ATTACHMENT 5

FINAL

Trucked Waste Program Evaluation Report

Prepared for
City of Santa Rosa
Santa Rosa, California
August 16, 2022

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BC	Brown and Caldwell
BMSP	Biosolids Management Strategic Plan
BOD	biochemical oxygen demand
CHP	combined heat and power
City	City of Santa Rosa
CMSA	Central Marin Sanitation Agency
COD	chemical oxygen demand
EBMUD	East Bay Municipal Utility District
EHB	emergency holding basin
FOG	fats, oil, and grease
gal	gallon(s)
gpm	gallons per minute
HSW	high-strength waste
LSW	low-strength waste
LTP	Laguna Treatment Plant
NapaSan	Napa Sanitation
NPV	net present value
PG&E	Pacific Gas and Electric Company Program Trucked Waste Program
R&R	Removal and replacement
SCADA	supervisory control and data acquisition
TKN	total Kjeldahl nitrogen
TM	technical memorandum
TS	total solids
TVS	total volatile solids
UVT	ultraviolet transmittance

Executive Summary

The City of Santa Rosa (City) hired Brown and Caldwell (BC) to evaluate the Trucked Waste Program (Program) at the Laguna Treatment Plant (LTP) to identify potential programmatic, physical, and process-related improvements. The goal of the evaluation was to summarize opportunities for the City to enhance Program operation and benefits while managing administrative and operating costs. The evaluation was conducted using the City's feedback and operating data, and was completed in three phases: 1) an assessment of baseline conditions, 2) development of enhancement alternatives, and 3) recommendation of enhancements for implementation with rebalanced tipping fees to maintain a net positive Program revenue. These phases are summarized graphically in Figure ES-1.

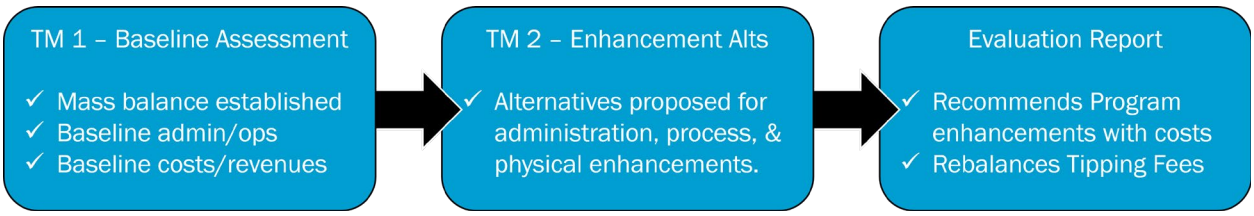

Figure ES-1. Program evaluation phases

The assessment of baseline conditions, Technical Memorandum (TM) 1, included an evaluation of baseline Program administration, operating costs and revenues; a solids-water-energy balance of trucked wastes, anaerobic digestion system, combined heat and power (CHP) system, and post-digestion solids handling; and a summary of annual operating costs and revenues. The development of enhancement alternatives, TM2, provided options to improve administrative, process, and physical aspects of the Program. This Evaluation Report recommends enhancement alternatives that align with the City's operating goals while maintaining benefits and lowering risk. This Evaluation Report summarizes the prior TMs and establishes a plan for the Program through 2032.

The Program is currently operating successfully – it provides a sustainable and economical outlet for local businesses to dispose of liquid wastes, it operates at a net positive energy balance, and it generates net positive revenue for the City through tipping fees and energy cost savings. While the Program provides several benefits to the City, the administration of the Program places undue burden on several City staff. Currently, three environmental compliance staff at the LTP are required to split their time to administer the Program, and one operator is required to operate the high-strength waste receiving station. This mode of operation has been sufficient to maintain Program operations but has limited trucked waste monitoring, sampling, and compliance enforcement. Without dedicated Program staff, there is also a risk to overextend LTP staff if the Program continues to expand.

Permitting haulers, monitoring and enforcing compliance, and collecting tipping fees are some key priorities that are accomplished with existing LTP staff. Additional Program tasks are challenging or infeasible for the existing staff to complete while also administering key priorities. These tasks include regular evaluation and rebalancing of tipping fees, complete monitoring of trucked waste loads received at the LTP, and planning for potential trucked waste expansions or restrictions. For example, there are opportunities to expand the Program given expected changes in market conditions from Senate Bill 1383, but additional improvements may be required to facilitate administration of an expanded Program. BC summarized enhancement recommendations that the

Program minimize compliance risks and provide flexibility to consider expansion. These recommendations, presented in Table ES-1, facilitate sustainable operation of the Program.

Table ES-1. Summary of Recommended Enhancements

Enhancement	Cost Impact	Benefits
Hire Program Manager and Technicians	Operations	• Dedicated Program oversight for improved monitoring, compliance and billing enforcement, and planning • Offload environmental compliance staff and operator back to LTP
Increase Sampling	Operations	• Increase monitoring/compliance • Improve load forecasting for planning
Construct New Septage Receiving Station	Capital Project	• Relocate receiving location to optimize traffic • Addition of pH monitoring and improved screening
Improvements to Existing Wastehauler Station	Capital Project	• Provide tools for technician staff to sample and monitor trucks within the existing Wastehauler Station
Construct New Wastehauler Station	Capital Project	• Relocate Wastehauler Station ahead of receiving locations • Provide workstations for new technician staff
Reroute Trucks	Capital Project	• New signage and striping to alleviate traffic in central corridor of LTP
Systems Integration and Analytics	Programming and Admin Cost	• Consolidate data collection and data access in single platform for improved Program tracking and monitoring

Recommended enhancements were evaluated for benefits, risks, and costs with input from City stakeholders. Estimated capital and operating costs for enhancement were added to a net present value (NPV) analysis based on a 10-year return period, and tipping fee requirements were determined to maintain a net positive revenue while accounting for annual escalation in operating costs. Figure ES-2 shows a comparison of baseline tipping fees and rebalanced tipping fees that are recommended to recover enhancement costs and treat the trucked waste.

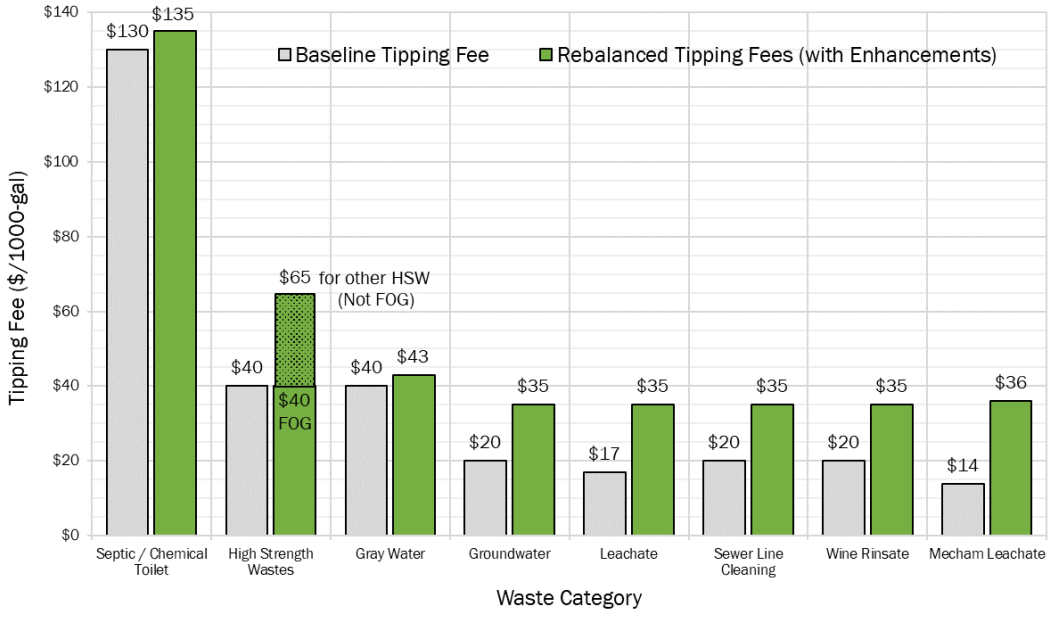

Figure ES-2. Comparison of baseline tipping fees and rebalanced tipping fees

Report presents option for incremental tipping fee increase, starting lower and ending higher than values shown in figure.

Figure ES-3 shows the proposed implementation schedule for the recommended enhancements (presented in Table ES-1), including changes to operations and construction of capital improvement projects.

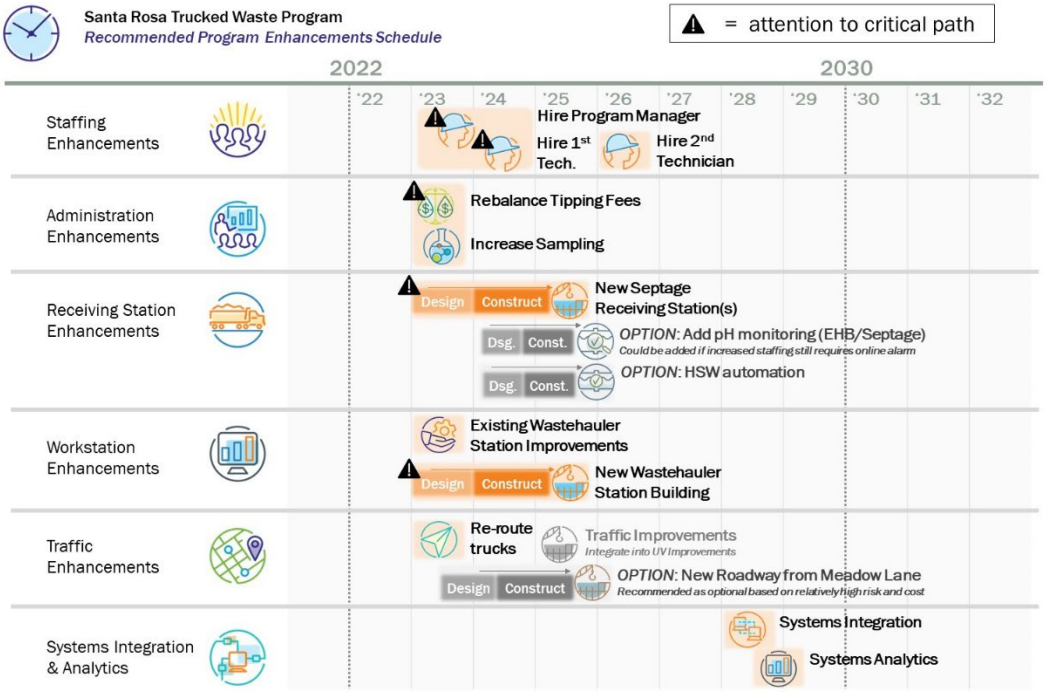

Figure ES-3. Implementation schedule for recommended Program enhancements

Actions denoted with an "attention to critical path" icon should be prioritized by the City. Immediate action is recommended to start processes required to hire additional staff and to include a new wastehauler station building to meet the schedule in the graphic; rebalancing tipping fees should be started now to implement higher fees in 2023; and a decision should be made to consider whether a new septage receiving station is necessary.

The evaluation identified improvements that minimize risks to the LTP by increasing oversight for monitoring of trucked wastes and Program costs and revenues. Improvements will add operating and capital costs, which can be recovered by increasing tipping fees. A NPV analysis was used to recommend tipping fee values that would result in net positive annual revenue over the next 10 years based on assumptions for annual cost escalations; however, additional considerations were identified:

- **Tipping fee price shock.** To maintain a net positive revenue equivalent to baseline conditions, tipping fee values for certain wastes (e.g., Mecham leachate) were recommended at over twice the current value. The City can also consider rates lower than values recommended by the analysis to mitigate risk of losing haulers and revenue.
- **Capacity evaluation.** Solids treatment capacities and population projections were not included in this evaluation.
- **Program expansion.** Evidence of solids treatment and gas conditioning capacities suggested Program expansion would require upgrades. Consideration for Program expansion should be coordinated with the City's Biosolids Management Strategic Plan (BMSP).
- **Market and regulatory conditions.** Senate Bill 1383 and contaminants such as microplastics and PFAS have the potential to change market conditions and biosolids end-use regulations. Operating costs should be considered and coordinated with the City's BMSP.

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Section 1

Introduction

The City of Santa Rosa (City) is evaluating the Trucked Waste Program (Program) at the Laguna Treatment Plant (LTP) to identify potential programmatic, physical, and process-related improvements. This study reviews the current Program operation using the City's direct feedback and operating data. The assessment of baseline conditions, Technical Memorandum (TM) 1, included an evaluation of current Program administration, operating costs and revenues; a solids-water-energy balance of trucked wastes, anaerobic digestion system, combined heat and power (CHP) system, and post-digestion solids handling; and a summary of annual operating costs and revenues. The development of enhancement alternatives, TM2, provided options to improve administrative, process, and physical aspects of the Program. This Evaluation Report recommends enhancement alternatives that align with the City's operating goals while maintaining benefits and lowering risk. This Evaluation Report summarizes the prior TMs and establishes an implementation plan for the Program through 2032.

Alternatives such as biogas utilization projects, biogas storage projects, digester capacity expansion, and Program expansion are deferred to align with the Biosolids Management Strategic Plan (BMSP) that will complement these findings. Recommendations from the BMSP should be coordinated with proposed enhancements from this evaluation. For example, if Program expansion is found to be favorable, then tipping fees should be rebalanced to recover the capital and ongoing costs. Projects identified in this report should be incorporated into site layouts developed as part of the BMSP.

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Section 2

Baseline Assessment

A baseline assessment was completed to determine the process and financial impacts of the current operation. Findings are summarized in this section and documented in TM1 (Appendix A).

2.1 Process Impacts from Trucked Waste

As presented in TM1, the baseline treatment process performances were evaluated based on 2 years of historical data. Solids, water, and energy information was reviewed simultaneously to perform an annual average mass, thermal, and energy balance. The balance was sufficient for estimating average annual operating costs and benefits. Annual average results alone prohibit existing unit process capacity calculations and are insufficient for comprehensive sizing of new equipment. Findings of the balance include estimated contributions of high-strength waste (HSW) to digester loading (15 percent), biogas production (15 percent), energy production (11 percent), and biosolids production (3 percent). These contributions were used to estimate costs and benefits associated with receiving HSW. Table 2-1 highlights HSW and low-strength waste (LSW) contributions to digester loading, biogas production, energy production, and biosolids production. Calculations are based on HSW and LSW quantities and characteristics, documented in TM1. Additional sampling of LSWs could further refine estimated impacts from the Program on the LTP.

Table 2-1. Process Impacts from Trucked Wastes on LTP

Parameter	Value (% of Total)
HSW Contributions	
HSW flow to digesters	15
HSW total solids load to digesters	15
HSW biogas production in digesters	15
HSW energy production in CHP engines	11
HSW biosolids	2.6
LSW Contributions	
LSW biogas production in digesters	1.0
LSW energy production in CHP engines	0.7
LSW biosolids production	1.3

2.2 Baseline Operating Costs and Revenues

Review of annual operating, maintenance, and treatment costs suggested the Program operates at a net positive revenue, as shown in Table 2-2. Annually, revenues received from tipping fees and the benefits of offsetting energy usage and power demands are greater than the costs required to administer the Program and treat the additional trucked wastewater loads.

Table 2-2. Revenue and Costs		
Item	Revenue	Cost
Tipping fees and permits	$2,260,000	
Trucked waste treatment[a]		$1,501,000
Trucked waste admin/compliance[b]		$325,000
Trucked waste laboratory		$30,000
Non-staffing costs associated with HSW	Subtotal:	-$34,000 (net benefit)
Pacific Gas and Electric Company (PG&E) Purchase offset		-$245,000 (net benefit)
HSW maintenance		$38,000
CHP inspections and maintenance		$69,000
HSW solids treatment		$23,000
HSW biosolids hauling		$81,000
Net revenue	$438,000	

a. *38 million gallons total per year of trucked waste assumed in TM1; Refined to 56 million gallons total per year for 10-year net present value (NPV) and tipping fee rebalancing exercises completed in this evaluation report.*
b. *Assumes overhead is captured in trucked waste treatment cost; refined based on communication with City*

The costs to administer the Program were added to direct treatment costs, which include overhead for items such as chemicals and power at the LTP, were normalized to 1,000 gallons (gal) of wastewater treated by the Program. These treatment costs were compared against tipping fees in Figure 2-1. Figure 2-1 suggests there is an opportunity to justify an increase tipping fees for all waste types. The evaluation suggested the greatest loss in revenue per gal from HSW and leachate waste. The calculated HSW treatment costs are impacted by the annual cost to staff an operator at the HSW receiving station. This representation assumes that the operator currently does not assist with administration or sampling of other, non-HSW, waste types. Otherwise, the utility electricity cost savings resulting from digester gas used for energy offsets is greater than annual costs incurred to maintain HSW receiving and CHP equipment (a net positive annual revenue of $34,000 is estimated). The relatively high treatment cost ($39.39 per 1,000-gal) is influenced by the assumed total Kjeldahl nitrogen (TKN) loading associated with the HSW category and conservatively does not account for potential synergistic volatile solids reduction benefits from co-digestion. Additional sampling was recommended to help refine treatment cost estimates and verify whether $40/1,000-gal is an appropriate tipping fee for certain HSW types (e.g., fats, oil, and grease [FOG]) or whether separate tipping fees are warranted for specific HSW types if there are significant differences in nutrient loads.

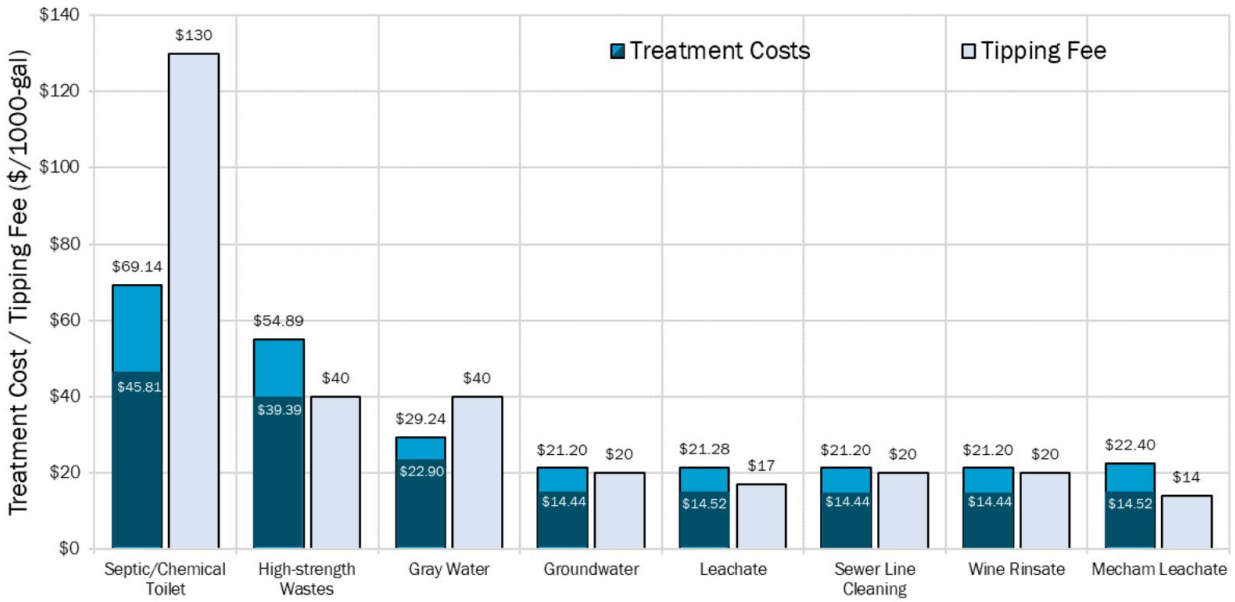

Figure 2-1. Comparison of treatment and administration costs versus tipping fees from TM1

2.3 Baseline Truck Traffic

Historical data was reviewed to quantify historical trucked waste traffic patterns at the LTP. Truck traffic is routed to three receiving locations: the HSW receiving station, the emergency holding basin (EHB) for LSW, and the septage receiving station for septic/chemical toilet wastes. Figure 2-2 shows the annual average traffic pattern on weekends and weekdays. Truck volume in 2020 was lower than 2019 and 2021. This trend is likely influenced by the coronavirus pandemic.

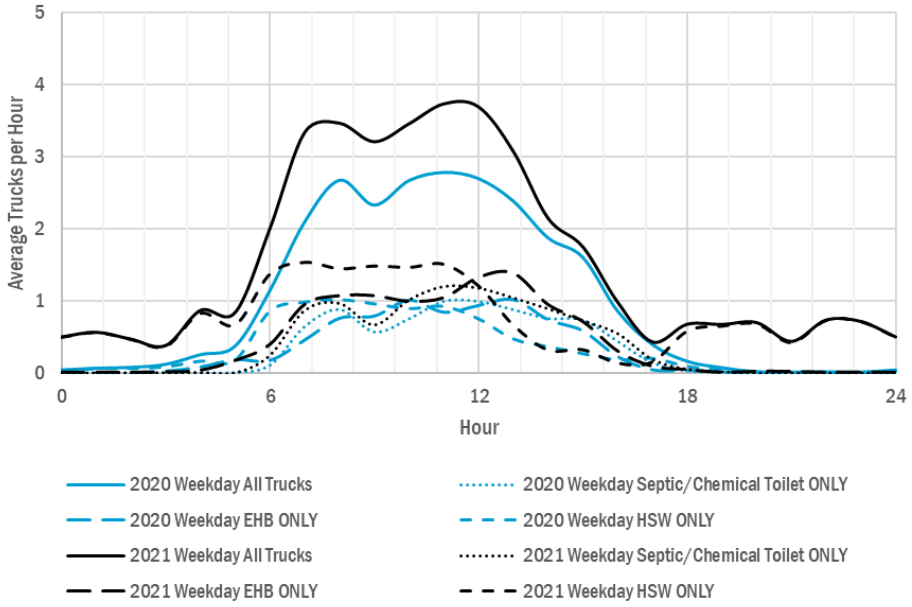

Figure 2-2. Truck traffic patterns in 2020 and 2021

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Section 3

Administration and Physical Enhancement Alternatives

TM2 (Appendix B) presents enhancement alternatives that have potential to improve the management or operation of the Program. These alternatives represent a wide net of enhancements including aspects of staffing, automation, and physical assets. City feedback across multiple departments during Workshop 3 (Brown and Caldwell {BC}, 2021) and following discussions helped identify alternatives to advance for this evaluation report (Appendix C). Suggested improvements, such as pH monitoring and automation were eliminated because of the limited value these projects provide. Figure 3-1 presents a graphical representation of the screening process for enhancement alternatives. The enhancements identified for implementation were evaluated based on benefits, costs, and risks, and are presented in Section 4.

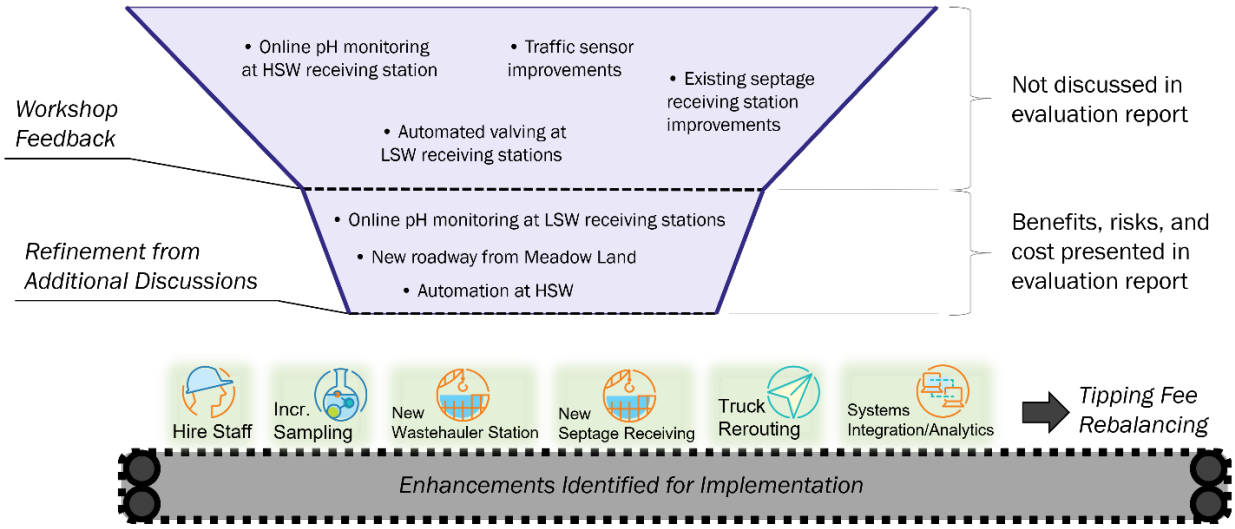

Figure 3-1. Representation of enhancement alternatives screening

Alternatives were screened for the following reasons:

- **Implementation under separate project.** Traffic sensor improvements identified in TM2 include using concrete to protect inductive loops or laser/video detection sensors. The City intends on implementing this alternative under the ultraviolet improvements project.
- **Limited value.** Online pH monitoring was determined to have limited value considering the recommendation to hire additional staffing that would improve monitoring of trucked waste. Increased sampling could identify pH issues without the need for online instrumentation. Similarly, automated valving was proposed to coincide with pH monitoring for LSW receiving stations.

- **Uncertainty and associated risk.** Automation of the HSW receiving station would require haulers to interface with push buttons to initiate the activities currently completed by an operator. This would also require haulers to connect trucks to the receiving stations. The risk of improper operation by haulers was a reason to screen this project. A new roadway from Meadow Lane poses security risks from a new point of entry and potential biological habitat impacts that have not yet been investigated.

Section 4

Enhancement Evaluations

This section evaluates the benefits, risks, and costs of enhancement alternatives. Enhancement alternatives have the potential to provide value to the Program by improving monitoring, compliance, management, and/or operations.

4.1 Administration and Operation Enhancements

These enhancement alternatives have the potential to improve operations and may impact annual operating costs.

4.1.1 Hire Additional Staff

Hiring dedicated, additional staff is recommended to lead and manage the Program. Currently, existing City staff, including three staff from environmental compliance, one data applications specialist, and one operator II, are strained to administer the Program. The four staff from environmental compliance and administration cover responsibilities that could be consolidated and completed by a single person. It is recommended that a single Program Manager is hired to lead these responsibilities for the City.

Hiring of a Program technician is also recommended to assume the role of the current licensed operator at the HSW receiving station. The Program technician could also be leveraged for additional sampling, although this capacity would be limited when offloading of HSW trucks is required. A second Program technician is recommended to further increase sampling and compliance monitoring for the Program. If Program expansion is considered, a second technician would be necessary to accommodate either increased truck traffic or new waste types. Technicians could also be leveraged by environmental compliance or operations for other tasks. Envisioned job descriptions for a Program manager and technicians are included in Appendix D. Table 4-1 compares benefits and risks to hiring additional staff.

Table 4-1. Hiring Additional Staff Benefits and Risks

Benefits	Risks
• Task consolidation to one program manager is expected to enhance efficiency • Additional staff will increase compliance monitoring (e.g., supports increased sampling of trucks) • Program manager can assume responsibilities to create and maintain Program documents, such as an enforcement action plan for non-compliance disciplinary actions, a Program sampling plan, and a Program annual report for cost/revenue monitoring • Technicians can perform same roles as operators without requiring operator license	• Annual operating costs increase if two technicians are hired (costs are comparable with one program manager and one technician) • Annual operating cost for additional staff expected to continue until staff transitions to another role

Timeline. Hiring a program manager is recommended as a top priority, and steps should be taken in 2023 to start this process. Hiring a Program manager before implementing other enhancements allows for the Program manager to be involved in Program changes, such as rebalancing tipping fees or creating an enforcement action plan. Hiring a technician can follow the program manager or

happen simultaneously. Hiring a Program manager first would allow them to be included in the technician's hiring process. It is anticipated that the first technician could be hired as early as 2023 (although the hiring process for these positions could be longer) and would replace the operator at the HSW receiving station. This would allow the operator to refocus their efforts on tasks which require licensure. A second technician is recommended to be hired in 2026, after a new "Wastehauler Station" is constructed to provide workstations for each technician. An operator could also be hired in lieu of a second technician.

Costs. Table 4-2 summarizes annual operating costs that are estimated for the staffing recommendations based on rates provided by the City.

Table 4-2. Hire Additional Staff Costs

Item	Annual Cost
Program Manager Annual Staffing Cost	$168,000 per year
Technician Annual Staffing Cost, each	$149,000 per year, each

Costs rounded to nearest thousand dollars

4.1.2 Increase Trucked Waste Sampling

Increasing trucked waste sampling is recommended to improve monitoring and compliance enforcement. Increased sampling could help identify specific haulers or wastes that are outside of the compliant pH range. Monitoring a greater portion of trucks prior to discharge using a pH probe can minimize slug loads of non-compliant wastes that may negatively impact the LTP performance. The increased sampling frequency also communicates to haulers that compliance screening and enforcement has intensified, which is expected to decrease the amount of "bad actors" over time.

Additional sampling information also provides greater confidence in estimating the process and financial impacts of trucked waste on the LTP. In the baseline assessment (TM1), assumptions were made based on regional trucked waste data; however, this information was not specific to the trucks discharging at the LTP. There is currently a lack of specific data for certain types of wastes, such as LSW discharged at the EHB, and certain wastewater characteristics, such as nutrients. Increased sampling is recommended to include wastewater characteristics of interest for LTP operations. These characteristics may include pH, total solids (TS), total volatile solids (TVS), biochemical oxygen demand (BOD), chemical oxygen demand (COD), and total nitrogen (TKN plus nitrite and nitrate). Characteristics of interest include those that either impact process capacity, effluent quality, and/or biosolids quantity and quality.

Table 4-3 compares benefits and risks associated with increased sampling. Key barriers to implementing this recommendation are confirming adequate capacity within the City's lab for processing additional samples.

Table 4-3. Increased Sampling Program Benefits and Risks

Benefits	Risks/Limitations
• Improved understanding of total suspended solids, inert solids, BOD (or COD), and TKN (i.e., nutrient) loading to the LTP • Project future loading conditions more accurately • Improve accuracy of capacity assessment analyses • Data can be used to implement concentration-based tipping fees • Improved monitoring and compliance enforcement for wastes with unacceptable characteristics based on permitted ranges	• Marginal increase in operating costs • Potential capacity limitations within existing LTP lab to process additional samples • Requires additional staffing to increase sampling (i.e., increased sampling may not be feasible with current staffing)

Timeline. Increase sampling in 2023 with oversight by Program manager. Create and manage a Program sampling plan to document frequency and analytes for each trucked waste type. Leverage sampling plan to audit monitoring efforts relative to the plan's goals.

Costs. Table 4-4 summarizes annual operating costs for sampling. The annual costs presented is 57 percent higher than baseline conditions, but represents a relatively small cost compared to other running annual operating costs. Compared the current number of samples, the additional costs cover an assumed increase in analyses by 33 percent for COD, 13 percent for TS, and 80 percent for TVS. This cost also assumes 624 TKN analyses are added. TM2 presents a comparison between baseline conditions and the recommended increase in sampling (Appendix B).

Table 4-4. Increased Sampling Costs

Item	Annual Cost
Annual Sampling Costs	$47,000 per year

Costs rounded to nearest thousand dollars

4.1.3 Implement Flow Restriction Program

The City has observed decreased ultraviolet transmittance (UVT) in the LTP disinfection process when leachate or compost waste is received in significant volumes during wet weather events. At a certain threshold, the amount of waste with humic-like materials is expected to decrease the UVT and increase energy requirements for disinfection. TM1 considered these costs in the unit cost to treat leachate waste. Equalizing or pre-treating these wastes are a challenge considering the physical and financial requirements, respectively; therefore, the recommended action is to implement flow restrictions for wastes categorized to contain "humic-like materials" during wet weather events. Wastes can be restricted to a maximum daily volume, or to zero discharge during wet weather altogether (e.g., permit conditions could state no leachate waste may be discharged when there is measurable precipitation at the LTP).

Flow restrictions are already implemented at the LTP by environmental compliance but are challenging to enforce without staff available to closely monitor haulers. Another option is to specify a surcharge on leachate wastes during wet weather. This would allow for leachate to be accepted, but should incentivize waste producers to either equalize flow or optimize leachate deliveries before wet weather events. If haulers are willing to pay the surcharge, then additional revenue could be used to offset the additional power required to operate at decreased UVT.

Timeline. Document flow restriction program in an enforcement action plan and in hauler permits. Update documentation and focus on enforcement during 2023 with oversight by Program manager.

Costs. Table 4-5 compares benefits and risks for implementing flow restrictions.

Table 4-5. Benefits and Risks of Implementing Flow Restrictions

Benefits	Risks
• Potential to decrease impacts to UVT during wet weather events	• Flow restriction of trucked wastes only may not address largest leachate discharger: Mecham pipeline • Requires close monitoring to enforce compliance (i.e., stated policy may not be sufficient) • May incentivize illegal leachate discharges

4.2 Capital Improvement Projects

These enhancements would require capital improvements to install new equipment, instruments, and/or facilities. Capital cost presented in this section have additional details shown in Appendix E, including subtotals for construction costs, construction markups, and project markups.

4.2.1 Reroute Trucks

TM2 recommended rerouting all EHB trucks around the east side of digesters instead of the current routing through the LTP's middle road (the west side of digesters). This redirection alleviates truck traffic down a corridor that is frequently used by plant staff and chemical deliveries. The other advantage is that the road on the east side of the digesters has adequate width to accommodate staging. HSW trucks, already routed along this route, can use this area for staging. The rerouting of LSW trucks along this route can allow for LSW trucks to stage in a similar location or adjacent to the EHB. This recommendation aims to keep truck traffic outside of corridors shared by other users, such as plant staff and chemical deliveries. Signing and striping is required to update traffic directions to haulers.

Table 4-6 compares benefits and risks associated with rerouting trucks.

Table 4-6. Rerouting Truck Traffic Benefits and Risks

Benefits	Risks
• Routing all EHB and HSW trucks on east side alleviates congested middle road • Improves temporary gravel roadway adjacent to EHB with asphalt road	• Monitor to verify haulers do not take a "shortcut" down the middle road • Increases truck traffic on roadways adjacent to the EHB • Potential for traffic congestion along road east of digesters, especially if Program expands

Timeline. Reroute trucks in 2023 by first using temporary traffic signals. Install new, permanent striping and signage if new traffic plan improves traffic conditions.

Costs. Table 4-7 summarizes capital costs for new striping and signage to reroute trucks. The total cost for rerouting truck traffic around the EHB is estimated at $790,000 and is mainly influenced by the cost required to improve gravel roadways to asphalt concrete.

Table 4-7. Rerouting Truck Traffic Costs

Item	Project Cost
Striping and Signage to Reroute Trucks	$15,000
Improve Gravel Roadway around EHB to Asphalt Concrete	$790,000

Costs rounded to two significant figures

4.2.2 Add Automation to HSW Receiving Station

The HSW receiving station currently requires one operator to assist trucks with offloading by manual actuation of valves. Valve actuation ensures the pump is properly switched between fill and recirculation modes, and that the rock trap is primed with process waste or utility water such that the fill pump does not run dry. The operator also records changes in the HSW tank levels to track the approximate gals of HSW that are received. These functions can be automated, allowing haulers to operate the station independent of City staff. This would alleviate the need for a full-time staffer at the HSW receiving station. Automation would also help facilitate off-hour deliveries, if desired, providing additional flexibility for haulers and potentially reducing truck traffic during the week.

Automation could free staff to focus on other tasks, such as sampling and monitoring of trucks; however, operation of the HSW receiving station by haulers would still be required. Haulers would be responsible for connecting corrugated piping to trucks, pressing buttons on the HSW receiving station panel, and verifying that their discharge is complete. However, introduces risk for improper connections to leak trucked waste or improper operation to cause an error or pump damage. Table 4-8 shows benefits and risks with automation.

Table 4-8. Adding HSW Automation Benefits and Risks

Benefits	Risks
• City staff not required to oversee offloading from HSW haulers • Addition of HSW receiving station alarms to supervisory control and data acquisition (SCADA) • Potential to leverage automation for off-hour deliveries	• Requires HSW haulers to operate system correctly • No staff gatekeeper to monitor truck discharges directly • Spilling truck waste is more likely without oversight from City staff

Timeline. This enhancement alternative is not recommended for implementation. Risks associated with allowing haulers to operate the HSW receiving station outweigh potential benefits at this time.

Costs. Table 4-9 summarizes capital and annual costs associated with HSW automation.

Table 4-9. Adding HSW Automation Costs

Item	Project and Annual Costs
Capital Cost for Design and Construction	$530,000
Annual Maintenance and Replacement Costs (1 percent of Project Cost)	$5,300 per year

Costs rounded to two significant figures

4.2.3 Construct New Septage Receiving Station

A new septage receiving station could provide additional pre-treatment of LSW and/or septage waste and would allow the station to be moved to a more convenient or less congested location. A new receiving station could consist of a valve and rock trap or could also include grinders, pumps, screening, and compaction. Table 4-10 presents technologies that provide pretreatment and could be included in a new septage receiving station. Technologies in Table 4-10 include the ability to monitor pH and conductivity as haulers discharge, and the station could be operated independent of City staff if a panel is designed to interface with haulers.

Table 4-10. Septage Receiving System Suppliers

Equipment Name	Vendor	Features[a]	Unit Capacity
Honey Monster	JWC Environmental	Actuated valve, rock trap, Muffin Monster (sludge grinder), auger screen and compactor, pH and conductivity sensors	400 or 600 gpm
SPIRALIFT SR30 Septage Receiving Station	Franklin Miller, Incorporated	Actuated valve; rock trap; cutting chamber (sludge grinder); spiral Screen and compactor; pH, conductivity, and level sensors	350 gpm
Septage BEAST	Saveco (formerly Enviro-Care)	Dual inlets, actuated valve, drum screen, auger compactor	450, 650, or 875 gpm
OR-TEC Septage Receiving Unit	OR-TEC, Incorporated	Motorized valve, integrated rock trap, basket screen, compactor	up to 400 gpm
Dusky Shark	Hydrodyne Engineering	Flow-through 3-9 mm screen (rock, rag, FOG capture)	up to 1,300 gpm

gpm = gallons per minute

a. Listed features demonstrate minimum equipment and instruments offered by vendor according to correspondence or brochure.

The cost for a new septage receiving station varies depending on the desired size and features. The cost estimate for this evaluation assumed a single septage receiving station installation including a rock trap, grinder, pH/conductivity monitor, plug valves, screening, and compaction. Figure 4-1 shows the approximate size required for the layout of a single septage receiving station, not including the staging area for a truck.

