



UNION SANITARY DISTRICT WASTEWATER RATE AND COST OF SERVICE STUDY

February 26, 2020



HF&H Consultants, LLC

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UNION SANITARY DISTRICT

5072 Benson Road
Union City, CA 94587



WASTEWATER RATE AND COST OF SERVICE STUDY

February 26, 2020

HF&H CONSULTANTS, LLC

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Walnut Creek, CA 94596



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February 26, 2020

Mr. Paul Eldredge
General Manager
Union Sanitary District
5072 Benson Road
Union City, CA 94587-2508

Subject: Wastewater Rate and Cost of Service Study

Dear Mr. Eldredge:

HF&H Consultants, LLC, is pleased to submit this Wastewater Rate and Cost of Service Study. The report summarizes the projected revenue requirements, updates the cost of service allocation among the customer classes, and provides updated rates for the next five years. Our report summarizes the results for FYs 2020/21, through 2024/25; a copy of our model, which contains projections for the next ten fiscal years, can be found in **Appendix B** of this report.

This report is organized into six sections:

- **Executive Summary** - a summary of the proposed wastewater rates.
- **Introduction** - a brief description of the study purpose and project background.
- **Revenue Requirements** - the estimated costs that must be covered by rates and other sources of revenue.
- **Revenue Increases** - the annual revenue increases needed to cover the projected costs and to maintain adequate reserves.
- **Cost of Service Analysis** - the allocation of the revenue requirement among the residential and non-residential customers based on updated loadings from each class.

Mr. Paul Eldredge
February 26, 2020
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- **Rate and Bill Analysis** - the updated rates with the cost of service adjustments and the required rate increases and a comparison of typical customer bills with comparable agencies.

The District is entering a period of significant capital improvements, which will be funded by a combination of rate increases, reserves, and bonds. Because of the adjustments required to align the rates with the cost of service, each customer class' rates undergoes a different percentage increases in the first year, followed by across-the-board, equal percentage increases in the subsequent four years of the planning period.

Very truly yours,

HF&H CONSULTANTS, LLC

John W. Farnkopf, P.E., Senior Vice President
Geoff Michalczyk, Project Analyst

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ACKNOWLEDGEMENTS

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ACRONYMS

ACWD	Alameda County Water District
COD	Chemical Oxygen Demand; a component of wastewater strength
CCF or HCF	Hundred cubic feet of metered water sold; 748 gallons; a cube of water 4.6 feet on edge
CIP	Capital Improvement Program
COSA	Cost of Service Analysis
FY	Fiscal Year
GPD	Gallons per Day
I&I	Inflow and Infiltration; stormwater runoff and shallow groundwater that enters collection systems through surface or subsurface connections, damaged pipes, open pipe joints, other openings such as manhole covers
Kgal	Kilogallons; 1,000 gallons
Klb	Kilopounds; 1,000 pounds
LU	Living Unit
MFR	Multiple Family Residential
Mg/l	Milligrams per Liter
Mgd	Million gallons per day
O&M	Operations and Maintenance
PAYGo	Pay-As-You-Go; funding capital improvements from cash rather than from borrowed sources of revenue
R&R	Renewal and Replacement
SFR	Single Family Residential
SS or TSS	Suspended Solids or Total Suspended Solids; a component of wastewater strength

LIMITATIONS

This document was prepared solely for Union Sanitary District in accordance with the contract between the District and HF&H and is not intended for use by any other party for any other purpose.

In preparing this analysis, we relied on information and instructions from the District, which we consider to be accurate and reliable and did not independently verify.

Rounding differences caused by stored values in electronic format may exist.

This document addresses relevant laws, regulations, and court decisions but should not be relied upon as legal advice. Questions concerning the interpretation of legal authorities referenced in this document should be referred to a qualified attorney.



**WASTEWATER RATE
AND
COST OF SERVICE STUDY**



SECTION 1: EXECUTIVE SUMMARY

Union Sanitary District (District) engaged HF&H Consultants, LLC (HF&H) to determine the cost of service and associated sewer service charges for FYs 2020/21 through 2024/25. The District intends to issue a notice of public hearing to rate payers in compliance with Proposition 218. The cost-of-service analysis will form the basis of the sewer service charges to be included in the notice and will serve as part of the administrative record, which is documented in this report.

FINDINGS AND RECOMMENDATIONS

Current Rates

The District’s current rates for FY 2019/20 are summarized in **Table 1-1**. Currently, single family residential customers are charged a flat rate of \$421.37 per living unit per year. Multi family customers also pay a flat rate of \$365.32 per living unit per year. Non-residential customers pay the greater of either a minimum fixed charge of \$365.32 per year per account (i.e., equal to the multi family charge) or a volumetric charge, which is the product of estimated wastewater flow times the charge per 1,000 gallons corresponding to the non-residential customer’s class.

Table 1-1. Current Rates FY 2019/20

	Adopted 2019/20
Residential (\$/LU)	
Single Family Residences	\$421.37
Multiple Family Residences	\$365.32
Minimum Charge	\$365.32
Commercial (\$/1,000 gals)	
Strong	\$10.64
Moderate	\$5.25
Weak	\$4.37
Fast-Food Restaurant	\$9.95
Full-Service Restaurant	\$13.18
Industrial	
Volume (\$/1,000 gals)	\$2.48
COD (\$/1,000 lbs)	\$328.24
Suspended Solids (\$/1,000 lbs)	\$763.48

Model Table 1A.

Revenue Increases

The District’s rates for FYs 2020/21 through 2024/25 are based on the adopted FY 2019/20 operating budget, the capital improvement program, and FY 2019/20 estimated actuals for revenue. The revenue increases indicated in **Table 1-2** reflect assumptions and currently available information. Prior to implementing rate increases after FY 2020/21, the District is advised to review and update the financial planning model annually in conjunction with the updates to its capital improvement program and associated O&M to confirm previous assumptions and verify the need for the subsequent projected revenue increases.

Table 1-2. Projected Revenue Increases

2020/21	2021/22	2022/23	2023/24	2024/25
8.2%	8.0%	8.0%	7.5%	7.3%

Model Table 3.

Cost of Service Analysis

The need to increase revenue by 8.2% for FY 2020/21 applies differently to each of the District’s customer classes because of adjustments in the cost of service. The number of accounts, the flow per class, and the COD and TSS strength concentrations per class were all updated. Certain rates decreased and others increased based on the relative changes from the prior flow and strength data. These differences indicate that since the prior cost of service analysis there has been a shift in the relative flows, loadings, and accounts among the customer classes. The present cost of service analysis reflects the current loadings, which will apply for the next five-year planning period. **Table 1-3** shows the combination of the cost of service rates with the 8.2% revenue increase.

Table 1-3. Comparison of Rates with Revenue Increase - FY 2020/21

	Adopted 2019/20	COSA 2019/20	COSA Minus Current	
			\$	%
Residential (\$/LU)				
Single Family Residences	\$421.37	\$420.12	(\$1.25)	-0.3%
Multiple Family Residences	\$365.32	\$370.22	\$4.90	1.3%
Minimum Charge	\$365.32	\$370.22	\$4.90	1.3%
Com/Ind (\$/1,000 gals)				
Fast-Food Restaurant	\$9.95	\$11.67	\$1.72	17.3%
Full-Service Restaurant	\$13.18	\$11.68	(\$1.50)	-11.4%
Strong	\$10.64	\$11.58	\$0.94	8.8%
Moderate	\$5.25	\$5.60	\$0.35	6.6%
Weak	\$4.37	\$4.70	\$0.33	7.4%
Industrial (sampled)				
Volume (\$/1,000 gals)	\$2.48	\$2.76	\$0.28	11.3%
COD (\$/1,000 lbs)	\$328.24	\$313.19	(\$15.05)	-4.6%
Suspended Solids (\$/1,000 lbs)	\$763.48	\$840.94	\$77.46	10.1%

Model Table 11.

Rate Projection

The five-year rate projection is summarized in **Table 1-4**. The FY 2020/21 rates are increased annually across-the-board by the revenue increases in the subsequent four years. At the conclusion of the five-year period, the cost of service analysis should be updated.

Table 1-4. Projected Rates

	Adopted 2019/20	COS Rates 2019/20	Proposed									
			2020/21	2021/22	2022/23	2023/24	2024/25					
Overall Revenue Increase				8.2%		8.0%		8.0%		7.5%		7.3%
Residential (\$/LU)												
Single Family Residences	\$421.37	\$420.12	\$454.57	7.9%	\$490.93	8.0%	\$530.21	8.0%	\$569.97	7.5%	\$611.58	7.3%
Multiple Family Residences	\$365.32	\$370.22	\$400.58	9.7%	\$432.63	8.0%	\$467.24	8.0%	\$502.28	7.5%	\$538.95	7.3%
Minimum Charge	\$365.32	\$370.22	\$400.58	9.7%	\$432.63	8.0%	\$467.24	8.0%	\$502.28	7.5%	\$538.95	7.3%
Com/Ind (\$/1,000 gals)												
Fast-Food Restaurant	\$9.95	\$11.67	\$12.62	26.9%	\$13.63	8.0%	\$14.72	8.0%	\$15.83	7.5%	\$16.98	7.3%
Full-Service Restaurant	\$13.18	\$11.68	\$12.64	-4.1%	\$13.65	8.0%	\$14.74	8.0%	\$15.85	7.5%	\$17.01	7.3%
Strong	\$10.64	\$11.58	\$12.53	17.7%	\$13.53	8.0%	\$14.61	8.0%	\$15.71	7.5%	\$16.85	7.3%
Moderate	\$5.25	\$5.60	\$6.06	15.4%	\$6.54	8.0%	\$7.07	8.0%	\$7.60	7.5%	\$8.15	7.3%
Weak	\$4.37	\$4.70	\$5.08	16.3%	\$5.49	8.0%	\$5.93	8.0%	\$6.37	7.5%	\$6.83	7.3%
Industrial (sampled)												
Volume (\$/1,000 gals)	\$2.48	\$2.76	\$2.99	20.4%	\$3.22	8.0%	\$3.48	8.0%	\$3.74	7.5%	\$4.02	7.3%
COD (\$/1,000 lbs)	\$328.24	\$313.19	\$338.87	3.2%	\$365.98	8.0%	\$395.26	8.0%	\$424.91	7.5%	\$455.92	7.3%
Suspended Solids (\$/1,000 lbs)	\$763.48	\$840.94	\$909.90	19.2%	\$982.69	8.0%	\$1,061.30	8.0%	\$1,140.90	7.5%	\$1,224.19	7.3%

Model Table 11.

SECTION 2. INTRODUCTION

STUDY PURPOSE

The purpose of this study is to update the District's rates to ensure that they generate sufficient revenue to recover the District's costs and that the rate structure reflects the District's current rate-making objectives. The District's rate-making objectives include the following:

- Rates must comply with Proposition 218 and applicable State codes.
- Provide revenue sufficiency and financial stability to fund the projected capital and O&M costs of the District.
- Reflect the cost of service.
- Meet the District's operations and capital funds reserve targets.
- Reflect the equity of costs in proportion to the level of service.
- Charge rates that are clear and understandable to the customers.

BACKGROUND

The District is an independent special district that provides wastewater collection, treatment, and disposal services to nearly 116,000 accounts, serving a population of 356,100. The District maintains a large number of facilities and equipment, including more than 839 miles of wastewater collection lines, seven pump stations, and a treatment plant. Since the 1990s, the primary focus of the District's Capital Improvement Program has been on rehabilitation, replacement and repair of its aging infrastructure, pump stations and treatment plant equipment. The current rate projections address a significant increase in the level of capital improvements.

The District is responsible for charging its customers fair rates that cover its cost of service. In July 2019, the District engaged HF&H to determine the cost of service and associated sewer service charges for FYs 2020/21 through 2024/25.

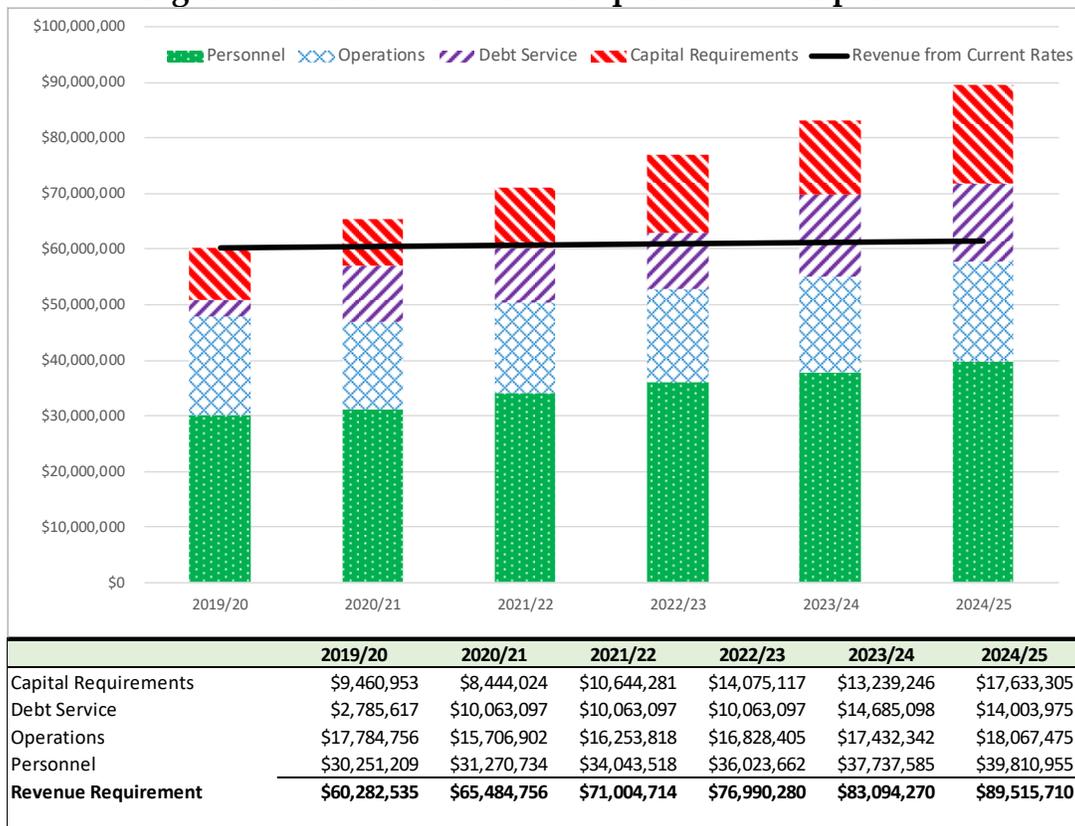
SECTION 3: REVENUE REQUIREMENT PROJECTIONS

The revenue requirements represent the costs that must be recovered from rate revenues and other sources. A twenty-year fiscal model was developed to derive revenue requirements that reflect the District’s capital improvement program. The first five years of this model, FY 2020/21 through FY 2024/25, are the presented in this report for purposes of rate adoption. Due to size constraints, only the first ten years of this model are provided in **Appendix B** of this report.

REVENUE REQUIREMENTS

The District’s O&M budget for FY 2019/20 served as the starting point for projecting the District’s operating expenses and revenues. The model also includes the District’s capital improvement program. The projected revenue requirements for the next five years are driven by the assumptions and escalation factors documented in the model. **Figure 3-1** summarizes the major categories comprising the revenue requirements. The revenue from current rates (plus growth) is also shown (black line).

Figure 3-1. Annual Revenue Requirement Components



Model Table 2.

Personnel Expenses

The District’s personnel expenses (e.g., salaries and benefits) are projected to increase by about 6% per year from approximately \$30.3 million to \$39.8 million over the five-year planning period. The primary reason for the increased cost is the addition of staff limited to the duration of the upgrade of the treatment plant.

Operations Expenses

The District’s operations expenses (e.g., maintenance, repairs, supplies, outside services) are projected to increase very slightly over the planning period.

Debt Service

The District allocates the cost of capital improvements between those projects that benefit existing rate payers (Fund 80 Structural) and those that benefit growth (Fund 90 Expansion). Fund 80 capital projects are funded from rate revenue. Fund 90 capital projects are funded from capacity charge revenue.

The District currently has \$2.7 million in Fund 80 debt service obligations associated with State Revolving Fund (SRF) loans, which were used to make improvements to the District’s wastewater treatment plant, collection system and pump stations. The District projects issuing additional debt during the five-year planning period, which will increase its Fund 80 debt service to about \$14.0 million. The projected debt service is calculated based on 90% of the estimated project costs. It has been the District’s experience that inevitable delays in project completion due to unforeseen conditions causes a lag in making capital improvements. Using 90% of projected capital costs avoids over-budgeting.

Table 3-1 summarizes the existing Fund 80 annual debt service payments and the annual increases in debt service, which increases when a \$37.9 million bond is issued in 2020, a \$154.8 million bond in 2021, and a \$153.0 million bond in 2024 for a total of \$345.7 million; the 2021 and 2024 bond amounts are based on current estimates. Note that the first debt service payment for the 2020 bond does occur until FY 2020/21.

