Napa Sanitation District
Cost of Service Sewer Service Charge Study

RATE STUDY RESULTS AND RECOMMENDATIONS

FINAL | November 2020

Contents

Appendices

Tables

Figures

Abbreviations

ADU	Accessory Dwelling Unit
AF	Acre-feet
BOD	biochemical oxygen demand
Carollo	Carollo Engineers, Inc.
City	City of Napa, CA
County	Napa County, CA
District	Napa Sanitation District
EDU	Equivalent Dwelling Unit
FOG	fats, oil, and grease
FYE	fiscal year ending
gpd	gallons per day
gpdd	gallons per dwelling unit per day
MFR	multifamily residential
MGD	million gallons per day
mg/L	milligrams per liter
MOP27	Manual of Practice 27
NapaSan	Napa Sanitation District
O&M	operations and maintenance
Study	Cost of Service Rate Study
RCN	Replacement Cost New
RTS	return to sewer
SFR	Single Family Residential
SSC	Sewer Service Charge
TM	Technical Memorandum
TSS	total suspended solids

Chapter 1

EXECUTIVE SUMMARY

Napa Sanitation District (NapaSan or District) provides wastewater collection and treatment in Napa County, California. NapaSan retained Carollo Engineers, Inc., (Carollo), an independent rate consultant, to perform a Cost of Service Rate Study (Study) for the District's wastewater rates for residential, commercial, industrial, and septage wastehauler customers. This cost of service report summarizes the recommendations from that analysis.

Several key opportunities and challenges for NapaSan shaped this analysis. The District continues to invest in its system, with significant collection system repair and replacement and upgrades at the treatment plant planned for the next decade. The Study is intended to test the revenue program's ability to fund these projects

Water usage is also a driver in the Study. Like many regions in California, residents of Napa County have demonstrated fluctuating water demands over the past several years. Additionally, businesses have been impacted by disruptions due to the ongoing COVID-19 pandemic and are likely to use less water this year as a result. While the residential rate structure is purely fixed, the commercial and industrial rate structures are based on metered water usage. Furthermore, the District's rate structure uses an equivalent dwelling unit approach, which relies on accurate measures of single-family residential water.

This planning uncertainty underscores the need for the Study. At the outset of the Study, Carollo and NapaSan outlined a set of objectives for arriving at a rate structure recommendation. The rates developed must be:

- Based on a detailed cost of service analysis of the wastewater system.
- Developed in accordance with relevant legal and industry guidelines.
- Equitable across customer classes and users.
- Simultaneously easy for customers to understand and for District staff to administer.

These objectives balance the many factors that NapaSan must consider when setting rates.

1.1 Study Framework

Carollo used a methodology that is first and foremost intended to be consistent with California laws and regulations, namely California Constitution article XIII D, section 6 (commonly referred to as Proposition 218) and its proportionality requirements. Carollo's approach is based on the foundational guidance of this law's language.

Carollo developed this analysis using the rate-setting framework as published in Water Environment Federation's *Financing and Charges for Wastewater Systems, Manual of Practice 27* (MOP27). Carollo also tailored its rate-setting approach to the policy guidance of the District and its Board of Directors, while staying within the frameworks of Proposition 218 and MOP27.

1.2 Legal Compliance

NapaSan periodically initiates cost of service analyses to review the alignment of costs with rates and charges. In the State of California, water agencies must establish rates in accordance with the substantive requirements defined by California Constitution article XIII D, section 6.

The goal of this Study and the underlying analysis is to document the nexus of costs and the corresponding rates and fees charged to customers. This document does not establish any legal opinions on behalf of either Carollo or NapaSan. The analysis in the Study has been conducted based on a review and interpretation of these stated legal guidelines, as well as relevant case law, but should not be considered to be legal guidance or contain any assurances of legal compliance.

1.3 Methodology and Approach

Carollo used an industry standard framework as outlined in MOP27. MOP27 outlines a step-by-step process for determining revenue requirements, allocating costs appropriately, and calculating final rates.

1.3.1 Revenue Requirement

The revenue requirement analysis compares NapaSan's forecasted revenues to its forecasted operating and capital costs. This determines the adequacy of existing rates to fund the costs of providing service. If a shortfall exists, or other funding goals are not met, additional funding through either rates or additional bond issuances are reviewed and recommended based on strategic goals and funding availability. Through its annual budgeting process, the District performs a detailed review of its costs, including operations expenditures, capital needs, and funding requirements.

1.3.1.1 Recommendations

Carollo recommends that the District implement an annual 3.0 percent revenue increase. This is projected to support the District meet its financial goals. The recommended financial plan is outlined in Table 1.1.

Table 1.1 Recommended Financial Plan Summary

Category [1]	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Baseline Revenues	$42,682	$39,606	$39,805	$41,199	$42,612
Operating Expenses	16,878	18,285	19,414	19,557	20,314
Debt Service & Capital	22,441	21,192	21,111	23,640	22,351
Surplus / (Deficit) (pre-increase)	**$3,363**	**$128**	**($720)**	**($1,998)**	**($54)**
Revenue Increase	3.0%	3.0%	3.0%	3.0%	3.0%
Additional Revenue	**$1,091**	**$1,162**	**$1,158**	**$1,199**	**$1,242**
Surplus / (Deficit) (post-increase)	**$4,454**	**$1,290**	**$438**	**($799)**	**$1,188**
Revenue Requirement for Rate Calculation [2]	**$32,548**	**$33,832**	**$35,181**	**$36,445**	**$37,752**

Notes:
(1) All figures in thousand dollars.
(2) Totals may not sum precisely due to rounding.

1.3.2 Cost of Service

After assessing the revenue requirements of the District, costs are allocated to specific functional categories. The cost of service allocation completed in this study is established on the functional allocation method in MOP27. This allocation to functional categories is based on several key operating functions, such as flow, removal of biochemical oxygen demand (BOD), and removal of total suspended solids (TSS). This process takes each item in NapaSan's budget and organizes the items collectively based on what function is served. This process results in rates that couple the cost incurred by the District, and the benefit delivered to the customer or the demand the customer places on the system and its resources.

1.3.2.1 Recommendations

As the system has changed over time, the allocation of costs needs to change accordingly. Previously, the allocation of costs was 50 percent to flow with 25 percent each to BOD and TSS. This analysis found that the allocation is 58 percent to flow, 15 percent to BOD, and 27 percent to TSS.

1.3.3 Rate Structure Assessment

The cost of service study is an opportunity to assess the reasonableness of certain assumptions in the current rate structure. Carollo reviewed several assumptions for the District.

1.3.3.1 EDU Flow Assumption

NapaSan uses an equivalent dwelling unit (EDU) approach to calculate its Sewer Service Charges. An EDU is a unit of measure intended to represent the volume and strength (BOD and TSS) of wastewater generated by a typical single-family residential (SFR) home. This allows NapaSan to compare the wastewater "demand" of different parcels and customers using a standardized unit of measure.

To date, the District has assumed that this demand from an SFR customer is 210 gallons per day (gpd). However, winter water usage analysis, a common proxy for wastewater demand, shows that the actual demand is lower, approximately 117 gpd. Carollo recommends changing the rate structure assumption to use 117 gpd instead of 210 gpd.

This change has several impacts. First, this will impact the multi-family residential rate structure by changing the relative amount of flow from parcels such as condos and duplexes. The impact of this change is shown in Table 1.2.

Table 1.2 Current and Proposed Residential Billing Ratios

Residential Unit Type	FYE 2021	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Single Family Dwelling	1.00	1.00	1.00	1.00	1.00	1.00
Duplex	1.00	0.96	0.92	0.88	0.84	0.80
Condominiums and Townhouses	1.00	0.97	0.94	0.91	0.88	0.85
Triplex, Fourplex, and Apartments	0.60	0.64	0.68	0.72	0.76	0.80
Mobile Home	0.60	0.65	0.70	0.75	0.80	0.85
Overnight Trailer Park	0.40	0.40	0.40	0.40	0.40	0.40
SFR with ADU	2.00	1.50	1.50	1.50	1.50	1.50

This change also impacts how BOD and TSS are projected for an EDU. If mass loadings of BOD and TSS are held constant while flow decreases, then by rule concentrations of the two constituents must increase. Because the total mass loadings at the District's treatment plant has varied minimally, the concentration of BOD and TSS must have increased in turn. This changes how commercial strength factors are calculated. The flow and concentrations are shown below in Table 1.3.

The updated strength factors for commercial classes incorporate these figures as well as the updated cost allocation to flow, BOD, and TSS referenced above.

Table 1.3 EDU Flow, BOD, and TSS Phase-In Schedule

Year	Flow (gpd)	BOD (mg/L)	TSS (mg/L)
FYE 2021	210	175	200
FYE 2022	188	209	238
FYE 2023	167	240	274
FYE 2024	150	265	303
FYE 2025	137	284	324
FYE 2026	126	301	344
FYE 2027	117	314	359

1.3.3.2 Commercial Rolling Average

For commercial customers, the annual Sewer Service Charge is calculated based on metered water usage for the prior year. To mitigate potential swings in demand and build the resiliency of the rate structure, it is recommended that the District use a three-year rolling average instead of just the last year. This should have a limited impact on customers, with the potential of making their annual bill more predictable. For the District, this will increase the level of revenues from more reliable sources that are less volatile based on water usage.

1.3.4 Rate Design

The rate design takes the allocation of costs and the rate structure assessment in the previous steps and calculates an updated rate. The results are outlined below.

Table 1.4 Sewer Service Charge Calculation

Class	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Revenue Requirement (thousands)	$32,119	$33,386	$34,718	$35,965	$37,255
Projected EDU	43,488	45,203	47,006	48,695	50,441
Sewer Service Charge ($/EDU)	$738.60	$738.60	$738.60	$738.60	$738.60

1.3.4.1 Bill Impacts

The impacts of the change in rates are shown below for residential customers.