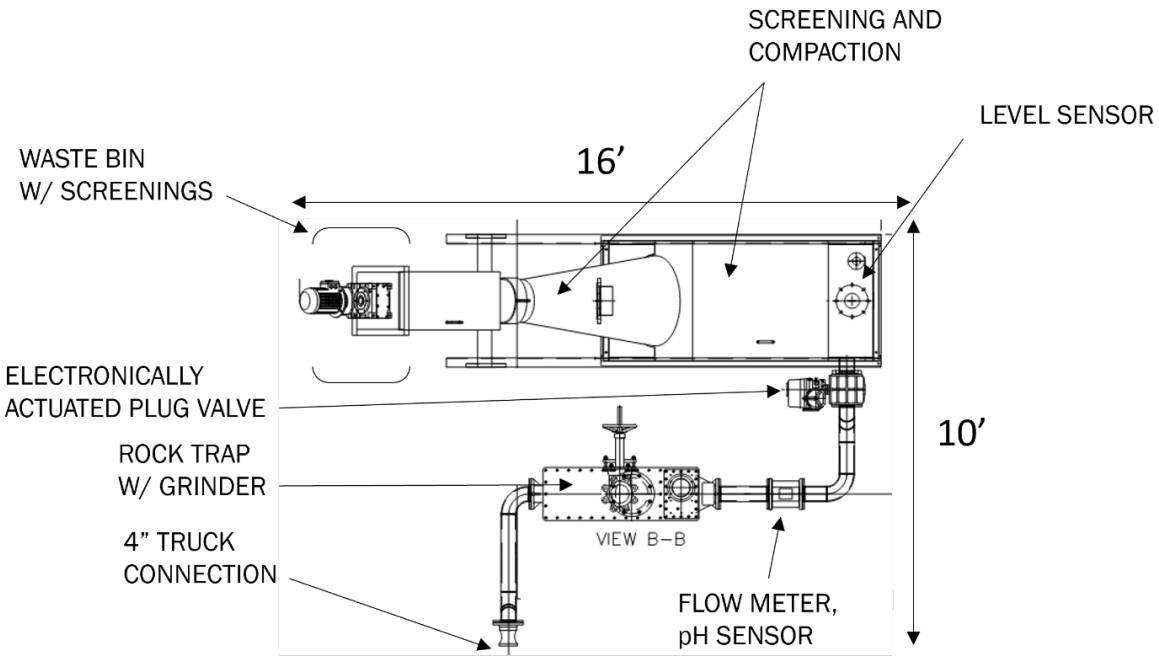

Figure 4-1. Example of new septage receiving station layout and features

Table 4-11 compares benefits and risks associated with a new septage receiving station.

Table 4-11. New Septage Receiving Station Benefits and Risks

Benefits	Risks
• Allows septage receiving station to be relocated • Could improve screening of septage contaminants, assuming screening and compaction equipment is installed[a] • Provides online pH and conductivity measurements, assuming instruments are installed[a] • Provides online flow measurements, assuming flow meter is installed[a] • System can be integrated into trucked waste management software • Although labeled as a "septage receiving station," the receiving station could investigate designs to accommodate other waste types (e.g., LSW)	• Higher capital cost to implement relative to maintaining current septage receiving station • Relocation of septage receiving station offsite would require hiring additional staff or locating a technician to the new receiving station to monitor wastes for compliance

a. Costs assume all features installed for a single truck connection point at the receiving station

Timeline. Coordinate site layout for new septage receiving station with BMSP . Design septage receiving station starting in 2023 and start construction in 2024. Implement the planning, design, and construction of this facility concurrent with a new Wastehauler Station (see Section 4.2.4).

Costs. Table 4-12 summarizes capital and annual costs for a new receiving station.

Table 4-12. New Septage Receiving Station Costs

Item	Project and Annual Costs
Capital Cost	$1,400,000
Annual Maintenance and Replacement Costs (2 percent of Project Costs)	$28,000

Costs rounded to two significant figures

4.2.4 Construct New Wastehauler Station

The current wastehauler station is a small building located adjacent to the septage receiving station. The current location is adjacent to discharge locations and allows waste haulers to bypass the building. Waste haulers have been observed to start discharging waste before checking in to the kiosk, which does not allow staff the opportunity to sample for compliance before discharge. The current building is not equipped with a dedicated workspace for staff. A new Wastehauler Station is recommended to improve compliance and provide a dedicated space for Program technicians. A new Wastehauler Station would include office space for new technician staff (including desks, a kitchenette, and a restroom), a window for hauler check-in with technicians, a fridge for sample preservation, and bench space for lite analytical equipment (e.g., pH probes). A sketch of these features is presented on Figure 4-2. This evaluation also considered footprint required to expand the lab to include a dedicated laboratory space if a more robust sampling and analytical measurement program is desired for trucked waste monitoring. This would require larger dedicated fume hoods and instruments for measuring critical parameters such as COD, TS, TVS, TKN, and total phosphorus; however, if the City's lab has capacity to process the recommended additional samples, a separate lab space is not necessary.

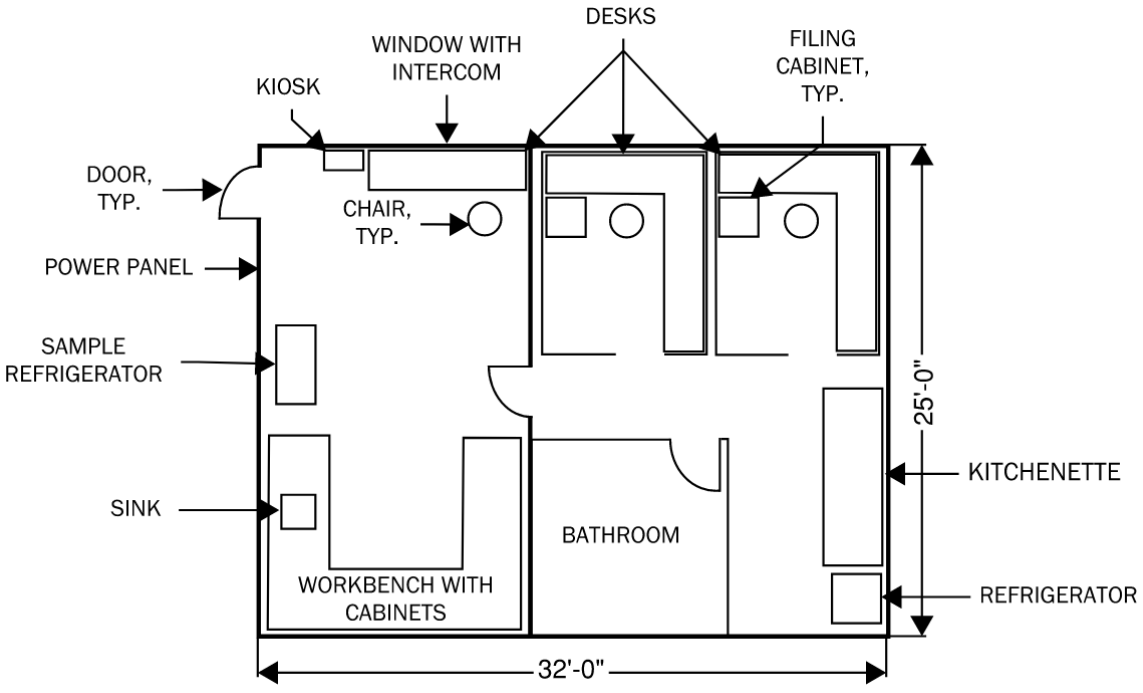

Figure 4-2. Conceptual drawing of new wastehauler station

The new Wastehauler Station should be located along the truck route and before receiving stations. All trucks should be required to pass and check-in at this Wastehauler Station prior to discharge. This is anticipated to improve compliance monitoring. The location should be evaluated with the BMSP to coordinate site layout efforts.

Table 4-13 compares benefits and risks associated with a new Wastehauler Station.

Table 4-13. New Wastehauler Station Benefits and Risks

Benefits	Risks
• Provides necessary workspace for additional technicians • Location requires trucks to check-in prior to discharge • Adds capacity for lite analytical measurements and storage of sample bottles	• Along with other capital project, requires a greater increase in tipping fees to recover costs in 10-year return period • Introduction of full laboratory equipment may increase building costs and adds safety risk[a]

a. Full laboratory equipment not included in conceptual drawing or capital cost estimate

Timeline. Coordinate site layout for new Wastehauler Station with BMSP. Design building starting in 2023 and start construction in 2024. Implement the planning, design, and construction of this building concurrent with a new septage receiving station (see Section 4.2.3). In the interim, purchase amenities to accommodate full-time technician staff and instruments for sampling.

Costs. Table 4-14 summarizes capital costs for this recommendation.

Table 4-14. New Wastehauler Station Costs

Item	Project Cost
New Wastehauler Station Project Capital Cost	$610,000

Costs rounded to two significant figures

4.2.5 Addition of pH probe for online monitoring of Septage Receiving and EHB

Adding pH probes at the EHB or septage receiving station provides the benefit of online monitoring of pH measurements for waste before it is received at the headworks. Alarms can indicate locally and to SCADA to assist operators and Program technicians with identifying non-compliant waste streams. In addition to monitoring waste, the presence of this system is anticipated to incentivize haulers to be more diligent about bringing compliant waste to avoid being restricted from discharging.

Figure 4-3 shows an example of the sampling setup required for a pH monitoring system with a dedicated enclosure to protect equipment and instruments. The pH probe is kept wetted using a pump that extracts flow from either the EHB or septage receiving station whenever a truck is discharging. A flow transmitter signals a pump to pull the trucked waste flow to a sampling apparatus where the pH probe is located. The sample is returned to a drain after analysis. This enhancement requires a 4-foot by 6-foot footprint to locate the enclosure, which would be above grade and accessible for instrument maintenance and access. Design of a flow impoundment structure would be required in an open channel to back-up flow sufficiently for the pump to pull wastewater samples.

Figure 4-3. Example of pH monitoring station for EHB or septage receiving

Table 4-15 compares benefits and risks associated with adding pH monitoring.

Table 4-15. Adding pH Monitoring to Septage Receiving and EHB Benefits and Risks

Benefits	Risks
• Provides online monitoring of flow to receiving stations to help identify non-compliant dischargers more quickly than with headworks pH monitoring • Potential to catch and prohibit non-compliant dischargers at greater frequency	• Complex system and design to keep pH probe wetted • Requires additional maintenance of instrumentation and equipment • Possibly higher costs depending on requirements for the pH monitoring system. Pre-design should be completed to create a more accurate cost estimate.

Timeline. This enhancement alternative is not recommended for implementation. Hiring of additional Program staff is expected to improve monitoring through additional sampling.

Costs. Table 4-16 summarizes capital and annual costs to add pH monitoring equipment.

Table 4-16. Add pH monitoring to Septage Receiving and EHB Costs

Item	Project and Annual Costs
EHB pH Monitoring System	$490,000
Septage Receiving pH Monitoring System	$490,000
Annual Maintenance and Replacement Costs, per System (1 % of Project Cost)	$4,900 per year

Costs rounded to two significant figures

4.2.6 New Roadway and Entry from Meadow Lane for Trucked Waste

Constructing a new dedicated roadway for trucked waste haulers from Meadow Lane is an attractive alternative because it eliminates truck traffic from the main entrance and southside of the LTP and improves plant staff safety; however, the proposed route introduces several risks. This entry would introduce plant-related traffic along Meadow Lane, which is a road that homeowners use for access and that does not currently receive regular plant-related traffic. The existing roadway is in poor condition and would likely require pavement improvements to handle medium-duty truck traffic. A new gate would be required to allow truck access. This new entry point introduces a potential security risk. Lastly, the proposed route within the LTP fence line is currently unpaved and could impact a protected species, the Tiger salamander. Any project that endangers this species' habitat could be stopped or slowed if required by an environmental assessment report.

Table 4-17 compares benefits and risks for this recommendation.

Table 4-17. New Roadway from Meadow Lane Benefits and Risks

Benefits	Risks
• Greatly improves truck traffic, eliminating congestion within south areas of LTP • Improves safety for plant staff	• Relatively high project costs are expected • Requires improvements of Meadow Lane; Homeowners share roadway • Adds traffic to Meadow Land, potentially impacting neighbors • Potential security concern with unstaffed new point of entry • Project could be stalled or stopped based on environmental assessment

Timeline. Currently, the risks and unknowns outweigh benefits for this enhancement alternative. If changes to the LTP provide an opportunity for this alternative to add value, the City should revisit the concept and prepare planning level cost estimates. For example, if the headworks is relocated north of primary equalization basins, then a separate trucked waste roadway may be more beneficial and worth reconsidering.

4.2.7 Utility Performance System Integration and Analytics

Integration and analytics of utility performance systems can help the Program manager and technicians to make more informed decisions regarding daily operations or long-term planning of the Program. A centralized data repository, mobile data collection, and data visualization could be leveraged to assist with decision making based on digester performance, permitting and compliance, billing, and lab data. The current system of transaction collection for billing is highly automated for waste hauler discharges at the LTP. Manual aspects to support accurate billing include checking reports for duplicate transactions and entering handwritten receipts, and this time is considered minimal. A manual entry process is implemented at the HSW receiving station to document sensor readings during hauler discharges, and this data is entered by operators in an online spreadsheet after each day. A mobile data entry would automatically commit operator data to the central system of record. Dashboards could be created to provide operators a meaningful way to verify Wastehauler information (e.g., billing, compliance, insurance, testing, etc.) to help maintain healthy treatment process operations.

Basic insight into biogas production and near-real-time evaluation of aeration energy consumption can also be included in the first effort. Long term, implementing a centralized system of record could allow for analytics to be developed in Seeq or similar software to optimize the introduction of liquid haulers' waste. These analytics could be descriptive, diagnostic, predictive, and/or prescriptive to allow engineers and operators to optimize biogas production and reduce aeration energy consumption with additions from haulers.

Based on a recent discussion with the City, a structured query language-based data warehouse that integrates the relevant Permitting Information Management System, Laboratory Information Management System, SCADA, Financial Information Management System and the Access Control System data would be the base upon which multiple Power BI dashboards can be built upon. Automated data entry could be completed using tablets.

Table 4-18 compares benefits and risks associated with systems integration and analytics.

Table 4-18. Systems Integration and Analytics Benefits and Risks

Benefits	Risks
• Decreases paper record keeping activities and end-of-day record consolidation • Consolidates important data into a single source to ease reporting and dashboarding • Reduces labor for reporting • Empowers operators and engineers to make informed decisions with haulers • Increases operational efficiency and resiliency through analytics	• Optimization analytics may not be possible with current data • Limited paper records from hauler transactions

Timeline. Based on feedback from the City, this project is recommended for implementation in 2028 and is estimated to take 2 years to complete.

Costs. Table 4-19 summarizes capital and operating costs for this recommendation.

Table 4-19. Systems Integration and Analytics Costs

Item	Project and Annual Costs
Capital Cost	$300,000
Annual Operating Cost	$10,000 per year
Annual Maintenance Cost	$10,000 per year
Annual Energy Cost	$800 per year

Costs rounded to one significant figure

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Section 5

Recommended Enhancements and Rebalanced Tipping Fees

This section presents recommended enhancements for implementation. A NPV analysis was used to evaluate the amount of tipping fee revenue required to operate the Program at a net positive revenue. Rebalanced tipping fees considered market conditions from regional wastewater treatment plants with trucked waste receiving stations.

5.1 Recommended Implementation Schedule

Figure 5-1 presents the recommended implementation schedule for enhancement projects recommended in Section 4. HSW automation or pH monitoring projects are shown as optional but are not recommended or included in the NPV analysis. Traffic sensor improvements were assumed to be included in the UV improvements project and are, therefore, not accounted for in the implementation schedule or rebalanced tipping fees.

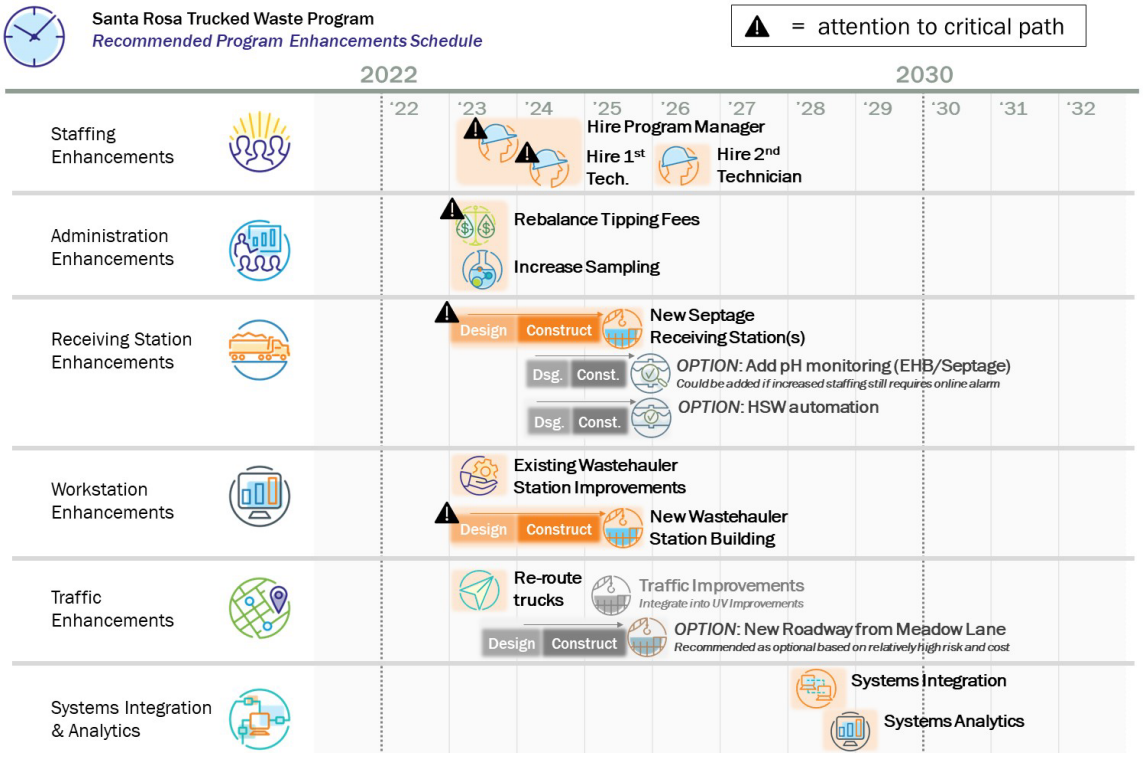

Figure 5-1. Program enhancements implementation schedule

Section 5.1.1 discusses recommended actions for projects denoted with an "attention to critical path" icon

5.1.1 Enhancement Projects with Critical Path

An early start is recommended for the following enhancements. The following lists critical path items that should be prioritized for enhancement projects with high priority, lengthy timelines, or high capital costs.

- **Hire Program Manager and First Program Technician.** Hiring new staff is anticipated to be a lengthy process. Onboarding a Program manager is a key recommendation that should be prioritized. Therefore, the hiring process for a Program manager and Program technician should be started immediately.
- **Rebalance Tipping Fees.** Increasing tipping fees will be required to recuperate costs for new staff, additional sampling, and recommended capital projects. TM1 identified trucked waste categories with an estimated cost to treat that is higher than the current tipping fee. These tipping fees (e.g., leachate, groundwater, wine rinsate, sewer line cleaning) should be increased in 2023. Based on the East Bay Municipal Utility District's (EBMUD) experience (see Section 5.4.2), a period of one month is sufficient notice to communicate rate increases. It is recommended that rate increases are applied to only a portion of the waste categories (see Section 5.4).
- **New Septage Receiving Station.** A new septage receiving station incurs a relatively high capital cost compared to other recommended enhancements. Rebalanced tipping fees are recommended to recuperate these project costs in a 10-year period while generating revenue that is comparable to current operations. Considering the relatively high impact of this project on recommended tipping fees, the City should prioritize considering whether this project is necessary for the Program.
- **New Wastehauler Station Building.** The new wastehauler station building provides monitoring and enforcement value to the Program and would accommodate desks for new Program staff. Similar to hiring a Program manager, a potentially lengthy process to include a new wastehauler station building in the City's capital improvements plan is the reason for identifying this project.

5.2 Net Present Value Analysis

A NPV analysis was completed over a ten-year return period, incorporating enhancement recommendations that either increase capital spending (e.g., building a new Wastehauler Station) or annual operating costs (e.g., increasing sampling and laboratory costs). The following assumptions were used to complete this analysis:

- 10 percent escalation rate for near term construction projects (intentionally high to capture current market risk and uncertainty)
- 3 percent escalation rate for utility performance system integration and analytics project (long-term project)
- 3 percent escalation rate for annual operating costs and energy costs
- 3 percent escalation rate for repair and rehabilitation costs
- Zero percent escalation rate for tipping fee revenues (assumes rebalanced fees are maintained over ten-year period)
- 2 percent discount rate (representing a 2 percent return on United States treasury bonds as an opportunity cost)

Additionally, the analysis assumed trucked waste volume (approximately 51 million gallons per year) and percentage breakdowns (presented in TM 1) resemble baseline conditions over the ten-year analysis period. Three scenarios were evaluated:

- **Scenario 1: Baseline Conditions with No Changes in Tipping Fees.** This scenario assumes tipping fees remain unchanged while annual running costs continue to increase at a 3 percent annual escalation.
- **Scenario 2: Baseline Conditions with Increased Tipping Fees.** This scenario assumes tipping fees are increased to generate additional revenue, but is otherwise identical to Scenario 1. The NPV increases respectively.
- **Scenario 3: Enhancement Projects Implemented with Rebalanced Tipping Fees.** This scenario assumes recommended enhancement projects, shown in Figure 5-1, are implemented. Higher tipping fees are required for this scenario relative to Scenario 2.

Figure 5-2 shows the comparison of NPV results for the three scenarios described above. Scenario 2 would require an additional $400,000 in tipping fee revenue per year to achieve annual revenues similar to baseline conditions, and Scenario 3 would require an additional $900,000 in tipping fee revenue per year. Appendix F presents a description of methodology used to rebalance tipping fees based on a NPV analysis.

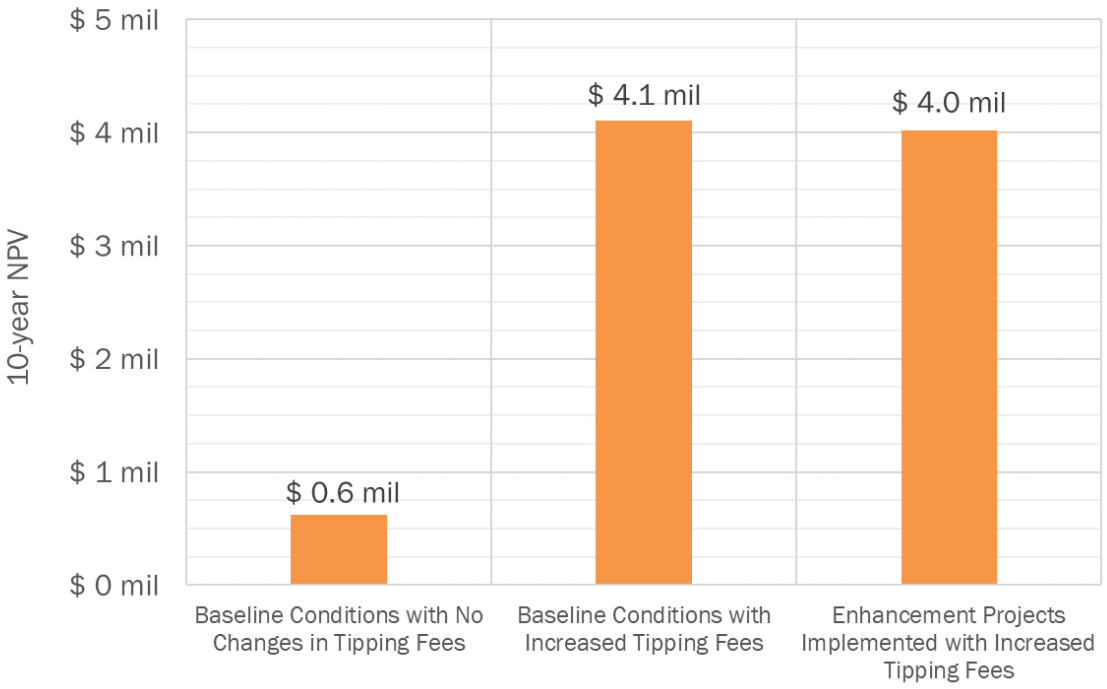

Figure 5-2. 10-year NPV scenarios suggest an increase in tipping fees is required

5.3 Municipal Treatment Plant Market Conditions

Before rebalancing tipping fees, the City's tipping fees were benchmarked against other waste receiving facilities in the region. Rebalanced tipping fees are recommended to be at or below the rates presented in Table 5-1 for the EBMUD, Central Marin Sanitation Agency (CMSA), and Napa Sanitation (NapaSan) to attract haulers. The tipping fee for septage/chemical toilet waste is an exception, as the City's current rate of $130/1000-gal is proven to retain septage haulers and is estimated to generate revenue, despite being higher than EBMUD and CMSA rates. It is also

recommended that the FOG tipping fee is maintained to avoid unintentionally losing grease haulers to other facilities which offer competitive rates.

Table 5-1. Tipping Fee Market Conditions

Trucked Waste Type	City	EBMUD	CMSA	NapaSan
Septic/Chemical Toilet, $/1000-gal	$130	$100 or less	$96	$220
FOG, $/1000-gal	$40	$120 or less	Free to $60	Free to $100
HSW, $/1000-gal	$40	$120 or less	No Applicable	Not Applicable
Gray Water, $/1000-gal	$40	Not Applicable	Not Applicable	Not Applicable
LSW, $/1000-gal	$14 to $20	$2 to $120	$10 (domestic waste)	Not Applicable
Permit Fee, $/year	$206	$350	Renewal: $210 to $630 New: $420 to $1,261	Not known
Monitoring Fee, $/sampling event	None	None	$75	None

In addition to comparison of tipping fee rates against other agencies, the cost to haul wastes was also considered. Assuming trucked wastes are generally sourced closer to the LTP than competing facilities, the estimated cost to haul waste additional miles is relatively high. Table 5-2 assumes a minimum additional cost of approximately $5 or more per trip would be required from haulers attempting to discharge at another facility in the region. This cost would be in addition to competing tipping fees in the region and could be considered when evaluating tipping fees.

Table 5-2. Tipping Fee Market Barriers

Trucked Waste Type	City	EBMUD	CMSA	NapaSan
Address of Treatment Plant	4300 Llano Rd, Santa Rosa	2020 Wake Ave, Oakland	1301 Andersen Dr, San Rafael	1515 Soscol Ferry Rd, Napa
Mileage from LTP Plant, miles	0	55	36	36
25% of Mileage from LTP, miles	0	14	9	9
Annual Mileage Rate, $/mile[a]	$0.63	$0.63	$0.63	$0.63
Cost for Additional Mileage, $/load	$0.00	$8.80	$5.70	$5.70

Note: Values rounded to two significant figures

a. Based on United States International Revenue Service standard mileage rate; accessed June 2022

5.4 Recommended Tipping Fees

Adjustments to tipping fees are recommended to achieve the following three criteria:

1. **Retain existing haulers.** A comparison to receiving stations within the region was completed to evaluate whether increases would be likely to incentivize haulers to take waste to another treatment plant (see Section 5.3). Rebalanced tipping fees should avoid unexpected decreases in volume, which would therefore decrease the predicted revenue stream to cover program enhancement costs. Certain wastes such as FOG and septic/chemical toilet were maintained to mitigate risk of losing FOG waste and based on feedback from the City that the septic/chemical toilet waste is in a “sweet spot” that has been tuned from rate adjustments in the past.

2. **Net positive revenue return over 10-year period.** Tipping fees are rebalanced such that the Program is estimated to return a net positive revenue for the City over a 10-year period. Tipping fees generate revenue to pay for enhancement projects recommended as an investment in the City's ability to effectively manage the Program and mitigate risks to the LTP treatment performance. The annual return was targeted to match baseline revenue determined in TM1.
3. **Avoid net costs for individual wastes.** Tipping fees are rebalanced to cover costs to treat each waste type, such that no single waste type may operate at a deficit. The cost to treat includes administration and annualized project capital costs.

The rebalanced tipping fees shown on Figure 5-3 would be required from 2023 to 2032 to recover costs and operate at a net positive revenue that matches baseline conditions. Incremental increases could also be implemented to avoid price shock with haulers. This approach is presented in section 5.4.1. The City should consider recovering costs while balancing risk. Rate increases could be tested for certain waste types that contribute relatively low flow and revenue to the Program before implementing hikes across all waste types. Significant rate increases could result in turning away haulers completely if the cost is uneconomical for their operations, however, this approach may be desired for wastes that pose greater compliance risks to LTP.

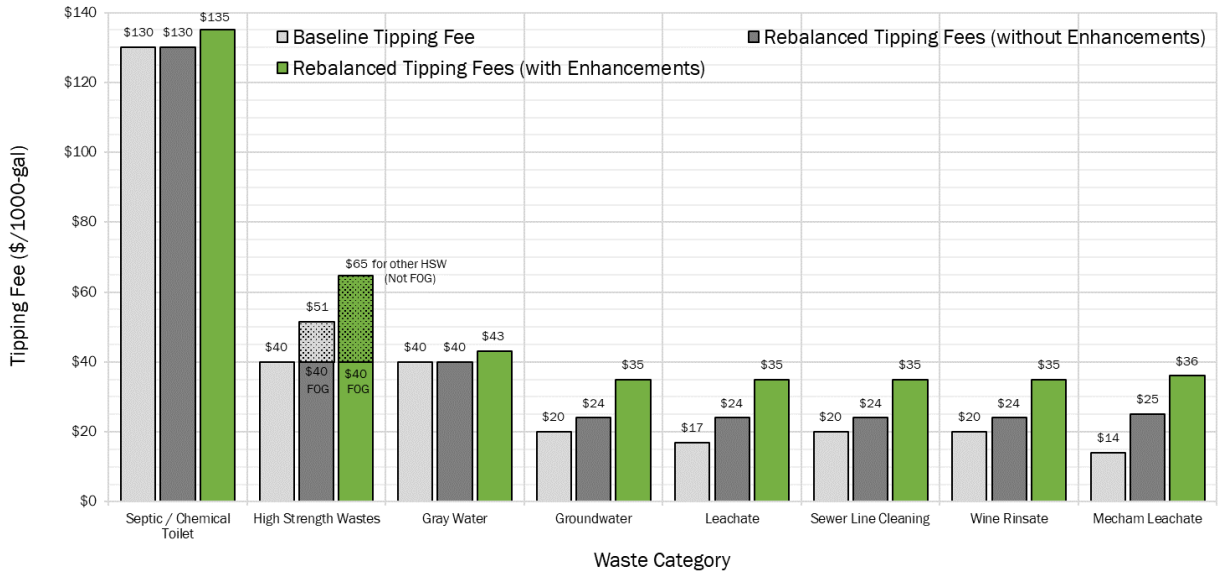

Figure 5-3. Treatment costs and recommended tipping fees to cover enhancement project costs

As demonstrated in Figure 5-3, generally the LSWs (groundwater, sewer line cleaning, wine rinsate) have the greatest opportunity to generate additional revenue. Findings from TM1 already demonstrated that there are relatively small profit margins associated with LSW relative to the estimated treatment costs for each waste type. Leachate wastes have the largest recommended increase, nearly double the baseline tipping fee values. The increase in influenced by treatment costs assumptions in TM1, which are relatively high to cover increased power demand costs estimated from leachate's impact on UVT.

FOG waste is recommended to be maintained at $40 per 1000 gals to retain the customer base and continue production of biogas. To generate net positive revenue from the aggregate HSW category, it is recommended that all other HSW (i.e., non-FOG HSW) is charged a higher tipping fee to recuperate

overall costs associated with maintenance of the HSW receiving station and cogeneration engines. In comparing the recommended HSW tipping fee to other facilities such as EBMUD, the increased value is not obviously higher than market conditions; however, the increase is over 50 percent of the baseline value and could still pose a shock to haulers.

Tipping fees should be rebalanced any time Program changes are implemented, and regular evaluation of annual costs and revenues is recommended to verify that tipping fees are appropriate to generate a net positive revenue for the City (see example Program manager description in Appendix D). Changes accounted for market conditions by comparing fees charged by other wastewater treatment plants in the region; however, other facilities have the ability to either increase or decrease their fees and therefore market conditions should be reviewed at least annually before evaluating tipping fees and renewing hauler pemits.

5.4.1 Incremental Tipping Fee Increases

Table 5-3 presents a range of values recommended for implementation in 2023 through 2032. Appendix G includes figures that present this data graphically. Values presented for 2023 are lower than those shown in Figure 5-3 and are less significant of a change relative to baseline values. Although this strategy mitigates some risk discussed in Section 5.4, there are still relatively high increases for leachate waste relative to baseline values. In an attempt to avoid a price shock to haulers, gradually increasing tipping fees is recommended to minimize risks of losing customers and revenue altogether. BC recommends annual evaluation of the Program costs, benefits, and revenue in coordination with enhancement projects' lifecycle costs to determine if tipping fees are still sufficient.

Table 5-3. Incremental Increasing Tipping Fee 10-year Implementation Schedule

Waste Type	Baseline Tipping Fees	Rebalanced Tipping Fees without Enhancements (2023–2032)	Rebalanced Tipping Fees with Enhancements (2023–2032)
Septage Receiving			
Septic/Chemical Toilet	$130	$130 - $130	$130 - $145
HSW Receiving			
FOG Waste	$40	$40 - $40	$40 - $40
Non-FOG Waste	$40	$47 - $56	$56 - $76
EHB			
Gray Water	$40	$40 - $40	$40 - $50
Groundwater	$20	$21 - $28	$28 - $41
Leachate	$17	$21 - $28	$28 - $41
Sewer Line Cleaning	$20	$21 - $28	$28 - $41
Wine Rinsate	$20	$21 - $28	$28 - $41
Mecham Leachate	$14	$22 - $29	$30 - $43

Depending on the City's risk tolerance, lower tipping fees (e.g., using recommended values if no enhancements are implemented) could be instituted in the near term and the new Program manager could evaluate actual net annual revenues against predicted revenues. Regardless, it is recommended that tipping fees are tested or increased before implementing enhancement alternatives such as constructing a new septage receiving station or hiring a second technician. The market should be tested to verify whether increases in tipping fees will still retain truck discharges and revenues to avoid the risk of stranded assets.

5.4.2 Timeline for Tipping Fee Increases

An increase in tipping fees should consider a sufficient timeline for reviewing operating costs, determining new tipping fee rates, and notifying haulers. For example, the EBMUD typically reviews their trucked waste program operating and treatment costs against their tipping fee revenues at the end of their fiscal year. At a minimum, tipping fees are set above the estimated cost to treat. Tipping fees may also be adjusted to either incentivize or discourage certain wastes. Recommended tipping fee adjustments are reviewed and finalized, then new annual tipping fees are communicated to haulers in December and are applied in January. This process occurs over a four to six month period and provides a one month notice to haulers. Some other notes from EBMUD's experience include:

- Rates are only increased for a fraction of the waste types permitted within the trucked waste program. About 25 percent of the permitted waste types may experience rate increases in a given year. For Santa Rosa, this may suggest increasing tipping fees for about three waste types per year.
- Rate increases of approximately 20 to 25 percent relative to the previous rate is not typically considered excessive.

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Section 6

Conclusions and Next Steps

The baseline assessment determined that the Program is currently operating at a net positive revenue. Revenues from tipping fees and benefits from electrical purchase offsets are higher than costs to administer the Program and treat trucked waste loads at LTP. Program enhancements were identified to improve monitoring, compliance, and safety. These enhancements provide value to LTP operations and administration.

Program enhancements alternatives were reviewed and developed with City staff (see Appendix H for meeting notes) to determine which alternatives provided highest value to the Program within the next 10 years. Enhancements were evaluated based on benefit, risk, and costs. Costs for each recommended enhancement and estimated revenues or cost savings were used to develop a 10-year NPV analysis. An implementation schedule was prepared for Program enhancements, and rebalanced tipping fees were recommended to continue operating the Program at a net positive revenue. Several of the rebalanced tipping fees are 50 to 100 percent higher than the current rates; it is recommended that the City adjust rates prior to implementation of all projects to confirm what rates the market will allow to avoid the risk of stranded assets.

Next steps are to monitor the progress of implemented tipping fees and enhancements, including the hiring of new key staff and increasing sampling of trucked wastes. Enhancement projects requiring high capital costs, such as a new Wastehauler Station or new septage receiving station should be implemented after monitoring revenue and trucked waste volume received with rebalanced tipping fees. The Program manager should review annual revenues and costs associated with the Program to verify continued operation at a net positive revenue to the City and adjust the Program implementation plan as needed.

Additional considerations regarding process capacity, Program expansion, and future regulatory conditions have been deferred to the City's BSMP. It is recommended that the BSMP considers alternatives that increase Program revenue while minimizing risk and mitigating capacity bottlenecks. Potential risks associated with increasing tipping fees should also be considered.

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Section 7

Additional Considerations

This study evaluated baseline operations and provided recommendations for improvement. Interdependencies between treatment capacity, Program expansion, and market/regulatory conditions will be evaluated as part of the City's BSMP.

Capacity Limitations. This evaluation specifically avoids any recommendation for Program expansion. Capacity is limited based on anecdotal evidence provided by the City. Recuperative thickening was noted as periodically required to maintain target digester retention times, and low pressures in the gas conditioning system was noted during periods with high gas flow (e.g., near or above 500 standard cubic feet per minute). Addressing capacity limitations could allow for Program expansion to maximize benefits from the Program.

Program Expansion. Aside from increasing volumes of existing trucked waste types (e.g., accepting more FOG waste), the Program could expand to include new waste types. Food waste, which California senate bill 1383 bans from landfills, could be added to digesters for additional energy production. Any Program expansion would require evaluation of existing capacities and could require new construction of additional treatment unit processes. Simultaneously, additional unit processes could accommodate potential population growth.

Market and Regulatory Conditions. In addition to increased biogas production, additional solids received for co-digestion with municipal wastewater would result in an increase in biosolids production. Furthermore, certain waste types could contribute contamination in the form of grit or microplastics. Changes in biosolids production should consider end-uses, which may be limited by regulations such as senate bill 1383 or potential regulatory restrictions on substances such as per- and polyfluoroalkyl substances (PFAS).