Table 3-1. Annual Debt Service Expense (Fund 80)

	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Existing SRF Loans	\$2,785,617	\$2,785,617	\$2,785,617	\$2,785,617	\$2,785,617	\$2,104,494
Future SRF Loans	\$0	\$0	\$0	\$0	\$0	\$0
Existing Bond Debt Service	\$0	\$0	\$0	\$0	\$0	\$0
Future Bond (2020)	\$0	\$501,806	\$501,806	\$501,806	\$501,806	\$501,806
Future Bond (2021)	\$0	\$6,775,674	\$6,775,674	\$6,775,674	\$6,775,674	\$6,775,674
Future Bond (2024)	\$0	\$0	\$0	\$0	\$4,622,001	\$4,622,001
Total Debt Service	\$2,785,617	\$10,063,096	\$10,063,096	\$10,063,096	\$14,685,098	\$14,003,975

Model Table 7G.

Capital Requirements

Fund 80 also is used to fund pay-as-you-go (PAYGo) capital projects, which vary from year to year, as shown in **Table 3-2** Fund 80 is used to buffer the annual fluctuations so that rates do not need to fluctuate directly with annual fluctuations in capital projects. Note that the amounts shown in **Table 3-2** are 90% of the estimated cost, which again, like debt service, avoids over-budgeting.

Table 3-2. PAYGo Capital Expenses (Fund 80)

	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
CIP Admin Facilities	\$630,000	\$45,000	\$360,000	\$0	\$270,000	\$180,000
CIP Collection System	\$1,395,000	\$1,350,000	\$1,706,400	\$3,178,800	\$1,528,330	\$765,000
CIP Transport	\$1,203,750	\$2,115,000	\$4,140,000	\$2,025,000	\$1,773,000	\$10,424,880
CIP Treatment	\$4,680,000	\$14,535,000	\$21,577,500	\$13,239,000	\$14,242,500	\$13,304,250
Plant & Pump R&R	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000
Pretreatment	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Transfers to SRF Reserves	\$483,727	\$0	\$0	\$0	\$0	(\$681,123)
Transfers to Fund 90	\$0	\$0	\$0	\$0	\$0	\$0
	\$8,647,477	\$18,300,000	\$28,038,900	\$18,697,800	\$18,068,830	\$24,248,007

Model Table 5.

During the five-year planning period from FY 2020/21 through FY 2024/25, **Table 3-2** indicates capital requirements of \$107.3 million. The funding for this requirement will be provided by \$64.0 million in revenue from rates (Capital Requirements shown in **Figure 3-1**) plus \$43.3 million of the Fund 80 balance.

Table 3-3. PAYGo Funding (Fund 80)

	2020/21	2021/22	2022/23	2023/24	2024/25	Total
PAYGo Capital Expenses	\$18,300,000	\$28,038,900	\$18,697,800	\$18,068,830	\$24,248,007	\$107,353,537
Capital Requirements	\$8,444,024	\$10,644,281	\$14,075,117	\$13,239,246	\$17,633,305	\$64,035,972
Funding From Reserves	\$9,855,976	\$17,394,619	\$4,622,683	\$4,829,584	\$6,614,702	\$43,317,565

SECTION 4: PROJECTED REVENUE INCREASES

REVENUE INCREASES

Current rate revenue cannot support the projected revenue requirements shown in **Figure 3-1**. The revenue increases that are recommended to cover the projected revenue requirements are summarized in **Table 4-1**. The revenue increases represent how much more revenue is needed compared to existing rates.

Table 4-1. Projected Revenue Increases

	2020/21	2021/22	2022/23	2023/24	2024/25
Current Revenue (before increases)					
Residential	\$44,527,897	\$44,750,537	\$44,974,289	\$45,199,161	\$45,425,157
Multiple Use	\$3,595,765	\$3,613,744	\$3,631,813	\$3,649,972	\$3,668,222
Commercial	\$4,551,973	\$4,551,973	\$4,551,973	\$4,551,973	\$4,551,973
Industrial	\$6,564,574	\$6,564,574	\$6,564,574	\$6,564,574	\$6,564,574
Exempt	\$1,281,747	\$1,281,747	\$1,281,747	\$1,281,747	\$1,281,747
Subtotal Revenue	\$60,521,956	\$60,762,574	\$61,004,396	\$61,247,426	\$61,491,672
Expenses					
Revenue Requirements	\$65,484,756	\$71,004,714	\$76,990,280	\$83,094,270	\$89,515,710
Surplus/(Deficit)	(\$4,962,800)	(\$10,242,140)	(\$15,985,885)	(\$21,846,844)	(\$28,024,038)
Increase in Revenue from rates	8.2%	8.0%	8.0%	7.5%	7.3%
Revenue from Current Rates	\$60,521,956	\$60,762,574	\$61,004,396	\$61,247,426	\$61,491,672
Revenue from Rate Increases					
2020/21	\$4,962,800	\$4,982,531	\$5,002,360	\$5,022,289	\$5,042,317
2021/22		\$5,259,608	\$5,280,540	\$5,301,577	\$5,322,719
2022/23			\$5,702,984	\$5,725,703	\$5,748,537
2023/24				\$5,797,275	\$5,820,393
2024/25					\$6,090,072
Total Revenue from Increases	\$4,962,800	\$10,242,140	\$15,985,885	\$21,846,844	\$28,024,038
Total Rate Revenue	\$65,484,756	\$71,004,714	\$76,990,280	\$83,094,270	\$89,515,710
Total Revenue Requirement (from above)	\$65,484,756	\$71,004,714	\$76,990,280	\$83,094,270	\$89,515,710

Debt Coverage

The revenue increases in **Table 4-1** must be sufficient to provide adequate coverage of the projected debt service. Coverage is the ratio by which net available operating revenue exceeds the annual debt service. A coverage ratio of at least 1.20 times is legally required; the District's debt management policy sets a goal of 1.50 times coverage. **Table 4-2** shows that the coverage during the planning period exceeds the legally required coverage.

Table 4-2. Debt Service Coverage

	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Revenue						
Revenue From Current Rates	\$60,282,535	\$60,521,956	\$60,762,574	\$61,004,396	\$61,247,426	\$61,491,672
Revenue From Rate Increases	\$0	\$4,962,800	\$10,242,140	\$15,985,885	\$21,846,844	\$28,024,038
Capacity Fees	\$13,567,000	\$5,700,000	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000
Interest Income	\$857,551	\$1,914,777	\$2,073,173	\$1,842,378	\$1,635,184	\$1,309,683
Other Revenue						
Income - External Work Orders	\$400,000	\$400,000	\$400,000	\$400,000	\$400,000	\$400,000
Field Inspection Fees	\$332,300	\$332,300	\$332,300	\$332,300	\$332,300	\$332,300
Plan Check Fees	\$87,000	\$87,000	\$87,000	\$87,000	\$87,000	\$87,000
Permits	\$169,000	\$169,000	\$169,000	\$169,000	\$169,000	\$169,000
Overtime Billed	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000
Miscellaneous Revenue (10 & 20 ONLY)	\$22,500	\$22,500	\$22,500	\$22,500	\$22,500	\$22,500
Sale of Surplus	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Urban Runoff Services	\$312,750	\$312,750	\$312,750	\$312,750	\$312,750	\$312,750
Total Revenue	\$76,043,636	\$74,436,083	\$77,414,437	\$83,169,208	\$89,066,004	\$95,161,943
Expenses						
Operating	\$49,036,650	\$47,949,636	\$51,297,336	\$53,852,067	\$56,169,927	\$58,878,430
Net Available Revenues	\$27,006,986	\$26,486,447	\$26,117,101	\$29,317,141	\$32,896,077	\$36,283,513
Debt Service (Bonds + SRF + Short Term)	\$3,902,080	\$14,376,601	\$14,376,600	\$14,376,600	\$23,496,956	\$22,588,792
Coverage	6.92	1.84	1.82	2.04	1.40	1.61

Model Table 7G.

RESERVE POLICIES

In addition to covering annual expenses, sewer service charges need to generate revenue to maintain adequate unrestricted reserves. The District has established policies for the types of reserves and the appropriate balances that should be maintained for each reserve. In order to set rates so that these policies are met, the reserves are organized as shown in **Table 4-3**.

Table 4-3. Policies for Reserve Target Balances

Minimum/Operating Target Balance	
Risk Management	2x annual deductible
Operating Cashflow [1]	25% of annual operating expenses
Industrial Customer Stabilization	Average revenue generated over a 2-year period from top 3 income producing SIU's
Emergency	\$9,500,000 by 2025
Target Balance	
Minimum Target Balance plus	
Structural R&R	Average 5-year CIP costs
Maximum Target Balance	
Target Balance plus	
Operating Cashflow [1]	Additional 25% of annual operating expenses

1. District policy requires 25-50% of annual operating expenses for operating cash flow reserves; 25% is included in the minimum target balance and 50% (an additional 25%) included in the maximum balance.

Minimum/Operating Target Balance

The minimum target balance should be exceeded at all times to maintain a sound financial position. By meeting this target, the District provides sufficient working capital for monthly O&M expenses during the nine-month lag between the collection and transfer of sewer service charge payments by the Alameda County tax assessor to the District. If this minimum balance is maintained, the District should be able to fund its monthly operations cash flow over this extended period without relying on the use of other reserves or a short-term loan. Meeting this target balance has the highest priority because of the consequences of failing to do so.

Target Balance

Meeting the Target Balance provides an additional increment of working capital liquidity to fund capital projects that are funded on a PAYGo basis (as opposed to those that are funded with debt) as well as other renewal and replacement capital costs. With adequate capital reserves, the District is able to pay contractors without encroaching on other reserves. Due to the duration of many capital projects, the Target Balance includes an allowance for the ten-year annual average CIP. The use of the ten-year annual average in this rate study is longer than the District's five-year policy to provide stability during a period of significant capital expenditures.

The consequences of failing to meet the Target Balance are not as serious as failing to meet the Minimum/Operating Target Balance. Failing to meet the Target Balance may result in a delay of PAYGo capital projects or in paying for capital projects with debt, depending on the level of construction. As a result, meeting the Target Balance is not as high a priority as meeting the Minimum/Operating Target Balance.

Maximum Target Balance

Meeting the Maximum Target Balance provides an additional increment of working capital liquidity that can be used for additional rate stabilization, emergencies, and other prudent contingencies. Rate stabilization may be required to cover spikes in O&M or capital costs caused by unforeseen regulatory or economic developments. Emergencies in the quake-prone Bay Area are an ever-present threat. Other contingencies can include the need for rates to cover the cost of expansion projects if revenue from capacity charges is insufficient to cover growth's share of construction.

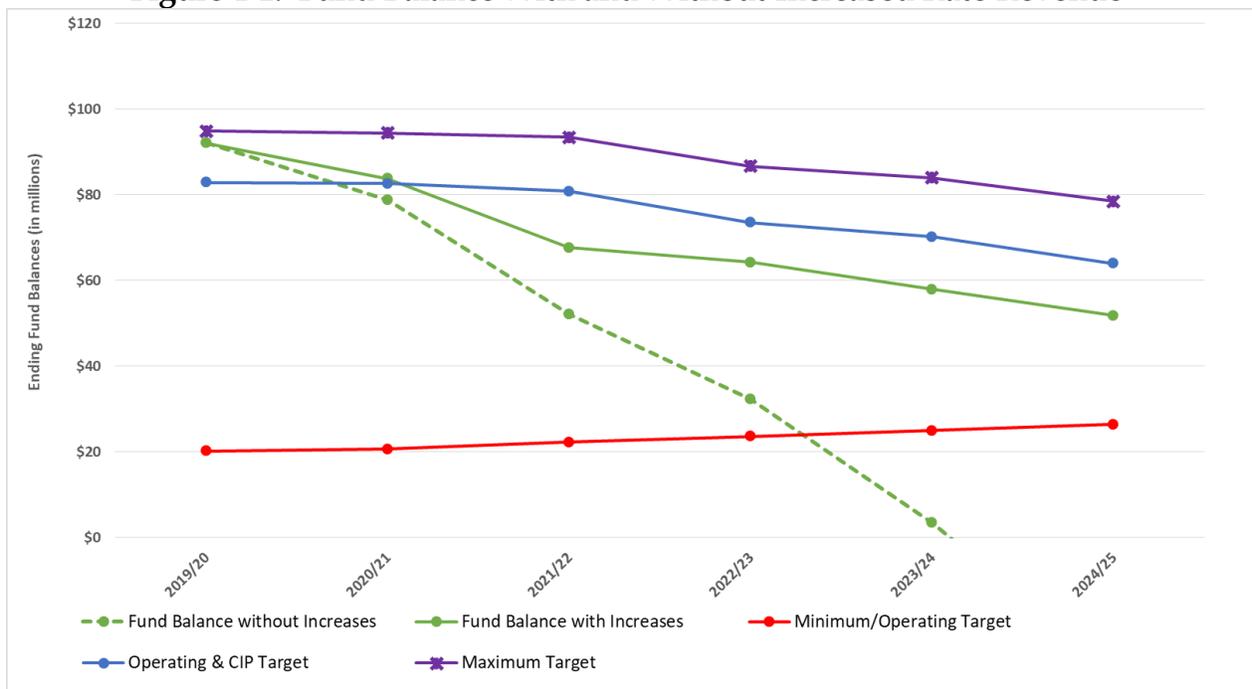
The consequences of failing to meet the Maximum Target Balance are the least serious; hence, meeting the target is the lowest priority. Exceeding the Maximum Target Balance from time to time is not problematic. Chronically exceeding it, however, will warrant an evaluation of the current rate structure.

FUND BALANCE

Figure 4-1 shows the three target balances and the projected annual fund balances with and without the revenue increases. Although the projections for the fund balance show straight lines between years, the fund balance will fluctuate up and down substantially during each year. The reserves are actively drawn on at all times during the year but are only periodically added to when revenue is received from rate payers, who are billed on the Alameda County tax rolls. The reserves are not simply accumulated without being used.

Given the revenue increases in Table 4-1, projections indicate that the fund balance (solid green line) in Figure 4-1 will diminish below the Target Balance (blue line) but remain above the Minimum/Operating Target Balance (red line) during the planning period. Projections beyond FY 2024/25 indicate that the fund balance remains above the Minimum/Operating Target Balance at all times.

Figure 4-1. Fund Balance With and Without Increased Rate Revenue



Model Table 1A.

SECTION 5: COST OF SERVICE ANALYSIS

A cost of service analysis (COSA) determines how much of the total revenue requirement should be paid by each customer class based on its respective share of wastewater flow and strength (i.e., chemical oxygen demand (COD) and total suspended solids (TSS or SS), the measures of wastewater strength used by the District). The District periodically reviews and updates its rates to ensure that they are based on the cost of service. Such updates should be conducted to account for any material changes in the loadings among the classes.

This section of the report describes the COSA step by step. The cost of service analysis involves the following steps:

1. Allocate cost to the functions provided by the District's wastewater facilities;
2. Determine units of service by function;
3. Determine unit costs of service by function;
4. Determine cost of service rates by customer class.

The COSA is a process of correlating the FY 2019/20 budgeted costs of the functions provided by the District with how much of those functions are required by each customer class. FY 2019/20 costs are used for the cost of service analysis because they are the most recent budget year. In addition, the District's cost accounting for this year serves to allocate the costs into categories that are consistent with the cost of service analysis.

FUNCTIONAL COST ALLOCATIONS

Table 5-1 first presents the allocation of operating expenses to the four functional cost categories (i.e., Customer Accounts, Flow, COD and TSS). The allocations depend on whether the cost is related to treatment plant O&M, collection system O&M, customer O&M or engineering functions. Each of these functions has its own set of allocation factors.

- Treatment plant O&M - It has been the District's practice to apportion treatment costs equally across flow, COD, and TSS, which is a common industry practice.
- Collection system O&M - 100% is allocated to the Flow category.
- Customer O&M - 100% is allocated to the Customer category.
- Engineering - It has been the District's practice to allocate half of the engineering to flow, which includes both the treatment plant and collection system, and the remaining 50% equally to COD and TSS.

