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M&C Fwd: PUC Audit of GSWA

1 message

Speaker's Office <speaker@guamlegislature.org> Thu, Nov 5, 2020 at 10:30 AM
To: Clerks Office <clerks@guamlegislature.org>
Cc: Rennae Meno <rennae@guamlegislature.org>

11/04/20	5:00 PM	11/04/20	Audit of Guam Solid Waste Authority.*	Public Utilities Commission	35GL-20-2410

Sinseru yan Minagåhet,

Office of the Speaker • Tina Rose Muña Barnes
Committee on Public Accountability, Human Resources & the Guam Buildup

35th Guam Legislature
I Mina'trentai Singko na Liheslaturan Guåhan

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---------- Forwarded message ---------
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Subject: Re: PUC Audit of GSWA
To: <speaker@guamlegislature.org>
Cc: Lou Palomo <lpalomo@guampuc.com>, <horeckylaw@teleguam.net>

Dear Speaker Barnes:

Please see the enclosed letter from the Guam Public Utilities Commission [PUC] and the PUC Management Audit of the Guam Solid Waste Authority.

Let me know if you have any questions in this regard. Thank you.

Sincerely,

Frederick J. Horecky

Chief Administrative Law Judge

Guam Public Utilities Commission

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November 4, 2020

The Honorable Speaker Tina Muña Barnes
35th Guam Legislature
Guam Congress Building
163 Chalan Santo Papa
Hagatna, Guam 96910

Dear Speaker Barnes:

In Public Law 34-058:3, the Guam Legislature required that the Guam Public Utilities Commission ["PUC"] perform a management audit of the existing operations of the Guam Solid Waste Authority ["GSWA"].

On October 29, 2020, the PUC Commissioners adopted the FINAL REPORT of MSW Consultants as the PUC Management Audit of GSWA. A copy of the Management Audit is attached hereto.

The PUC sincerely believes that the Audit provides useful suggestions to improve the finances and operations of GSWA. Please let us know if you have any questions in this regard or would like any further explanation concerning the Audit. Thank you.

Sincerely,

Frederick J. Horecky

Frederick J. Horecky
Chief Administrative Law Judge
Guam Public Utilities Commission

Enclosure

FINAL REPORT

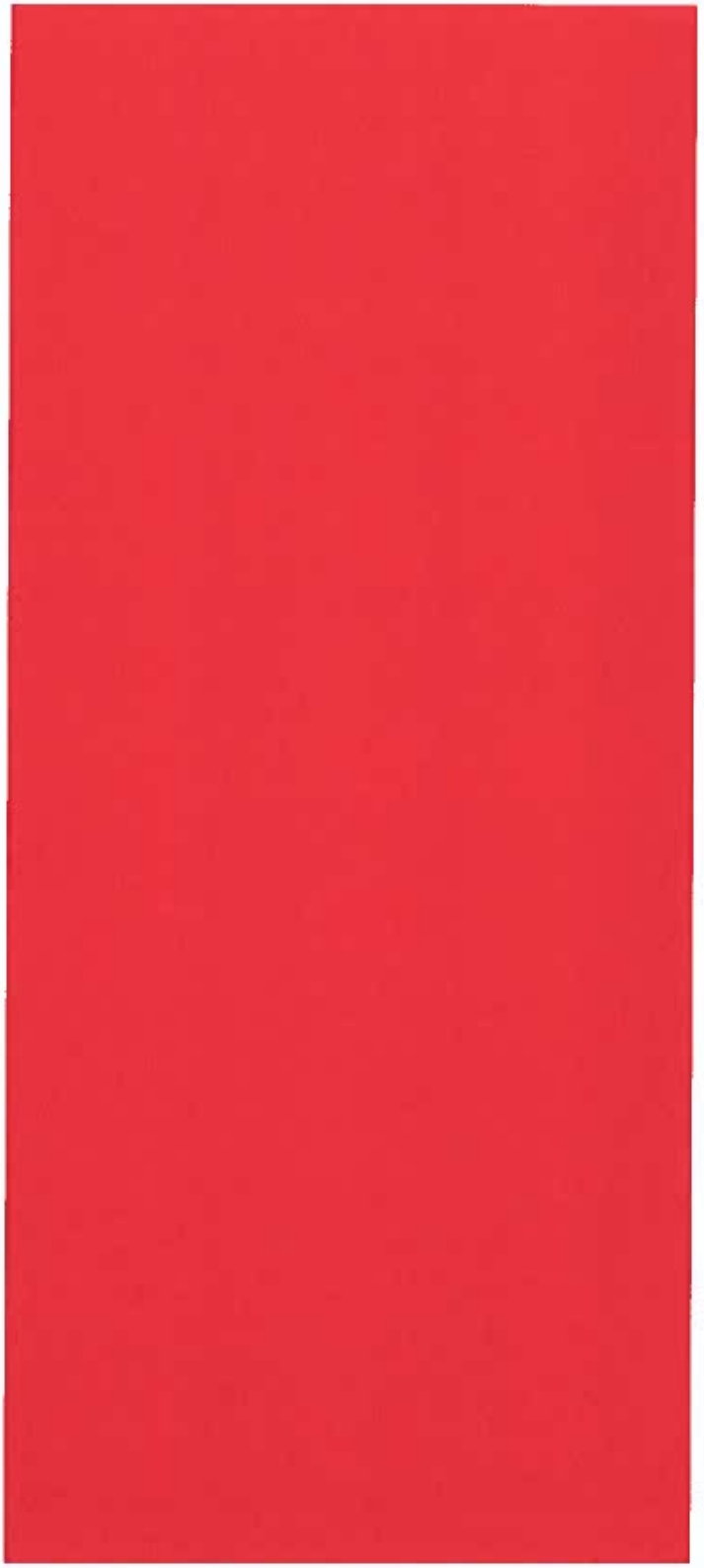
Guam Public Utilities Commission



October 23, 2020

Management Audit of the Guam Solid Waste Authority

MSW CONSULTANTS
800-679-9220



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This report has been prepared for the use of the client for the specific purposes identified in the report. The conclusions, observations and recommendations contained herein attributed to MSW Consultants constitute the opinions of MSW Consultants and/or its subconsultants. To the extent that statements, information and opinions provided by the client or others have been used in the preparation of this report, MSW Consultants has relied upon the same to be accurate, and for which no assurances are intended and no representations or warranties are made. MSW Consultants makes no certification and gives no assurances except as explicitly set forth in this report.

Note: The research and analysis contained in the report was substantially completed prior to the onset of the COVID-19 pandemic. After discussions with the Guam Public Utilities Commission (PUC) Law Judge and Guam Solid Waste Authority (GSWA), it was determined, at this time, no attempt would be made to integrate and update the analysis to capture impacts from COVID-19 to the GSWA. Such impacts may include: an increase in waste generation from the residential sector; a decrease in waste generation from the commercial sector; increased risks to operations staff of contracting the COVID virus; and unforeseen costs resulting from the above.

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E. EXECUTIVE SUMMARY

E 1 INTRODUCTION

In 2008, a Receiver appointed by the District Court of Guam was assigned responsibility for all solid waste and recycling responsibilities on Guam. After more than a decade of control by the Receiver, in May 2019, the Court turned over responsibility for residential solid waste collection and operation of three residential transfer stations to the Guam Solid Waste Authority (GSWA). GSWA also inherited numerous multi-year full-service third-party contracts that had been negotiated and executed by the Receiver. These contracts provide for the post-closure activities at the Ordot Dump, operation of the Layon Landfill, operation of the commercial transfer station, maintenance of the GSWA's collection vehicles, and marketing of recyclables and HHW, among other functions. The judge left the Receiver in charge of the Ordot Dump and of hiring a contractor to build Cell 3 at the Layon Landfill.

With the return of control for collection and convenience center operation to the GSWA, the Guam Public Utilities Commission (PUC) is statutorily required to perform a management audit of GSWA operations. This report contains the results of the required management audit, conducted by MSW Consultants on behalf of the PUC. The final methodology for the management audit included the following focal points, the results of which are summarized in this Executive Summary and described in detail in the full audit report:

- The creation of a rate model and performance of a revenue sufficiency analysis of current and future rates,
- A manpower and staffing analysis of GSWA's waste and recyclable collection and transfer operations, supplemented by research into four comparable programs on the U.S. mainland,
- A review of key third-party service contracts inherited by the GSWA from the Receiver, and
- An evaluation of the current management and operational capabilities of the GSWA.

E 2 BASELINE ASSESSMENT

E 2.1 OVERVIEW

The GSWA operates a solid waste collection system available to all single-family residents of Guam (including small multi-unit buildings that receive single family service). This collection system includes curbside collection of refuse, single stream recyclables, and bulky waste. However, participation is not mandatory so not all residential households on Guam elect to receive curbside collection from GSWA. Residents can opt to forego both the service and the monthly fee, instead opting to self-haul their materials to one of three residential transfer stations. Figure E-1 contains photos of several of the collection services provided by the GSWA. Figure E-2 shows the three residential transfer stations, and Figure E-3 shows the commercial-scale solid waste facilities on Guam.

E. EXECUTIVE SUMMARY

Figure E-1 Collection Services



Rearload Trash Collection



Rural Trash Collection



Bulk Waste Collection

Figure E-2 Residential Transfer Stations (Citizen Convenience Centers)



Harmon Street Convenience Center



Agat Convenience Center



Malojloj Convenience Center

Figure E-3 Commercial Solid Waste Facilities



Commercial Transfer Station



Recycling Facility



Layon Landfill

E 2.2 COLLECTION OBSERVATIONS

The management audit identified the following observations regarding solid waste collection provided by the GSWA:

- **Residential Collection is not Mandatory**: Only approximately 20,000 households subscribe to the curbside service. Collection productivity is therefore lower than expected, as most US residential curbside collection programs service every household.
- **Residents Received Standard Service**: Those residents who do subscribe to GSWA's service are receiving a reasonable level of service for refuse, recycling, and bulky waste collection.
- **Bulk Waste Collection**: GSWA collects curbside bulky waste from residents who call in for service. Each resident can request a bulky waste collection twice per year for a maximum of five items. Additional collections can be performed an additional charge. The provision of bulk waste service is hypothesized to be very important on Guam to minimize illegal dumping.
- **Route Balance**: Routes were not properly balanced. At the time of the audit, some recycling routes were scheduled as "go-back" routes which require a truck to complete its refuse collection service area, tip the refuse, and then return to the same area to collect recyclables. Additionally, some routes were reported to be "helper" routes, which mean they are not assigned to a specific number of households, but rather operate in a more freelance capacity. The collection system is consequently not operating at its most efficient level, and there are opportunities to reduce collection system cost by balancing routes and eliminating go-back and helper routes.
- **Multiple Truck Types**: GSWA uses three different types of trucks to service its customer base: 25 cubic yard (CY) rear loaders for standard collection, 10-CY rear loaders called mini-packers (Mini) for some more remote areas, and pick-up trucks with 6-CY dumping containers called Baby Trucks (Baby) for dirt roads. Opportunities exist to eliminate the smallest truck type, which would increase collection productivity and reduce equipment maintenance demand.
- **Vehicle Age**: Some vehicle types are beginning to exceed the expected average age, which means at least some vehicles will need replacement in the near future. The average age of collection vehicles was found to be seven years. An average age of five years would be more in line with industry standards.
- **GSWA Staffing**: GSWA staffs its operations with a combination of permanent staff on payroll, and temporary labor provided by a court-assigned contract with Pacific Human Resources. At any given time, roughly 75 percent of GSWA operations are staffed by payroll employees, and the other 25 percent by temporary (contract) employees. This arrangement complicates the management of the organization due to the potential for turnover of contract staff, although it may be necessary in the Guam labor market to supplement payroll employees with contract services. It was beyond the scope of the management audit to evaluate the wage rates and compensation policies of the GSWA.

E 2.3 FACILITY OBSERVATIONS

The three residential transfer stations currently being managed by the GSWA were found to be clean and well maintained. The Harmon Street Transfer Station is also home to a household hazardous waste facility, which is an important service to offer to Guam's residents in order to keep hazardous materials out of the Layon Landfill. However, these facilities handle a very small amount of the total residential refuse and recycling generated on Guam.

Given the relatively low usage rate of these facilities, and given the benefits (discussed in more detail in the full management audit) of converting residential collection to a mandatory, exclusive service, it may be possible in the future to close the two smaller facilities and retain only the Harmon Street transfer station and its important HHW facility.

E 3 RATE MODEL ANALYSIS

E 3.1 REVENUE SUFFICIENCY AND RATE IMPACTS

Solid waste rate models are Excel-based tools that compare current and future system revenues to current and future system costs to determine whether or not per household, per ton, or other system billing rates

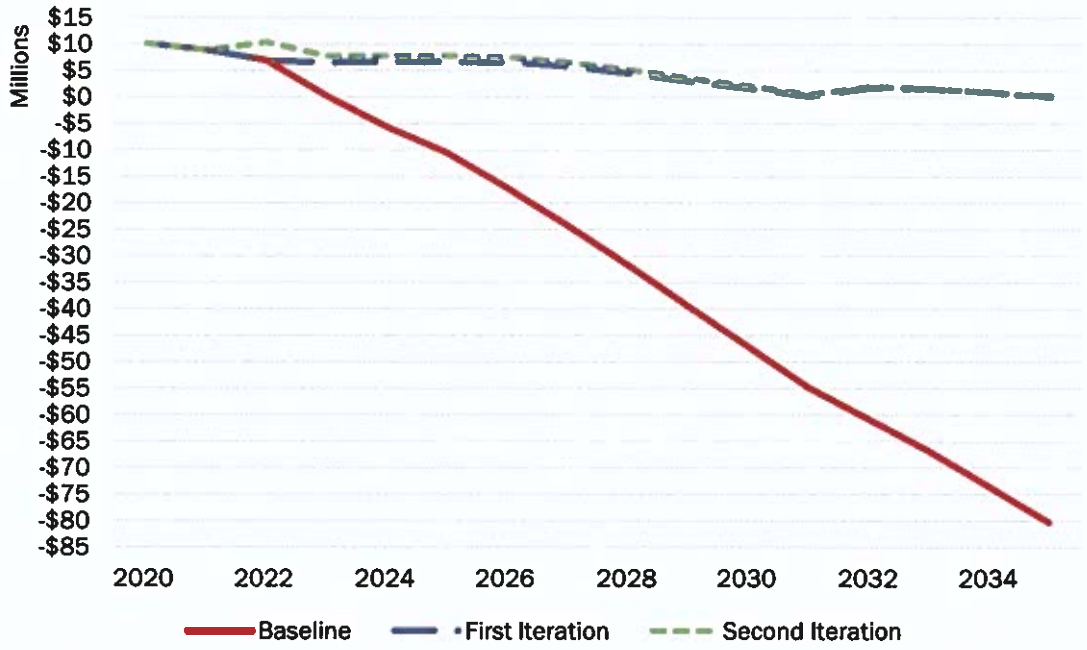
are sufficient to cover costs. This management audit incorporated a review and analysis of the most recent rate model being utilized by the Authority, which was updated and enhanced to account for current system realities, and used to examine whether current per household and per ton billing rates are sufficient to cover current costs and expected costs over a 15-year period.

The Authority's primary rate is charged as a tip fee on the tons of material received at the commercial transfer station and the Layon Landfill. At the time of the study, the going landfill tipping fee was $171.60 per ton. Although high by the standards of the mainland U.S., it is not uncommon for island landfills to have significantly higher tip fees.

A baseline (status quo) rate model was developed. The baseline projections factored in numerous capital, operating, cell development, and closure/post-closure cost assumptions. Additionally, two iterations of the rate model were developed to gain a preliminary sense of order of magnitude rate increases required to achieve revenue sufficiency over the 15-year study period. Separate iterations were prepared to show the impact of (i) a single rate increase, which would be expected to create greater potential for a shock to solid waste customers, and (ii) two smaller rate increases, designed to scale up to revenue sufficiency more slowly.

The single rate increase was found to require increasing the landfill tipping fee to $223 per ton, which is a 30% increase. The stair-step rate increase spread these adjustments over four years, although ending at a slightly higher tipping fee of $225. The results of the baseline projection and the two alternative iterations of the rate model are shown in Figure E-4. As shown, the GovGuam balance drops precipitously under the baseline (current) rates. This analysis suggests that significant rate increases are needed in the near future but that the need for this rate increase may be mitigated somewhat, but likely not eliminated, if the revenue base is expanded to include most or all Guam households. Additional analysis should be undertaken in this regard. Over a longer period of time it may be possible to reduce capital and operating costs to further enhance the financial health of the system.