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Section 8

Limitations

This document was prepared solely for the City of Santa Rosa in accordance with professional standards at the time the services were performed and in accordance with the contract between the City of Santa Rosa and Brown and Caldwell dated November 9, 2021. This document is governed by the specific scope of work authorized by the City of Santa Rosa; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the City of Santa Rosa and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 9

References

Brown and Caldwell. *Santa Rosa Trucked Waste Program Workshop 3.* May 16, 2021

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Appendix A: Program Administration Assessment TM1

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Technical Memorandum

FINAL

Prepared for: City of Santa Rosa

Project Title: Trucked Waste Program

Project No.: 157568.001.002

Technical Memorandum 1

Subject: Administration and Baseline Assessment

Date: April 27, 2022

To: Renae Gundy, Project Manager, Environmental Compliance

From: Alison Nojima, Project Manager, Brown and Caldwell

Prepared by: _____
Alison Nojima, P.E., License No. C84933

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Limitations:

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Section 1: Introduction

The City of Santa Rosa (City) is evaluating the Trucked Waste Program (Program) at the Laguna Treatment Plant (LTP) to identify potential programmatic, physical, and process-related improvements. This study reviews the current Program operation using the City's direct feedback from Workshop 1 and will provide the City with recommendations and an implementable plan. This administration and baseline assessment, Technical Memorandum 1 (TM1), establishes the Program's baseline operation. TM1 includes operating costs and revenues and a solids-water-energy balance of the anaerobic digestion system, combined heat and power (CHP) system, and post-digestion solids handling. The baseline operation will be compared with optimizations and process enhancements, including the option to expand the Program, in TM2. TM1 also includes an assessment of the Program administration and recommendations to discuss with the City during Workshop 2.

The key subjects that will be discussed in TM1 include:

- Estimations on revenues and costs
- Regulatory requirements and permits
- Staff administrative effort to manage program
- Maintenance and lab effort to maintain assets and measure samples
- Offloading and vehicle routing
- Billing process, system, and rates
- Monitoring program
- High-strength waste feedstocks

Deliverables associated with this study include:

- TM1: Administration and Baseline Assessments
- TM2: Trucked Waste Facility Process and Physical Enhancements
- Final Report: Trucked Waste Program Evaluation Report

Section 2: Baseline Operation

Baseline operation was established based on flow and loading data received from the City. Information was received as daily operations data from January 1, 2020 through November 23, 2021, as monthly and annual reports, and as email correspondence. A solids-water-energy balance was performed for the LTP solids treatment process to verify assumptions for digester feed contributions, digester gas production, CHP power production and heat recovery, and biosolids production. The solids-water-energy balance represents annual average performance and is presented in Attachment A. This section summarizes findings from the mass balance, highlighting impacts of the Program on the solids treatment processes at LTP.

2.1 Trucked Wastes

Trucked waste received at LTP may be categorized into three main types:

- High-strength waste (HSW),
- septic or chemical toilet waste, and
- other trucked wastes, which discharge to the LTP headworks.

HSW is collected at the HSW receiving station then sent to mesophilic anaerobic digesters where it is co-digested with primary sludge (PS), thickened waste activated sludge (TWAS), and scum. Septic waste is collected at a septage receiving station and is typically routed to the liquid treatment headworks. Other waste haulers are routed to the emergency holding basin (EHB). The EHB flow is routed to headworks, similar to septic waste, but with storage and equalization.

Table 2-1 summarizes the fraction of trucked waste types sent to the liquid and solids treatment processes. As demonstrated by the solids-water-energy balance:

- trucked wastes have a relatively low flow contribution to the liquid treatment process, and
- HSW trucked wastes have a relatively high flow contribution to the solids treatment process.

Table 2-1. 2021 Trucked Waste Contributions to Liquid and Solids Treatment Flows

Trucked Waste	Flow Fraction of Liquid Treatment[a]	Flow Fraction of Solids Treatment[b]
Gray Water, Groundwater, Sewer Line Cleaning, Wine Rinsate	0.06%	Routed to Liquid Treatment
Septic/Chemical Toilet	0.12%	Routed to Liquid Treatment
Leachate	0.08%	Routed to Liquid Treatment
Pipeline Leachate	0.21%	Routed to Liquid Treatment
High-strength Wastes	Routed to Solids Treatment	8.57%

a. Based on 15.3 million gallons per day (mgd) liquid treatment flow rate
b. Based on 0.158 mgd solids treatment flow rate

2.1.1 Trucked Wastes to Liquid Treatment Process

The types of trucked waste categories received at headworks include septic and chemical toilet wastes, gray water, groundwater, leachate, sewer line cleaning, and wine rinsate. Septic and chemical toilet wastes are considered high strength and are sent to headworks as they are discharged at the septage receiving station. Other trucked wastes are discharged throughout the day at the EHB and go to headworks as they are discharged. Flows received at the EHB have the potential to be equalized.

Leachate and trucked wastes containing humic materials are received at the EHB. These wastes negatively impact ultraviolet transmittance (UVT) and typically are delivered in higher quantities during wet weather events when UV disinfection is already operating at or near capacity. The City noted an event where UVT dropped significantly during a storm in October 2021, which created a compliance risk. The City estimates an additional $4 per thousand gallons[1] is required to treat leachate, which accounts for the increased power requirement to compensate for lower UVT.

Trucked wastes received at the liquid treatment process are assumed to have negligible impact on PS and TWAS pumping flow rates to the solids treatment system. The solids-water-energy balance did not evaluate the impact of trucked wastes on PS and TWAS loading. Additional sampling data for trucked wastes sent to the liquid treatment process could help refine the estimated contribution of these wastes to the solids treatment process.

[1] Email dated September 27, 2013, from Joseph Schwall regarding “Increase in Landfill Leachate Fee” based on leachate received on August 26 and subsequent decrease in UVT observed at LTP. Difference in electrical load to UV system due to leachate addition was used to estimate an additional energy cost per gallon of $0.004 per this email.

2.1.2 High-strength Wastes to Solids Treatment Process

HSW is routed to the solids treatment process directly. The HSW receiving station includes two rock traps and four HSW tanks with heat tracing. The rock traps are used to remove inert solids and debris to protect downstream equipment. Chopper pumps assist with HSW truck offloading to the above-grade tanks and recirculate the HSW.

The HSW receiving station receives six main categories of trucked waste, as shown on Figure 2-1. Historically, fats, oils and grease (FOG) and brewery wastes have been the two highest annual contributions to the HSW receiving tanks; however, brewery waste has recently been eliminated from the HSW program. FOG waste continues to be a major contributor to the HSW receiving station in terms of volume. Sampling of each category of HSW could help the estimated loading contribution from each category.

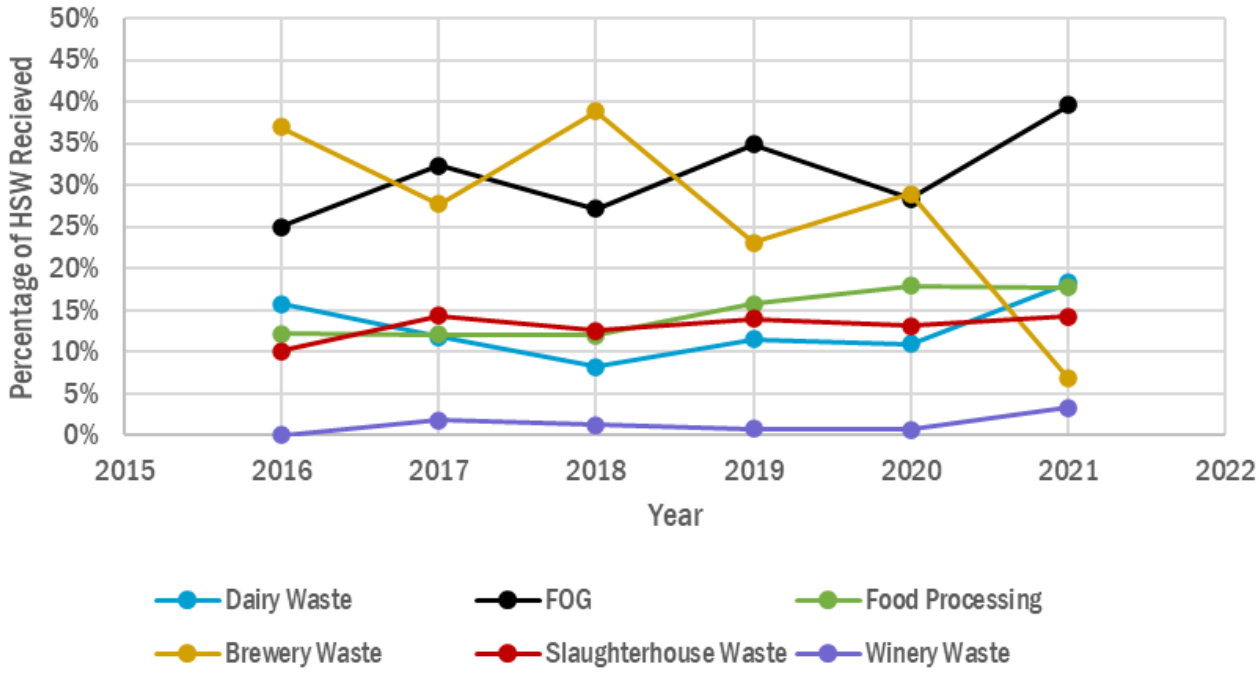

Figure 2-1. Percentage of HSW received by year

2.2 Digester Feed

Digester feed consists of HSW, PS, TWAS, and scum. PS is thickened in primary clarifiers and WAS is thickened with gravity belt thickeners to minimize the amount of digester volume required, as digester capacity is rated on both hydraulic retention time (HRT) and the organic loading rate (OLR). Addition of trucked HSW decreases the HRT and increases the OLR in digesters.

Table 2-2 summarizes baseline annual average HSW, PS, and TWAS flows and loads to digesters based on the solids-water-energy balance. HSW contributes approximately 10 percent of flow and volatile solids loading to digesters. This has a measurable impact on capacity and digester gas production.

Table 2-2. Digester Feed Flows and Loads				
Item	HSW	PS	TWAS	Digester Feed
Flow, gpd	16,500 (10%)	95,300 (60%)	46,200 (30%)	158,000
Total Solids Load, lb/d	5,680 (9%)	37,200 (60%)	19,300 (31%)	62,200
Volatile Solids Load, lb/d	5,400 (10%)	32,000 (60%)	16,000 (30%)	53,400
Volatile Solids Reduction Load, lb/d	4,880 (15%)	21,100 (66%)	6,080 (19%)	32,100

Notes: Scum flow and load is considered negligible relative to sludge production. Values rounded to three significant figures.
lb/d = pounds per day

2.3 Digester gas and Energy Production

Volatile solids digested in anaerobic digesters generate digester gas, which is used as the primary fuel in the CHP facility. Natural gas is also used in the CHP engines and is blended with digester gas as needed. Two of the engines are approved for use with only natural gas but this is not the typical practice. Digester gas has a lower energy and heat recovery potential than natural gas, which is related to the methane content in each. Other constituents in digester gas, such as hydrogen sulfide, moisture, and siloxanes, must be removed before digester gas can be used in CHP engines.

Table 2-3 shows typical ranges of digester gas production from digesters per unit of volatile solids destroyed. Typical ranges of CHP engine energy production and thermal recovery values are also presented. Digester gas production is on the higher end for mesophilic digestion due to co-digestion of HSW. The baseline mass balance suggested 37 percent energy recovery efficiency and 35 percent thermal recovery efficiency for CHP engines are appropriate assumptions.

Table 2-3. Digester Gas and Energy Production Assumptions		
Item	Range	Baseline
Digester gas production, cf/lb-VS[a]	12 - 18	16
CHP Electrical Efficiency, %[b]	37 - 42	37
CHP Thermal Efficiency, %[b]	35 - 43	35

a. Industry standard range for mesophilic anaerobic digesters.
b. Metcalf and Eddy, 5th Edition. The LTP engines are Cummins C1100 N6C 1100 kW engines with a lower heating value electrical efficiency rated at 40.3 percent.
cf/lb-VS = cubic feet per pound of volatile solids

Table 2-4 summarizes digester gas and natural gas contributions to the CHP engines and energy production. At least 15 percent of digester gas production is attributed to HSW, which translates to more than 11 percent of CHP energy production from HSW feed stocks. Based on assumed low-strength waste characteristics (Appendix A), there is negligible low-strength waste contribution to digester gas production.

Table 2-4. Digester Gas and Natural Gas Usage for CHP Engines			
Item	Natural Gas	Digester Gas	CHP Total
Gas consumption, cubic feet per day	105,000	508,000	613,000
Lower heating value British thermal units per cubic foot	952	551	--
Energy Produced, kilowatt hours per day	10,800 (26%)	30,300 (74%)	41,200

Annually, about 1 percent of digester gas is flared, resulting in a lower annual average gas flow rate from digesters than is produced. Digester gas flare was required 58 days in 2020 and 82 days in 2021. There are days when significant wasting is required due to capacity constraints in the gas conditioning system, which is sized for 500 standard cubic feet per minute. The gas conditioning system is a bottleneck with regard use of any additional digester gas that may be generated from increased HSW loading to the LTP.

Natural gas blending helps stabilize CHP engine output to account for variable digester gas production. There is no digester gas storage within the system. Natural gas is purchased; however, the value of electricity produced with the natural gas exceeds the cost. The baseline mass balance suggests 26 percent of the energy production from CHP engines is attributed to natural gas usage. Limitations to natural gas usage in the CHP engines are described in Section 3.2 Regulatory Requirements and Permits.

Heat recovery provides approximately 48 million British thermal units per day (MMBTU/d) of heat to digesters. The solids-water-energy balance provides an estimated thermal recovery potential of 133 MMBTU/day (d); however, based on historical data, approximately 50 MMBTU/d is used to heat digesters. This demonstrates an excess heat recovery capacity.

2.4 Biosolids Production

The volume of post-digestion biosolids increases if total digester loading increases, especially if inert solids loading increases or additional volatile solids are not destroyed. Based on BC's experience many activated sludge facilities with nutrient removal achieve approximately 30 to 40 percent volatile solids reduction of waste activated sludge (WAS), 55 to 70 percent volatile solids reduction of PS, and above 85 percent volatile solids reduction of HSW. The remaining solids may be inert or not digestible at the solids retention time and temperature used in LTP's mesophilic digesters. These undigested solids are captured in the dewatering belt filter press (BFP) and hauled from LTP for composting, Lystek, or land application. Additional trucked waste will result in increased digester gas and biosolids production. Beneficial process and/or financial impacts from additional truck waste streams should be balanced against potential risks and detrimental impacts from these same wastes.

Table 2-5 summarizes total solids (TS) and inert loads leaving the digester. The estimated solids loading contribution from trucked HSW is less than 3 percent to the BFP. Most of the HSW solids received are destroyed in digesters for digester gas generation. Overall, the impact HSW has on biosolids is relatively insignificant compared to PS and TWAS streams; however, flow contribution from HSW is important to consider as this increases hydraulic loading rate to the BFP. The scope for this project does not include an evaluation of the unit process capacities and is recommended for a future study.

Table 2-5. Belt Filter Press Flows and Loads

Item	From HSW	From PS	From TWAS	BFP Feed
Flow, gpd	16,500	95,300	46,200	158,000
TS Load, lb/d	800 (2.7%)	16,100 (54.4%)	13,200 (43.9%)	30,100
Inert Load, lb/d	280 (3.2%)	5,200 (59.2%)	3,300 (37.6%)	8,780

gpd = gallons per day
lb/d = pounds per day

Although low-strength wastes loads are not frequently measured, assumptions were considered to estimate the relative contribution from all trucked wastes on biosolids production. Approximately 4 percent of biosolids were estimated to originate from all trucked wastes (EHB, septage receiving, and HSW). Additional characterization of low-strength wastes through sampling would provide a more accurate estimation of this number.

Section 3: Program Administration

This section summarizes the hauler permits, regulatory requirements, billing system, monitoring, truck routing, and staff administrative effort for the Program.

3.1 Hauler Permits

Haulers are required to complete the City's Environmental Compliance (EC) application prior to discharging at the plant. The City's EC reviews the completed application, which includes a $206 annual fee and required insurance documentation. EC drafts and issues the hauler permit, which includes, along with permit and insurance requirement information (i.e., general liability, auto liability, and worker's compensation), the vehicles' tank capacities and license plates and the types of waste that this discharger is allowed to discharge. Permitted haulers receive a scan card for each licensed vehicle (trailer) that drivers use at the kiosk for recording discharges. Flow limits and pre-treatment requirements are not included in the permit.

3.2 Regulatory Requirements and Permits

The City is required to comply with several regulatory agencies and maintain active permits to operate the Program. The following list includes current and potential future permits that are associated with the Program:

- **National Pollutant Discharge Elimination System (NPDES):** Septage hauling must be discharged to the approved septage receiving station or equivalent location. The City is required to maintain a waste hauler manifest and an updated trucked waste management plan. This includes implementation of monitoring and enforcement to restrict toxic material to the LTP. Receiving septage waste must not interfere with the operation and performance of LTP.
- **California Department of Food and Agriculture (CDFA) Inedible Kitchen Grease (IKG) Rendering:** IKG collection, transport, and rending is regulated. IKG haulers are required to display a decal to demonstrate they are registered with CDFA and are using proper techniques during collection and transport. The City must also be licensed under IKG and maintain records of all grease deliveries.
- **Bay Area Air Quality Management District (BAAQMD):** BAAQMD maintains the active air permit, which includes requirements to monitor and treat at engine, flare, and HSW receiving point source locations. Per the current air permit, the HSW receiving station is limited to receiving 46,000 gallons per day (gpd) maximum. Two CHP engines are also limited to 15.55 million standard cubic feet per year (MMscf/year) of natural gas combined. The LTP is actively seeking to increase this limit to 17.24 MMscf/year. The other two engines have no limit. Each CHP engine is limited to 9.32 MMbtu/hr higher heating value (HHV). The LTP is actively seeking to increase this limit to 10.34 MMBtu/hr HHV.
- **CalRecycle Solid Waste:** If the City intends to process source-separated organics or food waste onsite, it must obtain a solid waste permit as a limited transfer station under the local enforcement agency.

3.3 Billing System

Waste types are selected from a dropdown menu at the kiosk based on the hauler's permit, and a receipt is issued to the driver for each load discharged. The transactions are recorded in the iPACS application's database for monthly transmission to the Citywide billing system. The City's finance department issues a bill after EC has manually reconciled monthly invoices.

The City does not have a specific trucked waste enforcement policy on prohibiting deliveries if invoices are past due, and accounts receivable does not check collections. EC tracks down collections and late payments, and there is no procedure for enforcement. Additionally, the wastewater department cannot see

which haulers paid the prior month, and can see only the invoices for the current bill period. The City's Enforcement Response Plan and billing policies support adding penalties to invoices and suspending or terminating trucked waste permits. The Santa Rosa City Code (Title 15 Sewers Chapter 15-06 General and Pretreatment Enforcement) states that charges or fines left unpaid for 30 calendar days may have an additional penalty imposed and interest is allowed to accrue. Also, wastewater discharge permits may be revoked when any provision of the discharge permit is violated. Therefore, the City has the authority to enforce late fees with additional fines or to terminate a permit due to a violation.

3.4 Monitoring

Monitoring of trucked waste haulers and HSW offloading is limited to a single full-time equivalent (FTE) employee during work hours. This includes monitoring of HSW receiving from Monday through Saturday, 6:30 am to 1 pm. Septage receiving and EHB are accessible from Monday through Saturday, 4 am to 8 pm. Certain customers have access to the EHB 24 hours per day throughout the week (aka 24/7 access). No operator is required for EHB use, unlike HSW and septage receiving stations. Providing 24/7 access to certain haulers alleviates truck traffic during the day; however, certain accounts are permitted to haul multiple types of waste (e.g., HSW and EHB wastes) and there is no way to verify HSW is not being discharged to the EHB during off-shift hours. The City has expressed concerns regarding "bad players" using the EHB to discharge other wastes that come with higher tipping fees.

Compliance sampling is collected three times per week from septic trucks at random. Septic trucks are the only waste type that is monitored using sampling. There is no sampling for wastes that are discharged to the EHB, and process samples are collected from HSW that is sent to digesters. HSW could be readily sampled during unloading using a spigot located at the rock trap, if desired.

3.5 Truck Routing

Truck routes associated with the Program are shown on Figure 3-1. All trucked waste types enter from the south gate and proceed along a single-lane road. This road is shared by vehicles entering and exiting the LTP. HSW trucks are required to use a road on the east side of the digesters to mitigate traffic congestion within the middle of the plant. Only one HSW truck can discharge at a time; this route allows HSW trucks to stage outside of the busy corridor located on the west side of digesters.

Other waste haulers, including septic waste haulers, are allowed to use the road on the west side of digesters. Septic trucks can stage off to the side of this road if necessary. Only one septic truck can discharge at a time. The EHB allows for about two trucks to discharge simultaneously.

As shown on Figure 3-1, there is other truck traffic at LTP for chemical and polymer deliveries and biosolids hauling. Ferric chloride deliveries occur near all trucked waste discharge locations. This has led to confrontations between drivers in the past. Regardless of vehicle routing, there are issues with access to unloading stations and chemical delivery locations due to high volumes of truck traffic.

Other trucks use the same single-lane roadway to enter and exit. This leads to heavy traffic and wear on roadways, in particular at the south gate entrance. Visible damage has been observed on both asphalt and concrete surfaces, as well as sealed joints. Inductive loop traffic sensors located at gates have been replaced twice in the past year. High volumes of truck waste haulers, about 40 to 50 trucks per day, are suspected of contributing to this damage.

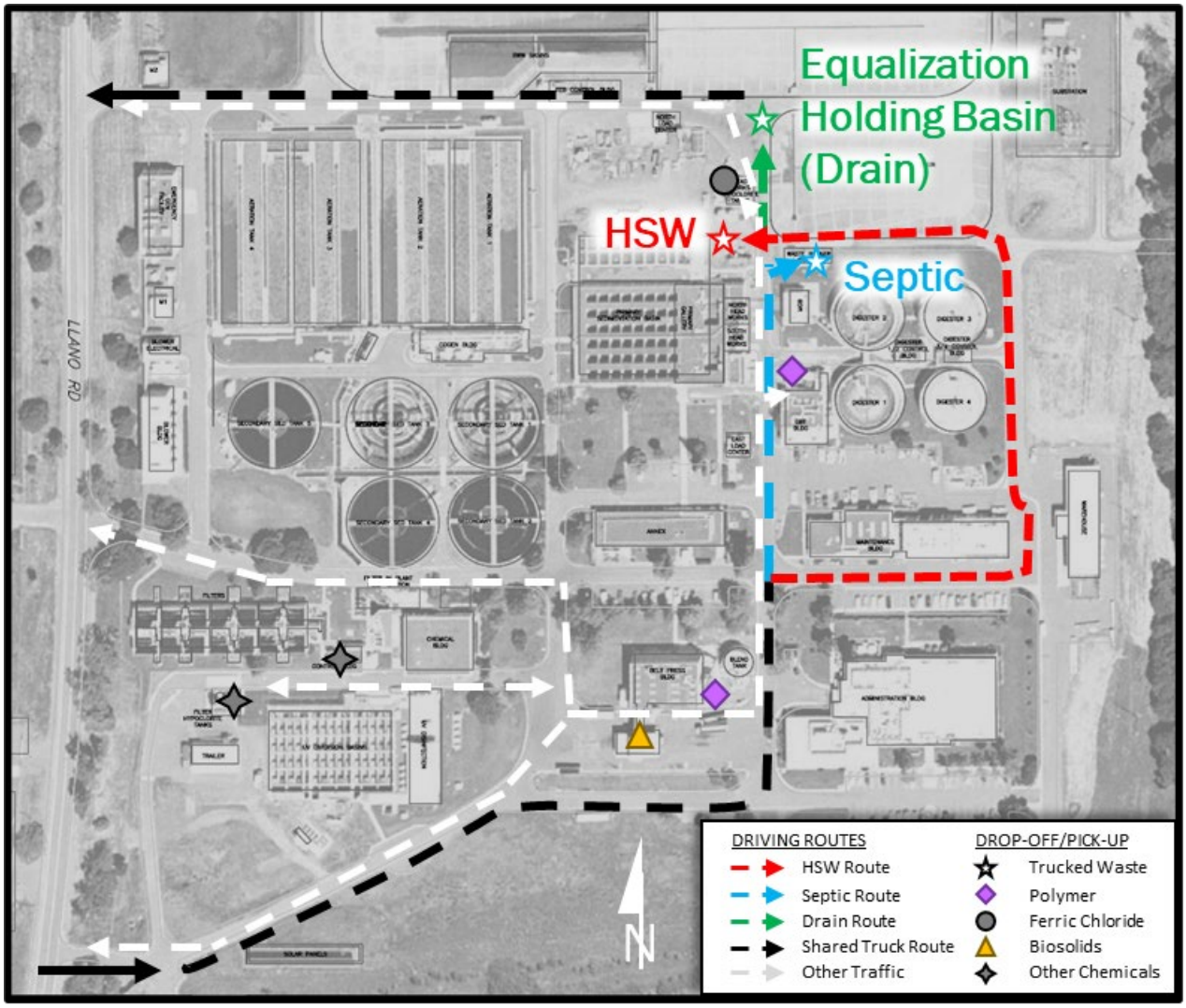

Figure 3-1. Current truck route at LTP

3.6 Staff Time

The City reported estimations of staff time spent administering the Program. The FTEs for each role are shown in Table 3-1. Program duties are:

- Environmental Compliance. Contact haulers, issue permits, review billing, fix administration mistakes, create hang tag file, and troubleshoot iPACS issues.
- Operator. Help offload HSW trucked waste, sample septic waste, and answer questions on site.
- Administration. Review daily transactions, collect manifests, and enter data into iPACS, and collect and input insurance.

Since this study will include the benefit of increased digester gas production and CHP output, the CHP system costs are included in the analysis and are also shown in Table 3-1. Additional labor required to maintain the CHP engines via periodic servicing is accounted for in Section 4.

Table 3-1. Staff Time for Program Operations and Maintenance and for CHP Engine Maintenance

Type	Program staff	CHP staff
Environmental Compliance	0.63 FTE	None
HSW Operation	1.06 FTE	None
Administration	0.4 FTE	None
Mechanical Maintenance	0.1 FTE	1 FTE
Total	2.19	0.1[a]

a. FTE for CHP proportioned to incremental energy produced from Program

In comparison to more than two FTEs for the City's program, East Bay Municipal Utilities District's (EBMUD) Resource Recovery trucked waste program is staffed with 6 FTEs. EBMUD averages about 150 trucks per day in comparison to 40 to 50 trucks per day at LTP; however, the Resource Recovery program at EBMUD benefits from having seven staff assigned to six roles (regulatory, administration, billing and accounts, engineer, inspector, and director).

Hiring two new FTEs dedicated to the Program could consolidate and streamline Program responsibilities. One FTE could focus on administration, billing, insurance, and permitting. The other FTE could support operations and monitoring. This operational FTE would not require a licensed wastewater operator and could release the current certified staff to support wastewater operations. The City has also noted addition of two mechanics and one electrician would be ideal to improve operations and maintenance.

Section 4: Operating Costs and Revenues

Program operating costs and revenues were assessed for 2019, 2020, and 2021. Revenue streams included tipping and permit fees. Energy production from HSW engines was considered as a cost-offsetting benefit and is reported in this section as a credit equivalent to the cost to otherwise acquire energy from Pacific Gas & Electric (PG&E).

4.1 Costs

Costs included labor and parts for CHP engine maintenance and servicing, HSW receiving station equipment maintenance, HSW Program administration and compliance monitoring, and HSW laboratory analysis.

4.1.1 Trucked Waste Treatment Costs

Treatment costs for trucked wastes were based on reported unit costs from the 2021 Water and Wastewater Rate Study (Reed and Hildebrand, 2021). Table 4-1 summarizes unit costs assumed with trucked wastes.

Table 4-1. Unit Costs Assumed for Treatment at LTP

Parameter	Unit Cost	Notes
Flow	$9.68/1000-gal	From Reed and Hildebrand (2021)
Biological Oxygen Demand (BOD)	$0.54/lb	From Reed and Hildebrand (2021)
Total Suspended Solids (TSS)	$0.63/lb	From Reed and Hildebrand (2021)
Total Kjeldahl Nitrogen (TKN)	$1.37/lb	From Reed and Hildebrand (2021)
UVT[a]	$4.00/1000-gal	from 2013 calcs by Joseph Schwall

a. *Additional cost to treat associated with leachate and humic wastes was calculated conservatively by Joseph Schwall based on an observed UVT decrease. The was documented in a 2013 email. The UVT parameter is applied to leachate waste.*

Treatment costs were estimated based on assumed BOD, TSS, and TKN concentrations associated with each trucked waste stream. Appendix B documents the concentration assumptions and calculation methodology in greater detail and Table 4-2 summarizes the estimated cost to treat for each type of trucked waste received. Higher strength streams, such as septic/chemical toilet waste and HSW, have higher costs to treat; however, these streams also have relatively higher tipping fees. Solids generated by HSW are also accounted for in biosolids hauling costs.

Table 4-2. Treatment Unit Costs for Trucked Waste Types

Waste Type	Cost to Treat ($/1000-gal)
Septic/Chemical Toilet	$45.81
High-strength Wastes	$39.39
Gray Water	$22.90
Groundwater	$14.44
Leachate	$14.52
Sewer Line Cleaning	$14.44
Wine Rinsate	$14.44
Mecham Leachate	$14.52

Treatment unit costs were developed based on a methodology that relies on BOD, TSS, and TKN concentrations for each trucked waste type. As noted in Section 3.4 Monitoring, sampling is relatively limited for trucked waste that is received at the LTP EHB, and sampling for septic/chemical toilet wastes occurs periodically throughout the week.

Based on cost to treat shown in Table 4-2 and the volumes of trucked waste received at LTP from 2019 through 2021, the estimated annual treatment cost incurred by trucked wastes was estimated at $925,000 for baseline conditions. The actual cost to treat per year will vary depending on the quantity and characteristics of truck wastes received at LTP, and additional sampling and monitoring could refine this baseline estimate. The baseline cost to treat is over 50 percent of total costs. Changes to the assumed concentrations for each trucked waste type (shown in Appendix B) would change the estimated treatment cost.

4.1.2 Trucked Waste Administration Costs

Administering the Program requires staff time to conduct responsibilities described in Section 3.5. Table 4-3 provides a breakdown of assumed rates, FTEs, and total annual cost for staff to administer the program. The largest fraction of administration costs consists of one FTE operator required at the HSW receiving station. The City has noted the HSW receiving station requires an operator to pump flow from HSW receiving tanks into the LTP; therefore, truck discharging into HSW tanks may not necessarily require an Operator II. The average administration cost for baseline operation is $615,000.

Table 4-3. Administration Costs for Program

Staff	Rate ($/hr)	FTE	Annual Total Cost
Env Compliance Inspector III	$152	0.3	$95,000
Department Application Specialist	$145	0.2	$60,000
Env Compliance Supervisor	$182	0.13	$49,000
Operator II	$149	1.06	$330,000
Senior Administrative Assistant	$96	0.4	$80,000
TOTAL		2.09	$615,000

4.1.3 High-Strength Waste Receiving Station Maintenance Costs

Maintenance of the HSW receiving station is summarized in Table 4-4. The annual maintenance cost from 2019 through 2021 has averaged $38,000 per year and is assumed for the baseline operation.

Table 4-4. Maintenance Costs for HSW Receiving Station

Year	HSW Labor, hours	HSW Labor, $	HSW Parts, $	Total Cost, $
2019	172.10	$24,000	$22,000	$46,000
2020	193.10	$27,000	$13,000	$40,000
2021	173.30	$25,000	$2,000	$27,000
AVERAGE	179.50			$38,000

4.1.4 Trucked Waste Laboratory Costs

There are two types of sampling efforts associated with the Program. Process samples are composited for flow from the HSW receiving tanks to the solids treatment system. These samples are collected about five to six times per week. Waste hauler monitoring samples are collected from septic haulers three times per week for chemical oxygen demand (COD) and TS analyses, and once per week for metals. The assumed annual average sampling frequency and total laboratory cost is summarized in Table 4-5. The average annual laboratory cost for process and compliance sampling is $30,000 and was assumed for baseline operation.

Table 4-5. Laboratory Costs for Trucked Waste and HSW Process Samples				
Analyses	HSW Process, samples/year	Waste Haulers, samples/year	Cost, $/sample	Total Cost, $/year
COD	0	156	$18.86	$3,000
TS	260	156	$12.64	$5,000
Total Volatile Solids	260	0	$18.03	$5,000
Metals	0	52	$310.52	$16,000
TOTAL LAB COST				$30,000

4.1.5 Combined Heat and Power Engine Servicing Costs

The CHP engines and digester gas conditioning system require annual inspections, maintenance, and periodic rebuilds. Table 4-6 summarizes assumed costs for 1,200-hour inspections and recorded maintenance and rebuilds for 2019, 2020, and 2021. The maintenance schedule for CHP engines includes service intervals of 8,000 hours (1 year), 25,000 hours (3 years), 50,000 hours (6 years), and 100,000 hours. Therefore, summarizing the average cost over a 3-year period should capture the average 3-year cycle costs; however, services required at longer intervals (i.e., 50,000- to 100,000-hour service intervals) may not be captured and should be accounted for in future tipping fee rebalancing. The average annual cost per kilowatt hour (kWh) is $0.041. This is similar to other facilities operating advanced, lean-burn engines with gas conditioning and exhaust treatment.

Table 4-6. CHP Engine Costs						
Year	Maintenance Labor Cost	1200 hr Inspection Costs [a]	Parts	Extra Cost	Consumables	Total Annual Cost
2019	$283,000	$200,000	$68,000	$39,000	$193,000	$783,000
2020	$246,000	$200,000	$53,000	$8,000	$208,000	$715,000
2021	$92,000	$200,000	$22,000	$6,000	$200,000[b]	$520,000
Average:						$618,000

a. Approximate costs provided by Richard Giordanella via email. Added to annual costs for CHP engine.

b. 2021 consumable cost not provided. Value shown is average of 2019 and 2020, which were similar.

Based on the solids-water-energy balance, an estimated 11.2 percent of the CHP energy production is attributed to the HSW streams. Therefore, the total annual cost for CHP engine servicing attributed to the HSW program for baseline operation is $69,000.

4.1.6 Solids Treatment, Dewatering, and Biosolids Costs

The solids treatment process consists of various stages of pumping, digester heating, dewatering polymer addition, dewatering BFP operations, and biosolids hauling. For the purposes of this evaluation, pumping costs associated with HSW receiving station were estimated based on the HSW digester feed pump, HSW chopper pumps, and HSW odor control fan operations. These operating costs were assumed as $9,100 per year. The fraction of HSW solids assumed in biosolids was applied to received chemical costs, including polymer and ferric chloride use. This resulted in an estimate $14,200 of chemical costs associated with the Program. Baseline solids treatment operating costs from HSW receiving were estimated as $23,000 per year.

The biosolids hauling and disposition cost was estimated based on values from the mass balance. Non-digested solids contribute 804 lb/d to the BFP, or approximately 2.8 percent of the total biosolids production. At a rate of $82.51 per wet ton, the cost to haul and dispose biosolids from received HSW was estimated at $81,000 per year.

4.2 Revenues

Revenue is collected via tipping and permit fees. Table 4-7 summarizes current tipping fees. A permit fee of $206 per hauler per year is also collected. Tipping fees are charged based on truck volume, with the exception of Mecham Pipeline Leachate, which is metered. A review of the City's reported trucked waste volume and revenue values suggests trucks are approximately 60 to 85 percent full when they discharge to the LTP. Tipping fees are compared to other programs in the region in Appendix C. Based on the estimated cost to treat for each trucked waste type, tipping fees appear appropriate; however, rebalancing and recategorizing of tipping fees could incentivize certain types of waste. Changes to the tipping fee structure could also consider practices such as a rate based on volume or concentration. These practices would require increased sampling and monitoring.

Table 4-7. Tipping Fee Summary

Waste Type	Tipping Fee ($/1000-gal)
Septic/Chemical Toilet	$130
High-strength Wastes	$40
Gray Water	$40
Groundwater	$20
Leachate	$17
Sewer Line Cleaning	$20
Wine Rinsate	$20
Mecham Leachate	$14

Annual average revenues are summarized in Table 4-8 for 2016 through 2021. A value of $2.06 million per year was assumed for baseline operation based on 2019, 2020, and 2021 revenues.

Table 4-8. Tipping Fee and Permit Revenue

Year	Revenue
2016	$886,000
2017	$1,591,000
2018	$2,179,000
2019	$2,202,000
2020	$1,541,000
2021	$2,445,000

4.3 Benefits

Based on the solids-water-energy mass balance, HSW contributes to over 11 percent of energy production from the CHP engines. Based on the current PG&E electric rate schedule, the average benefit of accepting HSW is $166,000 in offset electrical purchase. Continuous operation of the CHP engines also lowers the peak demand rate, which results in an average annual benefit of $79,000 in demand-charge savings. The energy cost savings estimated in 2020 and 2021 are shown in Table 4-9. An overall benefit to the City of $245,000 was assumed for baseline operation.

Table 4-9. Assumed Power Offset from HSW Digester gas Used in CHP Engines

Year	Total kWh produced	kWh from HSW	Total Energy Rate Offset, $	Total Demand Rate Offset, $
2020	15,620,000	1,750,000	($180,000)	($73,000)
2021	13,166,000	1,475,000	($152,000)	($85,000)
Average			($166,000)	($79,000)

4.4 Net Revenue

The average costs, revenues, and benefits summarized in the previous sections were combined to determine the Program net revenue. Table 4-10 represents the estimated average annual net revenue from the Program for baseline operating conditions based mainly on recent operations (i.e., 2019, 2020, and 2021). The estimated annual net revenue of $438,000 does not account for capital improvement projects, such as repairs to roadways and traffic sensors (see Section 3.5 Truck Routing) nor for periodic services such as Cummins engine tuning, which was quoted at $28,550, or digester cleaning. Aside from these costs, servicing costs incurred at intervals outside of a 3-year period should also be considered when rebalancing Program tipping fees as part of TM2.

Table 4-10. Program Baseline Revenues and Costs

Item	Revenue	Cost
Tipping Fees and Permits[a]	$2,075,000	--
Trucked Waste Treatment[b]	--	$1,026,000
Trucked Waste Admin/Compliance	--	$615,000
Trucked Waste Laboratory	--	$30,000
HSW Maintenance	--	$38,000
CHP Inspections & Maintenance	--	$69,000
PG&E Purchase Offset (Benefit)[c]	--	($245,000)
Solids Treatment Costs (Pumping and Chemicals)	--	$23,000
HSW Biosolids Hauling	--	$81,000
Net Revenue	$438,000	--

a. Approximately $185,000 in tipping fee revenues are assumed to be associated with pipeline leachate.
b. Approximately $139,000 in treatment costs are assumed to be associated with pipeline leachate.
c. Energy recovery from CHP engines attributed to HSW offsets electrical costs and is shown as a benefit.

