CHAPTER 9 – RECOMMENDED WASTEWATER SYSTEM CIP

9.1 Introduction

The WRMP has identified about $900 million in capital improvement projects needed to rehabilitate and upgrade its water and wastewater infrastructure to improve basic services and comply with regulatory requirements. Approximately 40% of that capital outlay (or about $350 million) is needed to address wastewater system needs. The wastewater system projects summarized in this chapter are based on facility visits, condition assessments, and engineering analyses described in Chapters 1 to 8 in this volume.

The recommended wastewater CIP program elements are based on the best information available at the time of the WRMP development. The specific project recommendations were derived from planning level analyses including a conceptual wastewater hydraulic model. This model will continue to be refined as GWA collects and incorporates better infrastructure and wastewater flow information. Further infrastructure system assessments and modeling will be needed to finalize other CIP recommendations and the prioritization of those projects. Design studies will typically be needed to further refine design parameters before proceeding with construction.

It is important to note also that the WRMP represents a snapshot in time with respect to project needs and priorities. The WRMP provides a solid foundation and reasonable estimate of the magnitude of investment needed to substantially improve utility service and reliability and to attain regulatory compliance. GWA will need to continue to update the WRMP as more information becomes available and basic assumptions change. For instance, at the end of the WRMP development, new general information was provided about possible significant military expansion on Guam. This possibility is addressed in a cursory manner in Volume 1 - Chapter 17, but will need to be addressed in more detail as more information becomes available. In this specific example, not only could needs increase substantially and quickly, other strategies like integrating existing military and municipal systems into one utility may be deemed necessary, feasible and appropriate to have a more secure, robust sustainable wastewater utility while providing environmental protection.

Volume 1, Chapter 15 – Capital Improvement Program of the WRMP describes elements associated with CIP for GWA. Some issues such as electrical power quality, corrosion and technology: e.g., Supervisory Control and Data Acquisition (SCADA) are common for the water and wastewater systems and are discussed in their respective chapters in Volume 1 of the WRMP.

Table 9-1 summarizes the proposed CIP projects for the wastewater system through 2026, which were developed principally from analyses presented in Chapters 3 (Facility Condition Assessment), 4 (Collection System), 5 (Treatment Facilities) and 6 (Septic Systems and Unsewered Areas). Several projects are presented as recurring annually through 2026. These projects can be defined as sequential projects to replace/rehabilitate the wastewater system assets over their useful life to mitigate catastrophic failure and financial impacts on GWA.

The tables that follow Table 9-1 are the forms that represent CIP projects that are either grouped due to their similarity (e.g., sewer upgrades) or individual projects. The intent of these tables is to help GWA to manage individual CIP projects effectively going forward. Some the table fields are blank because information is not available until the project is closer to implementation. The CAPE tool described in Chapters 10 and 15 (briefly) of Volume 1 can be used to manage and display the information in the Project Summaries.

9.2 Project Ranking

The $900 million value of capital improvements GWA is facing over the next 20 years must be prioritized for implementation to determine their impact on rates and other funding sources. Ranking of the projects was accomplished by a 3-step process.

1. System-wide improvements that are similar in nature were ranked based on technical criteria. For example, sewer upgrades were ranked based on overflows and surcharges. Those upgrades that were designed to eliminate historical overflows were given a higher priority than those where the sewer simply surcharges. Similarly, the transmission line priorities were based on historical fecal coliform data in the wells.
2. Each project was assigned a project type based on the intended purpose of the project. Most projects were assigned multiple project types since they usually accomplish more than one purpose.
3. The planner who developed the project used professional judgment to evaluate the assignment of project types and to schedule projects over the 20-year planning window. The highest priority projects are scheduled earlier in the planning period.

The project types are discussed as follows:

- **Life and Safety (LS) –** Projects that can have a direct impact on reducing risks to life and safety of customers and employees. An example of a LS project is one that will meet minimum fire flow and pressure standards.
- **Regulatory Compliance (RC) –** Projects that are intended to ensure compliance with safe drinking water, water quality, and other regulations promulgated by EPA and GEPA. An example of a regulatory compliance project is one that will help a wastewater treatment plant comply with its NPDES permit.
- **System Capacity (SC) –** Projects that are intended to increase capacity for existing or future flows, loads, and demand. An example of a SC project type is an upgrade of a sewer to prevent overflows or surcharging.
- **System Reliability (SR) –** Projects that are intended to increase the reliability of existing infrastructure and facilities. An example of a SR project type is the improvement to the Ugum WTP raw water intake to reduce the impact of siltation.
- **System Redundancy (SRED) –** Projects that are intended to provide redundant facilities or unit processes. An example of a SRED project type is the addition of a second finished water reservoir at the Ugum WTP.
- **Operation and Maintenance and Rehabilitation (OM&R) –** Projects that are needed to operate, maintain, and rehabilitate existing facilities and infrastructure to extend their useful life. An example of an OM&R project type is development and implementation of a corrosion control program.

There are some exceptions to this ranking. Some projects are already funded and are under design or construction. Examples include the upgrade of the Ugum WTP to membrane filtration, and the Sinajana transmission line. No attempt was made to change the schedule of these types of projects.

Some projects with low rankings based on project type were included in the first five years because they are critical to asset maintenance or system operation. These include corrosion control and SCADA improvements.

Though the CIP identifies over 70 specific projects, placeholders for uncertainties are included in the CIP to ensure sufficient financial resources are available for unexpected needs and on-going capital improvements to system-wide issues such as distribution pipe replacement, mechanical/electrical replacement, and wastewater collection and rehabilitation.

A second approach to project ranking was conducted after the draft WRMP was submitted for review. This approach consisted of a development of numerical points for each project type by means of a pairwise comparison. The pairwise comparison consisted of comparing the importance of each project type with each other project type. Points were assigned as follows:

- If project type A is much more important than project type B, five points were assigned to project type A.
- If project type A is more important than project type B, four points were assigned to project type A.
- If project type A is of equal importance to project type B, three points were assigned to project type A.
- If project type A is less important than project type B, two points were assigned to project type A.
- If project type A is much less important than project type B, one point was assigned to project type A.

For each comparison, the total number of points allocated between two project types is six. If project type A in the comparison gets five points, project type B automatically gets one point. Similarly, if project type A in the comparison gets three points, project type B automatically gets three points.

Four WRMP team members conducted the pairwise exercise independently. After the pairwise comparison was completed, the total number of points for each project type was tallied. The maximum number of points any project type could get is 25, and the minimum number is five. An average of the total points for each project type for all four team members was calculated. The ranking and average points of the project types are listed below:

1.	Life and Safety	21.8
2.	Regulatory Compliance	17.0
3.	System Reliability	16.3
4.	System Capacity	13.8
5.	System Redundancy	11.8
6.	Operation Maintenance and Rehabilitation	9.5

The points for each of the project types listed above were assigned to each of the CIP projects and their ranking was reviewed. The pairwise comparison matched closely with the initial ranking that was conducted. The pairwise comparison approach was not used for the final ranking; however, the point total was included for each project in the CIP project description summary listed in Volume 2,

Chapter 9 – Recommended Water System CIP and in Volume 3, Chapter 9 – Recommended Wastewater System CIP.

9.3 Conclusions

The primary feature of this section is the presentation of CIP project details using individual project summary sheets for the proposed CIP tasks. Also a project prioritization process, known as pariwise comparison, that uses six categories as a means of developing ranking of projects is explained in Section 9.2. The six categories are:

- Life and Safety
- Regulatory Compliance
- System Reliability
- System Redundancy
- System Capacity
- Operation Maintenance and Rehabilitation Recommendations

9.4 Recommendations

The schedule for commencement and completion of projects was to some extent determined as a factor in the prioritization exercise. However, some tasks with relatively low ranking were given a near term completion date because they provide support for so many features of other projects, these were related to electrical and SCADA systems as an example.

9.5 CIP Impacts

Table 9-1 lists all Wastewater System CIP projects in this chapter. They are also presented in Table 15-1 in Volume 1, Chapter 15 – Capital Improvement Program.

Table 9-1 – Wastewater System CIP Summary – Base Case

Project	Project Types[3]	Priority Ranking	Budget Year[1,2] 2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Totals
Wastewater Collection System - Capacity Related																							
Northern District STP Rte 16 PS Overflow Study	SR/SC	30.1	$50,000																				$50,000
Northern District STP Eliminate Flow Split	SR/OM&R	25.8	$50,000																				$50,000
Northern District STP Priority 1 Sewer Upgrades	RC/LS	38.8				$2,400,000																	$2,400,000
Northern District STP Priority 2 Sewer Upgrades	RC/SC	30.8														$280,000							$280,000
Northern District STP Priority 3 Sewer Upgrades	RC/SC	30.8																			$4,500,000		$4,500,000
Hagatna STP Priority 1 Sewer Upgrades	RC/LS	38.8				$4,000,000																	$4,000,000
Hagatna STP Priority 2 Sewer Upgrades	RC/SC	30.8														$17,000,000							$17,000,000
Hagatna STP Priority 3 Sewer Upgrades	RC/SC	30.8																			$11,000,000		$11,000,000
Hagatna STP Pump Station Upgrades	RC/SC	30.8				$440,000	$4,400,000				$120,000	$1,200,000					$4,500,000		$45,000,000				$55,660,000
Agat-Santa Rita STP Priority 1 Sewer Upgrades	RC/SC	30.8				$1,200,000																	$1,200,000
Agat-Santa Rita STP Priority 3 Sewer Upgrades	SC	13.8																			$4,500,000		$4,500,000
Baza Gardens STP Priority 1 Sewer Upgrades	RC/SC	30.8				$650,000																	$650,000
Baza Gardens STP Priority 2 Sewer Upgrades	SC	13.8														$580,000							$580,000
Inarajan STP Pressure Sewer Upgrades	RC/SC	30.8				$1,200,000																	$1,200,000
Year Total			*$100,000*	*$0*	*$0*	*$9,890,000*	*$4,400,000*	*$0*	*$0*	*$0*	*$120,000*	*$1,200,000*	*$0*	*$0*	*$0*	*$17,860,000*	*$4,500,000*	*$0*	*$45,000,000*	*$0*	*$20,000,000*	*$0*	***$103,070,000***
Wastewater Collection System - Unsewered Areas																							
NDSTP and Hagatna STP Unsewered Properties – Sewer Hook-ups[4]	RC/Other	17						$1,300,000	$1,300,000	$1,300,000	$1,300,000	$1,300,000											$6,500,000
NDSTP and Hagatna STP Unsewered Properties - New Sewers[5]	RC/Other	17						$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$40,500,000
NDSTP and Hagatna STP Unsewered Properties - Additional Sewer Hook-ups[4]	SC/Other	13.8									$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$15,000,000
South System Sewer Hook-ups[4]	RC	17																$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$7,500,000
Year Total			*$0*	*$0*	*$0*	*$0*	*$0*	*$4,000,000*	*$4,000,000*	*$4,000,000*	*$5,250,000*	*$5,250,000*	*$3,950,000*	*$3,950,000*	*$3,950,000*	*$3,950,000*	*$3,950,000*	*$5,450,000*	*$5,450,000*	*$5,450,000*	*$5,450,000*	*$5,450,000*	***$69,500,000***
Wastewater Collection System - Other																							
Manhole Frame Seal Repair	SR/OMR	25.8	$84,000																				$84,000
Agat Manhole Rehabilitation	SR/OMR	25.8	$54,000																				$54,000
Wastewater Collection System Recurring Inspection Program[6]	SR/OMR	25.8	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$610,000	$12,200,000
Wastewater Collection System Replacement/Rehabilitation Program[6]	SR/OMR	25.8	$1,100,000	$1,100,000	$1,100,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$37,300,000
Year Total			*$1,848,000*	*$1,710,000*	*$1,710,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	*$2,610,000*	***$49,638,000***
Wastewater Facilities																							
Facilities Plan/Design for the Agat-Santa Rita STP Replacement	RC/SR/SRED/SC	58.9		$600,000		$2,600,000																	$3,200,000
Agat-Santa Rita STP Replacement	RC/SR/SRED/SC	58.9						$30,000,000															$30,000,000
Facilities Plan/Design for the Baza Gardens STP Replacement	RC/SR/SRED	45.1	$500,000		$1,500,000																		$2,000,000
Baza Gardens STP Replacement	RC/SR/SRED	45.1					$18,000,000																$18,000,000
Facilities Plan/Design for the Hagatna STP Improvements & Effluent WWPS	SR/SRED/SC	41.9							$1,900,000														$1,900,000
Hagatna STP Improvements & Effluent WWPS	SR/SRED/SC	41.9									$18,000,000												$18,000,000
Facilities Plan/Design for Inarajan STP Expansion	SR/OM&R	25.8										$190,000											$190,000
Inarajan STP Expansion	SR/OM&R	25.8												$420,000									$420,000
Facilities Plan/Design for the Northern District STP – Biosolids	RC/SR	30.1	$500,000									$1,800,000											$2,300,000
Northern District STP Expansion - Biosolids	RC/SR	30.1			$5,000,000								$16,000,000										$21,000,000
Facilities Plan/Design for the Northern District STP Expansion	SR/SRED	25.6							$1,200,000														$1,200,000
Northern District STP Expansion	SR/SRED	25.6									$10,000,000												$10,000,000
Facilities Plan/Design for the Umatac-Merizo STP Improvements	SR/OM&R	25.8						$140,000															$140,000
Umatac-Merizo STP Improvements	SR/OM&R	25.8							$420,000														$420,000
Pago Socio STP Conversion	SR/OM&R	25.8										$3,700,000											$3,700,000
Year Total			*$1,000,000*	*$600,000*	*$6,500,000*	*$2,600,000*	*$18,000,000*	*$30,140,000*	*$3,520,000*	*$0*	*$28,000,000*	*$5,690,000*	*$16,000,000*	*$420,000*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	***$112,470,000***
Electrical/SCADA																							
Electrical Upgrade - Water Booster Stations (Pago Bay, etc)	LS/SR	38.1	$650,000																				$650,000
Electrical Upgrade - Water Booster Stations (Gayinero, etc)	LS/SR	38.1		$350,000																			$350,000
Electrical Upgrade - Water Booster Stations (Other WBPS)	LS/SR	38.1			$250,000																		$250,000
Electrical Upgrade - Water Wells	LS/SR	38.1	$2,000,000																				$2,000,000
Electrical Upgrade – Agat-Santa Rita STP	LS/SR	38.1	$400,000																				$400,000
Electrical Upgrade – Baza Garden STP	LS/SR	38.1					$300,000																$300,000
Electrical Upgrade – Northern District STP	LS/SR	38.1		$1,900,000																			$1,900,000
Electrical Upgrade – Umatac-Merizo STP	LS/SR	38.1			$300,000																		$300,000
Wastewater Pumping Station Electrical Upgrade	RC/SR	33.3	$1,000,000																				$1,000,000
GWA SCADA System - Phase 1	RC/SR	16.3	$250,000																				$250,000
GWA SCADA System - Phase 2	RC/SR	16.3		$1,100,000																			$1,100,000
GWA SCADA System - Phase 3	RC/SR	16.3			$2,500,000																		$2,500,000
GWA SCADA System - Phase 4	RC/SR	16.3				$850,000																	$850,000
Year Total			*$1,650,000*	*$3,000,000*	*$2,800,000*	*$850,000*	*$300,000*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	***$8,600,000***
Other																							
GIS	Other	--	$160,000	$160,000	$160,000	$160,000	$160,000																$800,000
Year Total			*$160,000*	*$160,000*	*$160,000*	*$160,000*	*$160,000*																***$800,000***
Annual Total			**$4,758,000**	**$5,470,000**	**$11,170,000**	**$16,110,000**	**$25,470,000**	**$36,750,000**	**$10,130,000**	**$6,610,000**	**$35,980,000**	**$14,750,000**	**$22,560,000**	**$6,980,000**	**$6,560,000**	**$24,420,000**	**$11,060,000**	**$8,060,000**	**$53,060,000**	**$8,060,000**	**$28,060,000**	**$8,060,000**	**$344,078,000**
							$62,978,000					$104,220,000					$71,580,000					$105,300,000	

