Napa Sanitation District
Cost of Service Rate and Capacity Charge Study

SEWER SERVICE CHARGE METHODOLOGY REVIEW AND CAPACITY CHARGE STUDY REPORT

FINAL | August 2018

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Abbreviations

2016 SSC Study	FYE 2016 Sewer Service Charge Rate Study
ADU	Accessory Dwelling Unit
ADWL	average dry weather loadings
AF	acre-feet
AWWA	American Water Works Association
BOD	Biochemical Oxygen Demand
Carollo	Carollo Engineers, Inc.
CIP	capital improvement plan
Cities	Cities of Napa and American Canyon (CA)
City	City of Napa, CA
County	Napa County, CA
District	Napa Sanitation District
EDU	Equivalent Dwelling Unit
ENR-CCI	Engineering News-Record Construction Cost Index
FTE	full-time equivalent
FYE	fiscal year ending
gpd	gallons per day
I&I	inflow and infiltration
MFR	Multifamily Residential
MGD	million gallons per day
mg/L	milligrams per liter
MOP 27	WEF *Financing & Charges for Wastewater Systems*, Manual of Practice No. 27
NapaSan	Napa Sanitation District
O&M	operations and maintenance
PWWF	peak wet weather flow
RTS	return to sewer factor
SD	standard deviation
SFR	single family residential
SSC	Sewer Service Charge
TM	Technical Memorandum
TSS	Total Suspended Solids
UWMP	Urban Water Management Plan
WEF	Water Environment Federation
WWTP	wastewater treatment plant

Chapter 1

INTRODUCTION

1.1 Project Background

Napa Sanitation District (NapaSan) retained Carollo Engineers, Inc. (Carollo) to conduct a study regarding its sewer service charge (SSC) and capacity charge methodologies, among other financial analyses. As outlined in the project scope, Carollo delivered a series of four technical memoranda (TM) outlining the analysis and recommendation for each individual topic covered by the study. Those topics are as follows:

- TM 1 – Financial Plan Review and Forecast
- TM 2 – Cost of Service Analysis and Results
- TM 3 – Billing Procedures Review and Recommendations
- TM 4 – Capacity Charge Analysis and Recommendations

The final report serves as a compilation of those TMs, with each TM serving as a chapter in this report.

1.2 About NapaSan

NapaSan provides wastewater collection and treatment for approximately 82,000 residents, primarily in the City of Napa, California. NapaSan treats 10 million gallons per day (MGD), with a total treatment capacity of 15.4 MGD. NapaSan is able to reclaim a portion of its wastewater flows for recycled water usage, producing approximately 650 million gallons per year.

Chapter 2

FINANCIAL PLAN REVIEW

As part of the project deliverables, NapaSan requested that Carollo review NapaSan's current ten-year financial forecast and the proposed revenue requirements, debt coverage ratios, and capital funding plan.

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

- operations and maintenance (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) 2028
- Assumed service area growth and cost escalation rates

- Non-conventional financing, such as grants and single family residential (SFR) loans

2.1 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 ensures that each cost center has enough money in reserves in order to continue funding operations and capital improvement plan (CIP) during unexpected revenue shortfalls according to the District's reserve targets. This test is not legally binding and reserve targets can be reduced in some cases in order to mitigate rate payer impacts.

2.2 Growth and Inflation Forecast

2.2.1 Growth Assumptions

NapaSan currently projects annual growth of approximately 0.7 percent on average over the next ten years. Annual growth over the next three years is projected between 1 and 1.25 percent, while FYE 2021 and beyond is projected at approximately 0.6 percent on average. The annual escalation rates for FYE 2019 through 2027 are outlined in Table 2.1.

2.2.2 Inflation Assumptions

Inflation for labor costs was assumed at 3.3 percent on average, while supplies and services were escalated at 2 percent. Capital costs were escalated at 3.2 percent. The annual escalation rates for FYE 2019 through 2027 are outlined in Table 2.1.

Table 2.1 Cost Escalation and Account Growth Rates by Fiscal Year

Category[(1)]	FYE 2019	FYE 2020	FYE 2021	FYE 2022	FYE 2023	FYE 2024	FYE 2025	FYE 2026	FYE 2027
System Connections	1.1	1.2	0.4	0.6	0.6	0.6	0.6	0.6	0.6
Labor Expenses	3.4	3.4	3.3	3.3	3.4	3.4	3.4	3.4	3.5
Supplies & Services	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Capital / Construction	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2

Notes:
(1) All figures in percentages.

2.3 Revenue Requirements Analysis

2.3.1 Financial Plan Basis

NapaSan's current financial plan was developed as part of its FYE 2016 Sewer Service Charge Rate Study (2016 SSC Study) performed by NBS. The 2016 SSC Study recommended a series of revenue increases for NapaSan in order to maintain positive cash flows, meet debt coverage obligations, and satisfy reserve policies.

The customer growth assumption was applied to current revenues and forecasted against projected expenditures for the next several years in order to test the validity of the recommended revenue increases.

2.3.2 Financial Tests

2.3.2.1 Cash Flow Test

As shown in Table 2.2, 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 2.1.

The scheduled revenue increases, along with the adjusted financial forecast, are outlined in Table 2.3.

Table 2.2 Financial Forecast Prior to Scheduled Revenue Increases

Category[1]	FYE 2018	FYE 2019	FYE 2020	FYE 2021	FYE 2022
Revenues					
Sewer Service Charge[2]	$22,800	$23,000	$23,200	$23,500	$23,600
Capacity Charges	3,600	4,200	5,100	1,800	2,700
Recycled Water Sales	900	1,000	1,200	1,300	1,300
Other Operating Revenues	500	500	500	500	500
Total Operating Revenues	**$27,700**	**$28,700**	**$30,000**	**$27,100**	**$28,100**
Interest	$200	$200	$300	$400	$400
Rents and leases	700	700	700	700	700
Grants	4,100	-	-	-	-
Loans	10,100	2,000	-	-	1,000
Total Non-Operating Revenues	**$15,100**	**$3,000**	**$1,000**	**$1,100**	**$2,100**
Total Revenues	**$42,900**	**$31,700**	**$31,000**	**$28,200**	**$30,200**
Expenditures					
Salaries and Benefits	9,600	9,900	10,200	10,600	10,900
Services and Supplies	5,800	5,900	6,000	6,200	6,300
Debt	4,800	4,800	5,900	5,900	5,900
S&S - OTO	-	-	200	300	-
Total Operating Expenses	**$20,200**	**$20,700**	**$22,500**	**$23,000**	**$23,200**
Capital Projects	$25,000	$15,200	$12,600	$12,500	$10,800
Additions to Meet Fund Targets	400	3,000	10,000	15,400	24,200
Total Non-Operating Expenses	**$25,500**	**$18,100**	**$22,500**	**$27,900**	**$35,000**
Total Expenses	**$45,700**	**$38,800**	**$45,000**	**$50,900**	**$58,200**
GAAP Adjustment	500	-	-	-	-
Surplus/(Deficit) [2]	**$(2,300)**	**$(7,100)**	**$(14,000)**	**$(22,700)**	**$(28,000)**
Ending Reserve Balance	**$12,500**	**$8,300**	**$4,300**	**$(3,100)**	**$(6,900)**

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

Table 2.3 Financial Forecast Following Scheduled Revenue Increases

Category[1]	FYE 2018	FYE 2019	FYE 2020	FYE 2021	FYE 2022
Baseline Revenues	$42,900	$35,100	$36,100	$34,800	$38,000
Operating Expenses	20,200	20,700	22,500	23,000	23,200
Non-Operating Expenses & Capital	24,600	15,200	12,600	12,600	10,800
Surplus / (Deficit) (pre-increase)	**$(1,900)**	**$(800)**	**$1,000**	**$(800)**	**$4,000**
Revenue Increase	15%	6%	5%	4%	3%
Additional Revenue	$3,400	$1,600	$1,400	$1,200	$900
Surplus / (Deficit) (post-increase)	**$1,500**	**$800**	**$2,400**	**$400**	**$4,900**

Note:
(1) All figures in thousand dollars.

2.3.2.2 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 2.4. The revenues outlined in the analysis are following the revenue increases shown in Table 2.3, 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 2.4 Debt Coverage Test Following Increases

Category[(1)]	FYE 2018	FYE 2019	FYE 2020	FYE 2021	FYE 2022
Allowable Revenues					
User Charges	$22,800	$26,400	$28,300	$30,100	$31,400
Other Operating Revenues	1,400	1,500	1,600	1,800	1,800
Non-Operating Revenues	900	1,000	1,000	1,100	1,100
Capacity Charges	3,600	4,200	5,100	1,800	2,700
Total Allowable Revenues	**$28,600**	**$33,100**	**$36,100**	**$34,800**	**$37,000**
Expenditures					
Operating Expenses	$15,400	$15,800	$16,300	$16,800	$17,200
Debt Service	4,800	4,800	5,900	5,900	5,900
1.50x Coverage	2,400	2,400	3,000	3,000	3,000
Total Expenditures plus Coverage	**$22,600**	**$23,100**	**$25,200**	**$25,700**	**$26,100**
Debt Coverage Surplus/(Deficit)	**$6,100**	**$10,000**	**$10,900**	**$9,100**	**$10,900**
Debt Coverage Ratio	**2.77x**	**3.57x**	**3.33x**	**3.04x**	**3.34x**

Notes:
(1) All figures in thousand dollars.

2.3.2.3 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. This reserve is maintained at 15 percent of annual operating expenses, excluding debt service and transfers.
- 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** 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.

In addition, NapaSan will begin funding a rehabilitation and repair fund for its recycled water assets beginning in FYE 2020.

The forecast of reserve balances under the scheduled revenue adjustments is outlined in Table 2.5.

Table 2.5 Reserve Balance Forecast Following Increases

Category	FYE 2018	FYE 2019	FYE 2020	FYE 2021	FYE 2022
Cash Flow after Expenses	**$1,520**	**$870**	**$2,460**	**$460**	**$4,930**
Operating Reserve					
Target	$2,310	$2,400	$4,000	$5,000	$6,000
Beginning Balance	$2,240	$2,310	$2,400	$4,000	$5,000
Transfers In / (Out)	70	90	1,600	1,000	1,000
Ending Balance	**$2,310**	**$2,400**	**$4,000**	**$5,000**	**$6,000**
Cash Flow Reserve					
Target	$10,750	$11,000	$11,000	$11,250	$11,600
Beginning Balance	$10,120	$11,570	$14,340	$13,990	$13,320
Transfers In / (Out)	1,450	2,770	(360)	(670)	3,800
Ending Balance	**$11,570**	**$14,340**	**$13,990**	**$13,320**	**$17,120**
Debt Reserve					
Target	$1,990	$-	$1,100	$1,100	$1,100
Beginning Balance	$1,990	$1,990	$-	$1,100	$1,100
Transfers In / (Out)	-	(1,990)	1,100	-	-
Ending Balance	**$1,990**	**$-**	**$1,100**	**$1,100**	**$1,100**
RW R&R Reserve					
Target	$-	$-	$120	$240	$380
Beginning Balance	$-	$-	$-	$120	$240
Transfers In / (Out)	-	-	120	130	130
Ending Balance	**$-**	**$-**	**$120**	**$240**	**$380**
Total Reserve Funds Balance	**$15,900**	**$16,700**	**$19,200**	**$19,700**	**$24,600**
Fund Equity Available for Use(2)	**$820**	**$3,340**	**$2,990**	**$2,070**	**$5,520**

Notes:
(1) All figures in thousand dollars.
(2) Fund equity available for use is equal to the sum of all reserve fund balances, less the sum of reserve fund targets. A negative fund equity level indicates that one or more of the reserve balances are below the policy target.

2.4 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 2023). The projected revenues and expenses are shown in Figure 2.1.