Table 5-1. Allocation of Costs to Functions - FY 2020/21

FUNCTIONAL ALLOCATION FACTORS						
Type	Total	Accounts	Flow	COD	TSS	
1 Treatment Plant O&M	100.0%	0.0%	33.0%	33.0%	34.0%	
2 Collection System O&M	100.0%	0.0%	100.0%	0.0%	0.0%	
3 Customer O&M	100.0%	100.0%	0.0%	0.0%	0.0%	
4 Engineering	100.0%	0.0%	50.0%	25.0%	25.0%	
5 Composite of Total O&M Expenses	100.0%	4.5%	47.2%	23.8%	24.5%	
6 Composite of Total O&M and Capital Expenses	100.0%	2.9%	47.4%	24.5%	25.2%	

REVENUE REQUIREMENT ALLOCATION						
	Rev. Req't 2019/20	Allocation Type	Cost Allocation			
			Accounts	Flow	COD	TSS
OPERATING COSTS						
Fund 20 Treatment & Disposal	\$13,824,013	1	\$0	\$4,561,924	\$4,561,924	\$4,700,164
Fund 20 Fab., Maint., & Const.	\$8,837,462	1	\$0	\$2,916,362	\$2,916,362	\$3,004,737
Fund 20 Collection Services	\$7,316,485	2	\$0	\$7,316,485	\$0	\$0
Fund 20 Technical Services						
CIP Team	\$1,585,846	4	\$0	\$792,923	\$396,462	\$396,462
Technical Services Team	\$1,249,033	4	\$0	\$624,516	\$312,258	\$312,258
Customer Team	\$1,652,620	3	\$1,652,620	\$0	\$0	\$0
Environmental Compliance Team	\$2,144,222	4	\$0	\$1,072,111	\$536,055	\$536,055
Fund 50 Total Transfer from Fund 20	\$407,600	4	\$0	\$203,800	\$101,900	\$101,900
Subtotal for O&M Composite	\$37,017,281		\$1,652,620	\$17,488,122	\$8,824,962	\$9,051,577
O&M Composite Allocation Factors	100%	5	4.5%	47.2%	23.8%	24.5%
Composite Allocations						
Fund 20 Business Services	\$4,342,142	5	\$193,853	\$2,051,364	\$1,035,172	\$1,061,754
Fund 20 General Manager	\$1,066,367	5	\$47,607	\$503,785	\$254,223	\$260,751
Fund 20 Board of Directors	\$179,176	5	\$7,999	\$84,648	\$42,716	\$43,813
Fund 10 County Commission Expense	\$109,000	5	\$4,866	\$51,495	\$25,986	\$26,653
Fund 30 Special Projects	\$4,354,600	5	\$194,409	\$2,057,249	\$1,038,142	\$1,064,800
Fund 40 OPEB Expense	\$1,375,000	5	\$61,386	\$649,593	\$327,802	\$336,219
Fund 60 Total Transfer from Fund 20	\$593,084	5	\$26,478	\$280,192	\$141,392	\$145,023
Total Operating Costs	\$49,036,650		\$2,189,219	\$23,166,448	\$11,690,393	\$11,990,589
DEBT SERVICE						
Bond Debt Service	\$0	1	\$0	\$0	\$0	\$0
SRF Loan Repayment	\$2,785,617	1	\$0	\$919,254	\$919,254	\$947,110
Other Loans	\$0	1	\$0	\$0	\$0	\$0
LOC Interest	\$0	1	\$0	\$0	\$0	\$0
Total Debt Services	\$2,785,617		\$0	\$919,254	\$919,254	\$947,110
CAPITAL COSTS (10-yr avg PAYGo)						
CIP Admin Facilities	\$508,500	5	\$22,702	\$240,231	\$121,227	\$124,340
CIP Collection System	\$2,094,638	2	\$0	\$2,094,638	\$0	\$0
CIP Transport	\$3,735,513	2	\$0	\$3,735,513	\$0	\$0
CIP Treatment	\$14,192,100	1	\$0	\$4,683,393	\$4,683,393	\$4,825,314
Plant & Pump R&R	\$250,000	1	\$0	\$82,500	\$82,500	\$85,000
Pretreatment	\$5,000	1	\$0	\$1,650	\$1,650	\$1,700
Transfers to SRF Reserves	\$19,072	1	\$0	\$6,294	\$6,294	\$6,484
Transfers to Fund 90	\$3,450,000	1	\$0	\$1,138,500	\$1,138,500	\$1,173,000
Short-Term Financing Loan	\$0	1	\$0	\$0	\$0	\$0
Total Capital Costs	\$24,254,823		\$22,702	\$11,982,719	\$6,033,564	\$6,215,838
Total Operating and Capital Costs	\$76,077,089		\$2,211,921	\$36,068,421	\$18,643,210	\$19,153,537
Total Composite Allocation Factors	100%	6	2.9%	47.4%	24.5%	25.2%
TRANSFERS TO/(FROM) RESERVES						
Main Operating Fund	(\$15,794,554)	6	(\$459,222)	(\$7,488,255)	(\$3,870,563)	(\$3,976,514)
NET REVENUE REQUIREMENT	\$60,282,535		\$1,752,699	\$28,580,166	\$14,772,647	\$15,177,023

Model Table 9.

The sum of these functional allocations is used to calculate an O&M Composite Allocation Factor which is calculated by taking the percentage of O&M costs allocated to each of the four functional cost categories. The O&M Composite Allocation Factors are used to allocate the composite operating costs, which are not directly related to one of the four functional allocation factors.

The debt service and PAYGo capital expenses are then allocated using the appropriate functional allocation factors, including the O&M Composite Allocation factor. The sum of the allocation of operating, debt service, and PAYGo costs is then used to determine the Total Composite Allocation Factors that are used for allocating transfers, which are not associated with specific costs. The result of this series of allocations yields the revenue requirement itemized by function.

UNITS OF SERVICE

Each of the four functional categories provides service to customers as shown in **Table 5-2**. This table shows the number of accounts and estimated wastewater discharge for each customer class. The values used for residential flow reflect reduced flows per residential account due to the increased use of water efficient appliances and conservation efforts. Commercial and industrial flows were derived from metered water use reports from ACWD. The District's existing estimate for Inflow and Infiltration (I&I) of 5% of total flow was used to account for inflows of runoff that have entered the system through sources such as manholes, private laterals and cracked pipelines.

The values used for COD concentrations were derived based on a review of the concentrations used in the District's prior studies as well as a comparison with other agencies that also use COD. It has been the District's practice of assigning concentrations to individual commercial and industrial customers and then calculating a weighted average to apply to each of the classes. The SS concentrations were updated by comparing the concentrations used in the District's prior studies with the guidelines promulgated by the State Water Resources Control Board; a new weighted average was also calculated for each class. I&I is comparatively low strength because it primarily consists of runoff that enters the collection system.

Table 5-2. Units of Service By Function

	<u>Accounts [a]</u>	<u>Discharge [b]</u>	<u>COD [c]</u>	<u>TSS [c]</u>	<u>COD</u>	<u>SS</u>
	LU	(kgal/year)	(mgd)	mg/l	mg/l	(klbs/year) (klbs/year)
Residential						
Single Family Residences	69,352	4,936,129	13.524	500	200	20,584 8,233
Multiple Family Residences	43,483	2,698,120	7.392	500	200	11,251 4,500
Total Residential	112,835	7,634,249	20.916			31,835 12,734
Commercial						
Strong	141	298,060	0.817	2,009	507	4,994 1,260
Moderate	732	542,235	1.486	505	211	2,284 954
Weak	743	270,716	0.742	345	135	779 305
Fast-Food Restaurant	75	35,287	0.097	2,024	507	596 149
Full-Service Restaurant	77	45,877	0.126	2,038	506	780 194
Total Commercial	1,768	1,192,175	3.266			9,432 2,862
Industrial						
Strong	34	90,908	0.249	2,009	507	1,523 384
Moderate	1,222	928,475	2.544	505	211	3,910 1,634
Weak	84	19,566	0.054	345	135	56 22
Total Industrial	1,340	1,038,950	2.846			5,490 2,040
Subtotal	115,943	9,865,373	27.028			46,757 17,636
Inflow and Infiltration	-	493,269	1.351	100	100	411 411
GRAND TOTAL	115,943	10,358,642	28.380			47,168 18,048

[a] Source for accounts: District CIXZ Report.
 [b] Source for flow:
 SFR: 195 gpd. MFR: 170 gpd.
 Commercial & Industrial: District CIXZ Report.
 Inflow & Infiltration: assumed 5% per District staff.
 [c] Source for COD and TSS concentrations:
 Residential: based on prior studies.
 Commercial & Industrial: Weighted average reports from District.
 Inflow & Infiltration: based on studies.

Model Table 10.

UNIT COSTS OF SERVICE

The cost of service corresponding to each of the four functions is calculated by dividing the functional costs in **Table 5-1** by the units of service in **Table 5-2**. The result is shown in **Table 5-3**. Note that an adjustment is required to reallocate the cost of service attributable to I&I from the three loading functions (i.e., flow, COD, and TSS) entirely to the accounts function. This adjustment is made because a significant portion of I&I originates in laterals of which the majority are residential and privately owned and maintained. This adjustment improves the alignment of the source of I&I with the cost of I&I.

Table 5-3. Unit Costs of Service by Function

	Cost Allocation				
	<u>Accounts</u>	<u>Flow</u>	<u>COD</u>	<u>TSS</u>	<u>Total</u>
Functional Costs					
Operating Costs	\$2,189,219	\$23,166,448	\$11,690,393	\$11,990,589	\$49,036,650
Debt Service Allocation	\$0	\$919,254	\$919,254	\$947,110	\$2,785,617
Capital Cost Allocation	\$22,702	\$11,982,719	\$6,033,564	\$6,215,838	\$24,254,823
Transfers To/(From) Reserves	(\$459,222)	(\$7,488,255)	(\$3,870,563)	(\$3,976,514)	(\$15,794,554)
	\$1,752,699	\$28,580,166	\$14,772,647	\$15,177,023	\$60,282,535
Units of Service (Incl I&I)	115,943	10,358,642	47,168	18,048	
Unit Costs (Incl I&I)	\$15.12	\$2.76	\$313.19	\$840.94	
	\$/Account	\$/1,000 gals	\$/1,000 lbs	\$/1,000 lbs	
Reallocation of I&I Costs					
I&I Units	-	493,269	411	411	
I&I Costs	\$0	\$1,360,960	\$128,842	\$345,950	\$1,835,753
Functional Costs	\$1,752,699	\$28,580,166	\$14,772,647	\$15,177,023	\$60,282,535
I&I Costs (Reallocated)	\$1,835,753	(\$1,360,960)	(\$128,842)	(\$345,950)	\$0
	\$3,588,452	\$27,219,206	\$14,643,805	\$14,831,073	\$60,282,535
Units of Service (Excl I&I)	115,943	9,865,373	46,757	17,636	
Unit Costs (Excl I&I)	\$30.95	\$2.76	\$313.19	\$840.94	
	\$/Account	\$/1,000 gals	\$/1,000 lbs	\$/1,000 lbs	

Model Table 11.

In cost of service analysis, all customer classes are treated equally through the application of the same unit costs to all customers, which is the fundamental purpose of cost of service analysis. In this way, cost of service analysis proportionately distributes the revenue requirement to customers without discrimination, after which rates can be designed to generate the revenue required to provide the necessary level of service to each class. Rates are derived in Section 6.

SECTION 6: RATE AND BILL ANALYSIS

In this section, rates are first calculated based on the cost of service determined in Section 5 for FY 2019/20. Those rates are compared with the adopted rates for FY 2019/20 to see how the updated cost of service compares with the previous cost of service rates. Rates are then calculated based on the cost of service with the revenue increase applied for FY 2020/21. The resulting rates for FY 2020/21 are compared with the current rates for FY 2019/20. These comparisons serve to show the impact of updating the cost of service coupled with the projected revenue increase in FY 2020/21.

This rate analysis recommends adjustments to the rates without making any changes to the rate structure, *per se*. Residential rates are charged flat rates per living unit, which is a common industry practice.¹ The flow charges for commercial and certain industrial customers is also a common industry practice that should be continued at the District. Charging the sampled industrial customers based on the unit costs of service is also a recommended practice.

COST OF SERVICE RATES

Tables 6-1, 6-2, and 6-3 show the derivation of the cost of service rates for FY 2019/20. These rates are derived by applying the unit costs of service in Table 5-3 to the units of service in Table 5-2. For residential customers, the rate is a fixed annual charge per living unit as shown in Table 6-1.

Table 6-1. Calculation of Residential Cost of Service Rates - FY 2019/20

Residential - Charge per Account					
	<u>Account</u>	<u>Flow</u>	<u>COD</u>	<u>TSS</u>	<u>Total</u>
Single Family Residential					
Units	69,352 accounts	4,936,129 kgal	20,584 klbs	8,233 klbs	
Accounts	69,352 accounts	69,352 accounts	69,352 accounts	69,352 accounts	
Units per account	1.0	71.18 kgal/account	0.297 klbs/account	0.119 klbs/account	
Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs	
Total Single Family Residential	\$30.95 per account	\$196.38 per account	\$92.95 per account	\$99.84 per account	\$420.12
Multi Family Residential					
Units	43,483 accounts	2,698,120 kgal	11,251 klbs	4,500 klbs	
Accounts	43,483 accounts	43,483 accounts	43,483 accounts	43,483 accounts	
Units per account (loading ÷ acct)	1	62.05 kgal/account	0.259 klbs/account	0.103 klbs/account	
Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs	
Total Multi Family Residential	\$30.95 per account	\$171.20 per account	\$81.04 per account	\$87.04 per account	\$370.22

Model Table 11. Units of service from Table 5-2. Unit costs from Table 5-3.

¹ See Appendix A for a discussion of volumetric residential wastewater rate structures, which is an alternative structure.

As shown in **Table 6-2**, commercial and certain industrial customers are billed per 1,000 gallons based on estimated wastewater discharge using metered potable water use from Alameda County Water District as a proxy. Commercial wastewater discharges are not metered and their flows are not sampled for COD and TSS concentrations.

Table 6-2. Calculation of Commercial/Industrial Cost of Service Rates - FY 2019/20

Commercial - Charge per Kgal					
	Account	Flow	COD	TSS	Total (per kgal)
Fast Food Restaurant					
Units	75 accounts	35,287 kgal	596 klbs	149 klbs	
Kgal	35,287 kgal	35,287 kgal	35,287 kgal	35,287 kgal	
Units/Kgal	0.0021254 accounts/kgal	1	0.0168802 klbs/kgal	0.0042284 klbs/kgal	
Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs	
Total Fast Food Restaurant	\$0.07 per kgal	\$2.76 per kgal	\$5.29 per kgal	\$3.56 per kgal	\$11.67
Full Service Restaurant					
Units	77 accounts	45,877 kgal	780 klbs	194 klbs	
Kgal	45,877 kgal	45,877 kgal	45,877 kgal	45,877 kgal	
Units/Kgal	0.0016784 accounts/kgal	1	0.0169969 klbs/kgal	0.0042200 klbs/kgal	
Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs	
Total Full Service Restaurant	\$0.05 per kgal	\$2.76 per kgal	\$5.32 per kgal	\$3.55 per kgal	\$11.68
Industrial & Commercial - Charge per Kgal					
	Account	Flow	COD	TSS	Total (per kgal)
Strong					
Units	175 accounts	388,968 kgal	6,517 klbs	1,645 klbs	
Kgal	388,968 kgal	388,968 kgal	388,968 kgal	388,968 kgal	
Units/Kgal	0.0004499 accounts/kgal	1	0.0167551 klbs/kgal	0.0042284 klbs/kgal	
Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs	
Total Strong	\$0.01 per kgal	\$2.76 per kgal	\$5.25 per kgal	\$3.56 per kgal	\$11.58
Moderate					
Units	1,954 accounts	1,470,710 kgal	6,194 klbs	2,588 klbs	
Kgal	1,470,710 kgal	1,470,710 kgal	1,470,710 kgal	1,470,710 kgal	
Units/Kgal	0.0013286 accounts/kgal	1	0.0042117 klbs/kgal	0.0017597 klbs/kgal	
Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs	
Total Moderate	\$0.04 per kgal	\$2.76 per kgal	\$1.32 per kgal	\$1.48 per kgal	\$5.60
Weak					
Units	827 accounts	290,282 kgal	835 klbs	327 klbs	
Kgal	290,282 kgal	290,282 kgal	290,282 kgal	290,282 kgal	
Units/Kgal	0.0028490 accounts/kgal	1	0.0028773 klbs/kgal	0.0011259 klbs/kgal	
Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs	
Total Weak	\$0.09 per kgal	\$2.76 per kgal	\$0.90 per kgal	\$0.95 per kgal	\$4.70
Industrial (sampled)					
	Account	Flow	COD	TSS	
Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs	

Model Table 11. Units of service from Table 5-2. Unit costs from Table 5-3.

Other industrial customers whose wastewater is charged based on sampled flows are charged the unit costs of service for flow, COD, and TSS.

Table 6-3. Calculation of Industrial Cost of Service Rates - FY 2019/20

Industrial (sampled)				
	<u>Account</u>	<u>Flow</u>	<u>COD</u>	<u>TSS</u>
Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs

Model Table 11. Unit costs from Table 5-3.

The cost of service rates for FY 2019/20 are summarized and compared with the adopted rates for FY 2019/20 in **Table 6-4**.

Table 6-4. Comparison of Adopted with Cost of Service Rates - FY 2019/20

	Adopted 2019/20	COSA 2019/20	COSA Minus Current	
			\$	%
Residential (\$/LU)				
Single Family Residences	\$421.37	\$420.12	(\$1.25)	-0.3%
Multiple Family Residences	\$365.32	\$370.22	\$4.90	1.3%
Minimum Charge	\$365.32	\$370.22	\$4.90	1.3%
Com/Ind (\$/1,000 gals)				
Fast-Food Restaurant	\$9.95	\$11.67	\$1.72	17.3%
Full-Service Restaurant	\$13.18	\$11.68	(\$1.50)	-11.4%
Strong	\$10.64	\$11.58	\$0.94	8.8%
Moderate	\$5.25	\$5.60	\$0.35	6.6%
Weak	\$4.37	\$4.70	\$0.33	7.4%
Industrial (sampled)				
Volume (\$/1,000 gals)	\$2.48	\$2.76	\$0.28	11.3%
COD (\$/1,000 lbs)	\$328.24	\$313.19	(\$15.05)	-4.6%
Suspended Solids (\$/1,000 lbs)	\$763.48	\$840.94	\$77.46	10.1%

Model Table 11.

The rates proposed for FY 2020/21 are derived by multiplying the 8.2% revenue increase in **Table 4-1** times the COSA rates for FY 2019/20 in **Table 6-4**. A comparison of the adopted FY 2019/20 rates with the proposed FY 2020/21 COSA rates is shown in **Table 6-5**. As a result of the cost of service adjustments, rates for each class increase by different percentage amounts.