[1] Cost based on (10% design, 5% Services during construction, 7% Construction Management, 50% Planning Level Adjustment)

[2] Costs are 2007 Dollars

[3] Project Types: **RC**=Regulatory Compliance; **SR**=System Reliability; **SRED**=System Redundancy; **SC**=System Capacity; **OMR**=OM&R; **LS**=Life & Safety

[4] Costs for design, planning, and construction of full treatment for GWUDI compliance; If filtration avoidance is allowed, total costs will be approximately $5,000,000 after transmission lines are complete

[4] Funded by Sewer Hook-up Revolving Fund

[5] GWA may not be able to provide new sewers to existing customers without a connection fee. New legislation or alternative funding sources may be required.

[6] Cost is an annual recurring cost to inspect and replace/rehabilitate the gravity and force main systems

Table 9-2 – Northern District STP Rte 16 PS Overflow Study

PROJECT SUMMARY		
Project Name	Route 16 PS overflow modification study	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.1	
Project Description	Assess opportunity to modify the Route 16 PS overflow to avoid excess wet weather flow diversion to Hagatna STP. Alternatively, increase station reliability.	
Project Justification	When the Route 16 pump station loses power (and it is expected in larger wet weather events) flow is diverted to the Hagatna STP service area based on flow metering results. During wet weather events, this exacerbates overflow problems along Route 1. Review the potential for wet weather diversion and potential modifications to the overflow to avoid impacts in the Hagatna service area.	
Project Budget	$50,000	
Funding Source(s)	USEPA: FY 2007 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Figure 9-1 – Northern District STP Rte 16 PS Overflow Study

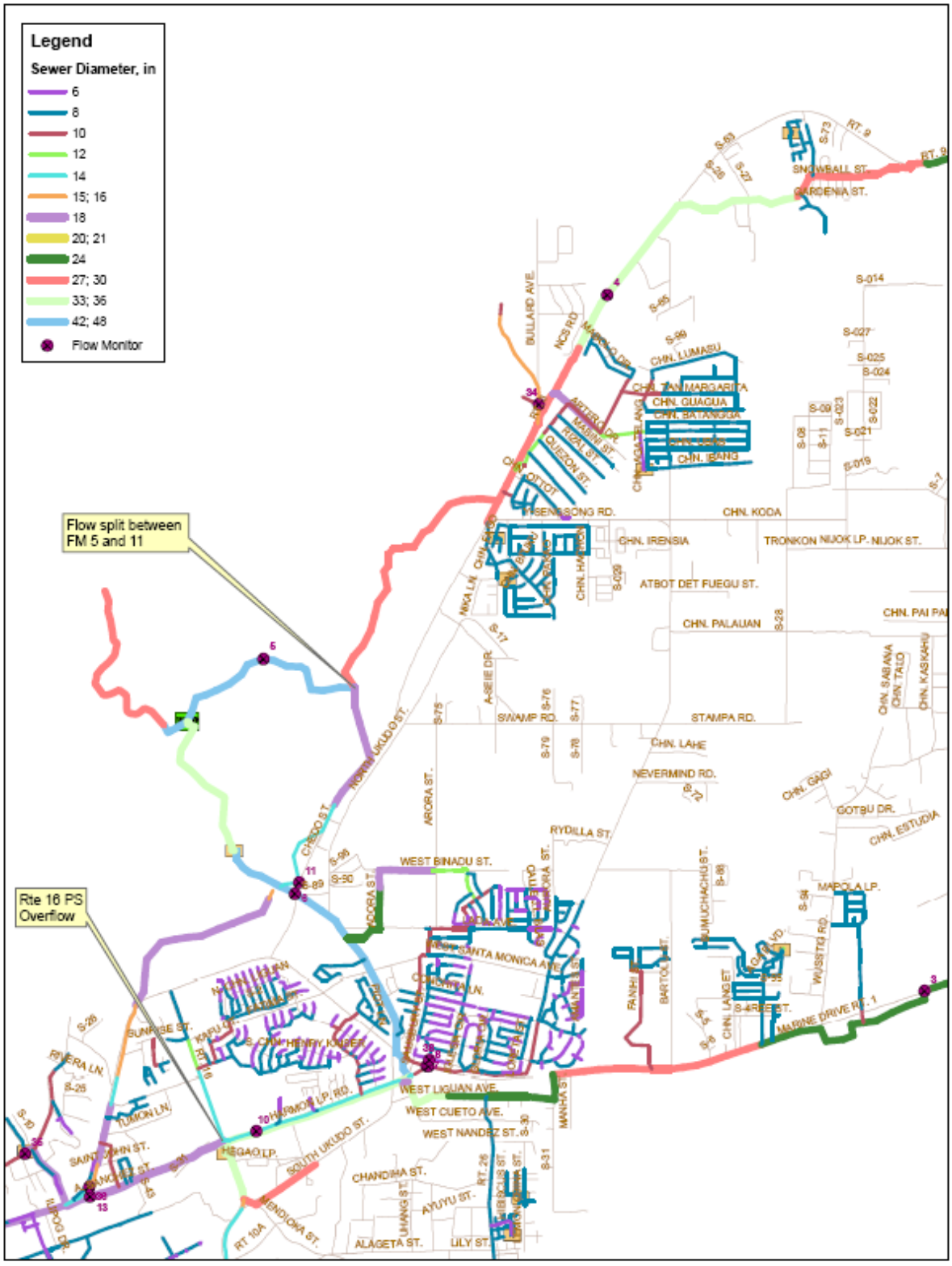

Table 9-3 – Northern District STP Eliminate Flow Split

PROJECT SUMMARY		
Project Name	NDSTP - Eliminate Flow Split	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☒ OM&R ☐ Other _____
Pairwise Points	25.8	
Project Description	Eliminate the flow split that occurs in the sewer manhole that collects flow from Andersen AFB and Navy Housing east of the North District STP (as located on attached figure) to divert all flow to the 42-inch gravity sewer.	
Project Justification	Most dry weather flows from the north end of the island on Route 3 and Route 9 could flow by gravity to the STP. However, the structure is constructed in such a way that most of the dry weather flow and perhaps 50% of the wet weather flow is diverted to the Southern Link Pump Station. Eliminating this split would reduce power usage at the pump station and increase system reliability.	
Project Budget	$50,000	
Funding Source(s)	USEPA: FY 2007 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Figure 9-2 – Northern District STP Eliminate Flow Split

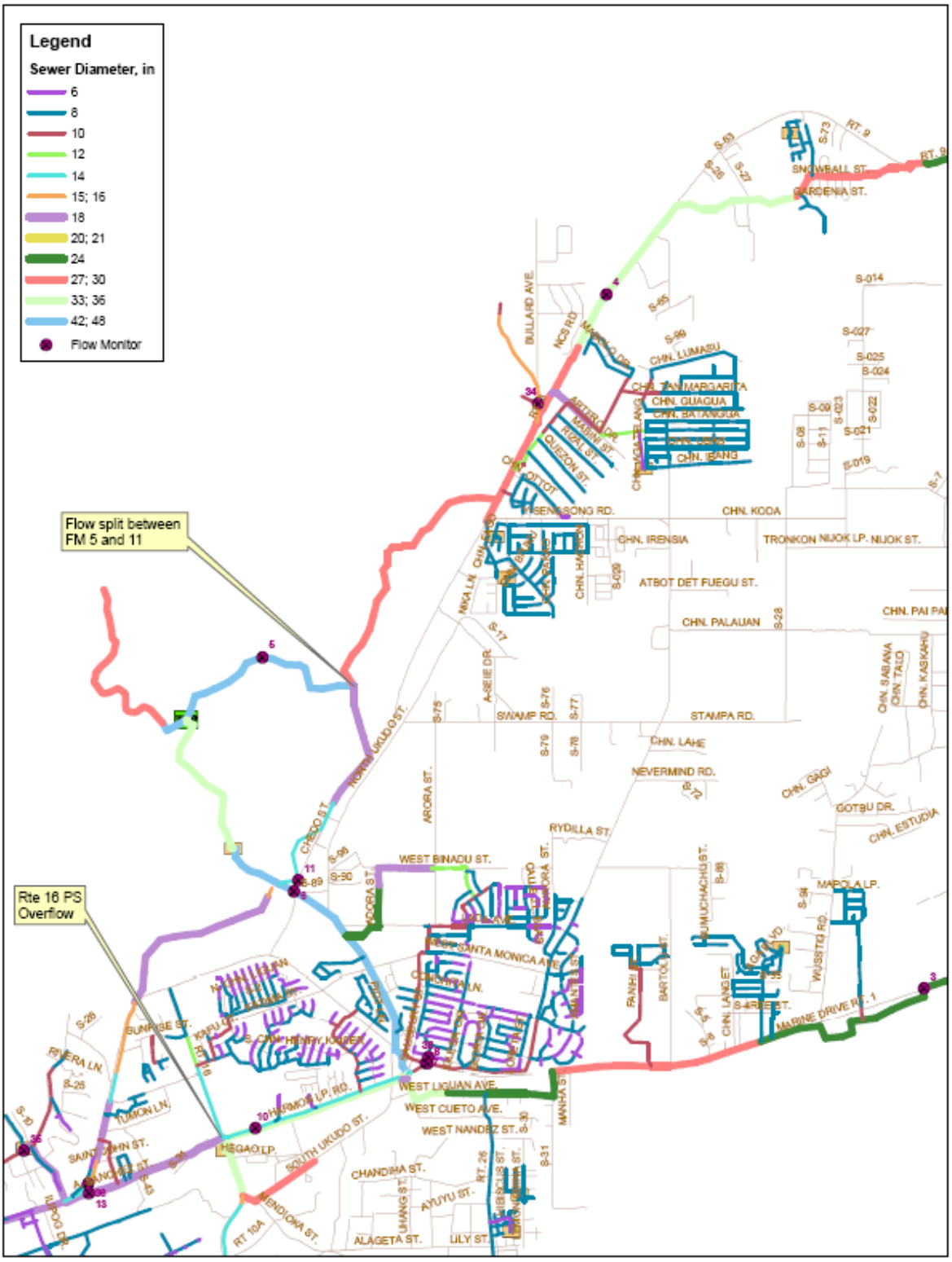

Table 9-4 – Northern District STP Priority 1 Sewer Upgrades

PROJECT SUMMARY		
Project Name	Priority 1 Sewer Upgrades -North District Service Area	
Project Type	☒ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	38.8	
Project Description	5,100 feet of sewers upstream of the Fujita pump station and just downstream of flow meters 7, 8, and 38 (Buena Vista) were found to be surcharged excessively both in the metering and modeling. These sewers have been assigned priority 1 for correction.	
Project Justification	Avoidance of overflows	
Project Budget	Fujita PS – $2,200,000 Buena Vista – $200,000 **Total Cost: $2,362,000**	
Funding Source(s)	USEPA: FY 2010 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-4a Northern District STP Priority 1 Sewer Upgrades Detail

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Required Diameter, in	Length, ft
FM 35	613570	0.7	10	14	318
FM 35	613572	1.7	12	21	44
FM 35	613574	1.0	12	18	215
FM 35	613591	0.5	10	14	260
FM 35	613593	0.5	10	14	256
FM 35	613595	0.5	10	14	256
FM 35	613629	0.6	10	14	254
FM 35	613630	0.7	10	14	320
FM 35	613668	0.5	10	14	325
FM 35	613717	1.0	10	18	112
FM 35	613725	0.9	10	18	260
FM 35	613727	0.9	10	18	260
FM 35	613729	1.0	10	18	260
FM 35	613768	0.9	10	16	341
FM 35	613769	0.9	10	16	259
FM 35	613814	0.6	10	14	341
FM 35	613815	0.6	10	14	340
FM 35	613830	0.6	10	14	255
Buena Vista	999178	1.8	10	14	423