The revenue and costs also do not account for capacity improvement projects; however, the next phase of this study will consider alternatives for improving HSW receiving and other physical improvements. Increased loading to liquid treatment process (e.g., septic waste on secondary treatment capacity; leachate on disinfection capacity) and solids treatment processes (e.g., HSW on digester capacity) may impact the year at which capacity is reached. The impact on capacity is not evaluated in this study and should be reviewed during the Biosolids Master Plan.

Figure 4-1 presents treatment costs and tipping fees for each waste type based on current operation. Two values are presented for treatment costs. The first, lower value represents treatment costs alone, based on the methodology described in Section 4.1.1. The higher value represents the "all in" cost, which includes treatment costs plus administration costs, permit fees (revenue), and laboratory costs. Costs and benefits associated with the HSW receiving station and CHP engines are applied to the High-strength wastes category. This figure suggests nearly all waste types have higher treatment and administration costs in comparison to the revenue raised from tipping fees, except for septage/chemical toilet and gray water wastes. However, treatment costs are contingent on assumptions for BOD, TSS, and TKN concentrations and there is a lack of monitoring data for trucked wastes due to insufficient staffing. Annual increases in treatment and administration costs may also explain why tipping fees for most waste categories are estimated to be less than the "all in" cost. This figure suggests an increase in tipping fees is appropriate to keep up with rising operating costs.

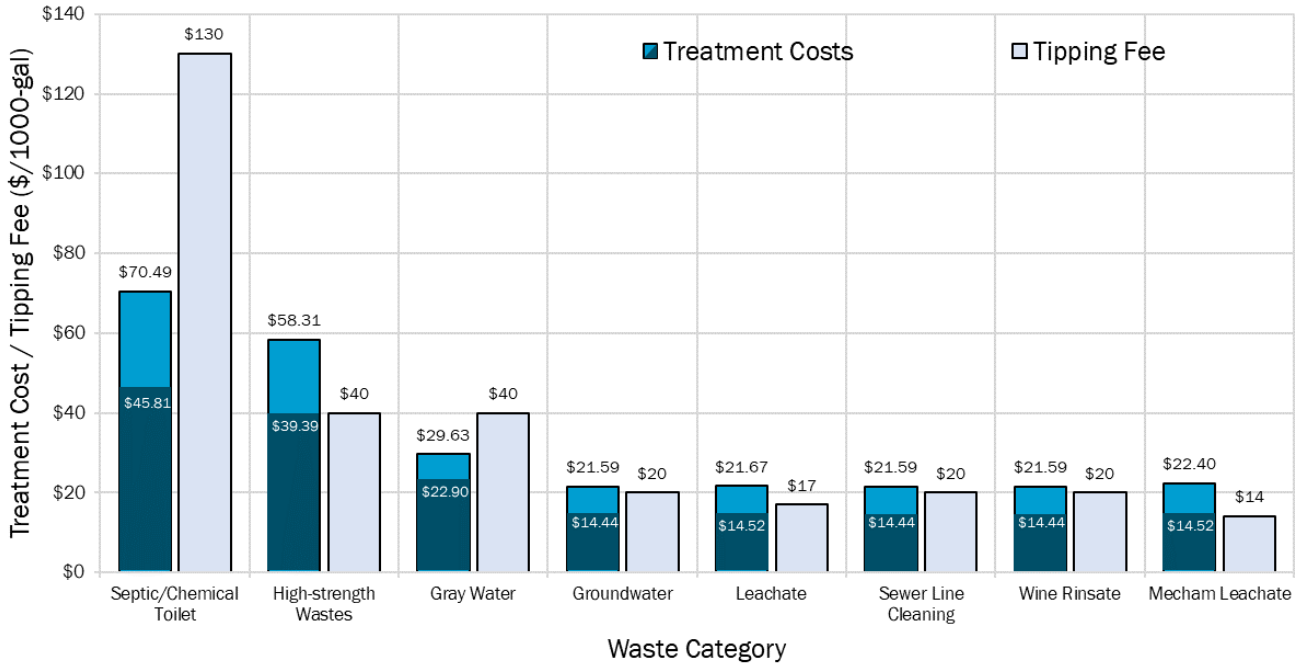

Figure 4-1. Treatment Cost and Tipping Fee Revenue per Waste Type

Treatment costs show two values: treatment cost only (lower value) and treatment, administration, and laboratory costs combined (higher value). All costs are shown relative to billed volume, assuming 86% fill for HSW and 95% fill for all other trucked wastes. Operator II costs are applied to wastes with dedicated receiving stations: septic/chemical toilet and high-strength wastes.

Section 5: Conclusions and Next Steps

The average annual revenues, costs, and benefits (Section 4) suggest that the current tipping and permit fees are appropriate to operate the Program without a deficit; however, anecdotal evidence from workshops and interviews with the City suggest the Program can be improved with changes to administration and monitoring. Capital improvements at the LTP may unlock additional benefits from CHP engines or improve daily operations with Program operations. Capacity improvements targeting process bottlenecks, such as the gas conditioning system, would be necessary to expand the HSW program. These improvements may increase capital and operating costs and could require a rebalancing of tipping fees, which will be evaluated in TM2.

A comparison of current tipping fees and costs for each waste type was presented. The comparison suggests tipping fees are less than the combined treatment and administration costs for all waste types, except Septic/Chemical Toilet waste. Tipping fees at nearby facilities in the region are presented in Appendix C. Recommendations on tipping fee adjustments, to be evaluated in TM2, will take fees charged by nearby facilities into consideration.

References

Metcalf and Eddy, *Wastewater Engineering: Treatment, Disposal, and Reuse*, McGraw-Hill, New York, 2013.

Reed, R., Hildebrand, M., *2021 Water and Wastewater Rate Study Report*, Section 3, "Wastewater Rate Study", City of Santa Rosa, 2021.

Attachment A: Solids-Water-Energy Balance

Figure demonstrating balance completed with 2020 and 2021 historical data

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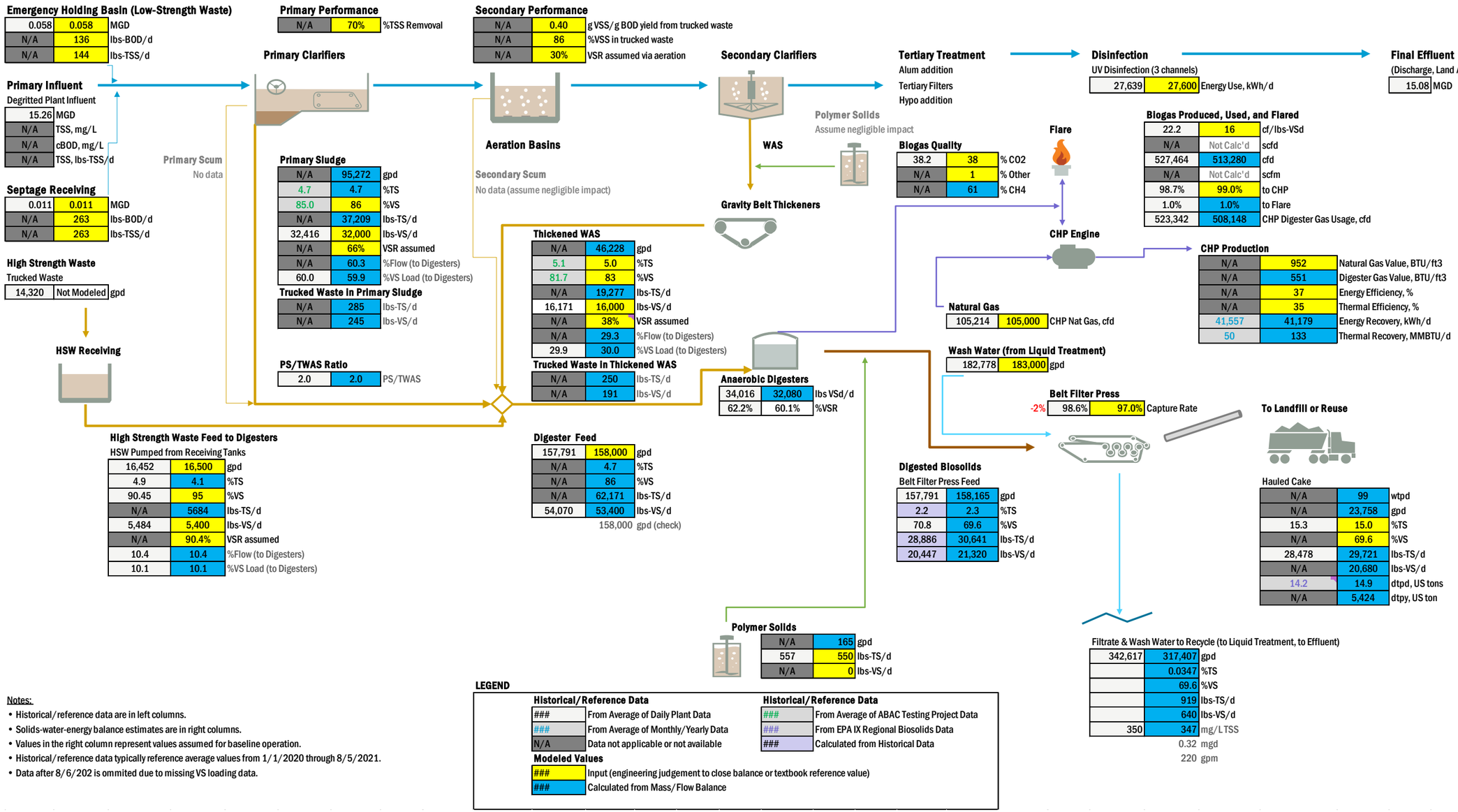

Notes:

- Historical/reference data are in left columns.
- Solids-water-energy balance estimates are in right columns.
- Values in the right column represent values assumed for baseline operation.
- Historical/reference data typically reference average values from 1/1/2020 through 8/5/2021.
- Data after 8/6/202 is ommited due to missing VS loading data.

Figure A-1. Solids-water-energy balance for City of Santa Rosa Laguna Treatment Plant solids treatment process

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Attachment B: Calculations

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Additional details for calculations referenced in the body of the report are recorded in this appendix. Calculations are shown below.

B.1 Increase in Landfill Leachate Fee Calculation

The calculation below was summarized in an email from Joseph Schwall on September 27, 2013 and is adopted in this memorandum to document the basis for an increase in leachate tipping fee.

First additional energy use was estimated:

- UV energy used from 8/27 to 8/29/2013 = 1392 kW
- UV energy used from 8/20 to 8/26/2013 = 763 kW
- Difference in energy used = 629 kW

Then, additional energy cost per day was estimated:

- Additional energy load, per day: 629 kW times 24 hrs/day = 15,096 kWhrs/day
- Additional energy cost, per day: 15,096 kWhrs/day times $0.10/kWh = $1,510/day

Finally, the additional cost was normalized to the amount of leachate flow received:

- Leachate flow, per day (at 280 gpm): 403,200 gallons/day
- Additional energy cost, per gallon: $1,510/day divided by 403,200 gallons/day = $0.004/gallon

B.2 Estimated Cost to Treat Calculations

Unit costs to treat trucked wastes were derived from Reed and Hildebrand (2021). These include:

- BOD unit cost = $0.54/lb
- TSS unit cost = $0.63/lb
- TKN unit cost = $1.37/lb
- UVT unit cost = $4.00/1000-gal

Table B-1 shows assumed concentrations for each trucked waste stream. The values were used to determine the cost to treat each trucked waste stream based on the calculation outlined in Reed and Hildebrand (2021). The methodology results in the following:

- Cost to treat, $/1000-gal = $0.54/lb x (BOD, lb/1000-gal) + $0.63/lb x (TSS, lb/1000-gal)
- + $1.37/lb x (TKN, lb/1000-gal) + $9.68/1000-gal (+ $4.00/1000-gal-leachate)

Table B-1. Concentrations for Trucked Waste Streams			
Non-residential Wastewater	BOD (mg/L)	TSS (mg/L)	TKN (mg/L)
Septic/Chemical Toilet[a]	3,000	3,000	600
High Strength Wastes[b]	0	0	2,600[a]
Gray Water[c]	900	1,500	112.5
Groundwater[d]	400	400	75
Leachate[c]	100	30	20
Sewer Line Cleaning[d]	400	400	75
Wine Rinsate[d]	400	400	75
Mecham Leachate[c]	100	30	20

a. Assumed based on BC experience. Recommended to refine with site-specific sampling data for LTP. Received COD and TS
b. BOD and TSS assumed as zero. BOD assumed for removal in anaerobic digesters, and TSS accounted for in biosolids hauling costs.
c. Based on a 2005 leachate and gray water wastes report.
d. Assumed as "Medium Strength" waste from Reed and Hildebrand (2021)

To determine overall costs, available data for received trucked wastes was reviewed in combination with reported tipping fee revenues. The assumptions shown in Table B-2 were applied to the average trucked waste volume received in 2019 through 2021, shown in Table B-3, to estimate the baseline total treatment costs.

Table B-2. Trucked Waste Volume Proportions	
Non-residential Wastewater	Estimated Percent of Annual Trucked Waste Volume Received
Septic/Chemical Toilet	10%
High-strength Waste	35%
Gray Water	5%
Groundwater, Sewer Line Cleaning, Wine Rinsate	20%
Leachate	5%
Mecham Leachate	25%

Table B-3. Trucked Waste Volumes Received Per Year	
Year	Total Trucked Waste, Gallons
2016	12,558,000
2017	28,500,000
2018	38,453,000
2019	39,304,000
2020	27,233,000
2021	48,554,000
2019-2021 Average	38,364,000

Attachment C: Tipping Fee Comparison

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Tipping fees at the LTP represent trucked wastes ranging from HSW, septic and chemical toilet waste, and other wastes that are collected at the LTP drain. Tipping fees are highest for septic and chemical toilet waste, which is appropriate based on the cost to treat estimates conducted as part of this analysis (see Appendix B). Tables C-1, C-2, and C-3 present tipping fee schedules for the East Bay Municipal Utility District (EBMUD), Central Marin Sanitation Agency (CMSA), and Napa Sanitation District (NapaSan). In comparison to the EBMUD trucked waste program (aka the EBMUD resource recovery (R2) program), the City receives a lower relative and total volume of trucked waste. In comparison to the CMSA wastewater treatment plant the LTP has approximately double the average dry weather flowrate. The tipping fee schedules capture programs intended to be representative in terms of regional proximity to the LTP.

Table C-1. EBMUD Tipping Fees for R2 Program Materials

Trucked Waste Type	Tipping Fee ($/1000-gal)
Septage	Up to $100
Fats, Oil and Grease (FOG)	Up to $120
Process Water	Up to $70
Brine (≤50 g/L TDS)	Up to $70
Brine (50-100 g/L TDS)	Up to $80
Brine (>100 g/L TDS)	Up to $110
Sludge	Up to $80[a] + $5/%TS
Clean Liquid Food Slurry	Up to $60[a] + $5/%TS
Liquid Organic Material	Up to $70
Protein Material	Up to $120
Slaughterhouses[b]	$12.27
Dairy Product Processing[b]	$10.07
Groundwater Remediation[b]	$1.90
Permit Fee	$350/year

a. *Up to 3 percent TS, then add $5 per gallon per percent TS up to 20 percent TS*
b. *Based on $0.139/lb-COD, $0.573/lb-TSS, and $1.83/1000-gal. In comparison, TM1 assumes $0.54/lb BOD, $0.63/lb-TSS, and $9.68/1000-gal for trucked wastes received at LTP.*

Table C-2. CMSA Tipping Fees	
Trucked Waste Type	Tipping Fee ($/1000-gal)
Septage and Chemical Toilet	$95.75
Domestic Strength (RV waste)	$10 per disposal
FOG (0-1,500 gal)	$60
FOG (1,501-3,000 gal)	$50
FOG (3,001-5,000 gal)	$30
FOG (5,001-10,000 gal)	$20
FOG (10,001-15,000 gal)	$10
FOG (>15,000 gal)	No Charge
Load Monitoring Fee	$75 per sampling event
New Permit Fee	$420 - $1,261[a]
Renewal Permit Fee	$210 - $631[a]

a. *Depending on user/permit class associated with the user.*

Table C-3. NapaSan Tipping Fees	
Trucked Waste Type	Tipping Fee ($/1000-gal)
Waste Hauler (2021-2026)[a]	$220-$260
FOG (<2,500 gal per month)	$100
FOG (2,500-24,999 gal per month)	$70
FOG (25,000-49,999 gal per month)	$30
FOG (≥50,000 gal per month)	No Charge

a. *Septic and recreational vehicle waste included. Rates increase from 2021 to 2026.*

Differences in the City's tipping fee structure include the following:

- The City has a higher septage and chemical tipping fee.
- EBMUD, CMSA, and NapaSan have tiered rates based on volume or strength of waste received. The CMSA and NapaSan tipping fees for FOG waste decrease with increased volume per truck. This incentivizes higher volumes of FOG. The EBMUD tipping fees for brines and sludges increase with concentration (total dissolved solids [TDS] and total solids [TS], respectively). This incentivizes trucked wastes with lower TDS and TS.
- EBMUD and CMSA have higher permit fees relative to the City's permit fee of $206. CMSA has lower permit fees for renewals.
- CMSA implements testing and monitoring fees, passing along laboratory and staff time costs to the haulers that are identified for testing. This cost is identified in the permit agreement.

Appendix B: Trucked Waste Facility Process and Physical Enhancements TM2

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Technical Memorandum

FINAL

Prepared for: City of Santa Rosa

Project Title: Trucked Waste Program

Project No.: 157568.001.003

Technical Memorandum 2

Subject: Process and Physical Enhancements

Date: July 1, 2022

To: Renae Gundy, Project Manager, Environmental Compliance, City of Santa Rosa

From: Alison Nojima, P.E., Project Manager, Brown and Caldwell

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Limitations:

This document was prepared solely for the City of Santa Rosa in accordance with professional standards at the time the services were performed and in accordance with the contract between the City of Santa Rosa and Brown and Caldwell dated November 9, 2021. This document is governed by the specific scope of work authorized by the City of Santa Rosa; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the City of Santa Rosa and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 1: Introduction

The City of Santa Rosa (City) is evaluating the Trucked Waste Program (Program) at the Laguna Treatment Plant (LTP) to identify potential programmatic, physical, and process-related improvements. This study reviews the current Program operation using the City's direct feedback and operating data. Technical Memorandum (TM) 1 included an evaluation of baseline Program administration, operating costs and revenues, and a solids-water-energy balance of the anaerobic digestion system, combined heat and power (CHP) system, and post-digestion solids handling. This document, TM2, recommends administrative, process, and physical enhancements for the Program. The final report will provide the City with recommendations and an implementable plan. TM2 serves as the starting point for Program recommendations. Feedback and consensus from Workshop 3 is incorporated into this final version. Several of the improvements, such as biogas utilization, rebalancing tipping fees, and program expansion are deferred to align with capacity evaluations to be performed during the Biosolids Master Plan.

The key subjects discussed in TM2 are:

- **Administration enhancements** – includes staffing, monitoring, sampling, billing, pre-treatment requirements, flow caps, non-compliance enforcement, late payment enforcement, and permitting
- **Process enhancements** – includes biogas utilization, digester feed strategies, receiving stations (high-strength waste [HSW], septage, and low-strength waste)
- **Physical enhancements** – includes capital projects that would improve Program management and have potential ancillary benefits to LTP operations, including truck and traffic route improvements, a new workstation for Program staff, new instrumentation, and a new utility performance system

Deliverables associated with this study include:

- TM1: Administration and Baseline Assessments
- TM2: Trucked Waste Facility Process and Physical Enhancements
- Final Report: Trucked Waste Program Evaluation Report

Section 2: Administration Enhancements

Administration enhancements include recommendations for the Program's staffing, sampling, monitoring, pre-treatment, and flow permit requirements; non-compliance and late payment enforcement; and tipping fee rebalancing.

2.1 Staffing

The baseline evaluation identified the Program is understaffed, which impacts the City's ability to monitor and sample truck loads, enforce compliance, and manage payments. Existing staff have sufficiently maintained equipment required to process trucked waste and continue to operate the LTP; however, existing staff are sharing responsibilities to cover administration, compliance, and receiving station operation in addition to their current roles. Hiring a minimum (min) of three full-time employment (FTE) staff is recommended to adequately monitor and manage the Program. The following roles are recommended:

- **Program manager** – a single person should manage the Program by overseeing day-to-day operations, providing direction for long-term performance, and fulfilling reporting requirements. The Program manager would divert administration burden from Environmental Compliance staff, which would include tasks such as communication with haulers, permit management, collections enforcement, billing, operations, City risk management, insurance, engineering, lab, maintenance, etc.

- **Program technicians** – two FTEs should be hired for a technician-level role. These persons would be responsible for day-to-day operation of the HSW receiving station, overseeing the emergency holding basin (EHB) and/or septage receiving station discharge, and sampling haulers. This role would offer the following benefits compared to baseline conditions:
  - **Non-operator position.** Technicians would be responsible for HSW receiving operations. This frees a certified operator currently assigned to HSW receiving to resume his/her typical LTP responsibilities. Technicians hired to oversee HSW do not require certification and have a lower salary impact than a wastewater treatment plant (WWTP) operator. An operator would still be required to operate pumping from the HSW receiving tanks to the LTP solids treatment process; however, this process is not labor intensive and is completed remotely via a control panel.
  - **Redundancy.** Two technicians provide redundancy. The role should include field work (operating receiving stations) and administrative work (reviewing permits, following up on compliance enforcement, completing reports per direction of the Program manager) to encourage development of a skill set that can be leveraged to help cover several Program needs.

Table 2-1 shows the baseline staff cost for administering the Program. Baseline operations require responsibilities to be spread among five people. Increased monitoring is desired but is difficult because the current staffing is at capacity. Adding the three new FTEs listed above (one Program manager and two technicians) would allocate revenue to appropriate staffing to lead, monitor, and enforce the Program. Many recommendations within this TM assume the recommended additional staff are hired to facilitate other recommended Program enhancements.

Table 2-1. Staff Cost Assumptions

Scenario	Staff	Cost[a]	Notes
Baseline	2.09 FTE (5 staff)	$325,000[b]	In the short term, current staff are able to operate the Program at net positive revenue; however, challenges and limitations from this operating mode were presented in TM1.
Recommended	3 FTE (3 staff)	$465,000[c]	Benefits of this scenario include 1) improved capacity to implement enhancement recommendations from this TM, and 2) redundancy for administration and field responsibilities.

a. Assumed rates include hourly pay, benefits, and indirect costs; provided by the City.

b. This assumes a rate of $80.60/hour for Environmental Compliance Inspector III, $71.50/hour for Department Application Specialist, $96.31/hour for Environmental Compliance Supervisor, $80.15/hour for Operator II, and $50.19/hour for Senior Administrative Assistant. The assumed full time employment equivalencies were presented in TM1.

c. This assumes a rate of $80.60/hour for the Program manager and $71.50 for technicians.

2.2 Monitoring and Sampling

Monitoring currently includes infrequent visual observations of trucked loads when staff is available, i.e., not on a scheduled basis. Visual observations have successfully identified wine waste being discharged instead of wine rinsate, the latter of which is permitted. Sampling is conducted on septic and chemical toilet wastes three times per week. Increased sampling will provide additional characterization for all waste types, which would increase the accuracy and confidence in estimated Program impacts on the LTP liquid and solids treatment processes. Additional characterization of individual wastes would provide data that could be leveraged to set tipping fee tiers or could serve as a basis to eliminate or restrict certain waste types (e.g., wastes with higher organic matter could be eliminated to mitigate ultraviolet (UV) disinfection impacts, and wastes with higher nutrients or dissolved solids could be restricted to control impacts from filtrate return streams on effluent quality).

Table 2-2 presents sampling costs for baseline operations and recommended changes. Increased sampling is recommended for low-strength wastes to characterize their impacts. Measuring chemical oxygen demand (COD) is recommended to approximate strength. Measuring total volatile solids (TVS) is recommended to estimate organic loading, and measuring total solids (TS) is recommended to estimate inert solids loading (when measured with TVS). Total Kjeldahl nitrogen (TKN) is recommended at a lower frequency to estimate nutrient impacts to the LTP. Other parameters, such as pH or total dissolved solids (TDS), are not listed in this section because they can be completed by technicians in the field using insertion probes. Therefore, the cost of these analyses is captured in the additional FTEs' cost and field monitoring equipment costs (see Section 4).

Table 2-2. Baseline versus Increased Monitoring Costs and Samples

Parameter	Baseline Cost	Baseline Samples	Increased Monitoring Cost	Increased Monitoring Samples
Low-strength Wastes	$0	none	$14,000	COD, TS, TVS (1/week/type[a]) TKN[b] (1/month/type[a])
Septic/Chemical Toilet	$22,000	COD, TS (3/week) Metals (1/week)	$24,000	COD, TS, TVS (3/week) Metals (1/week) TKN[b] (1/month)
HSW	$8,000	TS, TVS (5/week)	$9,000	TS, TVS (5/week) TKN[b] (1/week)
Total labor costs	$30,000		$47,000	

a. Assumes five unique low-strength-waste types.
b. Assumes $20 per TKN sample (COD is $18.86 per sample, for reference).

Increased sampling is recommended to achieve a greater confidence in trucked waste compliance with discharge permits. Increased monitoring and sampling will also increase the appearance of compliance monitoring for haulers in real time. Another benefit of increased sampling is improved ability to discern operating cost, biogas production, and biosolids production from trucked wastes. Currently, only the HSW is sampled on a composite basis. This provides sufficient data to estimate contributions to biogas and biosolids; however, other trucked waste contributions are unknown. Lastly, TKN can be used to estimate impacts of trucked waste on filtrate return stream ammonia to the liquid treatment process.

2.3 Pretreatment and Flow Requirements

Certain wastes are expected, or have been observed, to interfere with optimal LTP performance. Pretreatment requirements or flow restrictions are two strategies that can be implemented to mitigate impacts to LTP operations and performance. This section recommends pre-treatment and flow requirements for certain waste types. Mechanisms to implement, monitor, and enforce these requirements are highlighted.

2.3.1 Leachate Wastes

Pre-treatment monitoring, inspection, and surveillance procedures, including the cost of collection and analyzing a user's discharge, can be considered as additional costs for certain waste streams. As noted, the baseline assessment determined sampling is conducted three times per week for septic and chemical toilet waste, which likely covers a small fraction of trucked waste to the liquid treatment process. HSW receiving station flows to the digester are sampled as a daily composite of grab samples. This provides monitoring of TS and TVS. Trucked waste discharges to the EHB are not currently monitored.

Pre-treatment of leachate discharge could provide some benefit to UV transmittance (UVT) if there is a viable technology that can be added at a cost-effective rate. Before any type of pre-treatment can be identified, it is recommended the City perform additional UVT sampling of the leachate prior to being combined with municipal flows. Typical constituents that impact UVT include humic acids, tannins, and iron. UVT percentages and characterization data for the leachate are required to determine a pre-treatment technology. The impact of leachate flows should be coordinated with the UV supplier recently selected for the UV system upgrades project because these flows could impact validation testing. The Mecham pipeline is a logical location to add pre-treatment, as additional pre-treatment on site at LTP would require space and compliance with discharging to the pre-treatment technology. It would also increase LTP maintenance.

Leachate wastes extract soluble and solid materials from solid waste at landfills or compost facilities. Leachate may include organic matter that could interfere with UVT and impact disinfection. Interference typically occurs if leachate contributions are greater than 1 to 3 percent by volume. The min threshold for UVT interference depends on the WWTP and strength of the leachate waste. Figure 2-1 demonstrates hypothetical maximum (max) flow limits for leachate based on different thresholds. For example, at a flow of 20 million gallons per day (mgd) and assuming a 1-percent-by-volume threshold for leachate waste, the max allowable flow would be 8,300 gallons per hour (gal/hr), or about two to three trucks per hour. The City has observed impacts to UVT after rain events when leachate wastes were received at the LTP at a flow rate of approximately 200 gallons per minute (gpm). The City has expressed concerns about receiving leachate, especially during wet weather events.

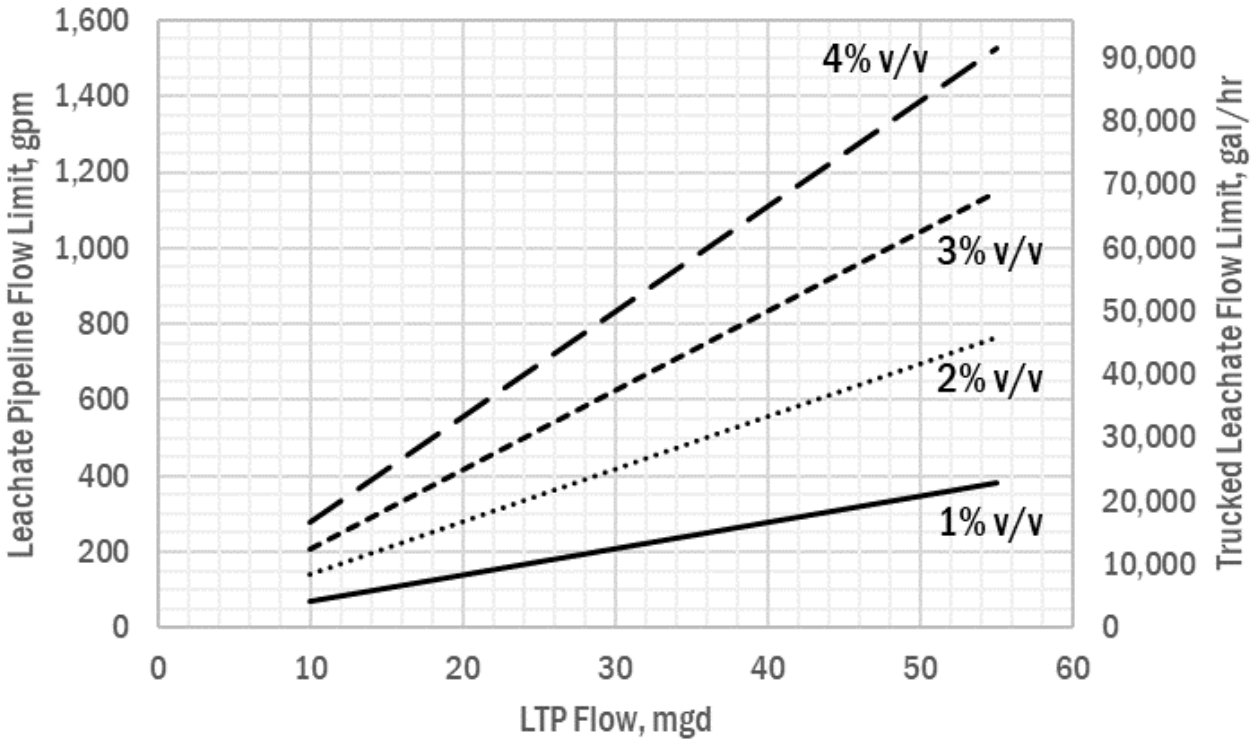

Figure 2-1. Example of leachate flow limits

Lines are presented as examples of how a percentage of leachate volume per total volume (v/v) would impact the acceptance limit.

There are two potential mitigation options to manage the UVT impacts from leachate wastes containing organic matter: 1) pre-treatment and 2) flow restrictions. Pre-treatment technologies for leachate wastes are typically unattractive due to high implementation costs. Requiring pre-treatment of leachate wastes could result in this waste being re-directed to another facility instead of the LTP altogether. Flow restrictions are a more attractive alternative because UVT impacts could be insignificant up to a certain threshold. Implementing max daily and/or hourly leachate flow limits could mitigate UVT issues while maintaining tipping fee revenues from leachate haulers. The exact threshold is not known at this time based on available data, and it is recommended that the LTP create a UVT profile based on blending secondary effluent with leachate.

A combination of pre-treatment and flow limitations could also be considered where dischargers are required to pretreat leachate discharged above a certain rate. The rate should be determined based on the estimated threshold for UVT impacts; however, this approach may still place an unreasonable monetary burden on dischargers and may also be economically impractical. In lieu of pre-treatment, flows above a certain threshold could be equalized and metered into the LTP liquid treatment process at a rate below the critical threshold expected to interfere with UVT. Reviewing UVT data after implementing this practice could help dial in the max allowable leachate flow rate based on actual operating data during wet weather events.

2.3.2 Food Wastes

Senate Bill 1338 (SB-1383) requires organic wastes to be diverted from landfills. This presents an opportunity for the City to consider accepting either raw or pre-processed food waste. Accepting raw food waste would require a dedicated receiving and processing facility. This facility would need a tip floor for solid food waste (typically about 30 percent TS) to be dumped. Then, a skid loader would be required to move solid waste into a treatment train for food waste processing. Processing would require dilution and decontamination. Because raw food waste is too thick to be pumped in the LTP solids treatment train, dilution to less than 15 percent TS is recommended. Food waste also carries contaminants, such as metals, plastics, or inert materials. Contaminant removal is needed to protect equipment performance and biosolids quality. Receiving and processing food waste on site also would generate high odors; therefore, any dedicated receiving and processing food waste facility on site would require odor control. Even with odor control, fugitive odors may be present.

Pre-processed food waste could also be accepted. Advantages to this alternative include mitigating odor risks and eliminating capital and operating costs for a processing facility. Sampling and monitoring would be required to verify pre-processed food wastes are within acceptable levels of solids and contamination. Criteria for pre-processed food waste are presented in Table 2-3; Attachment A includes additional criteria the Sanitation Districts of Los Angeles County developed for its pre-processed food waste receiving program. When accepting pre-processed food waste, the permit should also consider distinguishing haulers based on the waste source (e.g., domestic or commercial food waste). The waste source may impact the quality and consistency of received food waste.

Table 2-3. Pre-processed Food Requirements		
Parameter	Recommended Requirement	Reason
TS	12% to 14%	Recommended for pumpability with existing LTP solids treatment equipment.
Inert particle size	<1/8 inch	Particle size requirements are recommended to protect solids treatment equipment. Inerts, such as metals, glass, or grit, are considered contaminants and should be removed in pre-processing.
Volatile solids content	>85%	A min volatile solids content is recommended to monitor compliance with contamination removal (i.e., removal of glass, metals, and grit)
pH	Same as other trucked wastes	Protects against corrosion and process upsets.
Metals	Same as other trucked wastes	Protects against process upsets and protects effluent and biosolids quality.

2.3.3 Septic/Chemical Toilet

Septic and chemical toilet wastes typically have higher biochemical oxygen demand (BOD) concentrations than raw influent from the sewerage system. As a result, septic and chemical toilet discharges could result in a slug of increased BOD loading to the secondary treatment system. If septic and chemical toilet discharges cause noticeable impacts to the secondary treatment system, flow equalization or limitations to dischargers are recommended.

Currently, the septage receiving station is sized such that only one hauler may discharge at a time; therefore, a 1,000-gallon truck discharging within 5 to 10 minutes would result in a 100- to 200-gpm flow rate from septage receiving. Depending on the concentration of the septic/chemical toilet waste, this could result in a slug load that is 10 to 20 percent higher than the average influent BOD concentration. Allowing septic/chemical toilet haulers to discharge simultaneously could increase this rate by a factor of two or more; therefore, it is recommended to monitor impacts of septic/chemical toilet offloading. Based on workshops from this study, it does not appear that septic/chemical toilet discharges are of significant concern for the baseline condition; however, if septic/chemical toilet waste volume increases, careful monitoring should be implemented to verify whether there are impacts to the LTP.

2.4 Non-compliance Enforcement

Non-compliance with permit conditions has been experienced from haulers. Non-compliance issues include:

- **Liability insurance** – according to 15-06.070 of City Code, all dischargers shall provide proof of financial assurances sufficient to repair damage to LTP equipment or unit processes that may be caused by discharges.
- **Unpermitted waste** – allowable waste parameters (e.g., allowable pH range of 5 to 12) and type are specified in hauler permits. Unpermitted waste is not compliant with the permit and may be subject to enforcement. Discharge of unpermitted waste is a risk for the LTP because it could damage equipment or upset biological activity and performance. The current permit suggests that HSW could be subject to an initial characterization test for BOD, COD, TS, and TVS; however, these are not regularly enforced.

To enforce compliance, the following recommendations could be implemented:

- **Wastewater characterization and monitoring** – implement a wastewater characterization for each new hauler to establish the expected concentrations and pH for that waste. Monitoring results should be compared periodically against the initial wastewater characterization to verify the wastewater strength is within the expected range.

- **Non-compliant waste** – a waste found to be non-compliant via sampling should result in an immediate notification to the hauler. The permit could be placed on probation, which would allow the hauler to continue to discharge contingent on compliant waste. Depending on the City's tolerance, a multiple-strike policy could be implemented, such as allowing a certain amount of non-compliant sampling results per year or per quarter. Haulers exceeding this set amount would have their permits revoked and they would need to reapply.
- **Traffic violations** – haulers' failure to comply with LTP signage and stop signs has been observed. A policy should be outlined to document traffic infractions that could be recorded against the hauler and communicated to the hauling company; the hauler could also be placed on probation. Exceeding a certain threshold of violations during probation could result in a suspended or inactivated permit. This policy is not intended to actually result in a permit inactivation, but would have the purpose of increasing safety for plant staff by incentivizing trucks to follow LTP traffic directions.
- **Liability insurance violations** – the City already has a process to suspend permits for haulers with non-compliant liability insurance. If the issue is not corrected within 30 days, the permit is inactivated and the hauler is required to reapply for a new permit. This policy should be continued, as non-compliant insurance places the City at unnecessary risk.

The recommendations listed above should be considered for incorporation in an Enforcement Response Plan. This plan would serve to document permit violation criteria and provide a clear roadmap for enforcement actions. An Enforcement Response Plan is necessary to ensure fair and consistent enforcement actions. Enforcement actions should be proportional to the severity of the infraction, based on the risk or impact to either the LTP or City staff.

2.5 Late Payment Enforcement

Late payments are currently an issue for the City. Each billing cycle only includes the balance due for the current, single month. Enforcing past-due payments requires the City to follow up on invoices that were issued in previous months, and the City's financial department does not follow up on unpaid invoices. This system has no penalty for unpaid balances and, therefore, does not incentivize punctual payment. Late payment enforcement has historically included notes from the financial department on bills sent to haulers or email and phone notifications from City staff to warn haulers of permit violations.

Clear and enforced guidance on late payments is recommended to incentivize on-time payments from haulers. The Santa Rosa City Code (Title 15 Sewers Chapter 15-06 General and Pretreatment Enforcement) states that charges or fines unpaid for 30 calendar days may have an additional penalty imposed, and interest is allowed to accrue. Adding a penalty is recommended. The penalty should not place an unfair burden on haulers but should be significant enough to incentivize timely payments. New penalties should be communicated with haulers and documented in the permit. The process of assigning penalties should be outlined in an Enforcement Response Plan so that late payment criteria are clearly defined and penalties are consistently applied.