Table 6-5. Comparison of Adopted with Proposed Rates

	Adopted 2019/20	Proposed 2020/21	Proposed Minus Current	
			\$	%
Residential (\$/LU)				
Single Family Residences	\$421.37	\$454.57	\$33.20	7.9%
Multiple Family Residences	\$365.32	\$400.58	\$35.26	9.7%
Minimum Charge	\$365.32	\$400.58	\$35.26	9.7%
Com/Ind (\$/1,000 gals)				
Fast-Food Restaurant	\$9.95	\$12.62	\$2.67	26.9%
Full-Service Restaurant	\$13.18	\$12.64	(\$0.54)	-4.1%
Strong	\$10.64	\$12.53	\$1.89	17.7%
Moderate	\$5.25	\$6.06	\$0.81	15.4%
Weak	\$4.37	\$5.08	\$0.71	16.3%
Industrial (sampled)				
Volume (\$/1,000 gals)	\$2.48	\$2.99	\$0.51	20.4%
COD (\$/1,000 lbs)	\$328.24	\$338.87	\$10.63	3.2%
Suspended Solids (\$/1,000 lbs)	\$763.48	\$909.90	\$146.42	19.2%

Model Table 11.

A five-year rate projection based on the proposed FY 2019/20 cost of service rates in **Table 6-5** is presented in **Table 6-6**. For FY 2021/22 through FY 2024/25, rates are increased equally across-the-board.

Table 6-6. Five-Year Schedule of Rates

	Adopted 2019/20	COS Rates 2019/20	Proposed									
			2020/21		2021/22		2022/23		2023/24		2024/25	
Overall Revenue Increase				8.2%		8.0%		8.0%		7.5%		7.3%
Residential (\$/LU)												
Single Family Residences	\$421.37	\$420.12	\$454.57	7.9%	\$490.93	8.0%	\$530.21	8.0%	\$569.97	7.5%	\$611.58	7.3%
Multiple Family Residences	\$365.32	\$370.22	\$400.58	9.7%	\$432.63	8.0%	\$467.24	8.0%	\$502.28	7.5%	\$538.95	7.3%
Minimum Charge	\$365.32	\$370.22	\$400.58	9.7%	\$432.63	8.0%	\$467.24	8.0%	\$502.28	7.5%	\$538.95	7.3%
Com/Ind (\$/1,000 gals)												
Fast-Food Restaurant	\$9.95	\$11.67	\$12.62	26.9%	\$13.63	8.0%	\$14.72	8.0%	\$15.83	7.5%	\$16.98	7.3%
Full-Service Restaurant	\$13.18	\$11.68	\$12.64	-4.1%	\$13.65	8.0%	\$14.74	8.0%	\$15.85	7.5%	\$17.01	7.3%
Strong	\$10.64	\$11.58	\$12.53	17.7%	\$13.53	8.0%	\$14.61	8.0%	\$15.71	7.5%	\$16.85	7.3%
Moderate	\$5.25	\$5.60	\$6.06	15.4%	\$6.54	8.0%	\$7.07	8.0%	\$7.60	7.5%	\$8.15	7.3%
Weak	\$4.37	\$4.70	\$5.08	16.3%	\$5.49	8.0%	\$5.93	8.0%	\$6.37	7.5%	\$6.83	7.3%
Industrial (sampled)												
Volume (\$/1,000 gals)	\$2.48	\$2.76	\$2.99	20.4%	\$3.22	8.0%	\$3.48	8.0%	\$3.74	7.5%	\$4.02	7.3%
COD (\$/1,000 lbs)	\$328.24	\$313.19	\$338.87	3.2%	\$365.98	8.0%	\$395.26	8.0%	\$424.91	7.5%	\$455.92	7.3%
Suspended Solids (\$/1,000 lbs)	\$763.48	\$840.94	\$909.90	19.2%	\$982.69	8.0%	\$1,061.30	8.0%	\$1,140.90	7.5%	\$1,224.19	7.3%

Model Table 11.

CUSTOMER BILL COMPARISON

Typical bills based on the proposed FY 2020/21 rates for the District are compared with other neighboring wastewater agencies in **Tables 6-7** through **6-10**. The comparison is made for single family, multi family, commercial-moderate, and commercial-full service restaurants. For rate structures based on flow, the average flow per customer for the District was used.

The agencies selected for this comparison have unique conditions that account for the differences in bills. Some agencies may have recently or are currently undergoing major capital improvement programs as is the District while others may not. Some agencies may receive significant support from non-operating revenue such as property taxes, which is not the case with the District.

Table 6-7. Single Family Annual Charge Comparison with Neighboring Agencies



Table 6-8. Multi Family Annual Charge Comparison with Neighboring Agencies

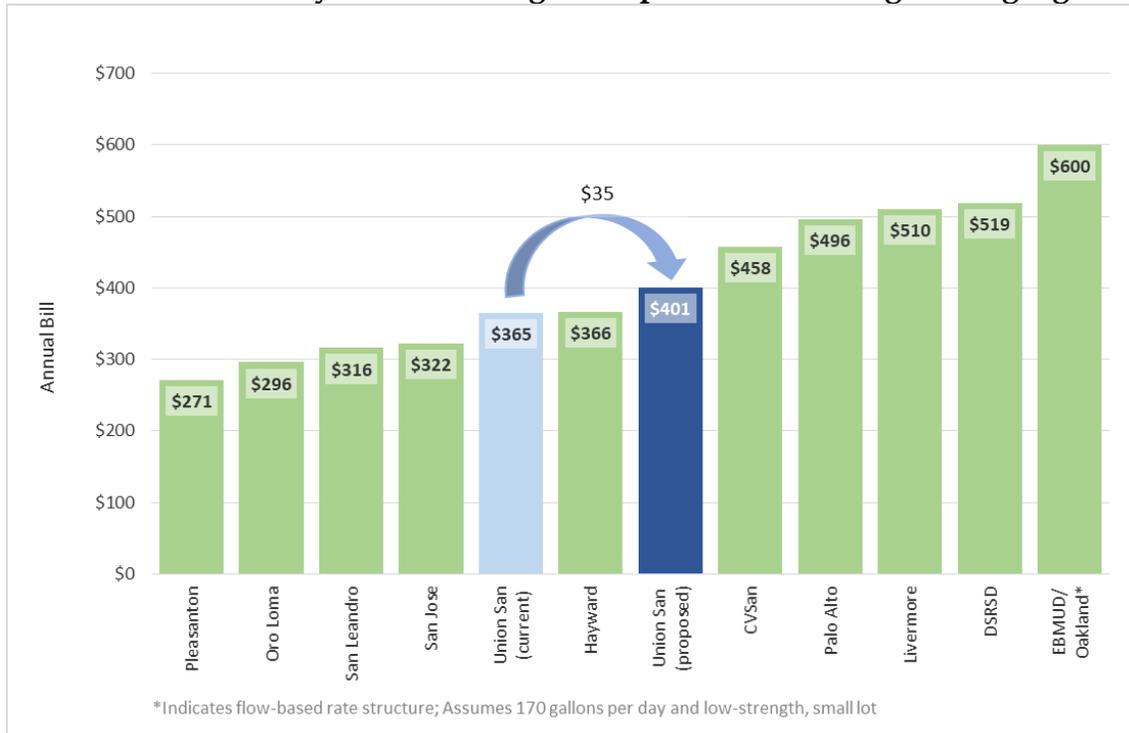


Table 6-9. Commercial-Moderate Annual Charge Comparison with Neighboring Agencies

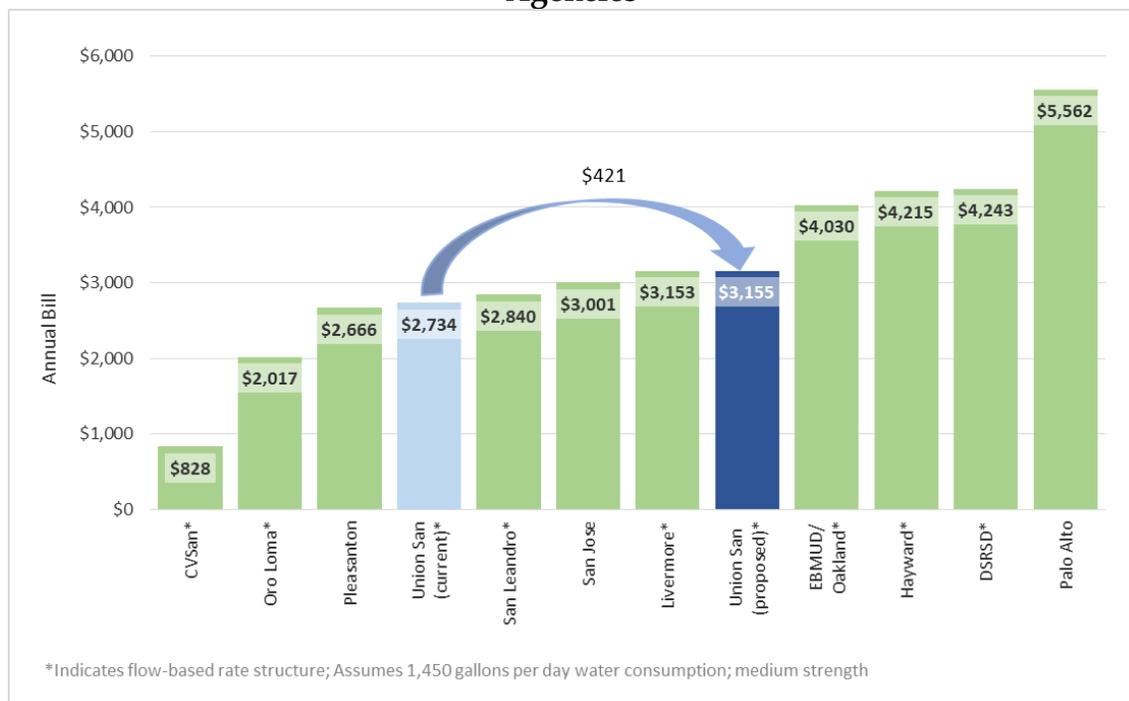
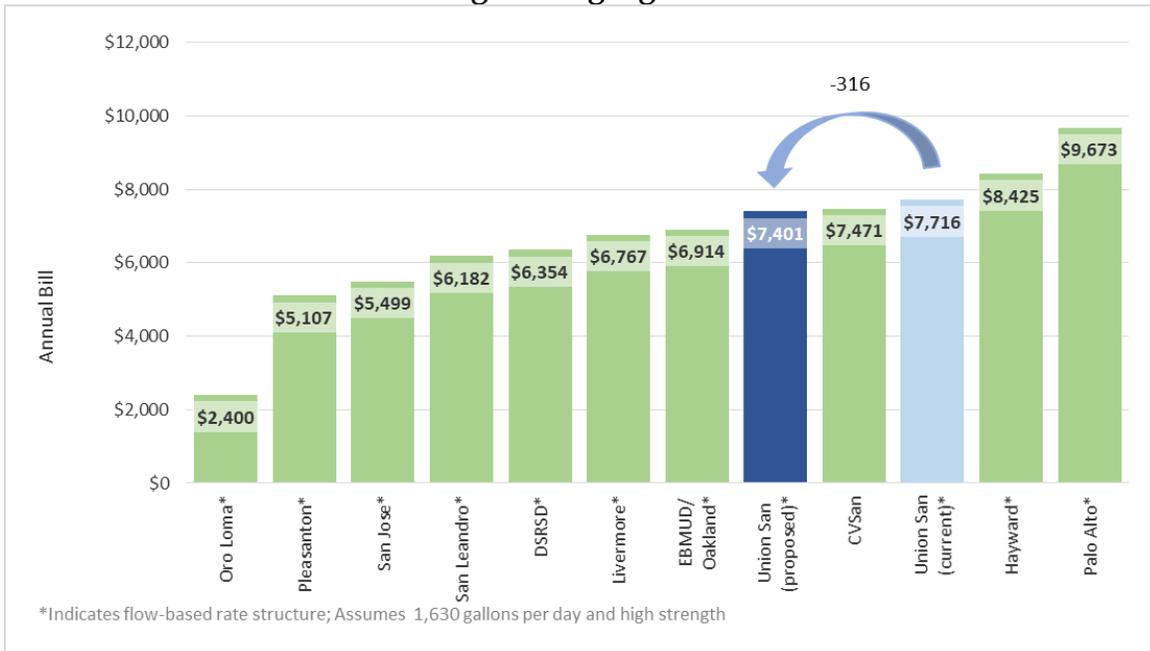


Table 6-10. Commercial-Full Service Restaurant Annual Charge Comparison with Neighboring Agencies



APPENDIX A

Technical Memorandum - Volumetric Residential Wastewater Rates



HILTON FARNKOPF & HOBSON

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MEMORANDUM

To: Paul Eldredge, General Manager, Union Sanitary District
From: John Farnkopf, Senior Vice President, HF&H Consultants, LLC
Date: January 9, 2020
Subject: Residential Volumetric Wastewater Rates

The District bills its residential customer classes flat charges per dwelling unit annually on the tax roll. Some of the District's residential customers occasionally ask whether they should be billed based on their wastewater flow. This memorandum was prepared to provide information to assist the District in explaining why the District charges its residential customers flat charges rather than volumetric charges.

Executive Summary

The magnitude of the difference in cost between a small household and an average household is not as great as one might expect. The cost of serving the small family is not that much less than the long-term average because 85% or more of a typical wastewater system's costs are fixed and do not vary with flow.

As a result, the difference in serving a family of two is not 50% of a family of four but, rather, about 7.5% (50% of the variable cost, which is estimated to be 15% of the total cost, is 7.5%). Given that the current single family fixed charge is \$421.37, the most a household could save with a volumetric charge would be 15% (for no flow) or \$63.21 per year (\$0.173 per day).

The District recognizes the fact that at least 85%¹ of its costs are fixed by charging a minimum charge to non-residential customers. The minimum charge ensures that flow-based customers will cover at least their share of fixed costs that exist even if they have

¹ The most significant costs that vary with flow are power and chemicals. HF&H evaluated the District's costs and determined that 85% of the costs are fixed and only 15% is variable.



no flow. Such a minimum charge would apply to single family customers if the District converted to volumetric residential charges.

Introduction

Residential potable water customers are accustomed to paying for at least a portion of their water service based on their volume of metered water use during the billing period. Billing residential wastewater customers based on flow is much less common. In California, 90% of residential potable water customers pay a volumetric charge, but only 30% of residential wastewater customers pay a volumetric charge.²

The District bills its non-residential customer classes based on their annual metered water use, which is a very common industry practice. The non-residential customers are typically a smaller proportion of the total customer accounts compared to the residential customers with more varied flows and strengths. As such, non-residential customers warrant special attention compared with the residential customer class, which is a larger, more homogeneous group of customers.

The attention that is required involves acquiring the flow data for each non-residential customer and in deriving their rates. The process that is required to acquire flow data for each residential customer and to derive volumetric rates for the residential classes is discussed below.

Determining Residential Flows

Wastewater flows for residential customers in particular cannot be metered accurately because the flow is typically not pressurized and contains solids and other organic and inorganic constituents that will quickly clog meters. Indeed, it is hard enough to keep sewers flowing freely when challenged by tree root intrusion, joint separation and offsets, pipeline cracks, and other physical defects without adding a mechanical device or weir to measure flow.

Communities that do bill residential wastewater customers volumetrically must instead estimate each customer's wastewater flow based on their potable water meter readings. Water meter readings do not translate directly to wastewater flow because water use includes significant water for irrigation and other uses that do not drain to the sewers. Because irrigation is the principal non-sewered water use, meter readings during the winter season provide the most accurate proxy for sewer residential water use. Adjustments to winter water use are sometimes made to reduce the meter readings

² *Volumetric Pricing for Sanitary Sewer Service in the State of California*. A&N Technical Services, Inc.. February 2011.



slightly (e.g., 5%) to reflect the fact that not all winter water use is sewered. For example, some customers irrigate year-round and some water is used for cleaning surfaces and laundry, which evaporates.

Acquiring meter reading data is more cost effective if the water service is provided by the same agency that provides wastewater service. When the wastewater agency does not have direct access to meter reading data, the effort to acquire meter reads is more complicated. The wastewater agency needs to request the data from the water supplier. The water accounts from the water supplier need to be reconciled with the wastewater agency's accounts, which requires substantially more administrative and overhead staff. The District acquires the meter reads for its non-residential customers (approximately 4,000 accounts out of a total 112,000 accounts) from Alameda County Water District (ACWD). The District's approximately 108,000 residential accounts is twenty-seven times as large as its non-residential class. The District currently has two full time employees that evaluate, troubleshoot and calculate the annual non-residential billing amounts. Converting to volumetric billing for residential customers will require significantly more staff to administer the billing process.

For an agency like the District, timing becomes critical if winter meter reads are used to calculate residential volumetric charges in time to submit the charges to Alameda County to be placed on the tax rolls. If the winter period is based on water use from December through March (two bi-monthly billing cycles), the meter reads from ACWD may not be available until May. The ACWD accounts need to be matched with the District's parcels. Anomalous meter readings, new accounts, and other adjustments must be processed. The charges can be calculated based on the winter average for each customer only after the Board has adopted the rates. Completing this work by late July can be challenging.