Figure 9-3 – Northern District STP Priority 1 Sewer Upgrades

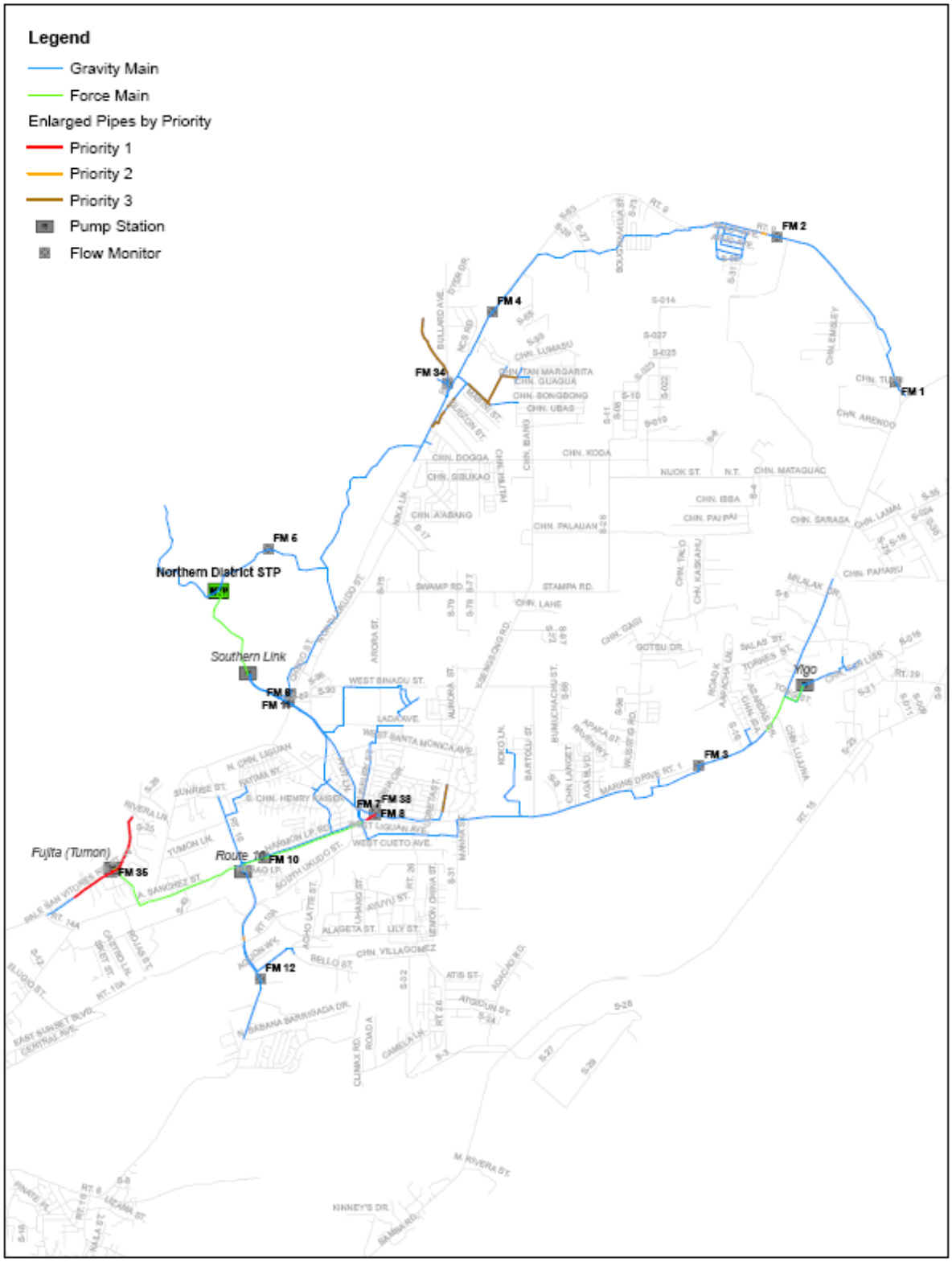

Table 9-5 – Northern District STP Priority 2 Sewer Upgrades

PROJECT SUMMARY		
Project Name	Priority 2 Sewer Upgrades-North District Service Area	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.8	
Project Description	Two short sections of pipe in the ND STP area were prioritized at level 2 for improvement in the future as population and sewered area grows.	
Project Justification	Avoidance of overflows	
Project Budget	$280,000	
Funding Source(s)	USEPA: FY 2020 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-5a – Northern District STP Priority 2 Sewer Upgrades Detail

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft
FM 4	525284	3.1	24	27	235
FM 6	605979	0.5	14	15	115

Figure 9-4 – Northern District STP Priority 2 Sewer Upgrades

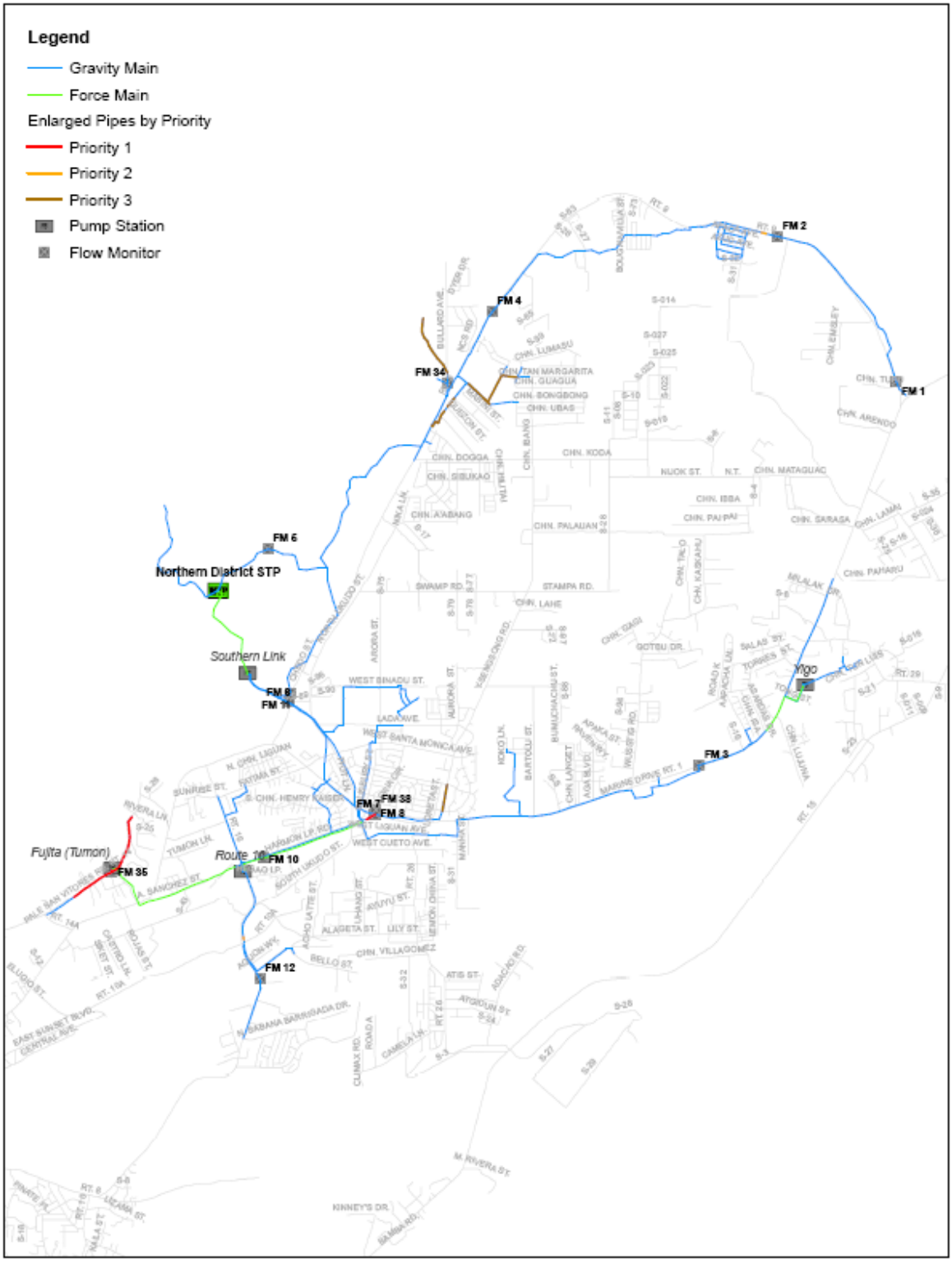

Table 9-6 – Northern District STP Priority 3 Sewer Upgrades

PROJECT SUMMARY		
Project Name	Priority 3 Sewer Upgrade-North District Service Area	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.8	
Project Description	9000 feet of sewer were given a priority of 3. These sewers received this priority because there is some uncertainty as to the accuracy of the modeling or in the actual pipe parameters (diameter, connectivity and slope). The pipe parameters should be verified. There is also a large un-metered flow entering the split manhole between the FM 5 and 11 sites. Monitoring of this flow and discovering its source will allow flows in this area to be re-distributed.	
Project Justification	Avoidance of overflows	
Project Budget	$4,500,000	
Funding Source(s)	USEPA: FY 2025 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-6a – Northern District STP Priority 3 Sewer Upgrades Detail

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft
FM 5	401564	1.5	12	21	378
FM 5	805750	1.4	12	18	390
FM 5	805752	1.3	12	14	175
FM 5	805754	1.3	12	14	224
FM 5	805756	1.3	12	14	64
FM 5	805773	1.2	12	14	255
FM 5	805785	1.1	12	14	220
FM 5	805786	1.1	10	14	232
FM 5	999007	0.9	10	15	1309
FM 5	999008	0.6	10	12	681
FM 5	999010	0.8	10	14	1220
FM 8	999170	0.7	10	12	1175
FM 34	620896	1.2	10	12	289
FM 34	620898	1.2	15	16	296
FM 34	620900	1.2	15	16	264
FM 34	620902	1.1	15	16	210
FM 34	620904	1.1	15	16	213
FM 34	620906	1.1	15	16	249
FM 34	620908	1.1	15	16	403
FM 34	620910	1.1	15	16	394
FM 34	620912	1.1	15	16	380

Figure 9-5 – Northern District STP Priority 3 Sewer Upgrades

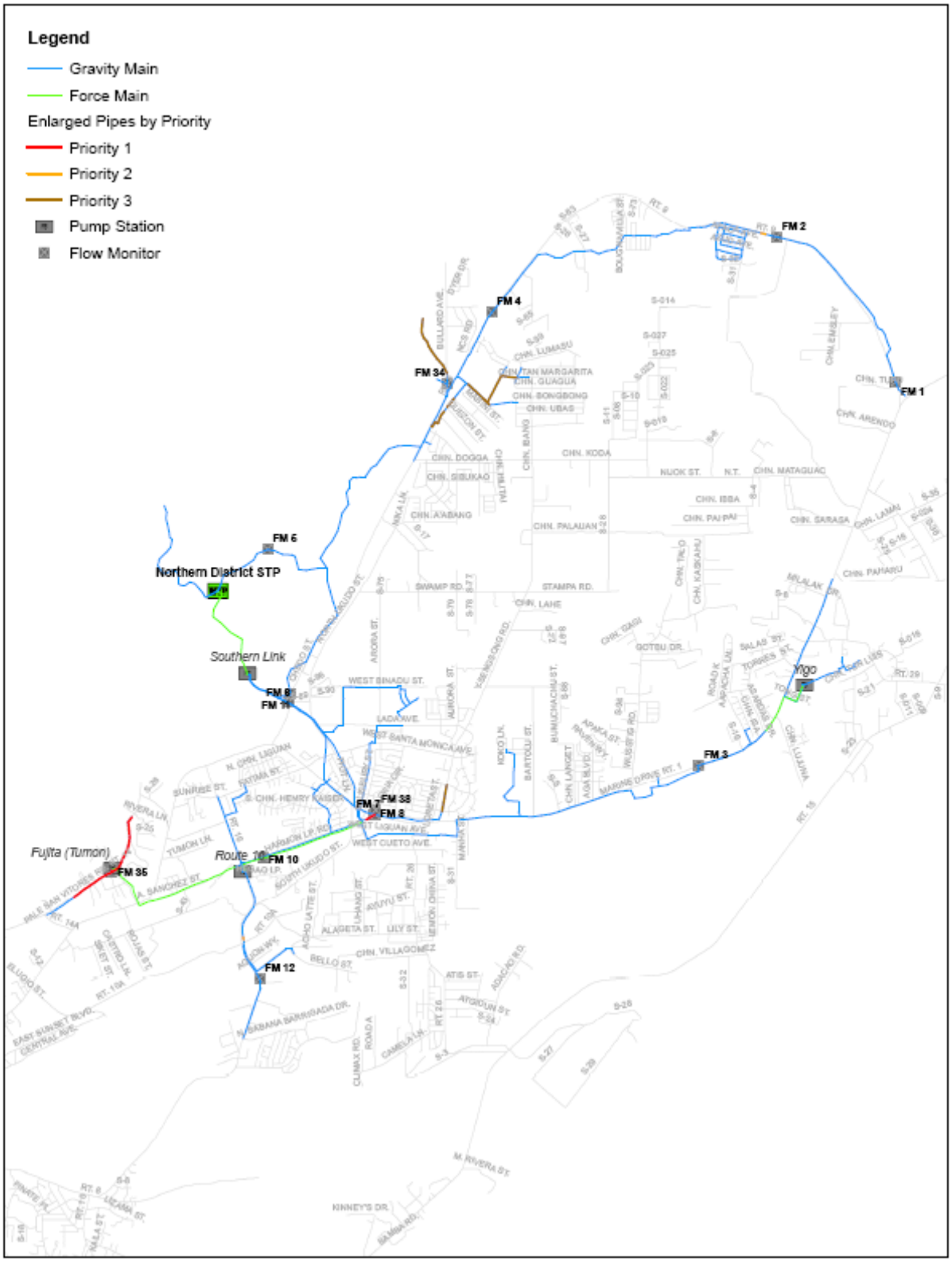

Table 9-7 – Hagatna STP Priority 1 Sewer Upgrades

PROJECT SUMMARY		
Project Name	Priority 1 Sewer Upgrades – Hagatna STP Service Area	
Project Type	☒ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	38.8	
Project Description	5100 feet of sewers in the Hagatna STP service area were identified as Priority 1 for upgrade.	
Project Justification	Avoid overflows	
Project Budget	$4,000,000	
Funding Source(s)	USEPA: FY 2010 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-7a – Hagatna STP Priority 1 Sewer Upgrades Detail