Table 1.5 Residential Rate Impacts

Class	FYE 2021	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Single Family Dwelling	$738.60	$738.60	$738.60	$738.60	$738.60	$738.60
Duplexes	$738.60	$709.06	$679.51	$649.97	$620.42	$590.88
Apartments	$443.16	$472.70	$502.25	$531.79	$561.34	$590.88
Condominiums / Townhouses	$738.60	$716.44	$694.28	$672.13	$649.97	$627.81
Mobile Home Spaces	$443.16	$480.09	$517.02	$553.95	$590.88	$627.81
Overnight Trailer Parking	$295.44	$295.44	$295.44	$295.44	$295.44	$295.44
Pool House/Rec Room	$738.60	$738.60	$738.60	$738.60	$738.60	$738.60
Single Family Dwelling w/ ADU	$1,477.20	$1,107.90	$1,107.90	$1,107.90	$1,107.90	$1,107.90
Apartments / S.R.O.	$443.16	$443.16	$443.16	$443.16	$443.16	$443.16

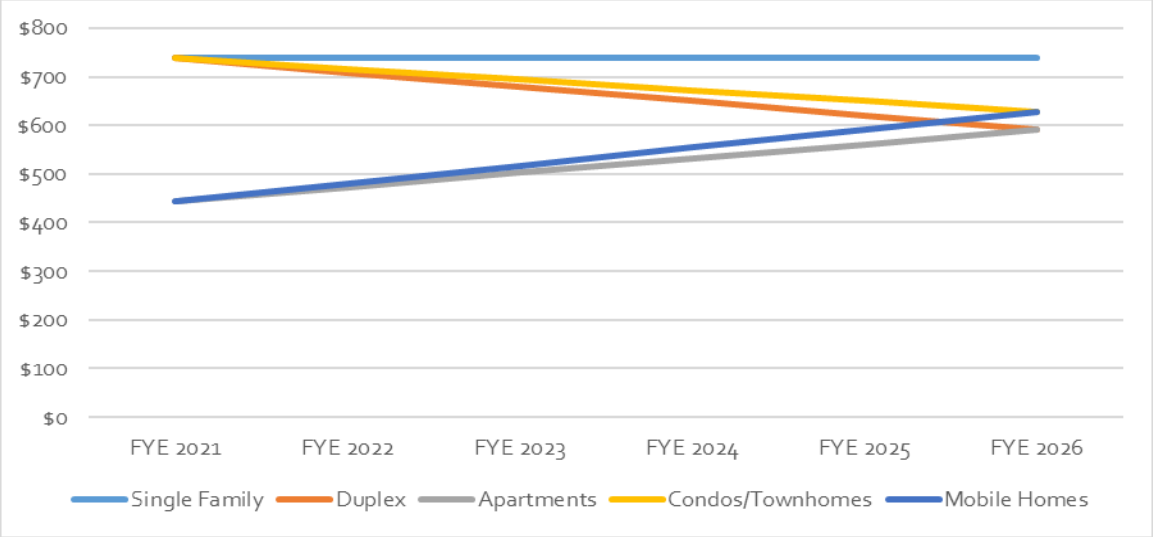

Figure 1.1 Residential Rate Impacts

Commercial bill impacts are more difficult to represent because it depends on how much water is metered. The table below shows a sample range of impacts for a customer that is currently using 1 EDU, which is 210 gpd. As the EDU flow estimate decreases, this customer will be billed for more EDU unless usage is reduced.

Table 1.6 Commercial Rate Impacts

Strength Factor	FYE 2021	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
1.0 (e.g. office, gym, hotel w/o restaurant)	$739	$827	$931	$1,036	$1,130	$1,235
1.4 (e.g. delis, commercial laundry)	$1,066	$1,069	$1,203	$1,340	$1,460	$1,596
2.0 (hotel w/ restaurant)	$1,477	$1,506	$1,694	$1,886	$2,056	$2,248
2.7 (restaurant)	$1,978	$1,865	$2,099	$2,336	$2,547	$2,784

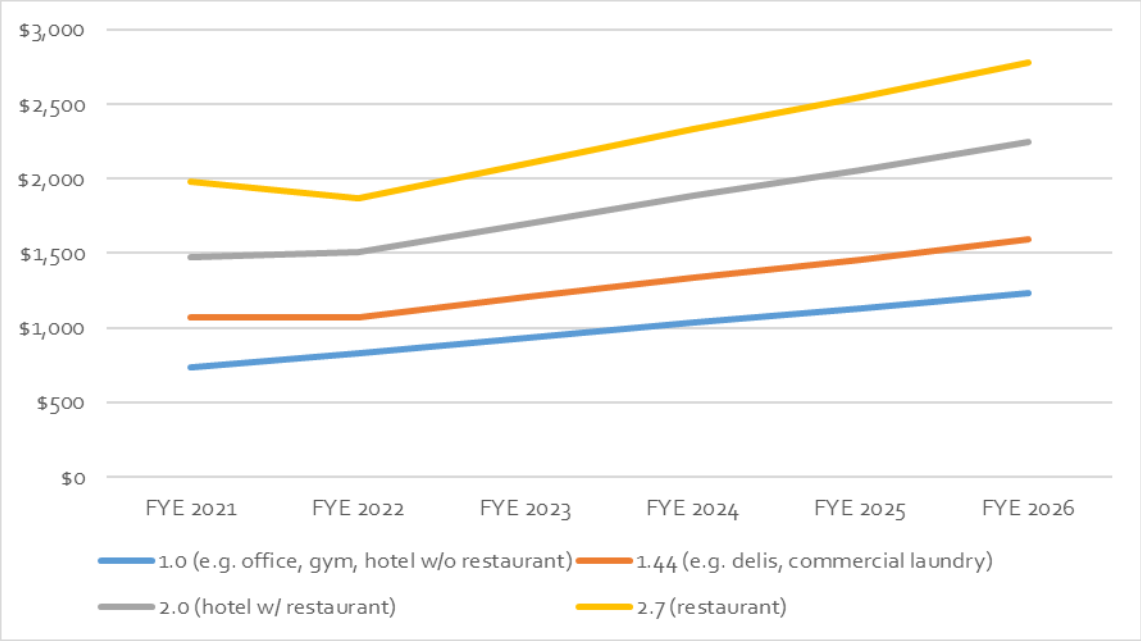

Figure 1.2 Commercial Rate Impacts

Chapter 2

INTRODUCTION

2.1 Project Background

NapaSan retained Carollo to conduct a study regarding its sewer service charge (SSC) methodologies. This Study summarizes and presents the results of Carollo's analysis, along with the assumptions and inputs used, the methodological basis of the analysis, and the impacts of the proposed changes.

2.1.1 About NapaSan

NapaSan provides wastewater collection and treatment for approximately 83,300 residents, primarily in the City of Napa, California. NapaSan treats 10 million gallons per day (MGD), with a total permitted treatment capacity of 15.4 MGD. NapaSan is able to reclaim a portion of its wastewater flows for recycled water usage, producing approximately 800 million gallons per year.

2.2 Project Approach

Carollo used an industry standard rate setting approach, following the methodology outlined in the Water Environment Federation's *Manual of Practice 27: Financing and Charges for Wastewater Systems* (MOP27). MOP27 outlines a commonly accepted approach for wastewater utilities to use to forecast revenue requirements, allocate costs to functional category and customer, and then calculate rates.

2.2.1 Proposition 218

Wastewater utilities in California must satisfy the requirements of California's Proposition 218. Proposition 218 requires that rates do not exceed the proportional cost of service. While this Study should not be considered a legal document and does not provide any guarantees, assurances, or other legal obligations to meet Proposition 218, the analysis was performed with proportionality requirements of Proposition 218 as a goal and the recommendations are presented using the best available data to show a nexus between costs and rates.

2.2.2 Organization of this Study

This Study is organized into the following sections to summarize the methodology and results of each step:

- Baseline Inputs and Assumptions
- Revenue Requirements
- Cost of Service Analysis
- Rate Structure Assessment
- Rate Recommendations
- Appendix

Chapter 3

BASELINE INPUTS AND ASSUMPTIONS

3.1 Existing Rate Structure

NapaSan's current rate structure uses an EDU approach for wastewater rates. This approach defines one EDU as the typical flow of an SFR home. All SFR customers pay the rate for one EDU, which, for fiscal year ending 2021, is $738.60.

Multi-family residential, non-residential, and industrial wastewater customers are billed based on how many EDUs are assumed from the connection each year. The EDUs are estimated based on total return flow. This is assumed for residential and is based on measured potable demand from non-residential and industrial customers. One EDU is currently equal to 76,650 gallons per year.

In addition, commercial and industrial customers have a Strength Factor to account for varying BOD and TSS, collectively known as loadings. These loadings form the basis of the treatment process and will be discussed further in the cost of service analysis of this Study. The strength factor is intended to adjust each EDU based on the relative loadings from each customer.

3.1.1 Residential

NapaSan's current rate structure for residential customers differentiates between different dwelling types, as outlined in Table 3.1.

Table 3.1 FYE 2021 Residential Sewer Service Charges

Dwelling Type	Number of EDU	FYE 2021 Sewer Service Charge
Condominiums and Townhouses	1.0	$738.60
Duplex, each unit	1.0	$738.60
Mobile Home	0.6	$443.16
Overnight Trailer Park, per space	0.4	$295.44
Single Family Dwelling	1.0	$738.60
Triplex, Fourplex, and Apartments	0.6	$443.16
Condominiums and Townhouses	1.0	$738.60

3.1.2 Commercial

Commercial Sewer Service Charges are charged annually, either on property tax assessments or directly billed to the commercial customer. The sewer service charge for commercial businesses is based on the following formula:

Equation 3.1 Annual Sewer Service Charge Equation

$$Annual\ Sewer\ Service\ Charge = \frac{Gallons\ of\ potable\ water\ used\ in\ prior\ year}{76{,}650\ gallons} \times Strength\ Factor \times Rate\ (\frac{\$}{EDU})$$

As outlined above, 76,650 is the current assumed annual water use in gallons for an EDU. The Strength Factor is based on guidance from the California State Water Resources Control Board, which outlines typical BOD and TSS concentrations from commercial users.[1] Measuring BOD and TSS concentrations is costly and difficult and would be impossible to obtain for every single customer. As a result, these industry standard concentrations are used.

The Strength Factor is then a function of the following formula:

Equation 3.2 Current Strength Factor Formula

$$Strength\ Factor\ = 50\% + 25\% \times \frac{Class\ BOD\ (mg/L)}{175\ mg/L} + 25\% \times \frac{Class\ TSS\ (mg/L)}{200\ mg/L}$$

The 175 milligrams per liter (mg/L) for BOD and 200 mg/L for TSS are based on the assumed concentration for a typical SFR dwelling. The BOD and TSS concentrations for each class, along with the resulting strength factors are shown in Table 3.2.

Table 3.2 Current Commercial Strength Factors

Business Category	BOD (mg/L)	TSS (mg/L)	Strength Factor
Automobile Sales and Service	175	200	1.0
Bars/Nightclubs	175	200	1.0
Bakery/Candy/Ice Cream	1,000	600	2.7
Banks/Business Offices	175	200	1.0
Car Wash Facilities	20	150	0.7
Churches	175	200	1.0
Convalescent Homes/Hospitals	175	200	1.0
Delicatessens	450	240	1.4
Dry Type Manufacturing	175	200	1.0
Laundries - Commercial	450	240	1.4
Laundries - Self Service	150	110	0.9
Markets (without food service)	450	240	1.4
Markets (with food service)	800	800	2.6
Merchandising/Retail Shops	175	200	1.0

[1] California State Water Resources Control Board Division of Water Quality, "Revenue Program Guidelines for Wastewater Agencies," April 1983. Retrieved 11/8/2020. https://www.waterboards.ca.gov/publications_forms/publications/general/docs/revenue_wastewater.pdf

Business Category	BOD (mg/L)	TSS (mg/L)	Strength Factor
Mortuaries/Funeral Homes	800	800	2.6
Newspapers / Printers	175	200	1.0
Physicians/Medical Offices	175	200	1.0
Restaurants & Caterers	1,000	600	2.7
Daycares/Private Schools	175	200	1.0
Service Related Enterprises	175	200	1.0
Service Stations/Repair Shops	175	200	1.0
Theaters	175	200	1.0
Shopping Centers/Complexes	175	200	1.0
Membership Organizations	175	200	1.0
Mixed Use (1 Meter)	450	240	1.6
Hotels & Motels (W/O Rest.)	175	200	1.0
Hotels & Motels (W/ Rest.)	500	600	2.0
Bed & Breakfast Inns	175	200	1.0
Industrial Monitoring	175	200	1.0
Hold & Haul	175	200	1.0

3.1.3 Industrial

Industrial customers are charged using the same formula as commercial customers. However, because these customers have higher strength flow that requires a discharge permit, their BOD and TSS concentrations are measured rather than using industry standards.