Figure E-4 Comparison of GovGuam Fund Balance for Baseline and Two Alternative Rate Scenarios



It should also be noted that the analysis of revenue sufficiency also identified a current and growing underfunding of fund balance requirements for the Layon closure and post-closure care funds. In the long run, these funds are projected to be depleted well before closure and post-closure expenses are fully incurred. The timing for this early depletion was beyond the management audit study period, but should be revisited in future audits.

E 3.2 MANDATORY VS. NON-MANDATORY COLLECTION POLICIES

At previously mentioned, residential collection service provided by the GSWA does not have to be purchased by Guam households; residential curbside refuse collection is therefore non-mandatory, and residents can instead opt to use the Island's transfer stations for their waste disposal needs. Communities with mandatory, exclusively provided curbside collection services gain three advantages over Guam's current non-mandatory system:

- The size of the customer base remains stable over time, because customers cannot opt to drop or add service (which could be disruptive for unexpected additions or subtractions).
- They are able to charge a fair, revenue-sufficient rate to all customers who benefit from having a solid waste utility; and
- They are able to operate their residential collection services with the optimal efficiency that is gained by servicing every household in a residential neighborhood.

Although not explicitly included in the scope of the manpower and staffing research, research was performed into the prevalence of mandatory, exclusively-provided residential refuse and recycling collection among similar sized local governments on the U.S. mainland. Fifteen communities across the mainland US with a comparable number of total households to Guam were randomly selected for the research.

Table E-1 summarizes the results of this research. As shown, 14 out 15 similar-sized cities in the U.S. have established mandatory, exclusive residential refuse and recycling collection systems. In the professional opinion of MSW Consultants, the results of the small but random sample of like-sized communities is representative of the broader universe of local governments on the US mainland. Guam is in a very small minority of jurisdictions that has not established exclusive, mandatory residential refuse collection.

Table E-1 Residential Collection in 15 Randomly Selected U.S. Cities

Municipality	State	Total Households	Mandatory Residential Collection?	Service Provider
Deerfield Beach	Florida	42,671	Yes	Public
Erie	Pennsylvania	44,790	Yes	Public
Asheville	North Carolina	41,626	Yes	Public
San Buenaventura	California	42,827	Yes	Contracted
Clinton	Michigan	40,057	Yes	Contracted
Simi Valley	California	42,506	Yes	Contracted
Billings	Montana	41,165	Yes	Public
Guam	**N/A**		**No**	**Public**
Richardson	Texas	40,630	Yes	Public
Davenport	Iowa	44,087	Yes	Public
Everett	Washington	41,447	Yes	Contracted
Vallejo	California	44,433	Yes	Contracted
Clarksville	Tennessee	41,220	No	Private Subscription
Fall River	Massachusetts	42,750	Yes	Contracted
Tuscaloosa	Alabama	40,842	Yes	Public
San Mateo	California	40,014	Yes	Contracted

E 4 MANPOWER AND STAFFING ANALYSIS

It was required in the management audit to conduct comparative research into the manpower and staffing of GSWA compared to that of local governments on the U.S. mainland that provide similar services to a comparable number of customers as the GSWA. Based on input from the GSWA and the PUC, only the GSWA collection system was included in the manpower and staffing research; landfill and transfer stations operations were excluded because these are currently contracted to private entities in Guam and cannot be easily altered by GSWA until conclusion of the contracts. Table E-1 identifies the benchmark cities selected for this exercise.

Table E-2 Manpower and Staffing Research Partners

Municipality	Isolated from Metro Areas	Total Residential Households	Residential Households Served	Mandatory, Exclusive Service?	Collection Technology	Collection Service Provider
Guam	Yes	42,026[1]	19,613	No	Semi-Auto	City
Salina, KS	Yes	19,453	15,100	No	Semi-Auto	City
Flower Mound, TX	No	22,792	22,792	Yes	Semi-Auto	Contractor
Logan, UT	Yes	15,632	15,632	Yes	Full Auto	City
Grand Rapids, MI	Yes	55,000	47,575	No	Full Auto	Open

[1] The Guam total residential household number contains both single-family and multi-family households, which are not served by the GSWA, as available data does not further split the total households into varying categories.

There are a number of important observations to be made from the research. Key findings include

- **GSWA Staff per Route is In Line**: GSWA's staffing for its semi-automated collection system is in line with other semi-automated systems.
- **GSWA Staff per 1,000 Households is Above Average**: GSWA requires more staff to service 1,000 households than the other semi-automated service providers. In lay terms, this suggests that GSWA may be operating a larger number of routes than necessary to service its customers, or else is maintaining extra capacity in its collection system in the event that it increases its customer base.
- **GSWA has Average to Below Average Route Size**: Similarly, the number of households served per semi-automated route is smallest in Guam compared to the other semi-automated collection systems.
- **GSWA Could Increase Productivity and Improve Safety with Automated Collection**: The data from this analysis clearly show the productivity and efficiency benefits of automated collection over semi-automated collection. Automated collection systems significantly reduce the size of the work force needed to provide services. Further, they increase the speed of collecting from each household. Finally, the waste management industry has embraced the higher safety levels achievable through automation. GSWA may wish to investigate some automated collection in the future to realize these productivity advantages.

Comparing collection systems is a complex undertaking, due to the many variables that impact the collection system, service delivery, and cost. However, a noteworthy finding of this research is that Guam's non-mandatory policy has two detrimental impacts on productivity and efficiency. First, there is a greater impact on account management to accurately track the customer base, charge and recover appropriate user fees, and manage open/closed accounts. Second, collection efficiency is impaired because GSWA routes must pass by non-customers in order to reach customers.

With the cost of disposal and processing being inherently high on Guam, efficiency and cost-controls are especially important. The authorities on Guam may wish to revisit the policy that allows residents to opt out of receiving curbside collection service from the GSWA, and consider converting GSWA to be the exclusive, mandatory collection provider for residential households. This policy change would bring Guam back into the vast majority of US mainland jurisdictions which grant mandatory, exclusive service – and charge full-cost rates – to their customers.

E 5 REVIEW OF CONTRACTS

The GSWA inherited numerous multi-year, full-service, third-party contracts that had been negotiated and executed by the Receiver. These contracts provide for the post-closure activities at the Ordot Dump, operation of the Layon Landfill, operation of the commercial transfer station, maintenance of the GSWA's collection vehicles, and marketing of recyclables and HHW, among other tasks. Table E-3 lists the three key third party contracts reviewed as part of this management audit.

Table E-3 Summary of Key Contracts Inherited by GSWA

Contract	Service Provider	Start	Optional Renewal Dates	End Date
Post-Closure of the Ordot Dump	Brown and Caldwell	May, 2018	May, 2023 May, 2028	May, 2033
Operation of the Layon Landfill	Green Group (Herzog)	April, 2011	April, 2016 April, 2021	April, 2026
Operation of the Commercial Transfer Station	Guahan Waste Control, Inc. (Mr. Rubbishman)	May, 2011	May, 2016 May, 2021	May, 2026

A number of technical observations about these contracts are contained in the full management audit report and are not repeated here. It should also be noted that GSWA inherited other contracts for maintenance of the GSWA's collection vehicles, marketing of recyclables, and HHW management. These contracts were not reviewed as part of the management audit.

E 6 MANAGEMENT AND OPERATIONAL EVALUATION

The MSW Team was explicitly charged with providing an evaluation of the GSWA's ability to manage and operate its current waste management and recycling system, consisting of residential collections and residential transfer stations directly staffed and operated by the GSWA, and other facility operations provided via operating contracts which were all put in place by the Receiver and inherited by the GSWA. The MSW Team has prepared this management audit report to organize the information and data relied upon to formulate an assessment of GSWA management and operations.

In the professional opinion of the MSW Team:

- The current management staffing configuration is appropriate for the GSWA's current breakdown of directly managed and contracted operations.
- Current Authority senior management and staff possess the industry knowledge, experience, and commitment to operate the residential collection system and the residential convenience centers effectively.
- The framework for the collection system is appropriate, and the user fee structure is typical of numerous programs on the US mainland that must cover their full costs from direct fees charged to customers.
- It was beyond the scope of this audit for the MSW Team to make a formal recommendation as to the level of GSWA fees; however, near-term increases appear to be required for the long-term financial health of the system.

Although it was beyond the scope of this management audit to provide extensive recommendations for changes to the system, and notwithstanding the current policy of non-mandatory residential collection, the MSW Team offers the following supplemental comments about the management of the services directly provided by GSWA:

- **Refuse and Recycling Route Balance**: The current refuse collection system uses helper/support routes on certain days. Recycling routes sometimes have additional trucks, and sometimes recycling is collected by refuse routes after completing refuse collection. These are inefficient methods for refuse collection and contrary to best practices. The GSWA should consider balancing routes, assigning dedicated recycling routes, and assigning each crew to their full route each day. The potential savings of reducing one or more daily routes is meaningful, and dedication of an appropriate number of recycling routes would improve the order and management of the collection program.
- **Need for Residential Transfer Stations**: The three transfer stations handle a small portion of the island waste. Due to the higher volume of throughput, the Harmon Street facility appears to have the volume to justify its cost of operation. Longer term, two of the less-used transfer stations should reduce their operating hours or potentially be closed entirely. Should mandatory curbside refuse and recycling collection be implemented on Guam, this would also lead to the likely closure of these facilities (which would no longer be needed because everyone would receive the curbside service), with the exception of the HHW receiving area at the Harmon Street convenience center.
- **Fleet Management and Replacement**: Should the GSWA pursue route balancing and reduce its number of operating routes per day, it would be expected to reduce the size of the collection fleet and place a greater emphasis on proper fleet replacement. Under such a scenario, the GSWA would need the flexibility and financial resources to replace older trucks on a routine schedule.

Finally, it was reported to the MSW Team that GSWA management has expressed an interest in taking over Ordot Dump post-closure and Layon Landfill operational responsibilities upon conclusion of the current third-party contracts. The MSW Team is of the opinion that both Authority management and operational resources would require substantial enhancement in order to successfully assume these additional responsibilities. Landfill operations require specialized technical and engineering expertise to plan, operate, and maintain the various components of the landfill. GSWA would need to expand its work force significantly to employ appropriate staff to fill these roles and responsibilities.

The above paragraph notwithstanding, the MSW Team notes that it is relatively common on the US mainland for municipalities to privatize their operations, and in the course of converting from public to private service provision, there is a direct transfer of employees from the municipal jurisdiction to the private vendor upon assumption of service. In reverse, should the GSWA not renew either or both contracts, it would presumably be advisable to explore how to retain many or even most of the current contractor staff to continue their roles under direct employment to GSWA. The MSW Team did not perform an in-depth review of the currently contract operations and therefore cannot offer an opinion on assumption of any currently contracted employees at the conclusion of these operating contracts.

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CHAPTER 1 – INTRODUCTION

1.1 INTRODUCTION

On March 17, 2008 the District Court of Guam appointed a Receiver to assume all solid waste and recycling responsibilities on Guam. At that time, GovGuam had 99 waste and recycling employees and was under court order to close the Ordot Dump and develop and operate a new landfill on Guam.

After years of Receiver-managed solid waste and recycling on Guam, the Legislature passed two key Statutes in 2013, and updated them in 2017, in anticipation of the return of solid waste and recycling duties to GovGuam.

Section 51A104 of 10GCA Health and Safety assigned solid waste and recycling powers and duties to the Guam Solid Waste Authority ("GSWA") and Section 51A119 provides that "The ...Public Utilities Commission ("PUC")...shall perform a management audit of the ... operations of the GSWA..."

In May 2019, the Court turned over responsibility for solid waste to the GSWA. The judge left the Receiver in charge of the Ordot Dump and of hiring a contractor to build Cell 3 at the Layon Landfill.

However, even with the role of the Receiver vastly diminished, the GSWA's direct role in managing waste and recycling on Guam is currently largely limited to the operation of the waste and recycling collection system and the three residential transfer stations as the Authority inherited numerous multi-year full-service third-party contracts that had been negotiated and executed by the Receiver. These contracts provide for the post-closure activities at the Ordot Dump, operation of the Layon Landfill, operation of the commercial transfer station, maintenance of the GSWA's collection vehicles, and marketing of recyclables and HHW, among other functions.

In 2017, the PUC issued a Request for Proposals for waste and recycling consulting firms to perform the statutorily required management audit of the GSWA. In 2019, MSW Consultants, along with Golder Associates as a subconsultant (MSW Team), was engaged by the PUC to perform the audit.

1.2 MANAGEMENT AUDIT METHODOLOGY

The management audit methodology was subsequently defined through conversations and input from both the MSW Team and the PUC. The final methodology included the following focal points:

- The creation of a rate model and performance of a revenue sufficiency analysis of current and future rates,
- A manpower and staffing analysis of GSWA's waste and recyclable collection and transfer operations, supplemented by research into four comparable programs on the U.S. mainland,
- A review of key third-party service contracts inherited by the GSWA from the Receiver, and
- An evaluation of the current management and operational capabilities of the GSWA.

In performing this management audit, the MSW Team performed a series of tasks including data collection and discovery (review of existing data and information; on-site meetings and interviews; facility tours; and collection system route observations); benchmarking research; financial analysis; and contract review. This report presents the findings and recommendations of the management audit.

1.3 REPORT ORGANIZATION

The management audit report is organized into the following chapters:

- **Chapter 2 – Baseline Assessments:** This chapter provides a description of the GSWA's operations, including collection operations, facility operations (including the active Layon Landfill, the closed

Ordot Dump, and the commercial and residential transfer stations), third party contracts, and financial management.

- **Chapter 3 – Rate Model Evaluation**: The GSWA is in possession of a financial rate model that was initially developed by the Receiver. This section contains a review of the model's strengths and weaknesses, and describes several important enhancements made to the model by the MSW Team to obtain a more robust snapshot of the near, medium, and long-term financial health of the GSWA. The section describes the basis of projected shortfalls of the current rate structure, and offers two alternatives for rectifying the shortfall.
- **Chapter 4 – Manpower-Staffing Analysis**: Research identified several U.S. mainland jurisdictions with a similar customer base and comparable collection services to those provided by GSWA. This section describes the research into the collection systems and their associated manpower and staffing, and draws several conclusions about GSWA's staffing and manpower. A more detailed methodology of the research, as well as supplemental findings, are contained in an appendix.
- **Chapter 5 – Review of Key Third-Party Contracts**: The GSWA inherited multiple contracts executed by the Receiver. Three key contracts for services being performed by private vendors include post-closure of the Ordot Dump, operation of the Layon Landfill, and operation of the commercial transfer station. The MSW Team reviewed these three contracts against standard terms and conditions that might be expected in similar contracts.
- Chapter 6 – Management and Operational Evaluation: Review of Management Structure; Evaluation of Operations

Supplemental details and information are contained in an exhibit and appendices at the end of the management audit.

CHAPTER 2 – BASELINE ASSESSMENTS

2.1 INTRODUCTION

The purpose of this chapter is to describe the GSWA-operated collection system and the GSWA-operated residential transfer stations. Additionally, this chapter provides analysis and commentary on these operations based on recognized industry performance metrics. Finally, this chapter describes the solid waste and recycling facilities within the GSWA's system, although the facilities that are operated under contract to a private vendor were not analyzed in depth. The information presented in this chapter was compiled based on input obtained during the MSW Team's site visits and collection system observations in November 2019.

2.2 RESIDENTIAL COLLECTION SYSTEM

The GSWA operates a solid waste collection system for all single-family residents of Guam (including small multi-unit buildings that receive single family service). This collection system includes curbside collection of refuse, single stream recyclables, and bulky waste.

It is important to note that not all residential households on Guam must receive curbside collection from GSWA. Residents can opt to forego both the service and the monthly fee, instead opting to self haul their materials to one of the Island's three residential transfer stations (described later in this section). The dynamics of non-mandatory curbside collection have a significant influence on the performance of collection services and this issue is revisited later in the report.

Table 2-1 summarizes the daily routes in service to reach GSWA's customers. As shown, there are a total of 65 total routes, or an average of 16 per day, with all households collected over four days per week. It was reported that the current routes were redesigned during the time that the Receiver operated the system.