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft	Remarks
FM 15	608126	1.6	18	30	40	Downsized section downstream of Rte 30 on Marine Drive
FM 18	608414	3.8	15	18	351	
FM 18	608415	3.7	15	18	350	
FM 18	608445	3.7	12	14	228	
FM 18	608447	3.7	12	14	179	
FM 18	608449	3.8	12	14	231	
FM 18	608451	3.8	12	14	228	
FM 18	608453	3.8	12	14	169	
FM 18	608455	3.8	12	14	231	
FM 18	608480	3.4	18	21	370	
FM 18	608487	3.5	12	14	308	
FM 18	608503	3.2	12	16	315	
FM 18	608505	3.3	12	16	306	
FM 18	608507	3.3	12	16	48	
FM 18	608508	3.3	18	21	380	
FM 18	608565	1.5	14	15	143	
FM 19	600804	6.4	24	36	90	Inverted siphon river crossing. Existing 24-in to remain.
FM 19	607935	4.5	30	36	345	
FM 21	614167	1.1	14	16	337	
FM 21	614169	1.1	14	15	215	
FM 24	601865	0.2	14	21	200	

Figure 9-6 – Hagatna STP Priority 1 Sewer Upgrades

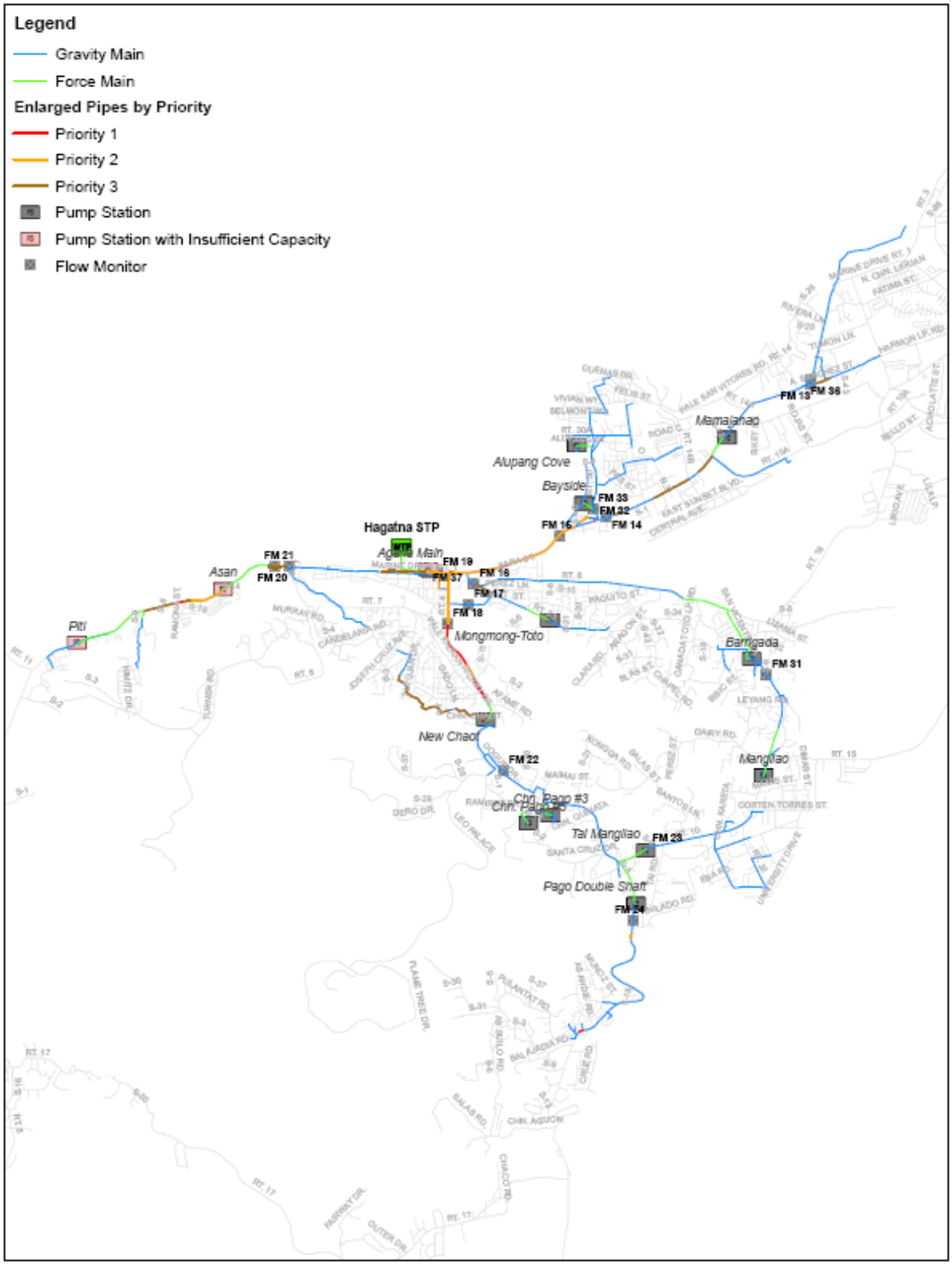

Table 9-8 – Hagatna STP Priority 2 Sewer Upgrades

PROJECT SUMMARY		
Project Name	Priority 2 Sewer Upgrades – Hagatna STP Service Area	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.8	
Project Description	16,000 feet of sewers in the Hagatna STP service area were identified as Priority 2 for upgrade.	
Project Justification	Avoid overflows	
Project Budget	$17,000,000	
Funding Source(s)	USEPA: FY 2020 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-8a – Hagatna STP Priority 2 Sewer Upgrades Detail

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft
FM 15	608034	6.1	30	36	136
FM 15	608036	6.2	30	36	187
FM 15	608038	6.2	30	36	356
FM 15	608040	6.8	30	36	323
FM 15	608862	2.8	24	36	331
FM 15	608863	2.0	18	21	117
FM 15	608868	0.9	18	21	117
FM 18	608417	5.8	18	21	349
FM 18	608456	5.7	12	14	265
FM 18	608482	5.2	12	14	267
FM 18	608484	5.2	12	14	305

Table 9-8a – Hagatna STP Priority 2 Sewer Upgrades Detail (continued)

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft
FM 18	608486	5.3	12	15	200
FM 19	600794	9.8	36	42	258
FM 19	600802	9.1	36	42	150
FM 19	600806	9.0	36	42	63
FM 19	600808	9.1	36	42	313
FM 19	600810	9.1	36	42	363
FM 19	600812	9.1	36	42	17
FM 19	607929	6.7	30	36	299
FM 19	607931	6.8	30	36	173
FM 19	607933	6.8	30	36	348
FM 19	607987	6.8	30	36	346
FM 19	607989	6.8	30	36	346
FM 19	607991	6.7	30	36	346
FM 19	607992	6.7	30	36	346
FM 19	608011	6.8	30	36	350
FM 19	608013	6.8	30	36	377
FM 19	608015	6.8	30	36	357
FM 19	608016	6.8	30	36	346
FM 19	608042	6.8	30	36	244
FM 19	608043	6.8	30	36	231
FM 19	999525	6.9	30	36	550
FM 19	999526	6.9	30	36	525
FM 19	999534	1.1	15	18	761
FM 21	614020	1.9	16	21	302
FM 21	614021	1.9	16	21	205
FM 21	614025	2.0	18	21	220
FM 21	614063	2.1	18	21	334
FM 21	614065	2.1	18	21	350
FM 21	614067	2.2	18	21	233
FM 21	614069	2.2	18	21	157
FM 24	808278	0.3	12	24	76
FM 24	808280	0.2	8	21	76
Hagatna STP	608389	6.2	24	36	285
Hagatna STP	608391	6.2	24	36	287
Hagatna STP	608392	6.2	24	36	1485
Hagatna STP	608397	6.2	24	36	288
Hagatna STP	608399	6.2	24	36	251
Hagatna STP	608400	6.2	24	36	269
Hagatna STP	608402	5.9	18	27	350
Hagatna STP	608418	5.8	18	27	350

Figure 9-7 – Hagatna STP Priority 2 Sewer Upgrades

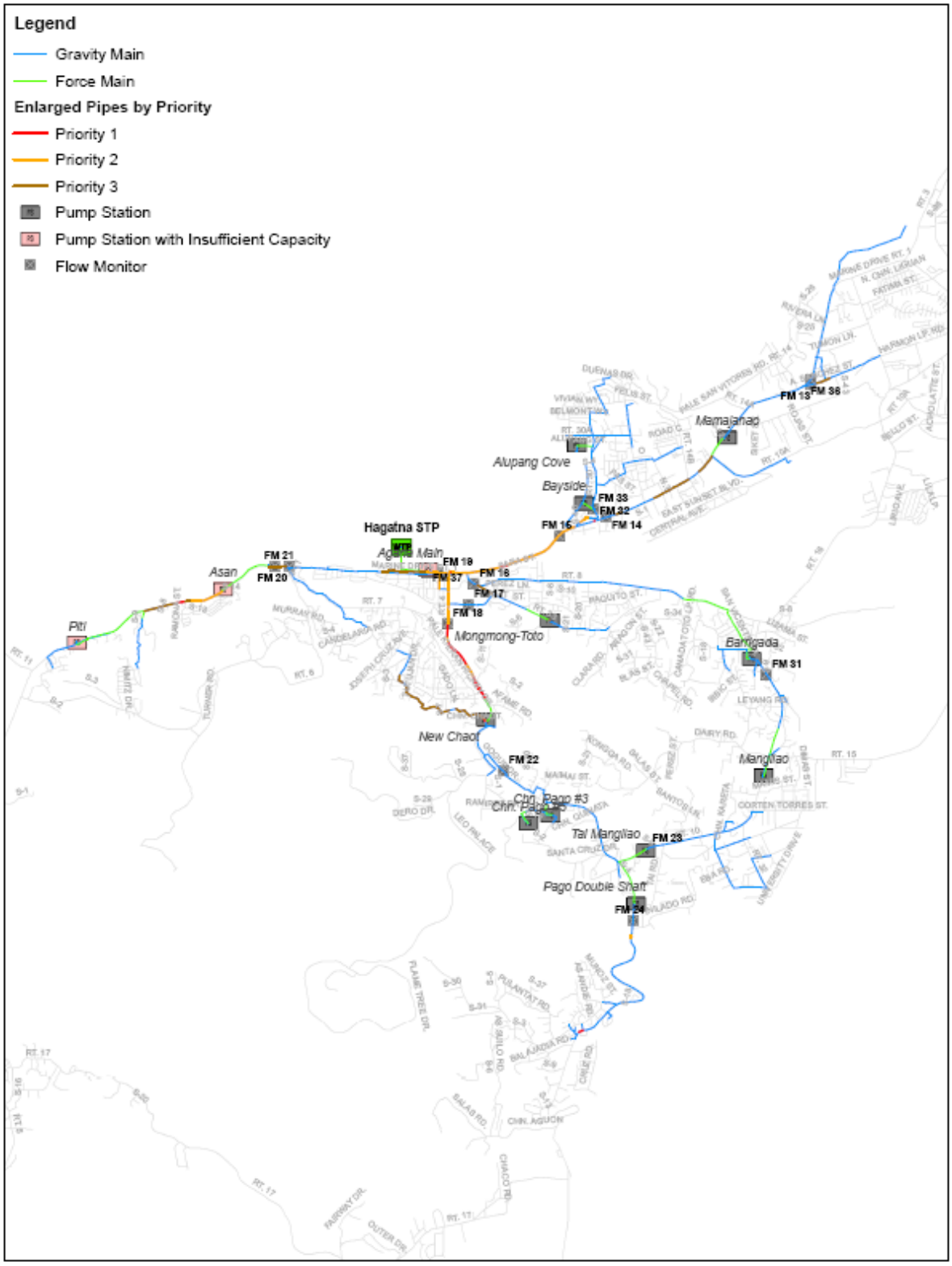

Table 9-9 – Hagatna STP Priority 3 Sewer Upgrades

PROJECT SUMMARY		
Project Name	Priority 3 Sewer Upgrades – Hagatna STP Service Area	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.8	
Project Description	17,000 feet of sewers in the Hagatna STP service area were identified as Priority 3 for upgrade. The pipe parameters and flows require verification before constructing the identified upgrade.	
Project Justification	Avoid overflows	
Project Budget	$11,000,000	
Funding Source(s)	USEPA: FY 2025 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-9a – Hagatna STP Priority 3 Sewer Upgrades Detail

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft	Remarks
FM 13	605984	2.0	18	21	320	Review overflow at Rte 16 PS
FM 13	605986	2.0	18	21	204	Review overflow at Rte 16 PS
FM 13	606010	2.0	18	21	108	Review overflow at Rte 16 PS
FM 13	605986A	2.0	18	21	121	Review overflow at Rte 16 PS
FM 14	608150	3.1	16	18	349	Review overflow at Rte 16 PS
FM 14	608240	2.9	18	21	207	Review overflow at Rte 16 PS
FM 14	608242	2.9	16	18	261	Review overflow at Rte 16 PS
FM 14	608244	3.0	14	15	260	Review overflow at Rte 16 PS
FM 14	608282	2.9	14	15	320	Review overflow at Rte 16 PS
FM 14	608284	2.9	14	15	240	Review overflow at Rte 16 PS
FM 14	608286	2.9	16	18	350	Review overflow at Rte 16 PS
FM 14	608288	2.9	16	21	295	Review overflow at Rte 16 PS
FM 14	608289	2.9	18	21	207	Review overflow at Rte 16 PS
FM 14	608334	2.9	16	18	367	Review overflow at Rte 16 PS
FM 14	608336	2.9	14	15	364	Review overflow at Rte 16 PS
FM 14	608372	2.8	16	18	354	Review overflow at Rte 16 PS
FM 16	999475	0.3	12	24	50	Verify pipe parameters
FM 16	999701	0.8	12	14	971	Verify pipe parameters
FM 18	608569	2.3	14	18	287	Verify parameters and flows
FM 18	608572	2.3	14	18	325	Verify parameters and flows
FM 18	608577	2.3	14	18	98	Verify parameters and flows
FM 18	608578	2.3	14	18	219	Verify parameters and flows
FM 18	608581	2.3	14	18	71	Verify parameters and flows
FM 18	608999	1.9	16	18	343	Verify parameters and flows
FM 18	609003	2.2	14	21	85	Verify parameters and flows
FM 18	609005	2.2	14	21	148	Verify parameters and flows
FM 18	609007	2.2	14	18	281	Verify parameters and flows
FM 18	609008	2.3	14	18	325	Verify parameters and flows
FM 18	609024	1.9	10	14	95	Verify parameters and flows
FM 18	609026	1.9	10	14	252	Verify parameters and flows
FM 18	609028	1.9	10	14	221	Verify parameters and flows
FM 18	609030	1.9	10	14	153	Verify parameters and flows
FM 18	609032	1.9	10	12	84	Verify parameters and flows
FM 18	609034	1.9	10	14	225	Verify parameters and flows
FM 18	609036	1.9	12	16	61	Verify parameters and flows
FM 18	609037	1.9	12	15	98	Verify parameters and flows
FM 18	609048	1.6	10	12	346	Verify parameters and flows
FM 18	609050	1.6	10	12	338	Verify parameters and flows
FM 18	609052	1.8	10	12	204	Verify parameters and flows
FM 18	609054	1.8	10	14	224	Verify parameters and flows
FM 18	609056	1.9	10	14	169	Verify parameters and flows
FM 18	609057	1.9	10	14	172	Verify parameters and flows
FM 18	609073	1.1	12	14	276	Verify parameters and flows
FM 18	609075	1.4	12	15	226	Verify parameters and flows
FM 18	609079	1.5	8	10	213	Verify parameters and flows