3.1.4 Wastehauler

This Study also reviewed the District's rates charged for septage received by septage wastehaulers. This discharge is delivered to the District's treatment facilities by truck. Most of the septage received by the District is from portable toilets, although some is received from wineries. Smaller amounts are received from restaurants and other food related industries.

The District's current rate structure for wastehaulers is divided between portable toilets, and then domestic, restaurant, and winery categories. These rates are outlined in Table 3.3.

Table 3.3 Current Portable Toilet Wastehauler Rates

Gallons	FYE 2021 Rate
0 - 276	$59.00
277 - 526	$81.00
527 - 776	$103.00
777 - 1,026	$125.00
1,027 - 1,276	$147.00
1,277 - 1,526	$169.00
1,527 - 1,776	$191.00
1,777 - 2,026	$213.00
>2,026	$235.00

Table 3.4 Current Domestic, Restaurant, and Winery Wastehauler Rates

Gallons	Domestic	Restaurant	Wineries
1,500	$517.00	$761.00	$1,071.00
1,750	$603.00	$888.00	$1,250.00
2,000	$689.00	$1,015.00	$1,429.00
2,250	$775.00	$1,142.00	$1,608.00
2,500	$861.00	$1,269.00	$1,787.00
2,750	$947.00	$1,396.00	$1,966.00
3,000	$1,034.00	$1,522.00	$2,142.00
3,250	$1,120.00	$1,649.00	$2,321.00
3,500	$1,206.00	$1,776.00	$2,500.00
3,750	$1,292.00	$1,903.00	$2,679.00
4,000	$1,378.00	$2,030.00	$2,858.00
4,250	$1,464.00	$2,157.00	$3,037.00
4,500	$1,722.00	$2,538.00	$3,574.00
4,750	$1,808.00	$2,665.00	$3,753.00
5,000	$2,068.00	$3,044.00	$4,284.00

3.2 Growth and Inflation Assumptions

3.2.1 Growth Assumptions

NapaSan currently projects that its number of connections will increase by approximately 0.7 percent on average over the next ten years. The District projects slower than average growth in FYE 2022 due to a potential slowdown in the economy, followed by a slight increase in the growth rate in the following years. The projected number of connections by class is outlined Table 3.5.

Table 3.5 Current and Projected Connections

Class [1]	FYE 2021	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Single Family Dwelling	19,307	19,489	19,582	19,744	19,945	20,071
Duplexes	1,649	1,664	1,672	1,686	1,703	1,714
Apartments	6,953	7,018	7,052	7,110	7,182	7,228
Condominiums / Townhouses	3,079	3,108	3,123	3,149	3,181	3,201
Mobile Home Spaces	1,475	1,489	1,496	1,508	1,523	1,533
Overnight Trailer Parking	148	149	150	151	153	154
Pool House/Rec Room	33	34	34	34	34	35
Single Family Dwelling W/ ADU	266	268	270	272	275	276
Apartments / S.R.O.	11	11	11	11	11	12
Commercial	1,606	1,621	1,628	1,641	1,658	1,668
Industrial	17	17	17	17	17	17
Total	34,544	34,869	35,034	35,323	35,683	35,909

Notes:
(1) All residential classes represent dwelling units.

3.2.2 Cost Escalation

Baseline revenue and expense data was provided by NapaSan and then escalated based on the type of expense. The annual escalation rates for FYE 2021 through 2026 are outlined in Table 3.6. These escalation rates were developed based on NapaSan's projected cost drivers.

Table 3.6 Cost Escalation and Growth Rates by Fiscal Year

Category	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Salary / Labor	6.1%	11.6%	5.5%	2.9%	2.9%
Supplies & Services	6.7%	2.5%	2.5%	2.5%	2.5%
General Inflation	3.2%	3.2%	3.2%	3.2%	3.2%

Chapter 4

REVENUE REQUIREMENTS

4.1 Revenue Requirements Analysis

This analysis compiled information from the following sources to develop a financial model to test the overall financial forecast prepared by NapaSan:

- O&M budgets, with past actuals and proposed budgets for the next fiscal year.
- Expense summaries by department.
- Debt service schedules.
- Capital improvement plans through fiscal year ending (FYE) 2030.
- Assumed service area growth and cost escalation rates.
- Non-conventional financing, such as grants and SRF loans.

4.2 Analysis and Financial Tests Performed

This analysis conducted three primary financial tests to assess NapaSan's financial plan.

- **Cash Flow Sufficiency Test** – The cash flow test defines the amount of annual revenues that must be generated in order to meet annual expenditure obligations of the utility as well as maintain sufficient reserves.
- **Bond Coverage Sufficiency Test** – Bond coverage refers to the collection in revenues to meet all operating expenses and debt service obligations plus an additional multiple of that debt service. NapaSan has a legally required minimum bond coverage ratio of 1.25 times (1.25x); however, for the purpose of prudent financial planning the bond coverage test was set to meet a 1.50x coverage ratio.
- **Reserves Test** – The reserve test reviews end of year fund balances against the District's reserve targets. This test is high priority because the reserves are used to fund capital projects over time without necessitating large rate increases. Furthermore, because the District only receives most of its revenues biannually through property taxes, healthy reserve levels allow the District to maintain consistent cash flow for operations throughout the year

4.2.1 Cash Flow Test

As shown in Table 4.1, the current revenue is not sufficient to meet operational or capital needs over the next several years. Revenue increases will be needed in order to maintain positive cash flow and fund capital projects and reserves. This revenue projection is based on the FYE 2017 revenue levels, escalated by service area growth factors found in Table 3.4.

The scheduled revenue increases, along with the adjusted financial forecast, are outlined in Table 4.2.

Table 4.1 Cash Flow Forecast Prior to Scheduled Revenue Increases

Category [1]	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Revenues					
Sewer Service Charge	$31,260	$32,385	$33,726	$34,938	$36,191
Capacity Charges	3,583	4,578	2,959	3,042	3,127
Recycled Water Sales	1,094	1,246	1,377	1,447	1,517
Hauler Fees	198	285	297	308	319
Development Fees	126	129	132	136	139
Miscellaneous Revenue	94	97	99	102	104
Total Operating Revenues	**$36,355**	**$38,720**	**$38,591**	**$39,972**	**$41,398**
Interest	360	449	475	484	468
Rents and leases	133	436	739	743	746
Grants	-	-	-	-	-
Loans	5,833	-	-	-	-
Sale of Capital Assets	-	-	-	-	-
Total Non-Operating Revenues	**$6,326**	**$885**	**$1,214**	**$1,227**	**$1,214**
Total Revenues	**$42,682**	**$39,606**	**$39,805**	**$41,199**	**$42,612**
Expenditures					
Board of Directors	$499	$514	$528	$542	$556
General Manager's Office	522	565	591	607	624
Administrative Services	1,724	1,864	1,946	2,000	2,055
Safety, Training & Fleet Maintenance	237	257	268	276	284
Collection System	2,386	2,625	2,756	2,834	2,914
Treatment Plant Operations	4,101	4,350	4,513	4,633	4,757
Treatment Plant Maintenance	1,887	2,016	2,096	2,152	2,211
Regulatory Compliance	851	935	981	1,008	1,037
Engineering	1,529	1,687	1,773	1,824	1,876
Community Outreach & Poll. Prev.	239	259	271	278	286
Water & Biosolids Reclamation	841	907	947	973	999
Non-Departmental Expenses	2,004	2,190	2,294	2,359	2,425
Other Labor Related Costs	59	116	451	71	291
Total Operating Expenses	**$16,878**	**$18,285**	**$19,414**	**$19,557**	**$20,314**
Debt Service	5,691	6,780	6,724	6,727	6,717
Capital Projects	16,750	14,413	14,387	16,913	15,635
Total Non-Operating Expenses	**$22,441**	**$21,192**	**$21,111**	**$23,640**	**$22,351**
Total Expenses	**$39,319**	**$39,477**	**$40,525**	**$43,197**	**$42,666**
Surplus/(Deficit)	**$3,363**	**($993)**	**($3,067)**	**($5,583)**	**($4,947)**

Notes:
(1) All figures in thousand dollars. Revenue and cash flow figures are prior to any scheduled revenue adjustments.

Table 4.2 Financial Forecast Following Inflationary Revenue Increases

Category [1]	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Baseline Revenues	$42,682	$39,606	$39,805	$41,199	$42,612
Operating Expenses	16,878	18,285	19,414	19,557	20,314
Debt Service & Capital	22,441	21,192	21,111	23,640	22,351
Surplus / (Deficit) (pre-increase)	**$3,363**	**($993)**	**($3,067)**	**($5,583)**	**($4,947)**
Revenue Increase	3.0%	3.0%	3.0%	3.0%	3.0%
Additional Revenue	**$1,091**	**$1,162**	**$1,158**	**$1,199**	**$1,242**
Surplus / (Deficit) (post-increase)	**$4,454**	**$1,290**	**$438**	**($799)**	**$1,188**
Revenue Requirement for Rate Calculation [2]	**$32,548**	**$33,832**	**$35,181**	**$36,445**	**$37,752**

Notes:
(1) All figures in thousand dollars.
(2) Based on Sewer Service Charge + Hauler Fee Revenues from Table 4.1, plus Additional Revenue from this table.
(3) Totals may not sum precisely due to rounding.

4.2.2 Debt Coverage Test

The debt coverage test is stipulated in the official statement for each bond series that NapaSan issues. NapaSan's stipulated debt coverage is 1.25x, meaning that revenues minus operating expenditures must be 25 percent greater than the debt service due in that fiscal year. While 1.25x is the mandated debt coverage ratio, this analysis assumes a more conservative 1.50x coverage. This allows NapaSan to plan without coming close to the 1.25x threshold.

Not all revenues are allowed in the debt coverage test. For NapaSan, all sewer service charge and capacity charge revenues are allowed in the debt coverage calculation. Some non-operating revenues, such as interest, rents, and leases, are permitted, while grant and loan proceeds are not.

The overview of revenues and expenditures included in this test are outlined in Table 4.3. The revenues outlined in the analysis are following the revenue increases show in Table 4.2, under the assumption that needed increases are cash flow driven and not debt driven. Based on this assumption, NapaSan is projected to well exceed its debt coverage ratio requirements.

Table 4.3 Debt Coverage Test Following Increases

Category [1]	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Allowable Revenues					
User Charges	$32,350	$33,547	$34,884	$36,137	$37,433
Other Operating Revenues	1,512	1,757	1,905	1,992	2,080
Non-Operating Revenues	360	449	475	484	468
Capacity Charges	3,583	4,578	2,959	3,042	3,127
Total Allowable Revenues	**$37,806**	**$40,331**	**$40,224**	**$41,655**	**$43,108**
Expenditures					
Operating Expenses	$16,878	$18,285	$19,414	$19,557	$20,314
Debt Service	5,691	6,780	6,724	6,727	6,717
1.50x Coverage	2,845	3,390	3,362	3,363	3,358
Total Expenditures plus Coverage	**$25,415**	**$28,455**	**$29,500**	**$29,647**	**$30,390**
Debt Coverage Surplus/(Deficit)	**$12,392**	**$11,876**	**$10,724**	**$12,008**	**$12,718**
Debt Coverage Ratio	**3.68x**	**3.25x**	**3.10x**	**3.29x**	**3.39x**

Notes:
(1) All figures in thousand dollars.

