within the District's service area, the District imposes a capacity fee. The customer's need for an increase in system capacity can be the result of a new connection to the system or a significant change in use on an existing connection that

results in an increase in Flow and/or wastewater discharge strength. The objective of a capacity fee is to assess against the benefitting party, their proportionate share of the cost of infrastructure required to provide them service.

1.3.2. LEGAL FRAMEWORK FOR CAPACITY FEES

Capacity fees are not subject to Proposition 218. However, the District's authority to impose the WCF is limited by other statutory and constitutional provisions. Government Code Section 66013 contains requirements specific to wastewater capacity fees. In addition, procedural requirements for adopting or protesting capacity fees, pursuant to Section 66013, are contained in Sections 66016, 66022, and 66023 of the Government Code. The most pertinent part of Section 66013 states:

> "Notwithstanding any other provision of law, when a local agency imposes fees for water connections or sewer connections, or imposes capacity charges, those fees or charges ***shall not exceed the estimated reasonable cost of providing the service*** for which the fee or charge is imposed…" (emphasis added)

The WCF is also subject to the requirements set forth by Proposition 26, which amended Section 1 of Article XIIIC, and requires the District to show the amount charged is not a tax by not exceeding the reasonable amount required to provide the service, as stated in Section 1(e)(2):

> "A charge imposed for a specific government service or product provided directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of providing the service or product."

The District's WCF is structured to meet the requirements of these laws, and to recover the reasonable cost of the facilities necessary to provide capacity for new, or significant changes to existing, sewer connections.

1.3.3. WASTEWATER CAPACITY FEES

The existing WCF were last updated in 2013 and were based on the Buy-In methodology. The Buy-In methodology requires new or upsized connections to pay their proportional share of the capital facilities and infrastructure built out and necessary to provide them service. The fee has been updated over the past five years to account for the effects of inflation but has not been updated to account for increased system value.

The wastewater system was built to accommodate build-out demand and, therefore, has surplus capacity to serve the remaining or anticipated growth without major upgrades or improvements. Based on this information, it is reasonable and appropriate to determine capacity fees based on the Buy-In method. Raftelis worked closely with the District to determine the value of the existing system inclusive of R2 assets and of select capital reserves. The value of the system was then spread over the wastewater system capacity in terms of wastewater flow volume (Flow) and strength factors for COD and TSS to determine the proposed capacity fee.

The analysis herein uses the Buy-In method to substantiate the proposed updated SFR WCF of $2,671 for FY 2019. The proposed FY 2020 SFR WCF is $2,752, rounded to $2,750 for the published charge.

Additionally, Raftelis evaluated several approaches for streamlining the process of determining non-residential WCF's. The approach chosen is more straightforward and is similar to the approach used to determine the applicable Water System Capacity Charge (SCC) for new or upsized connections. In conjunction with adopting updated capacity fees, Raftelis recommends that the District should adjust the capacity fees each year to keep pace with inflation by applying the Engineering News Record Construction Cost Index (ENR CCI).

2. Part I: Cost of Service Study Overview

2.1. Introduction

The District's wastewater service area covers an 88-square-mile area of Alameda and Contra Costa counties along the Bay's east shore, extending from Richmond in the north to Oakland in the south. It serves approximately 685,000 customers. Approximately 69 MGD of wastewater is treated on average at the Main Wastewater Treatment Plant (MWWTP). The wastewater utility is also responsible for the operation and maintenance of 15 wastewater pumping stations, 29 miles of concrete interceptor sewers, 8 miles of force mains, and three wet weather facilities. Each of the cities within the District's wastewater service area operates a sewer collection system that discharges into the District's intercepting sewers.

The major objectives of the COS Study include the following:

- Review current wastewater rate structures.
- Conduct a cost of service analysis for wastewater rates and charges subject to Proposition 218.
- Review and update the detailed cost allocations for the unit processes at the (MWWTP).
- Evaluate alternative methods of measuring wastewater strength and recommend a method.
- Review domestic strength concentration to reflect reduced flows at plant.
- Review allocation of wet weather costs to reflect the costs of I&I into the plant.
- Develop fair and equitable wastewater user charges.
- Validate cost of service methodology and calculation of wastewater charges.
- Demonstrate the impacts of the proposed wastewater user charges on typical customer bills.

Part I of this report provides an overview of the COS Study and includes findings and recommendations for wastewater user charges.

2.2. Legal Framework and Rate Setting Methodology

2.2.1. LEGAL FRAMEWORK[2] - COST OF SERVICE STUDY

In November 1996, California voters approved Proposition 218, which amended the California Constitution by adding Article XIII C and Article XIII D. Article XIII D placed substantive limitations on the use of the revenue collected from property-related fees and on the amount of the fee that may be imposed on each parcel. Additionally, it established procedural requirements for imposing new, or increasing existing, property-related fees. The California Supreme Court has determined that wastewater service fees are property-related fees subject to Proposition 218.

In accordance with these provisions, a property-related fee must meet all of the following requirements: (1) revenues derived from the fee must not exceed the funds required to provide the property-related service; (2) revenues from the fee must not be used for any purpose other than that for which the fee is imposed; (3) the

[2] Raftelis does not practice law nor does it provide legal advice. The above discussion is to provide a general review of apparent state institutional constraints and is labeled "legal framework" for literary convenience only.

amount of a fee imposed upon any parcel or person as an incident of property ownership must not exceed the proportional cost of the service attributable to the parcel; (4) the fee may not be imposed for a service, unless the service is actually used by, or immediately available to, the owner of the property subject to the fee. A fee based on potential or future use of a service is not permitted and stand-by charges must be classified as assessments subject to the ballot protest and proportionality requirements for assessments; (5) no fee may be imposed for general governmental services, such as police, fire, ambulance, or libraries, where the service is available to the public in substantially the same manner as it is to property owners. The five substantive requirements in Article XIII D are structured to place limitations on (1) the use of the revenue collected from property-related fees and (2) the allocation of costs recovered by such fees to ensure that they are proportionate to the cost of providing the service attributable to each parcel.

2.2.2. RATE SETTING PROCESS

Revenue Requirements. The COS Study used the revenue requirements method for allocating costs of service. This methodology is consistent with industry standards established by the WEF. The revenue requirements analysis "compares the revenues of the utility to its operating and capital costs to determine the adequacy of the existing rates to recover the utility's costs."[3]

Cost of Service. After determining a utility's revenue requirements, the next step in the analysis is determining the cost of service. The COS Study functionalized the costs, expenses, and assets of the wastewater system by major operating functions to determine the cost of service. After the assets and the costs of operating those assets were properly categorized by function, the COS Study classified them and allocated the revenue requirements to the various customer classes (e.g., single-family residential, multi-family residential, and non-residential) by determining the characteristics of those classes and the customer class' contribution to the incurred costs, such as flow and strength service characteristics. The impact that these matters have on system operations determined how the costs were allocated among the various customer classes.

Rate Design. The final part of the analysis was the rate design. Rate design involves developing a rate structure that proportionately recovers costs from customers. The final rate structure and rate recommendations were based on the District's existing rate design and updated to fund the utility's long-term projected costs of providing service, proportionally allocate costs to all customers, provide a reasonable and prudent balance of revenue stability while encouraging conservation, and comply with the substantive requirements of Article XIII D.

2.3. Organization of Part I: Wastewater Cost of Service

Part I of this Report includes three sections in addition to the Executive Summary and this Overview. A brief description of the remaining sections follows.

- ***Section 3 – Cost of Service Analysis: Wastewater Utility*** describes the findings and results of the wastewater rate study. It includes a description of the wastewater system, the wastewater cost of service methodology, the user classifications, the determination of annual revenues required from user charges, and a detailed discussion on the Cost of Service, which includes allocation of costs to wastewater parameters and the determination of unit costs.
- ***Section 4 – Proposed Wastewater User Charges*** includes a detailed discussion of the proposed wastewater user charges and the customer impacts resulting from the proposed user charges.

[3] American Water Works Association, Principles of Water Rates, Fees and Charges: Manual of Water Supply Practices M1 (6th ed. 2012).

- ***Section 5 – Proposed FY 2020 and FY 2021 Wastewater User Charges*** includes the revenue requirements proposed for FY 2020 and FY 2021 and proposed user charges using the results of the Cost of Service.
- ***Appendices -*** includes the results of the wastewater strength survey, a detail of the O&M expenses, and the fixed asset listing.

2.4. Acknowledgements

This Report was a team effort among the District's Project Team, the Woodard & Curran Team, and the Raftelis Team. We would like to thank the individuals listed below who contributed their time, expertise, and support to make this project a success. Throughout the project the input and direction provided by the District Project Team was critical to addressing the numerous issues and topics enumerated in this report.

- Eileen White – EBMUD, Wastewater Director
- Catherine Humphrey - EBMUD, Principal Management Analyst
- Tepa Banda – EBMUD (formerly), Principal Management Analyst
- Alicia Chakrabarti – EBMUD, Manager of Wastewater Environmental Services
- Phoebe Grow – EBMUD, Supervising Wastewater Control Representative
- Kristen Font – EBMUD, Wastewater Control Representative
- Saji Pierce – EBMUD, Attorney
- Richard Lou – EBMUD, Principal Management Analyst
- Sophia Skoda – EBMUD, Finance Director
- Dave Richardson – Woodard & Curran, Principal
- Mark Takemoto – Woodard & Curran, Senior Wastewater Engineer, Project Manager
- Susan Hsu – Woodard & Curran, Environmental Engineer

3. Cost of Service Analysis: Wastewater Utility

This section of the report discusses the allocation of O&M expenses and capital costs to the appropriate functional categories consistent with industry standards and the determination of unit costs. In this COS Study, wastewater rates were calculated based on data from FY 2017 because it was a representative year and because there was a full year of actual, functionalized expense data available at the time the COS Study commenced. Accordingly, FY 2017 is defined as the Test Year. Test Year revenue requirements are used in the cost allocation process. In Section 5, the FY 2020 and FY 2021 proposed revenue requirements will be used to calculate the proposed FY 2020 and FY 2021 user charges following the results of the cost of service for the Test Year.

As part of the COS Study, the District has defined three customer classes for the wastewater system: SFR, MFR, and non-residential. Non-residential customers are further classified into Business Classification Codes based on the type of business operated, which are grouped together or identified based on common characteristics of wastewater contributed to the system, including flow and strength. Together, the rates for the components of the wastewater service fees are structured to proportionately recover the costs of providing wastewater services among the various customer classes. As described in this report, the rates for the wastewater fees have five components: a Service Charge, a Flow Charge, a Strength Charge, a SF Bay Pollution Prevention Fee, and a Wet Weather Facilities Charge.

To allocate the cost of service among the different customer classes, costs first need to be allocated to the appropriate wastewater functional categories. The following sections describe the allocation of the operating and capital costs of service to the appropriate parameters of the wastewater system.

The total cost of wastewater service is analyzed by system function in order to equitably distribute costs of service to the various classes of customers. For this analysis, wastewater utility costs of service are developed consistent with the guidelines for allocating costs detailed in the WEF Manual of Practice No. 27, Financing and Charges for Wastewater Systems, 2004.

The wastewater COS analysis consists of six major steps, as outlined below:

1. Conduct plant mass balance analysis to estimate the flows and strength characteristics of each customer class.
2. Functionalize O&M expenses and capital costs into functional categories such as Treatment, Billing, and Customer Service.
3. Allocate each functional category into cost components such as Infiltration and Inflow (I&I), Flow, Strength, and Billing and Customer Service.
4. Develop customer class characteristics by cost component.
5. Calculate the cost component unit rates by dividing the total cost in each cost component in Step 3 by the customer class characteristics in Step 4.
6. Calculate the cost by customer class by multiplying the unit cost in Step 5 by the customer class characteristics in Step 4.

3.1. Wastewater COS Study Objectives

In reviewing the District's existing rates and charges, Raftelis discussed a number of considerations with staff. In addition to the general updates of cost of service, the following items were identified as primary objectives of the COS Study.

1. Review current wastewater rate structures.
2. Conduct a cost of service analysis for wastewater rates and charges subject to Proposition 218.
3. Review and update the detailed cost allocations for the unit processes at the (MWWTP).
4. Evaluate alternative methods of measuring wastewater strength and recommend a method.
5. Review domestic strength concentration to reflect reduced flows at the plant.
6. Review allocation of wet weather costs to reflect the costs of I&I into the plant.
7. Develop fair and equitable wastewater user charges.
8. Validate cost of service methodology and calculation of wastewater charges.
9. Demonstrate the impacts of the proposed wastewater user charges on typical customer bills.

3.2. Wastewater Characterization and Unit Process O&M and Capital Cost Allocation Update

This section documents the results as well as the methodology and assumptions used to update wastewater treatment unit processes at the MWWTP and the O&M and capital cost allocations for the COS Study. Woodard & Curran (W&C) reviewed the assumptions and methods used to calculate O&M and capital cost allocations used in the 2015 Wastewater Cost of Service Study (2015 COS Study) prepared by Raftelis which were based on the 2000 Wastewater Rates Cost Allocation Updated (2000 COS Study) prepared by Carollo Engineers. For the current COS Study, focused updates were made to the wastewater characterization parameters, specifically the parameters used for organic strength and applied to overall residential wastewater strength. In addition, updated O&M and capital cost allocations were calculated to apply to parameters of Inflow & Infiltration (I&I) flow [stormwater (SW) and groundwater (GW) flow], wastewater flow (WW), Chemical Oxygen Demand (COD), and Total Suspended Solids (TSS) .

3.2.1. WASTEWATER CHARACTERIZATION UPDATE

As part of the 2018 COS Study, updates to the wastewater characterization for organic strength and for residential wastewater strength were performed.

3.2.1.1. Update to Organic Strength Measurement

The 2000 and 2015 COS Studies utilized Chemical Oxygen Demand filtered (CODf) as a parameter for organic strength. CODf is the fraction of total COD that is measured from a wastewater sample filtered through a 1.5-micron filter. Historically CODf has been used by the District due to the cannery and industrial discharges of its customers at the time. However, presently CODf is not commonly used as a wastewater strength measurement, and the District's customer base no longer includes many high strength industrial customers where the distinction is relevant.

Carbonaceous Biochemical Oxygen Demand ($cBOD_5$) and COD were considered as a replacement for CODf as part of this COS Study. Raftelis conducted a survey of parameters used by 12 major wastewater agencies to measure wastewater strength and most use either COD or biochemical oxygen demand (BOD) as measurements of organic strength (see Appendix A). COD was chosen over $cBOD_5$ to be used for the 2018 COS Study because

COD measurements are easier to perform and have a faster analysis turnaround time. CODf was replaced directly with COD as part of this COS Study based on the assumption that the ratio of CODf/COD is approximately the same for all dischargers. The particulate COD fraction was allocated to only TSS and not COD to avoid repeated allocation (double counting) of the particulate COD fraction.

3.2.1.2. Residential Wastewater Strength Characterization

In November 2017 and June 2018, the District conducted residential wastewater sampling at four locations within the EBMUD wastewater service area to characterize the relationship between CODf, COD, cBOD, and BOD in residential wastewater for use in the COS Study. The sample results showed that, on average, the COD in residential wastewater is 3.8 times higher than CODf. W&C reviewed the sampling data for consistency and correspondence with residential wastewater data from outside the EBMUD wastewater service area. Based on the results of the sampling data, Raftelis developed updated residential strength data with input from District staff.

3.2.2. O&M COST ALLOCATION

3.2.2.1. O&M Cost Allocation Calculation Process

The O&M functional category allocations from the 2000 COS Study were calculated as illustrated in the following steps:

1. Unit processes were allocated a contribution percentage from each cost component including stormwater (SW) infiltration, groundwater (GW) infiltration parameter, wastewater (WW) flow, COD, and TSS based on the function of the unit process and available flow and wastewater data. Because TSS is the measurement of all solids suspended in wastewater, it also includes the particulate fraction of COD that can be filtered out and is not included in the CODf fraction. The particulate COD fraction was allocated to only TSS and not COD to avoid repeated allocation of the particulate COD fraction.

   For example, unit cost allocations for oxygenation tank maintenance were calculated based on the assumptions that each of the eight oxygenation tanks are maintained on the same schedule and that the cost associated with stormwater flow is proportional to the number of dedicated wet weather tanks. With 3 of the 8 tanks dedicated to wet weather treatment, the stormwater allocation is calculated as follows:

   $$SW = \text{No. Wet Weather Tanks}/\text{Total No. Tanks} = 3/8 = 38\%$$

   The remaining cost is allocated to dry weather flow, COD, and TSS equally and calculated as follows:

   $$GW = (100\% - 38\%) * 33\%^{(1)} * 10\%^{(2)} = 2\%$$

   $$WW = (100\% - 38\%) * 33\%^{(1)} * 90\%^{(2)} = 18\%$$

   $$COD = (100\% - 38\%) * 33\%^{(1)} = 21\%$$

   $$TSS = (100\% - 38\%) * 33\%^{(1)} = 21\%$$

   Notes: 1. Costs not attributable to stormwater are allocated equally 1/3 each to dry weather flow (wastewater and groundwater), COD, and TSS.
   2. Dry weather flow comprised of 90% wastewater and 10% GW infiltration.

The unit process assignments to each O&M functional categories are presented in Table 3-1. The cost component allocations in bold have been updated in the current COS Study and more details are provided in Section 3.2.2.3.

Each unit process was then assigned to an O&M functional category. The unit processes assigned to each O&M functional category are presented in Table 3-1. Allocations for each O&M category were then calculated in Table 3-2. The unit processes designations in bold have been updated in the current COS Study and more details are provided in Section 3.2.2.3

Table 3-1: Unit Process Cost Component Allocations

Unit Process Designation	SW	GW	Flow	COD	TSS
Interception	16	10	74	0	0
Pre/Post Chlorination	16	10	74	0	0
Dechlorination	16	10	74	0	0
Scum Disposal	0	0	0	0	100
Influent Pumping	16	10	74	0	0
Grit Removal	16	10	0	0	74
Primary Sedimentation (Operation)	8	9	83	0	0
Primary Sedimentation (Maintenance)	**44**	**6**	**51**	**0**	**0**
Primary Sludge Pumping	0	0	0	0	100
Oxygen Production	0	0	0	50	50
Oxygenation Tanks (Operation)	8	3	27	31	31
Oxygenation Tanks (Power)	8	1	3	44	44
Oxygenation Tanks (Maintenance)	38	2	18	21	21
RAS/WAS Pumping	0	0	0	50	50
Operations Center	6	3	27	32	32
WAS Thickening	0	0	0	50	50
Sludge Digestion	0	0	0	25	75
Power Generation Station	6	3	20	32	39
Debt Services	0	0	24	35	41
Sludge Dewatering	0	0	0	25	75
Sludge Disposal	0	0	0	25	75
Effluent Disposal	16	10	74	0	0
Wet Weather Facilities	100	0	0	0	0

Each unit process was then assigned to an O&M functional category. The unit processes assigned to each O&M functional category are presented in Table 3-2. The unit process designations in bold have been updated in the current COS Study and more details are provided in Section 3.2.2.4.

Table 3-2: Unit Process Designation Assignments

O&M Functional Categories	Unit Process Designations
Interceptor	Interceptor
Wet	Wet Weather Facilities
Influent Operations	**Pre/Post Chlorination** **Dechlorination** **Influent Pumping** **Effluent Disposal**
Influent Maintenance	**Pre/Post Chlorination** **Dechlorination** **Influent Pumping** **Effluent Disposal**
Primary Operations	**Scum Disposal** **Grit Removal** **Primary Sedimentation (Operation)** **Primary Sludge Pumping**
Primary Maintenance	**Scum Disposal** **Grit Removal** **Primary Sedimentation (Maintenance)** **Primary Sludge Pumping**
Secondary Operations	Oxygen Production Oxygenation Tanks (Operation) Oxygenation Tanks (Power) Secondary Clarification (Operation) RAS/WAS Pumping Operations Center
Secondary Maintenance	Oxygen Production Oxygenation Tanks (Maintenance) Oxygenation Tanks (Power) Secondary Clarification (Maintenance) RAS/WAS Pumping Operations Center
Sludge Operations	WAS Thickening Sludge Digestion Sludge Dewatering Sludge Disposal
Sludge Maintenance	WAS Thickening Sludge Digestion Sludge Dewatering Sludge Disposal
PGS	Power Generation Station

2. Allocations for each O&M functional category were then calculated based on the unit process allocations in each category and the respective cost percentages of each unit process. For example, the secondary maintenance functional category allocations were calculated from the cost weighted average of the cost component allocation for the unit processes assigned to the category including Oxygen Production, Oxygenation Tanks (Maintenance), Oxygenation Tanks (Power), Secondary Clarification (Maintenance), RAS/WAS Pumping, and Operations Center. The values used to calculate the secondary functional category is shown in Table 3-3.