Table 9-9a – Hagatna STP Priority 3 Sewer Upgrades Detail (continued)

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft	Remarks
FM 18	609080	1.5	10	14	173	Verify parameters and flows
FM 21	614018	1.8	16	18	288	Add with growth
FM 21	614130	2.4	16	18	331	Add with growth
FM 21	614132	2.4	16	18	311	Add with growth
FM 21	614163	1.6	14	16	275	Add with growth
FM 21	614165	1.6	14	16	291	Add with growth
FM 21	614192	1.6	12	14	235	Add with growth
FM 21	614194	1.6	12	14	300	Add with growth
FM 21	614196	1.6	12	14	300	Add with growth
FM 21	614197	1.6	14	15	285	Add with growth
FM 37	602074	4.6	27	30	364	Verify-size increase is small
FM 37	602076	4.5	27	30	27	Verify-size increase is small
FM 37	602088	4.6	27	30	363	Verify-size increase is small
FM 37	602090	4.6	27	30	373	Verify-size increase is small
FM 37	602092	4.6	27	30	353	Verify-size increase is small
FM 37	602093	4.6	27	30	363	Verify-size increase is small
FM 37	602100	4.6	27	30	76	Verify-size increase is small
FM 37	602101	4.6	27	30	363	Verify-size increase is small
FM 37	602134	3.9	27	30	297	Verify-size increase is small
FM 37	614134	2.4	16	18	340	Verify-size increase is small

Figure 9-8 – Hagatna STP Priority 3 Sewer Upgrades

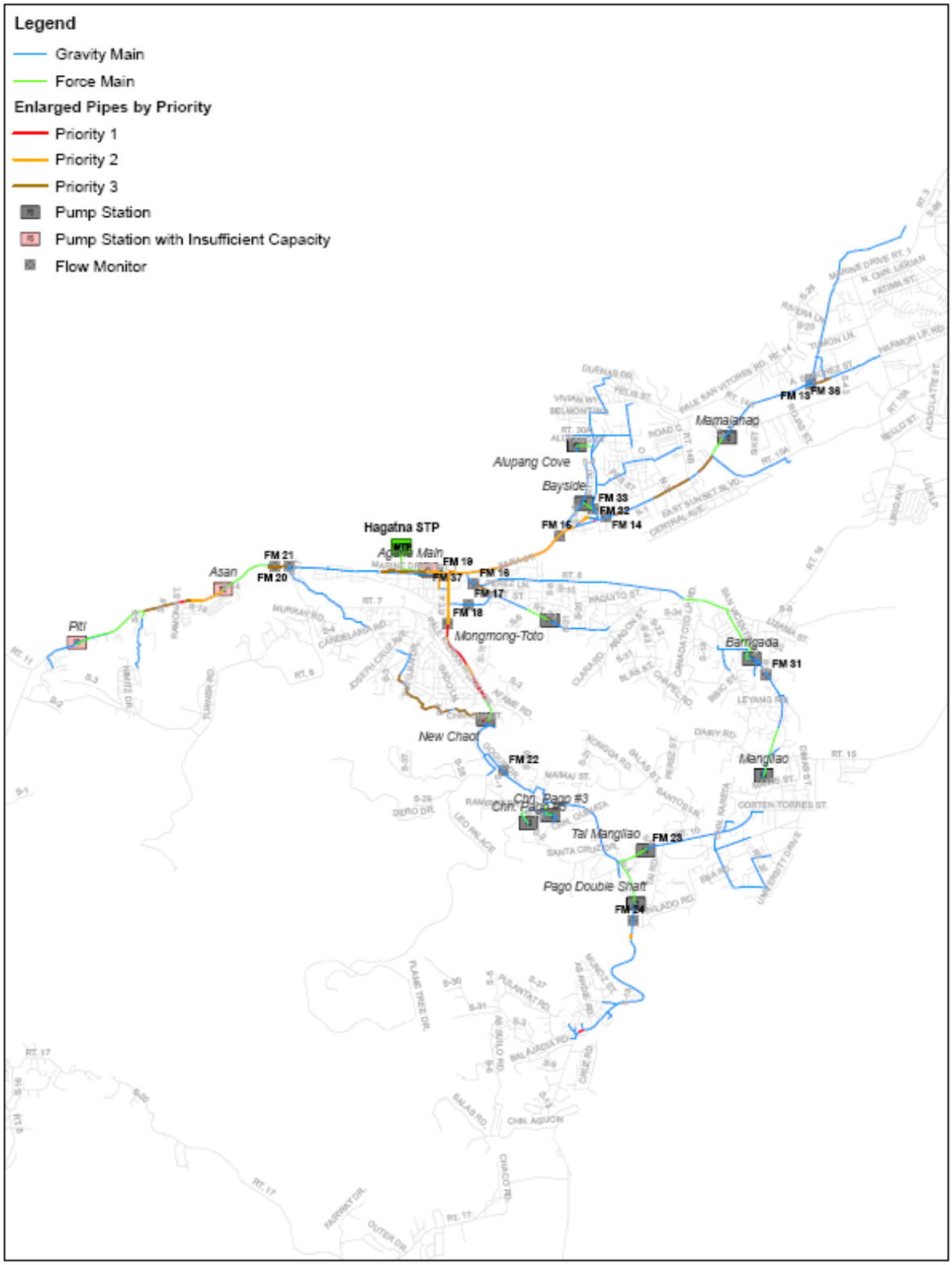

Table 9-10 – Hagatna STP Pump Station Upgrades

PROJECT SUMMARY		
Project Name	Upgrade pump stations in the Hagatna STP service area to provide necessary capacity	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.8	
Project Description	Three pump stations in the Hagatna STP service area were found to have insufficient capacity to deliver the projected peak flows: the Hagatna influent pump station, the Asan pump station, and the Tepungan (Piti) pump station. Evaluation of re-siting the Hagatna SPS to the STP or other site will be included in this project.	
Project Justification	Provide adequate capacity	
Project Budget	#1 Hagatna Main $4,500,000 Planning/Design /$45,000,000 Construction #2 Asan $440,000 Planning/Design / $4,400,000 Construction #3 Tegungan $120,000 Planning/Design / $1,200.000 Construction	
Funding Source(s)	USEPA: #1 – 2021/2023 FY 2009/2010 Bond Issuance: #2 – 2010/2011 #3 – 2015/2016	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-10a – Hagatna STP Pump Station Upgrades Detail

Item	Estimated Existing Capacity, mgd	Required Capacity, mgd	Construction Cost Including Markups
#1A Replace Hagatna Influent Pump Station	14	31	$40,000000
#1B New 42-in Gravity Sewer from Existing Hagatna PS to STP (2600 feet)	--	31	$5,000000
#2 Expand Asan Capacity	1.6	4	$4,400,000
#3 Expand Tegungan Capacity	0.6	1	$1,200,000

Figure 9-9 – Hagatna STP Pump Station Upgrades

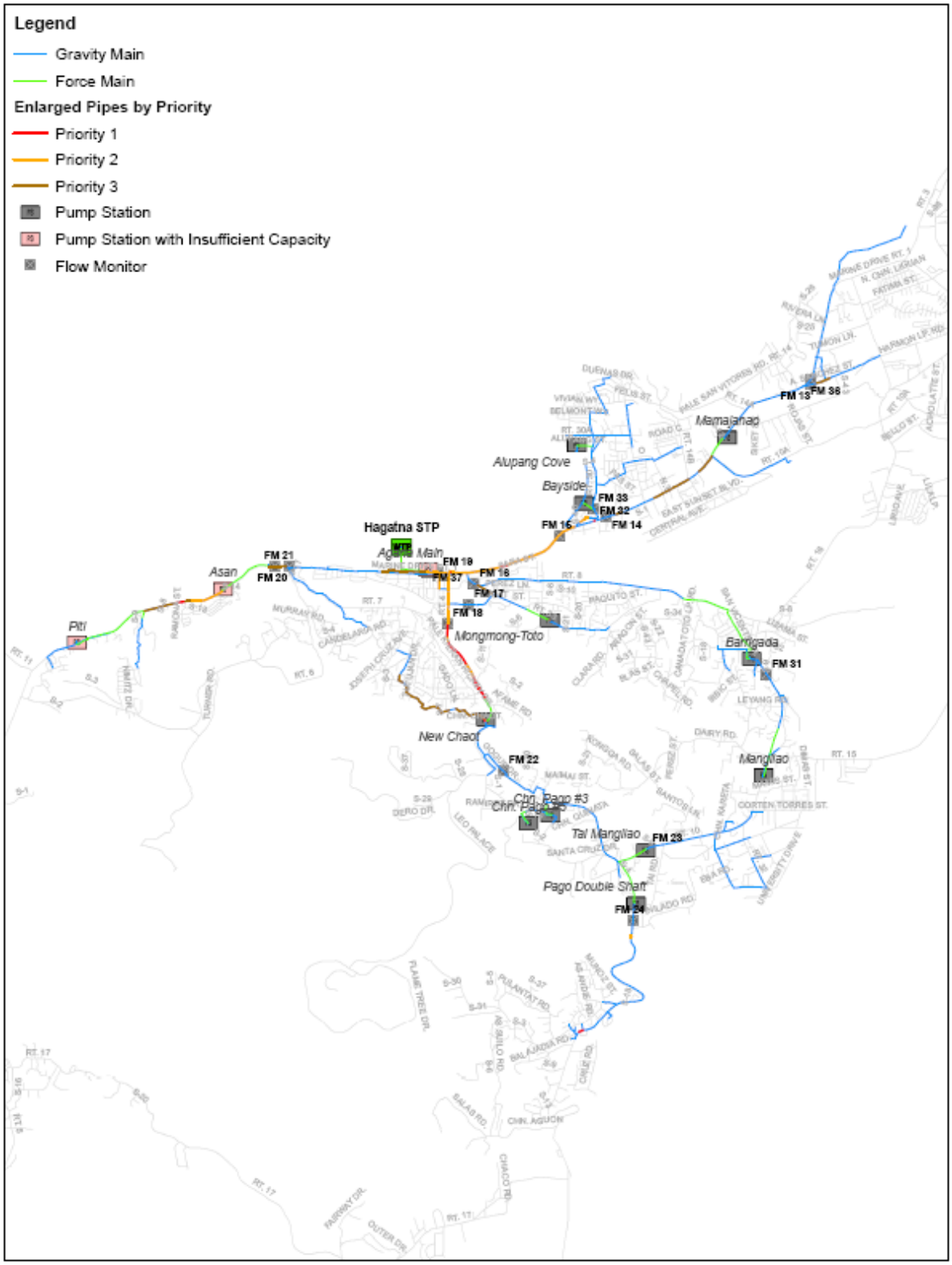

Table 9-11 – Agat-Santa Rita STP Priority 1 Sewer Upgrades

PROJECT SUMMARY		
Project Name	Priority 1 Sewer Upgrades – Agat-Santa Rita STP service area	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.8	
Project Description	1720 feet of sewer were assigned priority 1 for upgrade to avoid overflows as population growth occurs.	
Project Justification	Avoidance of overflows	
Project Budget	$1,200,000	
Funding Source(s)	USEPA: FY 2010 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-11a – Agat-Santa Rita Priority 1 Sewer Upgrades Detail

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft
FM 25	121176	1.6	16	18	1145
FM 25	121273	1.6	16	18	325
FM 25	121275	1.5	16	18	250