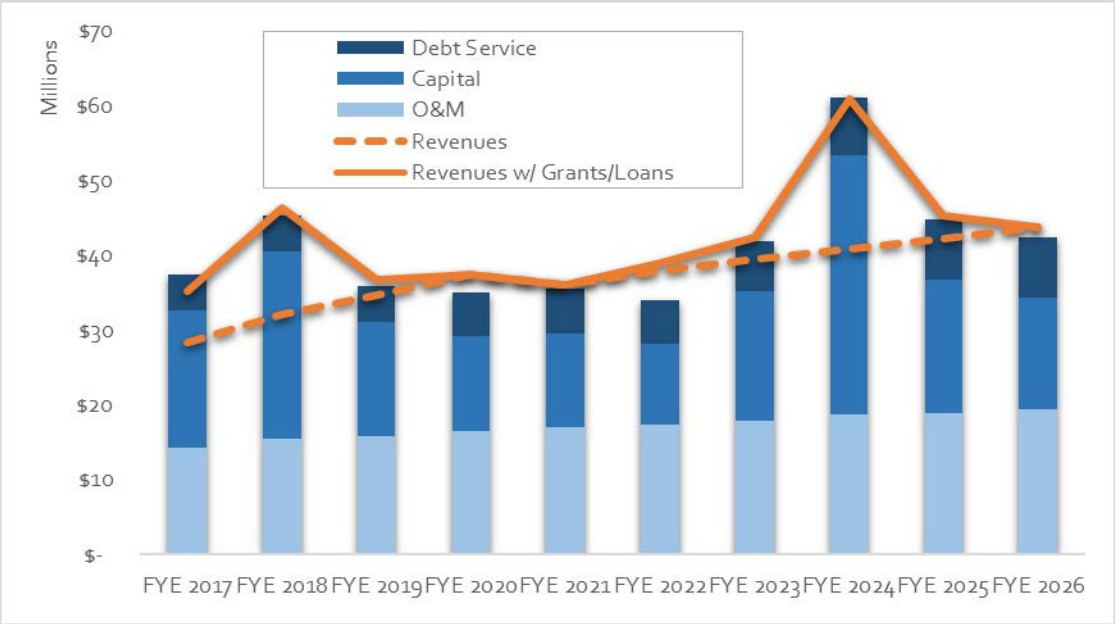

Figure 2.1 Projected Revenues and Expenses

Beyond FYE 2023, NapaSan is projected to achieve the same benchmarks in all years, except for a slight drop below cash flow needs in FYE 2024. However, this is a small shortfall (approximately $94,000) and can be covered with fund equity available for use ($4.27 million).

The forecasted sewer service charge under each fiscal year is shown in Figure 2.2.

2.4.1 Revenue Requirement

The revenue requirement outlines the total revenue target for the user rates based on the results of the financial tests (cash flow, debt coverage, and reserves). Table 2.6 outlines the calculation of the revenue requirement based on the scheduled revenue increases discussed in this tech memo.

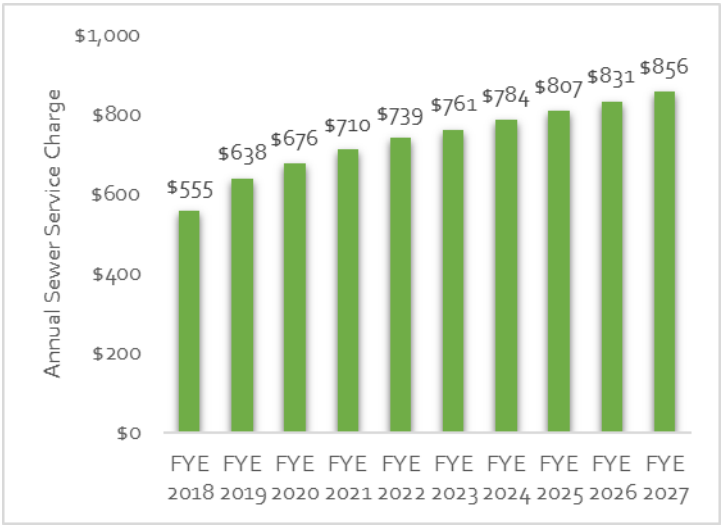

Figure 2.2 Projected Sewer Service Charge

Table 2.6 Revenue Requirements

Category	FYE 2018	FYE 2019	FYE 2020	FYE 2021	FYE 2022
Baseline Total Revenues	$42,900	$35,100	$36,100	$34,800	$38,000
Additional Revenue from Increase	3,400	1,600	1,400	1,200	900
Less:					
Capacity Charges	$(3,600)	$(4,200)	$(5,100)	$(1,800)	$(2,700)
Recycled Water Sales	(900)	(1,000)	(1,200)	(1,300)	(1,300)
Other Operating Revenues	(500)	(500)	(500)	(500)	(500)
Interest	(200)	(200)	(300)	(400)	(400)
Rents and Leases	(700)	(700)	(700)	(700)	(700)
Grants	(4,100)	-	-	-	-
Loans	(10,100)	(2,000)	-	-	(1,000)
Revenue Requirement for SSC	**$26,200**	**$28,000**	**$29,700**	**$31,300**	**$32,300**

Notes:
(1) All figures in thousand dollars.

Chapter 3

COST OF SERVICE ANALYSIS

3.1 Purpose

As part of the study, NapaSan requested that Carollo calculate the percentage of costs that are variable, based on the volume of wastewater flow and constituent solids that are conveyed to and treated at the plant, and develop new rate structure. Carollo developed a cost of service based allocation of costs between fixed and variable categories, and between the residential, commercial, and industrial categories.

3.1.1 Scope of the Cost of Service Analysis

This cost of service review covers NapaSan's wastewater collection and treatment systems. It does not include NapaSan's recycled water service, or any of its associated direct costs.

In 2012, NapaSan engaged Raftelis Financial Consultants to conduct a full cost of service rate study for NapaSan's recycled water system. That analysis developed rates intended to cover the operating costs associated with recycled water service.

As part of that analysis, any costs and projects associated with NapaSan's treatment process up to and including secondary treatment were assumed to be part of the wastewater customers' revenue requirement. Remaining tertiary treatment and recycled water distribution system costs were allocated to recycled water customers.

For this analysis, two assumptions were made with respect to recycled water costs.

1. The rates developed in the 2012 study are self-sustaining for the recycled water system. Rate revenue is assumed to fully cover recycled water operating costs, and that no additional revenue will be needed.
2. The allocation of costs between fixed and variable categories is approximately equal between the wastewater and recycled water systems, and the recycled water costs are not deducted from the line item expenditures in order to allocate costs to fixed and variable categories.

3.2 Current Class Allocation Approach

NapaSan's current rate structure is based on an equivalent dwelling unit (EDU) approach. The EDU is a common method of comparing wastewater demand from a given customer with that of a typical SFR, where 1 EDU is intended to represent the demand of that SFR customer. This allows the wastewater agency to bill its customers in standardized units, despite a lack of metered wastewater flows.

3.2.1 Residential Rate Allocation

NapaSan's current residential rate structure is 100 percent fixed for residential customers. Residential customers pay a flat annual sewer service charge depending on the residential dwelling type. Each dwelling type has a corresponding EDU assumption, ranging from 0.4 to 1.0 EDU. The annual SFR sewer service charge ($638.10 as of July 1, 2017) is adjusted by this factor.

The baseline EDU assumes wastewater flow of 210 gallons per day (gpd), with biochemical oxygen demand (BOD) and total suspended solids (TSS) of 175 and 200 milligrams per liter (mg/L), respectively. No changes are recommended at this time. NapaSan intends to reassess the residential flow and loading assumptions during its next Sewer Service Charge Study.

3.2.2 Commercial Rate Allocation

3.2.2.1 Wastewater Flow Assumptions

Commercial charges are calculated based on total annual usage and EDUs. NapaSan assumes that a typical single-family residence uses 76,650 gallons per year, or 210 gpd. NapaSan therefore sets 1 equivalent dwelling unit at 76,650 gallons per year. At the end of the year, NapaSan reviews potable water billing data from the City of Napa, and determines the number of flow EDUs based on that volume of demand. Accounts are adjusted based on data from subtraction meters for irrigation water usage, when available. Additional adjustments are made when calculating sewer service charges for some commercial facilities with significant landscape irrigation.

3.2.2.2 Wastewater Loading Assumptions

In addition to flow, NapaSan also treats loadings of constituents, namely BOD and TSS. These two constituents are a major target of the treatment processes used by NapaSan, and vary significantly across customer classes.

NapaSan's EDU calculation also must take into account this variance in loadings. The flow basis previously discussed is then adjusted based on a flow strength factor for each commercial use type. The commercial use type factors from the California State Water Resources Control Board Revenue Program Guides. This guide calculates the typical strength generated by various business types. These factors are outlined in Table 5.1 in the appendix. No changes to these factors are recommended at this time.

3.2.3 Industrial Rate Allocation

NapaSan has a significant number of industrial wastewater customers, primarily wineries and related operations. These customers require a permit in order to discharge waste to NapaSan's collection and treatment systems. These customers are billed on a monthly basis for sewer service that also stems from the EDU methodology.

Unlike commercial customers, most industrial customers have sampling data available for BOD and TSS. This data is used in the calculation of the monthly sewer service charge. Flow data comes from either flow meters, or from meter readings of the City's potable meters with adjustments made for any irrigation sub-meters and assumed domestic use. The calculation used is as follows:

Equation 3.1 Industrial Monthly Sewer Service Charge Calculation

$$Industrial\ Flow\ Factor = \frac{Average\ Dailly\ Flow\ (gallons)}{210\ gallons\ per\ day}$$

$$Industrial\ Strength\ Factor = 0.5 + 0.25 \times \left(\frac{BOD\ \left(\frac{mg}{L}\right)}{175 \frac{mg}{L}} + \frac{TSS\ \left(\frac{mg}{L}\right)}{200 \frac{mg}{L}} \right)$$

$$Industrial\ Monthly\ Sewer\ Use\ Fee = Flow\ Factor \times Strength\ Factor \times \frac{Rate\ per\ EDU}{12\ months}$$

where the 210 gallons per day, 175 mg/L BOD, and 200 mg/L TSS are assumed SFR flows and concentrations.

3.3 Cost Allocation Review

3.3.1 Fixed and Variable Line Item Assessment

NapaSan requested that Carollo conduct a cost of service review of NapSan's current operations and maintenance budget. The analysis consisted of a line item review and an allocation to fixed and variable categories. NapaSan is interested in understanding how much of its costs are driven by the volume of water treated, as well as the pounds of BOD and TSS that also must be treated. In practice, many of NapaSan's costs can be considered "variable" due to year-over-year fluctuations. However, this analysis is only focused on those costs that correlate with a change in flows, loadings, or both.

3.3.1.1 Expense Categories

Salaries and Benefits

All of NapaSan's labor costs were determined to be fixed in nature, or at a minimum "sticky," where changes are slow and based on long-planned changes. While labor costs may change due to a change in plant flow and loadings, these changes take many years to manifest, and typically do not correlate with plant flows on a year-to-year basis.

The salaries and benefits category includes costs from the following cost accounts:

- Salaries and Wages
- Overtime
- Holiday Pay
- Vacation Payout
- 457B Employer Contribution
- Cell Phone Allowance
- Director Pay
- Medicare
- F.I.C.A. / Social Security
- Employee Insurance - Premiums
- Workers Compensation
- Retirement
- Other Post-Employment Benefits
- Other Employee Benefits

None of these accounts were determined to have costs that could be considered variable and correlated with flow and loadings.

Services and Supplies

Costs from services and supplies form the other primary expense category tracked in NapaSan's budget process in addition to labor costs. These costs include routine administrative expenses such as printing, janitorial services, landscaping, and training fees. It also includes major operational and supply costs, such as equipment and vehicle maintenance, chemical purchases, and energy and other utilities.

Nearly all of the costs in this category were determined to be fixed in nature, with the exception of the following items:

- Waste Disposal Services
- Hazardous Waste Disposal Services
- Gas, Electric, and Water Utilities
- Chemical Purchases

None of these categories are expected to be completely variable. NapaSan will always need some baseline level of chemicals or electricity for instance. However, for the purposes of this analysis, they are assumed as 100 percent variable for alternative rate modeling. That is, they would be allocated to a variable rate approach.

Other Expenses

Other expenses include debt service payments, administrative costs on bond issuances, and taxes and assessments paid by NapaSan. All of these costs are assumed to be fixed because they are set for a long period of time, and do not correlate with the flow or loadings received in each year. Capital projects that address flow and load needs may be funded with these debt service payments, but NapaSan would not implement a project to address those needs based on one year of data.

This analysis did not consider Intrafund Transfers, which NapaSan tracks in this category as part of its annual budget process.

3.3.1.2 Allocation Results

The analysis resulted in the following split of expenses between what could be recouped from the current fixed charge, and what could be allocated to a variable rate. Looking only at the operating expenses (salaries and benefits, and services and supplies), approximately 87 percent of NapaSan's expenses could be considered fixed in nature. This is in keeping with data from other sewer agencies, where fixed costs are typically between 80 to 90 percent of total expenses. After including debt service and other non-operating expenses, the share of costs categorized as fixed increases to approximately 90 percent. The results of this analysis are found in Table 3.1.

Table 3.1 Cost Allocation Results

Expense Category	Fixed	Variable	Total
Operating Expenses			
Salaries and Benefits	$9,600	$0	$9,600
Services and Supplies	3,800	2,000	5,800
Total Operating Expenses	**$13,400**	**$2,000**	**$15,400**
Percent Split	*87%*	*13%*	
Other Expenses	4,800	-	4,800
Total Expenses	**$18,200**	**$2,000**	**$20,200**
Percent Split	*90%*	*10%*	

Notes:
(1) All Figures in thousands of dollars.