Table 3-3: Secondary Maintenance Functional Category Allocations[1]

Unit Process Designation	SW	GW	Flow	COD	TSS	% of budget
O2 Tanks (Mtn)	38	2	18	21	21	26%
O2 Tanks (Power)	8	1	3	44	44	6%
Secondary Clarification (Mtn)	17	3	24	28	28	26%
Operations Center	6	3	27	32	32	6%
RAS/WAS Pumping	0	0	0	50	50	7%
O2 Production	0	0	0	50	50	29%
Secondary Maintenance Allocation	**15%**	**2%**	**13%**	**35%**	**35%**	

Notes: 1. Unit process contribution allocations and relative percent of each O&M budget based on values used in the 2000 COS Study.

3.2.2.2. O&M Cost Allocation Review

W&C reviewed the O&M cost allocations from the 2000 and 2005 COS Studies for each unit process designation in view of current wastewater treatment plant operation and available data. The allocations and the unit processes assigned to each O&M category were then reviewed.

Flow Contribution Calculations

The stormwater, groundwater infiltration, and wastewater flow contributions of 16%, 10% and 74% used in the 2000 COS Study were used in this COS Study and not updated because the balance of base wastewater flow, stormwater, and groundwater infiltration entering the District's interceptors and the MWWTP has only marginally changed in the last two decades based on review of 2008-2017 flow data. The analysis of 2008 to 2017 flow data is presented below.

The flow contribution percentages from the 2000 COS Study were calculated as follows from influent flow data and customer water consumption data from FY 1990 to FY 1999. In that 10-year period, the Average Day Annual Flow (ADAF) was 76.5 MGD and the Average Dry Weather Flow (ADWF) was 64.1 MGD.

1. Wastewater flow was determined based on water consumption data for industrial, commercial, and residential accounts. The base wastewater flow was estimated at 56.8 MGD. The percentage of flow from the base wastewater flow is estimated as follows:

$$\%WW = WW/ADAF = 56.8/76.5 = \mathbf{74\%}$$

2. Stormwater flow was estimated as the difference of the ADAF and ADWF. The stormwater inflow was estimated as follows:

$$SW = ADAF - ADWF = 76.5\ MGD - 64.1\ MGD = 12.4\ MGD.$$
$$\%SW = (ADAF - ADWF)/ADAF = 12.4/76.5 = \mathbf{16\%}$$

3. Groundwater infiltration flow was estimated as the fraction of ADWF not accounted for in the base wastewater flow. The groundwater inflow was estimated as follows:

GW= ADWF – WW = 64.1 MGD – 56.8 MGD = 7.3 MGD
%GW = (ADWF – WW)/ADAF = 7.3/76.5 = **10%**

2008 to 2017 Flow Data Review

W&C reviewed influent flow data from 2008-2017 to verify the above flow allocations are still valid. The 10-year ADAF, ADWF and SW flows from 2008 to 2017 are shown in Table 3-4. The 10-year average ADAF, ADWF, and SW flows have decreased 20%, 21%, and 15%, respectively, from FY 1990-FY 1999 flows.

Table 3-4: Annual Average Influent Flow Data in MGD from 2008-2017

Year	ADAF	ADWF	SW (ADAF-ADWF)
2008	65	58	7
2009	66	54	12
2010	70	55	15
2011	67	56	11
2012	64	51	13
2013	52	49	3
2014	55	46	9
2015	47	43	4
2016	59	45	14
2017	64	47	17
10-year Average	**60.9**	**50.4**	**10.5**
% decrease from FY 1990– FY 1999 flow data	**20%**	**21%**	**15%**

The updated flow contributions were estimated based on the assumption that groundwater infiltration flows have decreased by the same percentage (15%) as the stormwater inflow flows. It is assumed that factors contributing to I&I such as cracked pipes and leaky joints in the collection system will affect groundwater infiltration and stormwater inflow equally. Collection system improvements to address those issues are assumed to have reduced inflow and infiltration to the same degree. The updated SW, GW, and WW flow contributions were estimated as 17%, 10%, and 73%, respectively, and calculated as follows:

1. Stormwater inflow was estimated as the difference of the ADAF and ADWF. The stormwater inflow was estimated as follows:

SW= ADAF- ADWF= 60.9-50.4= 10.5 MGD
% SW = SW/ADAF = 10.5/60.9 = **17%**

2. Groundwater infiltration was assumed to have decreased by the same percentage (15%) as stormwater infiltration flows. The groundwater inflow was estimated as follows:

GW = 15% * 7.3 MGD = 6.2 MGD
%GW = GW/ADAF= 6.2/60.9 = **10%**

3. Wastewater flow- Because current water consumption data was not available, wastewater flow was estimated as the fraction of ADAF not included as SW and WW. The percentage of flow from the base wastewater flow is estimated as follows:

WW=ADAF – SW – WW = 60.9 – 10.5 – 6.2 = 44.2 MGD
%WW = WW/ADAF= 44.2/60.9 = **73%**

The influent flow contributions to stormwater, groundwater, and wastewater flows from the 2000 COS Study and the estimated flow contributions from 2008 to 2017 flow data are summarized in Table 3-5. Because the change in flow contributions are minimal (1% increase from 16% to 17% for stormwater and 1% decrease from 74% to 73% for wastewater flow), the stormwater inflow, groundwater infiltration, and base wastewater flows used in the 2000 COS Study are still used in the current COS Study.

Table 3-5: Summary of Influent Flow Contributions

Time Period	SW	GW	WW
FY 1990 – FY 1999	16%	10%	74%
2008 - 2017	17%	10%	73%

Based on W&C's review, the same unit process and functional O&M category allocations used in the 2000 COS Study were found to still be valid except for the Primary Sedimentation (maintenance) unit process allocations and the Influent and Primary O&M category allocations. The proposed updates to these allocations are described below.

3.2.2.3. Primary Sedimentation (Maintenance) Unit Process Allocations Update

The primary sedimentation (maintenance) unit process was updated to reflect the current operation of the primary sedimentation tanks. The assumptions and methods used to calculate the cost allocations in the 2000 COS Study are still valid. Primary sedimentation tanks are maintained on a set schedule and associated costs for each of the 16 sedimentation tanks were assumed to be the same and proportional to the total number of tanks. Therefore, COD and TSS loadings are assumed to have no impact on maintenance costs and maintenance costs are attributed to the stormwater, groundwater infiltration, and wastewater flow parameters.

Maintenance cost allocations to stormwater and dry weather flows are estimated as the ratio of sedimentation tanks dedicated to wet and dry weather flows, respectively. There are currently seven dedicated wet weather primary sedimentation tanks, an increase from six dedicated tanks in the 2000 COS Study where the primary maintenance cost allocations were 38% SW, 6% GW, and 56% WW. The updated primary sedimentation (maintenance) process allocations were calculated as follows:

SW = (No. Wet Weather Tanks)/(Total No. Tanks)
= 7/16 = **43.8%**

GW = (% dry weather flows due to GW) * (No. tanks dedicated to dry weather flows)
= (WW/ADWF)[(1)] * (9*16)
= 0.1 * (9/16) = **5.6%**

WW = 100% - Stormwater - Groundwater
= 100% - 43.8% - 5.6% = **50.6 %**

Notes: 1. Flows used to estimate contributions of groundwater and wastewater to dry weather flows are from the 2000 COS Study.

3.2.2.4. Influent and Primary O&M Categories Allocations Update

In the 2015 COS Study, Influent and Primary O&M categories were assigned the same allocation percentages. Influent Operation and Primary Operation categories were both assigned cost allocations of 22.6% I&I flow, 62.7% wastewater flow, and 14.7% TSS and Influent Maintenance and Primary Maintenance categories were both assigned cost allocations of 28.0% I&I flow, 64.3% wastewater flow, and 7.7% TSS for maintenance. These allocations were calculated based on the weighted cost allocations from the following Unit Process Designations: Pre/Post Chlorination, Influent Pumping, Effluent Disposal, Grit Removal, Scum Disposal, Primary Sedimentation, and Primary Sludge Pumping. The updated allocations included distinct allocations for the influent and primary categories because influent O&M costs are generally related to I&I and wastewater flow only and primary O&M costs are generally related to both flow and TSS. For the influent and primary O&M allocations, particulate COD fraction is attributed to TSS and not accounted for in COD allocations to avoid repeated allocation (double counting) of the particulate COD fraction. The current updated allocations breakout the Pre/Post Chlorination, Influent Pumping, and Effluent Disposal processes to Influent O&M categories. Grit Removal, Scum Disposal, Primary Sedimentation, and Primary Sludge Pumping were assigned to the Primary O&M categories. Note that post chlorination and effluent disposal is allocated to influent O&M because the allocation includes only flow and the costs are tracked by the District in that manner. The allocation for each O&M category was calculated as the weighted average of the budget percentages for each unit process. The percent of the budget for each unit process designation was estimated from O&M budgets in the 2000 COS Study because there have not been significant changes to the unit processes. The updated allocation percentages for the influent and primary O&M categories as well as the unit process allocations attributed to each category are presented in Table 3-6.

Table 3-6: Updated Influent and Primary O&M Allocations

O&M Categories	Unit Process Designation	SW	GW	WW	COD	TSS	Percent of Budget[2]
Influent Operation	Pre/Post Chlorination	16%	10%	74%	0%	0%	100.0%
	Dechlorination	16%	10%	74%	0%	0%	
	Influent Pumping	16%	10%	74%	0%	0%	
	Effluent Disposal	16%	10%	74%	0%	0%	
	Updated Allocations	**16%**	**10%**	**74%**	**0%**	**0%**	**100.0%**
Influent Maintenance	Pre/Post Chlorination	16%	10%	74%	0%	0%	100.0%
	Influent Pumping	16%	10%	74%	0%	0%	
	Effluent Disposal	16%	10%	74%	0%	0%	
	Updated Allocations	**16%**	**10%**	**74%**	**0%**	**0%**	**100.0%**
Primary Operation	Scum Disposal	0%	0%	0%	0%	100%	100.0%
	Grit Removal	16%	10%	0%	0%	74%	
	Primary (Operation)	8%	9%	83%	0%	0%	
	Primary Sludge Pumping	0%	0%	0%	0%	100%	
	Updated Allocations	**6%**	**5%**	**23%**	**0%**	**67%**	**100.0%**
Primary Maintenance	Scum Disposal	0%	0%	0%	0%	100%	100.0%
	Grit Removal	16%	10%	0%	0%	74%	
	Primary (Maintenance)[1]	44%	6%	51%	0%	0%	
	Primary Sludge Pumping	0%	0%	0%	0%	100%	
	Updated Allocations	**32%**	**5%**	**36%**	**0%**	**28%**	**100.0%**

Rows or columns that do not add to 100% are off due to rounding

Notes:
1. Updated allocation for Primary Sedimentation (Maintenance) from Section 3.2.2.3.
2. Relative percent of each O&M budget based on estimated O&M budgets in 2000 COS Study. Costs for Influent O&M unit processes were presented as one budget and not broken out in the 2000 COS Study.
3. For the influent and primary O&M allocations, particulate COD fraction is attributed to TSS and not accounted for in COD allocations to avoid repeated allocation (double counting) of the particulate COD fraction.

3.2.2.5. Proposed O&M Cost Allocations

The cost allocations for each O&M category are summarized and shown in Table 3-11 with updated allocations in bold. I&I allocations were calculated as the sum of stormwater and groundwater allocations.

3.2.3. CAPITAL COST ALLOCATIONS

W&C reviewed the allocations for each unit process and for each asset category at the MWWTP. These capital cost allocations from the 2015 COS Study were based on the allocations from the 2000 COS Study. Allocations for each unit process have been confirmed to be reasonable and were not updated. The allocations for each asset category from the 2015 COS Study remain unchanged except for allocations for the Secondary Treatment Facility category which were updated as described below.

3.2.3.1. Secondary Treatment Facility Capital Cost Allocations Update

Costs for Secondary Treatment Facility assets have been allocated 6% to I&I and 94% wastewater flow. The cost allocations for the category were updated to account for COD and TSS. W&C updated the allocations by assigning the following unit process to Oxygenation Tanks (Structure), Oxygenation Tanks (Equipment), Secondary Clarifiers (Structure), and Secondary Clarifiers (Equipment) and calculating the weighted allocation of each parameter relative to the cost of each unit process. The proposed Secondary Treatment Facility capital cost

allocation is 2% I&I flow, 21% wastewater flow, 38% COD, and 38% TSS. The allocations and relative costs of each unit process used to calculate the proposed allocations are shown in Table 3-7.

Table 3-7: Updated Secondary Treatment Asset Allocations

Unit Process	SW	GW	Flow	COD	TSS	Percent of Cost
Oxygenation Tanks (structure)	0%	0%	0%	50%	50%	30%
Oxygenation Tanks (equipment)	0%	0%	0%	50%	50%	29%
Secondary Clarifiers (structure)	0%	6%	94%	0%	0%	22%
Secondary Clarifiers (equipment)	0%	6%	0%	47%	47%	19%
Updated Allocations	**0%**	**2%**	**21%**	**38%**	**38%**	**100%**

Notes: 1. Unit process allocations to I&I, Flow, COD, and TSS were based on allocations in the 2000 COS Study. Percent of cost were estimated from 6% Annual Cost from 2000 COS Study
2. Rows or columns that do not add to 100% are off due to rounding.

3.2.3.2. Proposed Capital Cost Allocations

The cost allocations for each Asset category are summarized and shown in Table 3-13 with updated allocations in bold.

3.3. Plant Balance

The plant balance analysis is used to estimate and validate the wastewater loadings (flow and strength) generated by each customer class. While wastewater discharged into sewers for most users is not metered when it enters the wastewater system, the total amount of flow and strength entering the treatment plant and treated every day is a known quantity. Additionally, non-residential and industrial customer flows can be estimated based on their water usage. Non-residential and industrial customer strengths are estimated according to industry accepted standards. The remaining loadings(total plant influent less: I&I, trucked waste at headworks, and non-residential and industrial loadings), are assigned to residential users.

The District currently bases its residential (SFR accounts and 2-4 dwelling unit MFR accounts) loadings on a fixed strength of 29.42 lbs of COD per dwelling unit and 11.01 lbs of TSS per dwelling unit. These fixed strengths per dwelling unit are calculated based on the average residential monthly flow per dwelling unit and the current assumed domestic strength concentrations of 855 mg/l COD and 320 mg/l TSS. The current residential assumed domestic strength concentrations are based on previous COS studies.

In addition to the fixed strength charge for residential customers, the District also assesses a variable flow charge to residential customers. However, an analysis of the billing records shows that about 97 percent of all residential customers' winter use falls within the 9 ccf per month per dwelling unit flow cap. Therefore, the flow charge is capped at 9 ccf per month per dwelling unit to recognize that some of the billed residential water consumption is likely used for irrigation purposes that does not contribute to wastewater flows and does not enter the wastewater system. Accordingly, residential billed water usage above 9 ccf per month per dwelling unit is not assessed a wastewater flow charge.

The plant balance analysis is performed by comparing the net plant influent loadings to the billed loadings from the wastewater treatment customers as shown in Table 3-8. The net plant influent is calculated by taking the total plant

influent[4] and subtracting the loadings from the R2 program (trucked waste)[5]. These loadings are then compared to the loadings from the wastewater treatment customers and the difference is attributed to I&I. The billed loadings by customer class shown in Table 3-8 include the assumed COD and TSS concentrations. The net plant loading analysis showed that the waste strength concentration for domestic strength should be decreased from 855 mg/l COD (225 mg/l CODf) and 320 mg/l TSS to 713 mg/l COD and 300 mg/l TSS[6]. Note that the plant flow shown is equivalent to 33.6 million ccf per year.

[4] Data for the total influent into the MWWTP were provided by the District.
[5] Data for the R2/trucked waste loadings were provided by the District.
[6] Based on residential wastewater sampling provided by the District.

Table 3-8: Test Year Plant Balance

	Flow (MG/yr)	COD (lbs/yr)	TSS (lbs/year)
Total Plant Influent	25,128	135,294,419	70,376,824
Less: Trucked Waste at Headworks	153	27,239,083	9,275,005
Less: I&I	9,280	1,790,750	19,311,516
Net Plant Influent	**15,695**	**106,264,585**	**41,790,303**
Non-Residential	3.57	231,114	12,522
2010 Meat Products	0.71	19,034	8,250
2011 Slaughterhouses	4.43	202,816	14,405
2020 Dairy Product Processing	0.00	0	0
2030 Fruit and Vegetable Canning	3.71	67,943	23,819
2040 Grain Mills	16.62	761,665	166,454
2050 Bakeries	3.27	141,043	819
2060 Sugar Processing	0.00	0	0
2077 Rendering Tallow	74.24	1,921,219	80,546
2080 Beverage Mfgr & Bottling	6.74	872,389	73,149
2090 Specialty Foods Mfgr	2.78	40,463	14,847
2600 Pulp and Paper Products	2.15	5,785	25,073
2810 Inorganic Chemicals Mfgr	1.96	1,585	491
2820 Synthetic Material Mfgr	90.86	1,518,571	53,081
2830 Drug Mfgr	0.63	23,683	2,200
2840 Cleaning and Sanitation Prod	0.10	6,775	1,224
2850 Paint Mfgr	0.00	0	0
2893 Ink and Pigment Mfgr	0.00	0	0
3110 Leather Tanning/Finishing	6.10	19,736	28,005
3200 Earthenware Mfgr	12.77	30,985	38,372
3300 Primary Metals Mfgr	9.60	20,703	2,404
3400 Metal Prod Fabricating	0.00	0	0
3410 Drum and Barrel Mfgr	3.49	7,516	2,036
3470 Metal Coating	71.39	481,078	59,576
4500 Air Transportation	582.66	8,795,348	4,570,780
5812 Food Service Establishment	3,700.25	22,002,084	9,264,035
6513 Apartment Bldgs (5+ units)	136.77	958,529	776,137
7000 Hotels, Motels with Food	12.37	190,045	31,999
7210 Commercial Laundries	185.15	1,796,661	293,572
7215 Coin Operated Laundromats	46.32	3,370,948	286,034
7218 Industrial Laundries	54.96	281,461	36,690
7300 Laboratories	34.60	270,446	57,744
7542 Auto Washing and Polishing	147.20	634,876	331,688
8060 Hospitals	544.20	2,053,699	363,326
8200 Schools	2,097.67	12,472,968	5,251,776
All Other	110.57	1,113,973	572,114
Multi-Use Customers	3.57	231,114	12,522
Total Non-Residential	**7,968**	**60,315,143**	**22,443,169**
Residential	**7,728**	**45,949,443**	**19,347,134**
Total (Residential & Non-Residential)	**15,695**	**106,264,585**	**41,790,303**

3.4. Allocation of Revenue Requirements by Function

The wastewater utility is comprised of various facilities, each designed and operated to fulfill a given function. In order to provide adequate service to its customers at all times, the utility must be capable of not only collecting the total amount of wastewater generated (flow), but also treating and removing various nutrients (e.g., TSS and COD) from the flow.

The separation of costs by function allows the allocation of these costs to the functional cost components. Table 3-9 shows the Test Year O&M expenses (based on the FY 2017 budget provided by the District) arranged by the different functional categories, as classified by District staff and W&C[7].

Table 3-9: Allocation of Wastewater O&M Expenses

O&M Categories	FY 2017
Interceptor	$2,783,233
R2	$2,360,771
Wet	$1,992,871
Influent Op	$6,732,235
Influent Mtn	$797,026
Primary Op	$21,814
Primary Mtn	$442,219
Secondary Op	$3,281,986
Secondary Mtn	$825,682
Sludge Op	$9,395,911
Sludge Mtn	$1,559,040
Lab	$5,813,131
Permit	$1,142,071
I/I	$3,998,801
PGS	$1,982,606
Reclaimed	$952,791
Reimbursed	$217,513
Billing	$2,231,746
Overhead	$17,394,592
Total O&M Expenses	**$63,926,037**

Table 3-10 shows the Test Year Replacement Cost Less Depreciation (RCLD) value of the total wastewater assets by the different asset classes, which are then classified by functions similar to the O&M expenses. RCLD value reflects the cost to replace the asset today less accumulated depreciation and was obtained from District's financial records[8].

[7] A detail of O&M expenses by functional categories can be found in Appendix B.
[8] A detail of the District's fixed assets can be found in Appendix C.