4.2.3 Reserve Tests

NapaSan currently maintains three reserves in order to maintain smooth funding of operating expenses.

- The **operating reserve** is designed to assist NapaSan during emergencies. Historically, this reserve has been maintained at 15 percent of annual operating expenses, excluding debt service and transfers. Beginning in FYE 2023, the target will be increased to 2 percent of net book assets.
- The **cash flow reserve** is the amount of cash necessary for NapaSan to have on hand on July 1 to cover its anticipated expenses through the summer and fall until NapaSan receives the bulk of its operating revenues (sewer services charges collected as property assessments) in December.
- The **debt reserve** is held in trust by a third party. This reserve is a requirement of the 2009B COP bond covenants and is used to ensure that debt service payments will be made in full and on time. The debt reserve requirement was eliminated when the 2009B COPs were refinanced in December 2017.
- The **recycled water repair and replacement reserve** is used to fund capital repairs for the recycled water system. NapaSan currently contributes 10 percent of recycled water revenues to this fund.

The forecast of reserve balances under the scheduled revenue adjustments is outlined in Table 4.4. NapaSan is projected to meet its fund targets in each of the next five years.

Table 4.4 Reserve Balance Forecast Following Increases

Category [1]	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Reserve Targets					
RW Repair & Replacement Reserve	$314	$439	$577	$721	$873
Bond/Debt Reserve	1,100	1,100	1,100	1,100	3,000
Operating Reserve	6,100	6,182	6,266	6,402	6,489
Cash Flow Reserve	11,285	12,532	13,069	13,142	13,516
Total Target	**$18,799**	**$20,254**	**$21,012**	**$21,365**	**$23,878**
Beginning Balance	$18,005	$22,459	$23,749	$24,186	$23,388
Cash Flow	4,454	1,290	438	(799)	1,188
Ending Balance	**$22,459**	**$23,749**	**$24,186**	**$23,388**	**$24,576**
Fund Equity Available for Use	**$3,660**	**$3,495**	**$3,175**	**$2,022**	**$698**

Notes:
(1) All figures in thousand dollars.

4.3 Financial Plan Assessment

Based on this analysis, Carollo anticipates that NapaSan will achieve its financial objectives with the scheduled revenue increases. The scheduled increases are projected to pass the cash flow, debt coverage, and reserve funding tests in each of the next five fiscal years (through FYE 2026), with the exception of FYE 2024 when the cash flow test is not met. However, this is not projected to be an issue as sufficient reserves will be available to maintain cash flow. The projected revenues and expenses are shown in Figure 4.1. Beyond FYE 2026, NapaSan is projected to achieve the same benchmarks in all years.

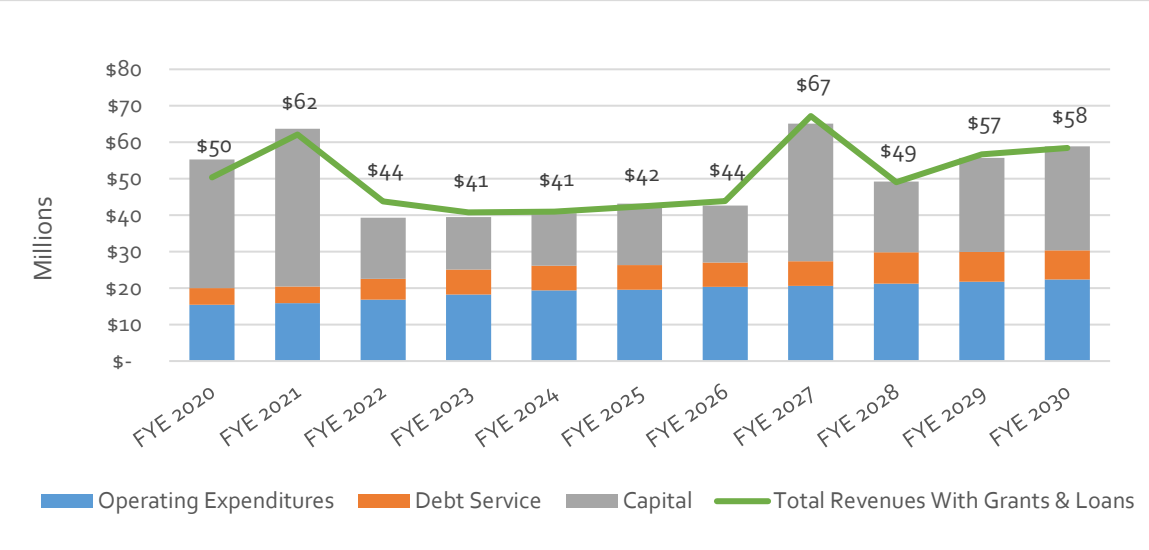

Figure 4.1 Projected Revenues and Expenses

Chapter 5

COST OF SERVICE ANALYSIS

The cost of service analysis creates the nexus between the costs and revenue requirements outlined in the previous section and the rates that will be calculated in the next section. Every dollar of the District's budget supports either an operating or capital expense, and those expenses have specific functions as their goal. Those functions are driven by the demands and needs of the District's service area and its customers.

This analysis took the following steps to perform the cost of service allocation:

1. Allocate operating and capital expenses to a functional category.
2. Allocate functional categories to a treatment constituent or other billable process.
3. Allocate test year revenue requirements to each billable process.
4. Allocate costs for each year of the rate program.

Following the calculation of the unit costs, the per EDU rate can be determined.

This approach is based on an industry standard methodology outlined in Water Environment Federation's *Manual of Practice 27: Financing and Charges for Wastewater Systems* (MOP27).

5.1 Allocation to Functional Categories

The operating and maintenance (O&M) expenses are categorized based on departments (i.e., cost centers) to the area driving the cost. These cost centers are shown in Table 4.1. These costs are then allocated to individual functional cost related to the District's system, such as influent pumping, primary treatment, solids handling, and other treatment, administrative, and general functions related to the District's operating goals and mission.

Table 4.1 outlines percentages bases used in O&M allocation. Administrative Services include accounting, payroll, general ledger, budgeting as well as customer service. It is allocated 40 percent to customer service and 60 percent to general. Safety, Training, and Fleet Maintenance is allocated to treatment plant, collection system, and administration equally as the personnel in the department move between collection system, treatment plants, and office. Treatment Plant Operations, Treatment Plant Maintenance, and Regulatory Compliance are allocated to various cost factors throughout the District's system. Engineering is allocated 2 percent to collection system and 98 percent to general. Community Outreach and Pollution Prevention is allocated 20 percent to industrial wastewater and 80 percent to administration as it is related to education and public events along with writing BMPs and managing fats, oil, and grease (FOG) under Regulatory Compliance. Water and Biosolids Reclamation is allocated 50 percent each to solids handling and recycled water.

The functional allocation uses a five-year average of the expenses in Table 4.1, with the five-year averages outlined in Table 5.1. This approach smooths out any single year costs and incorporates any planned new debt service or capital funding. The resulting cost allocation in dollar and percentage is included in Table 5.2.

Table 5.1 Five-Year Average of Operating Expenses for Functional Allocation

O&M Cost Center	Five Year Average
Board of Directors	$528
General Manager's Office	582
Administrative Services	1,918
Safety, Training & Fleet Maintenance	264
Collection System	2,703
Treatment Plant Operations	4,471
Treatment Plant Maintenance	2,072
Regulatory Compliance	962
Engineering	1,738
Community Outreach & Poll. Prev.	266
Water & Biosolids Reclamation	933
Non-Departmental Expenses	2,254
Other Labor	198
Total	$18,890

Notes:
(1) All figures in thousand dollars.

Table 5.2 Functional Allocation of Operating Costs

Cost Center	Board of Directors	General Manager's Office	Administrative Services	Safety, Training & Fleet Maintenance	Collection System	Treatment Plant Operations	Treatment Plant Maintenance	Regulatory Compliance	Engineering	Community Outreach & Poll. Prev.	Water & Biosolids Reclamation	Non-Departmental Expenses	Other Labor	Total
Influent Pumping	$-	$-	$-	$-	$-	$224	$332	$192	$-	$-	$-	$-	$-	$748
Septage Receiving	-	-	-	-	-	89	41	32	-	-	-	-	-	163
Preliminary Treatment / Headworks	-	-	-	-	-	179	228	32	-	-	-	-	-	439
Primary Treatment	-	-	-	-	-	402	104	32	-	-	-	-	-	538
Aeration Basins & Secondary Clarifiers	-	-	-	-	-	760	311	32	-	-	-	-	-	1,103
Oxidation Ponds	-	-	-	-	-	134	62	32	-	-	-	-	-	228
DAF	-	-	-	-	-	447	83	32	-	-	-	-	-	562
Secondary Effluent Pumping	-	-	-	-	-	89	21	32	-	-	-	-	-	142
Filtration	-	-	-	-	-	-	41	32	-	-	-	-	-	74
Disinfection	-	-	-	-	-	671	41	32	-	-	-	-	-	744
Solids Handling	-	-	-	-	-	760	249	192	-	-	467	-	-	1,668
Effluent Conveyance	-	-	-	-	-	89	41	192	-	-	-	-	-	323
Recycled Water	-	-	-	-	-	45	145	96	-	-	467	-	-	753
Treatment Plant	-	-	-	88	-	581	332	-	-	-	-	-	-	1,001
Collection System	-	-	-	88	2,703	-	-	-	40	-	-	-	-	2,831
Industrial WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cost Center	Board of Directors	General Manager's Office	Administrative Services	Safety, Training & Fleet Maintenance	Collection System	Treatment Plant Operations	Treatment Plant Maintenance	Regulatory Compliance	Engineering	Community Outreach & Poll. Prev.	Water & Biosolids Reclamation	Non-Departmental Expenses	Other Labor	Total
Customer Service	-	-	767	-	-	-	-	-	-	-	-	-	-	767
Admin	528	582	-	88	-	-	-	-	-	266	933	2,254	-	4,652
General / Unallocated	-	-	1,151	-	-	-	41	-	1,698	-	(933)	-	198	2,155
Total	$528	$582	$1,918	$264	$2,703	$4,471	$2,072	$962	$1,738	$266	$933	$2,254	$198	$18,890

Notes:
(1) All figures in thousand dollars.

Following the allocation of the cost centers to the functional categories, some costs need to be reallocated across the entire system. Cost centers allocated either to Admin or General / Unallocated are related to functions that could support multiple functional categories. For instance, the General Manager cost center is allocated to Admin because the General Manager interacts with all of the functional categories on a regular basis and accounting precisely for that time is not feasible. Therefore, this cost center and other similar ones are allocated to these two functions, and then reallocated in proportion to the other cost allocations. The results of this reallocation are shown in Table 5.3, along with the final operating cost functional allocation percentages.