3.4 Class Allocation Review

3.4.1 Baseline EDU Levels

NapaSan's EDU billing approach aims to assess each customer based on their level of wastewater system usage relative to a typical SFR household. Based on fiscal year ending (FYE) 2017 water usage data from commercial and industrial customers, the current EDU amounts are outlined in Table 3.2.

Table 3.2 Baseline EDU Levels for FYE 2018

Customer Class	FYE 2018 EDUs
Residential	23,344
Commercial	1,412
Industrial	14,410
Other Non-Residential [(2)]	1,409
Total [(1)]	**40,575**

Notes:
(1) EDU estimates are at beginning of fiscal year and do not include any projected development, or changes in commercial and industrial usage.
(2) Includes use types such as schools, local and state government facilities, open spaces, and utilities.

3.4.2 Water Usage Estimates

NapaSan bills its commercial and industrial customers based on sewer flow meters and metered potable water demand from the cities of Napa and American Canyon. NapaSan assumes that a

typical SFR household uses 210 gpd, or 76,650 gallons annually. Therefore, NapaSan assigns one EDU for every 76,650 gallons used each year by commercial and industrial customers. This volume is then adjusted by a strength factor to account for BOD and TSS loadings. The estimated wastewater flow weighted by BOD and TSS loadings is outlined in Table 3.3.

Table 3.3 Baseline Weighted Flow Estimates

Customer Class	Annual Weighted Usage (mg) [2]
Residential	2,061
Commercial	684
Industrial	1,105
Total [1]	**3,850**

Notes:
(3) Weighted using the strength factors and estimate flows for each customer class, as outlined in the appendix of this report for commercial, and by measured/assumed BOD and TSS concentrations for industrial customers.

3.4.2.1 Adjusted Water Usage and Loadings Estimates

NapaSan's current residential usage assumption of 210 gpd is under review, with flow measurements and meter data indicating that a flow assumption closer to 120-150 gpd is more appropriate. If the 210 gpd figure is adjusted downward to reflect this data, the other customer classes would need to be adjusted, or else the allocation of costs would be misaligned.

Furthermore, data on BOD and TSS shows different concentrations from the current 175 and 200 mg/L for BOD and TSS, respectively. Concentrations have gone up considerably. However, total pounds of each constituent have either remained constant or increased more modestly. This would also need to be reconciled with the non-residential strength factors.

Prior to making any changes to the underlying flow and strength assumptions, additional data on commercial loadings, similar to that obtained for SFR customers, should be collected. This would help determine if the change in concentrations is unique to residential customers, or if all customers have demonstrated this trend.

3.5 Alternative Rate Structure Analysis

3.5.1 Revenue Requirement Allocation

This analysis developed an alternative hybrid rate structure by taking the allocations from above, and allocating the revenue requirements outlined in Chapter 2 by the percentages in Table 2.1. The resulting shares of revenue requirements allocated to fixed and variable are outlined in Table 3.4.

Table 3.4 Cost Allocation Results

	Allocation percentage	Resulting Allocation
Revenue Requirement	$26,163	
Fixed	90%	$23,572
Variable	10%	$2,590

Notes:
(1) All Figures in thousands of dollars

3.5.2 Calculating Alternative Rates

3.5.2.1 Fixed Rate Portion

The calculation of the fixed rate portion is unchanged from the previous methodology. However, the share of costs allocated to this category is lower, and therefore the fixed fee will be lower than the current sewer service charge as a result. To illustrate the impact of this allocation, Table 3.5 outlines the current and alternative fee calculation methods.

Table 3.5 Fixed Rate Calculation

	Current Methodology	Alternative Methodology
Revenue Requirement(1)	$26,163	$23,572
EDUs	41,000	41,000
Annual Fixed Charge (2)	**$638.10**	**$574.94**

Notes:
(1) Figures in thousands of dollars.
(2) Revenue requirement divided by EDUs. Rate has been rounded to nearest $0.01.

The alternative allocation approach reduces the fixed charge by approximately $63 per year, or approximately 10 percent, as predicted by the allocation percentages.

3.5.2.2 Variable Rate Portion

Part of NapaSan's current rate structure is based on a variable basis currently. The commercial sewer service charge is calculated based on the volume of water used in the year, which is then matched against an assumed annual demand for a SFR customer. However, the rate is not directly tied to metered water usage on a bi-monthly basis. It is only used to determine the number of EDUs for the annual sewer service charge. Furthermore, residential customers do not have any variable portion to their bill at present.

A true variable approach would use a rate for each thousand gallons of water metered by either the cities of Napa or American Canyon. This would then show up on the customers' bills as a volumetric charge for usage.

Calculation Approach

Like potable water rate development, the volumetric rate is simply the division of allocated costs by the number of units anticipated in the year. Unlike potable water rate calculation however, the number of units for a sewer rate is not dependent solely on the volume of flow. Loadings of BOD and TSS must also be taken into account. Weighting each unit of flow by customer class is an appropriate method to accomplish this.

Variable Rate Calculation.

In order to calculate the variable rate, the flow must be gathered from the available potable water records and then weighted to reflect the appropriate customer class. The commercial and industrial data was taken from NapaSan's existing usage records, and then weighted for the appropriate customer class.

The residential records were taken from the City of Napa's potable water meter reads. Because the City's dataset did not include customer class designations that match NapaSan's, the commercial records from NapaSan's records described above were used to filter out commercial records from the City's dataset. The remaining records are assumed to be residential customers, however, there may be some inaccuracies in that data.

The resulting weighted flow figures are shown in Table 3.6 below. The resulting variable rate is $0.68 per thousand gallons using the revenue requirement for FYE 2018.

Table 3.6 Volumetric Rate Calculation

	Calculation
Revenue Requirement(1)	**$2,590**
Residential Flow (million gallons)	2,061
Weighted Commercial Flow (mg)	675
Weighted Industrial Flow (mg)	1,105
Total Weighted Flow (m)	**3,840**
Variable Rate ($ / thousand gallons) (2)	**$0.68**

Notes:
(1) Figures in thousands of dollars.
(2) Revenue requirement divided by total weighted flow. Rate has been rounded to nearest $0.01.

Challenges

Data Needs. This approach is far more data intensive than NapaSan's current approach. Rather than only documenting and billing for usage for its approximately 1,500 commercial and industrial customers, NapaSan would need to record usage for approximately 16,000 residential parcels, which include many multi-family residences that would bring the number of connections much higher. Some of the challenges already faced by NapaSan with billing commercial customers based on flow would only expand if residential customers were included. For instance, NapaSan staff routinely needs to make field inspections of commercial parcels to verify address recordings. This is a time-consuming process that could draw on NapaSan's resources, which brings costs that should be considered when evaluating the benefits of this approach.

Furthermore, it is important to point out some of the challenges because it impacts the calculation of these rates. This process requires collecting data from both the cities of Napa and American Canyon. These entities use different billing structures from NapaSan. This makes creating a complete dataset difficult, and without complete data available for all parcels, the rate calculation may be inaccurate. For that reason, the rates shown here are illustrative and would need a thorough review for accuracy prior to adoption.

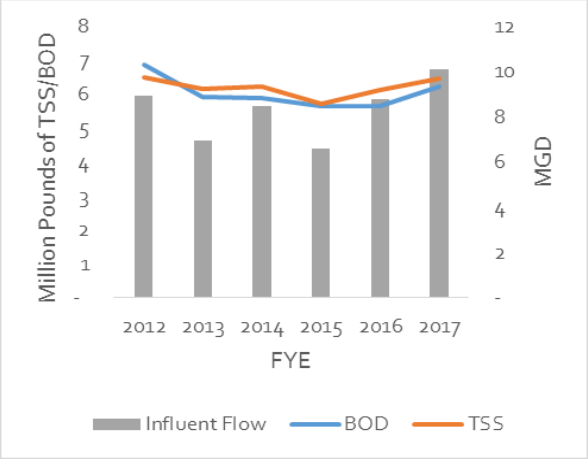

Figure 3.1 NapaSan Annual Flow and Loads

Revenue Volatility. The other major challenge with a variable wastewater rate structure is revenue volatility from year to year. Throughout California, potable water demands have decreased substantially in recent years due to the state's historic drought. These decreases—often in excess of 30 percent for some agencies—can have significant impacts on agency revenues. Given that such a large percentage of NapaSan's costs are fixed in nature, this type of revenue volatility may be undesirable when planning rates. Looking at NapaSan's plant influent flows over the last several years shows substantial volatility, with no year over year changes of less than 15 percent (Figure 3.1).

Additional Rate Structure Adjustments

There are several strategies often employed by wastewater agencies to smooth the bill impact for customers when a variable rate is introduced. For residential customers, a bill ceiling is often adopted to account for the fact that wastewater discharge does not increase linearly with potable water demand. Once a certain threshold is reached for residential consumption, much of the additional water usage goes to consumptive uses such as landscaping.

In order to account for the revenue volatility, some agencies will look at an entire year's worth of potable water bills for a customer, and then base the volumetric on the winter average. That usage is then set for the entire year. This helps smooth the revenue collection for the agency, while mitigating month-to-month fluctuations for the customer as well.

3.5.3 Estimated Bill Impact

The estimated impact of the alternative rate calculation would decrease the typical SFR customer's annual bill by approximately $11, from $638.10 to $627.06. It is expected that much of the decrease would be made up by higher demand users at the right tail end of the usage distribution. This assumes an annual usage of 76.6 thousand gallons, or approximately 6.4 thousand gallons per month. The bill impact of the alternative rate approach at various usage levels is depicted in Figure 3.2. Most residential customers would see a decrease in their annual bill because much of the costs would be reallocated to commercial and industrial customers that have higher usage volumes.

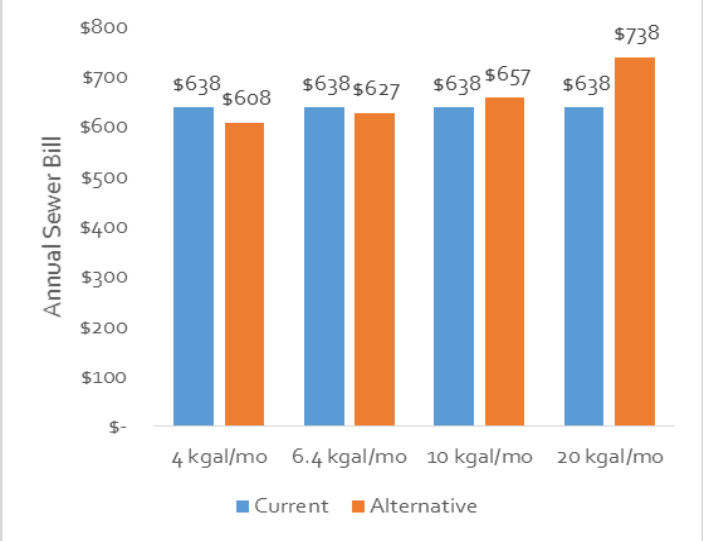

Figure 3.2 Estimated Residential Bill Impact

Chapter 4

RATE STRUCTURE ALTERNATIVES & BILLING FREQUENCY ANALYSIS

4.1 Rate Structure Terminology

When discussing fixed and variable rate structure components in this chapter, fixed components are those that do no change, regardless of flow or loadings. Conversely, variable components change based on measured or reported flow and loadings. Flow and loading assumptions made by NapaSan however, such as the class-wide assumptions used to differentiate between SFR units, and the various multifamily residential (MFR) dwelling types, are fixed rate components because they apply to the customer class as a whole.

4.2 Current Rate Methodology

4.2.1 Residential Rate Structure

The residential rate structure is currently entirely fixed. Each residential customer within a dwelling type designation (SFR, condo, duplex, etc.) pays the same rate regardless of flow or loadings. The rate is adjusted based on dwelling type—apartments pay a lower rate compared to SFR because of a lower assumed flow. However, this applies to the whole class and does not fluctuate from parcel to parcel based on usage.

4.2.2 Commercial Rate Structure

NapaSan's commercial wastewater rates use a hybrid approach. NapaSan assumes that the typical SFR customer uses 76,650 gallons per year, which defines 1 EDU. NapaSan then calculates each commercial bill first by estimating the number of EDUs for the year based on water usage records, and then adjusts that rate based on a fixed strength factor specific to that commercial type (i.e., laundry, restaurant, etc.). For example, a commercial laundry facility that consumes 500,000 gallons during the course of a year would have an EDU assessment of 6.5, which would then be adjusted by the class strength factor of 1.4 to result in a billing factor of 9.1, and an annual bill of $5,826.48, based on the FYE 2018 rate of $638 per EDU.