As a practical matter, agencies with time constraints such as these will resort to calculating the residential charges based on winter meter readings from the prior year. For example, the charges for FY 2020-21 would be based on ACWD's bi-monthly meter readings from December 2018 to March 2019. Hence, the lag from when the winter period began (December 2018) until when the service is provided (beginning July 2020) is nineteen months.

This lag exacerbates the problem of determining flow for new customers with no meter reading history. Whatever estimates are made for new customers until the new customer develops a water use history (e.g., applying the prior customer's history to the



new customer, applying per capita flow allocations based on occupancy, using overall residential flow averages) will lead to an even longer lag. Additional time and staff resources are also required for account reconciliation, with the potential for larger bill adjustments.

Deriving Volumetric Wastewater Rates

Rate design is a process of meeting a community's rate-making objectives consistent with governing laws, court decisions, and industry practices. The typical rate-making objectives are rate payer equity, revenue stability, customer understanding, ease of implementation, conservation management, and affordability as well as others that may be appropriate to the service area. The rate design should balance these objectives, weighting each objective based on the unique circumstances.

The primary objective of volumetric residential sewer service charges is rate payer equity: each bill is proportionate to the burden each residential customer places on the system. To achieve equity with its non-residential customers, whose flows and wastewater strengths vary widely, the District bills these customers based on their individual annual flows. Because the residential class is comparatively homogeneous, the use of flow to achieve equity is not as great.

The equity in using fixed charges per dwelling unit is equal for each residence, which some would consider less than ideal because there is some variation in sewer water use in the residential classes. Greater equity that may be achievable with volumetric rates is still not perfect. When flows are used, they are always estimates. For new customers, which come along every seven years on average, the estimates are based either on the prior customer or an average of all residential customers. For established customers, flows may include unusual winter irrigation during droughts, sewer water use by temporary residents such as students and holiday visitors. Flows may also not be representative of year-round wastewater production if the residents vacation during the winter billing period.

Other Considerations

Revenue stability can be a concern when some or all of the charge is based on volume. For non-residential customers, the flow should reflect only sewer flows; non-residential customers with significant irrigation usually have a separate irrigation service that is exempt from sewer service charges. Hence, the revenue from non-residential customers is relatively stable from year to year. In addition, overall revenue stability is improved because the non-residential charges are determined for the year.

Mr. Paul Eldredge
January 9, 2020
Page 5



Even when winter water use or summer caps is used to exclude irrigation water use from residential water use, the residential flows can vary more, which can affect revenue stability because the class is comparatively large. Billing flat charges comes closer to matching revenue with cash flow.



Summary

The District's use of flat charges per dwelling unit for its residential customers is consistent with industry practice. The District charges multi family residential customers 86.5% of single family customers to reflect the difference in occupancy. This rate differential is also consistent with industry practice.

The District does not charge its residential customers based on their individual flows. This is consistent with two-thirds of wastewater agencies in California, which have concluded that the increased cost of charging each residence based on its flow exceeds the improvement that might be gained in equity.

APPENDIX B

Wastewater Rate Model and Cost of Service Analysis
(version: FINAL BASELINE - USD COSA Model 2-26-20 report)

List of Model Tabs:

Tab 1A. Summary
Tab 2. Revenue Requirements
Tab 3. Rate Revenue Increases
Tab 5A. CIP & Loan Assumptions
Tab 8. Customer Billing Data
Tab 9. COS - Functional Costs
Tab 10. COS - Units
Tab 11. COS - Unit Costs

	A	B	C	D	E	F	G	H	I	J	K
1	Union Sanitary District										
2	Financial Model										
3	Table 1A. Summary										
4		<u>Adopted</u>	Projected								
5	Fiscal Year	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
6	Fiscal Year End	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
7	Rate Increases		8.2%	8.0%	8.0%	7.5%	7.3%	6.5%	5.5%	5.0%	5.0%
8	Cumulative Increase		8.2%	16.9%	26.2%	35.7%	45.6%	55.0%	63.6%	71.7%	80.3%
9											
10	Debt Coverage Ratio	6.92	1.84	1.82	2.04	1.40	1.61	1.70	1.84	1.97	2.12
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FYE Fund Balance - Contains All Unrestricted Funds Except 90

Fiscal Year	Fund Balance without Increases	Fund Balance with Increases	Minimum/Operating Target	Operating & CIP Target	Maximum Target
2019/20	92	92	20	83	95
2020/21	80	83	21	82	95
2021/22	52	68	22	81	94
2022/23	32	65	23	74	87
2023/24	3	58	24	70	84
2024/25	-	52	26	64	79
2025/26	-	52	27	59	74
2026/27	-	57	28	57	73
2027/28	-	39	29	60	76
2028/29	-	39	30	65	82

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Union Sanitary District												
2	Financial Model												
5				1	2	3	4	5	6	7	8	9	10
6		Index	Budget	Projected									
7		(Tab 1B)	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	
8	OPERATING EXPENSES												
9	5000 PERSONNEL EXPENSE												
10	5010 Fees, Board of Directors	1	\$78,735	\$81,491	\$84,343	\$87,295	\$90,350	\$93,512	\$96,785	\$100,173	\$103,679	\$107,308	
11	5020 Salaries, Reg	2	\$17,955,373	\$18,673,588	\$19,420,531	\$20,197,353	\$21,005,247	\$21,845,457	\$22,719,275	\$23,628,046	\$24,573,168	\$25,556,094	
12	ETSU Staff Resources (fully loaded)	2	\$0	\$215,507	\$1,198,243	\$1,556,021	\$1,764,994	\$2,273,418	\$2,364,355	\$2,458,929	\$2,557,286	\$2,659,578	
13	5040 Buyback - Vacation & MAL	3	\$214,500	\$214,500	\$214,500	\$214,500	\$214,500	\$214,500	\$214,500	\$214,500	\$214,500	\$214,500	\$214,500
14	5060 Overtime	2	\$477,609	\$496,713	\$516,582	\$537,245	\$558,735	\$581,084	\$604,328	\$628,501	\$653,641	\$679,787	
15	5080 Other Compensation	3	\$147,800	\$147,800	\$147,800	\$147,800	\$147,800	\$147,800	\$147,800	\$147,800	\$147,800	\$147,800	\$147,800
16	5099 Vacancy Factor (Budget Only)	2	(\$552,951)	(\$575,069)	(\$598,071)	(\$621,994)	(\$646,874)	(\$672,749)	(\$699,659)	(\$727,645)	(\$756,751)	(\$787,021)	
17	5105A PERS Retirement - Normal Costs	12	\$2,347,485	\$1,824,410	\$2,039,156	\$2,120,722	\$2,205,551	\$2,293,773	\$2,385,524	\$2,480,945	\$2,580,183	\$2,683,390	
18	5105B PERS Retirement - Unfunded Liability	1	\$3,196,761	\$3,578,381	\$4,170,549	\$4,689,055	\$5,046,160	\$5,417,524	\$5,460,109	\$5,622,361	\$5,752,923	\$5,887,076	
19	5120 Health & Welfare	13	\$3,586,906	\$3,730,382	\$3,879,598	\$4,034,781	\$4,196,173	\$4,364,020	\$4,538,580	\$4,720,124	\$4,908,929	\$5,105,286	
20	5140 Worker's Compensation	3	\$322,808	\$322,808	\$322,808	\$322,808	\$322,808	\$322,808	\$322,808	\$322,808	\$322,808	\$322,808	\$322,808
21	5160 Social Security & Medicare	3	\$271,463	\$271,463	\$271,463	\$271,463	\$271,463	\$271,463	\$271,463	\$271,463	\$271,463	\$271,463	\$271,463
22	5175 OPEB Expense (Fund 40)	2	\$1,375,000	\$1,430,000	\$1,487,200	\$1,546,688	\$1,608,556	\$1,672,898	\$1,739,814	\$1,809,406	\$1,881,782	\$1,957,054	
23	5195 Unemployment Insurance	flat	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
24	5205 Pre-Employment Expenses	1	\$50,000	\$51,750	\$53,561	\$55,436	\$57,376	\$59,384	\$61,463	\$63,614	\$65,840	\$68,145	
25	5210 Annual Physicals	1	\$7,000	\$7,245	\$7,499	\$7,761	\$8,033	\$8,314	\$8,605	\$8,906	\$9,218	\$9,540	
26	5220 Development & Education - Board Membe	1	\$25,000	\$25,875	\$26,781	\$27,718	\$28,688	\$29,692	\$30,731	\$31,807	\$32,920	\$34,072	
27	5270 Development & Education - District Council	1	\$5,000	\$5,175	\$5,356	\$5,544	\$5,738	\$5,938	\$6,146	\$6,361	\$6,584	\$6,814	
28	5280 Development & Education	1	\$297,950	\$308,378	\$319,171	\$330,342	\$341,904	\$353,871	\$366,257	\$379,076	\$392,343	\$406,075	
29	5290 Internal Trainers	1	\$1,750	\$1,811	\$1,875	\$1,940	\$2,008	\$2,078	\$2,151	\$2,226	\$2,304	\$2,385	
30	5300 External Trainers - Districtwide	1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
31	5310 Resource Library - Districtwide	1	\$1,000	\$1,035	\$1,071	\$1,109	\$1,148	\$1,188	\$1,229	\$1,272	\$1,317	\$1,363	
32	5320 Membership Fees	1	\$143,860	\$148,895	\$154,106	\$159,500	\$165,083	\$170,861	\$176,841	\$183,030	\$189,436	\$196,066	
33	5330 Employee Relations	1	\$17,225	\$17,828	\$18,452	\$19,098	\$19,766	\$20,458	\$21,174	\$21,915	\$22,682	\$23,476	
34	5340 Group Recognition	1	\$17,050	\$17,647	\$18,264	\$18,904	\$19,565	\$20,250	\$20,959	\$21,692	\$22,452	\$23,237	
35	5350 ERC BBQ & Setp	1	\$10,000	\$10,350	\$10,712	\$11,087	\$11,475	\$11,877	\$12,293	\$12,723	\$13,168	\$13,629	
36	5380 Social Committee	1	\$3,000	\$3,105	\$3,214	\$3,326	\$3,443	\$3,563	\$3,688	\$3,817	\$3,950	\$4,089	
37	5390 Employee Assistance Program	1	\$12,000	\$12,420	\$12,855	\$13,305	\$13,770	\$14,252	\$14,751	\$15,267	\$15,802	\$16,355	
38	5420 Travel - Mileage/Parking	1	\$3,325	\$3,441	\$3,562	\$3,686	\$3,816	\$3,949	\$4,087	\$4,230	\$4,378	\$4,532	
39	5430 Commercial Drivers Program	1	\$3,800	\$3,933	\$4,071	\$4,213	\$4,361	\$4,513	\$4,671	\$4,835	\$5,004	\$5,179	
40	5505 Safety Internal Training	1	\$300	\$311	\$321	\$333	\$344	\$356	\$369	\$382	\$395	\$409	
41	5510 Safety External Training	1	\$9,000	\$9,315	\$9,641	\$9,978	\$10,328	\$10,689	\$11,063	\$11,451	\$11,851	\$12,266	
42	5520 Safety Resource Library	1	\$600	\$621	\$643	\$665	\$689	\$713	\$738	\$763	\$790	\$818	
43	5530 Safety Development & Training	1	\$2,000	\$2,070	\$2,142	\$2,217	\$2,295	\$2,375	\$2,459	\$2,545	\$2,634	\$2,726	
44	5540 Safety Employee Relations	1	\$1,000	\$1,035	\$1,071	\$1,109	\$1,148	\$1,188	\$1,229	\$1,272	\$1,317	\$1,363	
45	5541 Safety Incentive Program	1	\$15,000	\$15,525	\$16,068	\$16,631	\$17,213	\$17,815	\$18,439	\$19,084	\$19,752	\$20,443	
46	5542 Team Safety Incentive Program	1	\$12,210	\$12,637	\$13,080	\$13,537	\$14,011	\$14,502	\$15,009	\$15,535	\$16,078	\$16,641	
47	5545 Safety Wellness Program	1	\$2,000	\$2,070	\$2,142	\$2,217	\$2,295	\$2,375	\$2,459	\$2,545	\$2,634	\$2,726	
48	5550 Safety Membership Fees	1	\$400	\$414	\$428	\$443	\$459	\$475	\$492	\$509	\$527	\$545	

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Union Sanitary District												
2	Financial Model												
5				1	2	3	4	5	6	7	8	9	10
6		Index	Budget	Projected									
7		(Tab 1B)	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	
49	5560	Safety Equipment Maintenance	1	\$1,000	\$1,035	\$1,071	\$1,109	\$1,148	\$1,188	\$1,229	\$1,272	\$1,317	\$1,363
50	5580	Safety Supplies	1	\$7,500	\$7,763	\$8,034	\$8,315	\$8,606	\$8,908	\$9,219	\$9,542	\$9,876	\$10,222
51	5590	Safety Professional Services	1	\$2,000	\$2,070	\$2,142	\$2,217	\$2,295	\$2,375	\$2,459	\$2,545	\$2,634	\$2,726
52	5600	Temp Help	1	\$90,750	\$93,926	\$97,214	\$100,616	\$104,138	\$107,783	\$111,555	\$115,459	\$119,500	\$123,683
53	5800	Tuition Reimbursement	1	\$18,000	\$18,630	\$19,282	\$19,957	\$20,655	\$21,378	\$22,127	\$22,901	\$23,703	\$24,532
54	5900	District Wide Training	1	\$70,000	\$72,450	\$74,986	\$77,610	\$80,327	\$83,138	\$86,048	\$89,060	\$92,177	\$95,403
55	SUBTOTAL - 5000 PERSONNEL EXPENSE			\$30,251,209	\$31,270,734	\$34,043,518	\$36,023,662	\$37,737,585	\$39,810,955	\$41,185,620	\$42,733,045	\$44,303,993	\$45,935,945
56	6000 REPAIR & MAINTENANCE												
57	6100	Parts & Materials	1	\$1,357,700	\$1,405,220	\$1,454,402	\$1,505,306	\$1,557,992	\$1,612,522	\$1,668,960	\$1,727,374	\$1,787,832	\$1,850,406
58	6200	Contractors	1	\$831,000	\$860,085	\$890,188	\$921,345	\$953,592	\$986,967	\$1,021,511	\$1,057,264	\$1,094,268	\$1,132,568
59	6255	SCADA Maintenance	1	\$5,000	\$5,175	\$5,356	\$5,544	\$5,738	\$5,938	\$6,146	\$6,361	\$6,584	\$6,814
60	6300	Repairs & Maintenance	1	\$1,000	\$1,035	\$1,071	\$1,109	\$1,148	\$1,188	\$1,229	\$1,272	\$1,317	\$1,363
61	6350	SCADA Maintenance	1	\$13,600	\$14,076	\$14,569	\$15,079	\$15,606	\$16,153	\$16,718	\$17,303	\$17,909	\$18,535
62	6410	Equipment - Contractors	1	\$8,750	\$9,056	\$9,373	\$9,701	\$10,041	\$10,392	\$10,756	\$11,132	\$11,522	\$11,925
63	6420	Equipment Maint. & Agreements	1	\$8,250	\$8,539	\$8,838	\$9,147	\$9,467	\$9,798	\$10,141	\$10,496	\$10,864	\$11,244
64	6430	Equipment Parts & Materials	1	\$6,200	\$6,417	\$6,642	\$6,874	\$7,115	\$7,364	\$7,621	\$7,888	\$8,164	\$8,450
65	6610	Radio Repair & Maintenance	1	\$23,600	\$24,426	\$25,281	\$26,166	\$27,082	\$28,029	\$29,010	\$30,026	\$31,077	\$32,164
66	6620	Telephone Repair & Maintenance	1	\$1,300	\$1,346	\$1,393	\$1,441	\$1,492	\$1,544	\$1,598	\$1,654	\$1,712	\$1,772
67	SUBTOTAL - 6000 REPAIR & MAINTENANCE			\$2,256,400	\$2,335,374	\$2,417,112	\$2,501,711	\$2,589,271	\$2,679,895	\$2,773,692	\$2,870,771	\$2,971,248	\$3,075,242
68	7000 SUPPLIES & MATERIALS												
69	7010	Hypochlorite	4	\$686,000	\$711,725	\$740,194	\$771,652	\$806,377	\$844,679	\$884,802	\$926,830	\$970,854	\$1,016,970
70	7030	Ferrous Chloride	4	\$547,000	\$567,513	\$590,213	\$615,297	\$642,985	\$673,527	\$705,520	\$739,032	\$774,136	\$810,907
71	7040	Polymers	4	\$560,000	\$581,000	\$604,240	\$629,920	\$658,267	\$689,534	\$722,287	\$756,596	\$792,534	\$830,179
72	7050	Gas Conditioning	4	\$162,000	\$168,075	\$174,798	\$182,227	\$190,427	\$199,472	\$208,947	\$218,872	\$229,269	\$240,159
73	7070	Misc. Chemicals	4	\$153,500	\$159,256	\$165,627	\$172,666	\$180,436	\$189,006	\$197,984	\$207,388	\$217,239	\$227,558
74	7080	Hydrogen Peroxide	4	\$487,000	\$505,263	\$525,473	\$547,806	\$572,457	\$599,649	\$628,132	\$657,968	\$689,222	\$721,960
75	7110	Gasoline	4	\$45,000	\$46,688	\$48,555	\$50,619	\$52,896	\$55,409	\$58,041	\$60,798	\$63,686	\$66,711
76	7120	Diesel	4	\$69,000	\$71,588	\$74,451	\$77,615	\$81,108	\$84,960	\$88,996	\$93,223	\$97,652	\$102,290
77	7130	Lubricants	4	\$42,350	\$43,938	\$45,696	\$47,638	\$49,781	\$52,146	\$54,623	\$57,218	\$59,935	\$62,782
78	7150	Misc. Petroleum Products	4	\$100	\$104	\$108	\$112	\$118	\$123	\$129	\$135	\$142	\$148
79	7210	Office Supplies	1	\$75,350	\$77,987	\$80,717	\$83,542	\$86,466	\$89,492	\$92,624	\$95,866	\$99,222	\$102,694
80	7215	Computer Supplies	1	\$18,400	\$19,044	\$19,711	\$20,400	\$21,114	\$21,853	\$22,618	\$23,410	\$24,229	\$25,077
81	7220	Emergency Preparedness Supplies	1	\$2,000	\$2,070	\$2,142	\$2,217	\$2,295	\$2,375	\$2,459	\$2,545	\$2,634	\$2,726
82	7225	Postage	1	\$13,500	\$13,973	\$14,462	\$14,968	\$15,492	\$16,034	\$16,595	\$17,176	\$17,777	\$18,399
83	7230	Printing	1	\$7,950	\$8,228	\$8,516	\$8,814	\$9,123	\$9,442	\$9,773	\$10,115	\$10,469	\$10,835
84	7235	Graphic Supplies and Materials	1	\$600	\$621	\$643	\$665	\$689	\$713	\$738	\$763	\$790	\$818
85	7240	Records Mgmt Storage and Supplies	1	\$17,000	\$17,595	\$18,211	\$18,848	\$19,508	\$20,191	\$20,897	\$21,629	\$22,386	\$23,169
86	7260	Courier	1	\$2,000	\$2,070	\$2,142	\$2,217	\$2,295	\$2,375	\$2,459	\$2,545	\$2,634	\$2,726
87	7265	Books & Subscriptions	1	\$15,150	\$15,680	\$16,229	\$16,797	\$17,385	\$17,993	\$18,623	\$19,275	\$19,950	\$20,648
88	7270	Assessor's Maps	1	\$600	\$621	\$643	\$665	\$689	\$713	\$738	\$763	\$790	\$818
89	7275	Misc. Office Expense	1	\$20,800	\$21,528	\$22,281	\$23,061	\$23,868	\$24,704	\$25,569	\$26,463	\$27,390	\$28,348