Table 2-1 Daily Route Summary for GSWA Collection Operations

Truck Type	Mon	Tue	Wed	Thu	Fri	Total	Avg. per Day
Refuse Collection – Semi-automated	6	6	6	6	0	24	6
Refuse Collection – Mini-Packer	2	2	2	2	0	8	2
Refuse Collection – Baby Packer	1	1	1	1	0	4	1
Helper & Missed Collection Routes [1]	2	3	3	3	1	12	3
Recycling Collection [2]	3	3	3	3	0	12	3
Bulk Waste Collection	1	1	1	1	0	4	1
Total	**15**	**16**	**16**	**16**	**1**	**64**	**15**

[1] It was reported to the MSW Team that there are two helper routes that operate each day and are deployed to assist with the refuse and recycling collection system. Additionally, a missed collection route runs one day behind the regular refuse schedule.
[2] Recycling is collected twice per month. It was reported that some days have dedicated recycling routes, while on other days the refuse trucks collect recyclables after they finish the refuse route. The number of routes shown in this table is an estimate.

MSW Consultants utilized its proprietary curbside collection model to more comprehensively analyze the GSWA collection system. The collection model was populated based on available system attributes and validated on the basis of real-time collection observations during the November 2019 visit. Individual components of the collection system are discussed in the following subsections.

2.2.1 REFUSE COLLECTION

Refuse collection is provided once each week. Perhaps the most noteworthy observation of the refuse collection system is that GSWA uses three different types of trucks to service its customer base. The different sized trucks are 25 cubic yard rear loaders (RL), 10 cubic yard rear loaders called mini-packers (Mini) and pick-up trucks with six cubic yard dumping containers called Baby Trucks (Baby). All the trucks utilize cart tippers to dump the carts. The GSWA tries to collect as many units as possible with the RL system, with the Mini system used to collect from the smaller, unpaved roads and dead-end streets. The Baby system is for units that have difficult-to-collect small driveways, roads with low overhanging trees, or that have to be accessed by backing up the road. These trucks are shown in Figure 2-1.

Figure 2-1 Refuse Collection Truck Types



Full Size Rearloader



Mini Packer (stock photo)



Baby Packer

Based on an updated house count of the routes performed by GSWA in December 2019, the system currently services just over 19,600 customers. Table 2-2 shows the number of units collected by each of the three truck types. As shown, the vast majority of units are serviced by the full size rearloader, which is the most efficient collection vehicle. However, unpaved roads and some limited access streets require a smaller, lighter duty vehicle.

Table 2-2 Unit Counts by Collection Vehicle Type

Collection Vehicle Type	Units	Percentage
Full Size Rearload	17,752	91%
Mini Packer	1,383	7%
Baby Packer (pup truck)	478	2%
Total	**19,613**	**100%**

Full size (25 cubic yard) rearloaders use two person crews and are equipped with two cart tippers to service the 96-gallon carts. Residents are required to place their carts at the curb for collection. Generally, the driver does not help the loader dump carts unless there are multiple carts at a single stop. These residential routes start collections at 3:00 AM each morning Monday through Thursday. The crews enjoy working in the cooler weather of the early mornings rather than the extreme heat of the afternoons. Each crew is required to work a 10-hour day with their shifts ending at 1:30 PM.

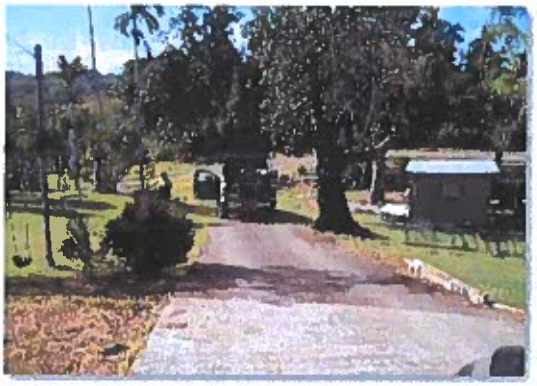
These trucks are not only equipped with the cart tippers but also a series of spotlights to illuminate the work area behind and next to the rear of the truck, increasing the safety of the work area for the crews.

The island has many streets that are narrow, have low hanging branches, or which are unpaved dirt roads. These street types are not conducive to the large rear loader trucks. Therefore, the GSWA uses smaller 10

cubic yard rear loader trucks for these more difficult collections. Two person crews operate this smaller size truck which is equipped with a single cart dumper. Collection operations are similar to the full size rearloader.

The GSWA also uses a single-operator pick-up truck with the six cubic yard dumping container with cart tipper to make collections at residences with long driveways or more difficult-to-access roadways. Another view of this service is shown in Figure 2-2.

Figure 2-2 Single Crew Pick-Up Truck



The residential house counts are shown in Table 2-3. This table also shows the variance of daily house counts to the average daily number of households served. As shown, the regular rearload packer routes are not well balanced.

Table 2-3 Residential House Counts by Route

Day	Rearload	Var.	Mini	Var.	Baby	Var.	Total
Monday	6,306	42%	357	3%	127	6%	6,790
Tuesday	5,178	17%	366	6%	113	-5%	5,657
Wednesday	3,696	-17%	328	-5%	119	0%	4,143
Thursday	2,572	-42%	332	-4%	119	0%	3,023
Average	**4,438**		**346**		**120**		**4,903**

Table 2-4 further illustrates the impact of unbalanced routes. Latter days of the week have low enough house counts that they could be serviced with only six trucks per day. However, the Monday and possibly the Tuesday house counts require more trucks. Given the cost of operating a daily route, it would appear that rebalancing routes could reduce the number of trucks on the routes each day and commensurately operating costs.

Table 2-4 Average Residential House Counts by Day

	Routes/Day	Monday	Tuesday	Wednesday	Thursday
Total RL HH		6,306	5,178	3,696	2,572
Budget HH/FL	6	1,051	863	616	429
Actual HH/RL	8	788	647	462	322

2.2.2 MISSED COLLECTION ROUTE

The GSWA operates a missed collection truck Tuesday through Friday. The one-person crew uses a pick-up truck with the six cubic yard dumping container with cart tipper to make these collections. The number of collections vary by day and week. The customer service department takes the missed collection calls from the customers and relays those calls to the Operation Dispatch Department for collection.

2.2.3 RECYCLING COLLECTION

The GSWA collects residential curbside recyclable material twice per month on the same day as refuse collection. Recyclables generated at residences are contained in 96-gallon wheeled carts and collected by semi-automated rear load trucks like the residential refuse collection. Recycling collection was reported to be performed through a combination of the following resources:

- **Dedicated recycling routes**: On some days of the week, there are dedicated recycling trucks that collect only recyclables.
- **Refuse truck go-back routes**: Other recycling collection was reported to be performed by refuse routes that have finished their refuse collection, and return to the same neighborhoods to collect recyclables.
- **Helper routes**: It was also reported that a helper truck could assist both a refuse route or a recycling route.

Given the multiple ways recycling is collected, it was not possible to observe the recycling collection service on the initial trip. The MSW Team intends to review this service on its next trip to Guam. However, based on our professional experience, it is atypical to provide curbside recycling collection with refuse routes or with helper routes. Both public sector and private sector operators on the US mainland would customarily develop balanced, dedicated recycling routes to service a residential region.

2.2.4 BULKY WASTE ROUTE

The GSWA collects curbside bulky waste from residents who call in for service. Each resident can request a bulky waste collection twice per year for a maximum of five items. Materials collected include appliances, mattresses, hot water heaters, and other bulky and metallic waste. Additional collections can be performed by GSWA crews for an addition charge of $25 for five items.

There is one bulky waste crew that is dispatched daily with a list of 20 to 30 residents that have materials to be collected. The crew uses a flat-bed truck with a lift gate to haul away these materials. This collection method is widely used for bulk waste collection and the provision of bulk waste service is hypothesized to be very important on Guam to minimize illegal dumping. Figure 2-3 shows a bulk waste crew loading appliances.

Figure 2-3 Bulk Waste Collection



2.2.5 EQUIPMENT

Each subscribed Guam residential unit receives a 96-gallon cart for refuse and a 96-gallon cart for recycling. Given the current customer base, the GSWA should have roughly 40,000 carts (half for refuse and half for recycling) in the field at residential locations throughout the island. Because collection is not mandatory, the GSWA faces the responsibility for tracking its cart inventory. Should account additions or deletions occur rapidly, it could create some challenges to maintain the cart inventory and to assure that only current customers have carts for GSWA service.

There is a total of 36 vehicles in the fleet with the majority consisting of rear loaders. Table 2-5 provides a count and average age of the various collection vehicles used by the GSWA. The average age of the fleet is comparable to most other US municipal collection system fleets. However, the current fleet is beginning to exceed expected average age in a fully utilized collection system (such as would be provided by a private collection company seeking to maximize its return on capital). It should be noted that one of the reasons the average fleet age is high is that the GSWA is currently retaining additional older, spare vehicles. Front-line collection trucks are all newer than average.

Table 2-5 GSWA Fleet Analysis

Truck Type	Count	Actual Average Age	Expected Average Age	Meeting Age Standards?
Pick-Up Trucks	8	4.5	5	Yes
RL Packers	15	7.4	5	No
Mini Packers	3	2.0	5	Yes
Baby Packers	3	2.0	5	Yes
Roll-Off Trucks	2	9.0	5	No
Service Vehicles	5	13.2	5	No
Total	**36**	**7**		**No**

2.2.6 BACK-OFFICE SOFTWARE

The Customer Service and Operations Department uses a software program from Alpine Technology Corporation (Waste Management Software) to manage the customer base and optimize operations. The Operation's office has a large video screen on the wall above the dispatch area that can project the routes and other pertinent information concerning the daily operation. The Waste Management Software also utilizes GPS technology to track the locations of fleet vehicles which can be viewed on the screen. A photograph of the video screen is shown in Figure 2-4.

Figure 2-4 Alpine Technology Routing Software



Many municipalities are using this type of technology to better manage the daily operations of the collection system including the tracking of collection vehicles and collections performed in order to maximize routing efficiency. The MSW Team understands that this software may be capable of assisting in a reroute of the island.

2.2.7 STAFFING

GSWA staffs its operations with a combination of permanent staff on payroll, and temporary labor provided by a court-assigned contract with Pacific Human Resources. The GSWA provided a detailed listing of budgeted positions in response to the data request, including position number, title name, positions, and grade. GSWA further itemized the typical use of contract staffing to supplement GSWA permanent staff. A summary of the total staffing for GSWA is shown in Table 2-6.

Table 2-6 GSWA Staffing

Type	Title	Permanent	Contract	Total
Admin	Accounting Technician I	1	0	1
	Accounting Technician II	1	0	1
	Administrative Assistant	1	0	1
	Assistant General Manager of Operations	1	0	1
	Chief of Administration	1	0	1
	Comptroller	1	0	1
	Customer Service Representative	8	0	8
	Engineer Supervisor	1	0	1
	General Manager	1	0	1
	Management Analyst III	1	0	1
	Safety Officer	1	0	1
	Subtotal Admin	**18**	**0**	**18**
Operations	Equipment Operator II	8	0	8
	Equipment Operator III	1	0	1
	Sanitation Worker	14	0	14
	Helpers	0	11	11
	Roll-off Operators	0	2	2
	Subtotal Operations	**23**	**13**	**36**
Grand Total		**41**	**13**	**54**

As shown in this table, there are 18 management and administrative staff and 36 operations staff, 13 of which are being performed by contract labor rather than permanent staff. MSW Consultants made a rapid audit of the permanent and contract staffing configuration during the field observations. While it was beyond the scope if this audit to validate the detailed rationale for current staffing assignments, we make the following observations:

- Based on a daily review of the Operational Assignment Sheets from three days of route observations, the collection system needs 38 operations staff (Sanitation Workers, Equipment Operators, and Helpers).
- To make up for the slight deficiency in the 36 budgeted and operations positions, GSWA assigns employees listed under Admin to perform operations.

- There are a number of apparent differences between the titles identified in the GSWA list of budgeted staff, and the actual roles being performed by those staff. Some of these are listed in Table 2-7.

Table 2-7 Discrepancies Between Budgeted and Actual Roles

Position on the Books	Actual Job Function Performed
Customer Service Representative	Sanitation Foreman
Equipment Operator III	Field Foreman
Customer Service Representative	Operations Clerk
Equipment Operator II	Support Repo [1]
Contract Employee	Support Termination [1]
Unknown	Grounds Maintenance (2 staff)
Unknown	Cart Maintenance (3 staff)

[1] These job functions are shown as provided by GSWA via email.

It was beyond the scope of this audit to validate the basis of the discrepancies observed. However, in the opinion of MSW Consultants, there are opportunities for GSWA to more closely align its budgeted staff positions with its administrative and operational needs. There may also be a benefit to revisiting the mix of permanent and contract employees to assure that GSWA continues to recruit experienced staff and complete its duties safely and efficiently.

2.2.8 Optimized Route Configuration

As a result of the apparent additional staff, and also because the current recycling collection configuration is not typical of municipal collection programs, the MSW Team made a more in-depth analysis of the daily route demand using its proprietary collection model. The results of this exercise are shown in Table 2-7.

Table 2-8 Optimized Route Estimation

	Current System				Optimized System	
Service	Daily Routes	House-holds Served	Days/ Week	House-holds per Route	Estimated Daily Routes	House-holds per Route
Refuse Collection – Semi-automated	6	17,752	4	740	6	740
Refuse Collection – Mini-Packer	2	1,383	4	173	1	465
Refuse Collection – Baby Packer	1	478	4	120	0	N/A
Helper & Missed Collection Routes [1]	3	unknown	4	Unknown	0	N/A
Recycling Collection [2]	Varies	unknown	4	Unknown	3	740
Total	**15**				**10**	

There are several important concepts shown in this table. First, three dedicated daily recycling routes would be sufficient to service the system, rather than the unbalanced system currently in place. With recycling being collected every other week, it should still be possible to collect half of the island one week and the other half the next week, all on the same day as refuse collection. Second, it is likely that mini-packer routes and the baby packer route could be condensed. Although it was beyond the scope of the audit to investigate all customers and roadway access, the mini-packer the number of daily routes in operation appears higher than expected given the size of the customer base. Finally, the helper route should be eliminated, once again simply by balancing routes across days of the week. The MSW Team recognizes that re-routing may

be challenging and could require up-front costs; however, the benefits would be expected to grow over time.

2.3 RESIDENTIAL TRANSFER STATIONS (CITIZEN CONVENIENCE CENTERS)

There are three Transfer Stations operated by the GSWA; Harmon Street, Agat, and Malojloj. Each of the transfer stations is designed for citizens to drop of their residential waste, recyclables, or bulky waste. The facility at Harmon Street also accepts Household Hazardous Waste (HHW). Each of the transfer stations is open Thursday through Monday from 9:00 AM until 5:00 PM.

The GSWA charges resident to use these facilities. The usage fees are described in Table 2-8. A GSWA employee staffs each facility and collects the fees at the gate before the residents are allowed to unload.

Table 2-9 Transfer Station Rate Table

Item	Fee
Household Trash	Price is based on volume which is estimated by the pay attendant in the following manner: • The minimum charge is $7.50 from one item up to the top of the sidewalls of a regular 8-foot pick-up bed. • If the amount is above the sidewalls and approximately half way to the top of the truck cab, the price will be $15.00. If slightly above the truck cab, the price will be $22.50. If significantly above the truck cab, the pay attendant will assess as needed.
Sofas, Mattresses / Box Spring	$7.50 per item
Cardboard	Free if placed in the recycling container
Glass Bottles and Jars	Free if placed in the recycling container

The Harmon Transfer Station handles the majority of the residential refuse at the transfer stations. As Table 2-9 illustrates, Harmon TS receives 13 percent of the total residential refuse. Agat and Malojloj each handle four and three percent, respectively.

Table 2-10 2019 Transfer Station Refuse Tonnage

Origin of Refuse	Total	Percent
Agat	681	4%
Harmon	2,551	13%
Malojloj	642	3%
Residential Refuse Collection	15,574	80%
Total	**19,447**	**100%**

The transfer stations also receive recyclables with Harmon receiving three percent of the total residential recyclables generated. Table 2-10 shows that both Agat and Malojloj each generate a little more than one percent of the total residential recyclable.