Figure 9-10 – Agat-Santa Rita STP Priority 1 Sewer Upgrades

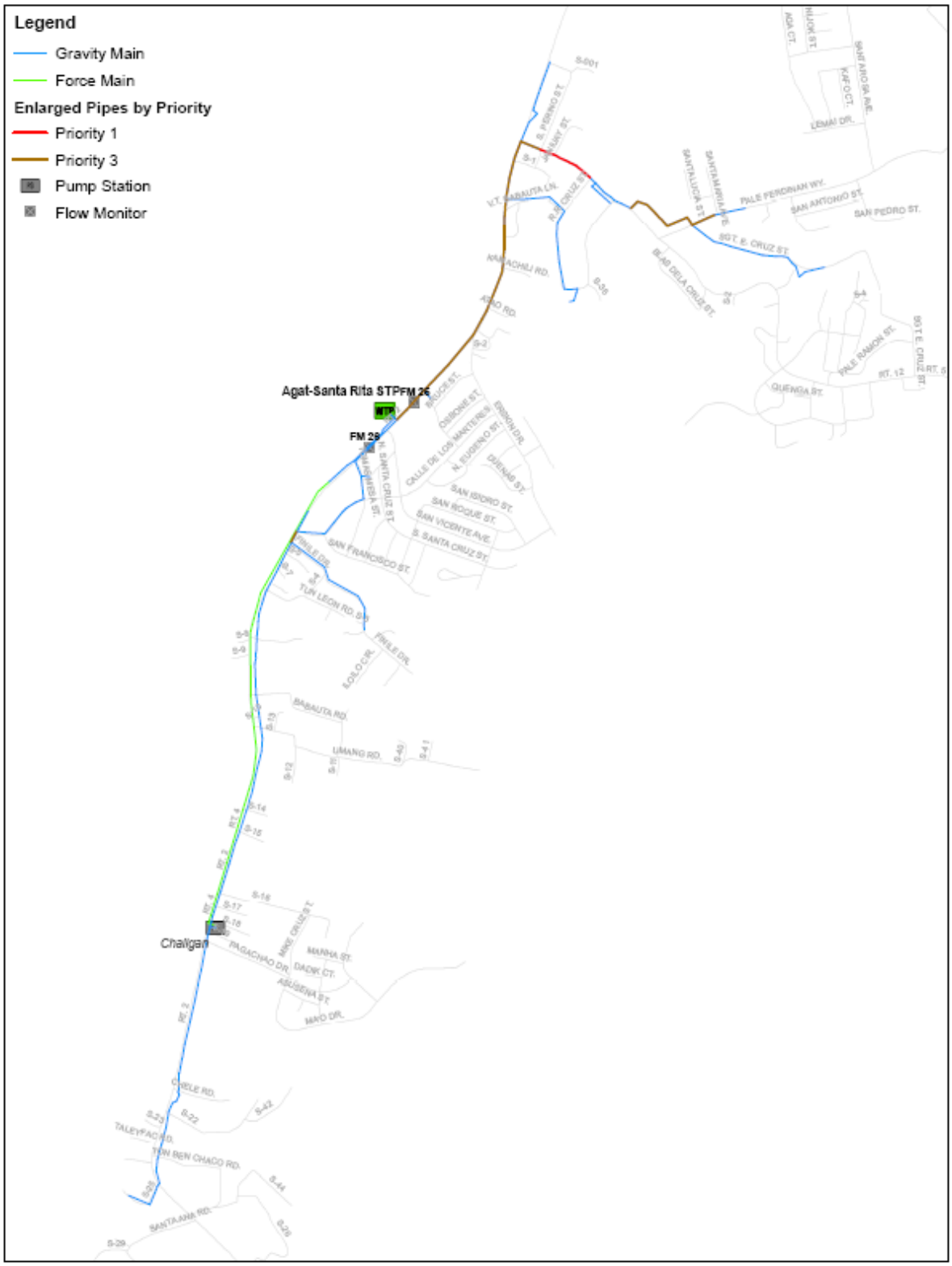

Table 9-12 – Agat-Santa Rita STP Priority 3 Sewer Upgrades

PROJECT SUMMARY		
Project Name	Priority 3 Sewer Upgrades – Agat-Santa Rita STP service area	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	13.8	
Project Description	6300 feet of sewer were assigned priority 3 for upgrade. These sewers where found to surcharge to near the ground surface in the model. They have been assigned lower priority to await field study of I/I sources and correction activities.	
Project Justification		
Project Budget	$4,500,000	
Funding Source(s)	USEPA: FY 2025 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-12a – Agat-Santa Rita STP Priority 3 Sewer Upgrades Detail
(Assess I/I Removal Before Upgrade)

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft
FM 25	121011	2.3	20	24	150
FM 25	121013	2.5	20	21	240
FM 25	121021	2.3	20	24	133
FM 25	121051	2.2	20	24	122
FM 25	121055	2.2	20	24	300
FM 25	121059	2.1	20	24	300
FM 25	121063	2.1	20	24	283
FM 25	121065	2.1	20	24	317
FM 25	121157	2.1	20	24	300
FM 25	121166	1.6	18	21	258
FM 25	121168	1.8	20	21	367
FM 25	121170	1.8	20	21	267
FM 25	121172	1.8	20	21	300
FM 25	121173	2.1	20	24	217
FM 25	121402	1.4	14	18	275
FM 25	121408	1.5	14	18	150
FM 25	121410	1.5	14	18	210
FM 25	121411	1.5	14	18	210
FM 25	121801	1.4	14	18	165
FM 25	122919	0.7	12	14	313
FM 25	998009	2.3	20	24	217
FM 25	121011A	2.5	20	24	200
FM 25	121051A	2.2	20	24	235
FM 25	121015	2.5	20	21	230
FM 26	125769	0.3	8	10	350

Figure 9-11 – Agat-Santa Rita STP Priority 3 Sewer Upgrades

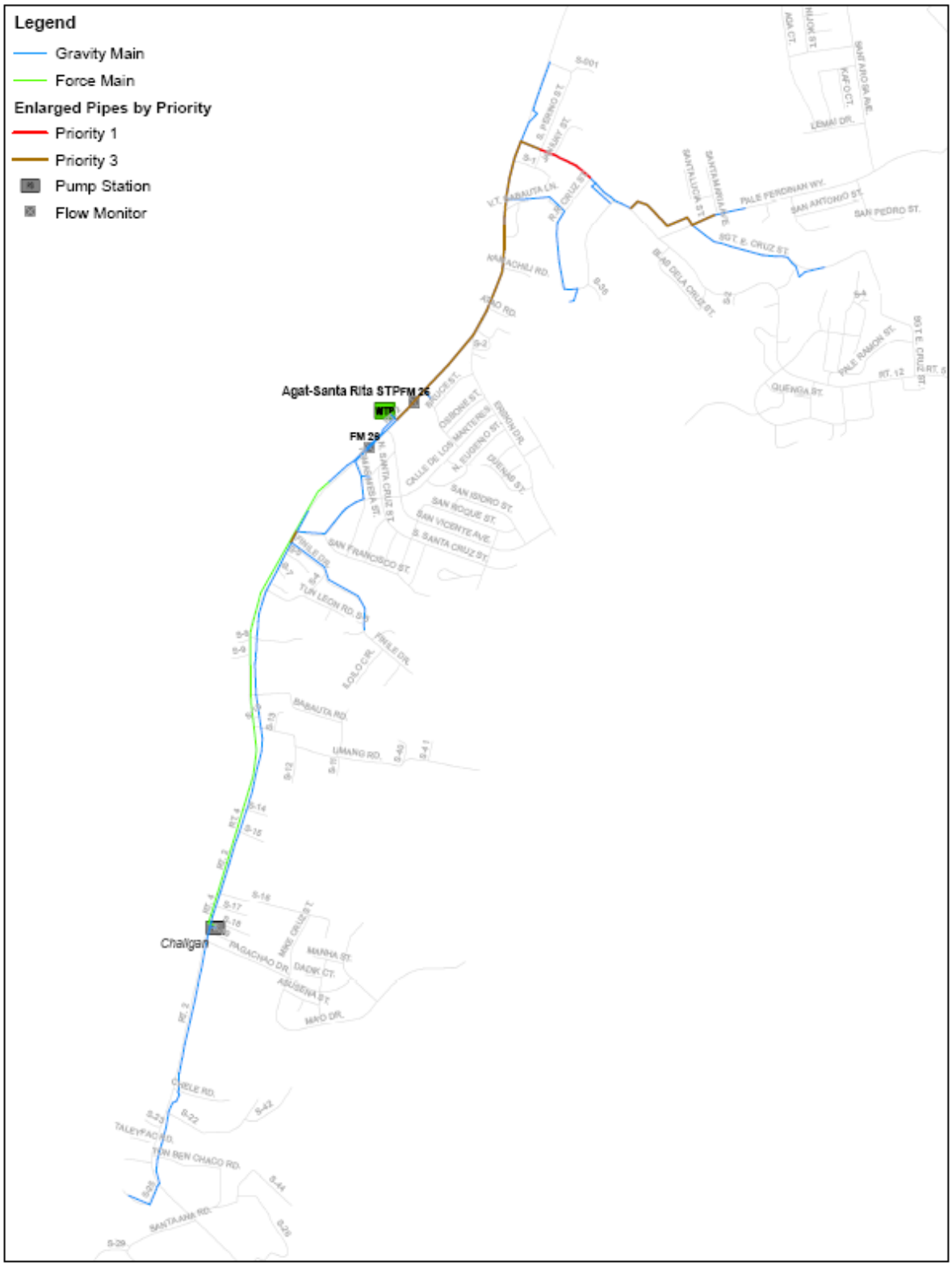

Table 9-13 – Baza Gardens STP Priority 1 Sewer Upgrades

PROJECT SUMMARY		
Project Name	Upgrade Priority 1 sewers in the Baza Gardens STP service area	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.8	
Project Description	1,600 feet of sewers have been assigned a Priority 1 ranking for improvement in the Baza Gardens STP service area to respond to growth in the connected population. These sewers should be addressed when areas in the Talofofo pump station service area that have currently unconnected sewers are brought on-line. The Talofofo pump station capacity should be examined at the same time.	
Project Justification	Avoidance of overflows	
Project Budget	$650,000	
Funding Source(s)	USEPA: FY 2010 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-13a – Baza Gardens Priority 1 Sewer Upgrades Detail

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft
FM 27	809048	0.6	10	12	320
FM 27	997811	1.5	10	12	174
FM 27	997812	1.5	10	12	168
FM 27	997813	1.5	10	12	137
FM 27	997814	1.5	10	12	149
FM 27	997815	1.5	10	12	253
FM 27	997816	1.6	10	12	119
FM 27	997817	1.6	10	12	232

Figure 9-12 – Baza Gardens STP Priority 1 Sewer Upgrades

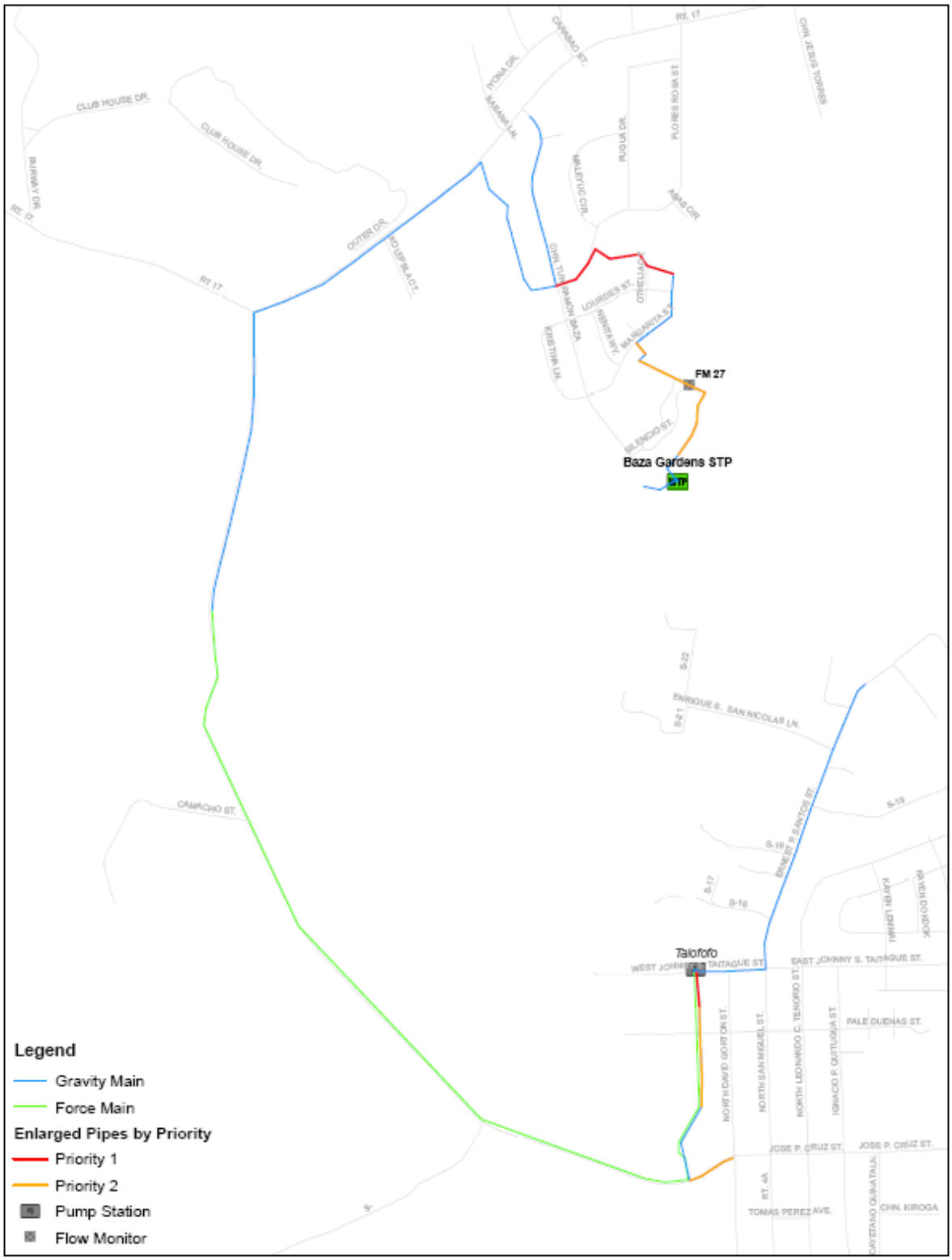

Table 9-14 – Baza Gardens STP Priority 2 Sewer Upgrades

PROJECT SUMMARY		
Project Name	Upgrade Priority 2 sewers in the Baza Gardens STP service area	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	13.8	
Project Description	2600 feet of sewers have been assigned a Priority 2 ranking for improvement in the Baza Gardens STP service area to respond to growth in the connected population. These sewers should be addressed as growth occurs.	
Project Justification	Avoidance of overflows	
Project Budget	$580,000	
Funding Source(s)	USEPA: FY 2020 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-14a – Baza Gardens Priority 2 Sewer Upgrade Detail

Meter	Model/ GIS ID	Max Flow, mgd	Existing Diameter, in	Upsize Diameter in	Length, ft
FM 27	809042	0.5	10	12	300
FM 27	809044	0.6	10	12	315
FM 27	809046	0.6	10	12	195
FM 27	811536	0.5	10	12	310
FM 27	812010	1.7	12	14	126
FM 27	997828	1.7	12	14	454
FM 27	997831	0.5	10	12	105
Baza TP	811997	1.8	15	18	145
Baza TP	811999	1.8	15	18	118
Baza TP	812001	1.8	15	18	194
Baza TP	812004	1.8	15	18	167
Baza TP	812005	1.8	15	18	132