The commercial rate structure is both fixed and variable in that the minimum bill is $638. NapaSan assesses each commercial parcel with a minimum of 1 EDU. As shown in the example however, the total bill becomes variable once the customer's usage exceeds 1 EDU.

4.2.3 Industrial Rate Structure

NapaSan's industrial rate is completely variable. These customers require a permit in order to discharge waste to NapaSan's collection and treatment systems. These customers are billed on a monthly basis for sewer service that also stems from the EDU methodology.

Unlike commercial customers, most industrial customers have sampling data available for BOD and TSS. Industrial customers without measured BOD and TSS data are billed based on an assumed strength factor. This data is used in the calculation of the monthly sewer service charge. Flow data comes from either flow meters or from meter readings of the City's potable meters with

adjustments made for any irrigation sub-meters and assumed domestic use. The calculation used is as follows:

Equation 4.1 Industrial Monthly Sewer Service Charge Calculation

$$Industrial\ Flow\ Factor = \frac{Average\ Daily\ Flow\ (gallons)}{210\ gallons\ per\ day}$$

$$Industrial\ Strength\ Factor = 0.5 + 0.25 \times \left(\frac{BOD\ \left(\frac{mg}{L}\right)}{175\frac{mg}{L}} + \frac{TSS\ \left(\frac{mg}{L}\right)}{200\frac{mg}{L}} \right)$$

$$Industrial\ Monthly\ Sewer\ Use\ Fee = Flow\ Factor \times Strength\ Factor \times \frac{Rate\ per\ EDU}{12\ months}$$

where the 210 gallons per day, 175 mg/L BOD, and 200 mg/L TSS are assumed SFR flows and concentrations.

4.3 Comparison of Rate Structure Alternatives

In order to compare the current rate structure with alternatives, Carollo reviewed the various options based on several criteria for rate structure performance. The results are summarized in Table 4.1.

Table 4.1 Rate Structure Alternatives Comparison

Criteria	Fixed Rate	Variable Rate	Advantage
Legal Compliance & Cost Allocation Detail	Most closely aligns with how costs are incurred	Limited amount of costs are variable; fixed rate more closely aligns	Fixed
Ease of Implementation	Customers are already familiar with this approach; staffing needs already in place; relatively low-cost for NapaSan	Slightly more complex to bill and explain; need support from City; greater staff time; additional costs would be incurred	Fixed
Affordability	Higher payments from customers, but customers pay same amount overall	If billed bi-monthly, smaller bill fits in low-income budgets better; however, usage and bill fluctuations can make household budgeting difficult	Variable
Revenue Stability	Fixed revenue semi-annually	Can fluctuate by year, season, or with short-term conservation (as in 2015-16)	Fixed
Data Analysis Needs	Data already collected and in place	Significant staff time needed already to reconcile commercial usage from City	Fixed

Notes:
(1) As outlined in Chapter 3: 90 percent of costs are estimated to be fixed.

Based on the results of this analysis, it is recommended that NapaSan continue using a fixed rate structure for its residential customers, and not introduce a variable rate component. While there are some advantages to a variable rate structure—most notably affordability if it is combined with a monthly or bi-monthly billing frequency—on the whole, the current fixed rate structure provides greater benefit for both NapaSan and its customers. The fixed rate structure most closely aligns with the nature of NapaSan's cost drivers.

Furthermore, the implementation process would be a significant challenge, and would require substantial collaboration and integration between NapaSan and the cities of Napa and American Canyon. Currently, NapaSan receives water usage data from each city for the industrial and commercial customers. Expanding this data collection to all of NapaSan's 37,000 connections would require a lengthy reconciliation process in order to integrate the cities' datasets into NapaSan's. These datasets are currently not compatible out of the box. In order to complete the same process for the commercial customers, regular audits had to take place in the field in order to confirm addresses, property characteristics, and other details necessary for billing, and staff still routinely undertakes these efforts. Undertaking the same process for all 16,000 residential parcels (covering more than 30,000 individual dwelling units) would require a lengthy and time-consuming effort from NapaSan's current staff.

4.4 Billing Procedures & Frequency

4.4.1 Current Methodology

NapaSan currently bills all of its residential customers semi-annually through County of Napa property tax rolls. NapaSan calculates the bill for each parcel in the service area, and then contracts with the County of Napa to include the wastewater bill with the property tax assessment. Commercial customers are charged semi-annually, either through the property tax assessment or directly from NapaSan. Industrial customers are charged monthly directly by NapaSan.

4.4.2 Alternative Billing Procedures

There are two alternative billing procedures available to NapaSan:

- Direct billing, where all bills would be calculated, printed, mailed, and processed for payment by NapaSan staff, with the potential to outsource some of these tasks.
- Contracted billing with the local potable water suppliers (cities of American Canyon and Napa) where the wastewater bill would be attached to the bi-monthly water bill.

4.4.2.1 Criteria for Analysis

This analysis looked at each alternative from several perspectives, taking into account logistical, staffing, fiscal, and customer considerations and how they would likely need to change from the current methodology. The categories for analysis are:

- Personnel and Staffing
- Payments and Collection
- Fiscal Policies
- Billing Infrastructure
- Customer Impacts
- Cost

4.4.2.2 Direct Billing from NapaSan

Personnel and Staffing

Staffing Levels

Currently, NapaSan does not have any dedicated staff for customer service or accounts receivable. One administrative assistant staff greets visitors and answers the general phone line, estimated at about 10 percent of their time (most of their time is involved in accounts payable and general administrative support), and one accountant spends about 20 percent of her time invoicing for industrial sewer customers and doing the annual calculations for residential and commercial sewer service charges and relaying that data to the County Tax Assessor.

Under a direct billing program, NapaSan's staffing requirements would have to increase by several full-time equivalent (FTE) employees. In addition to the current staff member responsible for calculating customer bills, there would be a need for:

- Cashiers to accept in-person payments (approximately 2 FTEs)
- Customer service staff to field more frequent calls (1-2 FTEs)
- Billing staff, however some agencies have indicated that this additional staffing need (0.5-2 FTE) could be incorporated into duties of current staff, reducing the need for additional staffing.

Approximately 3 to 5 additional FTEs would be necessary to properly manage and execute a direct billing program. For cost estimating purposes, each additional FTE is likely to add an additional $90,000 to $116,000 to NapaSan's budget after accounting for salaries, benefits, training, insurance, and other staffing costs.

Safety and Security

A number of agencies that accept in-person payments have had to make facility upgrades in order to maintain this service. Many agencies have found it necessary to install security glass in the immediate receiving area of the agency headquarters for security and safety of cashiers. While it is an extremely rare occurrence, some agencies did report the need to be prepared for aggressive and hostile customers. NapaSan should consider this when budgeting for direct billing.

Payments and Collection

Payment Methods

A manager from a neighboring agency provided an overview of the payment options available to that agency's customers, which included:

- Payment by mail to lockbox, accepting checks only. This payment option must include the payment coupon attached to each bill.
- In person payment by cash, check, or credit card (Visa and MasterCard). This particular agency did not accept American Express or Discover due to the higher processing fees (NapaSan currently accepts Discover and American Express). Customers could also pay via an outside dropbox, but like the mail option, the agency accepted checks only through this payment method.
- Payment through bank account ACH debit in an autopay enrollment program.
- Online payment through several options, including through internet banking portals with the agency as a bill payee or via an online bill pay website where customers could directly input their credit card details. This particular agency did not charge an additional fee to

accept credit card payments, and simply absorbed any associated fees as part of the annual budget. This agency reported that approximately 40 to 60 percent of its customers paid via online bill pay once the program was fully implemented.

Delinquencies, Nonpayment, and Enforcement

Because wastewater service cannot be shut-off in California, NapaSan has limited recourse for delinquent accounts. Currently, the sewer service charge is assessed on the property tax bill, where nonpayment would result in a lien. If NapaSan converted to direct billing, this would remain the primary enforcement action available to NapaSan, in addition to late fees and charges. Delinquencies would need to be reported to the County for processing and added to the property tax assessment for collection on a semi-annual basis.

One manager of a peer agency estimated that approximately 15 to 20 percent of residential customers elect not to pay their monthly wastewater bill on time, instead allowing it to be collected on the property tax assessment. Many homeowners preferred this collection method because it gave them an opportunity to claim a larger property tax deduction on their income taxes, despite the fact that late fees were assessed by the agency. It should be noted, however, that user fees collected on the property tax roll through an assessment are generally considered non-deductible expenses. This practice results in considerable time and effort by staff to track and place the delinquent sewer service charges onto the property tax roll, because of the noticing and public hearing requirements.

Fiscal Policies

Currently, NapaSan maintains two unrestricted reserve funds: a cash flow reserve, with a target of 50 percent of operations and maintenance expenses (O&M); and an operating reserve, with a target of 15 percent of O&M. The cash flow reserve is set at 50 percent of O&M due to the semi-annual property tax calendar and the corresponding timing of NapaSan's revenue.

As part of this analysis, NapaSan requested that Carollo consider any needed fiscal policy changes to adjust for the other potential billing procedures. Specifically, NapaSan was interested in the necessity of an additional fund for rate stabilization. Based on conversations with other agencies and a review of NapaSan's finances, it is not anticipated that additional reserve funding would be needed.

In fact, NapaSan may have some added flexibility if it adopts a bi-monthly billing approach because it will have more regular cash flows throughout the year, as opposed to relying on semi-annual payments. The current cash flow reserve target of 50 percent of O&M is in large part due to the long period of time between customer payments. Switching to bi-monthly billing would greatly reduce this requirement, and would enable NapaSan to consider adopting a more typical 90 days of expenses reserve target.

Billing Infrastructure

Logistical factors include additional non-personnel resources necessary to manage direct billing—billing software, payment remittance software, and other supporting resources that enable direct billing.

Bill Processing Software

A bill processing software such as Superion Software (formerly SunGard Public Sector); Harris Utilities; or Oracle Utilities C2M would be necessary to manage customer data, billing information, payment processing, and liens and penalties. It is difficult to recommend an individual software

solution at this time due to unknowns involving the billing systems used by the cities of Napa and American Canyon. Even if NapaSan continues to use a fixed rate structure with residential customers, commercial and industrial customers will still rely on meter reads from the cities. While NapaSan staff could continue manually developing these bills, it would be most efficient to integrate all bills under a chosen billing software.

Estimates from other peer agencies indicate that this would cost approximately $90,000 for initial software purchase and setup, with approximately $5,000 per year in maintenance costs.

Lockbox Service

A lockbox service is used by many agencies to collect payments by mail. A lockbox service is an off-site receiving address where customers can send payments. This lockbox is managed by a bank, which then processes the payments and streamlines the entire accounts receivable process. This allows for faster deposits of the agency's funds and less demand on staff resources. Furthermore, this provides an effective financial control by requiring the agency to verify payments with funds.

Cost is a disadvantage of a lockbox service. Most lockboxes charge flat setup and regular maintenance fees, and then typically collect a per item charge for payment processing and other services, such as check imaging or handling of correspondence. Other agencies have indicated that initial setup fees are approximately $1,000, with per item handling fees ranging from $0.10 to $0.40 per payment processed.

In spite of these additional costs however, using a lockbox service is likely to translate into time savings by agency personnel. Whether these savings will outweigh the costs incurred by the lockbox service depends on the volume and scale of the services needed and the lockbox provider selected.

Printing and Mailing Services

The agency manager that was interviewed for this analysis reported that this particular agency initially did all printing and mailing preparation in-house, but eventually outsourced the process to a printer. Due to a high number of service providers in that particular region, prices were generally lower than continuing in-house processing.

NapaSan would likely qualify for US Postal Service's commercial postage rate of $0.378 per First Class envelope. Combined with a printing and mailing service to prepare each individual bill, the peer agency estimated that printing and mailing service would cost approximately $0.50 per bill.

It is likely that a large percentage of customers would opt-in for electronic billing (e-bills), thus reducing the agency's mailing costs. The peer agency that was interviewed reported approximately half of all customers opted-in to e-bills over time. While these will come with costs of their own from the billing provider, these costs are typically less than the cost of postage and materials.

Customer Impacts

The impact to NapaSan's customers would likely be mixed. Advantages of direct billing include smaller, more regular bills. This can be particularly advantageous for low-income and fixed-income households in the NapaSan service area. Outreach could also receive a boost because customers would see a wastewater bill six times per year, as opposed to just twice per year currently. This offers an opportunity to enhance NapaSan's outreach and public engagement efforts, allowing regular communication through bill inserts, customer service interactions, and other methods that are not possible or not conducted as frequently with property tax billing.

Some of these advantages could be seen as disadvantages to other customers however. While bi-monthly billing presents the opportunity for greater outreach, it also holds the potential to open NapaSan to more frequent negative feedback. Customers that receive more frequent bills may develop the perception that they are being billed more money overall, rather than simply more frequently. This could result in more regular customer service calls and negative feedback.