Table 3-10: Allocation of Wastewater Assets - RCLD Value

Assets Categories	FY 2017
Mwwtp-Chlorine System	$186,190
Mwwtp-Chlorination Building	$2,780,669
Mwwtp-Outfall Land	$4,914,159
Mwwtp-Outfall Submarine	$9,205,483
Mwwtp-Outfall Bridge	$218,197
Mwwtp-Effluent Pump Station	$10,388,412
Mwwtp-Water Pump Station #3	$863,322
Mwwtp-Process Water Plant	$32,917
Mwwtp-Dechlorination Station	$8,720,247
Mwwtp-Filter Plant Solids Handling Facility	$22,626,059
Mwwtp-Sodium Bisulfite Area	$831,280
Mwwtp-Grounds & Improvements	$41,252,798
Mwwtp-Administration and Lab Building	$16,251,701
Mwwtp-Administration and Lab Center	$18,533,056
Mwwtp-Maintenance Center	$13,965,697
Mwwtp-Piping for Plant Utilities	$8,456,170
Mwwtp-Bulk Storage Area	$1,505,954
Mwwtp-Field Services Bldg	$3,531,511
Wastewater Land - General	$18,838,029
All Wastewater Portable Equipment	$9,022,399
Mwwtp-Aerated Grit Tanks	$5,543,750
Mwwtp-Grit Dewatering Station	$11,380,202
Mwwtp-Influent Pump Station	$32,843,269
North Interceptor	$58,423,966
South Interceptor	$50,076,391
Alameda Interceptor	$20,746,285
Estuary Crossing	$1,097,142
Central Avenue Interceptor	$12,000,875
South Foothill Interceptor	$29,180,384
Adeline Street Interceptor	$24,768,192
Powell Street Interceptor	$4,032,671
ANAS Interceptor	$4,637,798
Wood St Interceptor	$22,104,951
Pump Station A-Albany	$3,237,385
Pump Station B-Fernside	$5,585,393
Pump Station C-Krusi Park	$12,134,648
Pump Station D-Oak Street	$1,554,592
Pump Station E-Grand Street	$1,400,556
Pump Station F-Atlantic Avenue	$1,685,186
Pump Station G-Airport	$2,795,700
Pump Station H-Fruitvale	$9,657,560
Pump Station J-Frederick Street	$1,257,012
Pump Station K-7Th Street	$1,412,098
Pump Station L	$5,015,645
Pump Station Q- Wet Weather Page St Berkeley	$554,685
Pump Station N (new)	$5,806
ANAS Pump Station R	$9,838,090

Allocation of Wastewater Assets - RCLD Value (continued)

Assets Categories	FY 2017
Pump Station M - Bridgeway	$2,830,600
Mwwtp-Reactor Deck Area-Oxygen Production	$5,642,565
Mwwtp-Secondary Treatment Facility	$68,121,502
Mwwtp-Power Generation Station	$77,442,495
Mwwtp-Scum Dewatering Station	$9,352,008
Mwwtp-Chemical Trench	$893,677
Mwwtp-Pre-Chlorination Facility	$745,210
Mwwtp-Chemical Storage Building (Relocated)	$2,403,686
Mwwtp-Sludge Digestion Facilities	$127,315,822
Mwwtp-Sludge Dewatering Facilities	$34,276,421
Mwwtp-Temp Sludge Dewatering Facility	$1,402,992
Mwwtp-Odor Control at Sludge Thickener	$12,152,375
Mwwtp-Composting Facility	$1,201,029
Pt. Isabel Tp-Treatment & Pretreatment Structures	$38,484,242
Mwwtp-Mid-Plant Pump Station	$5,416,024
Mwwtp-Wet Weather Pump Station	$1,350,090
Mwwtp-Washdown Pump Station	$162,968
Oakport Wet Weather-Pretreatment Structure	$10,353,021
Oakport Wet Weather-Pretreatment Structure	$2,403,306
Mwwtp-Channel Crossing for Bypass Channel	$6,247,609
Mwwtp 90" Pipe-Primry Effluent Bypass	$2,793,630
Mwwtp 72" Pipe-Primry Influent Bypass	$2,552,927
Mwwtp-Diversion Structure	$27,553,044
Mwwtp-Bypass Inlet Structure	$10,480,288
North Interceptor Junction Storage	$863,142
Mwwtp-Bypass Outlet Structure	$616,410
Mwwtp-Final Effluent Bypass Channel	$8,548,717
Mwwtp-Storage Basin	$26,506,411
Oakport WW-Chlor System	$177,325
Oakport WW-DeChlor System	$149,286
Oakport WW-Control Bldg	$847,594
Oakport WW-Emg Gen	$632,197
Oakport WW-Drainage	$1,050,006
Oakport WW-Storage Bldg.	$633,213
Oakport WW-Lscape/Pav/Fence	$3,344,044
San Antonio Creek Wet Weather TP	$12,622,514
San Antonio Creek Ww Dechlorination Facility	$5,917,619
San Antonio Creek Ww Outfall Structure	$2,787,508
San Antonio Creek Ww Gravity Sewer	$588,791
San Antonio Creek Ww Lake Merritt Channel Crossing	$1,587,448
San Antonio Creek Ww Outfall Subequacous Pipeline	$2,484,495
Versailles interceptor	$1,622,502
Total Assets	**$1,047,651,236**

3.5. Allocation of Functional Costs to Cost Components

In order to allocate costs of service to the different user classes, unit costs of service are developed. O&M expenses and capital costs are functionalized as transmission, treatment, billing, administrative, etc. These total functionalized costs are then allocated to the flow, COD, and TSS parameters based on the design of each facility. Since treatment plants are designed to treat flow, COD, and TSS, treatment costs are allocated to those three parameters based on the design of each component of the treatment system. For example, the equipment in the secondary clarifiers is designed to remove suspended solids. Along with suspended solids there is also some removal of COD; therefore, the equipment cost is allocated to TSS and COD based on the removal of those two parameters. Additionally, the secondary tank structure is designed for flow; therefore, the structure cost is allocated to flow. Most of the wastewater systems must handle the additional loadings from wet weather flows; therefore, a portion of their system costs are allocated to the I&I parameter. Administrative costs such as billing, collecting, and customer accounting are assigned to the Customer cost component. General expenses not associated with I&I, Flow, COD, TSS, or Customer Service are assigned to the Other cost component. The Other cost components are then spread among the remaining costs centers proportionately.

Table 3-11 shows the different allocations to the cost components such as the parameters for I&I, Flow, COD, TSS, etc. of each O&M functional cost category. The allocations are calculated based on the functions of each category, provided by the District from the 2000 Wastewater Rates Cost Allocation Update prepared by Carollo Engineers. These allocations were reviewed by W&C (as discussed in Section 3.2.2). Updated allocations were calculated and provided by W&C for Influent Operation, Influent Maintenance, Primary Operation, and Primary Maintenance (as shown in Table 3-6) and are indicated by bold text. Raftelis has reviewed these updated allocations to ensure that they are based on the design function of each expense as they relate to Flow, COD, TSS, I&I and has confirmed that they are reasonable.

Table 3-11: Allocation to Cost Components - O&M

O&M Categories	I&I	Flow	COD	TSS	Customer	Other	Total
Interceptor	26%	74%					100%
R2						100%	100%
Wet	100%						100%
Influent Op	**26%**	**74%**					100%
Influent Mtn	**26%**	**74%**					100%
Primary Op	**11%**	**23%**		**67%**			100%
Primary Mtn	**37%**	**36%**		**28%**			100%
Secondary Op	9%	24%	34%	34%			100%
Secondary Mtn	17%	13%	35%	35%			100%
Sludge Op			31%	69%			100%
Sludge Mtn			28%	73%			100%
Lab						100%	100%
Permit						100%	100%
I/I	100%						100%
PGS	9%	20%	32%	39%			100%
Reclaimed						100%	100%
Reimbursed						100%	100%
Billing					100.0%		100%
Overhead						100.0%	100%

Table 3-12 shows the allocation of O&M expenses (shown in Table 3-9) to the different cost components based on the allocation percentages shown in Table 3-11[9].

Table 3-12: Allocation of O&M Expenses to Cost Components

O&M Categories	I&I	Flow	COD	TSS	Customer	Other	Total
Interceptor	$723,640	$2,059,592	$0	$0	$0	$0	$2,783,233
R2	$0	$0	$0	$0	$0	$2,360,771	$2,360,771
Wet	$1,992,871	$0	$0	$0	$0	$0	$1,992,871
Influent Op	$1,750,381	$4,981,854	$0	$0	$0	$0	$6,732,235
Influent Mtn	$207,227	$589,799	$0	$0	$0	$0	$797,026
Primary Op	$2,300	$4,938	$0	$14,576	$0	$0	$21,814
Primary Mtn	$162,886	$157,266	$0	$122,067	$0	$0	$442,219
Secondary Op	$295,379	$784,395	$1,099,465	$1,102,747	$0	$0	$3,281,986
Secondary Mtn	$137,063	$105,687	$291,466	$291,466	$0	$0	$825,682
Sludge Op	$0	$0	$2,940,920	$6,454,991	$0	$0	$9,395,911
Sludge Mtn	$0	$0	$428,736	$1,130,304	$0	$0	$1,559,040
Lab	$0	$0	$0	$0	$0	$5,813,131	$5,813,131
Permit	$0	$0	$0	$0	$0	$1,142,071	$1,142,071
I/I	$3,998,801	$0	$0	$0	$0	$0	$3,998,801
PGS	$178,435	$396,521	$634,434	$773,216	$0	$0	$1,982,606
Reclaimed	$0	$0	$0	$0	$0	$952,791	$952,791
Reimbursed	$0	$0	$0	$0	$0	$217,513	$217,513
Billing	$0	$0	$0	$0	$2,231,746	$0	$2,231,746
Overhead	$0	$0	$0	$0	$0	$17,394,592	$17,394,592
Total O&M Expenses	**$9,448,982**	**$9,080,052**	**$5,395,021**	**$9,889,367**	**$2,231,746**	**$27,880,869**	**$63,926,037**
% allocation	14.8%	14.2%	8.4%	15.5%	3.5%	43.6%	

Capital costs include capital improvements financed from annual revenues, debt service and other sources. Capital costs related to specific facilities will vary significantly from year to year. Allocating these costs based on the functions of these specific facilities could cause the rates to the different customer classes to change from year to year. A reasonable method of assigning capital costs to functional components, widely practiced in the industry, is to allocate such costs on the basis of net plant investment recognizing that over a period of time these allocations will provide costs to be passed on to customers equitably.

Net plant investment is represented by the total asset value of wastewater utility facilities less accumulated depreciation[10]. The estimated fiscal year net plant investment in wastewater facilities consists of the net plants in service as of the end of the Test Year.

Table 3-13 shows the different allocations to the cost components such has I&I, Flow, COD, and TSS of each capital asset. There are no "Customer" or "Other" cost components included because the capital assets are allocated directly to I&I, Flow, COD and TSS. The allocations of the wastewater capital assets were developed for the District in the 2000 Wastewater Rates Cost Allocation Update prepared by Carollo Engineers. These allocations were reviewed by W&C (as discussed in Section 3.2.3). Updated allocations were calculated and provided by W&C for the Secondary Treatment facility (as shown in Table 3-7) and are indicated by bold text. Raftelis has reviewed these updated allocations to ensure that they are based on the design function of each asset as they relate to Flow, COD, TSS, and I&I and has confirmed that they are reasonable.

[9] A detail of O&M expenses by functional categories can be found in Appendix B.
[10] A detail of the District's fixed assets can be found in Appendix C.

Table 3-13: Allocation to Cost Components – Capital

Assets Categories	I&I	Flow	COD	TSS	Total
Mwwtp-Chlorine System	50%	50%			100%
Mwwtp-Chlorination Building	50%	50%			100%
Mwwtp-Outfall Land	50%	50%			100%
Mwwtp-Outfall Submarine	50%	50%			100%
Mwwtp-Outfall Bridge	50%	50%			100%
Mwwtp-Effluent Pump Station	50%	50%			100%
Mwwtp-Water Pump Station #3	50%	50%			100%
Mwwtp-Process Water Plant	50%	50%			100%
Mwwtp-Dechlorination Station	50%	50%			100%
Mwwtp-Filter Plant Solids Handling Facility	50%	50%			100%
Mwwtp-Sodium Bisulfite Area	50%	50%			100%
Mwwtp-Grounds & Improvements	45%	24%	11%	20%	100%
Mwwtp-Administration and Lab Building	45%	24%	11%	20%	100%
Mwwtp-Administration and Lab Center	45%	24%	11%	20%	100%
Mwwtp-Maintenance Center	45%	24%	11%	20%	100%
Mwwtp-Piping for Plant Utilities	45%	24%	11%	20%	100%
Mwwtp-Bulk Storage Area	45%	24%	11%	20%	100%
Mwwtp-Field Services Bldg	45%	24%	11%	20%	100%
Wastewater Land - General	45%	24%	11%	20%	100%
All Wastewater Portable Equipment	45%	24%	11%	20%	100%
Mwwtp-Aerated Grit Tanks	45%	24%	11%	20%	100%
Mwwtp-Grit Dewatering Station	61%			39%	100%
Mwwtp-Influent Pump Station	61%	39%			100%
North Interceptor	61%	39%			100%
South Interceptor	61%	39%			100%
Alameda Interceptor	61%	39%			100%
Estuary Crossing	61%	39%			100%
Central Avenue Interceptor	61%	39%			100%
South Foothill Interceptor	61%	39%			100%
Adeline Street Interceptor	61%	39%			100%
Powell Street Interceptor	61%	39%			100%
ANAS Interceptor	61%	39%			100%
Wood St Interceptor	61%	39%			100%
Pump Station A-Albany	61%	39%			100%
Pump Station B-Fernside	68%	32%			100%
Pump Station C-Krusi Park	61%	39%			100%
Pump Station D-Oak Street	40%	60%			100%
Pump Station E-Grand Street	82%	18%			100%
Pump Station F-Atlantic Avenue	86%	14%			100%
Pump Station G-Airport	21%	79%			100%
Pump Station H-Fruitvale	23%	77%			100%
Pump Station J-Frederick Street	51%	49%			100%
Pump Station K-7Th Street	22%	78%			100%
Pump Station L	40%	60%			100%
Pump Station Q- Wet Weather Page St Berkeley	68%	32%			100%
Pump Station N (new)	43%	57%			100%
ANAS Pump Station R	43%	57%			100%

Allocation to Cost Components – Capital (continued)

Assets Categories	I&I	Flow	COD	TSS	Total
Pump Station M - Bridgeway	69%	31%			100%
Mwwtp-Reactor Deck Area-Oxygen Production			50%	50%	100%
Mwwtp-Secondary Treatment Facility	**3%**	**21%**	**38%**	**38%**	100%
Mwwtp-Power Generation Station		24.0%	35.0%	41.0%	100%
Mwwtp-Scum Dewatering Station				100%	100%
Mwwtp-Chemical Trench	50%	50%			100%
Mwwtp-Pre-Chlorination Facility	50%	50%			100%
Mwwtp-Chemical Storage Building (Relocated)			30%	70%	100%
Mwwtp-Sludge Digestion Facilities			30%	70%	100%
Mwwtp-Sludge Dewatering Facilities			30%	70%	100%
Mwwtp-Temp Sludge Dewatering Facility			30%	70%	100%
Mwwtp-Odor Control at Sludge Thickener			30%	70%	100%
Mwwtp-Composting Facility			30%	70%	100%
Pt. Isabel Tp-Treatment & Pretreatment Structures	100%				100%
Mwwtp-Mid-Plant Pump Station	100%				100%
Mwwtp-Wet Weather Pump Station	100%				100%
Mwwtp-Washdown Pump Station	100%				100%
Oakport Wet Weather-Pretreatment Structure	100%				100%
Oakport Wet Weather-Pretreatment Structure	100%				100%
Mwwtp-Channel Crossing for Bypass Channel	100%				100%
Mwwtp 90" Pipe-Primry Effluent Bypass	100%				100%
Mwwtp 72" Pipe-Primry Influent Bypass	100%				100%
Mwwtp-Diversion Structure	100%				100%
Mwwtp-Bypass Inlet Structure	100%				100%
North Interceptor Junction Storage	100%				100%
Mwwtp-Bypass Outlet Structure	100%				100%
Mwwtp-Final Effluent Bypass Channel	100%				100%
Mwwtp-Storage Basin	100%				100%
Oakport WW-Chlor System	100%				100%
Oakport WW-DeChlor System	100%				100%
Oakport WW-Control Bldg	100%				100%
Oakport WW-Emg Gen	100%				100%
Oakport WW-Drainage	100%				100%
Oakport WW-Storage Bldg.	100%				100%
Oakport WW-Lscape/Pav/Fence	100%				100%
San Antonio Creek Wet Weather TP	100%				100%
San Antonio Creek Ww Dechlorination Facility	100%				100%
San Antonio Creek Ww Outfall Structure	100%				100%
San Antonio Creek Ww Gravity Sewer	100%				100%
San Antonio Creek Ww Lake Merritt Channel Crossing	100%				100%
San Antonio Creek Ww Outfall Subequacous Pipeline	100%				100%
Versailles interceptor	100%				100%

Table 3-14 shows the allocation of the RCLD value of the wastewater assets (shown in Table 3-10) to the different cost components based on the allocation percentages shown in Table 3-13.

Table 3-14: Allocation of Wastewater Assets to Cost Components

Assets Categories	I&I	Flow	COD	TSS	Total
Mwwtp-Chlorine System	$93,095	$93,095	$0	$0	$186,190
Mwwtp-Chlorination Building	$1,390,334	$1,390,334	$0	$0	$2,780,669
Mwwtp-Outfall Land	$2,457,079	$2,457,079	$0	$0	$4,914,159
Mwwtp-Outfall Submarine	$4,602,741	$4,602,741	$0	$0	$9,205,483
Mwwtp-Outfall Bridge	$109,099	$109,099	$0	$0	$218,197
Mwwtp-Effluent Pump Station	$5,194,206	$5,194,206	$0	$0	$10,388,412
Mwwtp-Water Pump Station #3	$431,661	$431,661	$0	$0	$863,322
Mwwtp-Process Water Plant	$16,459	$16,459	$0	$0	$32,917
Mwwtp-Dechlorination Station	$4,360,123	$4,360,123	$0	$0	$8,720,247
Mwwtp-Filter Plant Solids Handling Facility	$11,313,030	$11,313,030	$0	$0	$22,626,059
Mwwtp-Sodium Bisulfite Area	$415,640	$415,640	$0	$0	$831,280
Mwwtp-Grounds & Improvements	$18,559,527	$9,757,955	$4,592,631	$8,342,685	$41,252,798
Mwwtp-Administration and Lab Building	$7,311,598	$3,844,185	$1,809,285	$3,286,633	$16,251,701
Mwwtp-Administration and Lab Center	$8,337,974	$4,383,817	$2,063,266	$3,747,999	$18,533,056
Mwwtp-Maintenance Center	$6,283,131	$3,303,452	$1,554,787	$2,824,328	$13,965,697
Mwwtp-Piping for Plant Utilities	$3,804,409	$2,000,226	$941,417	$1,710,118	$8,456,170
Mwwtp-Bulk Storage Area	$677,525	$356,219	$167,656	$304,554	$1,505,954
Mwwtp-Field Services Bldg	$1,588,817	$835,345	$393,159	$714,189	$3,531,511
Wastewater Land - General	$8,475,181	$4,455,956	$2,097,218	$3,809,675	$18,838,029
All Wastewater Portable Equipment	$4,059,154	$2,134,162	$1,004,454	$1,824,628	$9,022,399
Mwwtp-Aerated Grit Tanks	$3,381,687	$0	$0	$2,162,062	$5,543,750
Mwwtp-Grit Dewatering Station	$6,941,923	$4,438,279	$0	$0	$11,380,202
Mwwtp-Influent Pump Station	$20,034,394	$12,808,875	$0	$0	$32,843,269
North Interceptor	$35,638,620	$22,785,347	$0	$0	$58,423,966
South Interceptor	$30,546,598	$19,529,792	$0	$0	$50,076,391
Alameda Interceptor	$12,655,234	$8,091,051	$0	$0	$20,746,285
Estuary Crossing	$669,257	$427,886	$0	$0	$1,097,142
Central Avenue Interceptor	$7,320,534	$4,680,341	$0	$0	$12,000,875
South Foothill Interceptor	$17,800,035	$11,380,350	$0	$0	$29,180,384
Adeline Street Interceptor	$15,108,597	$9,659,595	$0	$0	$24,768,192
Powell Street Interceptor	$2,459,929	$1,572,742	$0	$0	$4,032,671
ANAS Interceptor	$2,829,057	$1,808,741	$0	$0	$4,637,798
Wood St Interceptor	$13,484,020	$8,620,931	$0	$0	$22,104,951
Pump Station A-Albany	$2,201,422	$1,035,963	$0	$0	$3,237,385
Pump Station B-Fernside	$3,407,090	$2,178,303	$0	$0	$5,585,393
Pump Station C-Krusi Park	$4,853,859	$7,280,789	$0	$0	$12,134,648
Pump Station D-Oak Street	$1,274,766	$279,827	$0	$0	$1,554,592
Pump Station E-Grand Street	$1,204,478	$196,078	$0	$0	$1,400,556
Pump Station F-Atlantic Avenue	$353,889	$1,331,297	$0	$0	$1,685,186
Pump Station G-Airport	$643,011	$2,152,689	$0	$0	$2,795,700
Pump Station H-Fruitvale	$4,925,355	$4,732,204	$0	$0	$9,657,560
Pump Station J-Frederick Street	$276,543	$980,470	$0	$0	$1,257,012
Pump Station K-7Th Street	$564,839	$847,259	$0	$0	$1,412,098
Pump Station L	$3,410,638	$1,605,006	$0	$0	$5,015,645
Pump Station Q- Wet Weather Page St Berkeley	$238,515	$316,171	$0	$0	$554,685
Pump Station N (new)	$2,496	$3,309	$0	$0	$5,806
ANAS Pump Station R	$1,475,713	$8,362,376	$0	$0	$9,838,090

Allocation of Wastewater Assets to Cost Components (continued)