Table 2. Revenue Requirements

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Union Sanitary District												
2	Financial Model												
5				1	2	3	4	5	6	7	8	9	10
6		Index	Budget	Projected									
7		(Tab 1B)	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	
90	7310	Team Safety - Equipment	1	\$26,500	\$27,428	\$28,387	\$29,381	\$30,409	\$31,474	\$32,575	\$33,715	\$34,895	\$36,117
91	7320	Team Safety - Clothing	1	\$83,950	\$86,888	\$89,929	\$93,077	\$96,335	\$99,706	\$103,196	\$106,808	\$110,546	\$114,415
92	7330	Team Safety - Supplies	1	\$28,300	\$29,291	\$30,316	\$31,377	\$32,475	\$33,612	\$34,788	\$36,006	\$37,266	\$38,570
93	7430	Small Tools	1	\$69,800	\$72,243	\$74,772	\$77,389	\$80,097	\$82,901	\$85,802	\$88,805	\$91,913	\$95,130
94	7435	Hardware (chains, fittings, ladders)	1	\$11,500	\$11,903	\$12,319	\$12,750	\$13,197	\$13,658	\$14,136	\$14,631	\$15,143	\$15,673
95	7440	Small Equipment	1	\$124,500	\$128,858	\$133,368	\$138,035	\$142,867	\$147,867	\$153,042	\$158,399	\$163,943	\$169,681
96	7450	Sampling Equipment	1	\$3,000	\$3,105	\$3,214	\$3,326	\$3,443	\$3,563	\$3,688	\$3,817	\$3,950	\$4,089
97	7460	Janitorial	1	\$24,300	\$25,151	\$26,031	\$26,942	\$27,885	\$28,861	\$29,871	\$30,916	\$31,998	\$33,118
98	7470	Misc. Supplies	1	\$21,500	\$22,253	\$23,031	\$23,837	\$24,672	\$25,535	\$26,429	\$27,354	\$28,311	\$29,302
99	7510	P2 Program Education Supplies	1	\$11,000	\$11,385	\$11,783	\$12,196	\$12,623	\$13,065	\$13,522	\$13,995	\$14,485	\$14,992
100	7515	P2 Program Supplies	1	\$13,000	\$13,455	\$13,926	\$14,413	\$14,918	\$15,440	\$15,980	\$16,540	\$17,119	\$17,718
101	7520	P2 Misc. Supplies	1	\$5,500	\$5,693	\$5,892	\$6,098	\$6,311	\$6,532	\$6,761	\$6,998	\$7,242	\$7,496
102	7530	Industrial Advisory Council Supplies	1	\$2,000	\$2,070	\$2,142	\$2,217	\$2,295	\$2,375	\$2,459	\$2,545	\$2,634	\$2,726
103	SUBTOTAL - 7000 SUPPLIES & MATERIALS			\$3,350,150	\$3,474,285	\$3,610,161	\$3,758,787	\$3,921,300	\$4,098,981	\$4,284,801	\$4,479,138	\$4,682,383	\$4,894,950
104	8000 OUTSIDE SERVICES												
105	8010	Insurance - Property & Contents	1	\$110,000	\$113,850	\$117,835	\$121,959	\$126,228	\$130,645	\$135,218	\$139,951	\$144,849	\$149,919
106	8020	Insurance - Fleet, Moving Vehicles	1	\$31,000	\$32,085	\$33,208	\$34,370	\$35,573	\$36,818	\$38,107	\$39,441	\$40,821	\$42,250
107	8030	Insurance - General Liability	1	\$180,000	\$186,300	\$192,821	\$199,569	\$206,554	\$213,784	\$221,266	\$229,010	\$237,026	\$245,322
108	8040	Insurance - Bonding	1	\$2,500	\$2,588	\$2,678	\$2,772	\$2,869	\$2,969	\$3,073	\$3,181	\$3,292	\$3,407
109	8050	Insurance - Deductibles	1	\$200,000	\$207,000	\$214,245	\$221,744	\$229,505	\$237,537	\$245,851	\$254,456	\$263,362	\$272,579
110	8060	Insurance - Retro Premiums	1	(\$35,000)	(\$36,225)	(\$37,493)	(\$38,805)	(\$40,163)	(\$41,569)	(\$43,024)	(\$44,530)	(\$46,088)	(\$47,701)
111	8110	Biosolids Disposal	1	\$929,000	\$961,515	\$995,168	\$1,029,999	\$1,066,049	\$1,103,361	\$1,141,978	\$1,181,947	\$1,223,316	\$1,266,132
112	8120	SSC Data Processing	1	\$14,000	\$14,490	\$14,997	\$15,522	\$16,065	\$16,628	\$17,210	\$17,812	\$18,435	\$19,081
113	8130	Underground Service Alert	1	\$22,000	\$22,770	\$23,567	\$24,392	\$25,246	\$26,129	\$27,044	\$27,990	\$28,970	\$29,984
114	8135	Smart Cover Monitoring Fees	1	\$9,000	\$9,315	\$9,641	\$9,978	\$10,328	\$10,689	\$11,063	\$11,451	\$11,851	\$12,266
115	8150	Grit & Screening Disposal	1	\$110,000	\$113,850	\$117,835	\$121,959	\$126,228	\$130,645	\$135,218	\$139,951	\$144,849	\$149,919
116	8160	Hazardous Materials Disposal	4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
117	8170	Misc. Contractual Services	2	\$193,000	\$200,720	\$208,749	\$217,099	\$225,783	\$234,814	\$244,207	\$253,975	\$264,134	\$274,699
118	8210	Audit & Accounting	1	\$70,000	\$72,450	\$74,986	\$77,610	\$80,327	\$83,138	\$86,048	\$89,060	\$92,177	\$95,403
119	8215	Legal	1	\$183,320	\$189,736	\$196,377	\$203,250	\$210,364	\$217,727	\$225,347	\$233,234	\$241,397	\$249,846
120	8220	Legal Advertisements	1	\$1,000	\$1,035	\$1,071	\$1,109	\$1,148	\$1,188	\$1,229	\$1,272	\$1,317	\$1,363
121	8225	Consulting Services	1	\$473,400	\$489,969	\$507,118	\$524,867	\$543,237	\$562,251	\$581,929	\$602,297	\$623,377	\$645,196
122	8235	Consulting Services - Computer	1	\$80,000	\$82,800	\$85,698	\$88,697	\$91,802	\$95,015	\$98,340	\$101,782	\$105,345	\$109,032
123	8236	Software Maintenance Agreement	1	\$380,300	\$393,611	\$407,387	\$421,645	\$436,403	\$451,677	\$467,486	\$483,848	\$500,782	\$518,310
124	8238	Hardware Maintenance Agreement	1	\$60,434	\$62,549	\$64,738	\$67,004	\$69,349	\$71,777	\$74,289	\$76,889	\$79,580	\$82,365
125	8240	Banking Services	1	\$45,000	\$46,575	\$48,205	\$49,892	\$51,639	\$53,446	\$55,316	\$57,253	\$59,256	\$61,330
126	8245	Bank Service - Merchant Card Fees	1	\$14,000	\$14,490	\$14,997	\$15,522	\$16,065	\$16,628	\$17,210	\$17,812	\$18,435	\$19,081
127	8255	Permit Fees	1	\$140,000	\$144,900	\$149,972	\$155,221	\$160,653	\$166,276	\$172,096	\$178,119	\$184,353	\$190,806
128	8260	Professional Services - Lab Analysis	1	\$97,000	\$100,395	\$103,909	\$107,546	\$111,310	\$115,206	\$119,238	\$123,411	\$127,730	\$132,201
129	8265	Professional Services - Other	1	\$13,100	\$13,559	\$14,033	\$14,524	\$15,033	\$15,559	\$16,103	\$16,667	\$17,250	\$17,854
130	8310	Water	5	\$141,300	\$146,952	\$152,830	\$158,943	\$165,301	\$171,913	\$178,790	\$185,941	\$193,379	\$201,114

Table 2. Revenue Requirements

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Union Sanitary District												
2	Financial Model												
5				1	2	3	4	5	6	7	8	9	10
6		Index	Budget	Projected									
7		(Tab 1B)	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	
131	8395	Processed Water	5	\$8,000	\$8,320	\$8,653	\$8,999	\$9,359	\$9,733	\$10,123	\$10,527	\$10,949	\$11,386
132	8410	Electricity	5	\$1,876,150	\$1,951,196	\$2,029,244	\$2,110,414	\$2,194,830	\$2,282,623	\$2,373,928	\$2,468,885	\$2,567,641	\$2,670,346
133	8510	Natural Gas	5	\$160,000	\$166,400	\$173,056	\$179,978	\$187,177	\$194,664	\$202,451	\$210,549	\$218,971	\$227,730
134	8610	Refuse	5	\$37,000	\$38,480	\$40,019	\$41,620	\$43,285	\$45,016	\$46,817	\$48,689	\$50,637	\$52,663
135	8620	Telephones, Lease Lines	5	\$150,000	\$156,000	\$162,240	\$168,730	\$175,479	\$182,498	\$189,798	\$197,390	\$205,285	\$213,497
136	8710	O&M Fixed - EBDA Fund 12	1	\$387,380	\$682,425	\$706,310	\$731,031	\$756,617	\$783,098	\$810,507	\$838,875	\$868,235	\$898,623
137	8720	R&R - EBDA Fund 31	7	\$56,925	\$359,032	\$359,032	\$359,032	\$359,032	\$359,032	\$359,032	\$359,032	\$359,032	\$359,032
138	8730	Special Project & Planning - EBDA	7	\$509,570	\$401,713	\$401,713	\$401,713	\$401,713	\$401,713	\$401,713	\$401,713	\$401,713	\$401,713
139	8740	O&M Variable - EBDA Fund 12	1	\$660,127	\$693,120	\$717,379	\$742,487	\$768,475	\$795,371	\$823,209	\$852,021	\$881,842	\$912,707
140	8810	Rents/Leases - Equipment	1	\$175,100	\$181,229	\$187,571	\$194,136	\$200,931	\$207,964	\$215,243	\$222,776	\$230,573	\$238,643
141	8940	County Commission Expense (Fund 10)	flat	\$109,000	\$109,000	\$109,000	\$109,000	\$109,000	\$109,000	\$109,000	\$109,000	\$109,000	\$109,000
142	8980	New Assets	1	\$230,000	\$238,050	\$246,382	\$255,005	\$263,930	\$273,168	\$282,729	\$292,624	\$302,866	\$313,466
143	SUBTOTAL - 8000 OUTSIDE SERVICES - less capital			\$7,823,606	\$8,572,242	\$8,855,170	\$9,148,534	\$9,452,720	\$9,768,131	\$10,095,181	\$10,434,301	\$10,785,941	\$11,150,562
144	9000 - SPECIAL PROJECTS												
145	9000	Special Projects (Fund 30)	1	\$4,354,600	\$1,325,000	\$1,371,375	\$1,419,373	\$1,469,051	\$1,520,468	\$1,573,684	\$1,628,763	\$1,685,770	\$1,744,772
146	SUBTOTAL - 9000 - SPECIAL PROJECTS			\$4,354,600	\$1,325,000	\$1,371,375	\$1,419,373	\$1,469,051	\$1,520,468	\$1,573,684	\$1,628,763	\$1,685,770	\$1,744,772
147	Total Operating Expenses			\$48,035,965	\$46,977,636	\$50,297,336	\$52,852,067	\$55,169,927	\$57,878,430	\$59,912,978	\$62,146,019	\$64,429,335	\$66,801,471
148													
149	DEBT SERVICE												
150	Fund 80	Bond Debt Service		\$0	\$7,277,480	\$7,277,480	\$7,277,480	\$11,899,481	\$11,899,481	\$11,899,481	\$11,899,481	\$11,899,481	\$11,899,481
151	Fund 80	SRF Loan Repayment		\$2,785,617	\$2,785,617	\$2,785,617	\$2,785,617	\$2,785,617	\$2,104,494	\$2,600,993	\$2,600,993	\$2,600,993	\$2,492,608
152	Fund 80	Other Loan Repayment		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
153		Line-of-Credit Interest		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
154		Line-of-Credit Non Utilization Fee		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
155	Total Debt Service			\$2,785,617	\$10,063,097	\$10,063,097	\$10,063,097	\$14,685,098	\$14,003,975	\$14,500,474	\$14,500,474	\$14,500,474	\$14,392,089
156	GROSS REVENUE REQUIREMENT			\$50,821,582	\$57,040,733	\$60,360,433	\$62,915,164	\$69,855,025	\$71,882,404	\$74,413,451	\$76,646,492	\$78,929,809	\$81,193,560
157													
158	CONTRIBUTION TO RESERVES												
159	INTERNAL FUND OPERATING EXPENSE TRANSFERS												
160	20	Main Operating Fund		(\$15,794,554)	(\$17,974,583)	(\$17,296,494)	(\$13,847,663)	(\$14,570,719)	(\$10,418,403)	(\$6,595,858)	(\$3,790,739)	(\$2,027,835)	\$2,634,163
161	50	Vehicle & Equipment R&R		\$407,600	\$432,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000
162	60	Information Systems R&R		\$593,084	\$540,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000
163	75	Emergency		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
164	70, 80, 85	Main Capital Fund		\$24,254,823	\$25,446,607	\$26,940,775	\$26,922,779	\$26,809,964	\$27,051,708	\$26,897,199	\$27,526,853	\$28,975,557	\$27,843,004
165	Total Internal Fund Expense Transfers			\$9,460,953	\$8,444,024	\$10,644,281	\$14,075,117	\$13,239,246	\$17,633,305	\$21,301,342	\$24,736,114	\$27,947,722	\$31,477,167
166	GRAND TOTAL - REVENUE REQUIREMENTS			\$60,282,535	\$65,484,756	\$71,004,714	\$76,990,280	\$83,094,270	\$89,515,710	\$95,714,793	\$101,382,607	\$106,877,531	\$112,670,727