Additionally, bi-monthly billing brings greater costs, as will be outlined further in later sections of this TM. As a result, customer bills would need to increase to cover any additional costs. This could result in further customer dissatisfaction.

Costs

Table 4.2 Cost Estimate for Direct Billing Procedure

	One-time Cost	Annual Cost
Cost for Collection on Property Tax	**$0**	**$12,500**
Cost for Direct Billing		
AR/Billing Software	$90,000	$5,000
Lockbox Service	$1,000	$13,300
Printing & Mailing	$0	$133,000
Security Improvements	$150,000	$0
Credit Card processing (assumed paid by customer)	$0	$0
4 FTE	$20,000	$464,000
Subtotal - Expenses	**$261,000**	**$615,300**
Fees and Interest on Delinquent Accounts (assume 10% delinquent)		(236,000)
Total - Net of Revenues	**$261,000**	**$379,300**

Direct bi-monthly billing would result in substantially higher costs for NapaSan when compared with the current property tax billing arrangement. Currently, NapaSan pays Napa County approximately $12,500 per year for property tax billing, collection, and remittance of funds. Management staff from a neighboring agency of approximately 40,000 connections (NapaSan serves approximately 37,000 accounts) estimated that direct billing came with a gross cost of approximately $600,000 per year for that agency. However, due to penalty fees and interest collected from delinquent ratepayers, the net cost was actually a surplus of $200,000. For this particular agency, the revenues from fees exceeded the cost of the billing program. However, it is not expected that the delinquency rate for NapaSan will be as high, and it is therefore not anticipated that a comparable level of interest and penalty related revenue would materialize for NapaSan.

Table 4.2 summarizes the various cost items that NapaSan could reasonably expect to incur to establish direct billing procedures. Initial start-up costs would include billing software, lockbox, staff recruitment and training, and, most significantly, facility upgrades to handle more regular customer visits and transactions.

Annual costs would include IT maintenance costs for the billing software, per payment fees for lockbox processing, printing and postage, and additional staff. Penalty fees and interest on delinquent accounts would result in offsetting revenues.

4.4.2.3 Contracted Billing from Cities of Napa and American Canyon

Personnel

Staffing Levels

While staffing needs would likely increase under a contracted billing arrangement, they would not need to increase to the same extent as under a direct billing engagement. Approximately 1 additional FTE would be necessary to properly manage and execute a direct billing program, covering tasks primarily related to additional customer service needs.

Safety and Security

Because NapaSan would not be collecting any payments either online, via mail, or in-person, no security enhancements would be needed as discussed in the Direct Billing analysis.

Payments and Collection

Payment Methods

In a contracted billing arrangement, all responsibility for payment collection would belong to the contracted third-party. In this case, the cities would likely integrate payment with their existing payment systems for water service, and then transfer revenue to NapaSan at agreed upon intervals. According to a peer agency that was interviewed for this analysis, their billing arrangement with the local municipality arranged for a monthly wire of funds.

NapaSan would be dependent on the policies of the cities regarding credit card processing fees. If the cities pay these fees, it can be assumed that the fees would be passed on to NapaSan in the form of lower revenue remittances.

Delinquencies, Nonpayment, and Enforcement

Under a contracted billing arrangement, enforcement responsibility would belong to the contracted third-party. In this case, the water departments for the respective cities would assume the role of sending out delinquency notices and assessing penalties. Furthermore, because water service can be shutoff, unlike wastewater service, the cities have this enforcement action at their discretion.

As a result of this enforcement mechanism, nonpayment is low by comparison to direct billing. According to a peer agency that currently uses contracted billing, nonpayment is very low, typically under 1 percent of total bills, which is comparable to NapaSan's current delinquency rate. For this particular agency, the coordinating municipality is very aggressive with respect to water shutoffs and nonpayment enforcement, which helps with overall payment collection. The cities of Napa and American Canyon would need to have clearly defined procedures for this to have the same effect for NapaSan.

Vacancies and Water Service Disconnections

According to NapaSan's rate ordinance, properties are billed for wastewater service as long as they are considered habitable, regardless of occupancy. This goes back to the inability to truly shut-off wastewater service.

Water service however, can routinely be shut-off, either for nonpayment or by request due to vacancy. When the parcel is shut-off for water service, it typically does not receive a water bill, and under a contracted arrangement, it is likely that a wastewater bill would not be sent either. Staff from a neighboring agency with contracted billing reported this procedure. In a neighboring sanitation district, staff members estimate the revenue loss at over $1 million per year. It is important therefore, for NapaSan to consider the impact of this lost revenue when considering a

contracted billing approach, as rates would need to be increased for all customers to account for this lost revenue.

Billing Software

It is unclear whether the cities could accommodate a request by NapaSan to include sewer billings on the water invoices. One city finance staff professional indicated in conversation that the city's current software used is old, legacy software that would require customization to accommodate such a change. It is reasonable to assume that if NapaSan were to request this service and the cities agreed, then NapaSan could be expected to contribute toward the initial software conversion and/or any other enhancements necessary to accommodate sewer billing.

Revenue Transfer

Because the contracted third-party would be responsible for collecting all payments on behalf of NapaSan, they would also be responsible for transmitting those payments to NapaSan in a timely and agreed upon manner. NapaSan and the cities would need to arrange for a regular transfer of funds. This would allow NapaSan to maintain normal operations without impacting its cash flow and funds availability.

Additionally, NapaSan would need to establish audit procedures to ensure that all funds have been transferred. According to the outside agency that uses contracted billing, staff had to request monthly reports for each account from the municipality. This would likely be the only way for NapaSan to audit the cities' billings for accuracy.

Customer Impacts

Many of the customer impacts under contracted billing would be comparable to those seen under direct billing. Customers would see more frequent bills, which could be advantageous from an affordability perspective. Additionally, there is the opportunity for more frequent outreach and engagement, depending on the capabilities of the billing entity, which would require additional coordination between NapaSan and the cities.

In addition, some of the disadvantages under direct billing would be mitigated under contracted billing. Because the water and wastewater bill would arrive together, much of the financial impact would be absorbed at once by the ratepayer. Adding the wastewater collection to that bill would have an initial impact as customers see a new line item. However, over time, it is reasonable to expect that customers would adapt and treat these items as one single bill.

There is a distinct disadvantage to a combined water and sewer bill however, particularly for the individual water suppliers. With the additional sewer bill arriving with the water bill, customers may form the impression that their water bill is increasing. This could also become an issue following future rate increases from NapaSan. There may also be confusion among customers regarding who actually provides sewer service, and the city water departments are likely to field more customer service requests as a result of this and bill impacts.

As with direct billing, contracted billing is expected to cost more, which would result in a bill increase for ratepayers, and potentially greater dissatisfaction at first, unless customers perceive an added benefit to the new procedures.

Costs

There are four primary costs that NapaSan would likely incur in a contracted billing arrangement.

- First, the cities' billing system would need to be upgraded to handle the dual billing, a one-time expense for NapaSan.
- The ongoing billing fee to cover bill processing and mailing is estimated to cost $1.30 per bill, based on interviews with a peer agency.
- Payment processing is assumed to cost approximately 1 percent of revenues.
- 1 FTE would be necessary to handle additional customer service tasks.

These costs are summarized in Table 4.3.

In addition to these direct expenses for NapaSan, it is necessary to account for approximately $850,000 in lost revenues due to vacancies. When a parcel is vacant, the water supplier typically does not bill for water service, while sewer agencies typically do. This gap in water billing would result in lost revenues for NapaSan. The vacancy rate is assumed to be approximately 3.5 percent.

Revenues from delinquency fees are not included in this cost analysis because NapaSan currently does not collect these fees in a significant amount. When compared to direct billing however, contracted billing would not allow NapaSan to recoup as much of those costs through penalties and interest payments because delinquent accounts would receive a water shut-off first, rather than a property tax assessment of the delinquent amount. As a result, the peer agency in this analysis that utilizes direct billing with property tax liens estimated the delinquency rate in excess of 15 percent, while the peer agency that utilizes contract billing with water shut-offs estimated less than 1 percent of accounts in delinquency.

Table 4.3 Cost Estimate for Contracted Billing Procedure

	One-time Cost	Annual Cost
Cost for Collection on Property Tax	$0	$12,500
Cost for Contracted Billing:		
AR/Billing Software	$20,000	$0
Contract Fee	$0	$289,000
Credit Card processing (assumed paid by NapaSan)	$0	$236,000
1 FTE	$5,000	$116,000
Subtotal Contracted Billing - Expenses	**$25,000**	**$641,000**
Revenue Loss from Vacancies	$0	$850,000
Total Contracted Billing - Net of Revenues	**$25,000**	**$1,491,000**

4.4.3 Billing Frequency

Currently, NapaSan bills its residential customers semi-annually through the property tax rolls. If NapaSan wanted to explore contracting a billing arrangement with the water utilities for each city, the only alternative available at this time is bi-monthly billing due to the limitations of water meter reading schedules from the cities of American Canyon and Napa. These entities only read bills on a bi-monthly basis, and therefore, NapaSan could not send out bills at a higher frequency than this.

Alternatively, NapaSan could pursue monthly billing if desired by implementing a direct billing approach where all bills and associated tasks are processed by NapaSan staff. However, this would eliminate most variable rate structure options because water usage data is only available on a bi-monthly basis.

4.4.4 Recommendation

It is recommended that NapaSan continue with its current property tax based billing methodology. The costs (as shown in Table 4.4 below) strongly support this method, and the benefits that would come with direct or contracted billing—smaller payments for low- and fixed-income customers; greater flexibility when setting reserve funding targets, and others—are largely outweighed by the cost and the additional staffing required.

It is also important to note that both of the peer agencies that were interviewed as part of this analysis to collect data on direct and contracted billing procedures, have already completed or are in the process of converting to a property tax based billing procedure like that used by NapaSan.

4.4.4.1 Cost Comparison

From the comparison of costs in Table 4.4, the current billing procedure is highly advantageous to NapaSan from a cost perspective. The current billing procedure is considerably less expensive compared to the alternative direct and contracted billing approaches.

Direct billing comes with higher upfront costs for NapaSan, but on an ongoing basis, is substantially lower in cost than contracted billing. This is primarily due to the revenue that NapaSan stands to lose on vacant parcels that are not billed for water, and would subsequently not be billed for sewer service either in a contracted billing arrangement.

Table 4.4 Billing Procedures Cost Comparison

Method [1]	Approximate Cost per Bill	One-Time Costs	Approximate Annual Costs		
			Total	Per Connection	Per EDU
Current	$0.17	$0.00	$12,500	$0.34	$0.31
Direct, without penalties & interest	$2.77	$261,000	$615,300	$16.63	$15.19
Direct, net of penalties & interest	$1.71	$261,000	$379,300	$10.25	$9.37
Contracted	$6.72	$25,000	$1,491,000	$40.30	$36.81

Notes:
(1) Current billing method is via semi-annual property tax bills. Direct and contracted billing would both be bi-monthly (6 billing periods per year).

4.4.4.2 Customer Impact

Chapter 3 outlined the impact of a variable rate approach for SFR customers at various usage levels. Figure 2.1 outlines the impact of the alternative bill methods on a typical SFR customer, using the per connection impacts from Table 4.4.

4.4.4.3 Peer Survey

Compared with other neighboring agencies in Northern California, NapaSan's residential billing procedures and frequencies are very common. Of the 18 wastewater agencies surveyed, half bill their customers through the property tax, while 12 use an entirely fixed rate structure. Central Contra Costa Sanitation District and Delta Diablo Sanitation District are the only agencies surveyed that use a property tax billing method with a variable rate component.

The results of the survey are found in Table 4.5. Where an agency uses a different rate structure (fixed, variable, or hybrid) between residential and commercial customers, the rate structure is in bold. Most agencies follow a similar structure as NapaSan—residential customers are billed with a fixed rate structure, while commercial customers are more likely to be billed with either a variable or hybrid structure. None of the 19 agencies surveyed bill their residential customers under a completely variable rate structure, while six agencies bill commercial customers with a variable rate structure. Similarly, only five agencies have any variable rate component for residential, while 13 have one for commercial.

Based on the results of this survey, it is clear that residential and commercial flows are treated differently across the region. Commercial customers are billed with a variable rate structure component more often because their flows are generally higher, and are assumed to have higher loadings of BOD and TSS. Therefore, agencies use variable rate components to account for this.