2.6 Permitting

Per the City Code, fees for permitting are intended to cover the cost to process permitting. The baseline permit fee is currently $206 per application. Table 2-4 provides estimated levels of effort to process new and renewal permits. New permits require more time to review and process, whereas renewing permits takes less time from City staff. Therefore, permit fees could be increased for new haulers to more closely cover costs, while existing haulers could have a lower renewal fee. This type of structure is implemented at Central Marin Sanitation Agency (CMSA) and is assumed to incentivize renewals.

Table 2-4. Pre-processed Food Requirements		
Permit	**Effort to Process Permit**	**Estimated Fee to Cover Cost**
Permit for New Hauler	• 2 hours of review by ECI III ($152.32/hour) • 30 minutes of processing by Sr. Admin ($96.33/hour)	$353 per new permit
Permit Renewal for Existing Hauler	• 1 hour of review by ECI III ($152.32/hour)	$152 per permit renewal

Costs rounded up to nearest dollar
ECI III = Environmental Compliance Inspector III; Rate includes overhead costs
Sr. Admin = Senior Administrative Assistant; Rate includes overhead costs

2.7 Billing System and Rebalancing Tipping Fees

TM1 presented tipping fees against the estimated treatment and administration cost for each waste type. The current tipping fee schedule allows the Program to operate at a net positive revenue, but the evaluation demonstrated that some waste types may operate at a cost to the City. Therefore, it is recommended that tipping fees be rebalanced such that no individual waste type is received at a net cost to the City. Figure 2-2 shows recommended rebalanced tipping fees that could be implemented to operate at a net positive revenue for each waste type in the year 2022, assuming no changes are made to the Program. The treatment and administration costs are normalized to truck volume by assuming HSW trucks are filled 89 percent and all other trucks are filled 95 percent and based on annual average truck volumes presented in TM1. Normalizing treatment costs is necessary when comparing against tipping fees because cost to treat was estimated based on volumes received, whereas tipping fees are charged based on truck capacity. This figure does not include any of the recommended enhancements from this TM. Tipping fee recommendations will be refined in the evaluation report to incorporate escalation of operating costs.

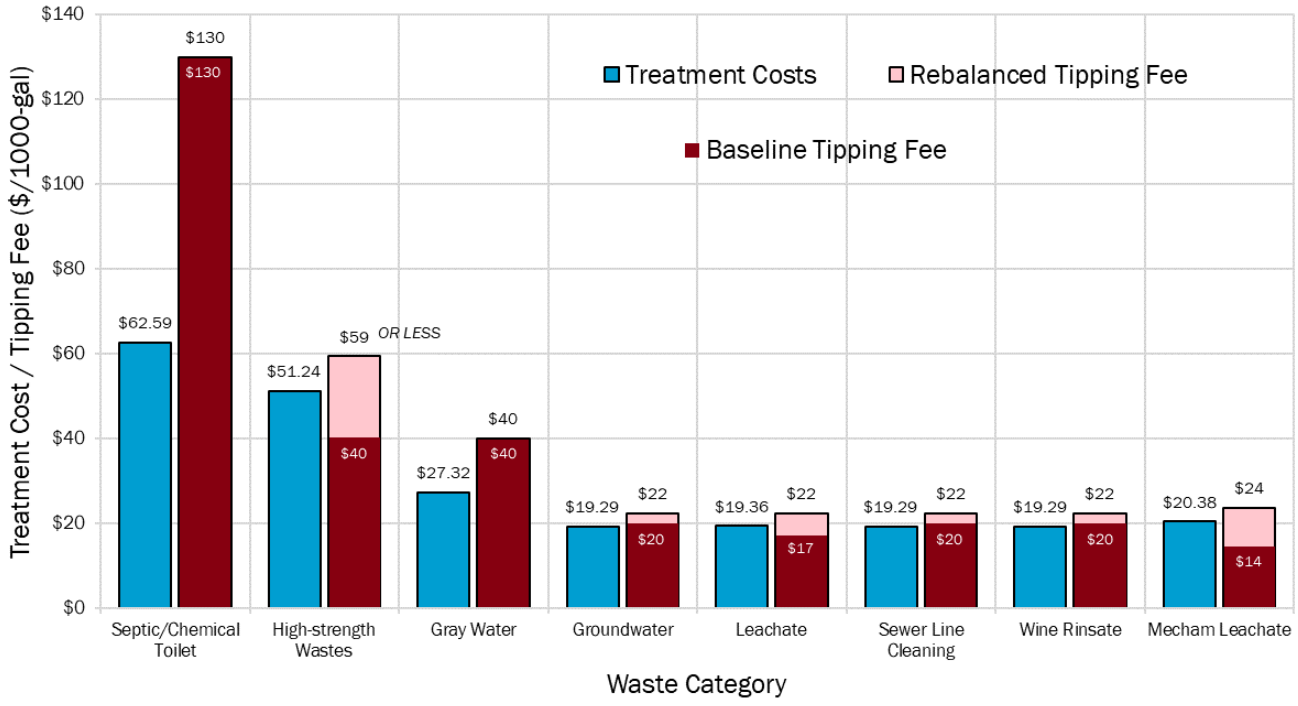

Figure 2-2. Rebalanced tipping fee recommendations versus treatment and administration costs

The septage receiving station is already estimated to operate at a net positive revenue but decreasing the tipping fee could result in an undesired increase in septic/chemical toilet volume; therefore, the tipping fee is maintained at $130 per 1,000 gallons. Any increases in HSW tipping fees should be implemented with caution while considering competition for certain wastes, such as fat, oil, and grease (FOG). Figure 2-3 presents FOG tipping fees from other facilities in the region. The City has the lowest tipping fee in the region, but other facilities offer lower rates to haulers with higher volumes. The rates decrease to zero (free to the hauler) for wastes above a certain value (e.g., above 15,000 gallons of FOG at CMSA is free; above 50,000 gallons of FOG per month at NapaSan is free). A tiered rate for HSW is recommended, such that a base cost of $59 is implemented to cover costs, while haulers discharging higher volumes are still charged $40 to maintain their business. Tiered rates would likely require programming changes for the kiosk (i.e., iPACS software) and financial software (i.e., ONESolution). Gray water is estimated to operate at a net positive revenue, so there is no recommended change. Other waste types (i.e., groundwater, leachate, sewer line cleaning, wine rinsate) are estimated to operate at cost to the City. The tipping fee is recommended to be increased to $22 per 1,000 gallons for low-strength trucked wastes and $24 per 1,000 gallons for pipeline leachate waste. These increases account for 3 percent annual escalation over a 5-year period and should, therefore, be acceptable for the next 5 years while operating at positive revenue. Alternatively, the tipping fee could be increased to $20 per 1,000 gallons and revisited annually.

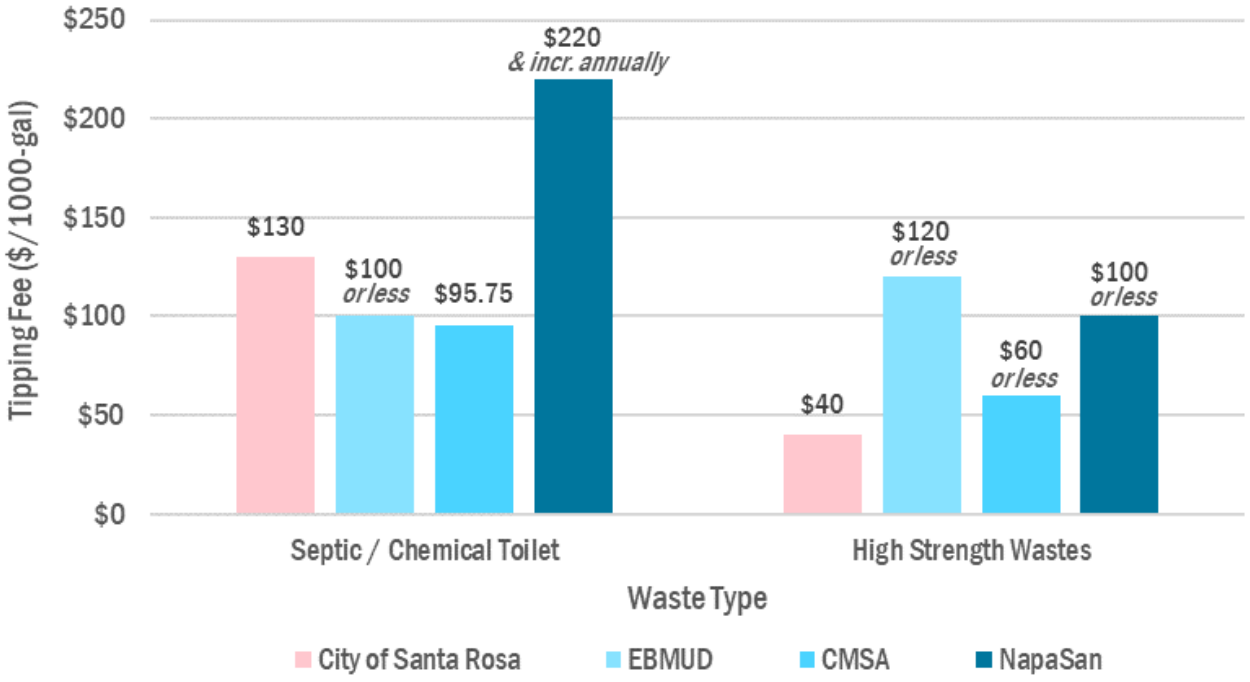

Figure 2-3. Comparison of septic/chemical toilet and HSW among Northern California facilities

Section 3: Process Enhancements

Process enhancements include receiving stations, digester feed, and biogas utilization alternatives.

3.1 Receiving Stations

The baseline condition consists of three receiving stations for trucked wastes. These locations include the HSW receiving station, septage receiving station, and EHB. All three receiving stations are located near each other, on the north side of the LTP. Mecham leachate waste is also received at the LTP and is transferred via a dedicated pipeline.

3.1.1 High-strength Waste Receiving

The HSW receiving station operates with minimal operator oversight but does require a field staffer to operate valves to prime the system after each HSW load to ensure pumps do not run dry. HSW receiving is adjacent to the ferric chloride chemical storage tank. Relocating the HSW station would be costly and is not recommended. The HSW receiving station could be automated and include the addition of a pH insertion probe. Automation would require all field staffer functions to be programmed, including:

- Valve actuation to switch pumps from recirculation to fill mode whenever a hauler connects to the HSW receiving station
- Pump operation when filling the tank during truck offload
- Pump shutoff after the truck offload is complete
- Process water operation to prime system so pump does not run dry
- Valve actuation to switch pumps from fill to recirculation mode when a hauler is not discharging

The pH probe signal could be programmed to alarm if a waste is measured outside of the acceptable range of 5 to 12. An unacceptable pH could also be used to shut off the HSW receiving station pump. Field staff could override the automatic pump shutoff if, in their judgement, the pH readings are close to the compliant range.

3.1.2 Septage Receiving

The current septage receiving station is located adjacent to a road that receives high truck volume. This road has been noted to cause congestion among trucks trying to reach the receiving station. Relocating the septage receiving station could alleviate some of this congestion but would require capital to excavate, pour concrete, add instrumentation and equipment, and connect the new receiving station to existing tie-ins. Another option would be to merge the septage receiving and low-strength waste receiving (aka EHB) stations into a single location. The benefit to this alternative would be more streamlined truck routing. If both waste categories were routed to EHB, there would be no improvements necessary and the septage receiving station could be abandoned. However, previous operations in this mode had resulted in slug loads of rags and debris from septage haulers that overwhelmed the influent screening system. If a new septage receiving station were constructed, then the station could be sized appropriately to receive waste from low-strength waste trucks as well. A new station could have more automated controls built in and be relocated outside of existing traffic congestion. A risk from this option would be increased traffic congestion at the receiving station if truck volumes exceed the capacity of the new receiving station, which could happen if program expansion is implemented. Therefore, sizing of a new receiving station should consider whether only septage will be received by the station or whether other low-strength wastes will also be received. The capacity of the station should be designed accordingly, and this decision will impact capital cost and site layout.

3.1.3 Emergency Holding Basin

The EHB allows multiple trucks to discharge simultaneously. This is a benefit for traffic congestion but can be a concern for plant safety and liquid treatment process impacts. The EHB is not actively used for trucked waste flow retention and equalization. Opportunities to enhance the EHB include:

- **Adding monitoring equipment and flow control** – waste discharged to the EHB flows down to a channel that sends flow to the liquid treatment process. A flow controlling device, such as a valve or sluice gate, could be used to retain trucked waste flow so that it is sent to the LTP at a desired rate. Monitoring equipment, such as insertion probes, could also be added to measure parameters such as pH or TDS.
- **Relocate the discharge location** – all trucks currently discharge on the west side of the EHB. The discharge location could be revised to another side to optimize traffic congestion and truck routes. This option is considered and discussed in Chapter 4.

3.2 Digester Feed

The LTP feeds digesters with a constant thickened waste activated sludge (TWAS) flow from gravity belt thickeners. Continuous wasting of feed stocks is important to maintain digester performance, as constant flow and loading are ideal and provide more stable operating conditions compared to fluctuating loads. Primary sludge is sent throughout the day to digesters and is thickened to approximately the same concentration of TWAS. The bottleneck in digester feed consistency is the HSW feed on weekends. The HSW flow is managed to try to maintain a constant flow throughout the day. On weekends, the volume in HSW tanks decreases until no more flow can be sent to digesters.

The current operating mode is recommended for digester feed. Feed should continue to spread out HSW flow and loading to target consistent flow and loading to digesters.

3.3 Biogas Utilization

Impacts to regulatory compliance and system processes with regards to potential future energy and solids projections resulting from Program expansion will be evaluated in the Biosolids Master Plan. These recommendations depend on the solids treatment capacity and flows and loads projections that will be performed as part of the scope.

3.3.1 Biogas Conditioning

The current biogas conditioning system treats up to 500 standard cubic feet per minute (scfm) of gas prior to combustion in the CHP engines and includes hydrogen sulfide (H_2S) removal, compression via blowers, moisture removal via gas chilling, siloxane removal, and final particulate filters. The system was designed for flows up to 365 scfm. Current operations experience flows of approximately 500 scfm, which decrease the system pressure to the point of shutdown. Figure 3-1 presents a process flow schematic for gas conditioning at LTP.

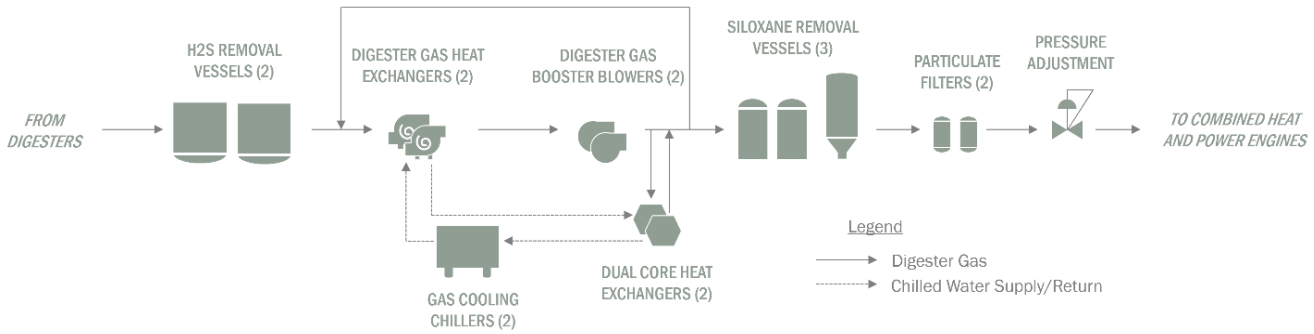

Figure 3-1. Simplified process flow schematic for the LTP digester gas (DG) conditioning system

Annually, about 1 percent of DG is flared due to capacity constraints in the gas conditioning system; flaring was required 58 days in 2020 and 82 days in 2021. The gas conditioning system is a bottleneck with regards to use of any additional DG that may be generated from increased HSW loading to the LTP. Expanding the Program and increasing gas production would require installing additional capacity in the gas conditioning system to maximize the benefits to the City. Further evaluation of the gas conditioning system capacity improvements and costs associated with an increase in co-digestion will be performed in conjunction with the Biosolids Master Plan.

3.3.2 Gas Control Strategies

Natural gas blending helps stabilize CHP engine output to account for variable DG production. There is no DG storage within the system. The baseline mass balance suggests 26 percent of the energy production from CHP engines is attributed to natural gas usage. The current CHP system is designed with four engines, with the two engines with selective catalytic reduction (SCR) having the ability to blend any ratio of DG and natural gas. A valve was installed to send back any blended gas to the two non-SCR, primarily DG-fueled engines; however, staff have noted issues with valve operability. The valve was never used and has been removed.

In conjunction with the Biosolids Master Plan, options will be considered to allow feeding various blends of gas to the two engine types (SCR and non-SCR).

3.3.3 Turbine

Combustion gas turbines, commonly referred to as “gas turbines,” are another common and well-proven gas utilization technology. Combustion gas turbines are often a good fit at the largest treatment plants as this technology, manufactured by Solar Turbines, comes in a single 4.6-megawatts (MW) size. While other gas turbine manufacturers and models exist in the marketplace, very few are rated to use biogas as a fuel, and of those few, the Solar Mercury 50 model is by far the most modern and efficient option. The result is a de facto single model option for gas turbines at wastewater plants.

Combustion gas turbines consist of three primary sections — the turbo compressor, combustion chamber, and turbine. The turbo compressor compresses large quantities of atmospheric air. Fuel mixes with the compressed air within the combustion chamber and ignites. The combustion gases can reach temperatures of up to 2,500 degrees Fahrenheit (°F). The turbine, or expander, then extracts mechanical energy from the expanded, high-temperature gases, which produces power and drives the turbo compressor. Both the compressor and turbine sections consist of multiple stages of blades that rotate at high speeds. Figure 3-2 shows an example gas turbine installation in Texas, and Figure 3-3 shows a process flow diagram of a combustion turbine for a WWTP application.

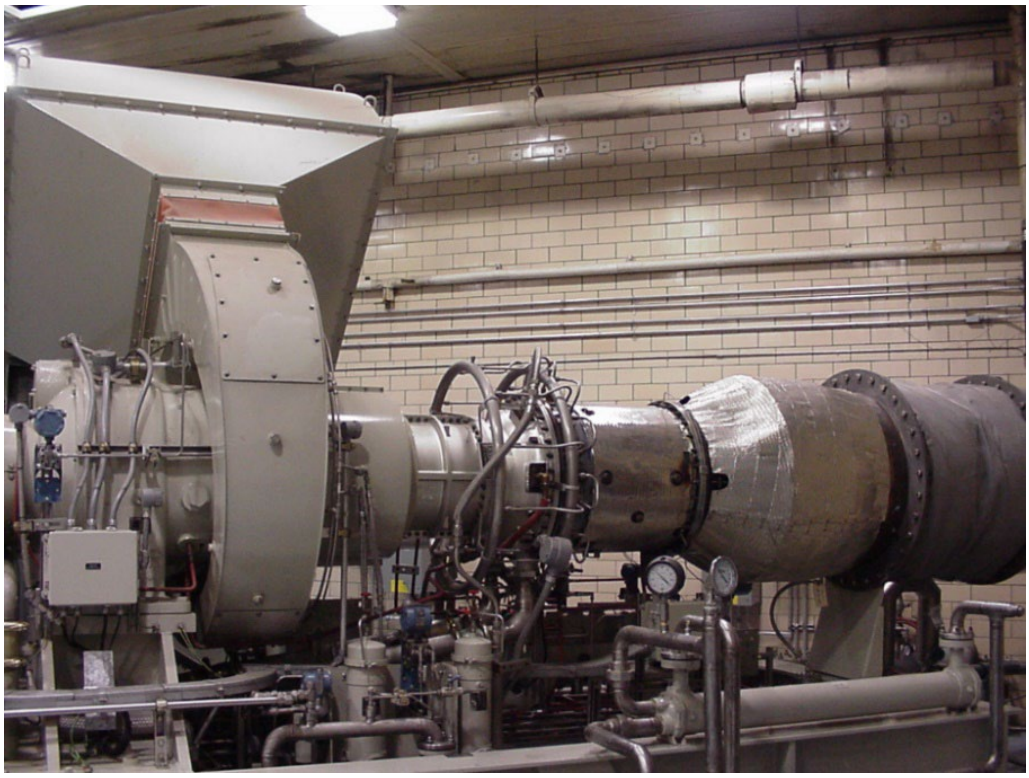

Figure 3-2. Solar Mercury 50 gas turbine at the Village Creek WWTP, Fort Worth, TX

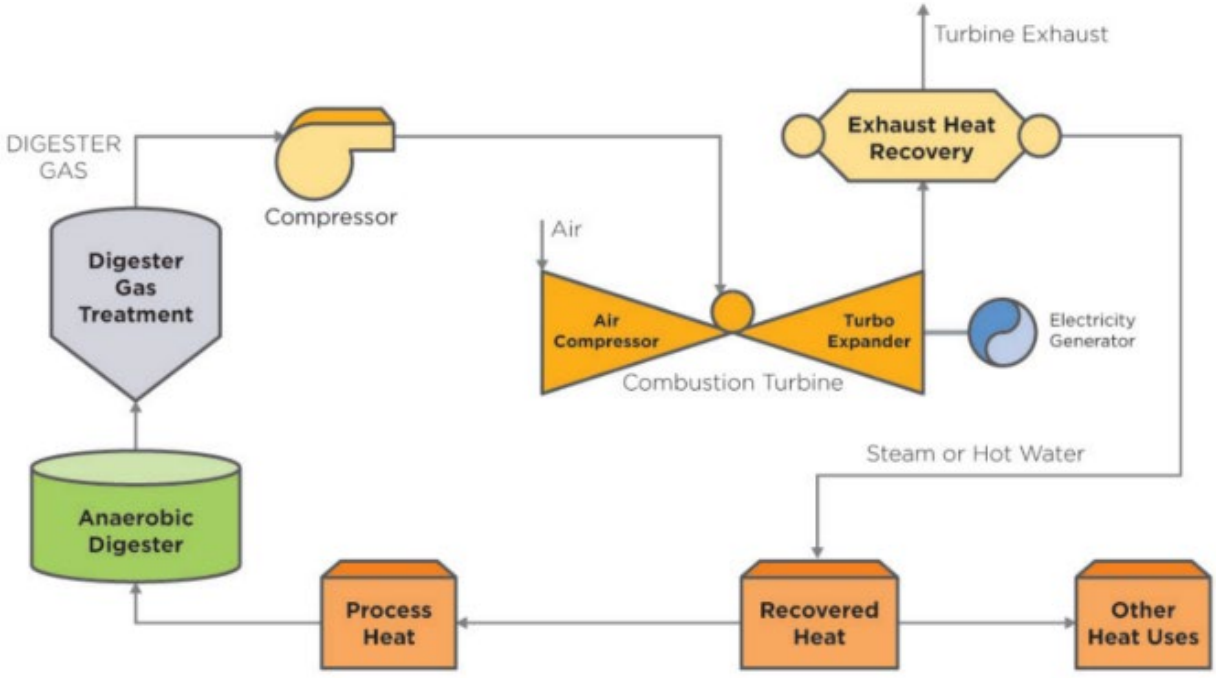

Figure 3-3. Process flow diagram of a typical simple-cycle, combustion gas turbine system without recuperation

The gas cleanup requirements for the Solar Mercury 50 turbine are summarized in Table 3-1.

Table 3-1. Turbine Fuel Quality Requirements

Parameter	Requirements
Fuel Pressure, psig, min	250
Siloxane	non detect
H_2S, ppmv, max	10,000
Total Particulates, ppmv, max	30
Max Particle Size, micron	10
Wobbe Number, British thermal units/cubic foot	550 - 620
Gas Supply Temperature, °F	Gas dew point temp+50
Liquids, cc free water per liter at 80°F, max	0.25

a. If carbon monoxide is present in the fuel gas, precautions must be taken to detect leaks.
cc = cubic centimeter
ppmv = parts per million by volume
psig = pounds per square inch gauge

Note the following regarding the fuel quality requirements:

- The H_2S requirement in Table 3-1 is for the equipment itself; actual H_2S limitations in DG fuel will be further limited by air permitting.
- The moisture and particulate requirements for this technology are compatible with the existing gas conditioning equipment.
- Siloxanes, while not defined in Table 3-1 for the turbine equipment itself, will likely be limited to low levels as good practice. The current siloxane removal equipment would meet the fuel cleaning requirements for a turbine.
- The existing blowers will not meet the pressure requirements; compressors are required to meet the higher fuel pressure.

The Solar Mercury 50 gas turbine has, in practice at other facilities, achieved very low nitrogen oxide emissions without an SCR system. At East Bay Municipal Utility District in Oakland, for example, the turbine unit was permitted without an SCR; however, BC believes that for a planning-level analysis, the City should assume an SCR exhaust after the treatment system will be required.

A turbine could result in lower operation and maintenance costs, as it has the potential to reduce maintenance events proportional to the number of available units. This creates a single point of failure, however, and downtime would result in 100 percent of the gas being flared.

3.3.4 Biogas Upgrading

Biogas upgrading produces biomethane, a renewable natural gas (RNG) substitute that can also be used in vehicles that are fueled by compressed natural gas. Under the current renewable fuels market conditions, DG upgrading alternatives that provide revenue can have better economic performance than current CHP operation. Upgraded DG is routed to either a pipeline injection system or on-site storage and dispensing as? vehicle fuel.

Similar to conventional gas treatment systems that remove contaminants to improve engine performance, DG upgrading first involves gas conditioning to remove moisture, H_2S, and siloxanes from the raw DG and

gas compression. The DG then goes through a separation process to remove carbon dioxide (CO_2). Because the separation process is imperfect, the waste stream from the separation process is a methane (CH_4)-lean tail gas consisting primarily of CO_2 with up to 7 percent of the total biogas CH_4 depending on the selected separation system. Tail gas is typically wasted using a flare or thermal oxidizers (possibly the existing dryer thermal oxidizer) and may require a supplemental natural gas feed to help the tail gas combust. Figure 3-4 shows a process flow diagram of a DG upgrading system.

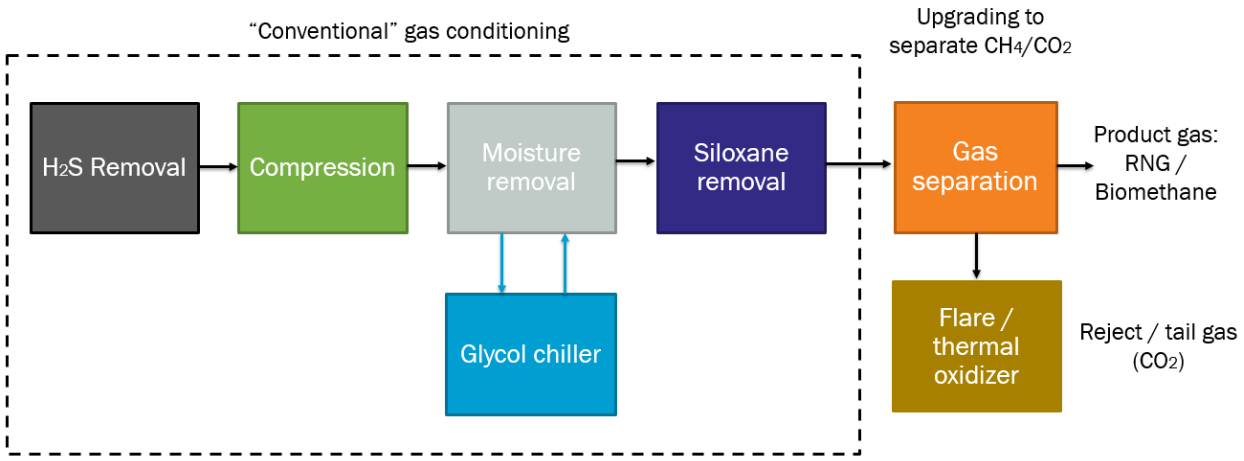

Figure 3-4. DG upgrading system schematic

Several DG separation technologies are available, including membranes, pressure swing adsorption, amine scrubbers, and water solvents. Figure 3-5 shows a small DG upgrading system provided by Unison Solutions that uses membrane separation. Other typical DG separation technology manufacturers include Air Liquide, Guild, and Greenlane.

Figure 3-5. DG upgrading system at San Mateo WWTP (California) using Unison's BioCNG system

Includes H_2S removal, moisture removal, compression, siloxane removal, and membrane separation.

3.4 Utility Performance System

The City collects data in the following forms:

- Truck volume per transaction per hauler
- Waste type per transaction per hauler
- Date and time per transaction per hauler
- Discharge location (three alternatives) per transaction per hauler
- Outstanding invoice amount associated with each hauler's account
- Insurance information associated with each hauler's account
- Sampling information (samples are collected and the LTP lab measures certain constituents – this monitoring is infrequent) for a certain transaction/load
- WWTP performance on a daily average basis (digester biogas, biosolids, effluent quality, etc.)

BC is investigating system and network architecture with the City to identify whether smart utility planning and implementations can help with employing data management and infrastructure. Following a recent discussion, an structured query language (SQL)-based data warehouse that integrates the relevant permitting information management system (PIMS), laboratory information management system (LIMS), supervisory control and data acquisition (SCADA), financial information management system (FIMS), and the access control system (ACS) data would be the foundation upon which multiple Power BI Dashboards and automated data entry on tablets can be built. The centralized data repository, mobile data collection, and data visualization will help operators of all experience levels make more informed decisions based on the performance of the digesters, permitting and compliance, billing, and lab data.

Initial dashboarding efforts can focus on digester performance and aeration energy usage, as well as provide operators a meaningful way to verify haulers' information whether it is related to billing, compliance, insurance, or testing to maintain healthy processes in LTP and catching problems before they happen. Long term, implementing a centralized system of record will allow for analytics to be developed in Seeq or similar software. These analytics could be descriptive, diagnostic, predictive, and/or prescriptive to allow engineers and operators to optimize the introduction of waste from trucks to support a more optimized utility for increased biogas production and reduced aeration energy consumption. The effort required to implement this type of solution is contingent on both the existing system and network architecture and the City's goals for a potential new utility performance system.

Section 4: Physical Improvements

This section documents physical upgrades that improve the Program or alleviate Program impact on processes but are not directly related to unit performance.

4.1 Traffic Improvements

Traffic improvements include video detection, pavement improvements, new alternative truck hauler routes, addition of a workstation, and addition of instrumentation.

4.1.1 Video Detection

The City has been having issues with its access system for truck haulers. The LTP has four inductive loops, two at the north gate and two at the south gate. This year alone, the inductive loops have been replaced twice due to a high volume of heavy-weight trucks. A potential solution is to implement video detection

cameras at both gates. Video detection technology is not prone to damage from the weight of trucks and would be a replacement technology in lieu of inductive loops.

An example of a this technology is Versicam, which is a high-resolution video camera that captures vehicles in all light conditions. The camera detects vehicles, sends an input to a motor, and the motor is used to operate a gate. Versicam is designed for placement on a post that is approximately 15 feet high and located 30 feet from the location where vehicles stop in front of a gate. The cost for a single Versicam is $6,000, without installation fees. The camera lens requires annual cleaning, so operational and maintenance costs are minimal.

4.1.2 Truck Traffic and Alternatives Routes

Figure 4-1 shows diurnal truck traffic throughout the day for each day of the week. During weekdays, about three to four trucks per hour are accessing the LTP from 7 a.m. to 12 noon. Saturday has lighter traffic but a similar profile to weekdays, and Sunday may have only a handful of trucks throughout the day.

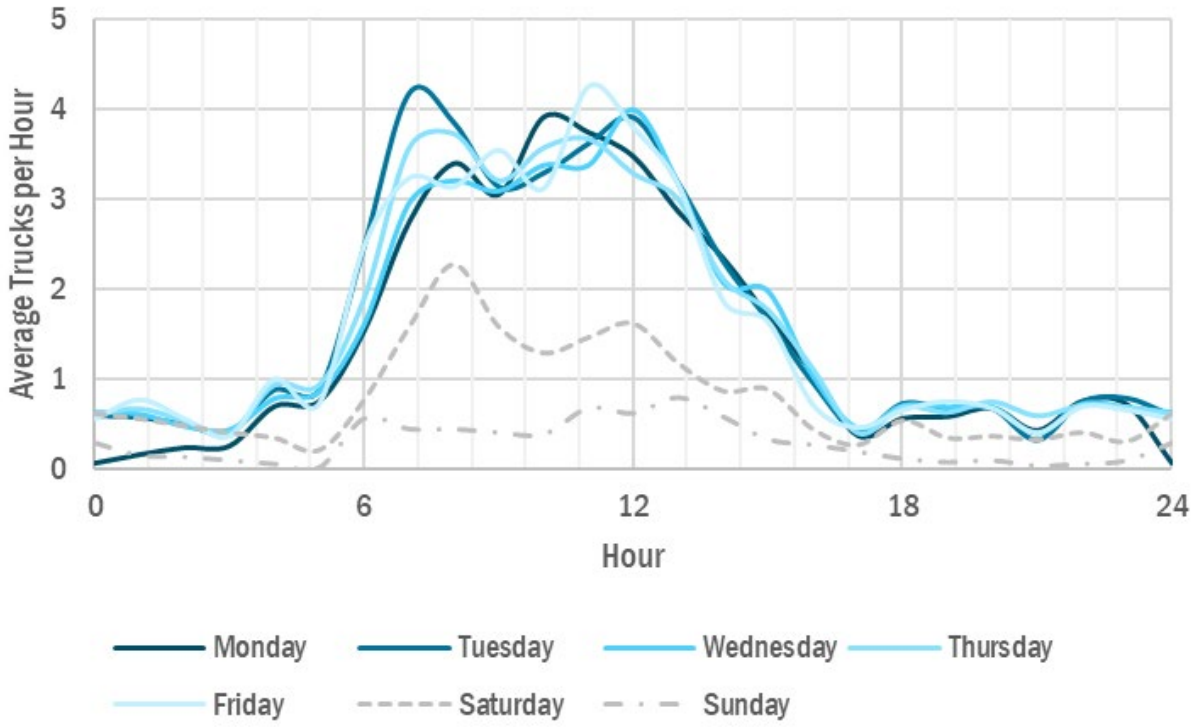

Figure 4-1. Diurnal truck traffic profiles in 2021

On average, there are about 40 trucks per day during weekdays and 20 trucks per day on Saturdays. This is a significant amount of traffic that can and has led to conflicts with other plant operations, such as chemical deliveries. The maximum truck volume observed in the historical data was 121 trucks on October 25, 2021. Access to unloading stations and chemical delivery locations is impacted by high truck traffic. As displayed on Figure 4-1, ferric chloride deliveries occur near all trucked waste discharge locations, which leads to traffic issues for drivers. The following routes are presented as alternatives to mitigate traffic issues at the LTP.

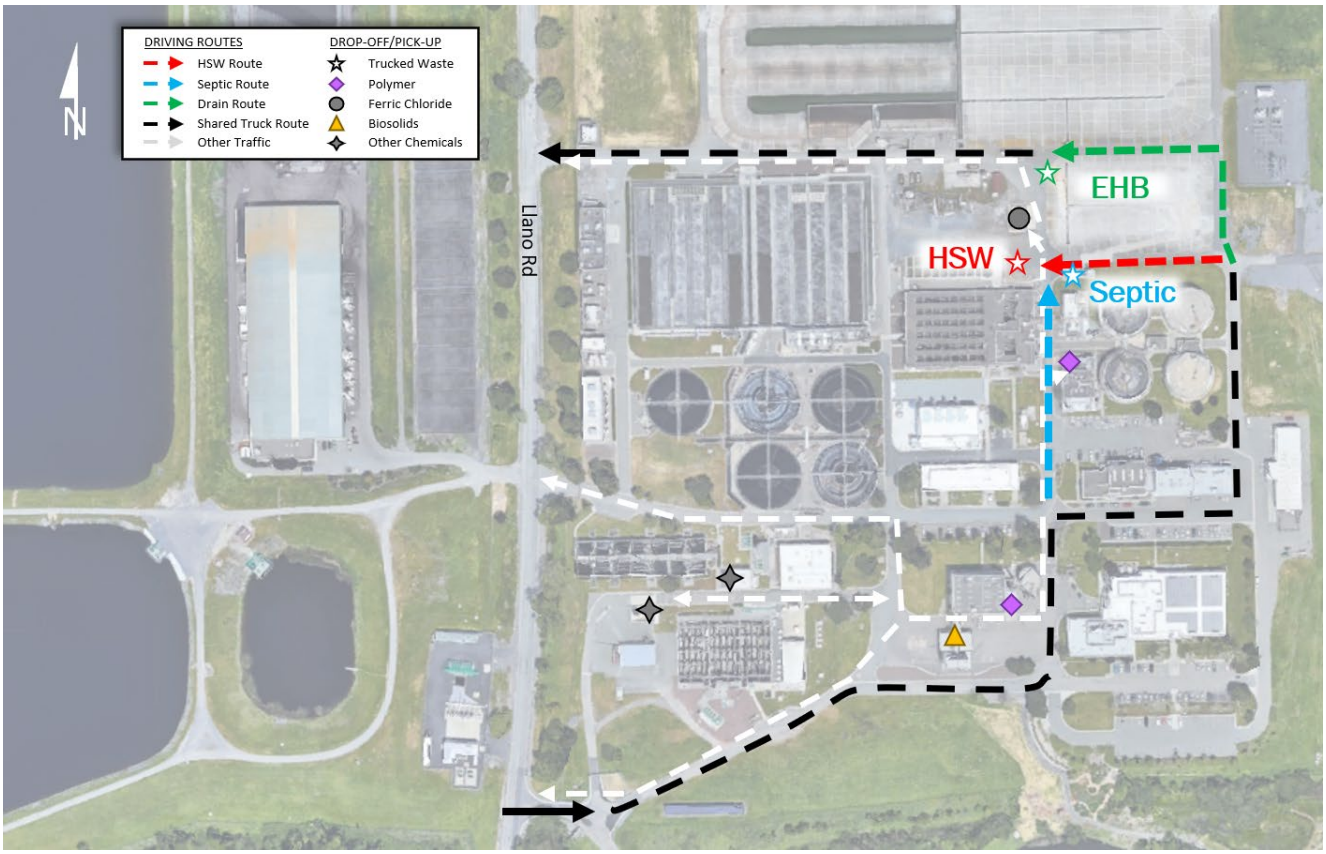

Figure 4-2. Truck route alternative to re-route trucks around east side of digesters

4.1.2.1 Alternative Route 1: Re-route Trucks Around Digesters

This alternative requires the least amount of capital and could be immediately implemented. This alternative re-routes all trucks around the digesters, which is the path currently used to route HSW trucks. The advantage is less traffic in the road that is directly west of the digesters, which receives traffic from plant operations, ferric chloride deliveries, and polymer deliveries. Figure 4-2 shows the routes and receiving stations associated with this new alternative. Septic/chemical toilet wastes would still use the septage receiving station and could still be routed along the west side of digesters. All other low-strength waste trucks would continue to discharge into the EHB but would now drive around the basin. All trucks, except septic/chemical toilet, could potentially stage alongside the road that is east of the digesters.