	A	B	C	D	E	F	G	H	I	J	K	L
1	Union Sanitary District											
2	Financial Model											
4												
5	Budget Projected											
6		Esc Factor	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
7	Current Revenue (before increases)	Tab 1B										
8	Residential	15	\$44,306,365	\$44,527,897	\$44,750,537	\$44,974,289	\$45,199,161	\$45,425,157	\$45,652,282	\$45,880,544	\$46,109,946	\$46,340,496
9	Multiple Use	15	\$3,577,876	\$3,595,765	\$3,613,744	\$3,631,813	\$3,649,972	\$3,668,222	\$3,686,563	\$3,704,996	\$3,723,521	\$3,742,138
10	Commercial	16	\$4,551,973	\$4,551,973	\$4,551,973	\$4,551,973	\$4,551,973	\$4,551,973	\$4,551,973	\$4,551,973	\$4,551,973	\$4,551,973
11	Industrial	8	\$6,564,574	\$6,564,574	\$6,564,574	\$6,564,574	\$6,564,574	\$6,564,574	\$6,564,574	\$6,564,574	\$6,564,574	\$6,564,574
12	Exempt	16	\$1,281,747	\$1,281,747	\$1,281,747	\$1,281,747	\$1,281,747	\$1,281,747	\$1,281,747	\$1,281,747	\$1,281,747	\$1,281,747
13		Subtotal Revenue	\$60,282,535	\$60,521,956	\$60,762,574	\$61,004,396	\$61,247,426	\$61,491,672	\$61,737,139	\$61,983,833	\$62,231,761	\$62,480,928
14	Expenses											
15	Revenue Requirements		\$60,282,535	\$65,484,756	\$71,004,714	\$76,990,280	\$83,094,270	\$89,515,710	\$95,714,793	\$101,382,607	\$106,877,531	\$112,670,727
16	Surplus/(Deficit)		\$0	(\$4,962,800)	(\$10,242,140)	(\$15,985,885)	(\$21,846,844)	(\$28,024,038)	(\$33,977,654)	(\$39,398,774)	(\$44,645,770)	(\$50,189,799)
17												
18	Increase in Revenue from rates			8.2%	8.0%	8.0%	7.5%	7.3%	6.5%	5.5%	5.0%	5.0%
19												
20	Revenue from Current Rates		\$60,282,535	\$60,521,956	\$60,762,574	\$61,004,396	\$61,247,426	\$61,491,672	\$61,737,139	\$61,983,833	\$62,231,761	\$62,480,928
21												
22	Revenue from Rate Increases											
24	2020/21			\$4,962,800	\$4,982,531	\$5,002,360	\$5,022,289	\$5,042,317	\$5,062,445	\$5,082,674	\$5,103,004	\$5,123,436
25	2021/22				\$5,259,608	\$5,280,540	\$5,301,577	\$5,322,719	\$5,343,967	\$5,365,321	\$5,386,781	\$5,408,349
26	2022/23					\$5,702,984	\$5,725,703	\$5,748,537	\$5,771,484	\$5,794,546	\$5,817,724	\$5,841,017
27	2023/24						\$5,797,275	\$5,820,393	\$5,843,628	\$5,866,978	\$5,890,445	\$5,914,030
28	2024/25							\$6,090,072	\$6,114,382	\$6,138,815	\$6,163,369	\$6,188,046
43	Total Revenue from Increases		\$0	\$4,962,800	\$10,242,140	\$15,985,885	\$21,846,844	\$28,024,038	\$33,977,654	\$39,398,774	\$44,645,770	\$50,189,799
44	Total Rate Revenue		\$60,282,535	\$65,484,756	\$71,004,714	\$76,990,280	\$83,094,270	\$89,515,710	\$95,714,793	\$101,382,607	\$106,877,531	\$112,670,727
45	Total Revenue Requirement (from above)		\$60,282,535	\$65,484,756	\$71,004,714	\$76,990,280	\$83,094,270	\$89,515,710	\$95,714,793	\$101,382,607	\$106,877,531	\$112,670,727
46	Transfer to/from Main Operating Fund		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	
3																	
4																	
5																	
6	Projects Deleted due to ETSU Projects or CIP Updates																
7																	
8	CIP						2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	
9	Project	Category	Structural (80)	Capacity (90)	Type of Funding	Total	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
10	* Admin Bldg. Seismic Upgrade and Leak Repairs	Admin Facilities	100%	0%	PAYGo	-											
11	* Field Ops Bldg. Seismic Upgrade and Leak Repairs	Admin Facilities	100%	0%	PAYGo	3,300,000						200,000		1,500,000	1,600,000		
12	* Control Bldg. Seismic Upgrade	Admin Facilities	100%	0%	PAYGo	-											
13	* Additional CS (Vehicle) Storage	Admin Facilities	100%	0%	PAYGo	250,000										250,000	
14	* FMC Bldg. - New	Admin Facilities	100%	0%	PAYGo	-											
15	* FMC Bldgs Renovation and Seismic	Admin Facilities	100%	0%	PAYGo	-											
16	* FMC Storage	Admin Facilities	100%	0%	PAYGo	300,000					300,000						
17	* Lab Remodel and Expansion	Admin Facilities	75%	25%	PAYGo	-											
18	* Plant Paving - P3	Admin Facilities	100%	0%	PAYGo	1,950,000	200,000		250,000				300,000		200,000		
19	* Radio Repeater Antenna Replacement	Admin Facilities	100%	0%	PAYGo	150,000										150,000	
20	* Solar Panel Replacement at Alvarado	Admin Facilities	50%	50%	PAYGo	300,000											
21	* Solar Panel Replacement at Carport	Admin Facilities	50%	50%	PAYGo	700,000		100,000									
22	* Solar Panel Replacement at Irvington	Admin Facilities	50%	50%	PAYGo	2,100,000			300,000								
23	* Cast Iron/Pipe Lining	Collection System	100%	0%	PAYGo	5,520,346		500,000		532,000		500,000		566,048		602,275	
24	* Central Avenue Sanitary Sewer Relocation	Collection System	100%	0%	PAYGo	1,050,000	50,000	1,000,000									
25	* Gravity Sewer Rehab/Replacement	Collection System	100%	0%	PAYGo	20,146,544	1,500,000		1,596,000		1,698,144		1,806,825		1,922,462		
26	* RCP Sewer Rehab (Alvarado Basin)	Collection System	100%	0%	PAYGo	3,850,000						350,000	3,500,000				
27	* RCP Sewer Rehab (Irvington Basin)	Collection System	100%	0%	PAYGo	3,300,000			300,000	3,000,000							
28	* RCP Sewer Rehab (Newark Basin)	Collection System	100%	0%	PAYGo	3,850,000								350,000	3,500,000		
29	* Stevenson at Davis St.	Collection System	0%	100%	PAYGo	1,700,000								200,000	1,500,000		
30	* Alameda Creek Crossing Lift Station	Transport	50%	50%	PAYGo	11,000,000										750,000	
31	* Cathodic Protection Improvements - Transport	Transport	100%	0%	PAYGo	1,550,000	300,000		500,000			150,000			150,000		
32	* Cherry Street Pump Station (Predesign)	Transport	0%	100%	PAYGo	3,000,000	400,000	1,400,000	1,200,000								
33	* Equalization Storage @ Alvarado	Transport	0%	100%	PAYGo	-											
34	* Equalization Storage @ Irvington	Transport	50%	50%	PAYGo	875,000	875,000										
35	* Equalization Storage @ Newark	Transport	40%	60%	PAYGo	25,700,000								2,300,000	7,000,000	16,400,000	
36	* Forcemain Corrosion Repairs - Phase 2	Transport	100%	0%	PAYGo	-											
37	* Forcemain Corrosion Repairs - Phase 3	Transport	100%	0%	PAYGo	1,000,000		500,000	500,000								
38	* Forcemain Corrosion Repairs - Phase 4	Transport	100%	0%	PAYGo	1,050,000			550,000	500,000							
39	* Forcemain Rehab	Transport	100%	0%	Future SRF1	53,000,000											
40	* Hayward Marsh Equipment Decom.	Transport	100%	0%	PAYGo	1,100,000		100,000	1,000,000								
41	* Irvington PS Pumps and VFDs	Transport	50%	50%	PAYGo	17,000,000					2,140,000	10,340,000	4,520,000				
42	* Newark & Irvington PS Chemical System Improvements	Transport	50%	50%	PAYGo	6,200,000	200,000	2,400,000	3,600,000								
43	* Newark Plant Site Security	Transport	50%	50%	PAYGo	-											
44	* Newark PS Pumps and VFDs	Transport	50%	50%	PAYGo	9,926,400					1,300,000	4,326,400	4,300,000				
45	* Pump Station Asset Condition Assessment R&R	Transport	100%	0%	PAYGo	22,450,000				1,500,000		3,850,000	1,000,000	200,000			
46	* Transport System Misc. Projects	Transport	100%	0%	PAYGo	4,750,000		250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	
47	* Wet Weather Flow Management	Transport	50%	50%	PAYGo	1,600,000	1,000,000	600,000									
48	* 30" ML Pipe Lining	Treatment	100%	0%	PAYGo	-											
49	* Aeration Blowers 7-9 Replacement	Treatment	50%	50%	PAYGo	-											
50	* Aeration Blower 11 Replacement (high speed)	Treatment	100%	0%	PAYGo	4,300,000	400,000	1,900,000	2,000,000								
51	* Aeration Internal Lift Pumps	Treatment	50%	50%	PAYGo	3,000,000			500,000	2,500,000							
52	* Aeration Tank (East) Baffling and Improvements	Treatment	0%	100%	PAYGo	-											
53	* Aeration Tank (East) Roof	Treatment	100%	0%	PAYGo	-											
54	* Alvarado Influent PS Improvements (Phase 1)	Treatment	80%	20%	Future Bond 1	10,500,000	6,000,000	4,500,000									
55	* Alvarado Influent PS Improvements (Phase 2)	Treatment	100%	0%	PAYGo	-											
56	* Alvarado Influent Valve Box Gate Valves 1-2	Treatment	100%	0%	PAYGo	800,000	100,000	700,000									
57	* Blower Bldg Channel Blower Demo & Repl - P3	Treatment	50%	50%	PAYGo	-											
58	* Blower Bldg (East) Ventilation Improvements	Treatment	100%	0%	PAYGo	-											
59	* Cathodic Protection Improvements - Plant	Treatment	100%	0%	PAYGo	2,525,000	75,000	900,000			500,000		150,000		150,000		
60	* Centrifuge Building Sludge Loadout Room Extension	Treatment	100%	0%	PAYGo	-											
61	* Cathodic Protection Improvements - Plant	Treatment	50%	50%	PAYGo	6,600,000	400,000	3,800,000	2,400,000								
62	* Centrifuge Replacement	Treatment	50%	50%	Future SRF3	16,500,000			700,000	1,000,000	7,400,000	7,400,000					
63	* Centrifuge Sys. Equip Replacement	Treatment	50%	50%	PAYGo	8,200,000				900,000	3,650,000	3,650,000					
64	* Cogen Building Ventilation	Treatment	50%	50%	PAYGo	-											
65	* Cogen Engine No. 1 Block 60k Replacement	Treatment	80%	20%	PAYGo	2,400,000						1,100,000					
66	* Cogen Engine No. 2 Block 60k Replacement	Treatment	80%	20%	PAYGo	3,700,000			1,000,000								
67	* Cogen Natural Gas and Power Meters	Treatment	50%	50%	PAYGo	-											

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
68	* Cogen Retrofit	Treatment	50%	50%	PAYGo	2,200,000								200,000	2,000,000	
69	* Contract Tank Improvements	Treatment	100%	0%	PAYGo	250,000	250,000									
70	* Control Box No. 1 Improvements	Treatment	100%	0%	PAYGo	7,000,000								650,000	4,400,000	1,950,000
71	* Degritter @ Headworks	Treatment	50%	50%	PAYGo	17,300,000								1,900,000	10,800,000	4,600,000
72	* Degritter Building Roof (Seismic) Replacement	Treatment	100%	0%	PAYGo	5,400,000										
73	* Degritters 1 and 2 Replacement	Treatment	0%	100%	PAYGo	-										
74	* Degritters No. 4	Treatment	50%	50%	PAYGo	-										
75	* Diffuser Replacement	Treatment	100%	0%	PAYGo	1,700,000										
76	* Digester Additional Capacity	Treatment	0%	100%	PAYGo	-										
77	* Digester Inspection and Rehab	Treatment	100%	0%	PAYGo	-										
78	* Digesters No. 1-4 Insp and Rehab	Treatment	100%	0%	PAYGo	27,850,000	1,500,000	1,400,000	3,600,000			450,000	4,100,000			
79	* Digester No. 5-7 Insp & Rehab	Treatment	100%	0%	PAYGo	16,200,000				500,000	4,600,000			450,000	4,300,000	
80	* Digester No. 7	Treatment	0%	100%	Future Bond 1	28,000,000	3,500,000	14,000,000	10,500,000							
81	* Emergency Outfall Outlet Improvements	Treatment	50%	50%	PAYGo	1,300,000		1,000,000	300,000							
82	* Flares Replacement	Treatment	100%	0%	PAYGo	6,000,000			700,000	5,300,000						
83	* Headworks Gates	Treatment	100%	0%	PAYGo	4,000,000										
84	* Headworks Bar Screens Replacement	Treatment	60%	40%	Future Bond 1	2,756,053	2,500,000	256,053								
85	* MCC Replacement	Treatment	100%	0%	PAYGo	1,550,000			100,000	900,000					50,000	500,000
86	* Plant Asset Condition Assessment Projects	Treatment	100%	0%	PAYGo	16,250,000			2,400,000			3,000,000				800,000
87	* Misc. Projects	Treatment	100%	0%	PAYGo	-										
88	* Plant Additional Power Source	Treatment	50%	50%	PAYGo	10,000,000										
89	* Plant 1 and 2 Water Sys Improv	Treatment	100%	0%	PAYGo	1,000,000			100,000	900,000						
90	* Odor Scrubber System Improvements	Treatment	100%	0%	PAYGo	51,350,000						650,000	1,300,000	5,200,000	4,800,000	1,500,000
91	* Plant Asset Condition Assessment R&R	Treatment	100%	0%	PAYGo	13,550,000				100,000	150,000	2,000,000	500,000		1,000,000	
92	* Plant 12kV Switchgear	Treatment	100%	0%	Future Bond 5	13,200,000					700,000	3,500,000	5,000,000	4,000,000		
93	* Plant 5kV Switchgear	Treatment	100%	0%	PAYGo	-										
94	* Plant Fiber Optic Network	Treatment	50%	50%	PAYGo	5,000,000		500,000	2,000,000			500,000	2,000,000			
95	* Plant Grating Replacement	Treatment	100%	0%	PAYGo	50,000	50,000									
96	* PLC Replacement	Treatment	100%	0%	PAYGo	1,750,000		250,000				300,000				350,000
97	* Primary Clarifier (1 - 4) Sesmic Upgrade	Treatment	100%	0%	PAYGo	6,360,000		550,000	4,000,000	1,810,000						
98	* Primary Clarifier Rehab (5-6)	Treatment	75%	25%	PAYGo	23,400,000	500,000					1,770,000	9,680,000	9,680,000	1,770,000	
99	* RAS Control Interim Improvements	Treatment	50%	50%	PAYGo	-										
100	* Plant Mechanical and Electrical Projects	Treatment	100%	0%	PAYGo	9,500,000		500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
101	* Reclaimed Water	Treatment	100%	0%	PAYGo	-										
102	* Reclaimed Water Plant	Treatment	100%	0%	PAYGo	-										
103	* Rehabilitation of Structures	Treatment	100%	0%	PAYGo	-										
104	* Sec. Clarifiers No. 5 and 6 Rehabilitation	Treatment	75%	25%	PAYGo	-										
105	* Secondary Digester 1 Inspect and Rehab	Treatment	100%	0%	PAYGo	8,750,000				350,000	3,200,000					
106	* Secondary Digester 2 Inspect and Rehab	Treatment	100%	0%	PAYGo	9,350,000							400,000	3,400,000		
107	* Seismic Retrofit of Conc. Structures	Treatment	100%	0%	PAYGo	2,600,000			200,000		300,000		300,000		300,000	
108	* Site Drainage Improvements	Treatment	50%	50%	PAYGo	6,300,000				400,000	800,000	2,800,000	2,300,000			
109	* Sludge Recirculation Pump Replacement	Treatment	50%	50%	PAYGo	550,000		200,000	150,000							
110	* Standby Power Generation System Upgrade - Series 1	Treatment	100%	0%	PAYGo	2,750,000	750,000	2,000,000								
111	* Standby Power Generation System Upgrade - Series 2	Treatment	100%	0%	Future Bond 4	31,000,000			14,000,000	12,000,000	5,000,000					
112	* Standby Power Generator No. 3	Treatment	0%	100%	PAYGo	24,000,000										
113	* Switchboard 3 Replacement	Treatment	100%	0%	PAYGo	1,250,000			100,000	800,000	350,000					
114	* Switchboard 4 Replacement	Treatment	100%	0%	PAYGo	1,650,000				150,000	1,000,000	500,000				
115	* Thickeners 1 & 2 Rehab	Treatment	100%	0%	PAYGo	2,650,000					200,000	1,700,000	750,000			
116	* Thickeners 3 & 4 Rehab	Treatment	100%	0%	PAYGo	3,650,000										
117	* WAS Thickeners	Treatment	100%	0%	PAYGo	11,000,000	500,000	4,000,000	5,000,000	1,500,000						
118	* Water Storage Tank	Treatment	50%	50%	PAYGo	-										
119	* Waste Recycling and Alternative Energy	Treatment	0%	100%	PAYGo	10,500,000										
120	ETSU PROJECTS	Treatment	100%	0%	PAYGo	-										
121	Campus Buildings - Series 1	Admin Facilities	100%	0%	PAYGo	500,000	500,000									
122	Campus Buildings - Series 2	Admin Facilities	100%	0%	Future Bond 4	71,900,000		10,400,000	42,100,000	19,400,000						
123	Aeration Basin Modifications - Series 1	Treatment	50%	50%	PAYGo	7,600,000	2,000,000				5,600,000					
124	Aeration Basin Modifications - Series 2	Treatment	50%	50%	Future Bond 4	55,000,000		10,200,000	22,400,000	22,400,000						
125	New Secondary Clarifiers - Series 1	Treatment	50%	50%	Future Bond 4	10,700,000		3,800,000	6,900,000							
126	New Secondary Clarifiers - Series 2	Treatment	50%	50%	Future Bond 5	91,200,000					54,700,000	36,500,000				
127	Effluent Facilities - Series 1	Treatment	60%	40%	PAYGo	5,000,000		2,000,000	3,000,000							
128	Effluent Facilities - Series 2	Treatment	60%	40%	Future Bond 5	42,800,000					21,400,000	21,400,000				
129	Plant Equalization and Storage	Treatment	0%	100%	Future Bond 5	19,500,000					550,000	1,650,000	17,300,000			
130	Nutrient Removal (Lvl 2 Year - round)	Treatment	50%	50%	Future Bond 9	185,500,000										
150	Total					1,145,809,343	23,550,000	69,706,053	134,696,000	77,192,000	116,288,144	109,336,400	59,956,825	31,346,048	46,192,462	28,602,275