Table 2-11 2019 Recycling Tonnage

Origin of Recycled Material	Total	Percent
Agat	14	1%
Harmon	59	3%
Malojloj	10	1%
Residential Recycling Collection	1,734	95%
Total	**1,816**	**100%**

2.3.1 HARMON STREET TRANSFER STATION AND HOUSEHOLD HAZARDOUS WASTE FACILITY

The Harmon Street Transfer Station and the Hazardous Waste Facility is located on Harmon Industrial Park Road behind the Government of Guam's Department of Public Works. This facility has compactors for household trash and cardboard. There are closed-top containers for other fiber and containers and open-top containers for glass and bulky waste. There is staff to accept payments, manage the household hazardous waste program, and help customers with their refuse and recyclables.

Figure 2-5 Harmon Street Transfer Station



The household hazardous waste materials are managed and stored in a separate building. This specially constructed building meets all the required safety standards for the different containers for each hazardous waste collected. The staff has to be specially trained to handle, identify, and package these types of hazardous materials. Management of household hazardous waste is provided by an outside contractor.

Figure 2-6 Household Hazardous Waste Materials



2.3.2 AGAT TRANSFER STATION

The Agat Transfer Station is located on Route 2 on the south end of Agat. This facility is staffed with a single person. The facility grounds were clean, signage was clear, and there was ample space available for residents to drop off materials. Several photos are shown in Figure 2-7.

Figure 2-7 Agat Transfer Station



2.3.3 MALOJLOJ TRANSFER STATION

The Malojloj Transfer Station is located on Route 4 (Malojloj Highway) just north of the intersection to the Talofofo Falls. This facility is staffed with a single person. This facility was also clean, had ample space for safe usage, and good signage. Pictures of the facility are shown in Figure 2-8.

Figure 2-8 Malojloj Transfer Station



Even with a fully staffed facility, residents using the facility for their recyclable materials still place significant contamination in with the targeted recyclables. The glass, plastic and metal containers were found to have significant contamination, as shown in Figure 2-9. Some of the contamination is simply due to cross-placement of recyclables into the wrong compartment; other contamination includes materials that are not wanted in the recycling stream.

Figure 2-9 Contamination Examples



These transfer stations facilities rely on the GSWA roll-off trucks to empty the loaded containers. The Authority uses their two roll-off trucks to service the containers at the three transfer stations. Table 2-11 below shows the average number of hauls for materials generated at the three transfer stations.

Table 2-12 Roll-off System Pull Frequencies from Transfer Stations

Material	Harmon	Agat	Malojloj
OCC	1x/wk	2x/yr	2x/yr
Paper	1x/wk	2x/yr	2x/yr
Glass	4x/wk	1x/wk	1x/wk
Refuse	7x/wk	2x/wk	2x/wk
Bulky	5x/wk	2x/mo	2x/mo

2.4 GSWA FACILITIES OPERATED UNDER CONTRACT

Descriptions of the commercial transfer station, recycling facility, HHW facility, the Layon Landfill, and the closed Ordot Dump are provided below primarily for reference.

2.4.1 COMMERCIAL TRANSFER STATION

The GSWA contracts with Guahan Waste Control to operate a commercial transfer station designed to minimize truck traffic to the Layon Landfill. The scale house for the facility is operated by the GSWA while Guahan Waste Control (Guahan) manages the operation of the facility. This facility primarily serves collection vehicles that collect residential or commercial waste throughout the northern and central parts of the island, as these regions are more distant from the Layon Landfill. Some collection in the southern end of the island may be transported directly to the landfill. The loaded collection vehicles must weigh in at the scale house at the transfer station.

Figure 2-10 shows several photographs of the commercial transfer station. The picture on the left is the tip floor where inbound trucks dump their loads. The waste is stored on the tip floor and loaded by wheeled loaders into transfer trailers located on a lower level as shown in the middle picture. The scalehouse is shown on the right.

Figure 2-10 Commercial Transfer Station



Guahan operates a fleet of ten transfer trucks and 100 cubic yard transfer trailers to transport the refuse collected at the facility to the Layon Landfill located 37.2 km from the transfer station. The trip to the landfill takes between 45 and 60 minutes each way, plus about 20 to 30 minutes to dump at the landfill. The transfer trucks must transverse a windy step section on Highway 4 before arriving at the Layon Landfill. Because the trailers are 45 feet long the drivers must swing into the opposing lane of traffic to make the turns. Because of this dangerous situation of having to cross the middle lane of the road, Guahan has hired, at a significant cost, a company to provide "pilot" vehicles to lead the transfer vehicles through this dangerous section of the road and warn oncoming vehicles of the danger. The pilot vehicle operation is a direct pass-through cost reimbursed by the GSWA to Guahan Waste Control, per the contract terms. Figure 2-11 shows a transfer trailer and stretches of highway traversed by the trailers and pilot vehicles.

Figure 2-11 Transfer Trailer and Highway 4 Between Transfer Station and Landfill



The transfer station received 80,728 tons in 2019. Guahan hauls an average of 13 to 14 loads per day to the landfill. Based on the truck inventory, and on the ability of one truck to make three to four trips per day, the operator has a sufficient amount of equipment and staff to efficiently operate this transfer station.

2.4.2 ORDOT DUMP

The Guam Solid Waste Authority owns two landfill facilities, the Layon Municipal Sanitary Landfill (Layon Landfill) and the Ordot Dump. The Layon Landfill is currently operating, and the Ordot Dump is closed and in its post-closure care period. MSW Team member Golder toured each facility in November 2019.

The Ordot Dump has a long history of environmental impacts and was the reason, via the Clean Water Act, that the Guam Receivership came into existence. The closure construction occurred during a 28-month period and the facility entered its post-closure long term care period in March 2016. However, the Receiver's request for a post-closure permit is still awaiting approval from the Guam EPA, which is expected to approve the permit in mid-November 2020. The Ordot Dump is operated by Brown and Caldwell through a contract with the Receiver, with the initial term being seven years from May 2018. The Ordot Dump appeared to be in good order, well maintained, and stabilized. Key items noted during the site visit:

- The contract term is for seven years, with two renewal term of five years each.
- The stormwater management system appeared to be very robust as compared to similar facilities in the mainland. This is likely due to the large amount of annual rainfall that Guam experiences.
- No excessive erosion conditions were noted during the site visit.
- The landfill gas collection and control system (GCCS) consists of several dozen gas extraction wells (both horizontal and vertical) and one open candlestick type flare. The GCCS is monitored, adjusted, and reported on a monthly basis.
- The site has ten groundwater monitoring wells and four surface water sampling locations which are required to be sampled on a semi-annual basis. During the site visit, a representative of Brown and Caldwell noted that the monitoring requirements are robust and require large volumes of water to be sampled (approximately 20 liters per well). This amount is large when compared to similar facilities in the mainland.
- The facility has three leachate storage tanks which serve to store collected leachate from the Ordot Dump. Leachate is then pumped to the Hagatna Wastewater Treatment Plant (operated by the Guam Waterworks Authority) for treatment.

Figure 2-12 shows several photographs of the Ordot Dump. The picture on the left shows the perimeter road, while the center and right pictures show a landfill gas flare and the concrete perimeter stormwater channel, respectively.

Figure 2-12 Ordot Dump



2.4.3 LAYON LANDFILL

The Layon Landfill is the only operating municipal solid waste (MSW) landfill on Guam. The facility's disposal area is approximately 22.4 acres and currently consists of two landfill cells (Cells 1 and 2). The Layon Landfill is operated by the GreenGroup (formerly Herzog Environmental, Inc.) which handles the waste disposal operations at the facility. The GreenGroup is in their first renewal term of the contract between the GreenGroup and the Receivership. The Layon Landfill appeared to be well operated and maintained. Key items noted during the site visit include:

- The contract term is for seven years, with two renewal term of five years each.
- The facility encounters significant rain during the year (at times greater than 100 inches/year).
  - 70% of the rain can be expected during the period of July through December. The operator noted that during the drier season, preparations for the wet season need to be completed. A major part of operating the facility is managing stormwater runoff and associated erosion.
- The landfill property is approximately 317 acres with approximately 127 acres (11 cells) devoted to waste disposal.

- The site access road needs to be relocated in support of the pending Cell 3 construction. This relocation appeared to be associated with changes in cell sequencing and long-term planning.
- The liner system for the facility is very robust and exceeds the requirements for a subtitle D (MSW landfill), which may increase the costs to construct and operate the facility.
- The facility appeared to be well equipped with machinery and vehicles to perform the required waste disposal operations. During the site visit, the GreenGroup noted that obtaining repair parts can be very challenging and costly due to the remoteness of Guam, thus having a well-equipped inventory of machinery appears to be prudent to maintain continued operations.
- It was noted that waste receipts have fluctuated in the past, with little increase over the past several years.
- Although it was beyond the scope of this engagement to investigate further, the MSW Team is aware of the recently created Zero Waste Guam Working Group. Assuming this Group achieves success at waste reduction initiative, it has the potential to impact (i.e., reduce) future waste receipts.

Figure 2-13, going left to right, shows the top of the Layon Landfill working face, a sideslope, and a view of the leachate tanks.

Figure 2-13 Layon Landfill



2.4.4 RECYCLING FACILITY

The recycling facility is privately owned and provides for manual picking of corrugated cardboard and mechanized sorting of commingled containers. The facility had a new baler for cardboard and plastics, but the sorting equipment appeared to be older and showing wear. The facility was reported to recycle cardboard, plastics, steel and aluminum, while glass does not go to the recycling facility but to the landfill for beneficial reuse. Figure 2-14, going left to right, shows the inbound pile of single stream material with floor sorting of cardboard; the mechanized sorting line, and cardboard bales exiting the baler.

Figure 2-14 Recycling Facility



CHAPTER 3 – RATE MODEL UPDATE & ANALYSIS

3.1 OVERVIEW

Solid waste rate models are Excel-based tools that compare current and future system revenues to current and future system costs to determine whether or not per household, per ton, or other system billing rates are sufficient to cover costs.

Current Guam statutes require that "...All commercial and residential tipping fees charged by the Authority shall be subject to the review and approval of the PUC;" further, that "A tipping fee per cubic yard, uncompacted, shall be established for business and government generators, subject to approval by the PUC, and shall be published in a rate order developed by the PUC," and elsewhere that "The PUC is hereby authorized to establish, amend and approve all commercial, government and residential tipping fee and user fees…"

Accordingly, an important task within this management audit has been to review and analyze the most recent rate model being utilized by the Authority, to update and enhance it to account for current system realities, and to examine whether current per household and per ton billing rates are sufficient to cover current costs and expected costs over a 15 year period, and to suggest possible new billing rate levels and policies that should be considered.

3.2 RECEIVER RATE MODEL

As a starting point, the most recent version of the receiver's rate model (dated 2010) was studied and analyzed. The most significant observations, among others, were that this rate model:

- Did not take into account the availability of bond proceeds to fund construction of Cell 3,
- Did not take into account the obligation of the Authority to pay the debt service on those bonds,
- Did not make clear the differences between long-term projected balances and best practices target balances of several important landfill-related reserve funds,
- Utilized cost inflation rate projections not based upon econometric data, and
- Utilized unrealistic cost estimates for cell construction, closure, and post-closure care.

3.3 METHODOLOGY FOR UPDATE

Working closely and collaboratively with the Authority, the MSW Team revised the Receiver rate model to accommodate the above observations and to also review and confirm the Authority's projection of system costs over the next 15 years.

Further, landfill engineers from Golder Associates reviewed the landfill-related schedules and assumptions within the rate model and made enhancements to make them more useful and accurate.

Once our revised rate model was agreed to by the Authority (the "Base Revised Rate Model") the MSW Team proceeded to run multiple iterations keeping certain underlying assumptions fixed while varying other assumptions in order to identify the potential impact of 1) the timing and level of possible increases in billing rates, and 2) an alternative reserve fund policy.

Table 3-1 shows the key fixed underlying assumptions common to all iterations of the model.

Table 3-1 Key Assumptions Used in Base Revised Rate Model

Assumption	Value
Annual Waste Growth (Tons)	0.35%
Population / Household Growth	0.45%
Cell Construction Cost per Acre - 2012	$2,000,000
Cells Closure Cost per Acre - 2019	$820,000
Layon Post-Closure Cost per Acre - 2012	$15,000
CPI Growth – Not Contracted	1.19%
CPI Growth – Ordot and Layon	1.86%
CPI Growth – Hauler Transfer Station	2.82%
Airspace Utilization Factor (Tons/CY)	0.675
Interest Rate	0.5%
Unrestricted Cash Balance Minimum (Days)	90
Unrestricted Cash Balance Minimum (Percent)	24.7%
Admin Cost Allocation to Disposal	50.0%
Admin Cost Allocation to Collection	50.0%

The only debt service assumed to be paid by solid waste revenues is for the Cell 3 construction bonds. The earlier receiver's model assumed some debt service payments for older bonds.

3.3.1 RATIONALE FOR FIXED ASSUMPTIONS

The following bullets provide additional details for the basis of the various assumptions in the preceding table.

- **Annual Waste Growth (Tons) – 0.35% –** While recent annual increases in tonnage have averaged only 0.24%, Guam's population growth has averaged 0.45% over the past 8 years and is increasing (see World Bank statistics in Exhibit 3-1, Guam Econometrics).
- **Population Growth – 0.45% –** Guam's population growth has averaged 0.45% over the past 8 years and is increasing (see World Bank statistics in Exhibit 3-1, Guam Econometrics).
- **Cell Construction Cost per Acre (2012) – $2,000,000 –** Cell construction cost assumed in the Receiver's rate model of $900,000 per acre appears to be insufficient. Typical costs in the mainland vary and may be expected to range from $300,000 to $800,000 per acre. Actual Cell 3 contracted construction costs (for the Layon Landfill) are approximately $27,000,000 for approximately 13.3 acres. This equates to a cost of approximately $2,000,000 per acre and is significantly higher than the noted range of costs. One item to note is that the cost of $27,200,000 does include the relocation of an access road and associated utilities, which may cause the unit cost to be slightly higher than needed. However, cell construction projects often include these types of costs for various reasons (mostly due to unknown conditions, etc.), so the landfill engineers recommend maintaining this cost per acre basis for future cell construction. This value yields a remote location factor of 2.5 (250%) to account for the remoteness of Guam and the apparent effect on pricing.
- **Cell Closure Cost per Acre (2019) – $820,000 –** Closure construction duration has been assumed to be a maximum of one year in duration for modeling purposes. Closure costs for landfills are typically less than that of new cell development/construction. Typical closure costs in the mainland range from $227,000 to $326,000 per acre. Given the contracted cost associated with the Cell 3 construction,

Golder estimates a closure cost of $820,000 per acre (approximately 250% of $326,000 per acre) to account for higher construction costs on the island.

- **Layon Post-Closure Cost per Acre (2012) – $15,000 –** The unit rate for post-closure care costs assumed in the Receiver's rate model of $5,039 per acre appears to be low based upon the other landfill related costs associated with Guam. Our landfill engineers recommend utilizing the unit rate of $15,000 per acre, per year in the rate model to account for the remoteness of Guam and the associated impact of pricing. This amount was based on the average cost per acre of select mainland landfills and scaled to account for higher construction costs.
- **CPI Growth – Not Contracted – 1.19% –** This is the consensus of two third-party measures of recent Guam CPI growth (see Moody's Analytics Economic Indicators and CIA World Factbook statistics in Exhibit 3-1, Guam Econometrics).
- **CPI Growth – Ordot and Layon – 1.86% –** This estimate is based upon the most recent annual CPI observations from the Bureau of Labor Statistics as applied to the contract-defined Adjustment Factors.
- **CPI Growth – Hauler Transfer Station – 2.82% –** This estimate is based upon the most recent annual CPI observations from the Bureau of Labor Statistics as applied to the contract-defined Adjustment Factor.
- **Airspace Utilization Factor (Tons/CY) – 0.675 –** The airspace utilization factor for the Layon Landfill is assumed to be 0.675 tons (1,350 pounds) per cubic yard, the minimum required by the operating contract between Herzog Environmental, Inc. and the Receiver. The airspace utilization factor is similar and related to the minimum effective density as noted in the operating contract for the Layon Landfill. The airspace utilization factor from the 2018-2019 Annual Operating Report for the Layon Landfill is 0.715. Note that for small MSW landfills with best management practices, the airspace utilization factor would have an expected range of 0.60 – 0.85. Thus, the assumed value appears to be reasonable given the size of the facility. The cumulative cubic yardage capacity (airspace), *Added CY's* from *Cells Built* (volumes from constructed cells), and *Liner Constructed* (area in acres) of the Layon Landfill has been calculated in accordance with the information presented in the Master Plan Update.
- **Interest Rate – 0.50% –** This assumption represents the recent rate on short term US treasury notes.
- **Unrestricted Cash Balance Minimum (Days) – 90 –** This assumption is as per the recommendation of the Authority.
- **Unrestricted Cash Balance Minimum (Percent) – 24.7% –** This assumption is as per the recommendation of the Authority.
- **Allocation of Administrative Expense – 50.0% Disposal & 50.0% Collection –** This assumption is as per the recommendation of the Authority.
- **The only debt service paid by solid waste revenues is for the Cell 3 construction bonds –** This assumption is as per the recommendation of the Authority.