Table 5.3 Functional Allocation Results

Functional Category	Subtotal	Reallocation of Admin & General / Unallocated	Total Allocation ($)	Total Allocation (%)
Influent Pumping	748	421	1,169	6%
Septage Receiving	163	92	255	1%
Preliminary Treatment / Headworks	439	247	686	4%
Primary Treatment	538	303	841	4%
Aeration Basins & Secondary Clarifiers	1,103	621	1,724	9%
Oxidation Ponds	228	129	357	2%
DAF	562	317	879	5%
Secondary Effluent Pumping	142	80	222	1%
Filtration	74	41	115	1%
Disinfection	744	419	1,163	6%
Solids Handling	1,668	939	2,607	14%
Effluent Conveyance	323	182	505	3%
Recycled Water	753	424	1,177	6%
Treatment Plant	1,001	564	1,565	8%
Collection System	2,831	1,595	4,425	23%
Industrial WW	-	-	-	0%
Customer Service	767	432	1,199	6%
Admin	4,652			
General / Unallocated	2,155			
Total	18,890	6,807	18,890	100%

Notes:
(1) All figures in thousand dollars.

5.2 Allocation to Billable Processes

The functional costs outlined above are now allocated to billable processes based on what treatment constituent or billable unit they support. These billable processes are as follows:

- Flow
- BOD
- TSS
- Customer
- Wastehaulers
- Recycled

District staff provided input on how each functional category contributes to addressing the billable processes shown above. Functional cost allocation factors were identified, and the allocated O&M expenses from the above step are allocated accordingly. The fixed asset registry data is also allocated to these billable processes. This allocation will be used for allocating capital costs.

5.2.1 Allocation of Operating Costs

The allocation results from Table 5.3 are allocated to each billable process based on how much it contributes to addressing or supporting that process. For instance, influent pumping, preliminary treatment/headworks, secondary effluent pumping, disinfection, effluent conveyance, and collection system all allocated 100 percent to flow, as these functional categories primarily support conveyance wastewater flow through the District's collection and treatment systems. In contrast, costs related to the primary clarifier are allocated 40 percent to BOD and 60 percent to TSS for this study. Aeration basins & secondary clarifiers and oxidation ponds are each allocated 60 percent to BOD and 40 percent to TSS. Filtration is allocated 100 percent to recycled as it is related to recycling water process. Solids handling is allocated 100 percent to TSS.

The percentages used for this allocation are presented in Table 5.4 and the results of this allocation are outlined in Table 5.5.

5.2.2 Allocation of Fixed Assets

The allocation of CIP and debt service does not use the same basis as the operating cost allocation. For these costs, the fixed asset registry is used because it is more in line with how these costs were incurred. The fixed asset registry reflects the current replacement value of the collection and treatment system and can be used as a proxy for how the District invests in the system, both for current repairs and future investment. Debt service generally reflects the design basis of the system, which is also best shown by the fixed asset registry.

The results of this allocation are outlined in Table 5.6. The Replacement Cost New (RCN) method was used for fixed assets, which takes the Original Cost of assets and escalates them into present-day dollars.

Table 5.4 Basis for Allocation of Operating Costs to Billable Process

Functional Category	Flow	BOD	TSS	Wastehaulers	Recycled	Customer
Influent Pumping	100%	-	-	-	-	-
Septage Receiving	-	-	-	100%	-	-
Preliminary Treatment / Headworks	100%	-	-	-	-	-
Primary Treatment	-	40%	60%	-	-	-
Aeration Basins & Secondary Clarifiers	-	60%	40%	-	-	-
Oxidation Ponds	-	60%	40%	-	-	-
DAF	-	-	100%	-	-	-
Secondary Effluent Pumping	100%	-	-	-	-	-
Filtration	-	-	-	-	100%	-
Disinfection	100%	-	-	-	-	-
Solids Handling	-	-	100%	-	-	-
Effluent Conveyance	100%	-	-	-	-	-
Recycled Water	-	-	-	-	100%	-
Treatment Plant	30%	30%	30%	-	10%	-
Collection System	100%	-	-	-	-	-
Industrial WW	-	-	-	-	-	-
Customer Service	-	-	-	-	-	100%

Table 5.5 Allocation of Operating Costs to Billable Process

Functional Category	Total	Flow	BOD	TSS	Wastehaulers	Recycled	Customer
Influent Pumping	$1,169	$1,169	$-	$-	$-	$-	$-
Septage Receiving	255	-	-	-	255	-	-
Preliminary Treatment / Headworks	686	686	-	-	-	-	-
Primary Treatment	841	-	336	505	-	-	-
Aeration Basins & Secondary Clarifiers	1,724	-	1,035	690	-	-	-
Oxidation Ponds	357	-	214	143	-	-	-
DAF	879	-	-	879	-	-	-
Secondary Effluent Pumping	222	222	-	-	-	-	-
Filtration	115	-	-	-	-	115	-
Disinfection	1,163	1,163	-	-	-	-	-
Solids Handling	2,607	-	-	2,607	-	-	-
Effluent Conveyance	505	505	-	-	-	-	-
Recycled Water	1,177	-	-	-	-	1,177	-
Treatment Plant	1,565	469	469	469	-	157	-
Collection System	4,425	4,425	-	-	-	-	-
Industrial WW	-	-	-	-	-	-	-
Customer Service	1,199	-	-	-	-	-	1,199
Total	$18,890	$8,640	$2,054	$5,292	$255	$1,449	$1,199
Allocation		46%	24%	258%	5%	569%	83%

Notes:
(1) All figures in thousand dollars.

Table 5.6 Allocation of Fixed Assets to Billable Process

Asset Category	RCN	Flow	BOD	TSS	General
Treatment Plant	$371,932	$123,977	$123,977	$123,977	-
Collection System	301,369	301,369	-	-	-
Admin	14,274	-	-	-	14,274
Subtotal:	687,574	425,346	123,977	123,977	14,274
Reallocation of "Admin" (in dollar)		9,017	2,628	2,628	-
Total ($) Allocation	$687,574	$434,363	$126,605	$126,605	-
Total Percent Allocation		63%	18%	18%	-

Notes:
(1) All figures in thousand dollars.

5.3 Allocation of Revenue Requirements

With the operating and capital cost allocation bases determined, the test year revenue requirements are then allocated to the billable processes. Table 5.7 outlines the results of this allocation. Operating expenses and offsetting revenues are allocated based on the basis outlined in Table 5.5, capital and debt service are allocated based on Table 5.6, and recycled water revenues are allocated directly to recycled water.

The resulting allocation is 55 percent of costs allocated to Flow, 14 percent to BOD, 25 percent to TSS, 1 percent to wastehaulers, <1 percent to recycled, and 4 percent to customer. Among the costs related to treatment and collection, it is 58 percent to flow, 15 percent to BOD, and 27 percent to TSS. The latter allocation will be important in the Rate Design Analysis when discussing changes to class based rates.

Table 5.7 Allocation of Test Year Revenue Requirements to Billable Process

Revenue Requirement Line Item	Allocation Basis	Total	Flow	BOD	TSS	Wastehaulers	Recycled	Customer
O&M								
Salaries & Benefits	O&M	$10,233	$4,681	$1,113	$2,867	$138	$785	$650
Services & Supplies	O&M	6,600	3,019	718	1,849	89	506	419
Other	O&M	45	21	5	13	1	3	3
Total Operating Expenses		$16,878	$7,720	$1,836	$4,729	$228	$1,295	$1,071
Non-Operating Expenses								
Debt Service - Existing	Assets	4,591	2,900	845	845	-	-	-
Debt Service - RW Lining	Assets	-	-	-	-	-	-	-
Debt Service - BVR & WNPS	Assets	-	-	-	-	-	-	-
Debt Service - 66"Trunk Rehab	Assets	1,100	695	203	203	-	-	-
Debt Service - 66"Trunk Rehab	Assets	-	-	-	-	-	-	-
Debt Service - NBWRA Projects	Assets	-	-	-	-	-	-	-
Debt Service - Digester/ABs	Assets	-	-	-	-	-	-	-
Capital	Assets	16,750	10,581	3,084	3,084	-	-	-
Total Non-Operating Expenses		$22,441	$14,176	$4,132	$4,132	$-	$-	$-
Non-Operating Revenues/Offsets								
Capacity Charges	Assets	(3,583)	(2,264)	(660)	(660)	-	-	-
Recycled Water Sales	RW Only	(1,094)	-	-	-	-	(1,094)	-
Development Fees	O&M	(126)	(58)	(14)	(35)	(2)	(10)	(8)
Miscellaneous Revenue	O&M	(94)	(43)	(10)	(26)	(1)	(7)	(6)
Other Revenues	O&M	(493)	(226)	(54)	(138)	(7)	(38)	(31)

Revenue Requirement Line Item	Allocation Basis	Total	Flow	BOD	TSS	Wastehaulers	Recycled	Customer
Loans & Grants	Assets	(5,833)	(3,685)	(1,074)	(1,074)	-	-	-
Contributions to Fund Equity	O&M excl. RW	4,454	2,206	525	1,351	65	-	306
Total Non-Operating Expenses		$(6,770)	$(4,069)	$(1,287)	$(582)	$55	$(1,149)	$261
Total Revenue Requirement		$32,548	$17,828	$4,681	$8,278	$283	$146	$1,332
Percent of Revenue Requirement			**55%**	**14%**	**25%**	**1%**	**0.4%**	**4%**
Percent Related to Collection & Treatment			**58%**	**15%**	**27%**			

Notes:
(1) All figures in thousand dollars.

5.3.1 Allocation of Future Revenue Requirements for the Sewer Service Charge

Costs related to Flow, BOD, TSS, and Customer form the basis of the Sewer Service Charge. The Industrial, Wastehauler, and Recycled Water categories are collected directly from the benefitting customers.

Using the allocation basis from Table 5.7 and the revenue requirements projected in Table 4.2, the revenue requirements are allocated to each billable process, which will then form the basis of the Sewer Service Charge calculation in the following section.

Table 5.8 Allocation of Future Revenue Requirements for Sewer Service Charge

Category	Allocation	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Flow	55%	$17,828	$18,531	$19,270	$19,962	$20,678
BOD	14%	4,681	4,865	5,059	5,241	5,429
TSS	25%	8,278	8,605	8,948	9,269	9,602
Customer	4%	1,332	1,385	1,440	1,492	1,545
Revenue Requirement for SSC		$32,119	$33,386	$34,718	$35,965	$37,255

Notes:
(1) All figures in thousand dollars.

The allocation of costs to wastehauler is shown below.

Table 5.9 Allocation of Future Revenue Requirements for Wastehauler

Category	Allocation	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Wastehauler	1%	$283	$294	$306	$317	$328

Notes:
(1) All figures in thousand dollars.

Chapter 6

RATE STRUCTURE ASSESSMENT

This analysis looked at NapaSan's current rate structure to assess changes that could be made to better support the following goals:

- Rates should reflect the cost of service for each customer.
- Rates should enhance the District's revenue resiliency.
- Rates should be easy to both understand and administer.

The following sections outline several topics of review and in some cases, recommended changes for the rate structure.

6.1 Residential Usage Assumptions

Currently, NapaSan assumes that each SFR customer uses approximately 210 gpd, equating to 76,650 gallons per year. This forms the basis of the District's current EDU calculation. However, both short- and long-term conservation trends have likely resulted in lower per capita demand than when the 210 gpd standard was adopted.

This analysis gathered water usage data from the City of Napa to assess the accuracy of this standard. The assumptions, methodology, results, and discussion of this analysis are provided in the appendix of this Study. This analysis ultimately recommends the following changes to the residential EDU assumptions, phased in over time for all classes except SFR with Accessory Dwelling Unit (ADU).