Relocating the discharge point at the EHB was considered but would require sufficient room for trucks to back up to the EHB and to exit the plant if discharge is continued from the back of the truck. Approaching the EHB from either the northeast or southeast corner is possible but does not leave room for simultaneous unloading of two trucks, which could lead to traffic congestion. If the northeast side of the EHB were used for unloading, trucks would likely have to continue north to exit the plant. There is currently no direct route to exit the property from the north side. If the southeast side of the EHB were used for unloading, trucks would likely have to continue south along the road proposed for trucks coming into the LTP. This could cause traffic congestion, especially if the road is being used for staging during peak delivery times.

An alternative approach could be to require all trucks to discharge using a 90-degree elbow. This would allow for discharge to occur along any side of the EHB, which provides additional flexibility for truck routing. The City would need to specify and enforce this requirement for all haulers and confirm that trucks are able to comply with the requirement. Using a 90-degree elbow and requiring discharge from the side would address discharge limitations discussed in the previous paragraph.

4.1.2.2 Alternative Route 2: Relocate Septage Receiving

The last proposed alternative to reduce traffic at the LTP is to move the septic receiving stations east of the digesters, as shown on Figure 4-3. The hauler route for the septic station is changed so both HSW and septic haulers take the same path. The road east of the digesters is used by both HSW and septic/chemical toilet haulers. All other low-strength waste trucks can continue to use the middle lane, which provides a direct route to the discharge location. An option to re-route low-strength wastes around the EHB (see Alternative Route 1) could also be implemented. The advantage of Alternative Route 2 over Alternative Route 1 is that septic trucks would be out of the center lane, which could alleviate traffic in the congested area of the LTP. A new septic receiving station would require more capital than other solutions but would provide an opportunity to improve the features of this station. Other trucked wastes (e.g., leachate) could also use this new receiving station, which could be advantageous if equalization and flow metering are implemented. Metering flow of HSWs into the liquid treatment stream is preferred if wastes are known to impact either UVT or secondary treatment due to slug loading.

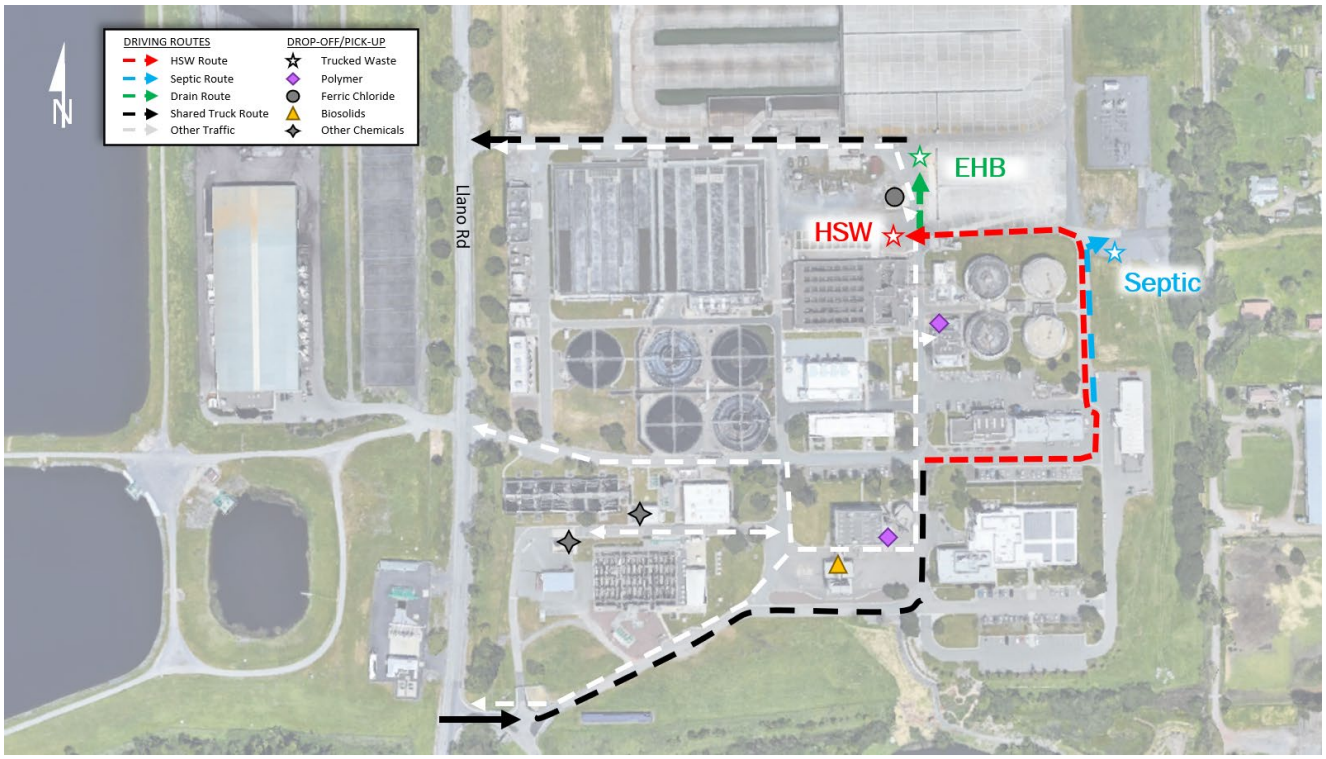

Figure 4-3. Septic receiving station relocation

4.1.2.3 Alternative Route 3: Build Dedicated Trucked Waste Access Road on Meadow Lane

Another alternative is to add a new access road from Meadow Lane to the northeast side of the LTP, as shown on Figure 4-4. The road would have a dedicated access gate that could remain open during business hours and be accessed with a fob during off-hours for trusted haulers. This road would allow direct access to all stations: HSW receiving, septage receiving, and the EHB. Also as shown on Figure 4-4, septic/chemical

toilet and other low-strength wastes are assumed to use the EHB for this alternative. Relocating the septage receiving station to the EHB allows HSW trucks to use the road south of the EHB for staging. The benefit of this alternative is complete removal of trucks from the south side of the LTP. This avoids any conflicts between trucked haulers and chemical deliveries and increases safety for plant staff. One of the three main risks of this alternative is decreased security, as a new access point is added. To mitigate security risks, security cameras can be added to the north side to monitor and document trucks as they enter the LTP. A second risk is the California tiger salamander, which is endangered and protected as part of the U.S. Fish and Wildlife Service's Recovery Plan for the Santa Rosa Plain (U.S. Fish and Wildlife Service, 2016). If construction in the proposed area is found to impact the salamander, then this Project could be delayed or stopped. A third risk is increased traffic on Meadow Lane, which could prompt neighbor complaints. This risk is considered minimal if the gate is left open during business hours, as the road has ample distance to the receiving stations and render traffic backups a non-issue.

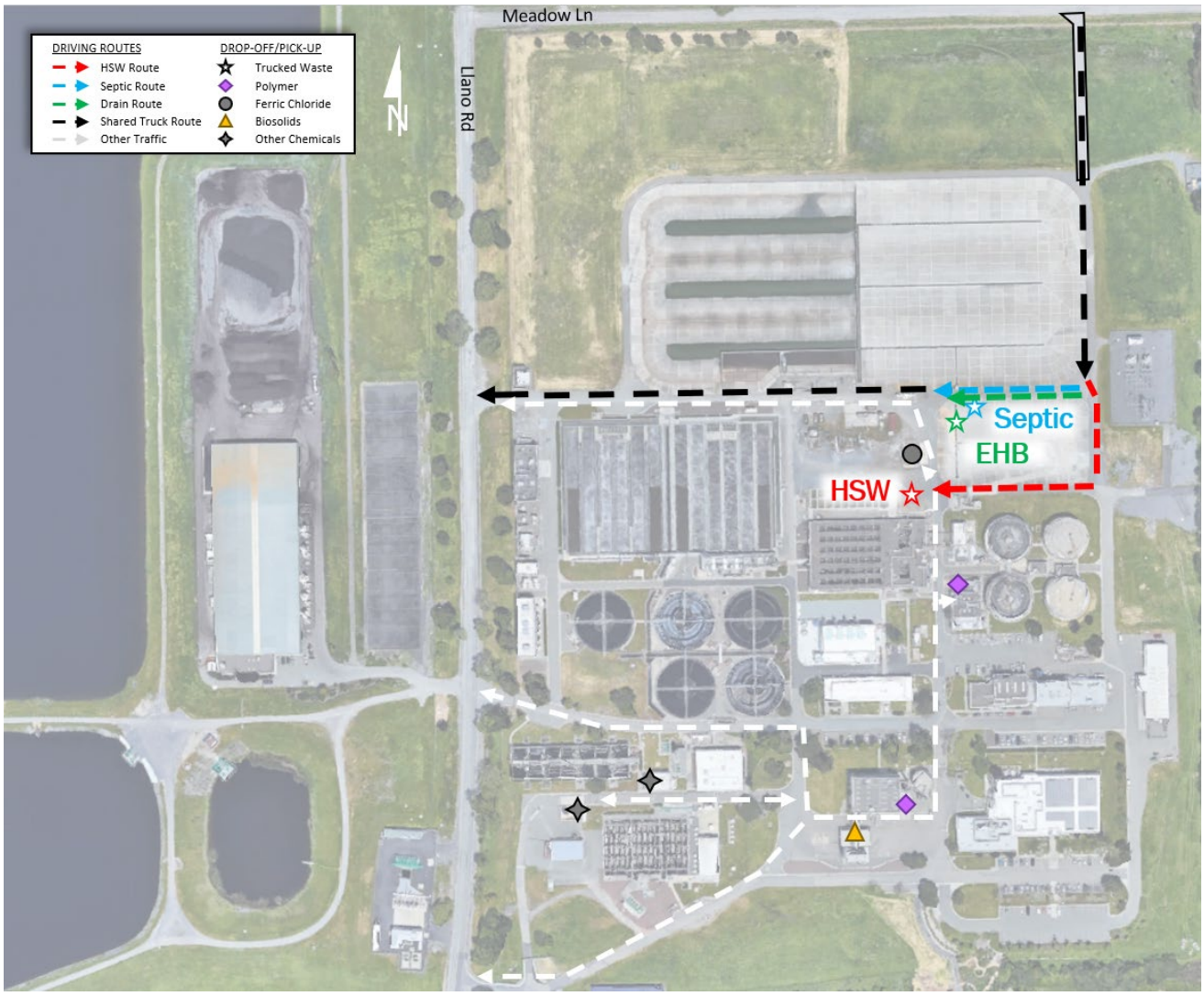

Figure 4-4. Additional road connecting Meadow Lane to LTP

4.1.3 Pavement Alternative

The LTP's existing asphalt roads suffer from a large range of cracks and potholes; therefore, new pavement design is recommended to mitigate further damages. The existing surface pavement can be upgraded to concrete in locations where stationary trucks are expected. Concrete possesses a greater design life and can withstand substantial loads better than asphalt. Concrete should be considered at the LTP entrance, where trucks frequently stop if accessing the LTP with a gate fob during after-hours discharges to the EHB. Concrete is also recommended for any areas that will be used for staging trucks.

4.2 Wastehauler Station

There is a small building adjacent to the existing septage receiving station, which is called the "Wastehauler Station". This building is accessed by all haulers to use the iPACS system, into which they scan a barcode and input the waste type they are discharging. The interior is shown in Figure 4-5. This building has electrical connections and could be improved to include accessories for administration, sampling and monitoring, and surveillance:

- **Administration enhancements** – ensure a stable wireless connection and provide a workstation that includes external monitors, keyboard, mouse, and docking station (for a laptop). This would allow technicians the ability to fulfill administrative roles while being available to help with operating the HSW receiving station or sampling trucks. Including climate control is recommended to make the station inhabitable year-round for a full-time position.
- **Sampling and monitoring enhancements** – adding sampling and monitoring equipment and instruments for technician use is recommended. Adding a refrigerator could be considered for interim storage of trucked waste samples (e.g., sampling every truck would result in about 40 samples daily). Adding the following instruments could be considered for monitoring trucks for compliance and/or sampling to understand potential impacts to the LTP. Probe use would require technicians to perform calibration curves; chemical use would require adequate training to promote safe handling.
  - pH probe
  - COD test (e.g., Hach)
  - Ammonia probe
  - Total suspended solids probe
  - TDS probe
  - Turbidity meter
- **Surveillance enhancements** – any added security cameras could be linked to the kiosk. Security cameras could be considered with wireless features, such that video streams can be reviewed from anywhere with an internet connection. This would allow City staff to monitor the entrance gate from anywhere on the LTP site, or even remotely.

Figure 4-5. Interior of Wastehauler Station

4.3 Instrumentation

Instrumentation can be leveraged for monitoring waste and automating certain processes. The HSW receiving station requires an operator to prime pumps after each truck; however, there is no real-time monitoring of waste compliance unless severe debris is discharged that causes immediate impacts to equipment. Similarly, the septage receiving station and EHB have no mechanism to monitor non-compliant waste. The following instruments are recommended for consideration at receiving stations:

- **pH probes** – a pH probe can be installed inline or submerged within a channel. pH probe output can be displayed locally on a display, and the output can be communicated to other equipment or SCADA. Per hauler permits, a pH range of 5 to 12 is required for all discharged waste; therefore, pH probes can be used to monitor waste compliance with this criterion. In the event of non-compliant pH, equipment such as HSW receiving pumps (existing) or valves (new or existing) could be closed to stop waste from entering the LTP treatment processes. The base cost for instrumentation and a controller module alone can cost about $4,500 without shipping, tax, or installation. Introducing communications between a pH probe and SCADA, iPACS, other instruments (e.g., automatic actuating valve) would also increase costs. Probe maintenance is required and could be assigned to a Program technician.
- **Automatic actuating flow control valve** – in tandem with a pH probe, installation of automated valves can be leveraged to stop flow from receiving stations before it enters the LTP. Notably, the EHB, which currently has the least oversight, could benefit from an automated valve or sluice gate if either could stop non-compliant flow from entering the treatment plant before dilution. Dilution of non-compliant waste or metering waste at a slower rate could mitigate slug loads to the treatment plant. The cost for an automatic flow control valve depends on the size of the line that the valve is controlling. Review of as-built records is recommended to verify pipeline sizes. For channels, a sluice gate would be recommended in lieu of a valve. This type of application may be applicable to the EHB.
- **Flow-indicating transmitter** – a flow-indicating transmitter could be used to control valves or pumps. This would allow waste to be introduced to the LTP at a controlled rate. For example, during wet weather events when UVT impacts are a concern, a flow meter installed on the Mecham pipeline or at the EHB could be used to throttle or close a valve or gate to limit the leachate flow contribution below a certain value (e.g., 1 percent by volume relative to the plant flow).

Section 5: Recommendations and Next Steps

Administration, process, and physical enhancements are recommended to improve the Program and are discussed in this section.

5.1 Administrative Enhancements

In TM1, the Program was evaluated to operate at a net positive revenue for the LTP; however, limitations in current staff capacity result in deficiencies in sampling, compliance monitoring, and enforcement. Increased staffing dedicated to the Program, specifically one Program manager and two Program technicians is recommended to allow the City to implement administrative recommendations from this report. Direct benefits of additional staffing include:

- Improving sampling and increasing the frequency will provide the LTP with data needed to accurately plan for future plant upgrades or expansions.
- Improving the real and perceived compliance monitoring of trucked wastes will allow the City to identify and correct any issues with non-compliant waste.
- Providing leadership to institute an Enforcement Response Plan

The City also mentioned UVT impacts from leachate; pre-treatment or flow limits are recommended, but specific technologies and restrictions should be investigated in a future study. Before any type of pre-treatment of leachate can be identified, it is recommended the City perform additional UVT sampling of the leachate prior to being combined with municipal flows. The impact of leachate flows should be coordinated with the UV supplier recently selected for the UV system upgrades project because these flows could impact validation testing.

5.2 Process Enhancements

Process enhancements evaluated for receiving stations include:

- Adding instrumentation to monitor wastes and control flow.
- Constructing a new septage receiving station. While this could be considered, it may have minimal impact to traffic congestion or process improvements depending on where the new receiving station is located.

The following items influence process performance and were also investigated:

- The digester feed strategy is aligned with best practices to send as consistent a feed as possible to maintain consistency in volatile solids reduction and gas production. HSW variability may result in changes in gas production. The City can manage variability by mixing HSW tanks and sending flow to digesters in a steady 24/7 rate.
- Recommendations for biogas utilization require coordination with program expansion pending a capacity evaluation to be performed during the Biosolids Master Plan.
- BC recommended that smart utility planning and implementations can potentially assist with the deployment of data management and infrastructure. A centralized data repository, mobile data collection, and data visualization will help operators of all experience levels make more informed decisions based on the performance of the digesters, permitting and compliance, billing, and lab data.

5.3 Physical Enhancements

Physical enhancements are recommended to alleviate LTP impacts from truck traffic and trucked wastes. Truck traffic causes congestion and safety concerns. The existing truck route can be improved by one of three alternatives:

- Build a new road from Meadow Lane (north side of LTP) to the EHB and HSW receiving station:
  - Benefit(s): diverts all truck traffic away from main entrance road used by other plant staff and chemical deliveries, which increases safety and decreases congestion/conflicts
  - Risk(s): project may be halted if it impacts the California tiger salamander; decreases truck traffic visibility, which could be a security concern; potentially increases congestion to residents that use Meadow Lane
- Re-route trucks around the east side of digesters:
  - Benefit(s): decreases congestion on the west side road, which is used by ferric chloride deliveries, polymer deliveries, and plant staff; allows all trucks to stage on right-hand shoulder of the east side road; requires no capital to implement
  - Risk(s): Increases traffic and congestion on the east side road; may require special signage or field staff to re-route trucks initially; lane proposed for low-strength waste trucks is routed between two basins (potential driving hazard)
- Construct new septage receiving station on east side of digesters:
  - Benefit(s): new septage receiving station location could reduce congestion; improvements to septage receiving station could feature flow equalization and automation improvements to the station; station could be sized to accept other types of trucked wastes (e.g., leachate)
  - Risk(s): could result in marginal improvement but requires higher capital investment than other alternatives

Truck wastes can cause issues with process upsets, including slug loading or UVT interference. Implementing instrumentation can help monitor wastes for compliance, strength, or flow. To assist with trucked waste monitoring and Program administration, the kiosk currently located in the Wastehauler Station adjacent to septage receiving is recommended for an upgrade to support Program technicians. Improvements should include climate control, a complete wireless workstation compatible with a laptop and ergonomically setup for computer work, sampling instruments and equipment, and surveillance equipment.

5.4 Next Steps

These administrative and physical improvements were reviewed and discussed with the City in Workshop 3 and additional follow up conversations to identify recommendations and associated benefits. Enhancements identified in this TM2 will be refined in the Final Report. Next steps also include an evaluation of Program expansion alternatives that consider impacts to digester feed, biogas handling, solids dewatering, and solids handling capacities, which are deferred to the Biosolids Strategic Management Plan. Future alternatives will account for capacity limitations in solids treatment and gas utilization. The final report will incorporate project costs for the recommended improvements using a net present value analysis to compare tipping fee revenues against operating and capital costs for the Program.

References

U.S. Fish and Wildlife Service, Recover Plan for the Santa Rosa Plain, (USFWS-Recovery-Plan-for-the-Santa-Rosa-Plain.pdf (amphibians.org), 2016

Attachment A: Detailed Summary of Food Waste Characteristics from LACSD

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Detailed Summary of Food Waste Characteristics from LACSD

ITEM	VALUE	REFERENCE
pH	3.0 – 7.0	LACSD SSO SPECIFICATION
Volatile Acids (Acetic Acid Equivalents)	Less than 8,000 mg/L	LACSD SSO SPECIFICATION
Total Solids	12.0 – 15.0%	LACSD SSO SPECIFICATION
Volatile Solids (% of Total Solids)	85 – 95%	LACSD SSO SPECIFICATION
Total COD	Greater than 180,000 mg/L	LACSD SSO SPECIFICATION
Total BOD	Greater than 80,000 mg/L	LACSD SSO SPECIFICATION
Specific Gravity@25 degC	0.95 – 1.10	LACSD SSO SPECIFICATION
Kinematic Viscosity@25 degC	Less than 200 cps	LACSD SSO SPECIFICATION
Ammonia as Nitrogen (NH3-N)	Less than 600 mg/L	LACSD SSO SPECIFICATION
Total Kjeldahl Nitrogen (TKN)	Less than 7,500 mg/L	LACSD SSO SPECIFICATION
Total Carbon	Greater than 9,000 mg/L	LACSD SSO SPECIFICATION
Electrical Conductivity	Less than 15 millimho/cm	LACSD SSO SPECIFICATION
Arsenic	Less than 1 mg/L	LACSD SSO SPECIFICATION
Calcium	Less than 3,000 mg/L	LACSD SSO SPECIFICATION
Chloride	Less than 3,000 mg/L	LACSD SSO SPECIFICATION
Chromium	Less than 2 mg/L	LACSD SSO SPECIFICATION
Magnesium	Less than 500 mg/L	LACSD SSO SPECIFICATION
Mercury	Less than 1 mg/L	LACSD SSO SPECIFICATION
Nickel	Less than 5 mg/L	LACSD SSO SPECIFICATION
Potassium	Less than 3,000 mg/L	LACSD SSO SPECIFICATION
Sodium	Less than 3,000 mg/L	LACSD SSO SPECIFICATION
Total Heavy Metals (Ag, As, Ba, Cd, Co, Cr, Cu, Hg, Mo, Ni, Pb, Sb, Se, Ti Sr, Sn, V, and Zn)	Less than 50 mg/L	LACSD SSO SPECIFICATION
Specific Heavy Metal Limits		
Cadmium (Cd)	1 mg/L	Ordinance OCSD-48
Chromium (Cr)	35 mg/L	Ordinance OCSD-48
Copper (Cu)	25 mg/L	Ordinance OCSD-48
Lead (Pb)	10 mg/L	Ordinance OCSD-48
Nickel (Ni)	10 mg/L	Ordinance OCSD-48

ITEM	VALUE	REFERENCE
Zinc (Zn)	50 mg/L	Ordinance OCSD-48
Physical Contamination [1] (greater than 4 millimeters)	0.5% by dry weight	Title 14 -Section 17868.3.1 – Physical Contamination Limits
Film Plastic (greater than 4 millimeters)	20% by dry weight of Physical Contamination	Title 14 -Section 17868.3.1 – Physical Contamination Limits

Note:

1. "Physical Contaminants" means human-made inert products contained within feedstocks, including, but not limited to, glass, metal, and plastic (Title 14 Section 17381).

Appendix C: Workshop 3 Prioritization and Phasing Feedback on Enhancement Alternatives

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Appendix C

Prioritization and Phasing Votes on TM2 Enhancement Alternatives

Brown and Caldwell hosted a workshop on May 16, 2022 via Microsoft Teams with the City. Enhancement alternatives included in the draft version of TM2 were presented, and participants from the City were asked to vote on alternatives in order to rank priorities for the City. Following the ranking of enhancement alternatives, the City was asked to participate an anonymous survey to identify the preferred implementation timeline for alternatives. This section documents the results from these exercises.

C.1 Prioritization of Enhancement Alternatives

Figure C-1 presents results from an exercise where each participant from the City was asked to vote five times on alternatives. Participants were allowed to vote a total of five times each, but could vote multiple times on a single alternative. Each participant only voted a maximum of one time per alternative. Alternatives that received no votes include:

- Existing septage receiving station improvements
- Addition of automated valve for non-compliant pH at septage receiving
- Addition of utility performance system (e.g., Power BI dashboard)
- Concrete paving at stationary truck locations: entry and staging areas
- Addition of laser/video detection instead of traffic inductor loops

Enhancement Alternatives	Priority Votes
Hire Program manager and 2 technicians	10
Increase sampling to all waste types	7
Implement flow restrictions for leachate wastes	1
Add in-line pH probe to HSW receiving	2
Add automation to HSW receiving	3
Add in-line pH probe to EHB	1
Add automated valve to EHB for non-compliant pH	4
Existing septage receiving station improvements	0
Construct new septage receiving station	3
Add in-line pH prove to septage receiving	1
Add automated valve to septage receiving for non-compliant pH	0
Add utility performnace system (e.g., Power BI dashboard)	0
Build new roadway entry for trucks from Meadow Lane	4
Concrete paving at stationary truck locations: entry and staging areas	0
Improve existing wastehauler station (Add workstation for technicians)	1
Add laser/video detection instead of traffic inductor loops	0
Increase tipping fees	8
Truck rerouting	3
Monitor unloading at HSW	1

Figure C-1. Results from prioritization exercise

After voting, a discussion illuminated that a new Wastehauler Station was desired in lieu of improving the existing Wastehauler Station (an option which received only one vote). Therefore, constructing a new Wastehauler Station was added to the phasing survey.

C.2 Phasing of Enhancement Implementations

Table C-1 summarizes the ranking and preferred implementation timeline for each alternative based on responses from the City during a phasing survey. There were nine participants voting on each alternative. The table is organized into three rows: high agreement (top), moderate agreement (middle), and low agreement (bottom). Feedback from this exercise helped prioritize the evaluations completed in Section 4 of this report.

Table C-1. Phasing of Enhancement Alternatives Presented during Workshop 3

Now	Near Term (2-5 years)	Long-Term (>5 years)	Never	Not Sure
7 Votes (78% agreement): • Hire 1st Technician • Increase sampling to all waste types	5 Votes (56% agreement): • Existing septage receiving station improvements • Construct new septage receiving station • Construct new waste hauler station (workstation for technicians, new location)	6 Votes (67% agreement): • Add utility performance system (e.g., Power BI dashboard)	7 Votes (78% agreement): • Add in-line pH probe to HSW receiving	Not applicable
5 Votes (56% agreement): • Hire Program Manage • Implement flow restrictions for leachate wastes • Truck rerouting	4 Votes (44% agreement): • Hire 2nd Technician • Add in-line pH probe to septage receiving • Build new roadway entry for trucks from Meadow Lane	Not applicable	4 Votes (44% agreement): • Add automated valve to EHB for non-compliant pH • Add automated valve to septage receiving for non-compliant pH	4 Votes (44% agreement): • Improve existing waste hauler station (Add workstation for technicians)
3 Votes (38% agreement): • Add automation to HSW receiving	3 Votes (38% agreement): • Add in-line pH probe to EHB • Concrete paving at stationary truck locations: entry and staging areas • Add laser/video detection instead of traffic inductor loops	Not applicable	Not applicable	Not applicable

Appendix D: Example Program Manager and Technician Job Descriptions

Appendix D provides example job descriptions for a Program manager and Program technicians.

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Appendix D

Program Manager and Technician Descriptions

This section provides example job descriptions for a Program manager and Program technicians. This report uses the term Program as an abbreviated reference to the City's Program. Descriptions below follow structure of posting typical to the City of Santa Rosa's job descriptions web page.[1] Qualifications, license or certificate, and working conditions descriptions are expected to be similar to environmental compliance inspectors with wastewater treatment operator certificates highly desirable for technicians.

D.1 Program Manager

Definition

The fundamental reason for the existence of this classification is to inspect and monitor discharges into the sub-regional wastewater treatment system by truck haulers in order to enforce the City of Santa Rosa's wastehauler discharge permit standards to protect performance of the LTP.

Distinguishing Characteristics

Under general supervision, a Program Manager enforces local, state and federal standards for trucked waste discharges into the LTP by inspecting commercial businesses, inspecting waste hauler trucks, and obtaining wastewater samples to determine requirements and compliance with discharge permits. This classification is distinguished from the Environmental Compliance Inspector classifications as the former inspects and enforces compliance for all applicable federal, state and local regulations involving primarily trucked wastes discharged directly to the LTP as part of the Program, and from the Program Technician in that the latter classification conducts the sampling program and performs basic trucked waste inspection, permitting, enforcement, and receiving station operation.

Supervision Received and Exercised

General supervision is provided by the Environmental Compliance Supervisor. Assignments may include the indirect supervision of technical and support services personnel in the section, such as Program Technician(s).

Example of Duties

Essential Duties

The following duties are considered essential for this job classification:

- Participate in the Environmental Services sampling team for waste hauler trucks
- Conduct a variety of chemical and biological field tests

[1] City of Santa Rosa Careers – Come Join Us! Website <https://www.governmentjobs.com/careers/srcity/classspecs>

- Evaluate commercial businesses work flows and wastewater discharges to determine Nonresidential waste hauler discharger classifications and permit requirements
- Prepare and issue Wastehauler Discharge Permits
- Ensure all haulers are have updated insurance and necessary certifications
- Inspect commercial facilities permitted by Program to determine compliance with local, state and federal standards, permits, ordinances, regulations and laws
- Maintain waste hauler inspection and sampling records and keep documents current
- Enforce permit requirements using Corrective Action Notices and Notices of Violation
- Interpret and implement Title 15 of the Santa Rosa City Code (Sewers) and the sewer codes of the sub-regional system partners
- Conduct investigations to provide support for legal action in response to wastehauler permit non-compliance
- Create and maintain an enforcement action plan for non-compliant waste haulers
- Create and facilitate waste hauler wastewater characteristic sampling program
- Coordinate with operations and maintenance staff to identify safety or compliance deficiencies caused by waste haulers, as required
- Prepare annual waste hauler report balancing the Program revenues and costs
- Prepare annual waste hauler report documenting wastewater characteristics for each permitted trucked waste category
- Research, recommend and implement solutions to more effectively accomplish Program goals or improve efficiency
- Review monthly waste hauler billing, resolve billing discrepancies, and follow-up to collect outstanding payments

Additional Duties:

In addition to the duties listed in the Essentials Duties Section, each employee in this classification may perform the following duties. Any single position may not be assigned all duties listed below, nor do the examples cover all duties which may be assigned.

- Participate in the preparation of technical reports for the State Water Quality Control Board and the Environmental Protection Agency
- Prepare compliance letters to trucked waste hauler dischargers
- Maintain and update enforcement action plan, sampling program, and permit files
- Prepare and conduct presentations to commercial users and the general public
- Perform related duties as assigned

D.2 Program Technician

Definition

The fundamental reason for the existence of this classification is to inspect and monitor discharges into the sub-regional wastewater treatment system by truck haulers in order to enforce the City's wastehauler discharge permit standards to protect performance of the LTP.

Distinguishing Characteristics

Under general supervision, a Program Technician monitors and facilitates trucked waste discharges into the LTP by inspecting waste hauler trucks, obtaining wastewater samples, and operating trucked

hauler receiving stations. This classification is distinguished from the Environmental Compliance Inspector classifications as the former inspects and enforces primarily trucked wastes as part of the Program, and from the Program Manager in that the latter classification manages the Program.

Supervision Received and Exercised

General supervision is provided by the Program Manager. Indirect supervision may be provided by an Environmental Compliance Inspector II, III, and Supervisor.

Example of Duties

Essential Duties

The following duties are considered essential for this job classification:

- Participate in the Environmental Services sampling team for waste hauler trucks
- Direct waste hauler traffic and facilitate waste hauler discharges
- Operate HSW receiving station, including connection of corrugated piping to waste hauler trucks, manual operation of pumps and values, and operation of panel equipment
- Coordinate with operations to regulate waste hauler discharges, as required
- Hauler truck sampling instrument maintenance and calibration
- Clean Program sampling equipment and instruments and maintain the waste hauler station in a neat and orderly condition
- Conduct a variety of chemical and biological field tests
- Review log books, field data, recordings, and other documentation related to waste hauler discharges permitted by the Program
- Assist Program Manager with enforcement of permit requirements using Corrective Action Notices and Notices of Violation
- Provide support for investigations specified by the Program Manager in response to wastehauler permit non-compliance per an enforcement action plan
- Conduct sampling requirements from waste hauler wastewater characteristic sampling program
- Perform physical inventory of Program equipment and supplies

Additional Duties

In addition to the duties listed in the Essentials Duties Section, each employee in this classification may perform the following duties. Any single position may not be assigned all duties listed below, nor do the examples cover all duties which may be assigned:

- Assist Environmental Compliance Inspectors and Operators with special assignments
- Assist in the modification of field sampling and compliance monitoring methods
- Perform related duties as assigned

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Appendix E: Capital Cost Estimates

Capital cost estimates are rounded to two significant figures and represent a screening estimate with a range of approximately plus 100 percent and minus 50 percent of the presented net total value.

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Enhancement Alternative:	Construct New Wastehauler Station			
Line Item	Units	Unit Cost	Qty	Cost
Foundation				
Demolition	LS	$ 5,600.00	1	$ 5,600.00
Grading	LS	$ 2,800.00	1	$ 2,800.00
Building				
Building Exterior and Foundation	SF	$ 70.00	800	$ 56,000.00
Appliances and Furniture				
Sample refrigerator	EA	$ 3,510.00	1	$ 3,510.00
Hach COD dual block reactor	EA	$ 2,529.07	1	$ 2,529.07
Hach COD Digestion vials	150 pk	$ 396.05	3	$ 1,188.14
Office Cubicle	EA	$ 3,380.00	2	$ 6,760.00
Laptop, External Monitors, Etc.	EA	$ 3,900.00	2	$ 7,800.00
Hach Spectrophotometer	EA	$ 7,996.35	1	$ 7,996.35
Hach TKN TNTplus Vials	25 pk	$ 267.90	18	$ 4,822.27
Watercooler	EA	$ 845.00	1	$ 845.00
Kitchenette	EA	$ 4,550.00	1	$ 4,550.00
Sink and fume hood	EA	$ 28,600.00	1	$ 28,600.00
Eyewash station	EA	$ 1,300.00	1	$ 1,300.00
Wall-mounted cabinets	LS	$ 7,150.00	1	$ 7,150.00
Subtotal				**$ 150,000**
Construction Markups				
Net Cost Markups				$ 100,000
Gross Cost Markups				$ 60,000
Construction Subtotal				**$ 310,000**
Project Markups				
Project Markups				$ 300,000
Net Total				**$ 610,000**

Enhancement Alternative:	Utility Performance System Integration and Analytics			
Line Item	Units	Unit Cost	Qty	Cost
System Integration	LS	$ 150,000.00	1	$ 150,000.00
System Analytics	LS	$ 250,000.00	1	$ 150,000.00
Subtotal				**$ 300,000**
Construction Markups				
Cost Markups				$ -
Construction Subtotal				**$ 300,000**
Project Markups				
Project Markups				$ -
Net Total				**$ 300,000**

Enhancement Alternative:	Reroute trucks on existing roads			
Line Item	Units	Unit Cost	Qty	Cost
Stripping	LS	$ 500.00	1	$ 500.00
Signage	EA	$ 273.00	8	$ 2,184.00
Paving around south side of EHB	SF	$ 16.00	2,300	$ 36,800.00
Paving around east and north side of EHB	SF	$ 16.00	10,200	$ 163,200.00
Subtotal				**$ 200,000**
Construction Markups				
Net Cost Markups				$ 130,000
Gross Cost Markups				$ 70,000
Construction Subtotal				**$ 400,000**
Project Markups				
Project Markups				$ 390,000
Net Total				**$ 790,000**

Enhancement Alternative:	Add Automation to HSW Receiving Station			
Line Item	Units	Unit Cost	Qty	Cost
Actuators				
4" valve actuator	EA	$ 5,200.00	8	$ 41,600.00
1.5" valve actuator	EA	$ 1,300.00	2	$ 2,600.00
Demolition				
Partial Demolition	LS	$ 10,000.00	1	$ 10,000.00
Electrical, Instrumentation				
Panel	EA	$ 10,000.00	1	$ 10,000.00
Indicators	EA	$ 19.50	15	$ 292.50
Switches/Push Buttons	EA	$ 130.00	10	$ 1,300.00
Wiring	LS	$ 7,500.00	1	$ 7,500.00
PLC screen	EA	$ 2,210.00	1	$ 2,210.00
Electrical and I&C Contingency	LS	$ 53,256.25	1	$ 53,256.25
Subtotal				**$ 130,000**
Construction Markups				
Net Cost Markups				$ 90,000
Gross Cost Markups				$ 50,000
Construction Subtotal				**$ 270,000**
Project Markups				
Project Markups				$ 260,000
Net Total				**$ 530,000**

Enhancement Alternative:	Construct New Septage Receiving Station			
Line Item	Units	Unit Cost	Qty	Cost
Quotes				
Septage Receiving Station Cost	LS	$ 227,627.50	1	$ 227,627.50
Other Construction Costs				
Demolition and Grading	LS	$ 22,762.75	1	$ 22,762.75
Site Civil	LS	$ 34,144.13	1	$ 34,144.13
Electrical, I&C	LS	$ 56,906.88	1	$ 56,906.88
Subtotal				**$ 350,000**
Construction Markups				
Net Cost Markups				$ 230,000
Gross Cost Markups				$ 120,000
Construction Subtotal				**$ 700,000**
Project Markups				
Project Markups				$ 700,000
Net Total				**$ 1,400,000**

Enhancement Alternative:	Addition of pH Probe for Online Monitoring at LSW Receiving Stations			
Line Item	Units	Unit Cost	Qty	Cost
Quotes				
pH and conductivity sensor setup	LS	$ 17,000.00	1	$ 17,000.00
Other Construction Costs				
Civil, Structural	LS	$ 1,700.00	1	$ 1,700.00
Proc Mech	LS	$ 8,500.00	1	$ 8,500.00
Electrical, I&C	LS	$ 85,000.00	1	$ 85,000.00
Subtotal				**$ 120,000**
Construction Markups				
Net Cost Markups				$ 80,000
Gross Cost Markups				$ 50,000
Construction Subtotal				**$ 250,000**
Project Markups				
Project Markups				$ 240,000
Net Total				**$ 490,000**

Appendix F: Tipping Fee Methodology

Appendix F outlines the methodology for evaluating Program costs and determining tipping fee adjustments. This methodology is provided as a reference for future adjustments.

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Appendix F

Tipping Fee Methodology

This section documents the methodology used to determine tipping fee requirements for the City's Program in order to maintain a net positive annual revenue similar to current, baseline conditions.