Assets Categories	I&I	Flow	COD	TSS	Total
Pump Station M - Bridgeway	$1,953,114	$877,486	$0	$0	$2,830,600
Mwwtp-Reactor Deck Area-Oxygen Production	$0	$0	$2,821,283	$2,821,283	$5,642,565
Mwwtp-Secondary Treatment Facility	$1,703,038	$14,373,637	$26,022,414	$26,022,414	$68,121,502
Mwwtp-Power Generation Station	$0	$18,586,199	$27,104,873	$31,751,423	$77,442,495
Mwwtp-Scum Dewatering Station	$0	$0	$0	$9,352,008	$9,352,008
Mwwtp-Chemical Trench	$446,839	$446,839	$0	$0	$893,677
Mwwtp-Pre-Chlorination Facility	$372,605	$372,605	$0	$0	$745,210
Mwwtp-Chemical Storage Building (Relocated)	$0	$0	$721,106	$1,682,580	$2,403,686
Mwwtp-Sludge Digestion Facilities	$0	$0	$38,194,747	$89,121,076	$127,315,822
Mwwtp-Sludge Dewatering Facilities	$0	$0	$10,282,926	$23,993,495	$34,276,421
Mwwtp-Temp Sludge Dewatering Facility	$0	$0	$420,898	$982,094	$1,402,992
Mwwtp-Odor Control at Sludge Thickener	$0	$0	$3,645,712	$8,506,662	$12,152,375
Mwwtp-Composting Facility	$0	$0	$360,309	$840,720	$1,201,029
Pt. Isabel Tp-Treatment & Pretreatment Structures	$38,484,242	$0	$0	$0	$38,484,242
Mwwtp-Mid-Plant Pump Station	$5,416,024	$0	$0	$0	$5,416,024
Mwwtp-Wet Weather Pump Station	$1,350,090	$0	$0	$0	$1,350,090
Mwwtp-Washdown Pump Station	$162,968	$0	$0	$0	$162,968
Oakport Wet Weather-Pretreatment Structure	$10,353,021	$0	$0	$0	$10,353,021
Oakport Wet Weather-Pretreatment Structure	$2,403,306	$0	$0	$0	$2,403,306
Mwwtp-Channel Crossing for Bypass Channel	$6,247,609	$0	$0	$0	$6,247,609
Mwwtp 90" Pipe-Primry Effluent Bypass	$2,793,630	$0	$0	$0	$2,793,630
Mwwtp 72" Pipe-Primry Influent Bypass	$2,552,927	$0	$0	$0	$2,552,927
Mwwtp-Diversion Structure	$27,553,044	$0	$0	$0	$27,553,044
Mwwtp-Bypass Inlet Structure	$10,480,288	$0	$0	$0	$10,480,288
North Interceptor Junction Storage	$863,142	$0	$0	$0	$863,142
Mwwtp-Bypass Outlet Structure	$616,410	$0	$0	$0	$616,410
Mwwtp-Final Effluent Bypass Channel	$8,548,717	$0	$0	$0	$8,548,717
Mwwtp-Storage Basin	$26,506,411	$0	$0	$0	$26,506,411
Oakport WW-Chlor System	$177,325	$0	$0	$0	$177,325
Oakport WW-DeChlor System	$149,286	$0	$0	$0	$149,286
Oakport WW-Control Bldg	$847,594	$0	$0	$0	$847,594
Oakport WW-Emg Gen	$632,197	$0	$0	$0	$632,197
Oakport WW-Drainage	$1,050,006	$0	$0	$0	$1,050,006
Oakport WW-Storage Bldg.	$633,213	$0	$0	$0	$633,213
Oakport WW-Lscape/Pav/Fence	$3,344,044	$0	$0	$0	$3,344,044
San Antonio Creek Wet Weather TP	$12,622,514	$0	$0	$0	$12,622,514
San Antonio Creek Ww Dechlorination Facility	$5,917,619	$0	$0	$0	$5,917,619
San Antonio Creek Ww Outfall Structure	$2,787,508	$0	$0	$0	$2,787,508
San Antonio Creek Ww Gravity Sewer	$588,791	$0	$0	$0	$588,791
San Antonio Creek Ww Lake Merritt Channel Crossing	$1,587,448	$0	$0	$0	$1,587,448
San Antonio Creek Ww Outfall Subequacous Pipeline	$2,484,495	$0	$0	$0	$2,484,495
Versailles interceptor	$989,726	$632,776	$0	$0	$1,622,502
Total Assets	**$465,802,474**	**$233,849,995**	**$124,198,140**	**$223,800,627**	**$1,047,651,236**
% allocation	44.5%	22.3%	11.9%	21.4%	

3.6. Allocation of Revenue Requirements

The total revenue requirements net of revenue credits from miscellaneous sources is, by definition, the net revenue requirement or net cost of providing service as shown in Table 3-15. This cost is then used as the basis to develop unit costs for the wastewater parameters and to allocate costs to the various customer classes in proportion to the services rendered. The concept of proportionate allocation to customer classes requires that allocations should take into consideration not only the volume of wastewater discharge used but also strength loadings associated with the wastewater flow.

The annual revenue requirement or cost of service to be recovered from wastewater charges includes operation and maintenance expenses and other non-operating expenses. O&M expenses include costs directly related to the collection, treatment, and disposal of wastewater and maintenance of system facilities as shown in Table 3-12.

The total Test Year cost of service to be recovered from the District's wastewater customers, shown in Table 3-15, is based on the FY 2017 budget provided by the District and estimated at approximately $91.5 million. Of this, approximately $47.3 million are operating costs and the remaining $44.2 million are capital costs, which consists of capital expenditures and existing debt service. The cost of service analysis is based upon the premise that the utility must generate annual revenues adequate to meet the estimated annual revenue requirements. As part of the cost of service analysis, revenues from sources other than wastewater rates and charges (e.g., revenues from miscellaneous services) are deducted from the appropriate cost elements. Additional deductions are made to reflect interest income and other non-operating income during the Test Year. Adjustments are also made to account for changes in cash balances to fund reserves and/or capital expenses to ensure adequate collection of revenue and to determine annual revenues needed from rates.

Table 3-15 shows the allocation of revenue requirements to operating and capital components to determine the revenue required from rates.

Table 3-15: Allocation of Revenue Requirements

	FY 2017		
	Operating	**Capital**	**Total**
Revenue Requirements			
O&M Expenses	$63,926,037		$63,926,037
Existing Debt Service		$33,301,178	$33,301,178
Proposed Debt Service		$0	$0
Admin Capital		$0	$0
Rate Funded Capital		$27,954,400	$27,954,400
Total Revenue Requirements	**$63,926,037**	**$61,255,578**	**$125,181,615**
Revenue Offsets			
Resource Recovery	$7,248,557	$4,655,692	$11,904,249
Property Taxes, less customer assistance		$4,514,980	$4,514,980
Ad Valorem Bond Levy		$2,865,215	$2,865,215
Interest	$485,439		$485,439
Laboratory Services	$4,210,262		$4,210,262
Reimbursements	$1,475,502		$1,475,502
Permit Fees	$1,592,767		$1,592,767
Capacity Charges		$0	$0
All Other Revenue			
BABS REBATE		$2,504,058	$2,504,058
PSL FEES	$1,126,722		$1,126,722
PGS ENERGY SALES		$900,014	$900,014
MISC[11]	$494,820		$494,820
Transfer (to)/from Rate Stabilization Reserve (RSR)	$0		$0
Total Revenue Offsets	**$16,634,069**	**$15,439,958**	**$32,074,027**
Adjustments			
Annual Cash Balance		$1,619,175	$1,619,175
Total Adjustments	**$0**	**$1,619,175**	**$1,619,175**
Cost of Service to be Recovered from Rates	**$47,291,967**	**$44,196,445**	**$91,488,412**

3.7. Development of Unit Costs of Service

In order to allocate costs of service to the different customer classes, unit costs of service need to be developed for each cost component. The unit costs of service are developed by dividing the total annual costs allocated to each component by the total annual service units of the respective cost component.

The unit costs of service are developed by dividing the total annual costs by the appropriate service units, such as flow, COD or TSS generated in the system, and accounts for billing costs. Table 3-16 shows the service units, such as annual flow, total pounds of COD and TSS, bills, etc. for each customer class. These service units are determined from the plant balance shown in Table 3-8 and FY 2017 consumption data provided by the District[12].

[11] Miscellaneous revenue includes billboard revenue and lease revenue.
[12] Number of parcels for FY 2017 provided by the District.

Table 3-16: Customer Class Service Units

Customer Class		Flow (ccf)	COD (lbs/yr)	TSS (lbs/yr)	Accounts	Bills	Parcels
Residential							
8800	Single Family	8,292,421	36,882,062	15,529,289	145,582	1,746,984	104,958
6514	MFR 2-4 Units	2,038,675	9,067,381	3,817,844	14,729	176,748	54,920
Subtotal Residential		**10,331,096**	**45,949,443**	**19,347,134**	**160,311**	**1,923,732**	**159,878**
Non-Residential							
2010	Meat Products	4,776	231,114	12,522			
2011	Slaughterhouses	944	19,034	8,250			
2020	Dairy Product Processing	5,917	202,816	14,405			
2030	Fruit and Vegetable Canning	0	0	0			
2040	Grain Mills	4,955	67,943	23,819			
2050	Bakeries	22,221	761,665	166,454			
2060	Sugar Processing	4,372	141,043	819			
2077	Rendering Tallow	0	0	0			
2080	Beverage Mfgr & Bottling	99,255	1,921,219	80,546			
2090	Specialty Foods Mfgr	9,014	872,389	73,149			
2600	Pulp and Paper Products	3,716	40,463	14,847			
2810	Inorganic Chemicals Mfgr	2,869	5,785	25,073			
2820	Synthetic Material Mfgr	2,620	1,585	491			
2830	Drug Mfgr	121,476	1,518,571	53,081			
2840	Cleaning and Sanitation Prod	839	23,683	2,200			
2850	Paint Mfgr	140	6,775	1,224			
2893	Ink and Pigment Mfgr	0	0	0			
3110	Leather Tanning/Finishing	0	0	0			
3200	Earthenware Mfgr	8,157	19,736	28,005			
3300	Primary Metals Mfgr	17,075	30,985	38,372			
3400	Metal Prod Fabricating	12,835	20,703	2,404			
3410	Drum and Barrel Mfgr	0	0	0			
3470	Metal Coating	4,660	7,516	2,036			
4500	Air Transportation	95,439	481,078	59,576			
5812	Food Service Establishment	778,957	8,795,348	4,570,780			
6513	Apartment Bldgs (5+ units)	4,946,864	22,002,084	9,264,035			
7000	Hotels, Motels with Food	182,844	958,529	776,137			
7210	Commercial Laundries	16,536	190,045	31,999			
7215	Coin Operated Laundromats	247,521	1,796,661	293,572			
7218	Industrial Laundries	61,921	3,370,948	286,034			
7300	Laboratories	73,470	281,461	36,690			
7542	Auto Washing and Polishing	46,252	270,446	57,744			
8060	Hospitals	196,797	634,876	331,688			
8200	Schools	727,541	2,053,699	363,326			
	All Other	2,804,374	12,472,968	5,251,776			
	Multi-Use Customers	147,823	1,113,973	572,114			
Subtotal Non-Residential		**10,652,180**	**60,315,143**	**22,443,169**	**18,513**	**222,156**	**15,927**
Total		**20,983,276**	**106,264,585**	**41,790,303**	**178,824**	**2,145,888**	**175,805**

Table 3-17 shows the allocation of the revenue offsets from each miscellaneous revenue source to each cost component. The revenue offsets are applied to the capital or operating cost components (I&I, Flow, COD, TSS, etc.) of the revenue requirements based on an overall allocation percentage for O&M and Capital shown at the bottom of Table 3-12 and Table 3-14, respectively, with the following exceptions:

- Resource Recovery (R2) Revenue[13]:
  - Operating - $7.25 million of R2 revenue is used to offset operating costs. 33% of this revenue is assigned to COD, 11% to TSS, and 34% is assigned to Flow to offset the treatment costs for R2. An additional 22% of R2 revenue is assigned to the Other (general) cost component to offset the R2 program administration costs.[14]
  - Capital - $4.66 million of R2 revenue is used to offset the wastewater systems capital costs. $1.4 million of this revenue is assigned to COD and $3.26 million is assigned to TSS.
- Property Tax Revenue: The District's wastewater system receives approximately $4.5 million in property tax revenue that does not have specific spending restrictions. Because it is unrestricted, $400,000 of the property tax revenues are assigned to fund the District's Customer Assistance Program which provides financial assistance to low income customers for the payment of wastewater charges. The wastewater system's remaining property tax revenue is allocated to the wastewater system's capital costs.
- Operating Reimbursements: The operating reimbursements, including laboratory services, reimbursements, and permit fees, offset Other (general) costs, because costs for laboratory services and permitting are assigned to the Other cost component.
- Private Sewer Lateral Fees: The Private Sewer Lateral (PSL) fees are for the required inspection of private sewer laterals. The revenue from PSL fees are used to offset the Customer cost component since the corresponding PSL expenses are charged to the I&I program, which is reallocated to the Customer cost component.

The percentages, shown in Table 3-17, are applied to the revenue offsets, totaling $32.07 million, shown in Table 3-15, to determine the amount of offsets to be applied to each cost component.

[13] The R2 program is based on voluntary agreements entered into by the parties and thus its fees/charges are not subject to Proposition 218 or to detailed cost-based justifications.
[14] Allocation of the R2 program revenue to offset operating expenses was provided by the District based on an analysis of the treatment of R2 waste.

Table 3-17: Revenue Offsets Allocation

Revenue Offsets Allocation	I&I	Flow	COD	TSS	Customer	Other	Total
Operating							
Resource Recovery		33%	11%	34%		22%	100%
Interest	15%	14%	8%	15%	3%	44%	100%
Laboratory Services						100%	100%
Reimbursements						100%	100%
Permit Fees						100%	100%
All Other Revenue							100%
PSL FEES					100%		100%
MISC		14%	8%	15%	17%	44%	100%
Transfer (to)/from Rate Stabilization Reserve (RSR)		14%	8%	15%	17%	44%	100%
Capital							100%
Resource Recovery			30%	70%			100%
Property Taxes, less customer assistance	100%						100%
Ad Valorem Bond Levy	44%	22%	12%	21%			100%
Capacity Charges	44%	22%	12%	21%			100%
All Other Revenue							100%
BABS REBATE	44%	22%	12%	21%			100%
PGS ENERGY SALES	44%	22%	12%	21%			100%
Revenue Offsets	**($7,374,158)**	**($3,930,650)**	**($3,019,996)**	**($7,214,393)**	**($1,229,752)**	**($9,305,079)**	**($32,074,027)**

The Other component is spread proportionally back to the remaining costs components. The calculation of the unit cost for each component is shown at the bottom of Table 3-18. The I&I capital expense will be recovered on the Wet Weather Facilities Charge collected on the property tax bill on each property that is connected to the wastewater system to pay for the capital facilities required to handle the wet weather flows that enter the District's wastewater system through the local collection systems and sewer connections. The I&I operating expense is the portion of the wastewater operating costs that is allocated to the I&I and is recovered on the customer unit cost component because it has no relationship to treatment flow or strength. Table 3-18 shows the calculation of the unit cost for each cost component. Total capital expenses equal debt service, administration of capital, and direct expenses, less transfers from other funds for capital and an adjustment for annual cash balance as shown in Table 3-15.

Table 3-18: Development of Unit Costs

	I&I	Flow	COD	TSS	Customer	Other	Total
Operating Expenses (**Table 3-12**)	$9,448,982	$9,080,052	$5,395,021	$9,889,367	$2,231,746	$27,880,869	$63,926,037
I&I Operating Expenses to be Recovered on Customer	($9,448,982)				$9,448,982	$0	
Adjusted Operating Expenses	$0	$9,080,052	$5,395,021	$9,889,367	$11,680,728	$27,880,869	$63,926,037
Capital Expenses (less Annual Cash Balance) (**Table 3-15**)	$26,515,297	$13,311,656	$7,069,844	$12,739,606	$0	$0	$59,636,403
Revenue Offsets (**Table 3-17**)	($7,374,158)	($3,930,650)	($3,019,996)	($7,214,393)	($1,229,752)	($9,305,079)	($32,074,027)
Total Cost of Service	**$19,141,139**	**$18,461,058**	**$9,444,869**	**$15,414,580**	**$10,450,976**	**$18,575,790**	**$91,488,412**
Allocation of Other Cost	$4,876,546	$4,703,284	$2,406,249	$3,927,139	$2,662,572	($18,575,790)	$0
Allocated Cost of Service	**$24,017,686**	**$23,164,342**	**$11,851,117**	**$19,341,719**	**$13,113,548**	**$0**	**$91,488,412**
Unit of Service (**Table 3-16**)	175,805	20,983,276	106,264,585	41,790,303	2,145,888		
	parcel	ccf	lbs/yr	lbs/yr	bills/yr		
Unit Cost	$11.38	$1.104	$0.112	$0.463	$6.111		
	per month	per ccf			$/month		

3.8. Allocation of Costs to Customer Class

The unit cost of each of the cost categories shown in Table 3-18 is then applied to the projected Test Year usage and units of each customer class to derive customer class costs.

Table 3-19 shows the allocation of costs to each customer class, based on the service units from Table 3-16 and the unit cost from Table 3-18. This includes the I&I cost component assessed to SFR, MFR with up to 4 dwelling units, and to non-residential overall based on the average I&I parcel unit cost.

Table 3-19: Allocation of Costs to Customer Class

Customer Class		I&I	Flow	COD	TSS	Customer	Total
Residential							
8800	Single Family	$14,338,888	$9,154,360	$4,113,258	$7,187,389	$10,675,841	$45,469,736
6514	MFR 2-4 Units	$7,502,923	$2,250,581	$1,011,236	$1,767,005	$1,080,109	$13,611,854
Non-Residential		$2,175,875	$0	$0	$0	$1,357,598	$3,533,473
2010	Meat Products		$5,272	$25,775	$5,795		$36,843
2011	Slaughterhouses		$1,042	$2,123	$3,818		$6,983
2020	Dairy Product Processing		$6,532	$22,619	$6,667		$35,818
2030	Fruit and Vegetable Canning		$0	$0	$0		$0
2040	Grain Mills		$5,471	$7,577	$11,024		$24,072
2050	Bakeries		$24,531	$84,944	$77,039		$186,515
2060	Sugar Processing		$4,826	$15,730	$379		$20,935
2077	Rendering Tallow		$0	$0	$0		$0
2080	Beverage Mfgr & Bottling		$109,572	$214,263	$37,279		$361,115
2090	Specialty Foods Mfgr		$9,951	$97,293	$33,856		$141,099
2600	Pulp and Paper Products		$4,103	$4,513	$6,872		$15,487
2810	Inorganic Chemicals Mfgr		$3,167	$645	$11,605		$15,417
2820	Synthetic Material Mfgr		$2,892	$177	$227		$3,296
2830	Drug Mfgr		$134,103	$169,358	$24,567		$328,028
2840	Cleaning and Sanitation Prod		$926	$2,641	$1,018		$4,586
2850	Paint Mfgr		$155	$756	$566		$1,476
2893	Ink and Pigment Mfgr		$0	$0	$0		$0
3110	Leather Tanning/Finishing		$0	$0	$0		$0
3200	Earthenware Mfgr		$9,005	$2,201	$12,962		$24,168
3300	Primary Metals Mfgr		$18,850	$3,456	$17,759		$40,065
3400	Metal Prod Fabricating		$14,169	$2,309	$1,112		$17,590
3410	Drum and Barrel Mfgr		$0	$0	$0		$0
3470	Metal Coating		$5,144	$838	$942		$6,925
4500	Air Transportation		$105,359	$53,652	$27,574		$186,584
5812	Food Service Establishment		$859,924	$980,898	$2,115,485		$3,956,307
6513	Apartment Bldgs (5+ units)		$5,461,056	$2,453,774	$4,287,654		$12,202,484
7000	Hotels, Motels with Food		$201,849	$106,900	$359,218		$667,967
7210	Commercial Laundries		$18,255	$21,195	$14,810		$54,260
7215	Coin Operated Laundromats		$273,249	$200,372	$135,873		$609,494
7218	Industrial Laundries		$68,357	$375,944	$132,384		$576,685
7300	Laboratories		$81,107	$31,390	$16,981		$129,478
7542	Auto Washing and Polishing		$51,060	$30,161	$26,726		$107,947
8060	Hospitals		$217,252	$70,804	$153,515		$441,571
8200	Schools		$803,164	$229,038	$168,157		$1,200,359
	All Other		$3,095,869	$1,391,043	$2,430,669		$6,917,581
	Multi-Use Customers		$163,188	$124,235	$264,790		$552,214
Total Cost		**$24,017,686**	**$23,164,342**	**$11,851,117**	**$19,341,719**	**$13,113,548**	**$91,488,412**

The residential user class has the highest assignment of costs at $59 million and is responsible for 64.6 percent of the total cost of service. The non-residential user classes are responsible for the remaining 35.4 percent of the annual cost of service. I&I cost assignment is based on average I&I unit cost per parcel. The total on Table 3-19 includes I&I contribution of $24 million from all customer classes.