Table 4.5 Neighboring Agency Residential Billing Methodology Survey

Agency	Notes	Residential			Commercial		
		Frequency	Method	Fixed/Variable	Frequency	Method	Fixed/Variable
NapaSan	Collection and treatment in Napa County	Semi-annual	Property Tax	Fixed	Semi-annual	Property Tax	Fixed
City of Antioch	Collection only; flow to Delta Diablo	Monthly	Direct	Hybrid	Monthly	Direct	Hybrid
Central Contra Costa Sanitary District	Collection and treatment in Contra Costa County	Semi-annual	Property Tax	Fixed	Semi-annual	Property Tax	**Variable**
Delta Diablo	Treatment for Antioch, Pittsburg, and Bay Point	Semi-annual	Property Tax	Fixed	Semi-annual	Property Tax	**Hybrid**
East Bay Municipal Utilities District	Collection and treatment in Alameda and Contra Costa Counties	Monthly	Direct	Hybrid	Monthly	Direct	Hybrid
Fairfield Suisun Sewer District	Collection and treatment for Fairfield and Suisun (Solano County)	Monthly	Direct (contract w/ City water)	Fixed	Monthly	Direct	**Variable**
City of Hayward	Collection and treatment	Monthly		Hybrid	Monthly	Direct	**Variable**
Las Gallinas Valley Sanitary District	Collection and treatment in San Rafael and Novato (Marin County)	Semi-annual	Property Tax	Fixed	Semi-annual	Property Tax	Fixed
Novato Sanitary District	Collection and treatment in Novato (Marin County)	Semi-annual	Property Tax	Fixed	Semi-annual	Property Tax	**Variable**

Table 4.5 Neighboring Agency Residential Billing Methodology Survey (continued)

Agency	Notes	Residential			Commercial		
		Frequency	Method	Fixed/Variable	Frequency	Method	Fixed/Variable
Regional San (Sacramento County)	Treatment for Sacramento County	Monthly	Direct	Fixed	Bi-monthly	Direct	Fixed
Ross Valley Sanitary District	Collection only; flow to Central Marin Sanitation Agency	Semi-annual	Property Tax	Fixed	Semi-annual	Property Tax	Fixed
City of Sacramento	Collection only (Sacramento County)	Monthly	Direct	Fixed	Monthly	Direct	**Hybrid**
Sacramento Area SD	Collection only (Sacramento County)	Bi-Monthly	Direct	Fixed	Bi-Monthly		Fixed
City of San Jose	Collection and Treatment (Santa Clara County)	Semi-annual	Property Tax	Fixed	Semi-annual	Property Tax	**Variable**
South County Park SD	Collection only (Sonoma County)	Semi-annual	Property Tax	Hybrid	Semi-annual	Property Tax	**Fixed**
Union Sanitary District	Collection and treatment in southern Alameda County	Semi-annual	Property Tax	Fixed	Semi-annual	Property Tax	**Variable**
City of Vacaville	Collection and treatment (Solano County)	Bi-Monthly	Direct	Hybrid	Bi-monthly	Direct	Hybrid
Vallejo Flood & Wastewater District	Collection and treatment (Solano County)	Semi-annual	Property Tax	Fixed	Semi-annual	Property Tax	**Hybrid**

Chapter 5

CAPACITY CHARGE ANALYSIS

5.1 Purpose

This chapter is intended to outline the methodologies, calculations, and recommendations for NapaSan's capacity charge for new system connections. As with any rate-related analysis, NapaSan prioritizes cost of service as a foundation of setting the capacity charge. Several key questions were at the center of this analysis:

- Do the capacity charges represent a reasonable nexus to the costs incurred by NapaSan on behalf of future customers and the benefits received?
- Is the capacity charge methodology consistent with standards established in the American Water Works Association (AWWA) M1 and the Water Environment Federation (WEF) MOP 27 manuals, and does it meet Board policies and adhere to applicable legal requirements?
- Is the allocation approach consistent with industry practices and California Government Code §54999.7 and §66013?
- Is it expected that the allocation approach will remain appropriate for use by NapaSan in the future?

By setting these guiding principles, the results of this analysis are developed with legal, policy, and fiscal tests in mind.

5.1.1 Statutory Considerations

Capacity charges are subject to the requirements of Government Code Sections 54999.7 and 66013. Capacity charges are "charges for facilities in existence at the time the charge is imposed or charges for new facilities to be constructed in the future which are of benefit to the person or property being charged." Section 66013 provides that capacity charges "shall not exceed the estimated reasonable cost of providing the service for which the fee or charge is imposed." Section 54999.7 establishes a similar cost-of-service requirement.

This chapter is intended to demonstrate the costs and assumptions that are used in NapaSan's capacity charges. This chapter should not be considered a legal opinion or guidance, but rather, a documentation of costs and assumptions that support NapaSan's capacity charge as a reasonable recovery of costs from new connections for providing wastewater collection and treatment.

5.1.2 Current Capacity Charge

NapaSan's current capacity charge was last reviewed in 2009 (2009 Study). That analysis recommended a capacity charge of $7,900 per equivalent dwelling unit (EDU) that should increase annually by an inflation factor. Upon adopting the recommended capacity charge, NapaSan implemented a phased approach to increasing its capacity charge, which was $5,660 per EDU at the time. The capacity charges from 1995 to present are outlined in Table 5.1. The capacity charge for new connections is $9,624 per EDU, as of July 1, 2018.

Table 5.1 NapaSan Capacity Charges, 1995-Present

Date Effective	Capacity Charge ($/EDU)
1995-2011	$5,660
Jan. 1, 2012	$6,000
July 1, 2012	$7,000
July 1, 2013	$8,300
July 1, 2014	$8,723
July 1, 2015	$8,950
July 1, 2016	$8,950
July 1, 2017	$9,299
July 1, 2018	$9,624

5.1.2.1 Annual Capacity Charge Escalation

In the time since the 2009 Study, NapaSan has adjusted the charge annually based on the year-over-year change in the February Engineering News-Record Construction Cost Index (ENR-CCI) for San Francisco, CA.[1] Regular reassessments of the capacity charge basis, such as this Study or the 2009 Study, are recommended every several years in order to confirm system capacities and integrate updated asset registries.

In between those reassessments however, an annual inflation adjustment of the fee is common across water and wastewater utilities, both in California and across the United States, regardless of the method used to develop the fee. In the case of a system that is undergoing expansion, system capacity growth is typically planned five to ten years in advance. Major expansions should therefore already be included in the capacity fee during regular reassessments. Because those expansion projects are presented in real dollars when included in the fee, the inflation adjustment serves to cover the project costs at the time that they are actually incurred in nominal dollars.

If the capacity charge uses a buy-in approach (this distinction will be detailed in Section 5.2 that follows) instead of an expansion approach, the inflation adjustment serves to represent the replacement value of the entire wastewater collection and treatment system. While depreciation decreases the value of assets over time, regular repair and replacement should keep pace with this depreciation. Therefore, the replacement value of the system should stay constant in real dollars. The inflation adjustment serves to keep pace with the nominal value of the system.

5.2 Capacity Charge Methodologies

The capacity charge is a straightforward calculation of system value divided by system capacity. Determining system value and capacity, however, can be complex and will vary from utility to utility. This choice varies based on a number of factors, including but not limited to:

- Age, size, and density of the system
- Planned expansion capital projects
- Anticipated growth

[1] February is used to align with NapaSan's budget approval timeline.

There are three widely accepted methodologies for calculating wastewater capacity charges. The selection of the best methodology depends on the nature of the system, the level of planned investment, and the projected need for system capacity.

5.2.1 Buy-In Approach

The current capacity charge was last updated in 2009. At that time, a "system buy-in" approach was utilized to calculate the capacity charge. This methodology is most appropriate when existing capacity is sufficient to serve both existing connections and forecasted future connections. Additionally, planned future expansion investment is minimal.

Utilities often construct excess infrastructure capacity to meet projected future demands. The purpose of the buy-in approach is to recover costs that have already been incurred by the wastewater agency. Existing customers have paid for this system over time through their user rates (through direct capital financing or retired debt). The buy-in approach (or the buy-in component, if used in a hybrid approach with another methodology) of a capacity charge provides a mechanism to reimburse existing system users for the carrying costs of constructing system capacity that is available to be used by future users.

5.2.1.1 System Valuation

The buy-in approach begins with estimating the current value of the agency's assets. The WEF Financing & Charges for Wastewater Systems, Manual of Practice No. 27 outlines four possible valuation approaches, shown in Table 5.2.

Table 5.2 System Valuation Approaches from WEF MOP 27

Method	Asset Valuation Approach
Original Cost	Nominal value paid at the time of construction
Net Book Value	Original value, less accumulated depreciation
Replacement Cost (as New), Less Depreciation (RCNLD)	Original cost less accumulated depreciation, adjusted to represent cost of replacement in current dollars
Replacement Cost (RCN)	Original cost, adjusted to represent cost of replacement in current dollars; no depreciation is subtracted

This analysis tested the RCNLD and RCN approaches. Many of NapaSan's system assets are more than 30 to 40 years old. The Original Cost and Net Book Value approaches would not accurately reflect NapaSan's system value when accounting for the compounding of inflation over those years.

For the RCNLD and RCN approaches in this analysis, the original cost of each asset is escalated into present day dollars. The cost escalation is conducted using an inflation index value for the installation date and adjusting the depreciated original cost into 2018 values. The only distinction between these approaches is the deduction of accumulated depreciation prior to escalation in the RCNLD approach.

These replacement cost values provide a snapshot of NapaSan's system value. In order to develop a system buy-in basis, this system value must be adjusted by several factors:

- Any donated or contributed assets are deducted because system users did not fund the construction of these assets.
- Outstanding principal on existing debt service is deducted because the future debt service payments are included in the sewer service charge, which is paid by all customers.

- Interest paid on existing debt service is added to the system value because current system users paid this cost to borrow for existing assets.
- Total cash reserves are added to the system value because rates paid by current users built these funds over time.

5.2.1.2 System Capacity and Charge Calculation

The final step in calculating a buy-in based capacity charge is to estimate the total system capacity, typically expressed in EDUs. EDUs are intended to represent the approximate demand on the system placed by a typical SFR dwelling. Each agency calculates this by taking into account the estimated flow, BOD, and TSS returned to the wastewater system by a SFR household. The fee is then calculated by dividing the system value by the total capacity of the system in EDUs, including all used and unused capacity.

Equation 5.1 Buy-In Capacity Charge Calculation

$$Buy - In\ Capacity\ Charge = \frac{Adjusted\ Existing\ System\ Value}{Existing\ Capacity\ in\ EDUs}$$

5.2.2 Incremental Approach

In contrast with the buy-in approach, which can be described as "backward-looking" by looking at historical system investment and capacity, the incremental approach is "forward-looking" by looking at planned expansion and growth of the system. The buy-in approach typically serves built-out systems better than systems that are growing and expanding. While the buy-in approach looks at the unit cost of existing capacity in the system, the incremental approach looks at the cost to add marginal capacity to a system where that demand cannot be served by existing capacity. The incremental approach can be neatly summed up by the philosophy of "growth pays for growth."

5.2.2.1 Incremental System Expansion Valuation

Similar to the buy-in approach, the incremental approach first looks at the cost of capacity. In the incremental case however, that cost of capacity is additive to the existing system, rather than a portion of the existing system. To estimate that cost, the CIP is allocated to either the repair and replacement (R&R) of existing assets or the installation of new assets for new capacity. The costs are allocated in present day dollars, regardless of timing.

Not all projects fit entirely in one allocation or the other. Some projects may serve both categories. For instance, pipe R&R can have an expansion element to it if the pipe replacement is upsized from the original pipe diameter and adds capacity.

5.2.2.2 System Capacity and Charge Calculation

Like the buy-in approach, the incremental approach calculation becomes a division of the cost of the system capacity by the number of EDUs served by those assets. The number of EDUs should be based on the capacity served at the end of the CIP used for projected system value.

Equation 5.2 Incremental Capacity Charge Calculation

$$Incremental\ Capacity\ Charge = \frac{Present\ Value\ of\ Future\ CIP}{Added\ Capacity\ in\ EDUs}$$

5.2.3 Hybrid Approach

For agencies that are close to build-out, but with significant expansion CIP planned, a hybrid approach is often appropriate. This combines elements of both approaches to form one capacity charge.

To develop a hybrid capacity charge, both system valuation approaches are performed—RCNLD of the existing system, along with allocation of expansion projects. Rather than dividing these by the EDUs associated with current and future capacity however, the combined system values are divided by the combined EDUs served, as demonstrated in Equation 5.3.

Equation 5.3 Hybrid Capacity Charge Calculation

$$Hybrid\ Capacity\ Charge = \frac{Adjusted\ RCNLD\ of\ Existing\ System + Present\ Value\ of\ Future\ CIP}{Total\ Future\ Capacity\ in\ EDUs}$$

5.2.4 Recommendation for NapaSan's Approach

While NapaSan utilized the buy-in approach for its 2009 update of the capacity charge, the system has changed noticeably in the last decade. As in 2009, the system can generally be described as at build-out, and limited future growth is planned. However, the current system is primarily limited by the collection system capacity, which necessitates substantial capital investments to expand collection system assets. Furthermore, significant expansion is planned at the wastewater treatment plant to enhance hydraulic and treatment capacity.