Table 6.1 Current and Proposed Residential Billing Ratios

Residential Unit Type	FYE 2021	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Single Family Dwelling	1.00	1.00	1.00	1.00	1.00	1.00
Duplex	1.00	0.96	0.92	0.88	0.84	0.80
Condominiums and Townhouses	1.00	0.97	0.94	0.91	0.88	0.85
Triplex, Fourplex, and Apartments	0.60	0.64	0.68	0.72	0.76	0.80
Mobile Home	0.60	0.65	0.70	0.75	0.80	0.85
Overnight Trailer Park	0.40	0.40	0.40	0.40	0.40	0.40
SFR with ADU	2.00	1.50	1.50	1.50	1.50	1.50

6.2 EDU Changes

6.2.1 Changes to Per EDU Flow and Loadings

6.2.1.1 Flow Changes

Based on the analysis of residential usage, the EDU assumption of 210 gpd is no longer accurate. It is recommended that NapaSan migrate to 117 gpd as the benchmark for 1 EDU.

In order to balance these changes and the impact that they will have on customers, the following schedule would phase in this change. The phase-in would start in FYE 2022 and complete by FYE 2027.

Table 6.2 EDU Flow, BOD, and TSS Phase-In Schedule

Year	Flow (gpd)	BOD (mg/L)	TSS (mg/L)
FYE 2021	210	175	200
FYE 2022	188	209	238
FYE 2023	167	240	274
FYE 2024	150	265	303
FYE 2025	137	284	324
FYE 2026	126	301	344
FYE 2027	117	314	359

6.2.1.2 BOD and TSS Changes

In light of the shift from 210 gpd to 117 gpd for the EDU benchmark, this impacts the BOD and TSS assumptions. The total mass of BOD and TSS coming into NapaSan's treatment facilities has remained largely unchanged in the last several years. As a result, if per capita flow has decreased but mass loadings have remained unchanged, then BOD and TSS concentrations have gone up as a result. Based on the current assumption of 210 gpd of flow, 175 mg/L of BOD, and 200 mg/L of TSS, one EDU is assumed to discharge approximately 112 lbs. of BOD and 128 lbs. of TSS, annually, based on the following equation to convert concentrations to loadings.

Equation 6.1 BOD and TSS Pounds Formula

$$Pounds = Flow\ (gpd) \times Concentration\ (mg/L)\ \times 8.345 \times 10^{-6}$$

To reach the same pounds of BOD and TSS with 117 gpd of flow, BOD concentrations would increase to 314 mg/L and TSS concentrations would increase to 359 mg/L.

Similar to the flow phase-in, the BOD and TSS changes would take place over time. The schedule is shown in Table 6.2.

6.2.2 Strength Factor Changes

6.2.2.1 Strength Factor Formula Change

There are two changes to the formula that splits flow, BOD, and TSS. The current formula is outlined in Equation 3.2. The first change is related to the units for flow and loadings outlined above.

The second is a change to the percentage allocation between flow, BOD, and TSS. The previous allocation was 50 percent to flow, 25 percent to BOD, and 25 percent to TSS. The results of the cost of service analysis shown in Table 5.7, specifically the percent allocated to collection and treatment, will be used in the strength factor formula going forward. The new formula is as follows, with the changes in bold:

Equation 6.2 Proposed Strength Factor Formula

$$Strength\ Factor\ = \mathbf{58\%} + \mathbf{15\%} \times \frac{Class\ BOD\ (mg/L)}{SFR\ BOD\ mg/L} + \mathbf{27\%} \times \frac{Class\ TSS\ (mg/L)}{SFR\ TSS\ mg/L}$$

The SFR BOD and TSS mg/L depends on the year of the rate structure, based on the figures in Table 6.2.

6.2.2.2 Updated Strength Factors

Based on the changes to the strength factor formula and the phase-in of flow and concentration changes, the following table outlines the proposed strength factor for each class.

Table 6.3 Current and Proposed Commercial Strength Factors

Business Category	FYE 2021	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Automobile Sales and Service	1.00	1.00	1.00	1.00	1.00	1.00
Bars/Nightclubs	1.00	1.00	1.00	1.00	1.00	1.00
Bakery/Candy/Ice Cream	2.68	2.25	2.25	2.25	2.25	2.25
Banks/Business Offices	1.00	1.00	1.00	1.00	1.00	1.00
Car Wash Facilities	0.72	0.80	0.80	0.80	0.80	0.80
Churches	1.00	1.00	1.00	1.00	1.00	1.00
Convalescent Homes/Hospitals	1.00	1.00	1.00	1.00	1.00	1.00
Delicatessens	1.44	1.29	1.29	1.29	1.29	1.29
Dry Type Manufacturing	1.00	1.00	1.00	1.00	1.00	1.00
Laundries - Commercial	1.44	1.29	1.29	1.29	1.29	1.29
Laundries - Self Service	0.85	0.86	0.86	0.86	0.86	0.86
Markets (without food service)	1.44	1.29	1.29	1.29	1.29	1.29
Markets (with food service)	2.64	2.35	2.35	2.35	2.35	2.35
Merchandising/Retail Shops	1.00	1.00	1.00	1.00	1.00	1.00
Mortuaries/Funeral Homes	2.64	2.35	2.35	2.35	2.35	2.35
Newspapers / Printers	1.00	1.00	1.00	1.00	1.00	1.00
Physicians/Medical Offices	1.00	1.00	1.00	1.00	1.00	1.00
Restaurants & Caterers	2.68	2.25	2.25	2.25	2.25	2.25
Daycares/Private Schools	1.00	1.00	1.00	1.00	1.00	1.00
Service Related Enterprises	1.00	1.00	1.00	1.00	1.00	1.00
Service Stations/Repair Shops	1.00	1.00	1.00	1.00	1.00	1.00
Theaters	1.00	1.00	1.00	1.00	1.00	1.00
Shopping Centers/Complexes	1.00	1.00	1.00	1.00	1.00	1.00
Membership Organizations	1.00	1.00	1.00	1.00	1.00	1.00
Mixed Use (1 Meter)	1.60	1.29	1.29	1.29	1.29	1.29
Hotels & Motels (W/O Rest.)	1.00	1.00	1.00	1.00	1.00	1.00
Hotels & Motels (W/ Rest.)	2.00	1.82	1.82	1.82	1.82	1.82
Bed & Breakfast Inns	1.00	1.00	1.00	1.00	1.00	1.00
Industrial Monitoring	1.00	1.00	1.00	1.00	1.00	1.00
Hold & Haul	1.00	1.00	1.00	1.00	1.00	1.00

6.3 Fixed / Variable Rates

NapaSan and its stakeholders have considered the question of implementing a more variable rate structure. Carollo performed a study in 2018 exploring that question and presented its findings to the District's Board of Directors. At that time, the Board declined to pursue variable rates further. The technical memorandum from that study is provided in the appendix of this Study.

6.4 Commercial Flow Changes

NapaSan currently bills its commercial customers based on their metered water usage in the prior year. While this approach has benefits, it also places the District's revenue at risk in the event of another drought where water usage declines. Similarly, an economic recession could decrease the amount of metered water usage.

As a result, it is recommended that the District transition to billing its commercial customers using an average of the prior three years as opposed to one single year. This has benefits for both the District and customers. For the District, it provides more stable revenue. For customers, it provides more predictable bills each year. If water usage significantly increases due to a one-time business expansion, it could impact the customer significantly in one year. With this approach, that increase would be smoothed over time.

Chapter 7

RATE DESIGN

Because the Sewer Service Charge is a per EDU rate, the rate design can be simplified as a division problem.

$$Sewer\ Service\ Charge = \frac{Projected\ Revenue\ Requirements}{Projected\ Number\ of\ EDU}$$

7.1 Projection of EDU Served

The projected number of EDU is based on the projected flow from each class, multiplied by the strength factor, and then divided by the flow per EDU for that year (based on Table 6.2). The detailed projection of flow for each class is presented in the appendix, while the summarized number of EDU is shown in Table 7.1.

Table 7.1 Projected EDU

Class	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Residential	30,845	30,991	31,248	31,566	31,767
Commercial	10,851	12,201	13,523	14,694	16,014
Industrial	1,791	2,011	2,236	2,435	2,660
Total	43,488	45,203	47,006	48,695	50,441

7.2 Proposed Rates

7.2.1 Per EDU Rate

The projected revenue requirements and EDU hold the Sewer Service Charge per EDU constant through FYE 2026. However, the impacts will vary based on customer class, as will be detailed further in the following sections.

Table 7.2 Sewer Service Charge Calculation

Class	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Revenue Requirement (thousands)	$32,119	$33,386	$34,718	$35,965	$37,255
Projected EDU	43,488	45,203	47,006	48,695	50,441
Sewer Service Charge ($/EDU)	$738.60	$738.60	$738.60	$738.60	$738.60

7.2.2 Wastehauler Rate

The costs associated with the District's wastehauler service were allocated directly in the previous chapter. Similar to the per EDU Sewer Service Charge, the wastehauler rate is a division equation of the allocated costs spread across projected units of service.

In the case of the wastehauler rate, the units of service are gallons of septage received. The revenues requirement is based on the costs allocated in Table 5.9.

The updated wastehauler rate consolidates the rates into one flow category. The previous rate structure separated the rate into categories for portable toilets, domestic uses, restaurants, and wineries. Because of similar flow characteristics and the overwhelming share of discharge from portable toilets though, these categories have been consolidated.

The projected rates are shown in Table 7.3.

Table 7.3 Wastehauler Rate Calculation

Class	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Revenue Requirement (thousands)	$283	$294	$306	$317	$328
Projected Million Gallons Received	1.31	1.31	1.31	1.31	1.31
Wastehauler Rate ($/gallon)	$0.22	$0.23	$0.24	$0.25	$0.26

7.3 Rate Impacts

7.3.1 Residential Rate Impacts

With the changes to residential EDU factors discussed above in this Study and shown in Table 6.1, the impact of the proposed Sewer Service Charge will have a different impact on each residential class.

The comparison of the rate impacts is shown below. While single family residential is constant, other classes see both increases and decreases by FYE 2026. The results are shown in Table 7.4 and Figure 7.1.