3.4 FINANCIAL ASSURANCE FOR MUNICIPAL SOLID WASTE LANDFILLS

The United States Environmental Protection Agency (EPA) requires that all owners/operators of municipal solid waste landfills demonstrate that they will be able to pay for the required closure and post-closure care activities, and any corrective action that might become necessary due to releases of contaminants into the surrounding environment. The EPA believes that requiring these financial assurance demonstrations ensures proper long-term financial planning by owner/operators so that sites will be closed properly and maintained and monitored in a manner that protects human health and the environment.

While state and federal government entities are exempt from these requirements, meeting them is considered Best Practice for Governmentally-owned landfills such as Layon. Furthermore, the Guam EPA requires that this requirement be addressed in landfill permit applications.

While Layon closure and post-closure expenses are not expected to be incurred for many years into the future, the MSW Team believes that it is important to identify at this time the very large deficiencies that can be expected in the projected balances of the Layon closure and post-closure reserve funds relative to the Best Practices balance.

Accordingly, our landfill engineers have calculated an estimated level that these reserve funds should reach under Best Practices for each year. While we believe that Guam should focus first on remedying the much nearer term deficiencies projected in the GovGuam Fund, it is important to note that once this fund is stabilized, deficiencies in the Layon closure and post-closure reserve funds must be addressed.

3.5 FINDINGS

As noted elsewhere, our rate sufficiency analysis covers the 15-year period FY 2020 thru FY 2035. While not opining on rates beyond that point, in the course of our work we have also projected the long-term life to the Layon Landfill and potential deficits in Layon closure and post-closure reserve funds in the very long term (50-100 years).

The MSW Team prepared two additional iterations of the rate model to fully define the potential impact of achieving revenue sufficiency over the 15-year study period. In addition to a baseline rate model, separate iterations were prepared to show the impact of (i) a single rate increase, which would be expected to create greater potential for a shock to solid waste customers, and (ii) two smaller rate increases, designed to scale up to revenue sufficiency more slowly. The baseline and both iterations are shown in Table 3-2 and graphically in Figure 3-1.

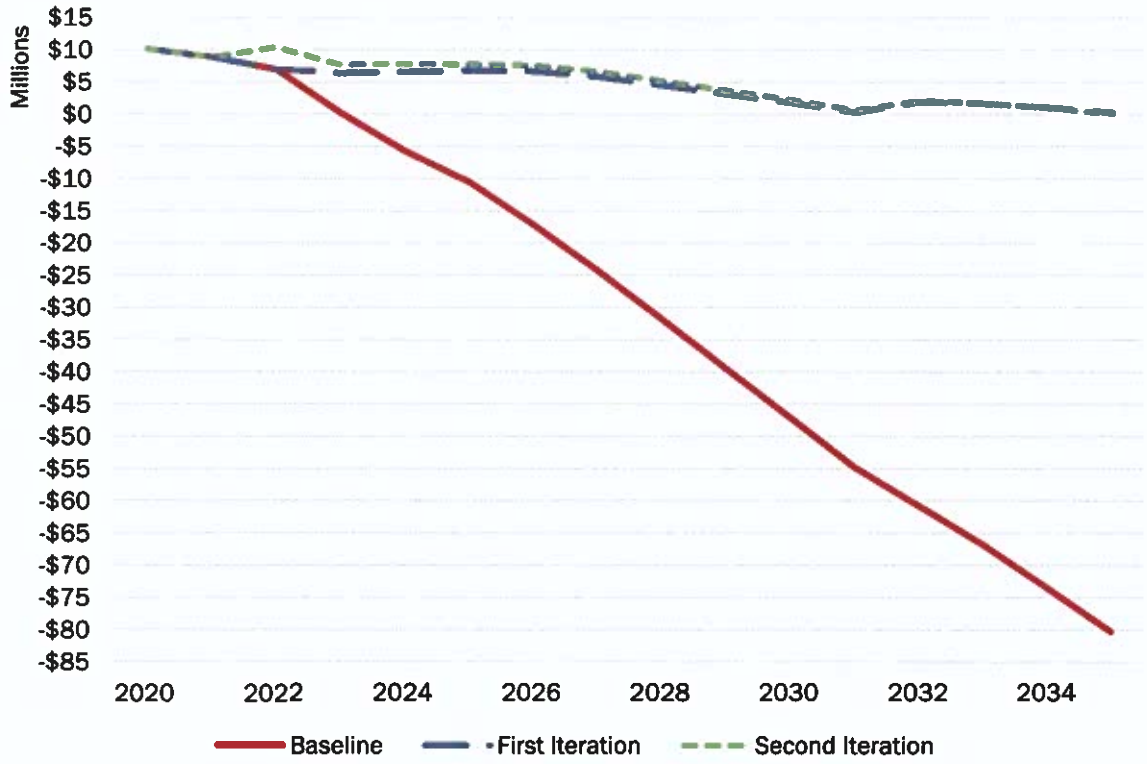
The GSWA currently charges participating households $30.00 per month for collection services. The tip fee currently being charged at the Layon Landfill is $171.60 per ton. Refuse from the military receives a ten percent discount on the tip fee while commercial customers can also receive the same discount if paying within 60 days of billing. The first iteration calls for an approximately 30 percent increase in the household monthly charge and tip fee, raising them to $39.00 and $223.00, respectively. The second iteration calls for two separate increases designed to scale up revenue sufficiency more slowly. The monthly household rate increases to $35.00 in 2022 and then $38.00 in 2024. The tip fee increases to $205.00 in 2022 and then $225.00 in 2024.

Table 3-2 Rate Model Findings for Base Assumptions and Iterations

	Base Revised Rate Model	Iteration #1: One Rate Increase	Iteration #2: Two Rate Increases
Unique Assumptions			
Cell Build Reserve Policy	Annual deposit assumptions provided by GSWA	Maintain approximately 10% balance after each cell build	Maintain approximately 10% balance after each cell build
GovGuam Fund Policy	None, substantial deficits will occur beginning in FY 2024	Stabilize GovGuam Fund through FY 2035	Stabilize GovGuam Fund through FY 2035
Layon Closure and Post Closure Reserve Policy	None	Calculate and monitor long-term deficiencies	Calculate and monitor long-term deficiencies
Findings			
Required Rate Increase*	Current rates maintained	Approximately 30% ($39/HH, $223/Ton) by FY 2024	Approximately 17% for residential ($35/HH) and 19% for tipping fee ($205/Ton) by FY 2022; approximately 9% for residential ($38/HH) and 10% for tipping fee ($225/Ton) by FY 2024
Last Year of Layon Capacity	2115	2115	2115
Current Aggregate Deficit in Layon Closure and Post-Closure Funds	-$28,265,271	-$28,265,271	-$28,265,271
Year Layon Closure Expenses Begin	2066	2066	2066
First Year Layon Closure Reserve Turns Negative (Year/Reserve Deficit)	2088 / -$40,877,794	2088 / -$40,877,794	2088 / -$40,877,794
Year Layon Post-Closure Expenses Begin	2066	2066	2066
First Year Layon Post-Closure Reserve Turns Negative (Year/Reserve Deficit)	2101 / -$149,170,489	2101 / -$149,170,489	2101 / -$149,170,489

**This may result in more waste being brought to the three drop off centers and/or more illegal dumping. It is beyond the scope of this study to quantify this potential impact. However, this impact along with other potential rate model iterations should be addressed in further rate analyses subsequent to this study.*

Figure 3-1 Comparison of GovGuam Fund Balance



As shown in the above table and figure, our two primary findings are (1) there is a need to address near-term projected deficiencies in the GovGuam Fund under current rates and system costs, and (2) there is a

need to address substantial long-term projected deficiencies in the Layon Closure and Post Closure Reserve Funds under current and projected rates and projected system costs. The two iterations are shown to stabilize the GovGuam Fund for the 15-year study period.

3.6 CONCLUSIONS

As summarized in Table 3-2, our two primary findings are (1) there is a need to address near-term projected deficiencies in the GovGuam Fund under current rates and system costs, and (2) there is a need to address substantial long-term projected deficiencies in the Layon Closure and Post-Closure Reserve Funds under current and projected rates and projected system costs.

Generally, these deficiencies can be mitigated in the short term primarily by rate increases while tools to address longer term deficiencies would include, in addition to further rate increases, capital and operating cost reduction programs and broadening the ratepayer base by making household subscription mandatory and/or assessing certain base residential system costs via taxes or user fees.

3.7 SUPPLEMENTAL RESEARCH: MANDATORY VS. NON-MANDATORY COLLECTION POLICIES

At this point it is worth mentioning that residential collection service provided by the GSWA does not have to be purchased by Guam households; residential curbside refuse collection is therefore non-mandatory, and residents can instead opt to use the Island's transfer stations for their waste disposal needs. As will be further discussed in Chapter 4, three of the four communities included in the benchmarking research have mandatory, exclusively-provided residential collection service. Communities with mandatory, exclusively provided curbside collection services[1] gain three advantages over Guam's current non-mandatory system:

- The size of the customer base remains stable over time, because customers cannot opt to drop or add service (which could be disruptive for unexpected additions or subtractions).
- They are able to charge a fair, revenue-sufficient rate to all customers who benefit from having a solid waste utility; and
- They are able to operate their residential collection services with the optimal efficiency that is gained by servicing every household in a residential neighborhood.

Although not explicitly included in the scope of the manpower and staffing research, MSW Consultants performed an additional query into the prevalence of mandatory, exclusively-provided residential refuse and recycling collection among similar sized local governments on the U.S. mainland. We randomly selected 15 communities across the nation with a comparable number of total households to Guam. For each community, we consulted our *WasteInsight* database to obtain information about the provision of residential curbside collection, and subsequently confirmed that the database was accurate through internet research and in some cases follow-up phone calls.

Table 3-3 summarizes the results of this research. As shown, 14 out 15 similar-sized cities in the U.S. have established mandatory, exclusive residential refuse and recycling collection systems. Some of these cities provide residential collection through a public organization (public works or sanitation department), while others have opted to contract with a private hauling company to provide the exclusive service. Only one of the randomly selected cities does not provide exclusive collection. Clarksville (TN) has left its residential collection market open to be served by private haulers, and requires residents to make arrangements for

[1] One of the benchmark communities, the City of Grand Rapids, does not provide mandatory, exclusive collection and currently experiences lower collection productivity, higher collection costs, and currently subsidizes its refuse collection user fees with tax revenue.

curbside collection with a private provider. Notably, Clarksville does not offer its own public collection service (like GSWA), but rather leaves all collection responsibility to private haulers.

Local regulations in these cities dictate whether or not residential refuse and recycling collection are mandatory and provided via an exclusive arrangement. In the professional opinion of MSW Consultants, the results of the small but random sample of like-sized communities is very representative of the broader universe of local governments on the US mainland. Guam is in a very small minority of jurisdictions that has not established exclusive, mandatory residential refuse collection.

Table 3-3 Residential Collection in 15 Randomly Selected U.S. Cities

Municipality	State	Total Households	Mandatory Residential Collection?	Service Provider
Deerfield Beach	Florida	42,671	Yes	Public
Erie	Pennsylvania	44,790	Yes	Public
Asheville	North Carolina	41,626	Yes	Public
San Buenaventura	California	42,827	Yes	Contracted
Clinton	Michigan	40,057	Yes	Contracted
Simi Valley	California	42,506	Yes	Contracted
Billings	Montana	41,165	Yes	Public
Guam	**N/A**		**No**	**Public**
Richardson	Texas	40,630	Yes	Public
Davenport	Iowa	44,087	Yes	Public
Everett	Washington	41,447	Yes	Contracted
Vallejo	California	44,433	Yes	Contracted
Clarksville	Tennessee	41,220	No	Private Subscription
Fall River	Massachusetts	42,750	Yes	Contracted
Tuscaloosa	Alabama	40,842	Yes	Public
San Mateo	California	40,014	Yes	Contracted

3.8 SUPPLEMENTAL RESEARCH: SYSTEM ECONOMICS OF BENCHMARK COMMUNITIES

As described more fully in Chapter 4, comparative research was performed on four U.S. mainland jurisdictions to compare the manpower and staffing levels of their collection programs relative to GSWA collection system manpower and staffing. In performing this research, the MSW Team found it informative to compile critical attributes of the overall waste management and recycling systems in addition to just manpower and staffing data. Although it was technically beyond the scope of the management audit, selected financial data from the four benchmark communities is provided below.

Table 3-4 compares the disposal and processing costs incurred by Guam and by each of the benchmark cities. As shown in this table, Guam's disposal and processing costs are exponentially higher compared to mainland jurisdictions, especially as all four of the cities selected for this comparative analysis are located in areas of the country with extensive land availability and proportionately low disposal costs. For this reason, at least some of the differences in the service fees charges to residents in Guam is attributable to the higher disposal and processing cost environment.

Table 3-4 Disposal and Processing Facilities and Costs

Metric	Guam	Salina, KS	Flower Mound, TX	Logan, UT	Grand Rapids, MI
Disposal Facility Type	Landfill	Landfill	Landfill	Landfill	WTE
Tip Fee ($/Ton)	$171.60	$36.00	$35.00	$29.00	$65.00
Processing Facility Type	MRF	MRF	MRF	MRF	MRF
Processing Fee ($/Ton) [1]	$275.68	$65.00	Unavailable	-$8.00	$65.00

[1] The amount shown for Guam is not a fee per se, but has been pulled from the rate model and represents the actual full cost of recyclables process under existing contracts. The values shown for the other jurisdictions are actual processing fees paid to material recovery facilities.

Table 3-5 summarizes the service charges in place within each of the benchmark communities.

Table 3-5 Collection Service Rates

Metric	Guam	Salina, KS	Flower Mound, TX	Logan, UT	Grand Rapids, MI
Refuse Collection Rate	$30.00/mo	$16.00/mo	$13.75/mo	$13.50/mo	32-Gal: $2.05/ collection 64-Gal: $5.10/ collection 96-Gal: $7.15/ collection
Recycling Collection Rate	Included in Refuse Rate	$5.50	Included in Refuse Rate	Included in Refuse Rate	Free
Yard Waste Fee	N/A	Included in Refuse Rate	Included in Refuse Rate	Included in Refuse Rate	Cart: $6.00/collection Bag: $2.50/collection
Bulk Item Fee	2 free collections per year; $25 per collection for each additional	$25 for first 15 mins; $25 for each additional 30 mins	Rolled into Refuse Rate	$20 + tonnage	Bulk: $20/collection Appliance: $25/collection

There are several noteworthy observations in this table:

- **Basic Rate Structure**: Three of the five jurisdictions – one of which is Guam – have a single monthly rate charged to residents. This rate includes both refuse and recycling collection. In the case of Flower Mound, even the bulk waste is included in the monthly rate.
- **Additional Charge for Bulk Waste**: While the bulk waste rate schedules vary, three of the benchmark cities charge extra for bulky waste, as a means to recoup the extra cost of maintaining a bulk waste service. Guam provides two free collection annually, after which additional fees are charged per collection. Salina, Logan, and Grand Rapids all charge extra for their bulk waste services.
- **Pay-As-You-Throw Rates**: The City of Grand Rapids is unique among the research partners in offering a pure Pay-As-You-Throw (PAYT) system. In Grand Rapids, refuse rates are determined based both on the size of the refuse cart (larger carts pay more than smaller carts) and on the frequency of set-out (residents who set out weekly are charged double residents who set out every-other-week). While this system is highly supported based on resident surveys, it creates significant customer service demands to track cart sizes and to record the frequency of cart lifts. Grand Rapids has invested in

extensive back-office and onboard event recording systems to properly manage this system, and also maintains a relatively large customer service staff.