4. Proposed Wastewater User Charges

4.1. Setting Individual Component Rates

The revenue requirements and cost of service analyses described in the preceding sections of this report provide a basis for the design of a wastewater user charge structure. Setting rates involves the development of user charge schedules for each user class so as to recover the annual cost of service determined for each user class. This section of the report discusses the development of a schedule of wastewater rates for the District's user classes and analyzes the impact of the proposed changes in cost allocations and rate design on the user classes.

As a result of the COS Study, the District is retaining its current customer classes and rate structure for the wastewater user charges. The District has defined three customer classes for the wastewater system: SFR, MFR, and non-residential. Non-residential customers are further classified based on the type of business operated, which are grouped together or identified based on common characteristics of wastewater contributed to the system, including flow and strength. Together, the rates for the components of the wastewater service fees are structured to proportionately recover the costs of providing wastewater services among the various customer classes

The primary emphasis in the design of rate structures is ordinarily placed on achieving fairness and equity, with the objective of being able to ensure that each customer class pays its proportionate share of costs and to comply with regulatory requirements. However, the individual customer class rates are determined based on the cost of service analysis.

The following subsections discuss how each rate component is calculated. The District's current wastewater rate structure has five components: a Service Charge, a Flow Charge, a Strength Charge, a SF Bay Pollution Prevention Fee, and a Wet Weather Facilities Charge.

1. **Service Charge:** The Service Charge is a fixed monthly charge per service connection and is calculated to recover a portion of the District's customer related costs defined in the COS.
2. **Flow Charge:** The Flow Charge is a variable monthly charge based on a customer's metered water use and assumptions regarding the volume of water returned to the sewer system. The charge recovers the flow related charges defined in the COS.
3. **Strength Charge:** The Strength Charge is based on the estimated amount of COD and TSS that a customer discharges into the sewer system, and is calculated to recover the District's costs of treating COD and TSS as defined in the COS. As residential customers' wastewater is fairly homogeneous, the strength charge is a fixed Treatment Strength Charge.
4. **SF Bay Pollution Prevention Fee:** The Pollution Prevention Fee is a fixed monthly charge that varies for residential and commercial customers based on the costs of the District's pollution prevention programs for residential and commercial customers. The District's pollution prevention programs were established to reduce pollutants at the source and protect the San Francisco Bay.
5. **Wet Weather Facilities Charge (WWFC) collected on the property tax bill:** The Wet Weather Facilities Charge is a fixed annual charge assessed by lot size for properties connected to the wastewater system. It is calculated to recover the District's I&I costs defined in the COS.

4.2. Proposed Residential Charges

The District currently has a fixed charge plus Flow Charge rate structure for its residential wastewater customers. One advantage of the fixed charge plus Flow Charge rate structure is that the fixed component can be used to stabilize revenues and to recognize the fact that wastewater system costs are mostly fixed, while the flow or variable component can be used to encourage water conservation. The fixed charges consist of a monthly Service Charge, assessed per account, and a monthly Strength Charge, assessed per dwelling unit. The monthly Strength Charge is assessed per dwelling unit because residential accounts include MFR customers that can have up to four (4) dwelling units. The Flow Charge is assessed per ccf of water usage, with a maximum of 9 ccf per month per dwelling unit. The maximum of 9 ccf per month per dwelling unit is used because an analysis of the billing records shows that about 97 percent of all residential customers' winter use falls within the 9 ccf per month per dwelling unit.

Table 4-1 shows the Test Year COS wastewater charges for residential customers, which includes SFR and MFR up to 4 dwelling units. Apartment buildings with 5 or more dwelling units are considered non-residential customers for wastewater billing purposes because the District does not track the number of individual dwelling units in large apartment buildings. The waste strength concentration for apartments with 5 or more units is assumed to be the same as the domestic strength used for the SFR and MFR up to 4 dwelling units on the basis that apartment dwellers are domestic users that generate residential strength. The revenue requirement for the Service Charge is the customer cost component (refer to Table 3-19), for the Strength Charge is the COD and TSS cost components, and for the Flow Charge is the flow component. The monthly Service Charge is $6.12 (rounded to the nearest cent from Table 3-18) and the Flow Charge is $1.11 (rounded to the nearest cent from Table 3-18). The Strength Charge per dwelling unit is based on 20.77 lbs of COD and 8.74 lbs of TSS per month times the unit rates of $0.112 and $0.463, respectively, from Table 3-18, for a total of $6.37. The average monthly charge shown in Table 4-1 is based on 6 ccf per month ($6.12 + $6.37 + (6 ccf x $1.11) = $19.15).

Table 4-1: Test Year Residential Wastewater Charges

	Revenue Requirements	Units of Service	COD (mg/l)	TSS (mg/l)	Test Year Proposed
Service Charge (per account)	$11,755,950	1,923,732			$6.12
Strength Charge (per dwelling unit)	$14,078,888	2,212,512	713	300	$6.37
Minimum monthly charge per household					$12.49
Plus: A flow charge per ccf (maximum of 9 ccf)	$11,404,941	10,331,096			$1.11
Minimum monthly charge at 0 units					$0.00
Maximum monthly charge at 9 ccf					$9.99
Total Residential Charge					
Minimum monthly charge					$12.49
Maximum monthly charge					$22.48
Average monthly charge at 6 ccf					$19.15

4.3. Proposed Non-Residential Charges

Similarly, the District is retaining the current rate structure and classification of customer groups based on the strength of their wastewater discharges. Non-residential customers will pay the same fixed charges as residential customers, assessed per meter, and will be charged a Flow Charge based on their actual water usage and their user classification.

Table 4-2 shows the Test Year COS wastewater charges for non-residential customers. The revenue requirement for the fixed charge is the customer component (refer to Table 3-19) and the Flow Charge is the sum of the flow, COD and TSS components. The monthly service charge is $6.12 (rounded to the nearest cent from Table 3-18). The treatment charge is the combined flow and strength treatment rates from the unit rates in Table 3-18 of $1.104 per ccf for flow, $0.112 per pound of COD, and $0.463 per pound of TSS. These unit rates are applied to one (1) ccf of flow and the pounds of COD and TSS based on the assumed concentrations listed in Table 4-2 .For example, non-residential customers that produce meat products have a Strength Charge based on 48.37 lbs of COD and 2.62 lbs of TSS per month times the unit rates of $0.112 and $0.463, respectively, from Table 3-18 for a total of $6.63. To this the flow charge of $1.104 is added for a total of $7.74 (rounded to the nearest cent).

Table 4-2: Test Year Non-Residential Wastewater Charges

	Revenue Requirements	Units of Service	COD (mg/l)	TSS (mg/l)	Test Year Proposed
Monthly Service Charge (per meter)	$1,357,598	222,156			$6.12
Treatment charge including flow processing (per ccf of sewage discharge)					
Meat Products	$36,843	4,776	7,752	420	$7.74
Slaughterhouses	$6,983	944	3,230	1,400	$7.41
Dairy Product Processing	$35,818	5,917	5,491	390	$6.07
Fruit and Vegetable Canning	$0	0	0	370	$4.89
Grain Mills	$24,072	4,955	2,196	770	$4.87
Bakeries (including Pastries)	$186,515	22,221	5,491	1,200	$8.41
Sugar Processing	$20,935	4,372	5,168	30	$4.81
Rendering Tallow	$0	0	0	3,500	$14.61
Beverage Manufacturing & Bottling	$361,115	99,255	3,101	130	$3.65
Specialty Foods Manufacturing	$141,099	9,014	15,504	1,300	$15.70
Pulp and Paper Products	$15,487	3,716	1,744	640	$4.18
Inorganic Chemicals Mfgr.	$15,417	2,869	323	1,400	$5.38
Synthetic Material Manufacturing	$3,296	2,620	97	30	$1.26
Drug Manufacturing	$328,028	121,476	2,003	70	$2.71
Cleaning and Sanitation Products	$4,586	839	4,522	420	$5.48
Paint Manufacturing	$1,476	140	7,752	1,400	$10.57
Ink and Pigment Manufacturing	$0	0	0	80	$3.82
Leather Tanning and Finishing	$0	0	0	1,700	$14.60
Earthenware Manufacturing	$24,168	8,157	388	550	$2.97
Primary Metals Manufacturing	$40,065	17,075	291	360	$2.35
Metal Products Fabricating	$17,590	12,835	258	30	$1.38
Drum and Barrel Manufacturing	$0	0	0	1,400	$14.86
Metal Coating	$6,925	4,660	258	70	$1.49
Air Transportation	$186,584	95,439	808	100	$1.96
Food Service Establishments	$3,956,307	778,957	1,809	940	$5.09
Apartment Buildings (5 or more units)	$12,202,484	4,946,864	713	300	$2.47
Hotels, Motels with Food Service	$667,967	182,844	840	680	$3.66
Commercial Laundries	$54,260	16,536	1,841	310	$3.29
Coin Operated Laundromats	$609,494	247,521	1,163	190	$2.47
Industrial Laundries	$576,685	61,921	8,721	740	$9.34
Laboratories	$129,478	73,470	614	80	$1.77
Automobile Washing and Polishing	$107,947	46,252	937	200	$2.34
Hospitals	$441,571	196,797	517	270	$2.25
Schools	$1,200,359	727,541	452	80	$1.66
All Other BCC (includes dischargers of only segregated domestic wastes from sanitary conveniences)	$6,917,581	2,804,374	713	300	$2.47

4.4. Proposed Wet Weather Facilities Charges

The WWFC funds capital expenses for the I&I facilities (wet weather facilities, interceptors, pumping stations and storage basins) that are required to handle the wet weather flows that enter the wastewater system through the local wastewater collection systems and sewer connections. The volume of wet weather flows that enter the wastewater

system from each property is proportional to the size of the collection system needed to serve each property. Properties with larger lots require more linear feet of collection system which presents more opportunity for storm water and ground water to enter through defects in the collection system. The volume of wet weather flows in the collection system has no direct relationship to a customer's monthly water use nor if the wastewater discharge is from a residential or non-residential customer. For these reasons, lot size rather than water service use is used as basis of the WWFC. The structure of WWFC is based on the rationale that larger lots contribute proportionally more to the wet weather flows than smaller lots. Accordingly, the WWFC is structured into three generalized lot sizes (or bins): 0 to 5,000 square feet (sq ft), 5,001 to 10,000 sq ft, and over 10,001 sq ft. The WWFC is based on median lot size for each of these bins.

The I&I capital facilities are designed to handle wet weather flows that are in excess of the normal wastewater discharges from wastewater customers. Because the WWFC is based on the size of the property and is unrelated to water or wastewater usage at the property, the District collects the WWFC on the property tax bill for all parcels that have connections to the local wastewater collection systems within the District's wastewater service area. The WWFC for public agencies that are exempt from property taxes is collected through the District's billing process.

Table 4-3 shows the calculation of the Test Year COS WWFC, based on median lot size for all customers. The total wet weather cost is divided by the total parcel areas within the District's service area to arrive at a unit cost per 1,000 sq ft. The proposed WWFC for each lot size is based on the unit cost multiplied by the median lot size in each bin.

Table 4-3: Test Year Wet Weather Facilities Charges

Lot size (sq ft)	Total # of Parcels	Median Lot Size (sq ft)	Test Year Proposed
0-5,000	104,958	4,000	$97.00
5,001-10,000	54,920	6,250	$151.56
over 10,001	15,927	14,284	$346.39
Total (Table 3-16)	**175,805**		
Total Wet Weather Costs (**Table 3-18**)	$24,017,686		
Total Area (1,000 sq ft)	990,583		
Unit Cost/yr/1,000sq ft	$24.25		

4.5. San Francisco Bay Pollution Prevention Fee

The District must undertake a variety of activities to successfully operate the Pretreatment Program and Pollution Prevention Program required by the United States Environmental Protection Agency (EPA) and the State of California (through the Regional Water Quality Control Board (RWQCB)).

The Pollution Prevention Program, required by the RWQCB, develops and implements strategies to minimize and monitor pollutants from both residential and non-residential sources. The fee applies to accounts in the District's wastewater service area to cover costs for program implementation and has not been increased since 2008. For non-residential customers (excluding apartment buildings with 5 or more dwelling units), the fee will remain $5.48 per month for FY 2020 and FY 2021. The fee for residential customers will remain $0.20 per month for each single family and multi family dwelling unit (apartment buildings with 5 or more dwelling units pay based on 5 dwelling units) for FY 2020 and FY 2021.

4.6. Customer Impacts

Raftelis completed an analysis to evaluate the impact of the proposed rate structure on customers with various water usage levels. The results of the COS analysis are shown in comparison to the District's Test Year rates. By comparing the changes to the Test Year in this section, the customer impact attributed to the COS adjustments can be shown. Section 5 contains the proposed FY 2020 and FY 2021 wastewater rates and bill impacts that incorporate the COS adjustments and updated revenue requirements for FY 2020 and FY 2021.

Table 4-4 shows the bill impacts for different customers with typical water usage for the Test Year.

Table 4-4: Typical Customers Wastewater Bill Impacts for Test Year

Customer Class	Monthly Flow (ccf)	FY 2017 Current Bill	FY 2017 Proposed Bill	Difference ($)	Difference (%)
SFR	6	$19.73	$19.15	($0.58)	-2.9%
MFR – Fourplex	25	$63.36	$59.35	($4.01)	-6.3%
Commercial – Office	50	$129.55	$129.62	$0.07	0.1%
Commercial – Restaurant	50	$253.05	$260.62	$7.57	3.0%
Industrial – Food Manufacturing	500	$7,255.55	$7,856.12	$600.57	8.3%

Note: Bill does not include the San Francisco Pollution Prevention Fee

Table 4-5 shows the impacts resulting from the Test Year proposed WWFC compared to the current WWFC.

Table 4-5: Wet Weather Facilities Charge Impacts for Test Year

Lot size (sq ft)	FY 2017 Current	FY 2017 Proposed	Difference ($)	Difference (%)
0-5,000	$94.10	$97.00	$2.90	3.1%
5,001-10,000	$147.00	$151.56	$4.56	3.1%
over 10,001	$336.00	$346.39	$10.39	3.1%

5. Proposed FY 2020 & FY 2021 Wastewater User Charges

To determine the FY 2020 and FY 2021 user charges, required revenue adjustments were made to the Test Year rates and charges based on the District's FY 2020 and FY 2021 budgets for development of FY 2020 and FY 2021 rates and charges presented in this section. The COS effort resulted in some adjustments to the District's individual rates that were presented in previous sections in comparison to the District's wastewater user charges for the Test Year. From the District's FY 2020 and FY 2021 budgeted operating, capital, and debt expenses, the FY 2020 and FY 2021 revenue requirements were established. The Raftelis model was used to calculate the FY 2020 and FY 2021 wastewater rates, combining the FY 2020 and FY 2021 increased revenue requirements with the results of the COS Study. The results of the cost of service study were incorporated into the proposed FY 2020 and FY 2021 user charges by adjusting the charges from the COS analysis to yield the FY 2020 and FY 2021 revenue requirements.

The District's proposed budgets for FY 2020 and FY 2021 do not contain detailed budgeted costs by function, so the Test Year COS results are adjusted to match the FY 2020 and FY 2021 revenue requirements based on the budget. The District does not anticipate that the distribution of expenses by function for FY 2020 and FY 2021 will be significantly different than the Test Year expenses.

This section documents the process and calculations made to determine the wastewater user charges for FY 2020 and FY 2021.

5.1. FY 2020 and FY 2021 Wastewater User Charges and Customer Impacts

The first step is to develop the current FY 2019 wastewater user charges based on the Test Year COS user charges. Table 5-1 shows the total FY 2019 revenue requirement, provided by the District, compared to the total Test Year revenue requirement as shown in Table 3-15.

Table 5-1: Wastewater Revenue Requirement for FY 2019

	FY 2017	FY 2019
Revenue Requirements		
O&M Expenses	$63,926,037	$71,535,499
Existing Debt Service	$33,301,178	$29,760,873
Proposed Debt Service	$0	$0
Admin Capital	$0	$0
Rate Funded Capital	$27,954,400	$41,807,600
Total Revenue Requirements	**$125,181,615**	**$143,103,972**
Revenue Offsets		
Resource Recovery	$11,904,249	$9,000,000
Property Taxes, less customer assistance	$4,514,980	$4,230,630
Ad Valorem Bond Levy	$2,865,215	$0
Interest	$485,439	$1,533,513
Laboratory Services	$4,210,262	$4,261,635
Reimbursements	$1,475,502	$1,442,000
Permit Fees	$1,592,767	$1,600,000
Capacity Charges	$0	$2,963,000
All Other Revenue		
BABS REBATE	$2,504,058	$2,500,000
PSL FEES	$1,126,722	$1,500,000
PGS ENERGY SALES	$900,014	$1,000,000
MISC	$494,820	$700,000
Transfer (to)/from Rate Stabilization Reserve (RSR)	$0	$0
Total Revenue Offsets	**$32,074,027**	**$30,730,778**
Adjustments		
Annual Cash Balance	$1,619,175	$11,121,645
Total Adjustments	**$1,619,175**	**$11,121,645**
Cost of Service to be Recovered from Rates	**$91,488,412**	**$101,251,548**
Difference (%)		**10%**

Since the FY 2019 revenue requirement is 10 percent higher than the Test Year revenue requirement, the Test Year COS user charges were increased by approximately the same percentage to calculate the COS adjusted FY 2019 user charges. Table 5-2 and Table 5-3 show the FY 2019 wastewater user charges for residential and non-residential customers, respectively, using the FY 2019 revenue requirement provided by the District.

Table 5-2: FY 2019 Cost of Service Adjusted Wastewater Rates - Residential

	FY 2017	FY 2019[15]	Difference (%)
Service Charge (per account) [A]	$6.12	**$6.75**	10%
Strength Charge (per dwelling unit) [B]	$6.37	**$7.03**	10%
Minimum monthly charge per household	$12.49	**$13.78**	10%
Plus: A flow charge per ccf (maximum of 9 ccf) [C]	$1.11	**$1.22**	10%
Minimum monthly charge at 0 units	$0.00	**$0.00**	
Maximum monthly charge at 9 units	$9.99	**$10.98**	10%
Total Residential Charge (A+B+C above)			
Minimum monthly charge	$12.49	**$13.78**	10%
Maximum monthly charge	$22.48	**$24.76**	10%
Average monthly charge at 6 ccf	$19.15	**$21.10**	10%

[15] Rates rounded to the nearest cent.

Table 5-3: FY 2019 Cost of Service Adjusted Wastewater Rates – Non-Residential

	FY 2017	FY 2019[16]	Difference (%)
Monthly Service Charge (per meter)	$6.12	**$6.75**	10%
Treatment charge including flow processing (per ccf of sewage discharge)			
Meat Products	$7.74	**$8.55**	10%
Slaughterhouses	$7.41	**$8.17**	10%
Dairy Product Processing	$6.07	**$6.71**	10%
Fruit and Vegetable Canning	$4.89	**$5.39**	10%
Grain Mills	$4.87	**$5.37**	10%
Bakeries (including Pastries)	$8.41	**$9.28**	10%
Sugar Processing	$4.81	**$5.31**	10%
Rendering Tallow	$14.61	**$16.10**	10%
Beverage Manufacturing & Bottling	$3.65	**$4.03**	10%
Specialty Foods Manufacturing	$15.70	**$17.35**	10%
Pulp and Paper Products	$4.18	**$4.60**	10%
Inorganic Chemicals Mfgr.	$5.38	**$5.92**	10%
Synthetic Material Manufacturing	$1.26	**$1.39**	10%
Drug Manufacturing	$2.71	**$2.99**	10%
Cleaning and Sanitation Products	$5.48	**$6.05**	10%
Paint Manufacturing	$10.57	**$11.67**	10%
Ink and Pigment Manufacturing	$3.82	**$4.22**	10%
Leather Tanning and Finishing	$14.60	**$16.12**	10%
Earthenware Manufacturing	$2.97	**$3.27**	10%
Primary Metals Manufacturing	$2.35	**$2.59**	10%
Metal Products Fabricating	$1.38	**$1.51**	10%
Drum and Barrel Manufacturing	$14.86	**$16.42**	10%
Metal Coating	$1.49	**$1.64**	10%
Air Transportation	$1.96	**$2.16**	10%
Food Service Establishments	$5.09	**$5.61**	10%
Apartment Buildings (5 or more units)	$2.47	**$2.72**	10%
Hotels, Motels with Food Service	$3.66	**$4.03**	10%
Commercial Laundries	$3.29	**$3.63**	10%
Coin Operated Laundromats	$2.47	**$2.72**	10%
Industrial Laundries	$9.34	**$10.32**	10%
Laboratories	$1.77	**$1.95**	10%
Automobile Washing and Polishing	$2.34	**$2.58**	10%
Hospitals	$2.25	**$2.48**	10%
Schools	$1.66	**$1.82**	10%
All Other BCC (includes dischargers of only segregated domestic wastes from sanitary conveniences)	$2.47	**$2.72**	10%

Table 5-4 shows the FY 2019 Wet Weather Facilities Charge, using the FY 2019 revenue requirement provided by the District.