Therefore, it is recommended that NapaSan consider all three approaches. The current system is sufficiently built out with capacity remaining in certain system elements to support a buy-in approach. In addition, substantial expansion of some system functions is planned, contributing to an incremental approach. This in-between state of the system indicates that there may be data to support all three approaches.

5.3 System Capacity

5.3.1 Wastewater Treatment Plant Capacity

5.3.1.1 Current Capacity

There are several system components at the wastewater treatment plant (WWTP) that place a limitation on NapaSan's treatment capacity. These limitations change depending on the time of year and the treatment constituent in question. These limitations are outlined in Table 5.3. The limitations are based on the average dry weather flow (ADWF), peak wet weather flow (PWWF), or average dry weather loadings (ADWL).

Table 5.3 WWTP System Capacity Limitations

Scenario	System Component	Capacity	Capacity Need and Flow/Load	
Winter Influent	Headworks + Influent Pump Stations	60 mgd	PWWF	60 mgd
Winter Effluent	Dissolved Air Flotation Thickeners (solids limitation)	28 mgd	PWWF	28 mgd
Summer Influent	Aeration Basins	8.5 mgd	ADWF	7.8 mgd
Summer Recycled Water	Recycled Water Filters	12.8 mgd	ADWF	8 ± mgd
Organics Loading	Aeration Basins	15,900 lbs/day BOD	ADWL	10,500 lbs/day BOD

Based on this capacity analysis, the aeration basin hydraulic capacity is the primary limiting condition for the WWTP during dry weather.

NapaSan assumes that each EDU discharges 210 gpd during ADWF conditions. Summer influent uses 7.8 mgd of capacity at the aeration basins, leaving 0.7 mgd of unused capacity, which translates to approximately 37,200 EDUs of currently utilized capacity and approximately 3,200 EDUs of remaining capacity.

5.3.1.2 Future Additional Capacity

NapaSan currently has two projects planned to expand WWTP capacity. A second digester is planned to increase the WWTP solids handling capacity, and the aeration basin will be expanded to accommodate additional secondary effluent. These upgrades are anticipated to add 10,000 EDUs of capacity at the treatment plant.

5.3.2 Collection System Capacity

5.3.2.1 Current Capacity

NapaSan's collection system is currently limited by the main trunk line that intercepts flows from the system main lines. This trunk line is 66 inches in diameter and can accommodate approximately 50 mgd during PWWF conditions. However, influent data from the plant in 2017 has recorded instantaneous flows that would equal 54 mgd, as some flow enters the plant from sources other than the 66-inch trunk line.

The addition of inflow and infiltration adds flow to the collection system. This causes the collection system to have a greater percent of capacity used compared to the WWTP. For this reason, the collection system capacity is equal to the WWTP at full capacity, which is 40,476 EDUs.

5.3.2.2 Future Capacity

NapaSan's capital improvement plan includes a project to increase the size of the 66-inch trunk line to 72 inches in diameter. This will increase the PWWF capacity of the trunk line coming into the WWTP to 62 mgd. Based on the same EDU PWWF assumptions, this additional 12 mgd increases the total collection system capacity to approximately 50,220 EDUs.

5.3.3 Total System Capacity

Between the WWTP and the collection system, NapaSan's total system capacity is limited by the summer hydraulic capacity of the aeration basins. While NapaSan has capacity to convey approximately 50 mgd via the 66-inch trunk line, the bottleneck for the system is the aeration basin

hydraulic capacity. This is true under both the current and future capacity conditions, as outlined in Table 5.4.

Table 5.4 Current and Planned EDU System Capacity

	WWTP EDUs	Collection EDUs
Current Used Capacity	37,238	40,476
Current Unused Capacity	3,238	-
Current Total Capacity	**40,476**	**40,476**
Future Planned Additional Capacity	10,000	9,720
Total Capacity (Existing + Future)	**50,476**	**50,220**

5.4 System Valuation

Because of the capacity limitations in the collection system, NapaSan's system valuation was divided between collection system and wastewater treatment plant.

5.4.1 Value of Existing System

Carollo used the most recent fixed asset registry to gather the following data:

- Original cost for each asset
- Installation date
- Functional category and location of the asset
- Depreciation basis used by NapaSan (for RCNLD only)

5.4.1.1 Depreciation and Inflation Adjustments

Non-Land Assets

Accumulated Depreciation under RCNLD Approach

NapaSan has used straight line depreciation in the past to estimate accumulated depreciation for its assets. In the course of the RCNLD analysis, NapaSan recognized that many of its assets would be fully depreciated under this basis, despite these assets still providing reliable service throughout NapaSan's collection and treatment systems. To account for this, NapaSan and Carollo elected to include a residual value for each asset, assigned based on the type of asset. These residual values were calculated using the percentages in Table 5.5.

Table 5.5 Residual Value Basis for RCNLD Values

Asset Category	Residual Value Percentage
Buildings & Improvements	25%
Construction in Progress	100% (no depreciation)
Donated Assets	25%
Equipment	10%
Infrastructure	25%
Land	100% (no depreciation)

The depreciable basis for each asset was based on the original asset cost, less the residual value. This depreciable basis was then divided by the years of useful life for the annual depreciation. Annual depreciation was then multiplied by the lesser of years of service or years of useful life to calculate accumulated depreciation. Finally, accumulated depreciation was subtracted from original cost before escalating to replacement cost as new.

Escalation to Replacement Cost as New

NapaSan records show assets dating as early as 1950 installation date, although some assets may be older. This presents a challenge for cost escalation using the ENR-CCI. While data is available prior to 1975, the index underwent a considerable calculation methodology change at that time, focusing more heavily on labor and changing the nature of the index. As a result, index values prior to 1975 do not provide a truly continuous comparison with post-1975 index values.

The Handy-Whitman Index provides a suitable alternative that goes back to 1950. The Handy-Whitman Index is published semi-annually in January and July. Like the ENR-CCI, the Handy-Whitman Index tracks construction and labor costs. However the Handy-Whitman Index provides an advantage because it only tracks costs from water, gas, and electric utilities, which provides a more useful comparison for NapaSan's costs. Furthermore, the Handy-Whitman Index uses a regional indexing approach, rather than a metro area approach that ENR-CCI uses. This is advantageous because it smooths out local cost fluctuations, while still accounting for different cost dynamics between various regions of the country.

This analysis used the Handy-Whitman Pacific Region Index to bring original costs less accumulated depreciation to present replacement cost.

Land Holdings

NapaSan's land holdings were not depreciated because the remaining useful life does not decrease as time goes on. Additionally, land value has escalated at a greater appreciation rate than the ENR-CCI that was used for adjusting non-land assets. This deviation of real estate appreciation from long-term construction costs indices is common, but is typically not substantial enough to warrant additional review. However, the pace of real estate appreciation in Napa County and across Northern California stands out and requires consideration of an alternative approach.

Two land holdings in particular stood out when reviewing the initial results of the ENR-CCI adjustment on all assets, including land assets. First, the land for NapaSan's North Napa pump station was originally purchased in February 1967 for $43,275. This would currently be valued at $152,376 with the ENR-CCI adjustment. However, NapaSan is currently evaluating this parcel for sale at a range between $3 and 5 million.

Second, NapaSan's Somky property, which is used for spreading of solids from the WWTP and to assist in meeting the District's summer non-discharge requirements, was purchased in September 1982 for $1.5 million. ENR-CCI projects this property at $3.5 million, but NapaSan is currently leasing this property at approximately $600,000 per year. Using standard leasing values, this parcel's estimated value is over $9.6 million.

There are several land indices available as alternatives to the ENR-CCI. This analysis ultimately selected the Lincoln Institute's index of land values by state. This index uses building costs and deducts these costs to determine the land value. This had inherent advantages of other land indices that track agricultural land values more closely. Napa County maintains a substantial agricultural industry, but there is also substantial residential and commercial development, necessitating a more diversified index. The Lincoln Index average year-over-year appreciation since 1975 is 10.6 percent, while the ENR-CCI over the same time period is 3.9 percent.

The Lincoln Index escalates the selected parcels to values that are more in line with the market benchmark data available for each. Table 5.6 compares the land values for each index, as well as original purchase information. For all land assets, the ENR-CCI projected NapaSan's total land holdings at a present value of approximately $16.9 million. By comparison, the Lincoln Institute index estimates that values at approximately $88.4 million.

Table 5.6 Land Index Comparison

Parcel	Purchase Data	Purchase Price	ENR Initial Estimate	Estimate Based on Market Data	Lincoln Institute Estimate
Somky	Sept. 1982	$1.5m	$3.5m	$9.6m	$13.7m
North Napa Pump Station	Feb. 1967	$43.3k	$152k	$3 to 5m	$2.5m

5.4.1.2 Allocation of Functional Categories and Locations

Each of NapaSan's assets is recorded with a functional location in the system. These locations were assigned as follows in Table 5.7.

Reclamation locations were split into two categories. Reclamation assets installed prior to and during 2009 are allocated to WWTP because they were primarily implemented in order to meet NapaSan's NPDES discharge requirements. This classifies these assets as more driven by wastewater treatment than recycled water production. Assets installed following 2009 were primarily implemented to expand recycled water production however, and are thus considered reclamation system assets.

The "as all others" designation is an indirect cost allocation for any categories that serve multiple systems, such as administration buildings and engineering.

Table 5.7 Allocation of Asset Locations to Functional Categories

Location	Functional Category
Treatment Plant	WWTP
Collection System	Collection
Reclamation, pre-2009	WWTP
Reclamation, post-2009	Reclamation
Pump Stations - General	Collection
Jameson Ranch	WWTP
North Napa Pump Station	Collection
Administration Facilities	As All Others
Somky Ranch	WWTP
Stonecrest Pump Station	Collection
West Napa Pump Station	Collection
Technical Services	As All Others
Airport/Fegundas Parcel	WWTP
Laboratory	WWTP
Outfall Pump Station	WWTP
Chardonnay Golf Course (Parcel)	As All Others
River Park Pump Station	Collection
Plant	WWTP

5.4.1.3 Replacement Cost New, Less Depreciation

The RCNLD approach estimates the value of the existing system by escalating the original asset cost less accumulated depreciation.

Capital Assets

Based on the allocation factors in Table 5.7, the value of capital assets in each system is as follows in Table 5.8.

Table 5.8 RCNLD Capital Assets Allocated by System

Capital Assets	Total	Allocated Value			
		WWTP	Collection	Reclamation	As All Others
Land	$99,934	$85,449	$4,485	$-	$10,000
Buildings and Improvements	298,776	177,733	86,076	24,310	10,657
Equipment	5,107	3,432	1,218	281	176
Construction in Progress	26,912	2,228	4,425	20,259	-
Donated sewer lines and other contributed assets	94,440	16,396	76,338	1,706	-
Subtotal	**$525,168**	**$285,238**	**$172,541**	**$46,555**	**$20,833**
Percent of Total Assets		57%	34%	9%	
Total with As All Other Reallocated	**$525,168**	**$297,021**	**$179,669**	**$48,478**	**$0**

All values in 2018 dollars, in thousands.

Adjustments

Several adjustments need to be accounted for prior to finalizing the value of the system. As outlined in the System Capacity and Charge Calculation discussion in Section 5.2 , donated assets and outstanding principal on debt must be deducted, while reserves and interest paid on debt must be added. Those adjustments are outlined below in Table 5.9.

Table 5.9 RCNLD Asset Adjustments

Adjustment	Total	Allocated Value		
		WWTP	Collection	Reclamation
Less: Donated sewer lines and other contributed assets	$(94,440)	$(16,396)	$(76,338)	$(1,706)
Less: Outstanding Principal for Infrastructure	(49,773)	(37,166)	(1,203)	(11,404)
Interest Expense	13,732	10,934	414	2,383
Reserves	15,878	9,587	5,799	491
Total Adjustments	**$(114,602)**	**$(33,040)**	**$(71,327)**	**$(10,235)**

All values in 2018 dollars, in thousands.

Donated assets were deducted based on which location those assets were allocated to. Most of the donated assets were within the collection system. Debt adjustments—both principal and interest—were based on the percent of total assets from Table 5.8. Reserves were allocated based on the percent of 2018 revenues from sewer versus recycled water fees. The sewer portion was split between WWTP and collection based on the percent of total assets.

Net Valuation of Current System

Combining the capital assets with the adjustments provides the net system value for the capacity charge, presented in Table 5.10.