MSW Consultants notes that there are many considerations in setting appropriate service rates for refuse, recycling and bulk waste service, and that the greater the cost for a refuse removal service, the higher the likelihood for increased illegal dumping. However, based on our professional opinion, many communities have found an appropriate way to provide a base level of service that includes refuse, recycling and some bulk waste service at a consistent price so that the incentive to illegally dispose is minimized. Although it was reported to us that illegal dumping is a problem in Guam, GSWA's rate structure, by including both refuse and recycling and by allowing for some free bulk waste set-outs, has attempted to address this important issue.

Doc. No. 35GL-20-2410.*

Exhibit 3-1 - Guam Econometrics

Inflation

Moody's Analytics Economic Indicators

Index 2007 Q4 = 100, Not Seasonally Adjusted

	2014				2015				2016				2017				2018				2019			
Period	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Percent	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25%	1.50%	0.13%	1.00%	0.00%	1.25%	0.50%	0.50%	-0.25%	1.25%	0.00%	-2.25%
Annual Total				**N/A**				**N/A**				**N/A**				**2.88%**				**2.25%**				**-1.25%**

CIA World Factbook as of 6/30/18

	2014				2015				2016				2017				2018				2019			
Period	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Percent	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Annual Total				**1.75%**				**1.50%**				**1.50%**				**1.25%**				**1.00%**				**1.00%**
Combined Average																**2.07%**				**1.63%**				**-0.13%**
																							Average for most recent three years	**1.19%**

Population Growth

World Bank

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Percent	0.14%	0.16%	0.19%	0.26%	0.38%	0.52%	0.68%	0.81%	0.90%
								Average	**0.45%**

Ordot Adjustment Factor

Index	Percent of Total	Most Recent - BLS	Previous Year - BLS	Percent Change	Percent Adjustment	Substitute for Percent Change
Fixed Component	18.00%	N/A	N/A	N/A	0.00%	
Construction Machinery & Equipment	30.00%	236.4	231.6	2.07%	0.62%	
Employment Cost Index	37.00%	138.7	135.0	2.74%	1.01%	
Gasoline - Fuel	15.00%	168.2	153.2	9.79%	0.23%	1.50%
Projected Adjustment Factor	**100.00%**				**1.86%**	

Layon Adjustment Factor

Index	Percent of Total	Most Recent - BLS	Previous Year - BLS	Percent Change	Percent Adjustment	Substitute for Percent Change
Fixed Component	18%	N/A	N/A	N/A	0.00%	
Construction Machinery & Equipment	30%	236.4	231.6	2.07%	0.62%	
Employment Cost Index	37%	138.7	135.0	2.74%	1.01%	
Gasoline - Fuel	15%	168.2	153.2	-11.09%	0.23%	1.50%
Projected Adjustment Factor	**100%**				**1.86%**	

Transfer Station Adjustment Factor

Index			Percent of Total	Most Recent - BLS	Previous Year - BLS	Percent Change	Percent Adjustment	Substitute for Percent Change
Facility Fee								
Fixed Component			8%					
Operations Fees	Fixed	0.41	14%					
	Variable	0.59	21%					
Employment Cost Index				138.7	135.0	2.74%	1.62%	
Transport Fee			50%					
Percent That Changes With			25%					
			13%					
Employment Cost Index				138.7	135.0	2.74%	0.34%	
Percent That Changes With			75%					
			38%					
Producer Price Index				266.3	261.0	2.03%	0.76%	
Fuel Charge			6%				0.10%	1.50%
Total			100%				2.82%	

CHAPTER 4 – MANPOWER & STAFFING ANALYSIS

4.1 INTRODUCTION

This section summarizes the manpower and staffing comparative research performed across local governments on the U.S. mainland that provide similar services to a comparable number of customers as the GSWA.

It should be noted that, based on input from the GSWA and the PUC, only the GSWA collection system was included in the manpower and staffing research. This is because collection services are provided directly by the GSWA (i.e., publicly-owned trucks and GSWA employee crews), which consequently means there is reasonable ability to make incorporate changes to collection operations that may be identified as a result of the research findings. Conversely, the landfill and transfer stations were excluded from the manpower and staffing research because these facility operations are performed via contract with private vendors. The GSWA consequently has little ability to incorporate findings from a manpower and staffing analysis for these facility operations. In lieu of manpower and staffing research, the Project Team reviewed the landfill and transfer station contracts against best procurement and operating practices. The results of these contract reviews are contained elsewhere in this report.

4.2 OVERVIEW OF SELECTED CITIES

The following four cities were selected for inclusion in the manpower and staffing analysis:

- **Salina, KS**: The City of Salina serves close to the same size population, and is located away from any major metro area (Kansas City is the closest major city at over 170 miles). Salina also offers a semi-automated collection system to its residents and is not an exclusive provider. Salina is arguably the closest comparison to Guam identified by the filter.
- **Flower Mound, TX**: Flower Mound is also comparably sized to Guam and provides exclusive semi-automated collection. Flower Mound does not share Guam's isolation, as it is located on the outskirts of the Dallas/Fort Worth region. Flower Mound has been retained in the research because its collection services are provided by a contractor rather than by the City itself.
- **Logan, UT**: Logan is located in a mountain valley over an hour from Salt Lake City. It shares Guam's relative isolation. The City also serves roughly the same number of households as GSWA, and is an exclusive provider. However, Logan uses fully automated collection for its residential services. It has been included as a comparison of semi-automated collection vs fully automated collection.
- **Grand Rapids, MI**: Grand Rapids is relatively isolated from other metro areas, but has a residential customer base which is substantially larger than Guam's. However, Grand Rapids shares another uncommon trait with Guam: it provides residential refuse collection which is not mandatory for residents to accept. Like Guam's, Grand Rapids' households can choose not to take the refuse collection service, opting instead to hire a private hauler. Both Grand Rapids and Guam must therefore devote administrative and management resources to tracking an ever-changing residential customer base. Most cities are the exclusive provider of residential refuse collection service and do not face this issue.

Table 4-1 summarizes the critical attributes that drove the selection of the four jurisdictions selected for the manpower and staffing analysis.

Table 4-1 Manpower and Staffing Research Partners

Municipality	Isolated from Metro Areas	Total Residential Households	Residential Households Served	Mandatory, Exclusive Service?	Collection Technology	Collection Service Provider
Guam	Yes	42,026[1]	19,613	No	Semi-Auto	City
Salina, KS	Yes	19,453	15,100	No	Semi-Auto	City
Flower Mound, TX	No	22,792	22,792	Yes	Semi-Auto	Contractor
Logan, UT	Yes	15,632	15,632	Yes	Full Auto	City
Grand Rapids, MI	Yes	55,000	47,575	No	Full Auto	Open

[1] The Guam total residential household number contains both single-family and multi-family households, which are not served by the GSWA, as available data does not further split the total households into varying categories.

It should be noted that three cities – Hot Springs, AR; Ypsilanti, MI; and Midland, MI – were also found to have semi-automated collection systems. However, these cities all ultimately declined to provide the details needed to be included in the comparative analysis.

4.3 COLLECTION SYSTEM MANPOWER AND STAFFING KEY FINDINGS

The analysis of manpower and staffing levels for the collection systems of the four research partners as well as for the GSWA specifically attempted to compare and contrast the following staffing levels of these collection organizations:

- **Collection Crews**: First and foremost, we compiled the number of equipment operators and helpers needed to be on route every day, plus any additional staff that must be kept within the organization to manage absenteeism such as vacations, sick leave, and other leave.
- **Route Supervisors**: Effective collection systems require a first line of supervision to serve as a troubleshooter within the service area, and to coordinate routes and route changes as circumstances warrant.
- **Collection Customer Service Representatives**: While there can be a blurry line between general solid waste system administration and collection system customer service, every program must be capable of interacting with customers to answer questions, confirm services, and address problems with scheduled collection (whether real or perceived).
- **Cart Management Staff**: Finally, with semi-automated and fully automated systems, every customer is assigned one or more standardized carts. These carts must be maintained and replaced as they are damaged, lost or stolen. Cities with cart-based collection must service its cart inventory.

Table 4-2 contains a detailed accounting of the number of staff at each of the four positions above. These counts are used in subsequent tables to compare staffing.

Table 4-2 Residential Collection System Staffing Summary (No. of Staff by Function)

Municipality	Guam	Salina, KS	Flower Mound, TX	Logan, UT	Grand Rapids, MI
Route Supervisors	2	1	2	1	1
Customer Service Reps	3	1	1	1	5[1]
Collection Crew	29	18	26	13	21
Cart Management	4	2	1	1	2
Total	**38**	**22**	**30**	**16**	**29**

[1] In addition to Grand Rapids' departmental administrative customer service demand, the City of Grand Rapids operates a 3-1-1 Call Center with 8-10 FTE and refuse/recycling calls are a substantial amount of their inquiry and service requests handled.

There are several key performance indicators that can be calculated for each of the collection systems included in the research. These are shown in Table 4-3.

Table 4-3 Residential Collection System Key Performance Indicators

Municipality	Guam	Salina, KS	Flower Mound, TX	Logan, UT	Grand Rapids, MI
Routes per Day	15.0	7.0	13.0	9.9	16.5
Staff per Route	2.5	3.1	2.3	1.6	1.8
Households Served	19,613	15,100	22,792	15,632	52,815[1]
Staff per 1,000 Households	1.9	1.5	1.3	1.0	0.5
Avg. Households per Refuse Route	490	604	569	909	921
Avg. Households per Recycling Route	1,961	1,510	911	1,818	1,864

[1] Approximately 47,000 households receive refuse collection, and 59,000 households receive recycling collection. Number shown is an average of the two services.

There are a number of important observations from Table 4-3. Note that MSW Consultants has based these observations both on the specific data available from this research exercise, but also supplemented with our knowledge of residential collection systems more broadly. Key findings include:

- **GSWA Staff per Semi-Automated Route is In Line**: When compared against other semi-automated collection systems, GSWA's number of staff per route is in line with other semi-automated systems.
- **GSWA Staff per 1,000 Households is Below Average**: Although GSWA's semi-automated staff per route is in line, GSWA requires more staff to service 1,000 households than the other semi-automated service providers. GSWA requires 1.9 staff per 1,000 households, which is 33 percent higher than Salina, and 47 percent higher than Flower Mound. In lay terms, this suggests that GSWA may be operating a larger number of routes than necessary to service its customers, or else is maintaining extra capacity in its collection system in the event that it increases its customer base.
- **GSWA has Average to Below Average Route Size**: Similarly, the number of households served per semi-automated route is smallest in Guam compared to the other semi-automated collection systems. Some of this effect is attributable to the fact that GSWA does not service every household and must drive past non-customers, while Salina and Flower Mound routes collect from every household.

- **GSWA Could Increase Productivity and Improve Safety with Automated Collection:** The data from this analysis clearly show the productivity and efficiency benefits of automated collection over semi-automated collection. Automated collection systems significantly reduce the size of the work force needed to provide services. Further, they increase the speed of collecting from each household. Finally, the waste management industry has embraced the higher safety levels achievable through automation. Logan and Grand Rapids provide automated collection, and they have significantly fewer staff per collection route, and far fewer staff per 1,000 households needed to service the area. Automated collection systems average one plus a fractional full-time equivalent (FTE) employee per route. Conversely, semi-automated systems average more than two FTEs per route. GSWA may wish to investigate some automated collection in the future to realize these productivity advantages.

Based on these data, at appears that GSWA is maintaining a slightly larger collection system than necessary to service its customer base. However, this may be appropriate if GSWA is obligated to collect from non-customers and/or support other services (e.g., illegal dump clean-ups), which may not be the case in the benchmark cities. Further, GSWA maintains incrementally more customer service staff. This is to be expected for a non-exclusive provider of service who must track current customers, and manage new customer onboarding and suspension of accounts for former customers.

4.4 COMPARATIVE DATA

The tables and exhibits to follow systematically compare relevant attributes of the collection programs and systems in each of the benchmark communities and provide context to the findings in Section 4.3. Table 4-2 identifies the specific residential collection services provided and shows the collection frequency for each service.

Table 4-4 Collection Frequency

Municipality	Guam	Salina, KS	Flower Mound, TX	Logan, UT	Grand Rapids, MI
Refuse Collection	Weekly	Weekly	Weekly	Weekly	Weekly
Recycling Collection	EOW	Weekly	Weekly	EOW	EOW
Yard Waste	N/A	Collected with Refuse	Collected with Bulk	Weekly	Weekly
Bulk Waste	On-Call	On-Call	Weekly	On-Call	Weekly

The following observations can be made from this table:

- Weekly collection of refuse is the norm in Guam and on the US mainland,
- Recycling collection frequency varies between weekly and every-other-week (EOW) frequency.
- The two cities that provide automated refuse collection also provide a third collection service for yard waste; while the semi-automated communities mix yard waste in with their refuse or bulk collection.
- All of the communities provide some form of bulk waste collection, which is usually on-call. On-call service requires a resident to notify the City that they need additional collection to remove larger items that cannot be readily collected within the regular trash collection program.

Table 4-3 shows the collection technology (i.e., the truck type and crew size) in use in each collection system

Table 4-5 Collection Technology and Crew Size

Metric	Guam	Salina, KS	Flower Mound, TX	Logan, UT	Grand Rapids, MI
Truck Type					
Refuse	Semi-Auto	Semi-Auto	Semi-Auto	Automated	Automated
Recycling	Semi-Auto	Semi-Auto	Semi-Auto	Automated	Automated
Yard Waste	N/A	N/A	N/A	Automated	Manual
Bulk Waste	Manual	Grapple	Grapple	Grapple	Manual
Crew Size					
Refuse	2	3	2	1	1
Recycling	2	1	2	1	1
Yard Waste	N/A	N/A	N/A	1	1
Bulk Waste	2	2	2	1	1

As previously discussed, three of the cities use semi-automated collection, with the other two using full automation. Bulk waste collection is the most diverse and includes manual and grapple truck service. The most noteworthy observation from this table is the inverse relationship between the degree of automated and the crew size. Semi-automated collection systems require an equipment operator with one or even two crew to load the truck; while automated collection systems require only a single equipment operator to tip carts using onboard hydraulics.

4.5 RESEARCH NOTES

In addition to the purely quantitative manpower and staffing comparisons in the preceding tables, there were additional, qualitative factors in these cities that are informative in a manpower and staffing comparison with Guam.

- **Plans to Automate**: Salina will soon be converting from its semi-automated collection system to a fully automated system. The City cited safety and efficiency in making this conversion.
- **Recycling Market Impacts**: Salina has also recently made the decision to stop its curbside recycling collection program, instead asking residents to use a local drop-off center. More broadly, all cities with any recycling program are currently incurring higher cost for these programs, as global markets for recyclables are in the midst of a long-lasting downturn due to changes in global trade policies. Grand Rapids has seen their recyclables processing fees increase as well. Among the research partners, only Logan appears to enjoy a positive material value for its recyclables.
- **Exclusivity in Commercial Sector**: Flower Mound and Logan each have regulated commercial collection by allowing only a single, exclusive provider. In the case of Flower Mound, the contract includes both residential and commercial customers and services. In Logan, the City is the exclusive provider of commercial sector collection as well as residential sector collection. For these cities, the scale of their collection system is significantly larger than had they only provided residential collection.[1] Such an increase in scale translates into more efficient, and therefore lower cost, collection service on a per-unit basis.

[1] The City of Logan is also the exclusive residential and commercial collection provider for the surrounding Cache County. This arrangement further increases the scale of the City's operation, thereby further improving the efficiency of the collection service for all City and non-city residents.

- **Heightened Customer Service for Non-Exclusive Providers**: The City of Grand Rapids was included in this research because it does not have mandatory, exclusive residential collection and consequently does serve every residential household. Grand Rapids in effect competes with private haulers for refuse collection business. In order to properly manage the fact that it only serves some customers, (as well as to manage its PAYT rate structure), the City has a larger customer service staff. The primary customer service needed for exclusive providers in a mandatory collection system is to record and address missed collections, which are relatively low in a well-operated system.