Table 7.4 Residential Rate Impacts

Class	FYE 2021	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Single Family Dwelling	$738.60	$738.60	$738.60	$738.60	$738.60	$738.60
Duplexes	$738.60	$709.06	$679.51	$649.97	$620.42	$590.88
Apartments	$443.16	$472.70	$502.25	$531.79	$561.34	$590.88
Condominiums / Townhouses	$738.60	$716.44	$694.28	$672.13	$649.97	$627.81
Mobile Home Spaces	$443.16	$480.09	$517.02	$553.95	$590.88	$627.81
Overnight Trailer Parking	$295.44	$295.44	$295.44	$295.44	$295.44	$295.44
Pool House/Rec Room	$738.60	$738.60	$738.60	$738.60	$738.60	$738.60
Single Family Dwelling w/ ADU	$1,477.20	$1,107.90	$1,107.90	$1,107.90	$1,107.90	$1,107.90
Apartments / S.R.O.	$443.16	$443.16	$443.16	$443.16	$443.16	$443.16

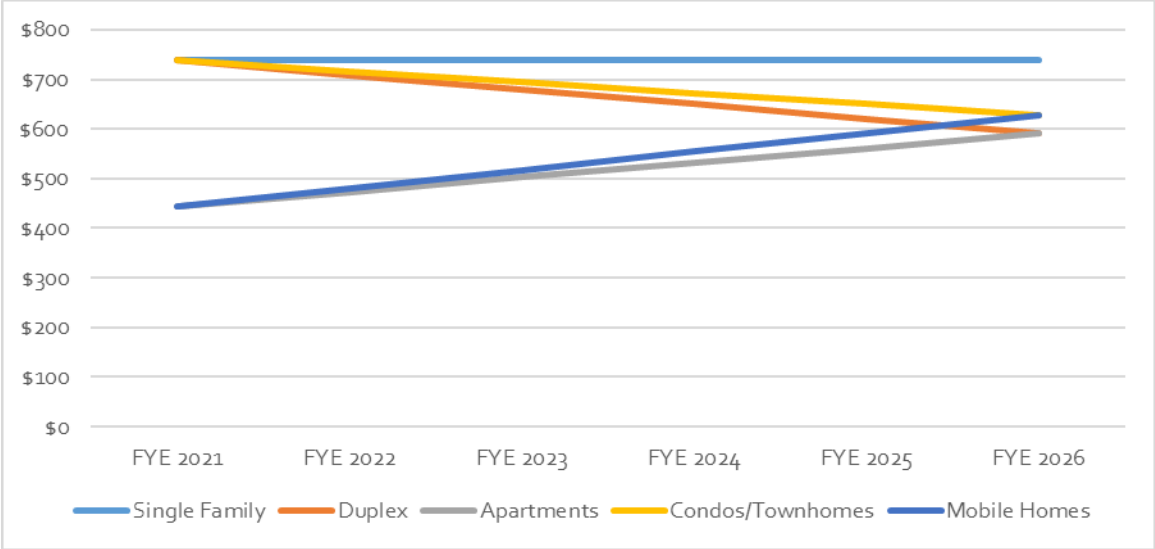

Figure 7.1 Residential Rate Impacts

7.3.2 Commercial Rate Impacts

The commercial rate impacts are going to vary significantly because of both the changes to the strength factors and the volume of water used by the commercial customer. To illustrate the impacts, the impact for a commercial customer currently using one EDU (76,650 gallons per year) across several different strength factor classifications is shown below. This assumes that the customer does not reduce their usage at all to fall in line with the new definition of an EDU (42,705 gallons per year). These impacts can be scaled up based on how much usage is currently used.

Table 7.5 Commercial Rate Impacts

Strength Factor	FYE 2021	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
1.0 (e.g. office, gym, hotel w/o restaurant)	$739	$827	$931	$1,036	$1,130	$1,235
1.4 (e.g. delis, commercial laundry)	$1,066	$1,069	$1,203	$1,340	$1,460	$1,596
2.0 (hotel w/ restaurant)	$1,477	$1,506	$1,694	$1,886	$2,056	$2,248
2.7 (restaurant)	$1,978	$1,865	$2,099	$2,336	$2,547	$2,784

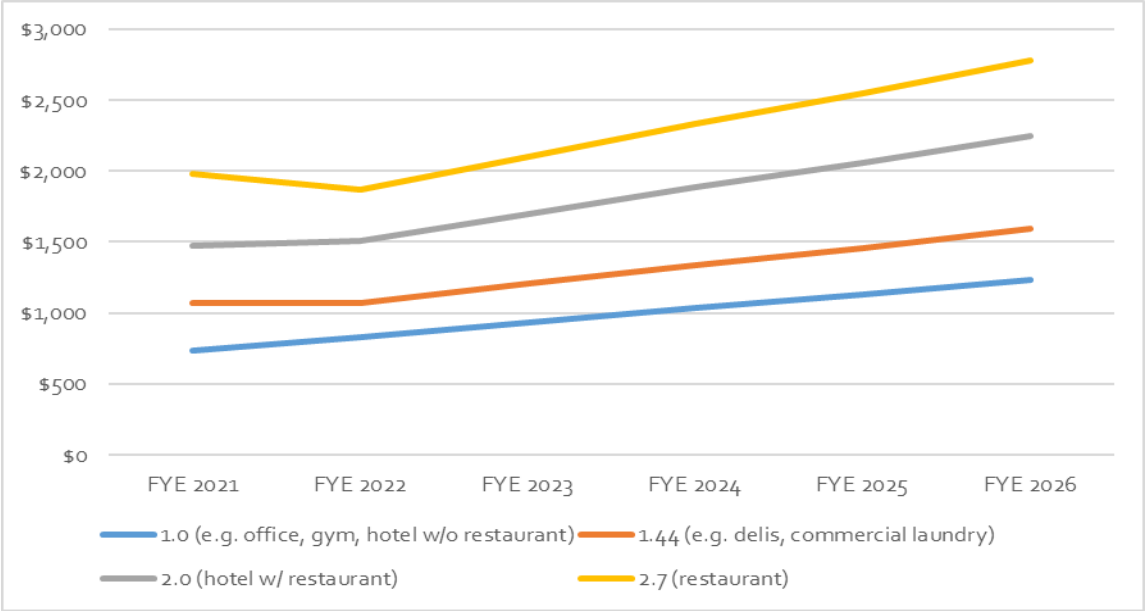

Figure 7.2 Commercial Rate Impacts

7.4 Sensitivity Analysis

The ongoing COVID-19 pandemic is projected to impact NapaSan's operations. Some of these impacts are already being felt through modified sewer flows received at NapaSan treatment facilities. Because of the nature of NapaSan's flow-based non-residential rate structure, this may result in lower revenues from non-residential customers this year.

Other impacts may be felt over the course of several years as the economic impacts of the pandemic and related closures become clear. Tourism is a significant economic driver in Napa County. If this industry and other related industries such as restaurants, lodging, and event spaces do not rebound relatively quickly, lower return flows could continue well beyond 2020, and NapaSan's volumetric revenue is likely to decline as a result.

7.4.1 Scenario Assumptions

Carollo looked at three scenarios to identify the potential lower and upper bounds of the sensitivity analysis:

- **Minimal impact** – one-time 5 percent reduction from baseline in commercial billed usage in FYE 2022.
- **Moderate impact** – multi-year reduction in commercial billed usage from baseline, with 10 percent reduction in FYE 2022 and 5 percent reduction in FYE 2023.
- **Significant impact** – multi-year reduction in commercial billed usage from baseline, with 10 percent reduction in FYE 2022, 10 percent reduction in FYE 2023, and 5 percent reduction in FYE 2024.

7.4.2 Scenario Comparison

This analysis first calculated the projected revenue losses if commercial usage decreases in 2020 and 2021, resulting in lower billed usage for FYE 2022 and FYE 2023. This is outlined in Table 7.6.

The minimal impact scenario results in revenue losses in FYE 2022 through 2024 due to the one-time reductions being smoothed out over three years as a result of the three-year rolling average recommendation. The moderate impact scenario extends into FYE 2025 because it forecasts a slower rebound in usage, while the significant impact scenario extends into FYE 2026 due to even slower projected rebound.

Table 7.6 Projected Revenue Loss under Demand Reduction Scenarios

Category	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Minimal Impact	$128	$144	$160	$-	$-
Moderate Impact	255	431	480	174	-
Significant Impact	511	862	1,120	523	191

Notes:
(1) All figures in thousand dollars.

Unexpected declines in revenue would typically be absorbed by reserves, with lower projected or negative cash flows resulting in lower end of year reserve balances. Taking the projected end of year reserve balances from Table 4.4 and deducting the revenue losses in in Table 7.6 on a cumulative basis, the projected reserves for each scenario are shown in Table 7.7. In addition, the end of year reserve balance target is also shown.

Over the next five years, each of the projected scenarios would result in end of year reserve balances that continue to meet reserve balance targets. However, the end of year balance under the significant impact scenario does come close to fallen below target. Therefore, given the uncertainty surrounding the pandemic and the economic response, these scenarios could be exhausted and the District should monitor usage closely to project future changes in revenue.

Table 7.7 Projected End of Year Reserves under Demand Reduction Scenarios

Category	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026
Minimal Impact	$22,331	$23,477	$23,755	$22,956	$24,145
Moderate Impact	22,203	23,062	23,020	22,047	23,235
Significant Impact	21,948	22,376	21,694	20,372	21,370
End of Year Reserve Balance Target	18,799	20,254	21,012	21,365	23,878

Notes:
(1) All figures in thousand dollars.

Appendix A
RESIDENTIAL WATER USAGE ANALYSIS

NapaSan uses an EDU approach to differentiate between the various types of residential parcels (single-family dwelling, condominiums, duplexes, etc.). An EDU is a unit of measure intended to represent the volume and strength[2] of wastewater generated by a typical SFR home. This allows NapaSan to compare the wastewater "demand" of different parcels using a standardized unit of measure.

Because wastewater flows are not regularly metered, and because there is no feasible method of measuring flows and strengths on a broad enough scale to have a statistically significant sample size, NapaSan must make usage estimates based on the latest water demand profile data available. The current EDU estimates are outlined in Table A.1.

Table A.1 FYE 2021 Residential Sewer Service Charges

Dwelling Type	Number of EDU	FYE 2021 Sewer Service Charge
Condominiums and Townhouses	1.0	$738.60
Duplex, each unit	1.0	$738.60
Mobile Home	0.6	$443.16
Overnight Trailer Park, per space	0.4	$295.44
Single Family Dwelling	1.0	$738.60
Triplex, Fourplex, and Apartments	0.6	$443.16

1.1 Methodology

1.1.1 Data Sources

1.1.1.1 Potable Water Demand Data Collection

Carollo and NapaSan staff discussed the current rate structure and decided that the best method of estimating the current EDUs is to review potable water demand data and consider relative usage between parcel types as a proxy for wastewater demand differences.
Carollo collected three sets of data from both NapaSan and the City of Napa (City), which provides water for the majority of NapaSan's wastewater customers:

- City water usage records for each address for 2016 through 2019.
- Napa County (County) tax assessment number and address table.

[2] Strength, also referred to as load or loadings, is a measure of a user's treatment constituents returned to the sewer collection system and ultimately to the wastewater treatment facility. Strength typically refers to biochemical oxygen demand (BOD) and total suspended solids (TSS). In addition to handling collection system flow volume, NapaSan must have sufficient treatment capacity to adequately reduce these constituents prior to discharge. Strength is typically measured either as a concentration (milligrams per liter) or as a weight (pounds).

- NapaSan billings by tax assessment number, along with dwelling units and dwelling type description (from Table A.1).

Because the water usage records acquired from the City did not include the same parcel type descriptions that NapaSan uses in its billings, this data needed to be paired with each usage record in the dataset. This involved merging the three datasets together, using the address and tax assessor's number as key fields. First, the City water usage and the County tax assessment tables were paired using the address field. Then NapaSan's dwelling type data was paired using the tax assessor's number. This pairing was conducted using the R statistical programming language.

1.1.2 Data Preparation and Analysis

1.1.1.2 Potable Water Dataset Preparation

The City's usage data provided bi-monthly meter readings in thousand-gallon units for the years of data provided. Once paired with NapaSan's parcel records, the gallons per dwelling unit per day were calculated using the number of dwelling units on record.

Wastewater flows are lower than potable water flows simply due to the fact that some portion of water usage does not reach the sewer, either through landscaping loss, food and beverage preparation, or other means. While exact measurements of wastewater versus water flows vary based on the service area surveyed, the assumed return to sewer factor (RTS) is often at least 70 to 90 percent, but it is not uncommon for this figure to be significantly lower.