[16] Rates rounded to the nearest cent.

Table 5-4: FY 2019 Cost of Service Adjusted Wet Weather Facilities Charge

Lot Size (sq ft)	FY 2017	FY 2019[17]	Difference (%)
0 – 5,000	$97.00	**$106.96**	10%
5,001 – 10,000	$151.56	**$167.10**	10%
>10,001	$346.39	**$381.92**	10%

Table 5-5 shows the revenue requirement for FY 2019 from Table 5-1 and the revenue requirements for FY 2020 and FY 2021 based on the District's proposed FY 2020 and FY 2021 budgets for the wastewater enterprise.

Table 5-5: Wastewater Revenue Requirement for FY 2020 and FY 2021

	FY 2019	FY 2020	FY 2021
Revenue Requirements			
O&M Expenses	$71,535,499	$75,091,889	$78,579,852
Existing Debt Service	$29,760,873	$30,228,258	$29,839,038
Proposed Debt Service	$0	$0	$0
Admin Capital	$0	$0	$0
Rate Funded Capital	$41,807,600	$48,475,000	$46,019,350
Total Revenue Requirements	**$143,103,972**	**$153,795,147**	**$154,438,240**
Revenue Offsets			
Resource Recovery	$9,000,000	$10,000,000	$10,000,000
Property Taxes, less customer assistance	$4,230,630	$5,030,000	$5,155,750
Full Property Taxes, including amount used for customer assistance	*$4,630,630*	*$5,430,000*	*$5,555,750*
Ad Valorem Bond Levy	$0	$0	$0
Interest	$1,533,513	$2,374,306	$2,082,768
Laboratory Services	$4,261,635	$4,389,484	$4,521,169
Reimbursements	$1,442,000	$1,485,260	$1,529,818
Permit Fees	$1,600,000	$1,600,000	$1,600,000
Capacity Charges	$2,963,000	$4,000,000	$4,000,000
All Other Revenue			
BABS REBATE	$2,500,000	$2,500,000	$2,500,000
PSL FEES	$1,500,000	$1,500,000	$1,500,000
PGS ENERGY SALES	$1,000,000	$1,000,000	$1,000,000
MISC	$700,000	$700,000	$700,000
Transfer (to)/from Rate Stabilization Reserve (RSR)	$0	$0	$0
Total Revenue Offsets	**$30,730,778**	**$34,579,050**	**$34,589,505**
Adjustments			
Annual Cash Balance	$11,121,645	$13,603,218	$10,011,341
Total Adjustments	**$11,121,645**	**$13,603,218**	**$10,011,341**
Cost of Service to be Recovered from Rates	**$101,251,548**	**$105,612,879**	**$109,837,394**
Revenue to be Collected from Rates [18]	*$100,851,548*	*$105,212,879*	*$109,437,394*
Difference (%)		**4%**	**4%**

[17] Rates rounded to the nearest cent.
[18] The revenue collected from rates is lower due to the Customer Assistance Discount.

The FY 2020 revenue requirement is 4 percent higher than the FY 2019 revenue requirement and the FY 2021 revenue requirement is 4 percent higher than the FY 2020 revenue requirement. Based on the percent increase in revenue requirements for FY 2020 and FY 2021, the FY 2019 COS adjusted wastewater user charges, shown in Table 5-2 through Table 5-4, need to be increased by the same percentages in FY 2020 and in FY 2021 to meet the rate revenue requirements[19].

Table 5-6 and Table 5-7 show the proposed FY 2020 and FY 2021 wastewater rates for residential and non-residential customers, respectively.

Table 5-6: FY 2020 and FY 2021 Wastewater Rates - Residential

	FY 2019	FY 2020[20]	Difference (%)	FY 2021[21]	Difference (%)
Service Charge (per account)	$6.75	**$7.02**	4%	**$7.30**	4%
Strength Charge (per dwelling unit)	$7.03	**$7.31**	4%	**$7.60**	4%
Minimum monthly charge per household	$13.78	**$14.33**	4%	**$14.90**	4%
Plus: A flow charge per ccf (maximum of 9 ccf)	$1.22	**$1.27**	4%	**$1.32**	4%
Minimum monthly charge at 0 units	$0.00	**$0.00**		**$0.00**	
Maximum monthly charge at 9 units	$10.98	**$11.43**	4%	**$11.88**	4%
Total Residential Charge (A+B+C above)					
Minimum monthly charge	$13.78	**$14.33**	4%	**$14.90**	4%
Maximum monthly charge	$24.76	**$25.76**	4%	**$26.78**	4%
Average monthly charge at 6 ccf	$21.10	**$21.95**	4%	**$22.82**	4%

[19] Revenue Requirements for FY 2020 and FY 2021 were developed and provided by the District.
[20] Rates rounded to the nearest cent.
[21] Rates rounded to the nearest cent.

Table 5-7: FY 2020 and FY 2021 Cost of Service Adjusted Wastewater Rates – Non-Residential

	FY 2019	FY 2020[22]	Difference (%)	FY 2021[23]	Difference (%)
Monthly Service Charge (per meter)	$6.75	**$7.02**	4%	**$7.30**	4%
Treatment charge including flow processing (per ccf of sewage discharge)					
BCCs					
Meat Products	$8.55	**$8.90**	4%	**$9.24**	4%
Slaughterhouses	$8.17	**$8.50**	4%	**$8.83**	4%
Dairy Product Processing	$6.71	**$6.98**	4%	**$7.25**	4%
Fruit and Vegetable Canning	$5.39	**$5.61**	4%	**$5.83**	4%
Grain Mills	$5.37	**$5.58**	4%	**$5.80**	4%
Bakeries (including Pastries)	$9.28	**$9.65**	4%	**$10.03**	4%
Sugar Processing	$5.31	**$5.53**	4%	**$5.74**	4%
Rendering Tallow	$16.10	**$16.74**	4%	**$17.40**	4%
Beverage Manufacturing & Bottling	$4.03	**$4.19**	4%	**$4.36**	4%
Specialty Foods Manufacturing	$17.35	**$18.05**	4%	**$18.75**	4%
Pulp and Paper Products	$4.60	**$4.79**	4%	**$4.98**	4%
Inorganic Chemicals Mfgr.	$5.92	**$6.16**	4%	**$6.40**	4%
Synthetic Material Manufacturing	$1.39	**$1.44**	4%	**$1.50**	4%
Drug Manufacturing	$2.99	**$3.11**	4%	**$3.23**	4%
Cleaning and Sanitation Products	$6.05	**$6.30**	4%	**$6.54**	4%
Paint Manufacturing	$11.67	**$12.14**	4%	**$12.61**	4%
Ink and Pigment Manufacturing	$4.22	**$4.39**	4%	**$4.56**	4%
Leather Tanning and Finishing	$16.12	**$16.77**	4%	**$17.43**	4%
Earthenware Manufacturing	$3.27	**$3.40**	4%	**$3.53**	4%
Primary Metals Manufacturing	$2.59	**$2.69**	4%	**$2.80**	4%
Metal Products Fabricating	$1.51	**$1.57**	4%	**$1.64**	4%
Drum and Barrel Manufacturing	$16.42	**$17.08**	4%	**$17.74**	4%
Metal Coating	$1.64	**$1.71**	4%	**$1.77**	4%
Air Transportation	$2.16	**$2.25**	4%	**$2.34**	4%
Food Service Establishments	$5.61	**$5.83**	4%	**$6.06**	4%
Apartment Buildings (5 or more units)	$2.72	**$2.83**	4%	**$2.94**	4%
Hotels, Motels with Food Service	$4.03	**$4.19**	4%	**$4.36**	4%
Commercial Laundries	$3.63	**$3.77**	4%	**$3.92**	4%
Coin Operated Laundromats	$2.72	**$2.83**	4%	**$2.94**	4%
Industrial Laundries	$10.32	**$10.73**	4%	**$11.15**	4%
Laboratories	$1.95	**$2.02**	4%	**$2.11**	4%
Automobile Washing and Polishing	$2.58	**$2.68**	4%	**$2.79**	4%
Hospitals	$2.48	**$2.57**	4%	**$2.68**	4%
Schools	$1.82	**$1.89**	4%	**$1.97**	4%
All Other BCC (includes dischargers of only segregated domestic wastes from sanitary conveniences)	$2.72	**$2.83**	4%	**$2.94**	4%

[22] Rates rounded to the nearest cent.
[23] Rates rounded to the nearest cent.

Table 5-8 shows the WWFC for FY 2020 and FY 2021. The increases mirror those of the wastewater increases, i.e. 4 percent per year.

Table 5-8: FY 2019 Cost of Service Adjusted Wet Weather Facilities Charge

Lot Size (sq ft)	FY 2019	FY 2020	Difference (%)	FY 2021	Difference (%)
0 – 5,000	$106.96	**$111.24**	4%	**$115.70**	4%
5,001 – 10,000	$167.10	**$173.78**	4%	**$180.74**	4%
>10,001	$381.92	**$397.20**	4%	**$413.10**	4%

The resulting customer bill impacts, shown in Table 5-9 and Table 5-10, reflect the increases described previously. Table 5-9 shows the bill impacts for different customers with typical water usage for FY 2020. Bill impacts for FY 2021 are approximately 4 percent more than those shown below.

Table 5-9: Typical Customers' Wastewater Bill Impacts for FY 2020

Customer Class	Monthly Flow (ccf)	FY 2019 Current Bill	FY 2020 Proposed Bill	Difference ($)	Difference (%)
SFR	6	$21.75	$21.95	$0.20	0.9%
MFR – Fourplex	25	$69.84	$68.01	($1.83)	-2.6%
Commercial – Office	50	$142.62	$148.52	$5.90	4.1%
Commercial – Restaurant	50	$279.62	$298.52	$18.90	6.8%
Industrial – Food Manufacturing	500	$8,001.12	$9,032.02	$1,030.90	12.9%

Note: Bill does not include Pollution Prevention Charge

Table 5-10 shows the impacts for FY 2020 resulting from the proposed WWFC compared to the FY 2019 WWFC. Bill impacts for FY 2021 are approximately 4 percent more than those shown below.

Table 5-10: Wet Weather Facilities Charge Impacts for FY 2020

Lot size (sq ft)	FY 2019 Current	FY 2020 Proposed	Difference ($)	Difference (%)
0-5,000	$103.74	$111.24	$7.50	7.2%
5,001-10,000	$162.06	$173.78	$11.72	7.2%
over 10,001	$370.44	$397.20	$26.76	7.2%

6. Part II: Wastewater Capacity Fee Study

6.1. Introduction

In addition to wastewater rates, the District has a Wastewater Capacity Fee (WCF) for new or upsized connections. The purpose of these fees is to pay for the connections share of the costs of existing and/or new wastewater facilities. These fees are designed to be proportional to the demand placed on the systems by the new or expanded connections. The recommended capacity fees for the District do not exceed the estimated reasonable costs of providing the facilities for which they are collected and are of proportional benefit to the property being charged. The existing wastewater capacity fees were last updated in 2013 and were based on the Buy-In methodology to ensure that new customers or existing customers increasing their capacity demand paid their fair share of treatment capacity costs. The fee has been updated over the past five years to account for the effects of inflation but has not been updated to account for increased system value.

6.2. Legal and Economic Framework

6.2.1. LEGAL FRAMEWORK

Unlike the wastewater service charges, the WCF is not subject to Proposition 218. Government Code Section 66013 contains requirements specific to wastewater capacity fees. In addition, procedural requirements for adopting or protesting capacity fees, pursuant to Section 66013, are contained in Sections 66016, 66022, and 66023 of the Government Code. The most pertinent part of Section 66013 states:

> *"Notwithstanding any other provision of law, when a local agency imposes fees for water connections or sewer connections, or imposes capacity charges, those fees or charges* ***shall not exceed the estimated reasonable cost of providing the service*** *for which the fee or charge is imposed…"* (emphasis added)

The WCF is also subject to the requirements set forth by Proposition 26, which amended Section 1 of Article XIIIC, and requires the District to show the amount charged is not a tax by not exceeding the reasonable amount required to provide the service, as stated in Section 1(e)(2):

> "*A charge imposed for a specific government service or product provided directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of providing the service or product."*

The District's WCF is structured to meet the requirements of these laws, and to recover the reasonable cost of the facilities necessary to provide capacity for new, or significant changes to existing, sewer connections.

6.2.2. ECONOMIC FRAMEWORK

The basic economic philosophy behind capacity fees is that the costs of providing service should be paid for by those that receive utility from the product. In order to effect fair distribution of the value of the system, the charge should reflect a reasonable estimate of the cost of providing capacity to new connections, or to customers seeking to upsize an existing connection, and not unduly burden existing users through a comparable rate increase.

Accordingly, many utilities make this philosophy one of their primary guiding principles when developing their capacity fee structure.

The philosophy that service should be paid for by those that receive utility from the product is often referred to as "growth-should-pay-for-growth." The principal is summarized in the American Water Works Association (AWWA) Manual M26, Water Rates and Related Charges:

> *"The purpose of designing customer-contributed-capital system charges is to prevent or reduce the inequity to existing customers that results when these customers must pay the increase in water rates that are needed to pay for added plant costs for new customers. Contributed capital reduces the need for new outside sources of capital, which ordinarily has been serviced from the revenue stream. Under a system of contributed capital, many water utilities are able to finance required facilities by use of a 'growth-pays-for-growth' policy."*

This principle, in general, also applies to wastewater and storm drainage systems. In this excerpt, customer-contributed-capital system charges are equivalent to capacity fees.

6.3. Methodology

There are two primary steps in calculating capacity fees: (1) determining the cost of capital required to serve new or upsized connections or accommodate an increase in density generated by in-fill projects, and (2) allocating those costs equitably to various types of connections based on the demand placed on the utility system.

There are several available methodologies for calculating capacity fees. The various approaches have evolved largely around the basis of changing public policy, legal requirements, and the unique and special circumstances of every local agency. The District uses the widely accepted Buy-In Method to calculate their capacity fees.

6.3.1. BUY-IN METHOD

The Buy-In approach rests on the premise that new or upsized connections are entitled to service at the same price as existing connections. Under this approach, new or upsized connections pay only an amount equal to their proportional share of the current system value, either using the original cost or replacement cost as the valuation basis and either netting the value of depreciation or not. This net investment, or value of the system, is then divided by the current demand of the system to determine the Buy-In cost per equivalent unit.

For example, if the existing system has 100 units of average usage and the new connector uses an equivalent unit, then the new customer would pay 1/100 of the total value of the existing system. By contributing this capacity fee, the new connector has bought into the existing system. The user has effectively acquired a financial position on par with existing customers and will face future capital challenges on equal financial footing with those customers. This approach is suited for agencies that either 1) have built most of their facilities and only a small portion of future facilities are needed for build-out, 2) the agency doesn't have an adopted long-term capital improvement plan, or 3) the "build-out" date is so far out in the future that it is difficult to accurately project growth and required facilities with precision. Figure 6-1 shows the framework for calculating the Buy-in Capacity Fee.

Figure 6-1: Formula for Buy-In Approach

6.3.2. ASSET VALUATION APPROACHES

There are various methods employed to estimate the asset value of the existing facilities and derive an updated capacity fee based on the existing asset value. The principal method used by the District to value its existing assets is replacement cost less depreciation.

- **Replacement Cost Less Depreciation (RCLD).** Considerations of the current value of wastewater facilities may also be materially affected by the effects of age and depreciation. Depreciation takes into account the anticipated losses in plant value caused by wear and tear, decay, inadequacy, and obsolescence. To provide appropriate recognition of the effects of depreciation on existing wastewater facilities, the replacement cost valuation measure can be expressed on an RCLD basis. This measure is similar to other valuation methods, with the exception that accumulated depreciation is computed for each asset account based upon its age or condition and deducted from the respective total replacement cost to determine the RCLD measure of system value.

6.4. Current Wastewater Capacity Fee

New residential customers are currently charged a WCF per dwelling unit based on the estimated maximum indoor water consumption per dwelling unit. On the other hand, for non-residential customers, the District's current procedures for calculating fees are complicated, require significant staff time to administer, and are difficult for customers to understand.

Currently, the WCF for non-residential customers is calculated by estimating the monthly maximum wastewater discharge volume and multiplying it by the WCF rate for the corresponding Business Classification Code (BCC) for that customer. The method for determining the maximum discharge volume is a complicated process and involves multiple methods based on number of fixtures, average daily water use per occupant, building size, or applicant provided estimates. Results are then compared, and the most reasonable maximum wastewater discharge value is selected. This process requires significant staff time and does not allow non-residential customers to perform a self-assessment of possible WCF prior to applying for service. Therefore, the District is seeking to simplify the method used for calculating the WCF for non-residential customers and meet the following objectives:

1. Review the existing WCF and update as needed.
2. Increase transparency and simplify the administration of the WCF.

These objectives will provide transparency with District customers and allow prospective new customers the ability to estimate their potential WCF for their project. Additionally, they will reduce staff time required to calculate the WCF for new non-residential project applications and minimize or eliminate the need for periodic evaluations of a customer's WCF as business use assumptions used in the initial WCF calculation change.

6.5. Proposed Wastewater Capacity Fee

6.5.1. PROPOSED METHOD: BUY-IN APPROACH

The District's wastewater system has available capacity within the existing system to serve remaining growth under existing regulations. Therefore, the Buy-In approach was used to determine the proposed capacity fees for the wastewater utility.

6.5.2. VALUE OF THE SYSTEM

The first step in determining the Buy-In capacity fee is to determine the value of the existing system. As mentioned above, there are several methods of determining the current value of assets, but, for the purposes of this Capacity Fee Study, RCLD was used to account for today's replacement cost for system improvements, while acknowledging the remaining useful life of system facilities. To accomplish this, the District provided fixed asset records on the original cost of the system. Replacement cost is estimated by adjusting the original costs to reflect what might be expected if a similar asset were constructed today. This was achieved by escalating the original construction costs by a construction cost index. Raftelis utilized the Engineering News-Record's average Construction Cost Index for 20-cities (CCI) which reflects the average costs of a particular basket of construction goods (See Appendix D). Raftelis used a CCI value of 10,737 for 2017 to estimate the replacement costs and to update the FY 2019 WCF. Accumulated replacement cost depreciation was determined by escalating the accumulated depreciation for each asset by the appropriate CCI. The accumulated depreciation was subtracted from the replacement cost to determine the current value of the assets using the RCLD methodology and appropriately reflects the use of the system by the existing customers. Table 6-1 shows the wastewater assets at original cost, escalated into 2017 dollars (i.e. replacement cost), replacement cost accumulated depreciation, and assets adjusted for depreciation (RCLD). A summary of assets by category can be found in Table 3-10[24].

[24] A detail of the District's fixed assets can be found in Appendix C.

Table 6-1: Wastewater Assets

Asset Class	Original Cost	Replacement Cost (A)	RC Depreciation (B)	Total Assets (RCLD) (A - B)
Chlorination	$4,446,780	$8,540,747	$5,573,887	$2,966,859
Effluent	$65,663,726	$182,912,843	$125,112,768	$57,800,075
General	$143,927,224	$287,890,054	$156,532,738	$131,357,316
Grit	$19,834,612	$43,162,452	$26,238,500	$16,923,952
Influent	$44,958,489	$87,805,442	$54,962,173	$32,843,269
Interceptor	$234,814,953	$631,706,603	$344,050,490	$287,656,113
Secondary	$80,177,795	$214,112,283	$140,348,216	$73,764,068
PGS	$94,548,798	$142,097,199	$64,654,705	$77,442,495
Primary	$11,143,586	$17,734,903	$6,744,008	$10,990,895
Sludge	$199,704,239	$296,325,729	$117,573,403	$178,752,326
Wet Weather	$182,998,207	$393,699,323	$216,545,452	$177,153,871
Total Assets	**$1,082,218,409**	**$2,305,987,576**	**$1,258,336,340**	**$1,047,651,236**

Additionally, the FY 2017 Working Capital Reserve and Capital Reserve beginning balances of $17,700,000 and $56,475,000, respectively, were included in the final value of the system as shown in Table 6-2. It is reasonable and appropriate to include the balance of the capital replacement reserves because these reserves have been built up over time by existing rate customers and will be used to repair or replace aging infrastructure, thereby contributing to the value of the system. To arrive at the total system value, the FY 2017 total debt service principal balances totaling $420,207,400 were subtracted from the sum of the Wastewater System value and the Reserve balance.

Table 6-2: Total System Value

Total System Value	
Wastewater System Value (RCLD)	$1,047,651,236
Reserve Balance	$74,175,000
Less Total Outstanding Principal	$420,207,400
Total System Value	**$701,618,836**

The wastewater assets from Table 6-1 were then allocated to cost components related to I&I, Flow, COD, and TSS using the percent allocations determined in the COS Study shown in Table 3-14. However, an additional step is required to reallocate the value of I&I assets since customers are not charged based on I&I flows. This was done by spreading the $465,802,474 in I&I assets proportionally to the other cost components of Flow, COD, and TSS. This results in revised allocation percentages to Flow, COD, and TSS as shown at the bottom of Table 6-3.