4.6 CONCLUSIONS

Comparing collection systems is a complex undertaking, due to the many variables that impact the collection system, service delivery, and cost. This section has attempted to compare and contrast key variables among Guam and the four research partners. MSW Consultants offers the following observations and conclusions, based both on this immediate research, but also on our broad-based experience and understanding of residential collection systems across the U.S.

- **Non-Mandatory Collection Policy Hampers GSWA Productivity and Increases Management Burden**: Perhaps the most noteworthy finding of this research is that Guam is in a small minority of public service providers that does not service 100 percent if its residential customer base via mandatory collection. This has two detrimental impacts on productivity and efficiency. First, there is a greater impact on account management to accurately track the customer base, charge and recover appropriate user fees, and manage open/closed accounts. Second, collection efficiency is impaired because GSWA routes must pass by non-customers in order to reach customers. Key performance indicators suggest that the semi-automated collection system in Guam is performing in line in some areas, but at the low end of the scale on other areas. In the opinion of MSW Consultants, there is a benefit to making sure the public sector collection provider is capable of servicing some overflow from the usual customer base in case there is a spike in new customers (e.g., if a private hauler goes out of business), or unexpected growth in the Guam customer base.
- **High-cost Market Conditions Suggest Collection Policies Should Strive for Operational Efficiency**: The cost of disposal and processing is inherently high on Guam (as discussed in Chapter 3). These factors are largely a product of market economics and cannot be readily reduced. However, the authorities on Guam could revisit the policy that allows residents to opt out of receiving curbside collection service from the GSWA, and consider converting GSWA to be the exclusive, mandatory collection provider. This policy change would bring Guam back into the vast majority of US mainland jurisdictions which grant mandatory, exclusive service – and charge full-cost rates – to their customers.
- **Frequency of Manpower/Staffing Research Updates**: We note finally that the current regulations requiring this research suggest the benchmarking should be performed on an annual basis. In practice, residential collection systems change slowly and it is not likely that this research needs to be performed more than every four to five years. In the opinion of MSW Consultants, the findings of the research presented herein would not be expected to change as long as the GSWA provides semi-automated collection as a non-exclusive service provider. Should the GSWA evolve over time to use another collection technology (i.e., to more fully automate their collection system) or should Guam enact regulatory changes to assign exclusive, mandatory residential collection system responsibility to the GSWA, then there would be a benefit to re-performing this manpower and staffing research in order to assess the effectiveness of these new collection system attributes.

CHAPTER 5 – REVIEW OF THIRD-PARTY CONTRACTS

5.1 SUMMARY OF CONTRACTS INHERITED BY THE GSWA

In April, 2019 the Court turned over responsibility for solid waste to the GSWA. The judge left the Receiver in charge of the Ordot Dump and of hiring a contractor to build Cell 3 at the Layon Landfill.

Subsequently, the Authority inherited numerous multi-year full-service third-party contracts that had been negotiated and executed by the Receiver. These contracts provide for the post-closure activities at the Ordot Dump, operation of the Layon Landfill, operation of the commercial transfer station, maintenance of the GSWA's collection vehicles, and marketing of recyclables and HHW, among other tasks. Table 5-1 lists the three key third party contracts reviewed by the MSW Team.

Table 5-1 Summary of Key Contracts Inherited by GSWA

Contract	Service Provider	Start	Optional Renewal Dates	End Date
Post-Closure of the Ordot Dump	Brown and Caldwell	May, 2018	May, 2023 May, 2028	May, 2033
Operation of the Layon Landfill	Green Group (Herzog)	April, 2011	April, 2016 April, 2021	April, 2026
Operation of the Commercial Transfer Station	Guahan Waste Control, Inc. (Mr. Rubbishman)	May, 2011	May, 2016 May, 2021	May, 2026

As shown, the GSWA is committed to the Layon Landfill and commercial transfer station operating contracts until mid-2021, and the Ordot Dump post-closure contract until mid-2023 at the earliest. All three contracts include one additional five-year extension period. The remaining sections further review each of these three key contracts.

5.2 ORDOT DUMP OPERATING CONTRACT

The Ordot Dump is operated under a contract with Brown and Caldwell (B&C). The contract is turnkey and requires B&C to provide services associated with the post-closure care of the Ordot Dump. The overall scope of the contract appears to be in-line with similar facilities and includes expected routine monitoring and reporting. The contract requires the operator to have trained individuals on site, and the training requirements are defined. The contract also requires the operator to have the adequate number, type, and size of equipment for use at the Ordot Dump.

The services are divided into routine and non-routine services. The routine services are segregated into 11 tasks, with sub-tasks noted under each main task and are as follows:

- Task 1 – General Administrative Services
- Task 2 – Site Security Operations and Maintenance Services
- Task 3 – Operations and Maintenance of the Cover System
- Task 4 – Groundwater and Surface Water Monitoring System Operations, Maintenance, and Monitoring Services
  - Groundwater Monitoring System Inspection and Maintenance
  - Groundwater and Surface Water Monitoring Services
  - Semiannual Groundwater Monitoring Report Preparation

- Task 5 – Landfill Gas Monitoring System Operations, Maintenance and Monitoring Services
  - Landfill Gas Monitoring Wellhead Inspections, valves, fittings, and components
  - Landfill Gas Monitoring Well Vegetation Removal/Disposal, and Wellhead and Access Maintenance
  - Landfill Gas Monitoring Well Sampling and Reporting
- Task 6 – Gas Collection and Control System
  - Routine LFG System Operation and Maintenance, Well-head Monitoring, and Surface Monitoring and Reporting
  - Routine Flare Station and Condensate Collection System Operation, Maintenance, Monitoring, and Reporting
  - Surface Emissions Monitoring and Reporting
- Task 7 – Settlement Survey and Monitoring
- Task 8 – Surface Water Drainage System Monitoring and Maintenance
  - Surface Water Drainage System Monitoring and Reporting
  - Surface Water Drainage System Maintenance and Cleaning
- Task 9 – Leachate Collection and Removal System Operations, Monitoring, and Maintenance
  - Leachate Collection and Removal System Monitoring
  - Leachate Collection and Removal System Operations and Maintenance
- Task 10 – Quarterly and Annual Consolidated Report Preparation
- Task 11 – Consolidated Expense Allowance/Insurance and Performance Bond
  - Consolidated Expense Allowance for Permit Fees, and Materials, Part and Equipment
  - Property Insurance
  - Performance Bond

Non-routine services are also segregated into a task structure with ten tasks listed as follows:

- Task 1 – General Administrative
- Task 2 – Site Security Operations and Maintenance Services
- Task 3 – Operations and Maintenance of the Final Cover System
- Task 4 – Groundwater and Surface Water Monitoring System Operations, Maintenance, and Monitoring Services
- Task 5 – Landfill Gas Monitoring System Operations, Maintenance and Monitoring Services
- Task 6 – Gas Collection and Control System
- Task 7 – Settlement Survey Monument Inspections and Monitoring
- Task 8 – Surface Water Drainage System Monitoring and Maintenance
- Task 9 – Leachate Collection and Removal System Operations, Monitoring, and Maintenance
- Task 10 – Quarterly and Annual Consolidated Report Preparation

Non-routine tasks are generally tasks which are not required to be performed on a routine/regular basis, but may be needed to continue proper operation, monitoring, and maintenance during the post-closure care period (e.g. redeveloping a groundwater monitoring well to allow for continued sampling operations).

Given that this contract may be renewed/extended until 2033, MSW Team member Golder has viewed these costs as fixed during our review. However, Golder notes that since the contract is turnkey, the risk

is placed on the contractor, thus they may have to account for multiple scenarios to continue providing the required tasks. This risk will typically be accounted for in man-hours/anticipated costs, and therefore be reflected in the overall annual cost. One example is that leachate generated from the facility is typically pumped from the leachate storage tanks to the Hagatna Wastewater Treatment plant. The contract does however require the operator to have a contingency in place to haul leachate from the facility at a minimum rate of 4,800 gallons per hour, 24 hours per day, seven days per week. This contingency likely caused the operator to contract multiple haulers on an emergency, on-call basis. This effort is likely included in the overall cost associated with the operation and maintenance of the leachate collection and removal system.

While having one service provider for the entire suite of services required for the Ordot Dump's post-closure care period is convenient, Golder has seen similar facilities break out these services to multiple service providers, often resulting in increased competition, which may yield a more cost-effective contract. Note doing this may require additional resources from the Guam Solid Waste Authority (GSWA) in procuring separate services and managing the subsequent contracts, if these services are transitioned away from the Receivership and back to the GSWA after the current contract expires.

Table 5-2 summarizes the salient elements of the Ordot Dump post-closure operating contract.

Table 5-2 Summary of Ordot Dump Post-Closure Operating Contract

Service Provider	Brown and Caldwell		
Term	**Start**	**End**	**Option Renewal**
	May 2018	May 2033	May 2023 / May 2028
Services Provided	"Routine Services" including preventive maintenance and monitoring of all equipment and systems required to meet all environmental requirements for a closed landfill and closure reporting and documentation "Non-Routine Services" defined as "services and maintenance that cannot be performed by the staffing assigned to carry out Routine Services" Procure, maintain, repair and replacement of all equipment required for Routine Services Full compliance and reporting responsibility		
Services NOT Provided	None – All services required will either be "Routine" or "Non-Routine"		
Fee Structure	If "Routine" – $800,732 in 2011 plus CPI-based annual escalation, plus pass-through costs which are limited to leachate treatment and hauling, stand-by water trucks and utilities If "Non-Routine" – Fee subject to mutual agreement via a defined "Task Order" procedure		

5.3 LAYON LANDFILL OPERATING CONTRACT

The Layon Municipal Sanitary Landfill (Layon Landfill) is operated under a contract with the GreenGroup (formerly Herzog Environmental, Inc.). The contract is turnkey and requires the contractor to provide

services associated with the waste disposal operations at the Layon Landfill. The overall scope of the contract appears to be in-line with similar facilities and includes various obligations of the operator. The contract is based upon a minimum annual waste disposal tonnage of 80,000 tons per operating year, with excess operating fees being $21.90 per ton in the base year of the contract, with annual CPI-based adjustments (as defined in the contract). The minimum tonnage threshold has been routinely met in recent years. There are allowances for pass-through costs, which may be requested and approved on a case-by-case basis. The contract requires the operator to coordinate the excavation and stockpiling of soil for daily cover use with the Receiver and GSWA. The contract also requires the operator to anticipate Final Closure Construction of portions of Cells 1 and 2. Specifically, the operator is to prepare Cells 1 and 2 to intermediate cover conditions in accordance with applicable laws and landfill permits.

Golder notes that depending on timing of the contract closeout, existing conditions should be reviewed prior to enforcing this requirement; requiring Cells 1 and 2 to be at intermediate grades prior to actual waste volume achieving those requirements could reduce the amount of available landfill volume (filling of Cell 1 and 2 with soil to achieve intermediate cover grades). The contract requires the operator to have trained individuals on site, and the training requirements are defined. The contract also requires the operator to have the adequate number, type, and size of equipment for use at the Layon Landfill. The contract defines waste not allowed for disposal at the Layon Landfill as the following:

- Old corrugated containers
- Untreated wood
- Bulky metallic waste
- Cleaners
- Pesticides/herbicides
- Septic tank or cesspool wastes

The operator is responsible for the screening of solid waste; a protocol is provided in Appendix 4 of the contract. There are also performance requirements associated with the contract. The operator must achieve a minimum effective waste density of 1,350 pounds per cubic yard (equates to an airspace utilization factor of 0.675), which Golder believes is reasonable given the size and location of the facility. The minimum effective density requirements do have liquidated damages associated with not achieving the minimum value, in the amount of $20 per cubic yard (in the base year of the contract with CPI-based escalation) with clear methodology described and an example calculation provided in the contract. The contract also requires the landfill to be operated efficiently and in a manner that will permit weighing, delivery, and exiting of vehicles delivering waste without undue waiting time.

The contract lists several landfill operation requirements in Section 5.05. The main requirements are as follows:

- Layon Landfill, general requirements
- Obligations regarding recyclables diversion
- Obligations regarding site maintenance
- Layon Landfill costs
- Operation of Layon Landfill
- Operator's managers
- Screening of waste
- Deliveries of excluded waste
- Weighing and identification of vehicles

- Leachate and condensate collection services
- Customer service
- Temporary access, haul, and fire break roads
- Maintaining landfill in a sanitary condition in accordance with applicable requirements (i.e. permits and regulations)

The contract excludes the following items/services:

- Environmental monitoring
- Cell construction
- Weighing and recording of waste haulers (trucks)[1]
- Closure and post-closure care responsibilities

The contract notes that the facilities and buildings provided by the Receiver/GSWA were presented in good operating condition. Unlike the Ordot Dump contract, having one service provider (operator) for the operation of a landfill is typical in the industry.

Table 5-3 summarizes key terms of the Layon landfill operating contract.

[1] Weighing is performed by GSWA at the commercial transfer station.

Table 5-3 Summary of Layon Landfill Operating Contract

Service Provider	Green Group (formerly Herzog)		
Term	**Start**	**End**	**Option Renewal**
	April 2011	April 2025	April 2016 / April 2021
Services Provided	Very inclusive turnkey landfill operations including operations during cell 1&2 construction (before receipt of waste) and uninterrupted operations during future cell construction Procure, maintain, repair and replacement of all equipment Daily and periodic cover from on-site material Waste screening and set aside Full compliance and reporting responsibility		
Services NOT Provided	Environmental monitoring, cell construction, closure and post-closure responsibilities"		
Fee Structure	80,000 tons per year put or pay at $2,871,681 in 2011 ($35.90/ton) plus CPI-based annual escalation $21.90/ton for waste over 80,000 tons per year plus CPI-based annual escalation from 2011 Plus pass-through costs which are limited to new governmental charges Liquidated damages for failure to achieve minimum effective density (1,350 lbs/cubic yard) at the cost of $20/cubic yard, plus CPI-based annual escalation		

5.4 SUMMARY OF HAULER-ONLY TRANSFER STATION CONTRACT

The Hauler only transfer station and related transportation services are operated under a contract with Guahan Waste Control, Inc. aka known as Mr. Rubbishman (MR). The facility is also owned by principals of this company. The contract is turnkey and requires MR to provide services required for the receipt, loading and transportation of waste to the Layon Landfill. The contract is very inclusive and requires MR to provide and maintain the facility, to procure, maintain, repair and replace all equipment, and to provide, maintain, repair and replace the outgoing scale.

MR is also responsible for waste screening and set aside, and compliance and reporting duties.

The fee structure mirrors that of the Layon Operating Contract with an 80,000 tons per year put or pay obligation at $30.08 in June 2011 plus cost of escort vehicles (added via Amendment 1) and CPI-based escalation. Although it is common for transfer station operating contracts to include both the loading and the transportation functions, these two services are typically priced separately, which could enable additional bidders in the future, as trucking-only concerns would not be expected to operate a facility but may provide competitive hauling services.

Additional waste up to 145,000 tons per year must be accepted if delivered, with 600 tons per day maximum at the same rate. Maintaining this standby capacity is a burdensome and costly feature to MR, but of significant value to GSWA, representing a substantial risk allocation away from GSWA.

Table 5-4 summarizes the key terms of the hauler-only transfer station operating and transportation contract.

Table 5-4 Summary of Hauler-Only Transfer Station Operating Contract

Service Provider	Guahan Waste Control, Inc		
Term	**Start**	**End**	**Option Renewal**
	May 2011	August 2026	April 2016 / April 2021
Services Provided	Very inclusive turnkey transfer station provision and operations Procure, maintain, repair and replacement of all equipment Outgoing scale provision, operation, maintenance, repair and replacement Waste screening and set aside Full compliance and reporting responsibility		
Services NOT Provided	Escort vehicles from transfer station to Layon Landfill. This was added via Amendment No. 1 in 2011.		
Fee Structure	80,000 tons per year put or pay at $30.08 in June 2011 plus cost of escort vehicles (added via Amendment 1) and CPI-based escalation Additional waste up to 145,000 tons per year, with 600 tons per day maximum at same rate		

GSWA inherited other contracts for maintenance of the GSWA's collection vehicles, marketing of recyclables, and HHW management. These contracts were not reviewed as part of the management audit.