Figure 9-13 – Baza Gardens STP Priority 2 Sewer Upgrades

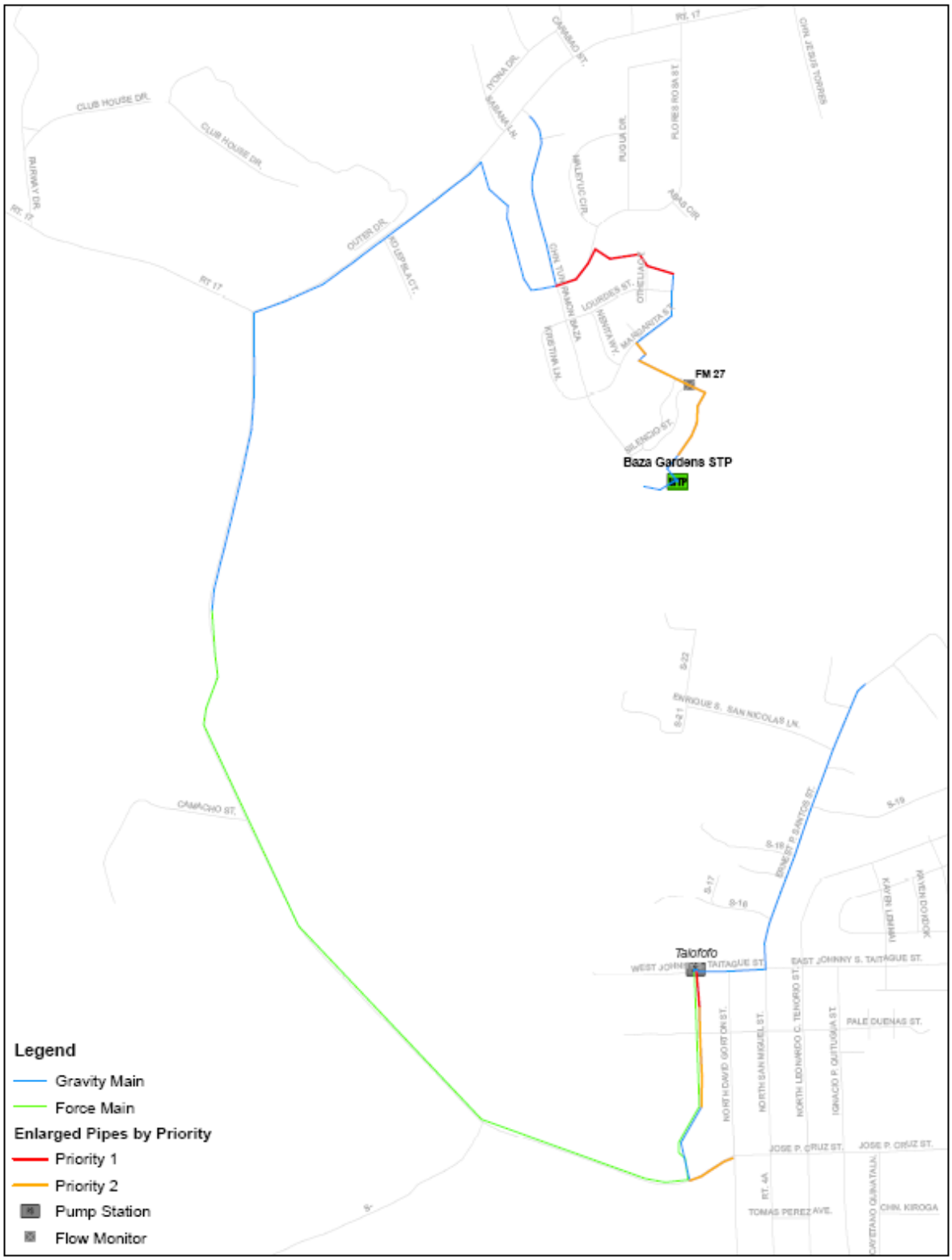

Table 9-15 – Inarajan STP Pressure Sewer Upgrades

PROJECT SUMMARY		
Project Name	Convert sewer in Chagamin Ave. to a Pressure Sewer	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.8	
Project Description	The GIS database includes an 8-in sewer in Chagamin Ave. with low-lying manholes which may overflow in the event of a problem at the Inarajan Main pump station. The water depths measured during the August 31, 2005 monitoring exceeded the apparent elevation of manholes between Chalan Tun Juan Street and the pump station. Conversion of this 1600 feet segment of sewer to a pressure sewer would avoid potential overflows. The reliability of the pump station should be examined.	
Project Justification	Avoidance of overflows	
Project Budget	$1,200,000	
Funding Source(s)	USEPA: FY 2010 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Figure 9-14 – Inarajan STP Pressure Sewer Upgrades

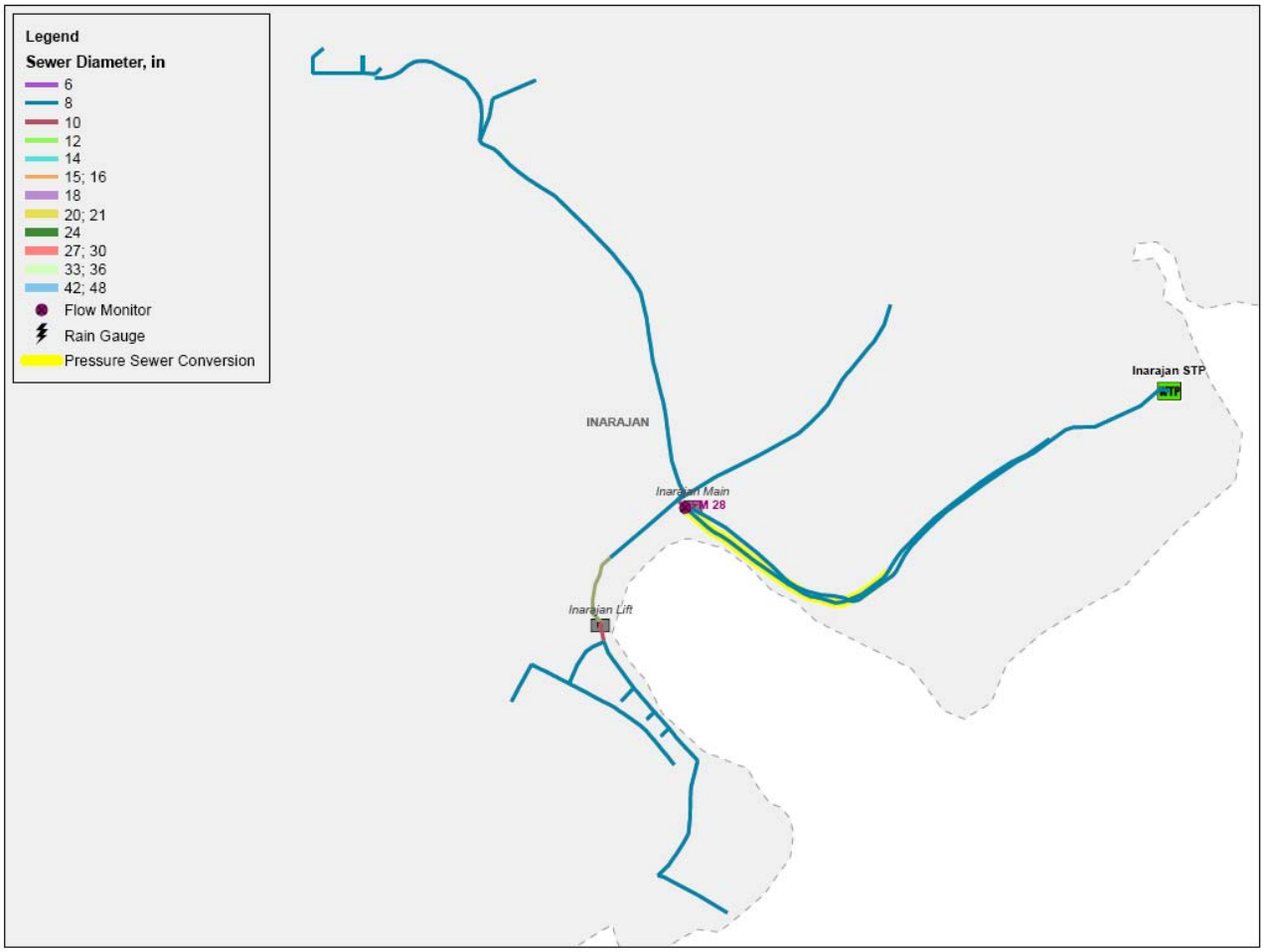

Table 9-16 – NDSTP and Hagatna STP Unsewered Properties – Sewer Hook-ups

PROJECT SUMMARY		
Project Name	Provide sewer service to 843 properties near existing sewers and within 1000 feet of a deep well in the NDSTP and Hagatna STP service areas	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☒ Other Well Head Protection
Pairwise Points	17.0	
Project Description	843 accounts were identified by WERI (see Chapter 3-6) that are within 200 feet of existing sewers and within 1000 feet of a water supply well which have water accounts but no sewer accounts. Research these properties and provide hook-ups to the existing sewers were no connection exists.	
Project Justification	Protection of water source	
Project Budget	$6,500,000 (Assume $1,300,000 per year for 5 years beginning 2012.)	
Funding Source(s)	Guam EPA Sewer Hook-up Revolving Fund	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Figure 9-15 – NDSTP Unsewered Properties – Sewer Hook-ups