Table 6-3: Wastewater System Value Allocation

	I&I	Flow	COD	TSS	Total
% Allocation (from **Table 3-14**)	44.5%	22.3%	11.9%	21.4%	100.0%
Wastewater System Value (RCLD)	$465,802,474	$233,849,995	$124,198,140	$223,800,627	$1,047,651,236
Reallocate I&I	($465,802,474)	$187,209,999	$99,427,557	$179,164,918	$0
Wastewater System Value	$0	$421,059,994	$223,625,698	$402,965,544	$1,047,651,236
% Allocated	**0%**	**40%**	**21%**	**38%**	**100%**

These percent allocations can then be applied to the Total System Value from Table 6-2 of $701,618,836 to determine cost allocations for Flow, COD, and TSS.

Table 6-4: Total System Value Allocation

% Allocation		Cost Allocation
Flow	40%	$281,986,612
COD	21%	$149,763,582
TSS	38%	$269,868,642
Total	**100%**	**$701,618,836**

6.5.3. SYSTEM CAPACITY

The second step in calculating the Buy-In WCF is to determine the demand or capacity of the system. Dividing the value of the system by the capacity provides a unit cost for the capacity fee. Here, the wastewater system capacity in terms of Flow in ccf, COD in pounds, and TSS in pounds will be used to determine the fee. The FY 2017 net units to the treatment plant, less I&I and trucked waste at headworks, are shown in Table 6-5.

Table 6-5: System Capacity

FY 2017 Net Units to Treatment Plant	
Flow (ccf)	20,983,276
COD (lbs)	106,264,585
TSS (lbs)	41,790,303

6.5.4. PROPOSED WASTEWATER CAPACITY FEES

The WCF for both residential and non-residential customers will be calculated based on the unit costs for Flow, COD, and TSS. The calculation of the unit costs for the Buy-In wastewater capacity fees are shown in Table 6-6. The unit costs are calculated by dividing the system values for Flow, COD, and TSS from Table 6-4 by the net plant influent in Table 6-5 for the corresponding cost component. The proposed capacity fees are based on Flow in ccf per year and COD and TSS in pounds per year. WCFs can then be calculated using the flow and strength data from the COS analysis for both residential and non-residential customers.

Table 6-6: WCF Updated FY 2019 Unit Costs

	System Value (A)	Net Plant Influent (B)	Updated FY 2019 Unit Cost (C) = (A ÷ B)	Current FY 2019 Unit Cost
Flow	$281,986,612	20,983,276	**$13.44** per ccf	**$15.99** per ccf
COD	$149,763,582	106,264,585	**$1.41** per lb	**$1.31** per lb
TSS	$269,868,642	41,790,303	**$6.46** per lb	**$6.33** per lb

6.5.4.1. Residential

Residential customers will continue to be charged a WCF per dwelling unit. The calculation of the WCF for a Single-Family Residence is shown in Table 6-7. The proposed capacity fee is for one dwelling unit and assumes a monthly flow of 7 ccf (84 ccf per year). Seven (7) ccf per month is the District's average indoor residential water usage as determined during the Water Utility's COS study in 2015. Domestic strength concentrations of 713 mg/l COD and 300 mg/l TSS from the wastewater COS Study were used to calculate the pounds per year of COD and TSS.

Table 6-7:Updated FY 2019 Single-Family Residence WCF

Updated FY 2019 Capacity Fee Calculation			Current FY 2019 Capacity Fee
Flow (ccf/year)	84	$1,128.96	
COD (lbs/year)	374	$527.34	
TSS (lbs/year)	157	$1,014.22	
Total SFR WCF		**$2,671**[25]	**$2,610**

The Single-Family Residence WCF can be multiplied by the number of dwelling units for Multi-Family Residence accounts to calculate their WCF.

6.5.4.2. Non-Residential

To increase transparency and uniformity, the District has decided to utilize the meter size to estimate annual average wastewater use for the WCF for non-residential customers with meters up to 1½ inches in size. This estimated wastewater discharge volume will be combined with an assigned strength category of low, medium, or high, based on the customers' BCC. For non-residential customers with meter sizes greater than 1½ inches, the District will determine the annual average use on a case by case basis. This replaces the current complex process of calculating the estimated wastewater discharge for each individual applicant based on business and facility attributes. The revised process should significantly reduce the amount of staff time necessary to determine the WCF, reduce the potential for error, and increase transparency for customers.

First, the yearly flow by meter size for meters 1½ inches and smaller was determined based on the non-residential yearly average wastewater use for each meter size from the FY 2017 wastewater consumption data (Table 6-8)[26]. This process is similar to how yearly flow by meter size is determined for the District's Water System Capacity Charge (SCC).

[25] Fee rounded to the nearest dollar.
[26] A detail of the calculation of non-residential yearly average use by meter size can be found in Appendix E.

Table 6-8: Yearly Average Wastewater Use by Meter size

Meter Size	Yearly Average Use (ccf)	Approximate Monthly Average Use (ccf)[27]
5/8 inch	132	11
3/4 & 1 inch	347	29
1 ½ inch	676	57

Second, non-residential strength categories of Low, Medium, and High were based on the range of COD and TSS loading concentrations from various BCCs contained in the District's treatment rate schedule and divided into categories as shown in Table 6-9[28]. Each non-residential BCC was then placed into one of the three strength categories based on the combined estimated strengths for COD and TSS from the wastewater COS analysis. For example, Hospitals (BCC 8060) have a COD strength of 517 mg/L and a TSS strength of 270 mg/l. The combined strength value is 787, which would fall into the Low category[29]. The "Low" category comprises domestic and other similarly low-strength customers with a combined COD and TSS of 1,600 mg/l or less. The "High" category comprises high-strength industrial and food processing customers, such as Rendering Tallow (BCC 2077), Bakeries (BCC 2050), and Dairy Product Processing (BCC 2020). The "Medium" category comprises those customers with strength between 1,601 and 5,000, such as Food Service Establishments (BCC 5812).

Table 6-9: Non-Residential Strength Categories

Non-Residential Strength Category	Range	
Low	0	1,600
Medium	1,601	5,000
High	5,001	999,999

Weighted average strengths for COD and TSS were then determined for each strength category using actual FY 2017 flows into the MWWTP as shown in Table 6-10.

Table 6-10: Weighted Average Strengths

Non-Residential Strength Category	Weighted Average COD Strength (mg/l)	Weighted Average TSS Strength (mg/l)
Low	690	262
Medium	1,958	749
High	8,259	820

The weighted average strengths by category and the flow by meter size were then used to calculate the non-residential WCF. The calculation of the Flow Charge for non-residential accounts with meter sizes of 1½ inches or smaller is shown in Table 6-11.

[27] Rounded up to the nearest ccf.
[28] Strength ranges were determined based on District input.
[29] Details of each BCC and its corresponding total strength and strength category can be found in Appendix E.

Table 6-11: Non-Residential Updated FY 2019 Flow Charge

Meter Size	Yearly Average Use (ccf) from Table 6-8 [A]	Flow Unit Cost from Table 6-6 [B]	Flow Charge [C] = [A x B]
5/8 inch	132	$13.44 per ccf	$1,774.08
3/4 & 1 inch	347	$13.44 per ccf	$4,663.68
1 ½ inch	676	$13.44 per ccf	$9,085.44

The COD and TSS charges are show in Table 6-12 and Table 6-13, respectively. These charges are calculated using the unit cost shown in Table 6-6, the weighted average strengths from Table 6-10, the yearly average use by meter size shown in Table 6-8, and conversion factors to convert from ccf to million gallons (MG) and mg/L to lbs/MG.

Table 6-12: Non-Residential Updated FY 2019 COD Charge

Meter Size	Strength Category		
	Low	Medium	High
5/8 inch	$801	$2,274	$9,596
3/4 & 1 inch	$2,107	$5,980	$25,225
1 ½ inch	$4,105	$11,648	$49,141

Table 6-13: Non-Residential Updated FY 2019 TSS Charge

Meter Size	Strength Category		
	Low	Medium	High
5/8 inch	$1,395	$3,986	$4,367
3/4 & 1 inch	$3,676	$10,472	$11,473
1 ½ inch	$7,158	$20,407	$22,352

The charges from Table 6-11, Table 6-12, and Table 6-13 are then combined to determine the total non-residential WCF by meter size and strength category as shown in Table 6-14. A direct comparison cannot be made to the current FY 2019 Non-Residential WCF by meter size because the current WCF process does not consider meter size when calculating the fee assessed to new non-residential applicants. The WCF will be calculated on a case by case basis for non-residential customers with meters that are 2 inches or larger.

Table 6-14: Non-Residential Updated FY 2019 WCF[30]

Meter Size	Strength Category		
	Low	Medium	High
5/8 inch	$3,970	$8,034	$15,738
3/4 & 1 inch	$10,446	$21,115	$41,362
1 ½ inch	$20,348	$41,141	$80,578

This proposed method of calculating the WCF for non-residential customers using the yearly average wastewater use based on meter size and assigning each BCC a strength category of Low, Medium, or High will provide transparency to the majority of non-residential customers and allow them the ability to estimate their potential WCF (for meter sizes less than 2 inches), will reduce the amount of staff time required to determine the WCF for

[30] Fee rounded to the nearest dollar for table, for administrative simplicity the District rounds to the nearest ten dollars for published WCF.

new non-residential customers, and will minimize the need for the review of a customer's WCF as business use assumptions change.

6.5.5. FY 2020 WASTEWATER CAPACITY FEE

Using the Engineering News-Record's average CCI for 20-cities for 2018, the proposed FY 2020 WCFs are calculated by escalating the updated FY 2019 WCF unit charges as shown in Table 6-15, Table 6-16, and Table 6-17.

Table 6-15: Proposed FY 2020 WCF Unit Costs

	Unit Cost
Flow	**$13.85** per ccf
COD	**$1.45** per lb
TSS	**$6.66** per lb

Table 6-16: Proposed FY 2020 Single-Family Residence WCF

Capacity Fee Calculation		
Flow (ccf/year)	84	$1,163.40
COD (lbs/year)	374	$542.30
TSS (lbs/year)	157	$1,045.62
Total SFR WCF		**$2,752**[31]

Table 6-17: Proposed FY 2020 Non-Residential WCF[32]

Meter Size	Strength Category		
	Low	Medium	High
5/8 inch	$4,090	$8,277	$16,214
3/4 & 1 inch	$10,762	$21,754	$42,614
1 ½ inch	$20,964	$42,386	$83,017

Raftelis recommends the District adjust the WCFs annually to keep pace with inflation for capital assets by applying the Engineering News Record CCI.

6.5.6. WCF CREDIT WHEN APPLICANT REQUESTS EXPANDING EXISTING SERVICE

Per the District's policy, customers will receive a credit based on the WCF previously paid for service at the property. The value of the WCF credit will be determined using the flow and strength assumed in the original WCF and updated using the current WCF schedule (for flow and strength). For properties on which no WCF was paid, customers will be granted a credit for the existing use. For existing meters 1½ inches and smaller, the WCF credit will be calculated based on the current WCF schedule for the existing meter size and strength. For existing meters over 1½ inches, the WCF credit will be calculated based on the most recent 10 years of usage and strength

[31] Fee rounded to the nearest dollar for table, for administrative simplicity the District rounds to the nearest ten dollars for published WCF.
[32] Fee rounded to the nearest dollar for table, for administrative simplicity the District rounds to the nearest ten dollars for published WCF .

for the existing meter, provided that this value is not less than the value indicated in the schedule for the 1½ inch meter. If the account is subject to an Estimation Permit, the usage credit will consider diversion.

Appendices

Appendix A – Wastewater Strength Survey

California WW Agencies	Non-Residential Categories	Number of Rate Classifications	$/Unit	Strength Factors	Additional Comments
San Francisco PUC	Single	1	$/ccf	COD & SS	Monthly service charge, flow charge, charge per pound of COD, SS, and Oil & Grease (using SIC standard loadings if no sampling)
LA City Sanitation	Single	1	$/ccf	N/A	Only charge based on flow, Commercial discharge = 93% of winter water use, can apply for adjustment for low strength
Sanitation Districts of LA County	Business Type	45	$/SU	COD & SS	Charge per Sewage Unit (SFR = 1 unit) using mean loadings per business type; Industrial - $/MGY for flow, $/1,000 lbs for COD & SS
Central Contra Costa Sanitary District	Business Type	22	$/ccf	BOD & SS	Flow charge per business type; Flow charge per student for schools; Industrial – Fixed charge, $/ccf for flow, $/1,000 lbs for BOD & SS)
Union Sanitary District	Business Type	5	$/kgal	COD & SS	Divided into strong, moderate, weak, or type of restaurant; Industrial - $/kgal for flow, $/1,000 lbs for COD & SS
San Jose	Business Type	38	$/ccf	BOD, SS, NH_3	Flow charge per business type; Industrial – $/ccf for flow, $/1,000 lbs for BOD, SS, & NH_3, and annual charges for capacity required
Sacramento Regional County Sanitation District	Business Type	43	$/ESD	BOD, SS, TKN, Pathogens	Charge per Equivalent Single-Family Dwelling (SFR = 1 unit) using mean loadings per business type; Industrial - $/MG for flow & pathogens, $/1,000 lbs for BOD & SS
Santa Monica	Strength Range	7	$/ccf	BOD & SS	Divided into low to high ranges, churches, institutional, schools, or industrial
Out-of-State WW Agencies					
Phoenix, AZ	Business Type	10	$/ccf	COD & SS	All users assessed a flat environmental charge ($/ccf) and a flow charge per business type; Industrial - $/ccf for flow, COD, SS, and an Industrial Pretreatment Monitoring Charge
Salt Lake City, UT	Strength Range	7	$/ccf	COD, BOD, SS	Divided into classes with specific ranges & charged per ccf for flow, BOD, & SS; High strength (>1,800 mg/l) - $/lb of COD, BOD, & SS
Renewable Water Resources, SC	Single	1	$/kgal	BOD & SS	Monthly service charge & flow charge based on commercial or industrial, Per lb surcharge for high strength users (>250 mg/l of BOD or SS)
Little Rock Water Reclamation Authority, AR	Single	1	$/ccf	COD & SS	Monthly service charge & flow charge based on inside or outside city limits; Per lb surcharge for high strength users (>600 mg/l of SS, >50 mg/l of oil & grease, or >960 mg/l COD)

Non-Residential Categories

1. Business Type – Non-residential customers are divided into groups based on the type of business and assumed strengths.
2. Single – Non-residential customers are all placed in a single category.
3. Strength Range – Non-residential customers are divided into groups based on a range of strengths.

Appendix B – Detailed O&M Expenses

O&M Expenses by Function

O&M Expenses Info		Function	FY 2017
1002	Maintain Interceptor Facilites	Interceptor	$830,618
1003	Operate Interceptor Facilities	Interceptor	$1,952,615
1004	Maintain Resrce Recovery Fclty	R2	$512,055
1005	Operate Resrce Recovery Fclty	R2	$351,531
1012	Maint Main Wwtp Wet Weathr Fac	Wet	$266,273
1123	Operate Inflnt-Efflnt Facilits	Influent Op	$6,732,235
1124	Maintn Inflnt-Efflnt Facilits	Influent Mtn	$797,026
1221	Operate Prim Trtmnt Facilities	Primary Op	$21,814
1222	Maintn Prim Trtmnt Facilities	Primary Mtn	$442,219
1223	Public Plant Tours	Overhead	$61,691
1231	Grounds Genl Plant Maintenance	Overhead	$2,700,716
1232	Janitorial Service	Overhead	$329,362
1312	Maintain Oxygen Productn Plant	Secondary Mtn	$172,274
1322	Maintn Secndry Reactors Clairf	Secondary Mtn	$650,170
1323	Operate Secondary Trtmnt Facil	Secondary Op	$3,281,986
1332	Maintain Process Wtr Plant	Secondary Mtn	$3,238
1423	Operate Sludge Processes	Sludge Op	$9,395,911
1424	Maintain Sludge Processes	Sludge Mtn	$1,479,309
1531	Operate Oakport Storm Facility	Wet	$344,920
1532	Maintain Oakport Storm Facilty	Wet	$443,502
1551	Operate Pt Isabel Storm Faclty	Wet	$534,162
1552	Maintain Pt Isabel Storm Fclty	Wet	$265,319
1561	Ope Sn Antonio Cr Stormwtr Fac	Wet	$137,879
2004	Resource Recovery Admin	R2	$1,497,185
2011	Laboratory Analysis	Lab	$3,166,226
2012	Laboratory Support	Lab	$2,534,834
2020	Laboratory Research & Develop	Lab	$112,071
2111	Maintenance Engineering	Overhead	$0
2113	Research & Developmnt Engnrng	Overhead	$465
2114	Plant Operation Engineering	Overhead	$464,188
2115	Special Investigations	Overhead	$419,817
2211	Npdes Compliance Monitoring	Overhead	$418,116
2212	Admin Indus Dischg Compli Prog	Permit	$555,780
2213	Wet Wthr Compl Monitor (Npdes)	Wet	$816
2214	Investigate Illegal Discharges	Permit	$0
2216	Inspect Indus Discharge Facilt	Permit	$309
2217	Implmt Pollution Prevent Prog	Permit	$208,740
2220	Air Quality Administration	Overhead	$3,373
2222	Inspect Support Ww Dept Projts	Overhead	$1,445
2224	Review Compliance	Permit	$19,169
2225	Other Source Contrl Activities	Permit	$344,441
2226	Other Field Service Activities	Permit	$13,631
2227	Grease Hotspot Response	Reimbursed	$86,071
2228	I/I Control Program	I/I	$3,998,689
2230	Inpsect/Monitor Revenue Prgram	Overhead	$239
2231	Revise Revenue Programs	Overhead	$260,839
2233	Admn Wet Wthr Rates & Charges	Billing	$35,463
2400	WW Asset Management Program	Overhead	$357,949
2401	WW Emergency Preparedness	Overhead	$32,561
3627	Operate Pwr Generation Facilty	PGS	$1,695,246
3657	Maint Power Generation Facilty	PGS	$287,360
4052	Chevron Reclamation Fac Oper	Reclaimed	$4,852
4054	E BAYSHORE Wtr Recl Fac - Op	Reclaimed	$3,777
4055	E BAYSHORE Wtr Recl Fac - Mai	Reclaimed	$101,623
6500	Operate Irrigation Process	Reimbursed	$27,442
6510	Maintain Irrigation Projects	Reimbursed	$18,365
6565	Bill & Collection Chargebacks	Billing	$2,196,283
6572	Work for Others - Billable	Reimbursed	$28,516
6573	Work for Water System Genl Fnd	Reimbursed	$1,816
6576	Work for I/I Correction Progrm	I/I	$112
6577	Union Business Reimbursable	Reimbursed	$55,303
6579	Chev Recl Liq-Operation	Reclaimed	$141,803
6600	Chev Recl Liq-Maint	Reclaimed	$131,600
6601	RARE Operations & Maintenance	Reclaimed	$516,484
6602	Chev Recl Sol - Maintenance	Reclaimed	$52,652
8000	Operating Budget - No Expense	Overhead	$0
8117	WW Data Management System	Overhead	$654,043
8118	DCS Operations & Maintenance	Overhead	$164,095
8345	Vehicle Maintenance and Repair	Overhead	$1,332
8511	Administrative & General	Overhead	($3,176,540)
8512	Employee Relations	Overhead	$229,894
8513	General Training	Overhead	$124,045
8515	Fiscal Activities	Overhead	$142
8516	Financial Planning	Overhead	$68,687
8519	Rate Analysis	Overhead	$246
8523	Technical Training	Overhead	$1,481,072
8524	Regulatory Compliance Training	Overhead	$179,039
8526	Internal Audits	Overhead	$305
8541	Financial Reporting	Overhead	$124
8561	Water System A & G Chargebacks	Overhead	$6,014,354
8563	Insurance Chargebacks	Overhead	$343,543
8567	Regulatory Management	Overhead	$919,282
8587	Employee Recognition Program	Overhead	$6,425
8590	Non-Ergonomic Furn & Inst Exp	Overhead	$846
8591	Ergonomic Audit Compliance	Overhead	$7,562
8592	Occupational Health & Safety	Overhead	$43,065
8593	Workers Compensation	Overhead	$272,528
8595	Production Exams	Overhead	$6,693
8621	Purchases For Stores	Overhead	$0
8624	Rebuild Parts for WW Stores	Sludge Mtn	$79,731
8711	Community Relations	Overhead	$2,939
8712	Legislative Affairs	Overhead	$11,549
8713	Customer/News Media Relations	Overhead	$0
8723	District Publications	Overhead	$0
8732	Emer Prepare/Hazd Miti Mgmt	Overhead	$25,548
8733	Affirmative Action	Overhead	$19,280
8755	Financial Systems	Overhead	$368
8766	Info Sys Planning	Overhead	$135,740
8905	Organizational Memberships	Overhead	$198,756
8923	Risk Management	Overhead	$40
8940	Capital Programs Management	Overhead	$343,379
8941	Departmental Overhead	Overhead	$4,265,448
8951	Area Yard Expense	Overhead	$0
8992	Budget Office Adjustments	Overhead	$0
TOTAL O&M			**$63,926,037**