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CHAPTER 6 – MANAGEMENT & OPERATIONAL EVALUATION

6.1 MANAGEMENT STRUCTURE

The Guam Solid Waste Authority is managed by a Board of Directors. This Board is appointed by the Guam government and oversees the management of the Authority. The Board has hired a General Manager to oversee and manage day-to-day operations. The General Manager is assisted by a staff of five managers with varying responsibilities. Table 6-1 lists the management (non-operational) staff.

Table 6-1 Management and Administrative Positions in GSWA

General Manager	
Comptroller	**Chief of Administration**
Management Analyst	Administrative Assistant
Accounting Tech (2)	Customer Svc. Reps – Office (3)
Engineer Supervisor	Customer Svc Reps – Scalehouse (3)
Safety Officer	**Operations Supervisor**
	Customer Svc Rep – Operations Support

Roles and responsibilities for these non-operating staff are listed below.

- The Comptroller manages the Accounting Department with a staff of three other employees. This department is responsible for all account, budgeting and collection activity.
- The Chief of Administration is responsible for all office staff comprised of an Administrative Assistant, three customer service representatives in the office, three scalehouse attendants, and another customer service representative who is assigned to help the Operations Supervisor. The Customer Service Representatives answer calls for all service-related issues. The scalehouse attendants manage the transfer stations, verifying usage and collecting money.
- The Operations Supervisor manages a large staff of Equipment Operators, Sanitation Workers and Cleaning Crew manage the day-to-day operations of the GSWA. The Organizational Chart, provided to the team in the initial data request, list 28 workers but that number has been expanded since the chart was last updated. It was also verified that 10 or more contract workers are routinely used to support GSWA operations (see Chapter 2 for details). The Operations Department is responsible for the collection of the residential refuse and recycling. A Clerk also report to the Supervisor and assists in the management of the collection operations and paperwork associated with those operations.
- The Safety Officer is responsible for safety training and accident investigation and prevention.
- The Engineering Supervisor is responsible for the management of the transfer stations and has some oversight at the landfills.

In the professional opinion of the MSW Team, the current management staffing configuration is appropriate for the GSWA's current breakdown of directly managed and contracted operations.

6.2 OPERATIONAL EVALUATION

The MSW Team was explicitly charged with providing an evaluation of the GSWA's ability to manage and operate its current waste management and recycling system, consisting of residential collections and residential transfer stations directly staffed and operated by the GSWA, and other facility operations provided via operating contracts which were all put in place by the Receiver and inherited by the GSWA.

CHAPTER 6 – MANAGEMENT & OPERATIONAL EVALUATION

The MSW Team has prepared the preceding sections of this report to organize the information and data relied upon to formulate an assessment of GSWA management and operations. As described throughout this report, the GSWA provided all data and information requested by the MSW Team; and further hosted the MSW Team to observe collection observations and tour its facilities during a visit in November 2019. During the visit the MSW Team observed residential refuse, recycling and bulky waste collection, and the operation of the convenience centers. Also, during this visit, the Team conducted interviews with the General Manager and each of the Managers. A senior landfill engineer from Golder Associates spent the week visiting the two landfills, observing their operations and interviewing on-site contracted operators.

6.2.1 COLLECTION SYSTEM AND RESIDENTIAL TRANSFER OPERATIONS

Based on the above tasks, the MSW Team offers its opinion that current Authority senior management and staff possess the industry knowledge, experience, and commitment to operate the residential collection system and the residential convenience centers effectively. The framework for the collection system is appropriate, and the user fee structure is typical of numerous programs on the US mainland that must cover their full costs from direct fees charged to customers. (The amount of the actual user fees to be charged are discussed in Chapter 3 and are not repeated here. It was beyond the scope of this audit for the MSW Team to make a formal recommendation as to the level of GSWA fees.)

The MSW Team further notes, as discussed in Chapters 3 and 4, that the GSWA faces greater challenges than the typical collection program on the US mainland because its services are not mandatory for all Guam residential households. This characteristic creates both operational inefficiency and also adds confusion to collection crews who cannot easily track active customers on route. Although it was beyond the scope of this management audit to provide extensive recommendations for changes to the system, and notwithstanding the current policy of non-mandatory residential collection, the MSW Team offers the following supplemental comments about the management of the services directly provided by GSWA:

- **Refuse and Recycling Route Balance**: The current refuse collection system uses helper/support routes for larger assigned house counts on Monday and Tuesday. Recycling routes sometimes have additional trucks, and sometimes recycling is collected by refuse routes after completing refuse collection. These are inefficient methods for refuse collection and contrary to best practices. The GSWA should consider balancing routes, assigning dedicated recycling routes, and assigning each crew to their full route each day. It should also explore the use of its Alpine Technology system and its underlying geocoded customer addresses as the basis for the reroute. The potential savings of reducing one or more daily routes is meaningful, and dedication of an appropriate number of recycling routes would improve the order and management of the collection program.
- **Need for Residential Transfer Stations**: The three transfer stations handle a small portion of the island waste. Due to the higher volume of throughput, the Harmon Street facility appears to have the volume to justify its cost of operation. Longer term, GSWA should consider tracking the number of cars, tonnage delivered, and cost at the Agat and Malojloj transfer stations and decide if the operating hours should be further reduced or even if the facilities should be closed. Should mandatory curbside refuse and recycling collection be implemented on Guam, this would also lead to the likely closure of these facilities (which would no longer be needed because everyone would receive the curbside service), with the exception of the HHW receiving area at the Harmon Street convenience center.
- **Fleet Management and Replacement**: Should the GSWA pursue route balancing and reduce its number of operating routes per day, it would be expected to reduce the size of the collection fleet and place a greater emphasis on proper fleet replacement. Under such a scenario, the GSWA would need the flexibility and financial resources to replace older trucks on a routine schedule.

6.2.2 LANDFILL OPERATIONS

As detailed in Chapter 5 the two key third-party contracts shown in Table 6-1 will be coming up for renewal soon.

Table 6-2 Third-Party Contracts

Contract	Renewal Date
Ordot Post-Closure	May 2023
Layon Operations	April 2021

Senior Authority management has indicated that they believe that these contracts should not be renewed and that the Authority should take over these aspects of the solid waste system in addition to residential collection and the three convenience centers.

The MSW Team is of the opinion that both Authority management and operational resources would require substantial enhancement in order to successfully assume these additional responsibilities. Landfill operations require specialized technical and engineering expertise to plan, operate, and maintain the various components of the landfill. The commercial transfer station requires less technical expertise than a landfill, but expands operations into long-haul and its inherent risks given Guam's highway system. During the site observations, the MSW Team noted nine or ten staff employed at the Layon Landfill, and two at the Ordot Dump. GSWA would need to expand its work force significantly to employ appropriate staff to fill these roles and responsibilities. Also, the commercial transfer station is privately owned. Public operation may not be an acceptable option to the owners.

The above paragraph notwithstanding, the MSW Team notes that it is relatively common on the US mainland for municipalities to privatize their operations, and in the course of converting from public to private service provision, there is a direct transfer of employees from the municipal jurisdiction to the private vendor upon assumption of service. In reverse, should the GSWA not renew either or both contracts, it would presumably be advisable to explore how to retain many or even most of the current contractor staff to continue their roles under direct employment to GSWA. The MSW Team did not perform an in-depth review of the currently contract operations and therefore cannot offer an opinion on assumption of any currently contracted employees at the conclusion of these operating contracts.

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APPENDIX A

BENCHMARK RESEARCH METHODOLOGY

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APPENDIX A – BENCHMARK RESEARCH METHODOLOGY

A 1. METHODOLOGY

Literally thousands of U.S. mainland cities, counties, and solid waste authorities operate vertically integrated solid waste management systems that include the provision of curbside refuse and recycling services to their single-family residential sectors. However, these collection systems vary widely in the size of the customer base, and in the collection services offered. Further, effective comparative research requires active participation from the selected jurisdictions, who must be willing to invest their own employee time provide operational data that is not readily available through conventional internet research. It was therefore necessary to develop a process to identify, screen, and select jurisdictions to be included in the manpower and staffing benchmark research to give the greatest chance that the findings of the research would realistically inform this management audit and provide useful observations and findings about collection system best management practices.

MSW Consultants applied the following methodology to conduct the benchmarking research:

- **Step 1**: Filter U.S. Census Bureau data to identify jurisdictions that have curbside collection of refuse and recycling and approximately the same number of residential households as Guam.
- **Step 2**: Develop screening criteria related to the provision of "similar services." MSW Consultants believes that the single most influential aspect of GSWA's collection system is the use of semi-automated collection technology. Other forms of collection technology include manual collection and fully automated collection. Filtering out manual and fully automated collection dramatically reduces the number of candidate benchmark communities. MSW Consultants identified only five communities in the entire U.S. that met the first two criteria.
- **Step 3**: Develop a concise list of data needs from each of the identified jurisdictions. The list of data needs included not only manpower and staffing data, but also a range of collection system parameters that better enable us to interpret and understand the differences between the selected jurisdictions and the GSWA. The research, consequently, was more broad-based and therefore more informative than had we focused solely on manpower and staffing.
- **Step 4**: Establish formal contact with each identified jurisdiction to gauge their interest in participating in the comparative research. It is important to note that MSW Consultants relies on the support of these third parties to complete this assignment; such support is not always forthcoming. To bolster our potential success recruiting participants, the PUC provided an open letter introducing the project to prospective cities and requesting their assistance. Further MSW Consultants offered to share the results of the benchmarking research with all participants. As a result of these efforts, two jurisdictions with highly similar customer bases and service provision were successfully recruited.
- **Step 5**: Supplement the results set after Step 4 with additional jurisdictions to cover the range of manpower and staffing considerations that are relevant to this audit. MSW Consultants is a national expert in collection system optimization, with a long list of collection system analyses for public sector organizations. In order to gain the maximum insight into GSWA's collection system operations, MSW Consultants supplemented the list of research partners with two additional cities for which we have completed collection system analyses and therefore have access to the critical operating data that is needed to draw meaningful conclusions about the GSWA's collection service.

As a result of these steps, four jurisdictions were successfully and thoroughly compared to the GSWA, and MSW Consultants believes the findings and observations from this research provide informative insights and satisfy the intent of this requirement of the management audit.

APPENDIX A – BENCHMARK RESEARCH METHODOLOGY

A 2. LIMITATIONS

While this research is intuitively a reasonable means of evaluating the management and performance of the GSWA, it is important to note that waste and recycling collection systems operate under numerous variables that are unique to their service areas. Collection systems and services are influenced by, among other variables, regulatory policy, regional disposal and recycling market conditions, neighborhood topography and housing density, labor markets, privatization, and many smaller factors. While the selection of same-sized jurisdictions helps to normalize the comparative research somewhat, it is nonetheless critical to understand various aspects of the local collection systems and regional markets in which the benchmark communities operate.

A critical component of this research involves the definition of the phrase "similar services." Broadly, the ideal comparison would include communities that only provide curbside refuse and curbside recycling collection. In practice, many U.S. cities also provide curbside yard waste collection in addition to refuse and recycling. Yard waste collection is provided seasonally in more northern climes, and annually in the south. Additionally, many cities offer a separate curbside collection of bulky wastes. Bulk waste collection may be offered routinely (e.g., every month or once per quarter), or the bulk service may be offered on an on-call basis for an additional fee. Some jurisdictions even offer commercial collection service. It is important to recognize these additional services when comparing Guam to other mainland jurisdictions.

A second critical detail to determining whether two communities offer "similar services" involves the collection technology being used. Guam relies on a semi-automated collection system On the U.S. mainland, there has been and continues to be a strong push within the waste management industry towards fully automated collection. MSW Consultants estimates that over 75 percent of all refuse collection programs nationally are fully automated, and over 50 percent of recycling programs (based on number of households served). In performing this research, we selected communities that provide semi-automated as well as automated collection to provide some contrast between the two systems.

APPENDIX B

REGULATORY BACKGROUND

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APPENDIX B – REGULATORY BACKGROUND

In the process of developing a scope of services for this management audit, the MSW Team performed an in-depth review of the regulatory language which guides the management audit and identifies specific duties to be performed by the PUC and the GSWA. This appendix contains the results of this regulatory review for future reference.

The following formatting convention was developed to summarize the identified language:

- **Bolded:** sections that assign obligations to the PUC (numbered as "PUC*X*").
- **Bolded and Underlined:** sections that assign obligations to the GSWA (numbered as GSWA*X*").

12 GCA Sections 12102.1 through 12102.2, aka the "Ratepayers Bill of Rights", in addition to laying out the procedure by which a utility must propose a rate increase also requires the PUC to **"…annually conduct a study comparing the staffing pattern and man power levels of Public Utilities under their purview to the staffing patterns and manpower levels of at least (4) other utilities in the United States Mainland which provide similar services to a comparable number of customers."** PUC1

The Ratepayer Bill of Rights also requires that such **"studies be made available to residents attending the public hearings on the proposed rate increase."** Further, the **"PUC must, in determining approval an any rate increase, take into account the results of such studies and order reductions or other adjustments in the operations of the Public Utility requesting a rate adjustment, as recommended or suggested by such studies, prior to granting approval for a rate increase."** PUC2

Section 51A119 of 10GCA Health and Safety provides that **"The…PUC…shall perform a management audit of the existing operations of the Guam Solid Waste Authority …"** PUC3

Section 51A104 assigns the following "Powers and Duties" to the GSWA.

(A) "The Authority shall have and exercise each and all of the following powers:

(1) **administer those powers listed under Chapter 51a, Title 10 of the Guam Code Annotated…**"

(2) **"acquire by grant, purchase, gift, devise, or lease or by the exercise of the right of eminent domain in accordance with the provisions and subject to limitations of Title 21 GCA Chapter 15, and hold and use any real or personal property necessary or convenient or useful for the carrying on of any of the powers pursuant to the provisions of this chapter "** GSWA1

(3) "**establish its internal organization and management, and adopt regulations for the administration of its operations** " GSWA2

(4) **"(A) establish and modify from time to time with approval of the PUC, reasonable rates and charges for the collection, transportation, disposal, storage, recycling and processing of solid waste to recover the full cost of providing solid waste management services, and collect money from customers using such services** " PUC4 and GSWA3

(B) **"similarly, the authority shall establish and modify from time to time, with approval of the PUC reasonable rates and charges for servicing of debt obtained to undertake capital improvements to solid waste management"** PUC5 and GSWA4

(5) **"enter into contracts and execute all instruments necessary or convenient in the exercise of its powers, adopt a seal, and sue or be sued in its own corporate name"** GSWA5

(6) **"at any time or from time to time, incur indebtedness pursuant to Article 2 of this Chapter."** GSWA6

Section 51A 301(b) requires that "...All commercial and residential tipping fees charged by the Authority shall be subject to the review and approval of the PUC"

(c) **"A tipping fee per cubic yard, uncompacted, shall be established for business and government generators, subject to approval by the PUC, and shall be published in a rate order developed by the PUC."** PUC6

(d) **"A residential tipping fee, which may include collection charges and a Self-Drop Fee, may be established subject to the approval of the PUC".** PUC7

(e) **"The PUC is hereby authorized to establish, amend and approve, in accordance with chapter 12 of Title 12, Guam Code Annotated, all commercial, government and residential tipping fee and user fees (including without limitation a self-drop fee, a variable residential tipping fee and, collectively referred to as "Tipping Fees" which, when established, shall replace those previously created by law."** PUC8

(1) **"Tipping fees authorized and establish by PUC shall be based on volume and on an analysis of operations costs, including those cost components specifically listed under Title 10 GCA Section 51a 114".** PUC9

(2) **"PUC is empowered to undertake a focused management audit of the existing operations of the Guam Solid Waste Authority."** PUC3

Table B-1 summarizes the key tasks from our management audit approach and indicates which regulatory requirements will be addressed within each task. Citations in the table relate to the enumerated excerpts above.

Table B-1 Correlation of Regulatory Language to Report Sections

Report Section	Regulatory Language
Entire Report	PUC3
Chapter 1 – Introduction	
Chapter 2 – Baseline Assessment	GSWA1, GSW2
Chapter 3 – Rate Analysis	PUC2, PUC4 GSWA3, PUC5, GSWA4, GSWA6, PUC6, PUC7, PUC8, PUC9
Chapter 4 – Manpower and Staffing	PUC1
Chapter 5 – Contract Review	GSWA5
Chapter 6 – Operational Assessment	PUC3







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