Table 5A. CIP & Loan Assumption

	A	B	C	D	E	F	G	H	I	J	K	L
1	Union Sanitary District											
2	Sewer Rate Update & COS Analysis											
5												
6	<i>Cost of Service Year (Table 9)</i>											
7		Index	1	2	3	4	5	6	7	8	9	10
8		(1b)	Estm Actual	Projected								
			2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
9	ACCOUNTS											
10	Residential											
11	Single Family Residences	15	69,352	69,699	70,047	70,397	70,749	71,103	71,459	71,816	72,175	72,536
12	Apartments	15	20,648	20,751	20,855	20,959	21,064	21,169	21,275	21,382	21,489	21,596
13	Multiple Family Residences	15	1,810	1,819	1,828	1,837	1,846	1,856	1,865	1,874	1,884	1,893
14	Trailers/Mobile Homes	15	1,695	1,703	1,712	1,721	1,729	1,738	1,746	1,755	1,764	1,773
15	Condominiums/Townhouses	15	19,330	19,427	19,524	19,621	19,720	19,818	19,917	20,017	20,117	20,217
16	Total Residential		112,835	113,399	113,966	114,536	115,109	115,684	116,263	116,844	117,428	118,015
17												
18	Commercial											
19	Strong	16	141	141	141	141	141	141	141	141	141	141
20	Moderate	16	717	717	717	717	717	717	717	717	717	717
21	Weak	16	743	743	743	743	743	743	743	743	743	743
22	U	16	15	15	15	15	15	15	15	15	15	15
23	Fast-Food Restaurant	16	72	72	72	72	72	72	72	72	72	72
24	Full-Service Restaurant	16	76	76	76	76	76	76	76	76	76	76
25	Total Commercial		1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
26												
27	Industrial											
28	Strong	16	34	34	34	34	34	34	34	34	34	34
29	Moderate	16	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188
30	Weak	16	84	84	84	84	84	84	84	84	84	84
31	U	16	34	34	34	34	34	34	34	34	34	34
32	Fast-Food Restaurant	16	3	3	3	3	3	3	3	3	3	3
33	Full-Service Restaurant	16	1	1	1	1	1	1	1	1	1	1
34	Total Industrial		1,344	1,344	1,344	1,344	1,344	1,344	1,344	1,344	1,344	1,344
35												
36	GRAND TOTAL		115,943	116,507	117,074	117,644	118,217	118,792	119,371	119,952	120,536	121,123

	A	B	C	D	E	F	G	H	I
1	Union Sanitary District								
2	Sewer Rate Update & COS Analysis								
5									
6									
7	FIGURE 11A								
8	FUNCTIONAL ALLOCATION FACTORS								
9	Type		Total		Accounts	Flow	COD	TSS	Total
10	1 Treatment Plant O&M		100.0%		0.0%	33.0%	33.0%	34.0%	100.0%
11	2 Collection System O&M		100.0%		0.0%	100.0%	0.0%	0.0%	100.0%
12	3 Customer O&M		100.0%		100.0%	0.0%	0.0%	0.0%	100.0%
13	4 Engineering		100.0%		0.0%	50.0%	25.0%	25.0%	100.0%
14	5 Composite of Total O&M Expenses		100.0%		4.5%	47.2%	23.8%	24.5%	100.0%
15	6 Composite of Total O&M and Capital Expenses		100.0%		2.9%	47.4%	24.5%	25.2%	100.0%
16									
17	REVENUE REQUIREMENT ALLOCATION								
18		Rev. Req't	Allocation		Cost Allocation				
19		2019/20	Type		Accounts	Flow	COD	TSS	Total
20	OPERATING COSTS								
21	Fund 20 Treatment & Disposal	\$13,824,013	1		\$0	\$4,561,924	\$4,561,924	\$4,700,164	\$13,824,013
22	Fund 20 Fab., Maint., & Const.	\$8,837,462	1		\$0	\$2,916,362	\$2,916,362	\$3,004,737	\$8,837,462
23	Fund 20 Collection Services	\$7,316,485	2		\$0	\$7,316,485	\$0	\$0	\$7,316,485
24	Fund 20 Technical Services								
25	CIP Team	\$1,585,846	4		\$0	\$792,923	\$396,462	\$396,462	\$1,585,846
26	Technical Services Team	\$1,249,033	4		\$0	\$624,516	\$312,258	\$312,258	\$1,249,033
27	Customer Team	\$1,652,620	3		\$1,652,620	\$0	\$0	\$0	\$1,652,620
28	Environmental Compliance Team	\$2,144,222	4		\$0	\$1,072,111	\$536,055	\$536,055	\$2,144,222
29	Fund 50 Total Transfer from Fund 20	\$407,600	4		\$0	\$203,800	\$101,900	\$101,900	\$407,600
30	Subtotal for O&M Composite	\$37,017,281			\$1,652,620	\$17,488,122	\$8,824,962	\$9,051,577	\$37,017,281
31	O&M Composite Allocation Factors	100%	5		4.5%	47.2%	23.8%	24.5%	100%
32	Composite Allocations								
33	Fund 20 Business Services	\$4,342,142	5		\$193,853	\$2,051,364	\$1,035,172	\$1,061,754	\$4,342,142
34	Fund 20 General Manager	\$1,066,367	5		\$47,607	\$503,785	\$254,223	\$260,751	\$1,066,367
35	Fund 20 Board of Directors	\$179,176	5		\$7,999	\$84,648	\$42,716	\$43,813	\$179,176
36	Fund 10 County Commission Expense	\$109,000	5		\$4,866	\$51,495	\$25,986	\$26,653	\$109,000
37	Fund 30 Special Projects	\$4,354,600	5		\$194,409	\$2,057,249	\$1,038,142	\$1,064,800	\$4,354,600
38	Fund 40 OPEB Expense	\$1,375,000	5		\$61,386	\$649,593	\$327,802	\$336,219	\$1,375,000
39	Fund 60 Total Transfer from Fund 20	\$593,084	5		\$26,478	\$280,192	\$141,392	\$145,023	\$593,084
40	Total Operating Costs	\$49,036,650			\$2,189,219	\$23,166,448	\$11,690,393	\$11,990,589	\$49,036,650
41									
42	DEBT SERVICE								
43	Bond Debt Service	\$0	1		\$0	\$0	\$0	\$0	\$0
44	SRF Loan Repayment	\$2,785,617	1		\$0	\$919,254	\$919,254	\$947,110	\$2,785,617

	A	B	C	D	E	F	G	H	I
1		Union Sanitary District							
2		Sewer Rate Update & COS Analysis							
4									
5		Inflow and Infiltration	5.0%						
6									
7									
8		Report Table 5-2							
9									
10			Accounts [a]	Discharge [b]		COD [c]	TSS [c]	COD	SS
11			LU	(kgal/year)	(mgd)	mg/l	mg/l	(klbs/year)	(klbs/year)
12		Residential							
13		Single Family Residences	69,352	4,936,129	13.524	500	200	20,584	8,233
14		Multiple Family Residences	43,483	2,698,120	7.392	500	200	11,251	4,500
15		Total Residential	112,835	7,634,249	20.916			31,835	12,734
16									
17		Commercial							
18		Strong	141	298,060	0.817	2,009	507	4,994	1,260
19		Moderate	732	542,235	1.486	505	211	2,284	954
20		Weak	743	270,716	0.742	345	135	779	305
21		Fast-Food Restaurant	75	35,287	0.097	2,024	507	596	149
22		Full-Service Restaurant	77	45,877	0.126	2,038	506	780	194
23		Total Commercial	1,768	1,192,175	3.266			9,432	2,862
24									
25		Industrial							
26		Strong	34	90,908	0.249	2,009	507	1,523	384
27		Moderate	1,222	928,475	2.544	505	211	3,910	1,634
28		Weak	84	19,566	0.054	345	135	56	22
29		Total Industrial	1,340	1,038,950	2.846			5,490	2,040
30									
31		Subtotal	115,943	9,865,373	27.028			46,757	17,636
32									
33		Inflow and Infiltration	-	493,269	1.351	100	100	411	411
34									
35		GRAND TOTAL	115,943	10,358,642	28.380			47,168	18,048
36									
37		[a] Source for accounts: District CIXZ Report.							
38		[b] Source for flow:							
39		SFR: 195 gpd. MFR: 170 gpd.							
40		Commercial & Industrial: District CIXZ Report.							
41		Inflow & Infiltration: assumed 5% per District staff.							
42		[c] Source for COD and TSS concentrations:							
43		Residential: based on prior studies.							
44		Commercial & Industrial: Weighted average reports from District.							

	B	C	D	E	F	G	H	I	J	K
1	Union Sanitary District									
2	Sewer Rate Update & COS Analysis									
6	Report Table 5-3									
7										
8	Cost Allocation									
9		<u>Accounts</u>	<u>Flow</u>	<u>COD</u>	<u>TSS</u>	<u>Total</u>				
10	Functional Costs									
11	Operating Costs	\$2,189,219	\$23,166,448	\$11,690,393	\$11,990,589	\$49,036,650	from Table 9			
12	Debt Service Allocation	\$0	\$919,254	\$919,254	\$947,110	\$2,785,617	from Table 9			
13	Capital Cost Allocation	\$22,702	\$11,982,719	\$6,033,564	\$6,215,838	\$24,254,823	from Table 9			
14	Transfers To/(From) Reserves	(\$459,222)	(\$7,488,255)	(\$3,870,563)	(\$3,976,514)	(\$15,794,554)	from Table 9			
15		\$1,752,699	\$28,580,166	\$14,772,647	\$15,177,023	\$60,282,535				
16										
17	Units of Service (Incl I&I)	115,943	10,358,642	47,168	18,048		from Table 10			
18	Unit Costs (Incl I&I)	\$15.12	\$2.76	\$313.19	\$840.94					
19		\$/Account	\$/1,000 gals	\$/1,000 lbs	\$/1,000 lbs					
20	Reallocation of I&I Costs									
21	I&I Units	-	493,269	411	411		from Table 10			
22	I&I Costs	\$0	\$1,360,960	\$128,842	\$345,950	\$1,835,753				
23										
24	Functional Costs	\$1,752,699	\$28,580,166	\$14,772,647	\$15,177,023	\$60,282,535				
25	I&I Costs (Reallocated)	\$1,835,753	(\$1,360,960)	(\$128,842)	(\$345,950)	\$0				
26		\$3,588,452	\$27,219,206	\$14,643,805	\$14,831,073	\$60,282,535				
27										
28	Units of Service (Excl I&I)	115,943	9,865,373	46,757	17,636		from Table 10			
29	Unit Costs (Excl I&I)	\$30.95	\$2.76	\$313.19	\$840.94		To below			
30		\$/Account	\$/1,000 gals	\$/1,000 lbs	\$/1,000 lbs					
31										
33	Residential - Charge per Account									
34		<u>Account</u>	<u>Flow</u>	<u>COD</u>	<u>TSS</u>	<u>Total</u>				
35	Single Family Residential					(per acct)				
36	Units	69,352 accounts	4,936,129 kgal	20,584 klbs	8,233 klbs					
37	Accounts	69,352 accounts	69,352 accounts	69,352 accounts	69,352 accounts					
38	Units per account	1.0	71.18 kgal/account	0.297 klbs/account	0.119 klbs/account					
39	Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs					
40	Total Single Family Residential	\$30.95 per account	\$196.38 per account	\$92.95 per account	\$99.84 per account	\$420.12				
41										
42	Multi Family Residential									
43	Units	43,483 accounts	2,698,120 kgal	11,251 klbs	4,500 klbs					
44	Accounts	43,483 accounts	43,483 accounts	43,483 accounts	43,483 accounts					
45	Units per account (loading ÷ acct)	1	62.05 kgal/account	0.259 klbs/account	0.103 klbs/account					
46	Unit Costs (\$ per Unit)	\$30.95 per account	\$2.76 per kgal	\$313.19 per klbs	\$840.94 per klbs					
47	Total Multi Family Residential	\$30.95 per account	\$171.20 per account	\$81.04 per account	\$87.04 per account	\$370.22				
48										
49	Commercial - Charge per Kgal									

Table 11. COS - Unit Costs

	B	C	D	E	F	G	H	I	J	K
50		<u>Account</u>		<u>Flow</u>		<u>COD</u>		<u>TSS</u>		<u>Total</u>
51	Fast Food Restaurant									(per kgal)
52	Units	75 accounts		35,287 kgal		596 klbs		149 klbs		
53	Kgal	35,287 kgal		35,287 kgal		35,287 kgal		35,287 kgal		
54	Units/Kgal	0.0021254 accounts/kgal		1		0.0168802 klbs/kgal		0.0042284 klbs/kgal		
55	Unit Costs (\$ per Unit)	\$30.95 per account		\$2.76 per kgal		\$313.19 per klbs		\$840.94 per klbs		
56	Total Fast Food Restaurant	<u>\$0.07 per kgal</u>		<u>\$2.76 per kgal</u>		<u>\$5.29 per kgal</u>		<u>\$3.56 per kgal</u>		<u>\$11.67</u>
57										
58	Full Service Restaurant									
59	Units	77 accounts		45,877 kgal		780 klbs		194 klbs		
60	Kgal	45,877 kgal		45,877 kgal		45,877 kgal		45,877 kgal		
61	Units/Kgal	0.0016784 accounts/kgal		1		0.0169969 klbs/kgal		0.0042200 klbs/kgal		
62	Unit Costs (\$ per Unit)	\$30.95 per account		\$2.76 per kgal		\$313.19 per klbs		\$840.94 per klbs		
63	Total Full Service Restaurant	<u>\$0.05 per kgal</u>		<u>\$2.76 per kgal</u>		<u>\$5.32 per kgal</u>		<u>\$3.55 per kgal</u>		<u>\$11.68</u>
64										
65	Industrial & Commercial - Charge per Kgal									
66		<u>Account</u>		<u>Flow</u>		<u>COD</u>		<u>TSS</u>		<u>Total</u>
67	Strong									(per kgal)
68	Units	175 accounts		388,968 kgal		6,517 klbs		1,645 klbs		
69	Kgal	388,968 kgal		388,968 kgal		388,968 kgal		388,968 kgal		
70	Units/Kgal	0.0004499 accounts/kgal		1		0.0167551 klbs/kgal		0.0042284 klbs/kgal		
71	Unit Costs (\$ per Unit)	\$30.95 per account		\$2.76 per kgal		\$313.19 per klbs		\$840.94 per klbs		
72	Total Strong	<u>\$0.01 per kgal</u>		<u>\$2.76 per kgal</u>		<u>\$5.25 per kgal</u>		<u>\$3.56 per kgal</u>		<u>\$11.58</u>
73										
74	Moderate									
75	Units	1,954 accounts		1,470,710 kgal		6,194 klbs		2,588 klbs		
76	Kgal	1,470,710 kgal		1,470,710 kgal		1,470,710 kgal		1,470,710 kgal		
77	Units/Kgal	0.0013286 accounts/kgal		1		0.0042117 klbs/kgal		0.0017597 klbs/kgal		
78	Unit Costs (\$ per Unit)	\$30.95 per account		\$2.76 per kgal		\$313.19 per klbs		\$840.94 per klbs		
79	Total Moderate	<u>\$0.04 per kgal</u>		<u>\$2.76 per kgal</u>		<u>\$1.32 per kgal</u>		<u>\$1.48 per kgal</u>		<u>\$5.60</u>
80										
81	Weak									
82	Units	827 accounts		290,282 kgal		835 klbs		327 klbs		
83	Kgal	290,282 kgal		290,282 kgal		290,282 kgal		290,282 kgal		
84	Units/Kgal	0.0028490 accounts/kgal		1		0.0028773 klbs/kgal		0.0011259 klbs/kgal		
85	Unit Costs (\$ per Unit)	\$30.95 per account		\$2.76 per kgal		\$313.19 per klbs		\$840.94 per klbs		
86	Total Weak	<u>\$0.09 per kgal</u>		<u>\$2.76 per kgal</u>		<u>\$0.90 per kgal</u>		<u>\$0.95 per kgal</u>		<u>\$4.70</u>
87										
88	Industrial (sampled)									
89		<u>Account</u>		<u>Flow</u>		<u>COD</u>		<u>TSS</u>		
91	Unit Costs (\$ per Unit)	\$30.95 per account		\$2.76 per kgal		\$313.19 per klbs		\$840.94 per klbs		
92										
93										

Table 11. COS - Unit Costs



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