Appendix C – Fixed Asset Listing

Fixed Asset Listing Including R2 Assets

Unit Process CATEGORY*	Class Descr.	Class Code	ORIG.COST	ENR ADJ COST	DEPR.	NET BOOK VALUE	ENR ADJ NET BOOK
CHLORINATION	Mwwtp-Chlorine System	**WW0352 Total**	$195,146	$235,085	$38,192	$156,954	$186,190
CHLORINATION	Mwwtp-Chlorination Building	**WW0402 Total**	$4,251,633	$8,305,662	$2,822,637	$1,428,996	$2,780,669
EFFLUENT	Mwwtp-Outfall Land	**WW0311 Total**	$2,078,909	$37,573,997	$1,749,213	$329,696	$4,914,159
EFFLUENT	Mwwtp-Outfall Submarine	**WW0312 Total**	$5,545,770	$35,463,863	$2,484,933	$3,060,837	$9,205,483
EFFLUENT	Mwwtp-Outfall Bridge	**WW0313 Total**	$238,025	$553,777	$144,239	$93,786	$218,197
EFFLUENT	Mwwtp-Effluent Pump Station	**WW0342 Total**	$19,753,653	$50,937,272	$14,466,277	$5,287,377	$10,388,412
EFFLUENT	Mwwtp-Water Pump Station #3	**WW0347 Total**	$896,125	$1,758,671	$456,222	$439,902	$863,322
EFFLUENT	Mwwtp-Process Water Plant	**WW0381 Total**	$35,549	$45,931	$10,072	$25,477	$32,917
EFFLUENT	Mwwtp-Dechlorination Station	**WW0382 Total**	$11,547,948	$21,763,793	$6,176,794	$5,371,154	$8,720,247
EFFLUENT	Mwwtp-Filter Plant Solids Handling Facility	**WW0387 Total**	$23,339,363	$30,708,751	$5,841,899	$17,497,464	$22,626,059
EFFLUENT	Mwwtp-Sodium Bisulfite Area	**WW0508 Total**	$2,228,383	$4,106,789	$1,777,323	$451,061	$831,280
GENERAL (% ALLOC	Mwwtp-Grounds & Improvements	**WW0371 Total**	$17,856,733	$65,846,631	$3,554,284	$14,302,449	$41,252,798
GENERAL (% ALLOC	Mwwtp-Administration And Lab Building	**WW0372 Total**	$14,641,163	$24,856,819	$5,042,638	$9,598,525	$16,251,701
GENERAL (% ALLOC	Mwwtp-Service Building	**WW0373 Total**	$85,103	$1,521,999	$85,103	$0	$0
GENERAL (% ALLOC	Mwwtp-Administration And Lab Center	**WW0375 Total**	$29,149,018	$61,751,583	$18,730,344	$10,418,674	$18,533,056
GENERAL (% ALLOC	Mwwtp-Maintenance Center	**WW0376 Total**	$12,762,666	$25,027,753	$4,496,152	$8,266,515	$13,965,697
GENERAL (% ALLOC	Mwwtp-Piping For Plant Utilities	**WW0401 Total**	$29,335,050	$53,964,487	$23,475,208	$5,859,841	$8,456,170
GENERAL (% ALLOC	Mwwtp-Bulk Storage Area	**WW0506 Total**	$4,675,143	$8,616,033	$3,857,998	$817,145	$1,505,954
GENERAL (% ALLOC	Mwwtp-Field Services Bldg	**WW0917 Total**	$2,707,085	$4,385,876	$520,848	$2,186,237	$3,531,511
GENERAL (% ALLOC	Wastewater Land - General	**WWLAND Total**	$15,698,358	$18,838,029	$0	$15,698,358	$18,838,029
GENERAL (% ALLOC	ALL WASTEWATER PORTABLE EQUIPMENT	**WWPEQP Total**	$17,016,906	$23,080,843	$8,857,313	$8,159,593	$9,022,399
GRIT	Mwwtp-Aerated Grit Tanks	**WW0351 Total**	$6,738,689	$24,868,458	$5,142,043	$1,596,646	$5,543,750
GRIT	Mwwtp-Grit Dewatering Station	**WW0357 Total**	$13,095,923	$18,293,994	$4,799,289	$8,296,634	$11,380,202
INFLUENT	Mwwtp-Influent Pump Station	**WW0341 Total**	$44,958,489	$87,805,442	$23,222,046	$21,736,444	$32,843,269
INTERCEPTOR	North Interceptor	**WW0301 Total**	$41,420,877	$123,207,365	$12,945,682	$28,475,195	$58,423,966
INTERCEPTOR	South Interceptor	**WW0302 Total**	$34,996,907	$194,804,054	$14,527,558	$20,469,350	$50,076,391
INTERCEPTOR	Alameda Interceptor	**WW0303 Total**	$16,499,924	$50,887,666	$2,888,235	$13,611,689	$20,746,285
INTERCEPTOR	Estuary Crossing	**WW0304 Total**	$456,493	$8,613,905	$398,346	$58,147	$1,097,142
INTERCEPTOR	Central Avenue Interceptor	**WW0305 Total**	$8,938,996	$16,212,501	$2,322,141	$6,616,856	$12,000,875
INTERCEPTOR	South Foothill Interceptor	**WW0306 Total**	$21,294,073	$41,755,704	$6,350,700	$14,943,372	$29,180,384
INTERCEPTOR	Adeline Street Interceptor	**WW0307 Total**	$18,786,975	$34,841,246	$5,298,935	$13,488,040	$24,768,192
INTERCEPTOR	Powell Street Interceptor	**WW0308 Total**	$5,290,727	$10,023,746	$3,149,519	$2,141,208	$4,032,671
INTERCEPTOR	ANAS Interceptor	**WW0309 Total**	$3,487,760	$5,903,844	$747,931	$2,739,830	$4,637,798
INTERCEPTOR	Wood St Interceptor	**WW0310 Total**	$20,997,951	$22,990,808	$715,854	$20,282,096	$22,104,951
INTERCEPTOR	Pump Station A-Albany	**WW0321 Total**	$3,671,840	$6,903,405	$1,264,231	$2,407,608	$3,237,385
INTERCEPTOR	Pump Station B-Fernside	**WW0322 Total**	$6,626,560	$13,437,291	$3,554,247	$3,072,313	$5,585,393
INTERCEPTOR	Pump Station C-Krusi Park	**WW0323 Total**	$13,224,227	$27,331,207	$6,245,021	$6,979,206	$12,134,648
INTERCEPTOR	Pump Station D-Oak Street	**WW0324 Total**	$1,476,192	$2,413,942	$261,955	$1,214,238	$1,554,592
INTERCEPTOR	Pump Station E-Grand Street	**WW0325 Total**	$1,456,328	$2,232,785	$259,280	$1,197,049	$1,400,556
INTERCEPTOR	Pump Station F-Atlantic Avenue	**WW0326 Total**	$1,858,182	$4,964,291	$993,727	$864,455	$1,685,186
INTERCEPTOR	Pump Station G-Airport	**WW0327 Total**	$2,676,794	$6,036,937	$1,232,324	$1,444,470	$2,795,700
INTERCEPTOR	Pump Station H-Fruitvale	**WW0328 Total**	$11,532,000	$21,587,169	$4,213,606	$7,318,394	$9,657,560
INTERCEPTOR	Pump Station J-Frederick Street	**WW0329 Total**	$1,353,719	$4,232,678	$912,424	$441,295	$1,257,012
INTERCEPTOR	Pump Station K-7Th Street	**WW0330 Total**	$1,426,705	$4,302,641	$882,403	$544,302	$1,412,098

Fixed Asset Listing Including R2 Assets Continued

Unit Process CATEGORY*	Class Descr.	Class Code	ORIG.COST	ENR ADJ COST	DEPR.	NET BOOK VALUE	ENR ADJ NET BOOK
INTERCEPTOR	Pump Station L	**WW0331 Total**	$4,860,237	$9,397,137	$2,148,866	$2,711,371	$5,015,645
INTERCEPTOR	Pump Station Q- Wet Weather Page St Berkeley	**WW0333 Total**	$591,847	$1,024,700	$261,770	$330,077	$554,685
INTERCEPTOR	Pump Station N (new)	**WW0334 Total**	$6,329	$8,531	$2,022	$4,307	$5,806
INTERCEPTOR	ANAS Pump Station R	**WW0335 Total**	$7,367,039	$12,474,919	$1,557,089	$5,809,949	$9,838,090
INTERCEPTOR	Pump Station M - Bridgeway	**WW0344 Total**	$2,963,275	$4,417,692	$906,942	$2,056,333	$2,830,600
Secondary	Mwwtp-Reactor Deck Area-Oxygen Production	**WW0369 Total**	$11,292,511	$27,264,106	$8,619,301	$2,673,209	$5,642,565
Secondary	Mwwtp-Secondary Treatment Facility	**WW0370 Total**	$68,885,284	$186,848,178	$35,772,517	$33,112,767	$68,121,502
PGS	Mwwtp-Power Generation Station	**WW0386 Total**	$94,548,798	$142,097,199	$34,377,181	$60,171,617	$77,442,495
PRIMARY	Mwwtp-Scum Dewatering Station	**WW0399 Total**	$8,971,497	$13,645,702	$2,710,608	$6,260,889	$9,352,008
PRIMARY	Mwwtp-Chemical Trench	**WW0400 Total**	$720,479	$1,413,962	$265,109	$455,370	$893,677
PRIMARY	Mwwtp-Pre-Chlorination Facility	**WW0507 Total**	$1,451,611	$2,675,239	$1,047,253	$404,358	$745,210
SLUDGE	Mwwtp-Chemical Storage Building (Relocated)	**WW0374 Total**	$3,099,994	$5,431,990	$1,707,302	$1,392,692	$2,403,686
SLUDGE	Mwwtp-Sludge Digestion Facilities	**WW0383 Total**	$137,687,776	$189,522,660	$36,039,066	$101,648,710	$127,315,822
SLUDGE	Mwwtp-Sludge Dewatering Facilities	**WW0384 Total**	$40,533,004	$66,048,316	$16,776,847	$23,756,157	$34,276,421
SLUDGE	Mwwtp-Temp Sludge Dewatering Facility	**WW0385 Total**	$1,521,047	$1,965,280	$435,188	$1,085,859	$1,402,992
SLUDGE	Mwwtp-Odor Control At Sludge Thickener	**WW0388 Total**	$15,546,197	$31,588,096	$9,431,944	$6,114,254	$12,152,375
SLUDGE	Mwwtp-Composting Facility	**WW0450 Total**	$1,316,220	$1,769,386	$422,719	$893,502	$1,201,029
WET WEATHER	Pt. Isabel Tp-Treatment & Pretreatment Structur	**WW0343 Total**	$45,505,445	$79,322,234	$23,284,945	$22,220,500	$38,484,242
WET WEATHER	Mwwtp-Mid-Plant Pump Station	**WW0346 Total**	$6,638,722	$10,689,873	$3,071,790	$3,566,932	$5,416,024
WET WEATHER	Mwwtp-Wet Weather Pump Station	**WW0348 Total**	$1,289,130	$1,793,206	$281,433	$1,007,696	$1,350,090
WET WEATHER	Mwwtp-Washdown Pump Station	**WW0349 Total**	$215,504	$422,933	$132,464	$83,040	$162,968
WET WEATHER	Point Richmond-Pretreatment Structure	**WW0354 Total**	$8,000	$14,744	$8,000	$0	$0
WET WEATHER	Oakport Wet Weather-Pretreatment Structure	**WW0355 Total**	$10,004,031	$20,696,768	$4,695,127	$5,308,904	$10,353,021
WET WEATHER	Oakport Wet Weather-Pretreatment Structure	**WW0356 Total**	$2,043,657	$3,035,239	$320,290	$1,723,367	$2,403,306
WET WEATHER	Mwwtp-Channel Crossing For Bypass Channel	**WW0358 Total**	$4,780,140	$9,381,167	$1,596,693	$3,183,447	$6,247,609
WET WEATHER	Mwwtp 90" Pipe-Primry Effluent Bypass	**WW0359 Total**	$2,005,802	$3,936,446	$582,318	$1,423,484	$2,793,630
WET WEATHER	Mwwtp 72" Pipe-Primry Influent Bypass	**WW0360 Total**	$2,540,549	$4,830,464	$1,231,433	$1,309,116	$2,552,927
WET WEATHER	Mwwtp-Diversion Structure	**WW0361 Total**	$28,195,434	$76,418,148	$11,603,602	$16,591,832	$27,553,044
WET WEATHER	Mwwtp-Bypass Inlet Structure	**WW0362 Total**	$15,415,976	$66,083,386	$10,831,043	$4,584,933	$10,480,288
WET WEATHER	North Interceptor Junction Storage	**WW0363 Total**	$341,675	$1,094,573	$117,925	$223,750	$863,142
WET WEATHER	Mwwtp-Bypass Outlet Structure	**WW0364 Total**	$587,432	$1,855,267	$273,342	$314,090	$616,410
WET WEATHER	Mwwtp-Final Effluent Bypass Channel	**WW0365 Total**	$8,287,786	$9,507,372	$747,149	$7,540,637	$8,548,717
WET WEATHER	Mwwtp-Storage Basin	**WW0366 Total**	$20,503,268	$40,861,822	$6,996,233	$13,507,035	$26,506,411
WET WEATHER	Oakport WW-Chlor System	**WW0391 Total**	$628,279	$1,345,499	$527,519	$100,760	$177,325
WET WEATHER	Oakport WW-DeChlor System	**WW0392 Total**	$962,754	$1,953,463	$869,987	$92,767	$149,286
WET WEATHER	Oakport WW-Control Bldg	**WW0393 Total**	$1,439,408	$3,195,628	$1,057,726	$381,682	$847,594
WET WEATHER	Oakport WW-Emg Gen	**WW0394 Total**	$955,196	$1,843,016	$557,844	$397,352	$632,197
WET WEATHER	Oakport WW-Drainage	**WW0395 Total**	$1,160,534	$2,577,178	$687,704	$472,831	$1,050,006
WET WEATHER	Oakport WW-Washwtr Pump Sta.	**WW0396 Total**	$121,075	$268,870	$121,075	$0	$0
WET WEATHER	Oakport WW-Storage Bldg.	**WW0397 Total**	$436,931	$970,286	$151,788	$285,143	$633,213
WET WEATHER	Oakport WW-Lscape/Pav/Fence	**WW0398 Total**	$1,996,609	$4,417,692	$483,477	$1,513,133	$3,344,044
WET WEATHER	San Antonio Creek Wet Weather TP	**WW0500 Total**	$13,470,868	$24,821,541	$6,619,905	$6,850,962	$12,622,514
WET WEATHER	San Antonio Creek Ww Dechlorination Facility	**WW0501 Total**	$6,203,211	$8,990,173	$1,786,184	$4,417,027	$5,917,619
WET WEATHER	San Antonio Creek Ww Outfall Structure	**WW0502 Total**	$2,682,144	$4,934,140	$1,165,669	$1,516,475	$2,787,508
WET WEATHER	San Antonio Creek Ww Gravity Sewer	**WW0503 Total**	$540,029	$995,243	$220,545	$319,484	$588,791
WET WEATHER	San Antonio Creek Ww Lake Merritt Channel Cro	**WW0504 Total**	$1,759,796	$3,243,208	$898,431	$861,364	$1,587,448
WET WEATHER	San Antonio Creek Ww Outfall Subequacous Pip	**WW0505 Total**	$2,278,822	$4,199,745	$930,711	$1,348,111	$2,484,495
INTERCEPTOR	Versailles interceptor	**WW0918 Total**	$1,552,995	$1,700,439	$71,179	$1,481,816	$1,622,502
	TOTAL WASTEWATER ASSETS		**$1,082,218,409**	**$2,305,987,576**	**$441,320,440**	**$640,897,969**	**$1,047,651,236**

Appendix D – Construction Cost Index

Engineering News Record Construction Cost Index – 20 Cities

Year	CCI Average	Year	CCI Average	Year	CCI Average
1908	97	**1945**	308	**1982**	3825
1909	91	**1946**	346	**1983**	4066
1910	96	**1947**	413	**1984**	4146
1911	93	**1948**	461	**1985**	4195
1912	91	**1949**	477	**1986**	4295
1913	100	**1950**	510	**1987**	4406
1914	89	**1951**	543	**1988**	4519
1915	93	**1952**	569	**1989**	4615
1916	130	**1953**	600	**1990**	4732
1917	181	**1954**	628	**1991**	4835
1918	189	**1955**	660	**1992**	4985
1919	198	**1956**	692	**1993**	5210
1920	251	**1957**	724	**1994**	5408
1921	202	**1958**	759	**1995**	5471
1922	174	**1959**	797	**1996**	5620
1923	214	**1960**	824	**1997**	5826
1924	215	**1961**	847	**1998**	5920
1925	207	**1962**	872	**1999**	6059
1926	208	**1963**	901	**2000**	6221
1927	206	**1964**	936	**2001**	6343
1928	207	**1965**	971	**2002**	6538
1929	207	**1966**	1019	**2003**	6694
1930	203	**1967**	1074	**2004**	7115
1931	181	**1968**	1155	**2005**	7446
1932	157	**1969**	1269	**2006**	7751
1933	170	**1970**	1381	**2007**	7966
1934	198	**1971**	1581	**2008**	8310
1935	196	**1972**	1753	**2009**	8570
1936	206	**1973**	1895	**2010**	8799
1937	235	**1974**	2020	**2011**	9070
1938	236	**1975**	2212	**2012**	9308
1939	236	**1976**	2401	**2013**	9547
1940	242	**1977**	2576	**2014**	9806
1941	258	**1978**	2776	**2015**	10035
1942	276	**1979**	3003	**2016**	10338
1943	290	**1980**	3237	**2017**	10737
1944	299	**1981**	3535	**2018**	11062

Appendix E – Non-Residential WCF

Non-Residential Yearly Average Wastewater Use by Meter Size for WCF Calculation

Meter Size	FY 17 WW Consumption (ccf)	Number of Accounts	Yearly Average Use (ccf)
5/8 inch	1,230,073	9,318	132
3/4 & 1 inch	1,231,818	3,548	347
1-1/2 inch	2,008,662	2,973	676

Non-Residential Strength Assumptions for WCF Calculation

BCC	Description	COD (mg/L)	TSS (mg/L)	Total Strength	Strength Category	Flow (hcf/yr)	Weighted COD	Weighted TSS
2010	Meat Products	7,752	420	8,172	High	4,776	37,023,552	2,005,920
2011	Slaughterhouses	3,230	1,400	4,630	Medium	944	3,049,120	1,321,600
2020	Dairy Product Processing	5,491	390	5,881	High	5,917	32,490,247	2,307,630
2040	Grain Mills	2,196	770	2,966	Medium	4,955	10,884,214	3,815,719
2050	Bakeries	5,491	1,200	6,691	High	22,221	122,015,511	26,665,200
2060	Sugar Processing	5,168	30	5,198	High	4,372	22,594,496	131,160
2080	Beverage Mfgr & Bottling	3,101	130	3,231	Medium	99,255	307,771,216	12,903,205
2090	Specialty Foods Mfgr	15,504	1,300	16,804	High	9,014	139,753,056	11,718,200
2600	Pulp and Paper Products	1,744	640	2,384	Medium	3,716	6,482,040	2,378,458
2810	Inorganic Chemicals Mfgr	323	1,400	1,723	Medium	2,869	926,687	4,016,600
2820	Synthetic Material Mfgr	97	30	127	Low	2,620	253,878	78,600
2830	Drug Mfgr	2,003	70	2,073	Medium	121,476	243,268,679	8,503,349
2840	Cleaning and Sanitation Prod	4,522	420	4,942	Medium	839	3,793,958	352,380
2850	Paint Mfgr	7,752	1,400	9,152	High	140	1,085,280	196,000
3200	Earthenware Mfgr	388	550	938	Low	8,157	3,161,653	4,486,350
3300	Primary Metals Mfgr	291	360	651	Low	17,075	4,963,680	6,146,973
3400	Metal Prod Fabricating	258	30	288	Low	12,835	3,316,564	385,050
3470	Metal Coating	258	70	328	Low	4,660	1,204,061	326,177
4500	Air Transportation	808	100	908	Low	95,439	77,066,593	9,543,851
5812	Food Service Establishment	1,809	940	2,749	Medium	778,957	1,408,977,422	732,219,580
7000	Hotels, Motels with Food	840	680	1,520	Low	182,844	153,552,302	124,333,848
7210	Commercial Laundries	1,841	310	2,151	Medium	16,536	30,444,430	5,126,160
7215	Coin Operated Laundromats	1,163	190	1,353	Low	247,521	287,817,419	47,028,990
7218	Industrial Laundries	8,721	740	9,461	High	61,921	540,011,646	45,821,422
7300	Laboratories	614	80	694	Low	73,470	45,088,809	5,877,635
7542	Auto Washing and Polishing	937	200	1,137	Low	46,252	43,324,248	9,250,400
8060	Hospitals	517	270	787	Low	196,797	101,704,493	53,135,087
8200	Schools	452	80	532	Low	727,541	328,993,952	58,203,264
0	All Other	713	300	1,013	Low	2,804,374	1,998,116,539	841,312,227