This is particularly true in the hotter summer months when a greater share of water usage goes to landscaping. For this reason, winter usage numbers were utilized when comparing residential classes for demand patterns. Winter was defined as bi-monthly bills with an end date in January, February, or March, which covers usage in those months, as well as December. Napa County, like most of California, receives the bulk of its precipitation in the cooler winter months. Therefore, most residents reduce their landscaping water use in these months.

There are limitations to this approach. This approach only mitigates one potential source of consumptive water usage. However, given the cost in time and money that would be required to conduct a full wastewater flow sampling study, and the comparative ease and availability of this water usage data, it is still a valid proxy for estimating the comparative wastewater flows across residential classes.

RTS factors could be applied to further complement this analysis, but without a better sense of NapaSan's actual RTS percentages based on flow sampling, this would add an unnecessary layer of complication to the analysis. Furthermore, it could potentially introduce inaccuracies into the analysis if, for instance, RTS differs between residential parcel types (e.g., duplexes could have a higher RTS rate compared with condos). Additionally, an accurate RTS percentage is something only obtainable through a rigorous wastewater flow sampling study, which would ultimately negate the need for this winter usage analysis. As a result, an RTS factor was not applied to the usage data.

1.1.1.3 Summarizing Usage Patterns for Each Dwelling Type

The usage data received from the City included a single line for each meter reading. Once paired with NapaSan's parcel information, these meter readings also included the parcel type from Table A.1, as well as the number of dwelling units assessed.

Calculating Usage per Dwelling Unit per Day

Because the City's usage records were already provided in thousand-gallon (kgal) units, converting these records to gallons per day was a straightforward task of dimensional analysis. It was assumed that a typical bi-monthly billing cycle was 60 days in length. The equation for calculation gallons per parcel per day.

Equation A.1 GPDD Calculation

$$Gallons\ per\ Dwelling\ Unit\ per\ Day = \frac{Usage\ (kgal)}{Dwelling\ units} \times \frac{1{,}000\ gallons}{kgal} \times \frac{Billing\ cycle}{60\ days}$$

This was calculated for each billing record that had a successful match between the two datasets.

Weighting Usage Records on Dwelling Unit Count

While each address had a gallons per dwelling unit per day (gpdd) calculation, these measures had to be weighted based on the number of dwelling units for the parcel. Without weighting, a 4-unit apartment complex with usage of 500 gpdd would have the same level of influence on the summary statistics as a 100-unit complex with usage of 100 gpdd.

To weight the usage numbers, each rows was replicated by the number of dwelling units attached. Using the hypothetical from above, a 4-unit complex would have 3 additional duplicate rows for each billing cycle, and a 100-unit complex would have 99 additional duplicate rows.

Descriptive Statistics

Summary statistics were calculated for each of the dwelling types. Median and mean were calculated, and then each of these measures was compared to the comparable measure for SFR. Boxplots and histograms were developed for each dwelling type to observe the distribution of usage among City water customers.

1.2 Results and Discussion

1.2.1 Descriptive Statistics

1.2.1.1 Potable Water Data

The analysis of the winter water usage for the residential classes under review showed distinct differences between SFR and multifamily residential (MFR) dwelling types. The summary statistics for each dwelling type, and the percent of SFR demand from each dwelling type, are outlined Table A.2. Figure A.1 demonstrates the distribution of daily demand for each dwelling type.

Looking at the summary statistics and the distribution of usage for the primary dwelling types, SFR stands out as a higher demand dwelling type, with a median of 116.7. Condos and mobile homes appear to have similar demand, with median usage of 100.0 and 106.2 gpdd, respectively. Duplexes and apartments have similar usage at 91.7 and 92.8 gpdd, respectively.

All of the other dwelling types demonstrate a lower typical demand compared with SFR. Looking at Figure A.1 apartments and duplexes have a similar demand profile to one another, while condos and mobile homes likewise share a demand profile. SFR and SFR with ADU stand alone.

Table A.2 Summary Statistics of Gallons per Dwelling Unit per Day

Dwelling Type	Median	% of SFR Median
Single Family Dwelling	116.7	100%
Duplex	91.7	79%
Condominiums and Townhouses	100.0	86%
Triplex, Fourplex, and Apartments	92.8	80%
Mobile Home	106.2	91%
Single Family Dwelling w/ ADU	150.0	129%
Overnight Trailer Park	No data available	

1.2.2 Discussion

Based on the results of the analysis of the different dwelling types, there are several options available for adjusting the billing factor for each dwelling type. SFR usage will remain as the baseline for which other classes are billed. However, the other dwelling types will need adjustment to reflect the updated usage profiles.

1.2.2.1 Single-Family Residential

Based on the analysis of potable water usage data, along with wastewater flow measurements, it is clear that flows from SFR customers are substantially lower than previous benchmarks. Both the potable water data and the measured wastewater flow data converged on a number significantly lower than 210 gpd, with winter potable water records showing 117 gpd.

Single Family Residential with Accessory Dwelling Unit

SFR with ADU shows higher usage on average than SFR without ADU. The District currently bills these customers for 1 full EDU in addition to the primary SFR connection. However, it is clear that the real water usage is much lower.

The median for a SFR with ADU is 150 gpd, approximately 30 percent higher than a standalone SFR at 117 gpd. There has been significant expansion of ADU development in Napa County in the last several years, with permitted connections more than doubling between 2018 and 2019. Some of these new connections may not be fully occupied and water usage data is still coming in. As a result, while it is clear that SFR with ADU use less water than their current EDU estimate, there is a high degree of uncertainty as to exactly how much less that figure is.

Therefore, it is recommended that SFR with ADU be assessed at 1.50 EDU for the next several years until more data is available from these new connections and can confirm the gpd estimate.

1.2.3.1 Multi-Family Residential

Condos and Mobile Homes

Condominiums and mobile homes display similar usage patterns based on this analysis. The median usage per day is close, and their distributions demonstrate similar patterns. As a result, it is reasonable to treat these two dwelling types as one single billing classification.

Duplexes and Apartments

Because duplexes and apartments share a median, it would also be reasonable to treat these within one billing designation.

Further investigation into the mobile home class may reveal sub-class designations that could better fit the demand profile. However, with only twelve addresses designated as mobile home, it would be difficult to develop more detailed classifications. Therefore, it is reasonable to combine duplexes and mobile homes in a single billing classification.

1.3 Conclusion

Ultimately, usage varies significantly from month to month, and from parcel to parcel. Because wastewater flows are not metered, these rate structures must achieve a balance between representing a typical, average customer, and covering a wide swatch of usage patterns. SFR patterns are significantly different enough to warrant their own classification. For multi-family dwellings, two classifications stand out from the data, with condos and apartments grouped, and mobile homes and duplexes in a separate grouping.

The recommended rate structure approach is outlined in Table A.3.Carollo does not recommend any changes for overnight trailer parks due to the limitations of the data.

Table A.3 Proposed Billing Ratio Adjustments

Residential Unit Type	Current EDUs	Proposed EDUs
Single Family Dwelling	1.0	1.0
Duplex	1.0	0.80
Condominiums and Townhouses	1.0	0.85
Triplex, Fourplex, and Apartments	0.6	0.80
Mobile Home	0.6	0.85
Overnight Trailer Park	0.4	0.40
Single Family Dwelling with ADU	2.0	1.5

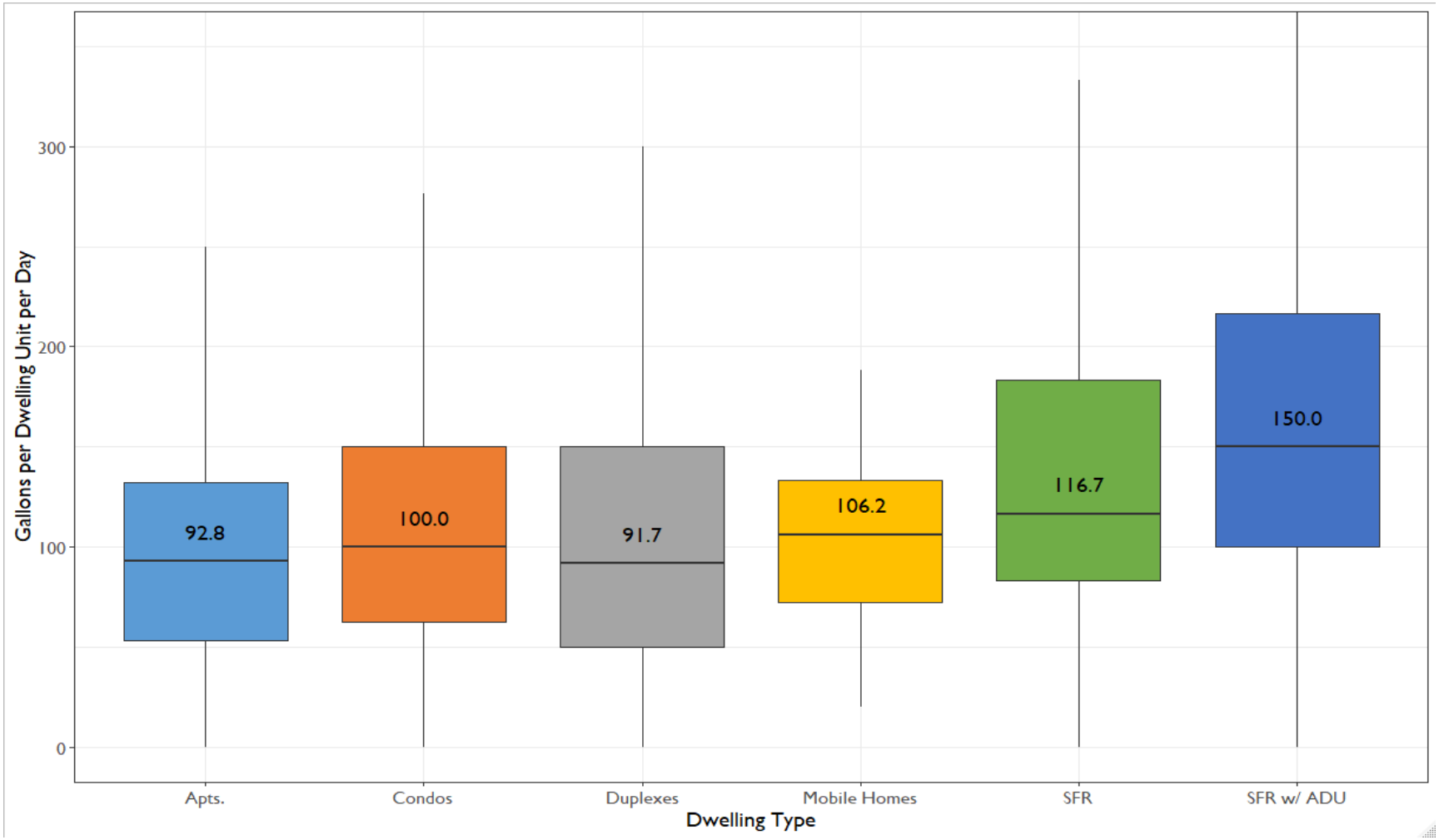

Figure A.1 Winter Usage Distributions and Medians for Each Dwelling Type

Appendix B

BILLING METHODOLOGIES AND ALTERNATIVE RATE STRUCTURES TECHNICAL MEMORANDA