Step 1. Determine Baseline Conditions

Use recent historical operating, revenue, and cost data to determine baseline conditions. For this study, the City of Santa Rosa's historical operation data was reviewed to determine baseline operating conditions. Key assumptions and findings for baseline conditions included the following for this evaluation:

- Annual tipping fee revenues
- Tipping fee revenues per trucked waste type (categories permitted and tracked by the City)
- Treatment costs per trucked waste type
- Total volume received per trucked waste type
- Operations and administration costs for staff and laboratory analyses
- Solids treatment operating costs for thickening and dewatering equipment (discounted based on percentage attributed to HSW)
- Maintenance costs for receiving stations
- Maintenance costs for cogeneration engines (discounted based on percentage attributed to HSW)
- Benefits from PG&E (energy) purchase offset and savings from peak shavings (discounted based on percentage attributed to HSW)

After balancing tipping fee revenues, energy offset benefits, and costs, the total net annual revenue was estimated at $438,000 of net positive revenue to the City of Santa Rosa from annual operations of their Program. A target net annual revenue of $400,000 in 2022 dollars was set as a criterion for the rebalancing exercise to maintain a revenue similar to current conditions.

Step 2. Determine Future Operating Conditions and Costs

Determine future operating conditions, operating costs, and capital costs. Treatment costs and tipping fee revenues are based on the total volume of trucks received at the LTP. Determine whether any changes are expected to significantly change revenue or costs. If changes to annual running costs (e.g., hiring additional staff) or capital outlays (e.g., building a new septage receiving station) are expected, predict and document the timeline and magnitude of these changes.

The following list includes operating condition assumptions used for this analysis:

- Assumes 51 million gals of trucked waste plus leachate waste is received
- Assumes percentage of received waste match stated values in TM1 (10 percent septic/chemical toilet, 35 percent HSW, 5 percent gray water, 5 percent groundwater, 5 percent trucked leachate, 5 percent sewer line cleaning, 10 percent wine rinsate, and 25 percent Mecham pipeline leachate)
- Assumes volume and fraction are unchanged in next ten years (no Program expansion)

The following list of annual operating costs are included in the analysis:

- Staffing costs
- Direct treatment costs (term used for rate based on 2021 rate study presented in TM. Value includes power and overhead to operate treatment plant and is assigned to waste types according to pounds of TS, BOD, and TKN that each waste contributes. A premium is added to leachate waste to account for impacts to the UV system, which is most significant during wet weather flows.)
- Laboratory analysis costs
- Maintenance costs (for CHP engines and HSW receiving station)
- Electrical offset benefits (from biogas produced from HSW)
- Systems Integration and Analytics (operations of PowerBI dashboard for a recommended enhancement)
- Removal and replacement (R&R) Costs
  - Cogen engine tuning (every 1 year)
  - HSW receiving R&R (every 5 years)
  - Roadway R&R (every 10 years)
  - Probe R&R (every 3 years)
  - Cogen engine rebuilds (every 10 years, per engine)
  - Automation R&R (every 3 years)

Capital improvement projects were recommended to enhance the Program. These capital outlays were implemented as shown in the bulleted lists below:

- Construct new Wastehauler Station (building for staff and waste hauler kiosk): $610,000
  - 30 percent of cost in 2023 (represents design)
  - 70 percent of cost in 2024 (represents construction)
- Add systems integration and analytics: $300,000
  - 100 percent of cost in 2028
- Reroute trucks within treatment plant with new signage and stripping: $14,000
  - 100 percent of cost in 2023
- New Septage Receiving Station: $1,400,000
  - 30 percent of cost in 2023 (represents design)
  - 70 percent of cost in 2024 (represents construction)

Step 3. Calculate NPV

A NPV analysis allows for operating and capital costs to be rolled into a single value representing either the net present cost or net present benefit to the City. For this study, costs were presented as negative NPVs and benefits were presented as positive NPVS. Assume in the analysis that annual running staffing, maintenance, R&R, and operating costs escalate. Assume in the analysis that tipping fees are fixed (conservative, as fees can be increased annually if desired) and assume benefits from energy offsets are also fixed. The annual tipping fee revenue must be balanced in step five to match the assumed tipping fee revenue in the NPV analysis.

For this study, the following assumptions were used:

- Variable escalation rates capturing relatively higher escalation rates in the near term that could impact capital improvement projects.
  - Capital projects: 10 percent escalation
  - Systems integration and analytics project: 3 percent escalation
  - Benefits escalation: Zero percent escalation
    - Fixed at zero such that recommended rebalanced tipping fees could be unchanged over 10-year analysis period
    - Assumes 3 percent escalation in PG&E benefits
  - Annual running costs: 3 percent escalation
  - Annual R&R costs: 3 percent escalation
- Discount rate set at 2 percent to represent US Bonds opportunity loss
- No escalation rate set for loans (assumes capital for projects does not require loans)
- 10-year period (analysis ends in 2032 and year one starts in 2023; all costs in 2022 dollars)

Step 4. Document Market Conditions

Review tipping fees charged by other facilities in the region, including EBMUD, CMSA, and NapaSan. Similar waste types, such as FOG, have market competition and therefore increasing tipping fee revenues for these types of wastes must be done with caution.

Step 5. Balance Tipping Fees

Apply direct treatment costs (see TM1) to each type of waste. Add operating costs, administrative costs, maintenance costs, and benefits to the baseline treatment cost to calculate the treatment cost for each waste in $/1000-gal. Because the tipping fees are charged by the truck size, and treatment costs are charged by the volume received, it is necessary to assume a percentage that each truck is filled so that the costs ($/1000-gal) are more representative. The net tipping fee revenue should sum to the revenue assumed in Step 3 when completing the NPV analysis. Calculate the net direct treatment and operating costs using the treatment cost for each waste for quality assurance.

For this evaluation, septic and chemical toilet waste was left near $130 per 1000-gal, and FOG was left at $40/1000-gal. Other wastes had tipping fees readjusted to the treatment cost and an additional fixed value (e.g., $3/1000-gal) was added to target net tipping fee revenues that match the assumptions in the NPV analysis.

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Appendix G: Supplemental Data and Figures

Appendix G shows supplemental figures from data used to present findings in the body of the report.

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Appendix G

Supplemental Figures and Tables

Data provided by the City was reviewed to analyze truck traffic to the LTP. This section presents figures and tables that provide additional detail, supplementing information provided within the body of the evaluation report.

G.1 Tipping Fee Implementation Figures

Tipping fee implementation is recommended for consideration by the City. There is an alternative to implement a single, fixed fee that is predicted to provide net positive revenue over the next ten years of operation while recuperating enhancement project costs (see Section 5.4) or tipping fees could be increased incrementally as discussed in Section 5.4.1. Figure G-1 through G-5 demonstrate how incremental increases might be implemented such that the increase between 2022 and 2023 is less dramatic. The shaded area represents a range of tipping fees recommended if all enhancement projects are included (upper end of range) and if no enhancement projects are included (lower end of range). BC recommends annual evaluation of the Program costs, benefits, and revenue in coordination with enhancement projects' lifecycle costs to determine if tipping fees are still sufficient.

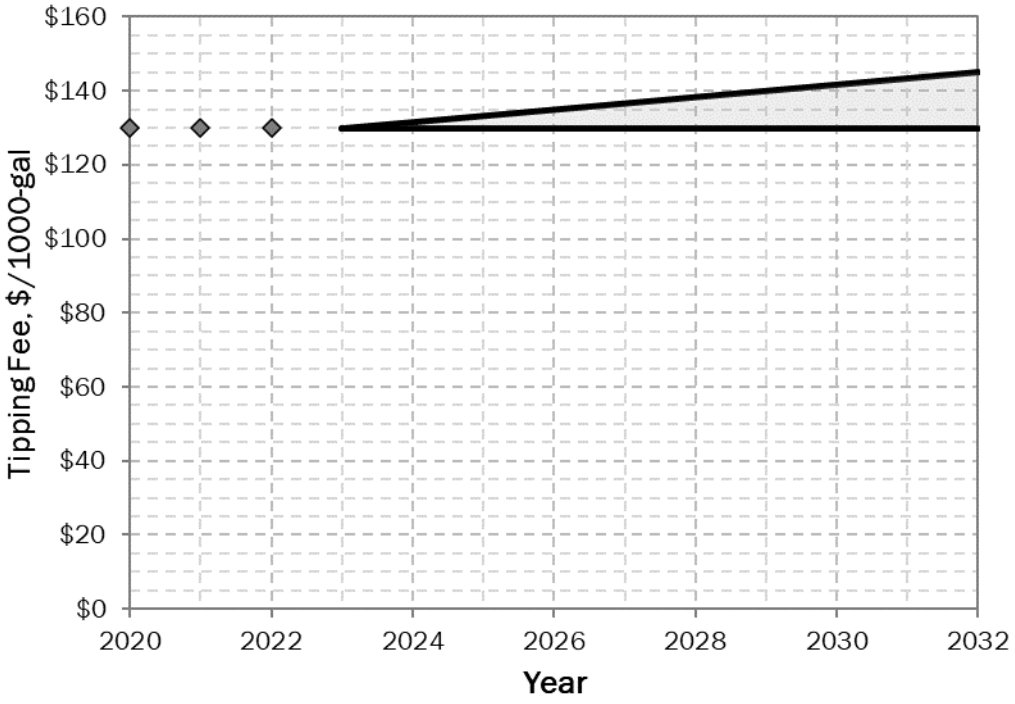

Figure G-1. Example of septic/chemical toilet waste tipping fee increases

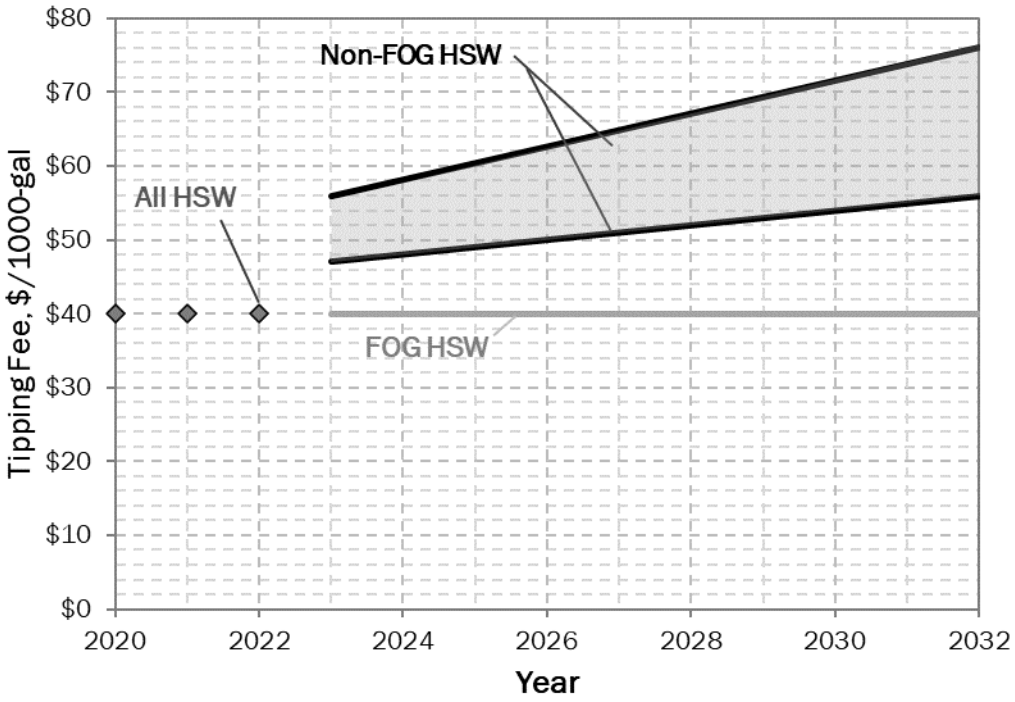

Figure G-2. Example of HSW tipping fee increases

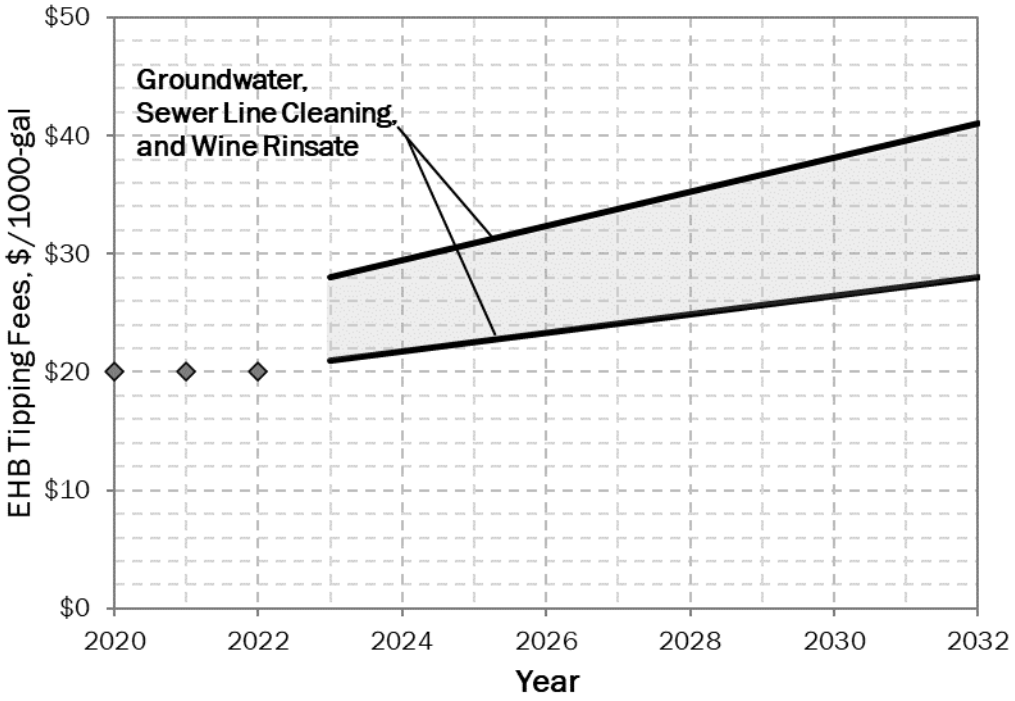

Figure G-3. Example of LSW tipping fee increases

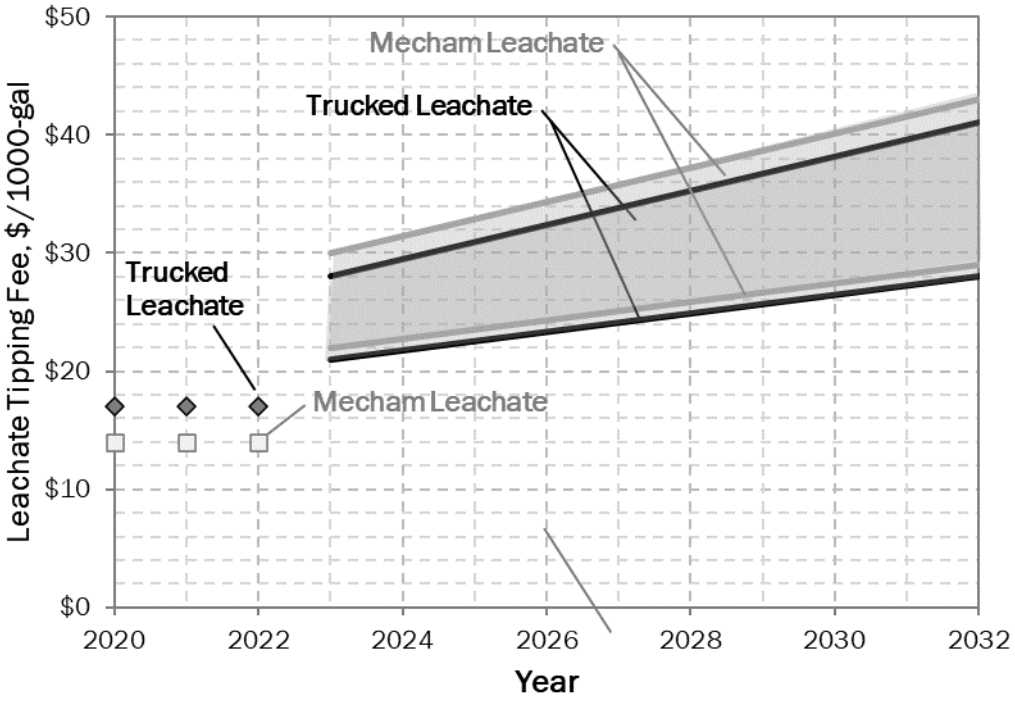

Figure G-4. Example of leachate waste tipping fee increases

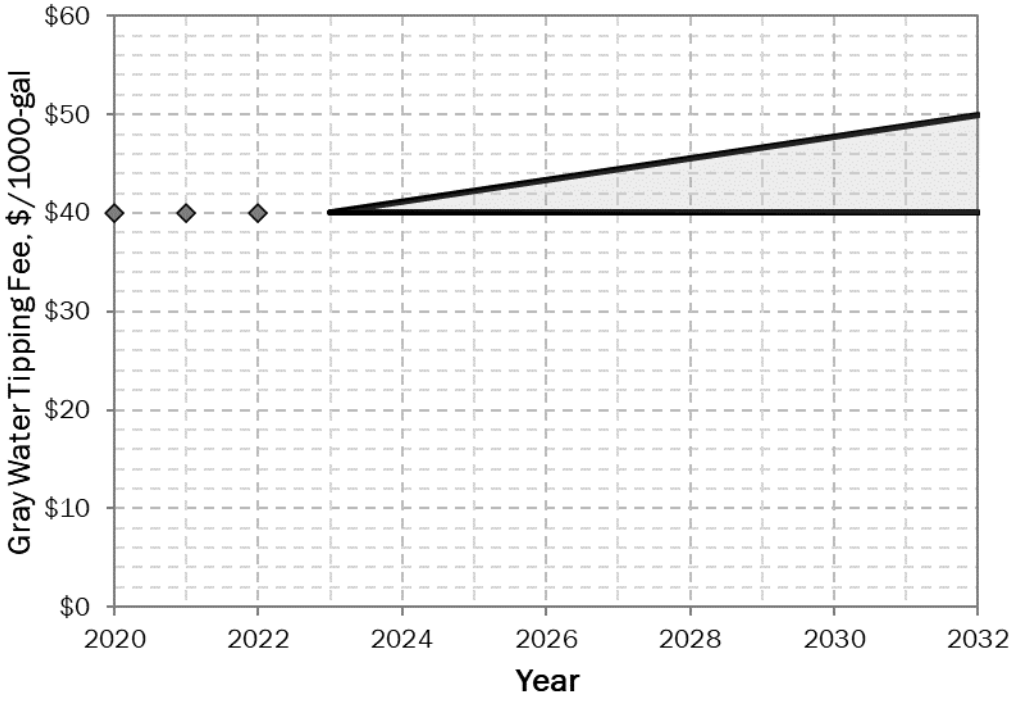

Figure G-5. Example of gray water waste tipping fee increases

G.1 Truck Traffic Figures

Average total truck traffic patterns are presented in Section 2.3 and provide average patterns into and out of the LTP. Figures G-6 and G-7 summarize average daily traffic at different receiving stations. Figures G-8, G-9, and G-10 present truck traffic patterns for haulers discharging to septage receiving, HSW receiving, and the EHB, respectively, in the year 2021.

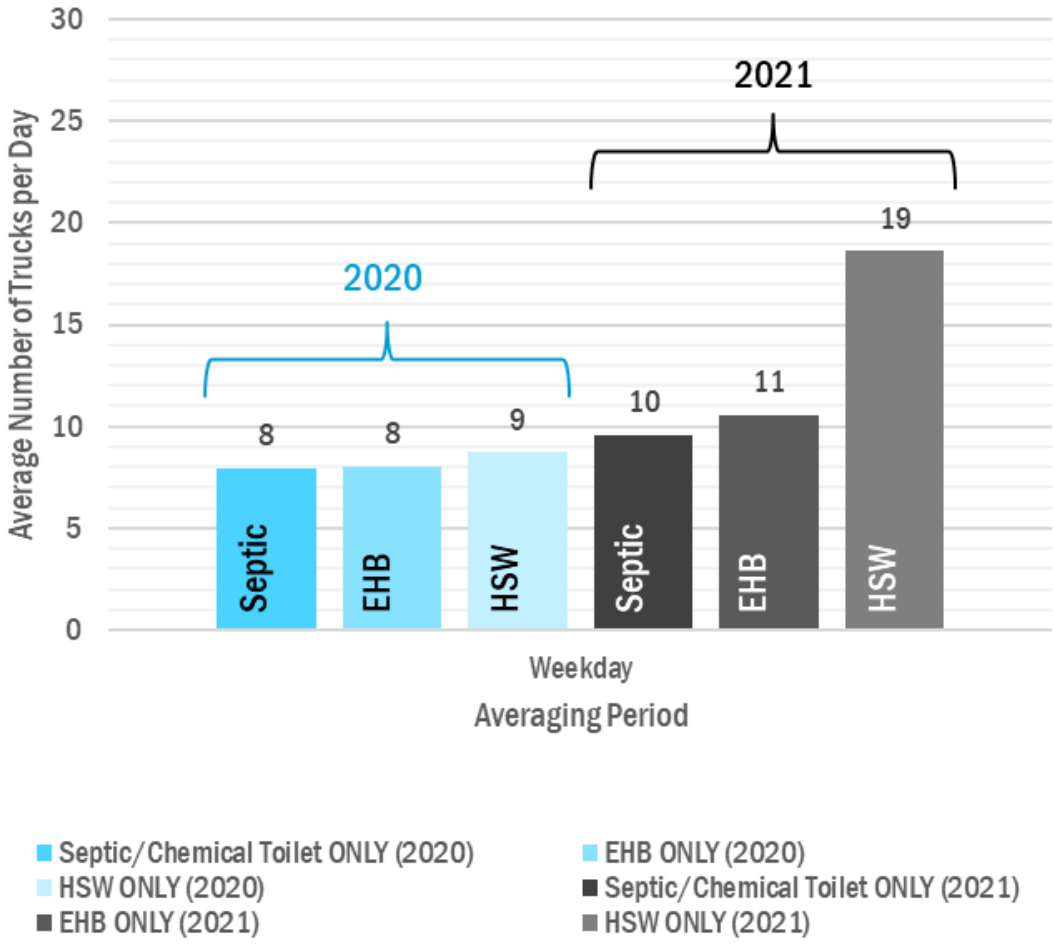

Figure G-6. Example of gray water waste tipping fee increases

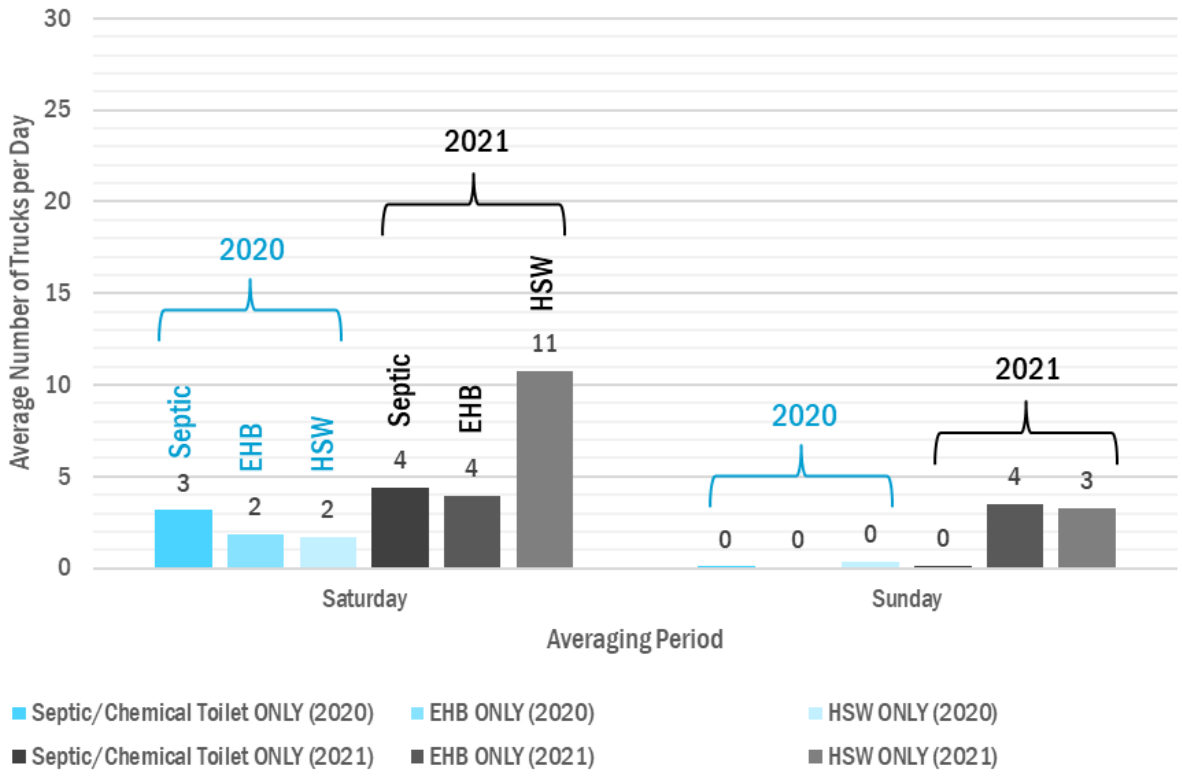

Figure G-7. Example of gray water waste tipping fee increases

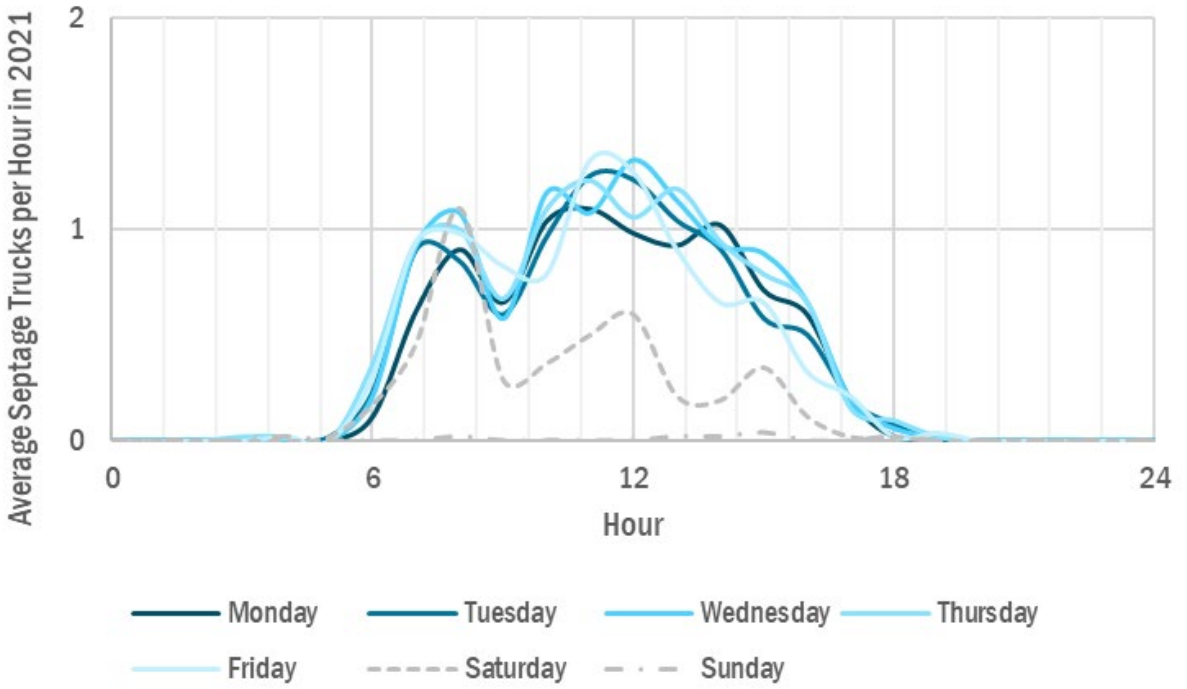

Figure G-8. Average septage truck traffic per hour in 2021

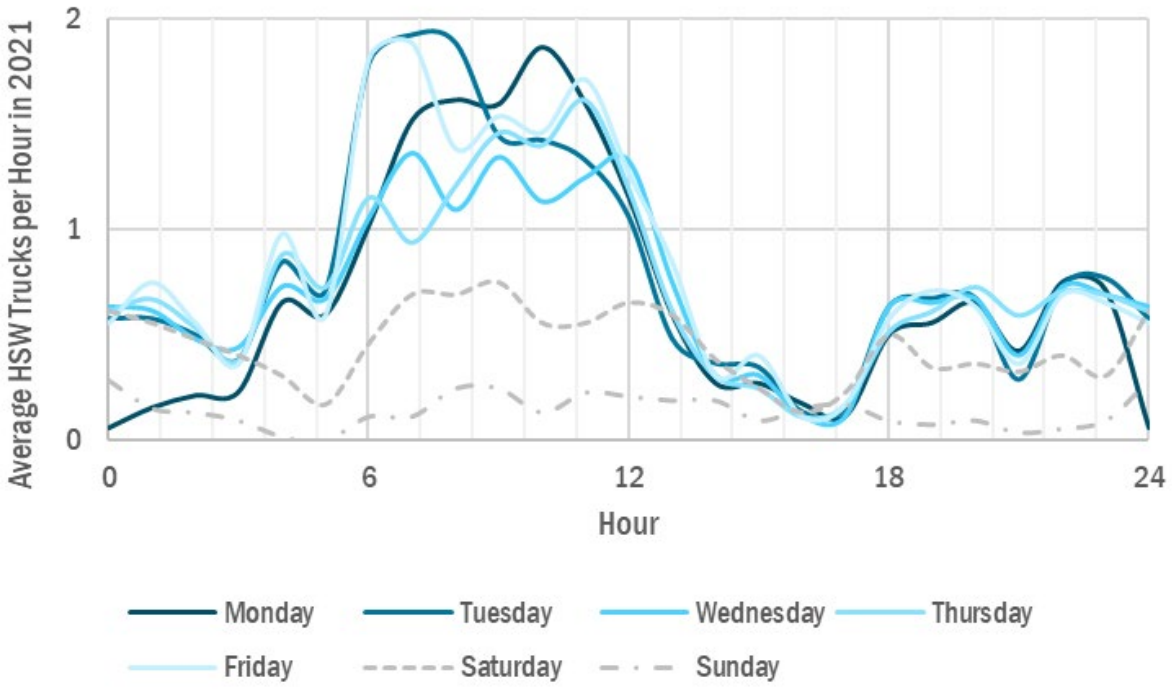

Figure G-9. Average HSW truck traffic per hour in 2021

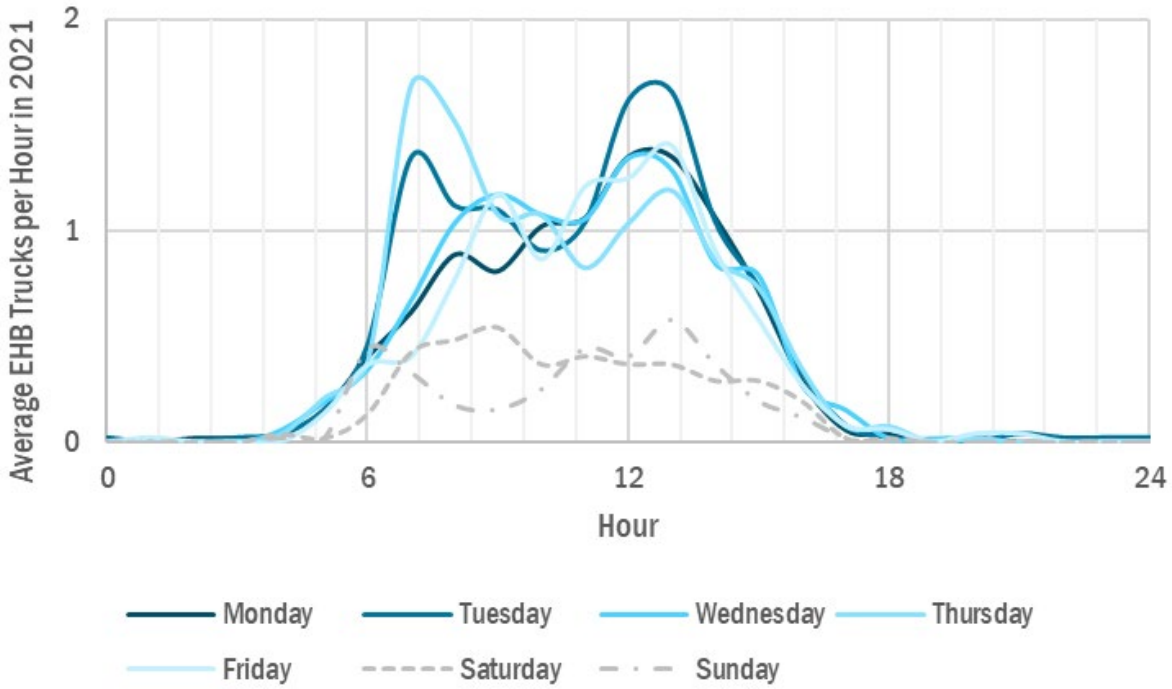

Figure G-10. Average EHB truck traffic per hour in 2021

Appendix H: Meeting Notes

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Meeting Notes

201 N Civic Drive, Suite 300
Walnut Creek, CA 94596

T: 925.937.9010
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Prepared for: City of Santa Rosa
Project Title: Trucked Waste Program Evaluation
Project No.: 157568

Purpose of Meeting: Technical Kickoff Workshop
Date: Thursday, December 9, 2021
Meeting Location: City of Santa Rosa LTP – Estuary Conf Rm **Time:** 12:30 p.m. to 2:30 p.m.
Agenda Prepared by: Divij Sharma, Brown and Caldwell

Attendees:
Renae Gundy, City of Santa Rosa
Martin St. George, City of Santa Rosa
Emma Walton, City of Santa Rosa
Richard Giordanella, City of Santa Rosa
Zach Kay, City of Santa Rosa
Brian Bokkin, City of Santa Rosa
Heather Johnson, City of Santa Rosa
Judy Wells, City of Santa Rosa
Adam Ross, Brown and Caldwell
Alison Nojima, Brown and Caldwell
Divij Sharma, Brown and Caldwell

Minutes

Action items are underlined. **Decisions are in bold.**

1. Introductions

Name	Role
Renae Gundy	Environmental Compliance Inspector, HSW Coordinator
Martin St. George	Environmental Compliance Supervisor
Emma Walton	Deputy Director of Utilities Operations
Sean McNeil (not present)	Deputy Director of Environmental Services
Zach Kay	Biosolids Coordinator
Richard Giordanella	Mechanical Technologist
Brian Bokkin	Wastewater Treatment Superintendent
Heather Johnson	Environmental Services Officer
Judy Wells	Department Applicant Specialist

2. Project goals and objectives
    a. Establish fees that are more reflective of operational costs to treat. Justify fee

changes in the report. Demonstrate payback on any physical improvements.

b. Identify voids in duties and responsibilities.

c. Provide a clear path forward for the Waste Hauler Program.

3. How do we carry out the study? (general discussion)
    a. Baseline operations
        - A truck receives a permit, and the plant then notes the tank volume and associates it with the license plate. That truck then receives a scan card that is permitted to deliver certain waste types. The hauler selects which waste they deliver from a drop-down menu at the kiosk. The info is then transmitted to Ipax to generate a receipt.
        - Hauler reaches out to the Environmental Compliance (EC) team. EC gives the hauler an application to become a Wastehauler. EC receives the completed application, $206 annual fee and required insurance documentation from the Hauler. EC drafts and issues the permit to the Hauler. The permit includes, along with permit and insurance requirement information, the vehicle tank capacities and license plates and the types of waste that this discharger is allowed to discharge. The permitted hauler receives a scan card for each licensed vehicle (trailer), for the drivers to use at the kiosk for recording discharges. Waste types are selected from a dropdown menu at the kiosk, and a receipt is issued to the driver for each load discharged. The transactions are recorded in the iPACS application's database for monthly transmission to the Citywide billing system.
    b. Identify potential programmatic/administrative improvements
        - Rebalance tip fees to cover the cost of treatment
        - Establish flow limits for haulers
        - Establish pre-treatment limits for certain wastes
    c. Identify process-related and/or physical enhancements
        - Judy will provide hauler discharge data in truck capacity.
        - BC will investigate if there is a pre-treatment process that can be implemented to treat the contaminated rainwater waste before it enters the plant (goal of removing constituents that inhibit UV transmissivity in the disinfection system).
        - Consider adding a mechanism to shut off the system.
        - The Vaughan Chopper Pumps currently installed are frequently replaced due to ragging and heavy wear and tear. The City is upgrading the pump blades, impellers, and housing to see if it can increase pump life.
        - Consider adding heavy duty screening/bar screens/muffin monster to save the pumps from suffering any sort of grinding.
        - Physical improvements that require capital must demonstrate project payback/cost recovery.
        - Identify digester feed strategies to stabilize DG production
    d. Develop summary report and roadmap for future
4. Baseline operations and staff feedback
    a. Waste types accepted
        - Revisit septage rates; favorable rates have resulted in increased deliveries
        - Find a way to better communicate with the trucked waste companies (Grab n

Grow) about what certain requirements need to be met for the waste.

- The plant stopped taking brewery waste into the HSW system.
- The study will provide requirements for SB 1383 organics
- Future consideration to meter delivery loads (current billing based on truck volume, not delivered volume).
- Possibility of adding brine to the list of wastes, could be very profitable. Are there TDS impacts?
- Humic (Grab n Grow compost stormwater) and leachate wastes have negatively impacted UVT and are typically delivered during wet weather events when UV is already operating at capacity. Additional costs to treat are $5/1000 gallons. These wastes pose a compliance risk and tipping fees should be evaluated to compete with EBMUD and based on cost to treat. Permitting limits and enforcement fines should be included in the study.
- The City can reopen hauler permits if it impacts plant compliance.

b. Billing system
   - How to deal with late payments more effectively.
   - Once the truck that contains a certain truck tank capacity scans their card and selects which waste, they are going to dump off a receipt is printed. Those receipts are checked daily and put into a manual report – this is an automatically generated report from iPACS, not manual - to where the report is checked at the end of the month by administration who signs them off. Once signed the program transfers them to and bills are created.
   - Environmental Compliance (Renae, Martin, Sean) manually reconciles monthly invoices and reviews prior to finance sending the bill.
   - There is no authority for the City to prohibit deliveries if invoices are past due. The study should consider collection enforcement.
   - Accounts receivable does not check collections. How to improve policies?
   - Martin handles collections and late payments.
   - 50% of haulers have delinquent insurance. Consider improving enforcement in the study and assigning this task to staff.
   - Trucks are billed by truck tank volume and waste type.
   - Identify how to show last month's past due statement on each invoice. Wastewater can't see which haulers paid in the prior month, only on the latest bill.
   - The money generated goes towards the subregional funds, it gets tracked but it is never noted for what specific funds.

c. Staff time
   - Staff time is tracked by maintenance hours and equipment.
   - HSW and Waste Hauler shacks are open Mondays through Fridays till 1 P.M. - Septic and EHB dump area hours are Monday- Saturday, 4am-8pm, High Strength Waste station hours are Monday-Saturday, 6:30am- 1pm, 24/7 access is dependent upon permissions granted pertaining to waste type. Most limited access is for the HSW station. Haulers as issued Gate FOBs programmed with access for after hours times when the plant gates are locked (before 5am and after 5pm).