Table 5.10 RCNLD Net System Value

	Total	Allocated Value		
		WWTP	Collection	Reclamation
Capital Assets	$525,168	$297,021	$179,669	$48,478
Asset Value Adjustment	$(114,602)	$(33,040)	$(71,327)	$(10,235)
Net System Value	**$410,565**	**$263,980**	**$108,342**	**$38,243**

All values in 2018 dollars, in thousands.

5.4.1.4 Replacement Cost New

The RCN approach is identical to the RCNLD approach, with the exception that it does not deduct accumulated depreciation.

Capital Assets

Based on the allocation factors in Table 5.7, the value of capital assets in each system is as follows in Table 5.11.

Table 5.11 Capital Assets Allocated by System

Capital Assets	Total	Allocated Value			
		WWTP	Collection	Reclamation	As All Others
Land	$99,934	$85,449	$4,485	$-	$10,000
Buildings and Improvements	442,843	280,230	122,617	26,556	13,440
Equipment	10,705	6,268	3,622	390	425
Construction in Progress	26,912	2,228	4,425	20,259	-
Donated sewer lines and other contributed assets	240,187	53,538	184,885	1,764	-
Subtotal	**$820,580**	**$427,713**	**$320,034**	**$48,969**	**$23,865**
Percent of Total Assets		54%	40%	6%	
Total with As All Other Reallocated	**$820,580**	**$440,524**	**$329,620**	**$50,436**	**$0**

All values in 2018 dollars, in thousands.

Adjustments

Several adjustments need to be accounted for prior to finalizing the value of the system. As outlined in the System Capacity and Charge Calculation discussion in Section 5.2 , donated assets and outstanding principal on debt must be deducted, while reserves and interest paid on debt must be added. Those adjustments are outlined below in Table 5.12.

Table 5.12 Asset Adjustments

Adjustment	Total	Allocated Value		
		WWTP	Collection	Reclamation
Less: Donated sewer lines and other contributed assets	$(240,187)	$(53,538)	$(184,885)	$(1,764)
Less: Outstanding Principal for Infrastructure	(49,773)	(37,166)	(1,203)	(11,404)
Interest Expense	13,732	10,934	414	2,383
Reserves	15,878	8,801	6,586	491
Total Adjustments	**$(260,349)**	**$(70,968)**	**$(179,088)**	**$(10,293)**

All values in 2018 dollars, in thousands.

Donated assets were deducted based on which location those assets were allocated to. Most of the donated assets were within the collection system. Debt adjustments—both principal and interest—were based on the percent of total assets from Table 5.8. Reserves were allocated based on the percent of 2018 revenues from sewer versus recycled water fees. The sewer portion was split between WWTP and collection based on the percent of total assets.

Net Valuation of Current System

Combining the capital assets with the adjustments provides the net system value for the capacity charge, presented in Table 5.13.

Table 5.13 RCN Net System Value

	Total	Allocated Value		
		WWTP	Collection	Reclamation
Capital Assets	$820,580	$440,524	$329,620	$50,436
Asset Value Adjustment	$(260,349)	$(70,968)	$(179,088)	$(10,293)
Net System Value	**$560,231**	**$369,556**	**$150,532**	**$40,143**

All values in 2018 dollars, in thousands.

5.4.2 Future Added System Value

The future system value is based on the cost of capital improvements for additional capacity in present-day dollars. Only projects entirely or partially devoted to adding system capacity are included in this calculation. Other projects, such as system repair and replacements, do not add new capacity and therefore would be considered ineligible for inclusion in the capacity charge calculation.

The WWTP and collection system projects over the next ten years are outlined in Table 5.14 and Table 5.15, respectively.

5.4.2.1 WWTP Projects

There are two primary expansions projects planned for the WWTP, and they are both 100 percent allocated to expansion. The second digester is planned to add an additional 10,000 EDUs of solids handling capacity. The aeration basin expansion is planned to match those 10,000 EDUs with additional secondary treatment hydraulic capacity, which is currently the limiting process at the WWTP.

Table 5.14 Planned WWTP Expansion Project Costs

Project	Total Cost	% Expansion	Expansion Allocation
WWTP - Second Digester	$17,226	100%	$17,226
WWTP Master Plan	1,844	50%	922
WWTP - Aeration Basin Expansion	6,346	100%	6,346
Total	**$25,417**		**$24,495**

All values in 2018 dollars, in thousands.

5.4.2.2 Collection System Projects

The 72-inch trunk line and the Browns Valley trunk projects are the primary collection expansion projects for NapaSan over the next ten years. Neither of these projects is allocated entirely to expansion so partial funding will come from user rates, but a substantial portion will also be yielded from capacity charges to pay for the additional capacity.

Table 5.15 Planned Collection System Expansion Project Costs

Project	Total Cost	% Expansion	Expansion Allocation
Collection System Master Plan	$1,071	50%	$536
Browns Valley Trunk	20,300	82%	16,646
72-Inch Trunk Upsize	46,037	24%	11,049
Total	**$67,408**		**$28,230**

All values in 2018 dollars, in thousands.

5.5 Capacity Charge Calculation

5.5.1 Buy-In Approach

The buy-in approach is based solely on existing system value and capacity and assigns a proportional value of that system to new connections. The calculation of the buy-in capacity charge for both the RCNLD and RCN approaches is presented in Table 5.16.

Table 5.16 Buy-In Capacity Charge

Calculation	RCNLD		RCN	
	WWTP	Collection	WWTP	Collection
Current System Value [1]	$263,980	$108,342	$369,556	$150,532
Current EDU Capacity	40,476	40,476	40,476	40,476
System Value per EDU	$6,522	$2,675	$9,130	$3,719
Buy-In Capacity Charge per EDU [2]	**$9,199**		**$12,850**	

Notes:
(1) Row values in 2018 dollars, in thousands.
(2) Sum of WWTP and collection system value per EDU.

5.5.2 Incremental Approach

In contrast with the buy-in approach, the incremental approach only includes system value and capacity that are not currently used. This includes existing capacity that is currently unused within NapaSan's system. Because NapaSan currently has approximately 3,200 EDUs of WWTP capacity remaining (approximately 8 percent of total capacity), these EDUs and their corresponding existing system value can be used in the incremental approach. Using the existing system valuation of $145.7 million for the WWTP, 8 percent equates to $11.7 million.

The incremental approach calculation is outlined in Table 5.17.

Table 5.17 Incremental Capacity Charge

Calculation	RCNLD		RCN	
	WWTP	Collection	WWTP	Collection
Future Additional System Value [1]	$24,495	$28,230	$24,495	$28,230
Unused Existing System Value [1]	$21,118	-	$29,565	-
Total Future + Unused System Value [1]	$54,059	$28,230	$54,059	$28,230
Additional Future + Unused EDU Capacity	13,238	9,714	13,238	9,714
System Value per EDU	$4,084	$2,906	$4,084	$2,906
Buy-In Capacity Charge per EDU [2]	**$6,350**		**$6,988**	

Notes:
(1) Row values in 2018 dollars, in thousands.
(2) Sum of WWTP and collection system value per EDU

5.5.3 Hybrid Approach

The hybrid approach blends elements of the buy-in and incremental approaches to assign both existing system value and expansion capacity value.

The hybrid approach calculation is outlined in Table 5.18

Table 5.18 Hybrid Capacity Charge

Calculation	RCNLD		RCN	
	WWTP	Collection	WWTP	Collection
Current System Value [1]	$263,980	$108,342	$369,556	$150,532
Future Additional System Value [1]	$24,495	$28,230	$24,495	$28,230
Current + Future System Value [1]	$288,475	$136,572	$394,051	$178,762
Additional Future + Unused EDUs	50,476	50,190	50,476	50, 190
System Value per EDU	$5,715	$2,721	$7,807	$3,562
Buy-In Capacity Charge per EDU [2]	**$8,435**		**$11,367**	

Notes:
(1) Row values in 2018 dollars, in thousands.
(2) Sum of WWTP and collection system value per EDU, rounded to the nearest $1.

5.6 Capacity Charge Recommendation and Future Escalation

5.6.1 Capacity Charge Recommendation

The three methodologies for both the RCNLD and RCN approaches are outlined in Table 5.19. All six calculations are consistent with standard calculation approaches, and indicate that the current rate of $9,624 is within the established range of allowable charges.

Based on a comparison of the three methodologies, the RCNLD buy-in approach best serves NapaSan's funding needs and best reflects the nature of NapaSan's collection and treatment systems. While expansion projects are planned for the next ten years, they are not of a nature that drastically expands total system capacity. Rather, the primary goal of these projects is to bring all of the various system components' capacities in alignment and to remove some of the bottlenecks that are currently limiting NapaSan's total capacity.

The RCNLD is recommended over the RCN because most of NapaSan's system is of a sufficient age that deducting accumulated depreciation is appropriate.

Table 5.19 Capacity Charge Calculation Matrix

Method	RCNLD ($/EDU)	RCN ($/EDU)
Buy-In	$9,199	$12,850
Incremental	$6,352	$6,990
Hybrid	$8,437	$11,369

5.6.2 Future Escalation Recommendations

5.6.2.1 Annual Capacity Charge Adjustment

As discussed in Section 5.1.2.1 of this TM, It is uncommon for an agency to reassess its capacity charge every year. It is standard practice to escalate the capacity charge based on an appropriate cost index.

The ENR-CCI is one of the most common indices used for cost escalation in the water and wastewater industry. NapaSan has used the ENR-CCI for San Francisco each year to adjust its capacity charges for the following fiscal year.

While parts of this analysis used the Handy-Whitman Index rather than the ENR-CCI, it is still appropriate to use the ENR-CCI for annual adjustments to the capacity charge. The Handy-Whitman Index was selected for parts of this analysis that included time series dating back to 1950. The ENR-CCI would have been insufficient for this time series because there was a change in the methodology used to develop the ENR-CCI during that span. However, the current ENR-CCI is sufficient for escalating from one year to the next because its methodology is consistent over that period of time.

Furthermore, the ENR-CCI and the Handy-Whitman Index have tracked fairly close to one another over the last decade. Since 2009, the ENR-CCI compound annual growth rate is 2.7 percent, while the Handy-Whitman has been 2.9 percent. As a result, the ENR-CCI is sufficient for annual adjustments.

This analysis however, recommends that NapaSan use the Handy-Whitman Index whenever escalating its asset registry, until there are no remaining non-land assets that pre-date 1975. Once those assets have been replaced or retired, and no assets pre-date 1975, the ENR-CCI should be used for the RCN/RCNLD calculation.

5.6.2.2 Local vs. National Escalation Index

This analysis recommends that NapaSan use the U.S. average ENR-CCI rather than using the San Francisco ENR-CCI. This change, which is the recommended approach from ENR, should smooth out local fluctuations that occur in individual metro areas.

The ENR-CCI heavily relies on labor costs for its values, which can fluctuate substantially. While Napa's labor market is closely tied to San Francisco, there are still labor market changes at the local level in San Francisco that are unlikely to cascade all the way down to Napa, such as union strikes or city-level labor negotiations that have stalled and are lagging behind national wage inflation.

Additionally, some materials included in the ENR-CCI are less critical than others for NapaSan's capital projects, such as lumber versus cement and steel, which are both included in the index.

Lumber is the most volatile in price of the three materials, and is most dependent upon local conditions. Shortages or excesses of lumber in San Francisco could therefore have an outsized impact on NapaSan's cost forecasting when using the local ENR-CCI.

Finally, these local fluctuations typically smooth out and regress to the twenty city average for ENR-CCI over time. Using the local ENR-CCI during one of these short-term spikes or valleys could inaccurately capture that fluctuation for an entire year.

Appendix

Table 1.1 Current Commercial Strength Factors

Residential Unit Type	Current Strength Factor
Automobile Sales & Service	1.0
Bakeries/Candy/Ice Cream Manufacturing	2.7
Banks/Business Offices	1.0
Bars/Nightclubs	1.0
Bed and Breakfast Inns	1.0
Car Wash	0.7
Carpet & Rug Cleaners	1.4
Churches	1.0
Convalescent/Care Homes/Hospitals	1.0
Daycare Facilities	0.8
Delicatessen (no cooking)	1.4
Delicatessen (cooking)	2.0
Dry Type Industries	1.0
Funeral Homes	2.6
Hotels/Motels (without restaurants)	1.0
Hotels/Motels (with restaurants)	2.0
Laundries-Commercial	1.4
Laundries-Self Service	0.9
Markets, with disposals	2.6
Markets, without disposals	1.4
Membership Organizations, with kitchens	2.7
Membership Organizations, without kitchens	1.0
Merchandising/Department/Retail Stores	1.0
Mixed Use (1 water meter)	1.6
Physicians/Medical/Dental Offices	1.0
Printers/Newspapers	1.0
Repair Shops/Service Stations	1.0
Restaurants and Caterers	2.7
Service Related Enterprises	1.0
Theaters	1.0