- Laboratory costs are by sample and load testing. City to provide lab costs ($/sample).
- Loads are by rate group.
- The City will provide rate studies for the cost to treat.
- Sampling and monitoring oversight are deficient as there is no dedicated staff. Consider better quality control and more frequent sampling of incoming waste.

d. Offloading and vehicle routing
- Asphalt repairs are needed due to heavy truck traffic.
- Consider traffic sensor replacement

e. Cogen system
- The gas conditioning system capacity is 500 scfm.
- It takes 280 scfm to run each engine at full output; 560 scfm for two engines.
- Permit limit is 15.55 MMscf of NG per year for engines 1 and 2. Engine operations would benefit if NG blending limit is increased.
- Consider adding two more SCRs to increase operational flexibility. SCR units are undersized. Consider installing bigger SCRs so they can run the engines slightly richer – they are running very lean right now to meet permit. City will send SCR O&M costs.
- DG CH4 content with HSW is 70%, but before it was around 64% which may mean it will increase more. Operations must manually adjust methane content to tune cogen.
- Staff noted gas blending challenges associated with a double leaf check valve.
- Before HSW deliveries, 1 engine ran on full output. With HSW, 2 engines run on full output.

f. Baseline Operations: Regulatory Requirements

5. Next steps
   a. Draft Technical Memorandum 1 – 03/15/2022
   b. Technical Memorandum 1 Workshop – 03/24/2022
   c. Final Technical Memorandum – 04/17/2022

Meeting Notes

201 N Civic Drive, Suite 300
Walnut Creek, CA 94596

T: 925.937.9010
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Prepared for: City of Santa Rosa (Santa Rosa)
Project Title: Trucked Waste Program Evaluation
Project No.: 157568

Purpose of Meeting: Workshop 2
Date: Tuesday, March 29, 2022
Meeting Location: Santa Rosa LTP – Estuary Conf. Room **Time:** 11:00 a.m. to 12:30 p.m.
Notes Recorded by: Maxwell Armenta, Brown and Caldwell (BC)

Attendees:
Renae Gundy, Santa Rosa
Martin St. George, Santa Rosa
Emma Walton, Santa Rosa
Richard Giordanella, Santa Rosa
Christian Williams, Santa Rosa
Brian Bokkin, Santa Rosa
Maxwell Armenta, BC
Heather Johnson, Santa Rosa
Judy Wells, Santa Rosa
Sean McNeil, Santa Rosa
Tanya Mokvyts, Santa Rosa
Alison Nojima, BC
Adam Ross, BC

Minutes

This document captures notes from Workshop 2 of the Santa Rosa Trucked Waste Program Evaluation. Notes are organized according to the PowerPoint outline, highlighting presentation takeaways.

Action items are underlined. **Decisions are in bold.** Notes from BC's presentation are in black font. Note from questions, answers, and comments during the workshop are in blue font.

1. Introductions
    a. Max added to the Brown and Caldwell team
2. Project goals and objectives (from kickoff meeting notes)
    a. Establish rates that are more reflective of operational costs to treat. Justify fee changes in the report. Demonstrate payback on any physical improvements.
    b. Identify staffing voids in duties and responsibilities.
    c. Provide a clear path forward for the Waste Hauler Program.
3. Baseline operations
    a. Mass Balance (findings based on 2020 and 2021 annual average data)
        - 10% of digester hydraulic retention time and organic loading rate are from high strength waste (HSW)
        - Less than 1% of liquid treatment process flowrate (not load) is from all trucked wastes combined

- 11% of combined heat and power (CHP) energy production is from HSW
- 26% of CHP energy production is from natural gas
- 3% of biosolids production is from HSW
- Unknown quantity of digester loading, biosolids production, and biogas production from all other (non-HSW) trucked wastes
    1. BC noted they could make assumptions for low-strength wastes and calculate a percentage of solids and biogas contribution from low-strength wastes.

b. Revenue and costs

- Noted the City's historical engine O&M at $0.041/kWh is within range typically assumed when planning cogeneration and CHP projects, and cost to operate is less than purchasing electricity from Pacific Gas and Electric (PG&E).
- Tipping fees were compared to treatment costs (units in $/1000-gal).
- Takeaway: the trucked waste program operates in a net positive revenue, based on assumptions for cost to treat.
- Santa Rosa asked why Mecham pipeline leachate is included in the analysis, since it is not a trucked waste. BC noted that pipeline leachate can be accounted for in a separate line item so that it is captured, but not noted as a "trucked waste" in the revenues and costs tables.
- Noted that cost per test per gallon is higher for septic waste typically, since trucks are typically smaller than other trucked wastes.
- Noted that tipping fees for septage and chemical toilet were originally $0.48/gallon in 1990's, then this was lowered to $0.27/gallon. Eventually, $0.13/gallon is what brought people through the doors.
- It was asked whether tipping fee revenue incorporated depreciation based on capacity impacts. BC did not evaluate digester or solids treatment capacity; bottleneck analysis not yet completed and will be performed in Biosolids Master Plan.

4. Discussion

a. Permitting

- If food waste is not processed onsite at LTP, then CalRecycle Solids Waste permit is not required. BC recommends including pre-processing requirements for haulers such that waste can be pumpable (otherwise high odors are expected).
- Santa Rosa noted that haulers are planning on pre-processing, but "pumpable" criteria was not yet being planned – some criteria on what defines "pumpable" would be useful.
- Santa Rosa noted CalRecycle would require reporting (and tracking) for food waste, whether or not it is pre-processed.

b. Staffing

- Assumed 2 FTE overall, 1 FTE for operating HSW receiving station
    1. Santa Rosa noted that this may not be enough. The HSW receiving station encroaches on a second operator's time. HSW is opened 6 days per week. Swing shift will interact with truck drivers (about zero

to a couple per day); **there is more than 1 FTE operating the HSW receiving station.** City to provide BC with FTE assumption.

- Recommend adding 1 more FTE and using non-operator for HSW receiving station
    1. Santa Rosa noted it is also important to consider redundancy (e.g., if operator is sick, how is the responsibility covered by other staff)
    2. Consider automation to help police activity.
    3. Noted, for example, that haulers have been caught with wine instead of wine rinsate. Easy to tell by visual observation; however, hard to confirm whether truck driver was aware or not of the violation.
    4. Sampling frequency is low; easy to be a "bad actor" at Santa Rosa.
    5. Wine and pH issues observed.
        a. Asked if pH could be automated.

c. Process and Physical improvements
- Biogas, receiving station, traffic equipment/routes, and shack workstation
- BC asked if Santa Rosa is open to expand trucked waste program – yes based on nods around room.
- Noted that hourly data may be needed to recommend digester feed strategies. HSW tanks are typically operated to try and maintain consistent feeding. Feed pump has limited turn-down; HSW tanks typically drained by 2 a.m.
- More engines results in more downtime and more maintenance. Santa Rosa suggested considering a generator setup sized to produce what is needed with a single unit instead of four.
- Flare compliance is a concern at times and is used during engine startup and transition periods.
- Santa Rosa noted gas storage could help with buffering during change-over of equipment.
    1. BC noted a dedicated storage tank could provide on the order of 15 minutes.
    2. BC noted a membrane cover could provide about 4 hours of storage.
- UV project was noted at three years out.
- Santa Rosa suggested considering emergency holding basin (EHB) rerouting.
- **Open to re-routing non-HSW trucked waste flow at different locations onsite or around the drain.**

d. Administration and compliance improvements
- Staffing, billing system, pre-treatment and flow limits, non-compliance enforcement, late payment enforcement, and increased sampling.
    1. Flow limits for humic waste suggested by Santa Rosa to have criteria such as once per hour or six total per day – acknowledged most humic waste is received during wet weather events.
    2. Financial department has noted there is one space for misc. notes, which can be used to include "past due" notice on bills

3. The "PAST DUE" balance is not currently itemized compared to other due payments for waste haulers.
4. Can overdue notifications be tagged to the hauler cards?
5. Procedures for non-compliance have been updated. **Specific plans for non-compliance plans dedicated to the waste haulers are needed.**
6. Tools and legal mechanism exist per City Code and Permit
7. Insurance issues have been addressed currently
8. A "suspended permit" allows haulers the opportunity to come good on their permit.
9. There are about 62 waste haulers currently.
10. Enforcement leads to difficult conversations with waste haulers.
11. BC suggested leveraging utility performance group to help alleviate program compliance and oversight issues. For example, PowerBI could be leveraged with a tablet in the field.

e. Alternatives

- Program expansion, brine addition, flow limitations – rebalancing tipping fees for each alternative/scenario
    1. Santa Rosa noted brine addition could impact recycled water and ground water compliance and draw attention from State Water Resource Control Board.
        a. **It is still worth documenting a scenario where brine is received to demonstrate risk on compliance.**
    2. Add limits based on headworks
    3. Add scenarios where limits are applied to certain waste types.
- Consider impacts to existing equipment capacity for each alternative

Brown AND Caldwell

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Meeting Notes

Prepared for: City of Santa Rosa (Santa Rosa)
Project Title: Trucked Waste Program Evaluation
Project No.: 157568

Purpose of Meeting: Workshop 3
Date: May 16, 2022
Meeting Location: Microsoft Teams (Virtual) **Time:** 10:00 a.m. – 11:50 a.m.
Minutes Prepared by: Maxwell Armenta, Brown and Caldwell (BC)

Attendees:
Renae Gundy, Santa Rosa
Judy Wells, Santa Rosa
Heather Johnson, Santa Rosa
Sean McNeil, Santa Rosa
Tanya Mokvyts, Santa Rosa
Alison Nojima, BC
Maxwell Armenta, BC
Martin St. George, Santa Rosa
Emma Walton, Santa Rosa
Christian Williams, Santa Rosa
Richard Giordanella, Santa Rosa
Zach Kay, Santa Rosa
Adam Ross, BC

Summary

This document captures notes from Workshop 3 of the Santa Rosa Trucked Waste Program Evaluation. Notes are organized according to the PowerPoint outline, highlighting presentation takeaways.

Action items are underlined. **Decisions are in bold.** Notes from BC's presentation are in black font. Note from questions, answers, and comments during the workshop are in blue font.

1. Third workshop for Trucked Waste Program Evaluation. Overview of presentation was shared:
   - Review project goals
   - Obtain feedback on TM 2
   - Conduct interactive discussion on prioritization and phasing
   - Review next steps to wrap up the project

2. Project Goals and Objectives
   - Provide clear strategy and costs for program expansion.
   - TM 1 was the baseline evaluation; TM 2 focused on enhancements.
   - Today's presentation takes place between TM 2 and Final Report. The discussion will help BC finalize TM 2 and draft the final report.
   - Program expansion will be reviewed in the future because it is linked to capacity.
3. TM 2 Recommendations Review
   - Recommended enhancement alternatives from TM 2 were presented.

- Considerations for phasing were presented. BC highlighted that Santa Rosa may consider hiring certain roles first, such as hiring a Program Manager before the technicians.
- Considerations for staffing versus automation were presented. BC highlighted the benefit of redundancy with additional staffing and that less automation may be necessary if there are 2 or more FTEs available for onsite monitoring.
- HSW loads could take up to one hour for haulers to discharge and an operator is required at HSW receiving during the entire discharge period.
- Sean asked about baseline tipping fee. Martin noted that TM 2 tipping fee increases do not appear to incorporate enhancement project costs. Maxwell confirmed enhancement projects and hiring additional staff are not included in the tipping fees presented in TM 2. Final report will present rebalanced tipping fees to account for predicted future operating costs and improvement projects.
- Martin liked increasing tipping fees, for example increasing from $20/1000-gal to $25/1000-gal for certain wastes and liked the idea of implementing tiered rates for certain wastes.
    - Tipping fees can be increased before improvements if the market justifies increase.
- Emma would suspect there is more budgetary support for additional automation than hiring more people.
    - Sean agreed and noted automation is beneficial for trucked wastes received during off-hours, such as late in evenings or weekends.
    - Clear roles and responsibilities for new staff job descriptions are necessary.
- Emma noted the report needs to justify/explain the baseline HSW operator being received back into plant operations.
- Martin noted concerns for wastes dumped into septic area as well as EHB. Haulers not classified as hazardous waste haulers have brought car wash wastes to LTP as well.
    - Additional monitoring may illuminate issues. Wastes received 24 hours a day include leachate, grey water, or Strauss – wastes that are uniform.
    - Plant is open until 8 pm; late hours tend to be when rogue loads are off-loaded.
- Adam asked if automation could relieve a redundancy of 1 FTE.
    - Emma believes this approach would be justifiable and have greater support.
    - **Emma recommended hiring a Program Manager and 2 Technicians (3 FTE total) as for the report**, and one technician could be removed if needed.
- Emma noted that concrete paving could be an issue with underground utility/yard piping.
- Renae asked if traffic camera project could be accomplished in the UV project.
    - Emma said traffic camera and/or concrete roadway improvements could be accomplished under the UV project, but Santa Rosa would need to make a note to include these in the project.
    - Calgon Carbon was confirmed as the UV vendor.
- **There is interest for video cameras at plant access areas.**
- **No pH issues observed in digesters suggests pH probe at HSW is not needed.**
- Christian suggested a new, central wastehauler station where all haulers check-in *before* arriving at their discharge location to be located on the northwest side of the warehouse (structure located on east-end of property).
    - Wastehauler station video at south gate can be tied into new wastehauler station.

4. Prioritization and Phasing Exercise
    - Each staff from Santa Rosa voted for their top five projects out of the listed projects in the presentation. Each staff described their rationale for their selections.

- After prioritization, a phasing survey was conducted with five phasing options. The notes below capture discussion during these exercises. The attachment included in this document shows the prioritization exercise results and survey responses.

5. Discussion
   - Emma voted to prioritize projects that could be implemented sooner rather than later.
   - Renae likes the idea to implement a pH probe at all places but voted for the EHB location.
   - Sean agreed that an automated valve for non-compliant waste should be prioritized for HSW, Septage and EHB
     - Renae noted that Brian had noted pH issues at HSW receiving but Joe Schwall did not have issue with pH at HSW receiving. HSW pH is not currently tested.
   - Martin would add general monitoring in the whole area (where trucked wastes are received). Currently understands that 1 FTE replacing an operator would require the FTE to stay at HSW the whole time a truck is there.
     - Christian agreed.
   - Christian is concerned that installing a pH meter in the EHB would be difficult because the probe requires constant submergence and is not concerned with pH from HSW.
   - Christian noted a desire to avoid band-aid solutions/projects with his prioritization votes
     - Richard agreed with avoiding band-aid solutions/projects
   - Martin noted that is logical to improve the wastehauler station if two FTEs are hired and working predominantly in the field.
   - If pH is completed on every load, then there is less of a point for more alarms and valves in the system.
   - Christian would argue for a new septic discharge location and the wastehauler station/kiosk to be added in central location where waste is dumped.
     - Another alternative could be near the south gate, but then FTE would spend time monitoring other trucks that are not part of the trucked waste program.
   - Zach would rather improve current roadways instead of building a new roadway from Meadow Lane. Suggested improving a roadway that can manage heavy traffic. Some direction or a marked corridor could be added.
   - Emma agreed that the hauler station within the gate makes sense, but also could see the station being at the front gate. Or, a video camera could be installed at the south gate.
   - Sean noted that if the kiosk is closer to the discharge location, the FTE could sample loads. Otherwise, it would require sampling for vehicles waiting to get into plant at Llano Road.
   - Christian assumed 2 FTEs at the shack or wastehauler station and 1 FTE at HSW. Grab sampling at the north-end of the shack.
     - Martin agreed with phasing implementation. Assumption is that construction of a wastehauler station would be a way out.
   - Martin noted there are priority times when high leachate loads are received.
     - Christian noted they can re-route trucks temporarily during these periods.

6. Next Steps
   - City to finalize TM 2 review comments
   - BC will incorporate TM 2 comments to finalize TM 2 and roll out a final report.
   - Phasing and costs will be included in the final report.
   - Rebalancing tipping fees will be based on incorporated recommendations.

Action Required

The following are a list of actions required as a result of the meeting discussion:

1. BC to incorporate meeting feedback and discussion into final TM 2 (also based on report comments) and Final Report. **Assigned Person(s):** Alison Nojima; **Response Required:** per schedule
2. Santa Rosa to complete TM 2 comments and send comments to BC. **Assigned Person(s):** Renae Gundy; **Response Required:** per schedule

Attachment: Prioritization and Phasing Results

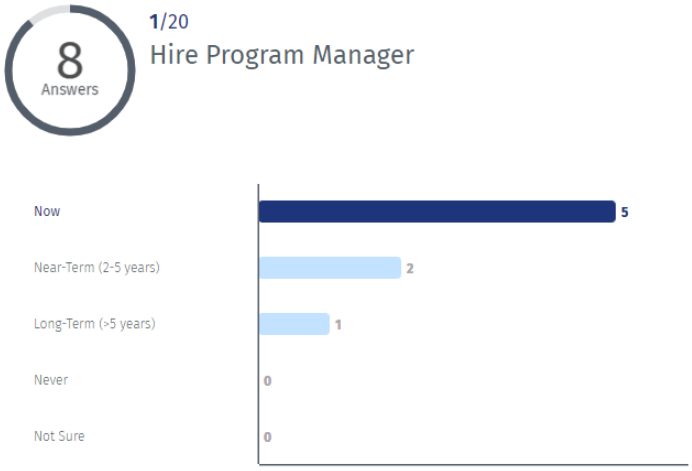
Prioritization Activity

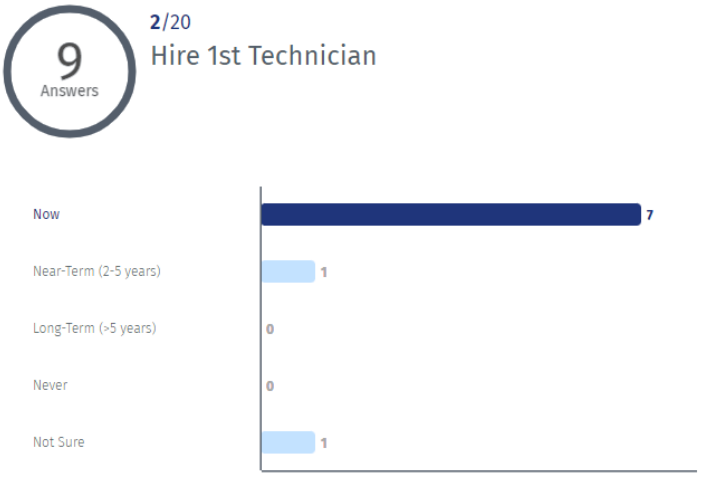
Each meeting participant was requested to vote for enhancement alternatives. Each participant was allowed to vote five times, and a single alternative could receive multiple votes from one person. Participants voiced their votes and Alison Nojima (BC) recorded responses. The image below is the results of the prioritization exercise.

Enhancement Alternatives	Priority Votes
Hire Program manager and 2 Technicians	☺☺☺☺☺☺☺☺☺
Increase sampling to all waste types	☺☺☺☺☺☺☺
Implement flow restrictions for leachate waste	☺
Add in-line pH probe to HSW receiving	☺☺
Add automation to HSW receiving	☺☺☺
Add in-line pH probe to EHB	☺
Add automated valve to EHB for non-compliant pH	☺☺☺☺
Existing septage receiving station improvements	
Construct new septage receiving station	☺☺☺
Add in-line pH probe to septage receiving	☺
Add automated valve to septage receiving for non-compliant pH	
Add utility performance system (e.g., Power BI dashboard)	
Build new roadway and entry for trucks from Meadow Lane	☺☺☺☺
Concrete paving at stationary truck locations: entry and staging areas	
Improve wastehauler station (Add workstation for technicians)	☺
Add laser/video detection instead of traffic inductor loops	
Increase tipping fees	☺☺☺☺☺☺☺☺
Truck rerouting	☺☺☺
Monitoring unloading at HSW	☺

Phasing Activity

Each participant was sent a link to participate in surveys to vote on phasing for each project alternative. Phasing options included: now, near-term (2-5 years), long-term (>5 years), never, or not sure. The following 20 screen shots demonstrate survey results for each phasing question.

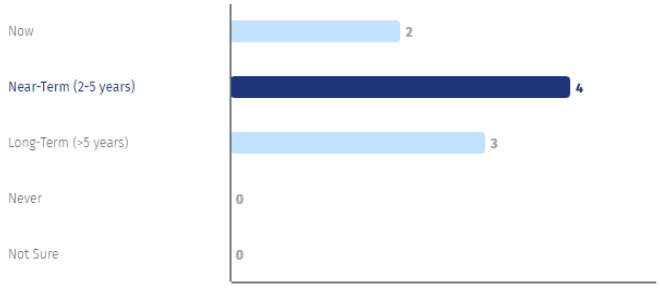




9 Answers

3/20

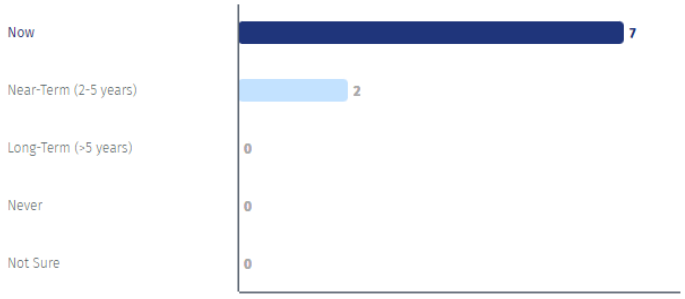
Hire 2nd Technician



9 Answers

4/20

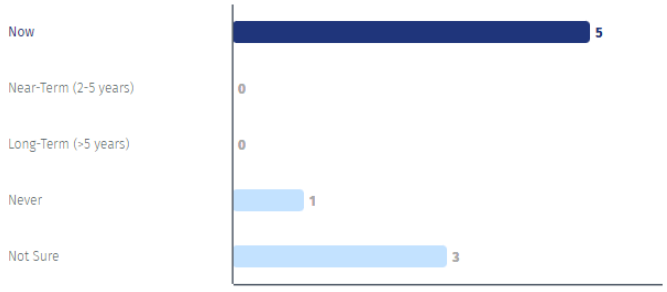
Increase sampling to all waste types



9 Answers

5/20

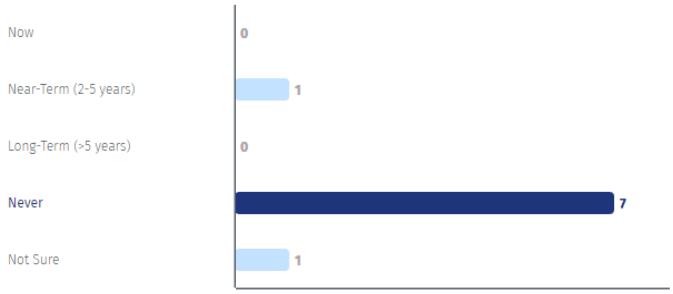
Implement flow restrictions for leachate waste



9 Answers

6/20

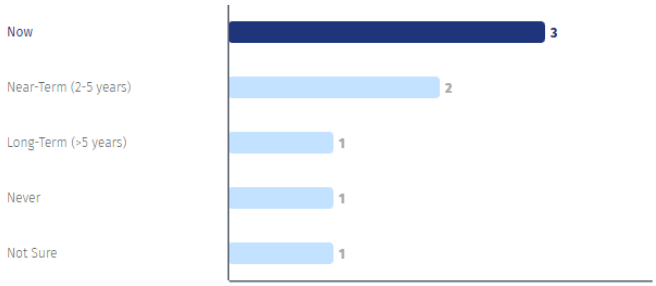
Add in-line pH probe to HSW receiving



8 Answers

7/20

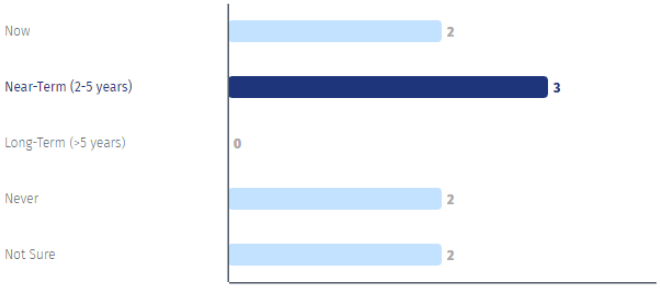
Add automation to HSW receiving



9 Answers

8/20

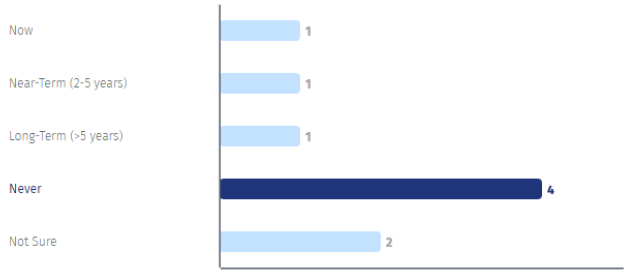
Add in-line pH probe to EHB



9 Answers

9/20

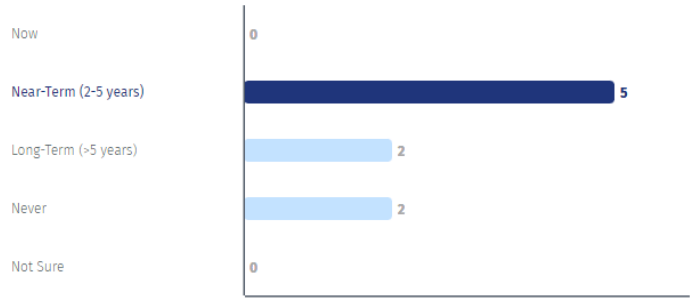
Add automated valve to EHB for non-compliant pH



9 Answers

10/20

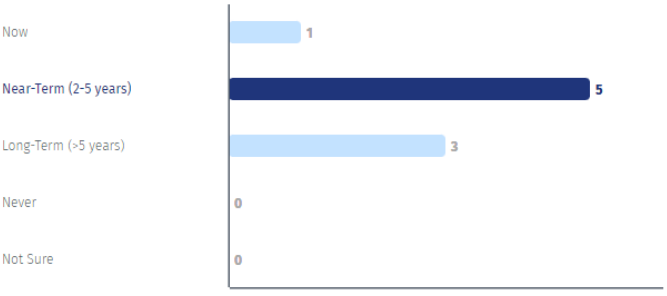
Existing septage receiving station improvements



9 Answers

11/20

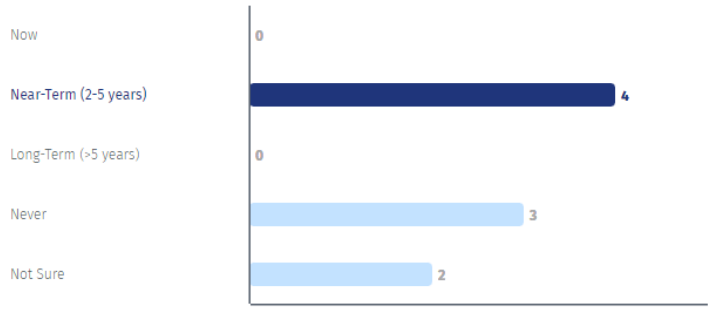
Construct new septage receiving station



9 Answers

12/20

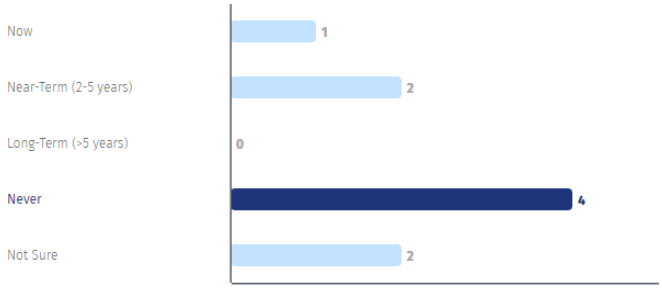
Add in-line pH probe to septage receiving



9 Answers

13/20

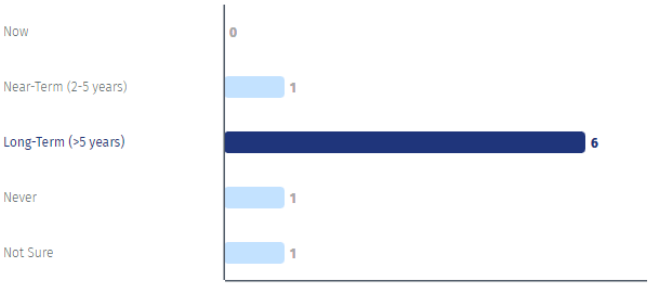
Add automated valve to septage receiving for non-compliant pH



9 Answers

14/20

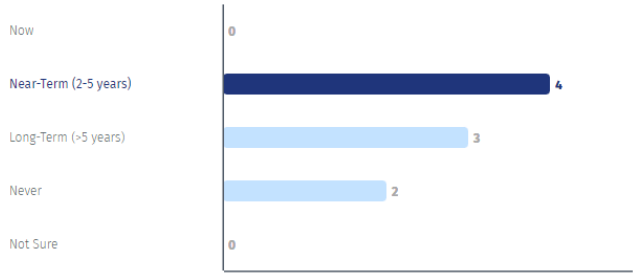
Add utility performance system (e.g., Power BI dashboard)



9 Answers

15/20

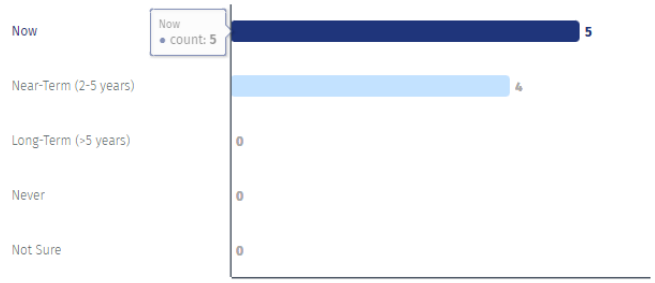
Build new roadway and entry for trucks from Meadow Ln



9 Answers

16/20

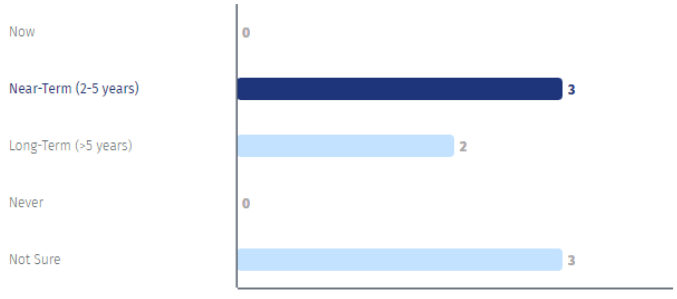
Truck rerouting



8 Answers

17/20

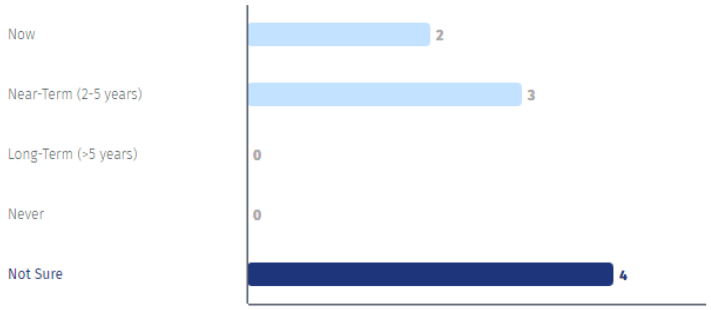
Concrete paving at stationary truck locations: entry and staging areas



9 Answers

18/20

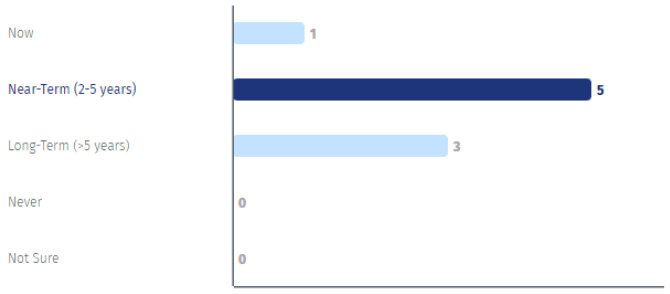
Improve existing wastehauler station (Add workstation for technicians)



9 Answers

19/20

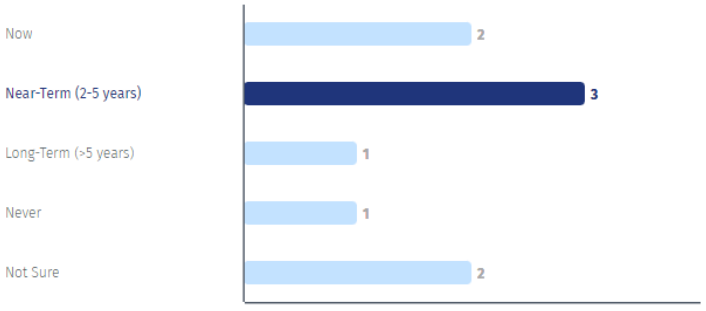
Construct new wastehauler station (workstation for technicians, new location)



9 Answers

20/20

Add laser/video detection instead of traffic inductor loops



Brown AND Caldwell

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Meeting Minutes

Prepared for: City of Santa Rosa (Santa Rosa)
Project Title: Trucked Waste Program Evaluation
Project No.: 157568

Purpose of Meeting: Workshop 4 (Draft Evaluation Report Review)
Date: July 7, 2022
Meeting Location: Microsoft Teams (Virtual) **Time:** 10:00 a.m. – 11:50 a.m.
Minutes Prepared by: Maxwell Armenta, Brown and Caldwell (BC)

Attendees:

Renae Gundy, Santa Rosa	Mike Prinz, Santa Rosa
Judy Wells, Santa Rosa	Christian Williams, Santa Rosa
Heather Johnson, Santa Rosa	Richard Giordanella, Santa Rosa
Sean McNeil, Santa Rosa	Zach Kay, Santa Rosa
Tanya Mokvyts, Santa Rosa	Adam Ross, BC
Alison Nojima, BC	Maxwell Armenta, BC

Summary

This document captures notes from Workshop 4 of the Santa Rosa Trucked Waste Program Evaluation. Notes are organized according to the PowerPoint outline, highlighting presentation takeaways.

Action items are underlined. **Decisions are in bold.** Notes from BC's presentation are in black font. Note from questions, answers, and comments during the workshop are in blue font.

1. Agenda was reviewed for the meeting
2. Goals and Objectives were reviewed

- Feedback from discussions used to develop recommendations. TM1, TM2, and Draft Evaluation Report completed
- Tipping fees may be impacted by the biosolids management strategic plan (BMSP) and could be rebalanced in context of recommendations from BMSP
- Mike noted that it is essential to link with the BMSP because biosolids are generated by the trucked waste program, and City needs to understand the costs.

3. TM2 presented all enhancement alternatives, which were prioritized based on City feedback. A discussion with Mike, Christian, and Renae further refined the recommended projects for implementation.
4. Six key enhancements were factored into the NPV analysis and rebalanced tipping fees: hire staff, increase sampling, new wastehauler station, new septage receiving, truck rerouting, and systems integration and analytics.

- Santa Rosa noted that gravel road was designed to be temporary; does it need to be modified as a permanent solution?
- Santa Rosa noted that report should highlight flexibility that an operator could be hired in lieu of second technician if that is more beneficial. It is okay to keep costs based on a second technician.

5. A schedule for implementation of recommended enhancements was presented

- Santa Rosa noted that hiring in 2023 may be a bit optimistic. Suggested to note in the report that the hiring timeframe could be longer.
- Timeline for increasing tipping fee rates looks okay.
  - Mike and Sean will discuss
  - Sean will work with Kimberley
- Tanya noted that capital projects could also take a while to start.
- Mike and Sean would like to understand what projects are important and/or time-sensitive so that the Santa Rosa understands what is most critical to focus on now.
  - BC to show critical path on schedule (e.g., hiring managers, implementing large capital projects, and priority tipping fees for rate increases)

6. Tipping fees are recommended for increase, and the phasing of tipping fee increases was discussed.

- Mike asked about gas storage. Noji noted this was discussed in TM2 and applicability with engines could be reviewed in BMSP.
- Heather confirmed rates increased relative to 2006 and 2007.
- Christian suggested that new UV system could impact operational costs (more efficient). Suggested a smaller rate increase could be considered based on sticker shock from leachate price jump.
- Sean noted that leachate waste has high PFAS loads. Sean noted this is something to consider when reviewing biosolids regulations impacts.
- Sean noted 2023 seems correct for increasing fees. Agrees with communication with haulers up front. Suggested three rate increases once a year and provide forecast in advance.
- City asked how other facilities increase rates. NapaSan projects increase from 2021 to 2026. BC will ask EBMUD and CMSA about tipping fee practices. Adam noted that EBMUD gives lower rates to wastes that are preferred.

7. BC presented that tipping fees should be increased incrementally and see if the market will bear higher rates to avoid stranded assets.
8. BC highlighted that new septage receiving and hiring a second technician have high costs and large impact on tipping fees.
9. Job descriptions were highlighted, and included in Appendix D of report

- Max commented that Christian had previously noted that technician might transition to operator.
- Sean added that technician might also could also be an Env Compliance I position; offers advancement for the role.

10. Other discussion

- Sean wants rate structure to be prioritized. What period is best (e.g., a 3- or 5-year incremental rate increases)?
- Sean commented that tipping fees are not the biggest cost to haulers necessarily; the fuel cost and labor have a higher impact.
- BC noted that we should consider whether the haulers can pass along costs.
  - Sean agreed early communication would be considerate.

11. Final report comments

- 2-week review period to finalize comments from the City.

12. Biosolids questions

- Richard asked if Class A has more revenue. Zach noted it depends on what the farmers can pay. Currently Class B is an expensive outlet. Tanya and Richard asked if Santa Rosa wants to be retail and if BC could look at retail in the BMSP? Noji said yes, biosolids end use markets and regulations should be investigated in the BMSP.

Action Required

The following are a list of actions required as a result of the meeting discussion:

1. BC to incorporate meeting feedback and discussion into final evaluation report, including:
   - incorporate cost for new roadway to replace gravel road for rerouted LSW truck route,
   - highlight critical path for enhancements on schedule, and
   - provide information on how rates are increased at other facilities.
   Assigned Person(s): Alison Nojima, Max Armenta; **Response Required:** 8/4/2022
2. Santa Rosa to provide comments to BC for draft evaluation report.
   Assigned Person(s): Renae Gundy; **Response Required:** 7/21/2022