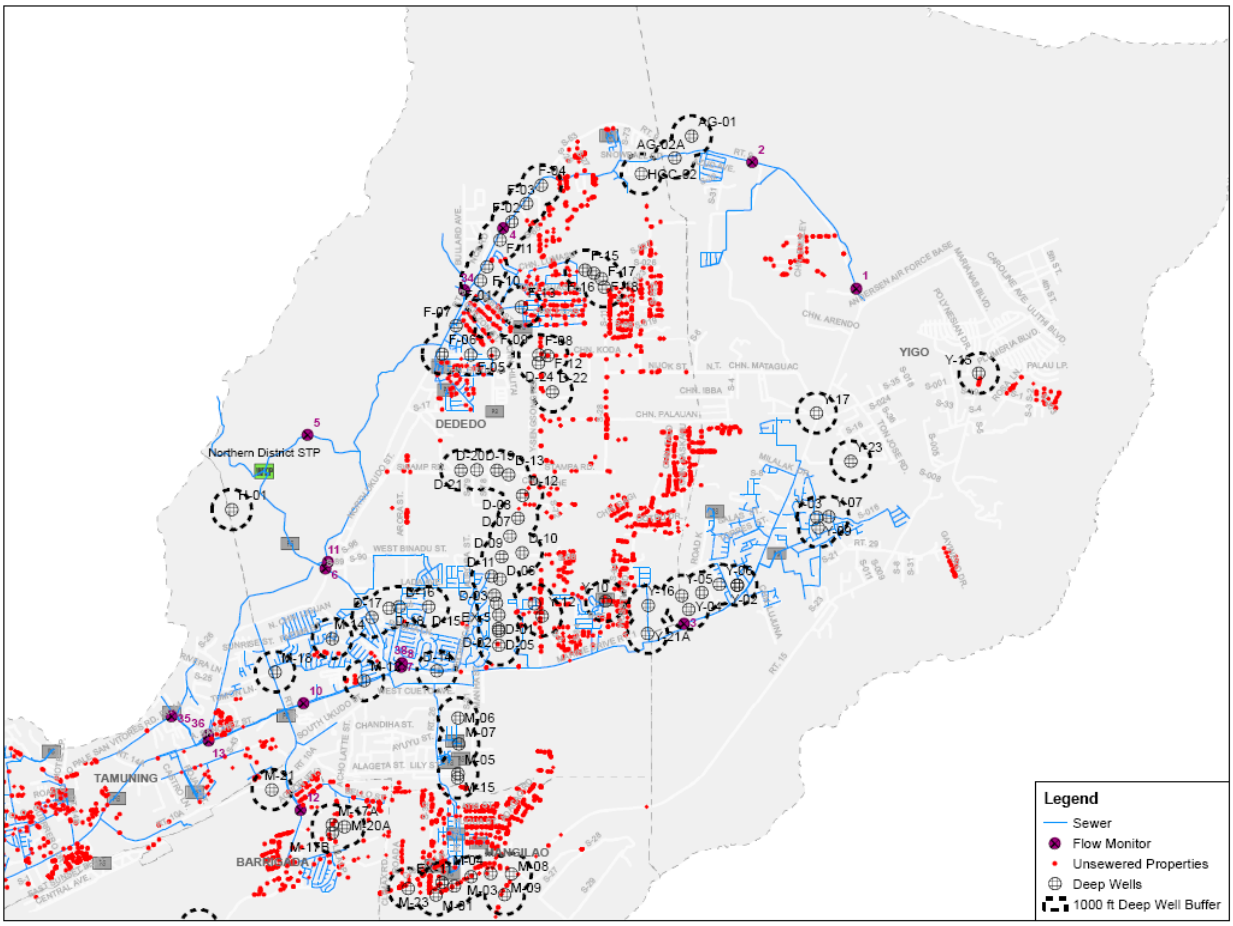

Figure 9-16 – Hagatna STP Unsewered Properties – Sewer Hook-ups

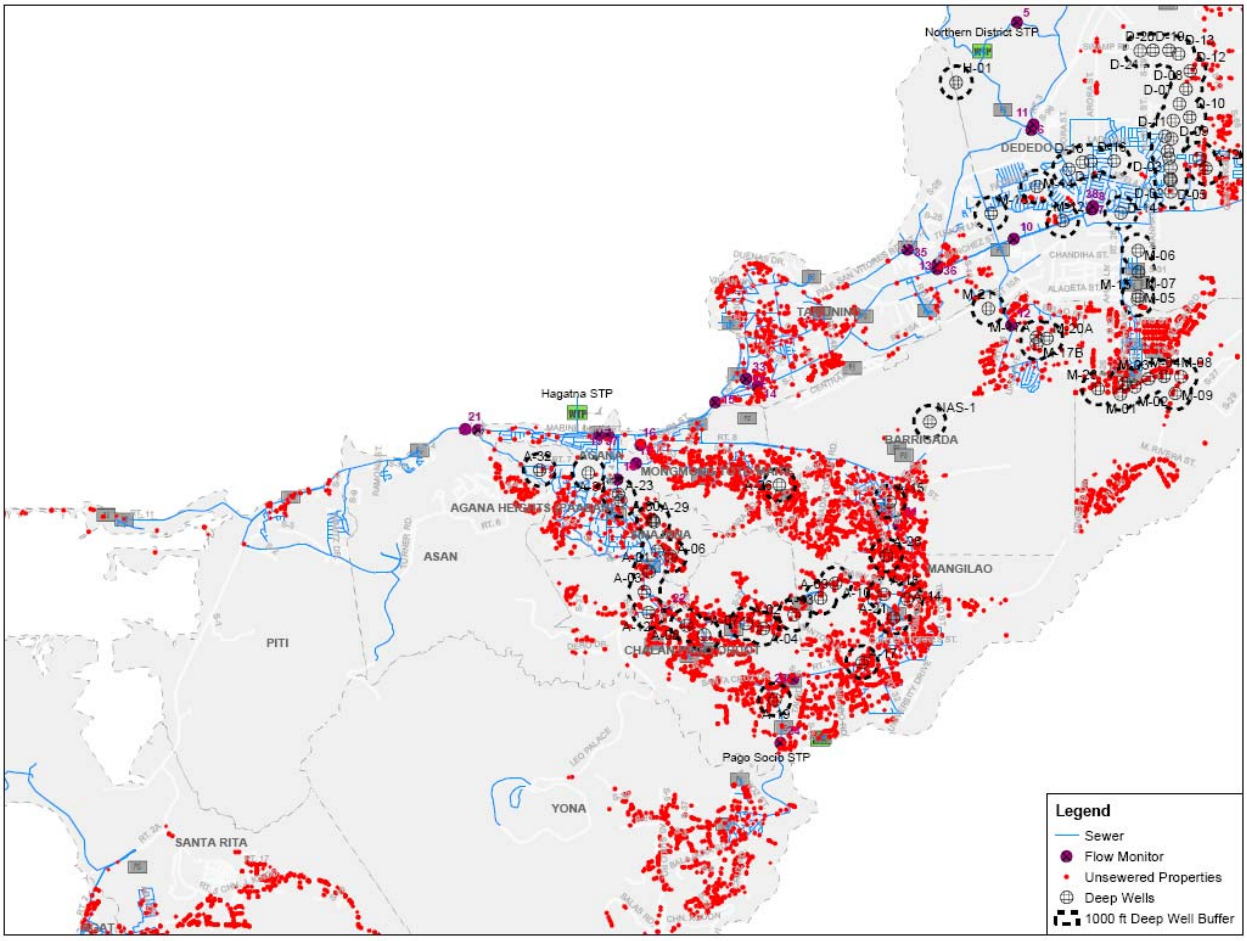

Table 9-16a – NDSTP and Hagatna STP Unsewered Properties – Sewer Hook-ups Connection Detail

Deep Well Name	Unsewered Properties	Connect to Existing Sewers	Require New Sewers	Estimated Feet of New Sewers
A-01	17	11	6	600
A-02	56	25	31	1100
A-03	4	3	1	450
A-04	35	27	8	1600
A-05	5	5	0	
A-06	36	21	15	1300
A-07	51	51	0	
A-08	46	46	0	
A-09	8	7	1	1000
A-10	20	19	1	450
A-12	40	33	7	750
A-13	26	4	22	1500
A-14	70	55	15	1300
A-15	54	38	16	1400
A-17	60	59	1	750
A-18	30	30	0	
A-19	69	44	25	2200
A-21	26	22	4	900
A-23	5	5	0	
A-25	7	7	0	
A-26	67	6	61	4500
A-28	114	108	6	400
A-29	3	3	0	
A-30	20	20	0	
A-31	3	3	0	
A-32	12	12	0	
D-04	2	2	0	
D-05	1	0	1	350
D-12	10	0	10	6200
D-16	1	1	0	
D-22	6	0	6	3300
D-24	7	0	7	
EX-11	47	24	23	3500
F-01	1	1	0	
F-02	2	0	2	1000
F-04	13	11	2	450
F-05	19	19	0	

Table 9-16a – NDSTP and Hagatna STP Unsewered Properties –
Sewer Hook-ups Connection Detail (continued)

Deep Well Name	Unsewered Properties	Connect to Existing Sewers	Require New Sewers	Estimated Feet of New Sewers
F-06	4	4	0	
F-07	14	14	0	
F-08	6	0	6	
F-09	9	9	0	
F-10	4	4	0	
F-12	3	0	3	1300
F-13	14	14	0	
F-15	8	8	0	
F-18	27	0	27	3600
GHURA-501	17	17	0	
M-01	29	0	29	
M-02	7	1	6	800
M-03	9	0	9	600
M-04	20	0	20	4500
M-08	1	0	1	400
M-12	6	6	0	
M-14	4	4	0	
M-15	1	1	0	
M-17A	8	0	8	1500
M-17B	6	6	0	
M-20A	2	2	0	
M-21	3	3	0	
M-23	31	0	31	3500
MJ-1	22	0	22	12000
MJ-5	96	0	96	4300
Y-10	37	14	23	3800
Y-12	18	14	4	2600
Y-15	5	0	5	8100
Y-16	2	0	2	
Total	1406	843	563	82000
Hagatna total	903	675	228	21700
ND total	503	168	335	60300

Table 9-17 – NDSTP and Hagatna STP Unsewered Properties - New Sewers

PROJECT SUMMARY		
Project Name	Provide sewers to service unconnected properties within 1000 feet of water supply wells but not near existing sewers	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☒ Other Well Head Protection
Pairwise Points	17.0	
Project Description	563 properties were identified by WERI (see Volume 3, Chapter 6) that are within 1000 feet of deep wells but not near existing sewers that have water accounts but not sewer accounts. Research these properties and provide new sewers as necessary to provide service. Estimated lengths by deep well are given in Table 9-16a. (Also reference Table 6-9 in Volume 3, Chapter 6.)	
Project Justification	Protection of water source	
Project Budget	$40,500,000 (Assume $2,700,000 per year for 15 years beginning 2012.)	
Funding Source(s)	TBD. GWA may not be able to provide new sewers to existing customers; new legislation or alternative funding may be required.	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-18 – NDSTP and Hagatna STP Unsewered Properties – Additional Sewer Hook-ups

PROJECT SUMMARY		
Project Name	Provide hook-ups for unsewered properties near sewers in the north that are not within 1000 feet of deep wells	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☒ System Capacity ☐ OM&R ☒ Other Well Head Protection
Pairwise Points	13.8	
Project Description	The stipulated order calls for hook-ups of all unsewered properties within 200 feet of existing sewers via a sewer hook-up revolving fund. There are 1963 properties identified by WERI in the North and Hagatna service areas with water accounts but no sewer account.	
Project Justification	Protect water source	
Project Budget	$15,000,000 (Assume $2,700,000 per year for 12 years beginning 2015.)	
Funding Source(s)	Guam EPA: Sewer Hook-up Revolving Fund	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-19 – South System Sewer Hook-ups

PROJECT SUMMARY		
Project Name	Provide sewer hook-ups for unsewered properties in the south	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	17.0	
Project Description	945 properties were identified by WERI in the south systems with water accounts but not sewer accounts, which are within 200 feet of existing sewers. The stipulated order specifies that a sewer hook-up revolving fund be established to provide connections to existing sewers. As water supply protection is not involved, these are scheduled late in the program.	
Project Justification	Regulatory Compliance	
Project Budget	$7,500,000 (Assume $1,500,000 per year for 5 years beginning 2022.)	
Funding Source(s)	Guam EPA: Sewer Revolving Fund	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-20 – Manhole Frame Seal Repair

PROJECT SUMMARY		
Project Name	Manhole Frame Seal Repair	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☒ OM&R ☐ Other _____
Pairwise Points	25.8	
Project Description	Repair the manhole cover frame to barrel/cone seal at multiple manhole locations identified by manhole inspections: 53 in Agat 5 in Yigo 4 in Hagatna	
Project Justification	Will reduce the potential for inflow to the collection system during wet weather events	
Project Budget	$84,000 ($1,000 per manhole with a 35% contingency)	
Funding Source(s)	USEPA: FY 2007 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-21 – Agat Manhole Rehabilitation

PROJECT SUMMARY		
Project Name	Agat – Manhole Rehabilitation	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☒ OM&R ☐ Other _____
Pairwise Points	25.8	
Project Description	Rehabilitate 4 manholes that were identified to have active infiltration by manhole inspection	
Project Justification	Will reduce infiltration to the collection system during wet and dry weather events	
Project Budget	$54,000 ($10,000 per manhole with 35% contingency)	
Funding Source(s)	USEPA: FY 2007 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-22 – Wastewater Collection System Recurring Inspection Program

PROJECT SUMMARY		
Project Name	Wastewater Collection System Recurring Inspection Program	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☒ OM&R ☐ Other _____
Pairwise Points	25.8	
Project Description	Inspect approximately 1/8 (12%) of the collection system each year by CCTV, manhole inspections, or smoke testing. Based on GEPA regulation, all of the sewers within 1,000 feet of a potable water supply well or within the groundwater protection zone must be inspected every 5 years regardless of its priority rating.	
Project Justification	The life span of wastewater collection system piping in 50-100 years. Proactive inspections are required to identify problem areas before system fails. Project findings will identify structural defects and assist in location of inflow or infiltration points. Results will be used to prioritize future CIP projects.	
Project Budget	Assume $610,000 per year. ▪ 1/8 of total gravity collection system inspected each year ▪ 50% of 1/8 of system inspected by manhole inspection (approximately 400 manholes at $300 per manhole) ▪ 25% of 1/8 of system inspected by CCTV (approximately 44,400 feet at $8 per foot) ▪ 25% of 1/8 of system inspected by smoke testing (approximately 44,400 feet at $3 per foot)	
Funding Source(s)	Annual O&M Expense	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-23 – Wastewater Collection System Replacement/Rehabilitation Program

PROJECT SUMMARY		
Project Name	Wastewater Collection System Replacement/Rehabilitation Program	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☒ OM&R ☐ Other _____
Pairwise Points	25.8	
Project Description	Annual recurring design and construction project to replace/rehabilitate 3/4% of the total collection system (~8,600 feet) per year. This would focus on the worst condition pipes not already scheduled for hydraulic related rehab or replacement. The cost is estimated at $240 per foot which assumes an average pipe diameter of 10 inches and does not include the cost of potential traffic control.	
Project Justification	Replacement/rehabilitation program will upgrade sewer collection system as a proactive activity to mitigate catastrophic system failure.	
Project Budget	$2,000,000/year recurring annual funding	
Funding Source(s)	USEPA: FY 2007 - 2025 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-24 – Facilities Plan/Design for the Agat-Santa Rita STP Replacement

PROJECT SUMMARY		
Project Name	Facilities Plan/Design for Agat-Santa Rita STP Replacement	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☒ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	58.9	
Project Description	Planning and design for new wastewater treatment facilities to meet existing and future flow capacity and reliably achieve regulatory compliance. The new facilities will incorporate provisions for redundancy to improve reliability and facilitate operations and maintenance activities. The MP budget model for the new facilities were based on (see Volume III, Chapter 5, Figure 5-21): ▪ mechanically cleaned bar screens ▪ grit removal ▪ primary clarifiers ▪ TFSC process (trickling filters, solids contact tanks, and recirculation pumping station) ▪ secondary clarifiers ▪ effluent pumping ▪ effluent disinfection A minimum of two process/equipment units which are each sized to provide for the 2026 average flow are required to provide complete redundancy, although the option to incorporate more smaller units with one backup unit should be determined in the Facilities Plan. Although future planning costs were based on the TFSC process, the primary purpose of the Facilities Plan is to evaluate various treatment processes to determine the most appropriate treatment method. Evaluation of the feasibility of a jointly funded/operated treatment facility with the Navy should also be performed as a task of the planning work.	
Project Justification	▪ Existing facilities do not have sufficient capacity for current and future flow projections. ▪ Existing facilities lack redundancy and reliability, are difficult to operate, and require significant repair	
Project Budget	Facilities Plan/Design: $3,200,000	
Funding Source(s)	USEPA: FY 2008 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	

Table 9-24 – Facilities Plan/Design for the Agat-Santa Rita STP Replacement (continued)

Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:
Administrative Activities Underway	

Table 9-25 –Agat-Santa Rita STP Replacement

PROJECT SUMMARY		
Project Name	Agat-Santa Rita STP Replacement	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☒ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	58.9	
Project Description	Construction of new wastewater treatment facilities to meet existing and future flow capacity and reliably achieve regulatory compliance. The new facilities will incorporate provisions for redundancy to improve reliability and facilitate operations and maintenance activities. The MP budget model for the new facilities was based on (see Volume III, Chapter 5, Figure 5-21): ▪ mechanically cleaned bar screens ▪ grit removal ▪ primary clarifiers ▪ TFSC process (trickling filters, solids contact tanks, and recirculation pumping station) ▪ secondary clarifiers ▪ effluent pumping ▪ effluent disinfection Actual process design, project details, and construction documents are determined and provided in the Facilities Plan and Design documents.	
Project Justification	▪ Existing facilities do not have sufficient capacity for current and future flow projections. ▪ Existing facilities lack redundancy and reliability, are difficult to operate, and require significant repair.	
Project Budget	New Treatment Facilities: $30,000,000	
Funding Source(s)	USEPA: FY 2012 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-26 – Facilities Plan/Design for the Baza Gardens STP Replacement

PROJECT SUMMARY		
Project Name	Facilities Plan/Design for Baza Gardens STP Replacement	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☒ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	45.1	
Project Description	Planning and design for new wastewater treatment facilities to reliably meet secondary treatment limits. Due to strict effluent limits impose by the stream discharge, and difficulty in operating complex treatment systems to reliably meet these limits, an alternative means of disposal should be considered in the Facility Plan. Facility Plan process recommendations will be based on the recommended alternative means of disposal. The new facilities will incorporate provisions for redundancy to improve reliability and facilitate operations and maintenance activities. The MP budget model for the new facilities were based on (see Volume III, Chapter 5, Figure 5-47): ▪ mechanically cleaned bar screens ▪ grit removal ▪ primary clarifiers ▪ TFSC process (trickling filters, solids contact tanks, and recirculation pumping station) ▪ secondary clarifiers ▪ effluent pumping ▪ effluent disinfection ▪ two 300 feet injection wells A minimum of two process/equipment units which are each sized to provide for the 2026 average flow are required to provide complete redundancy, although the option to incorporate more smaller units with one backup unit should be determined in the Facilities Plan. Although future planning costs were based on the TFSC process, the primary purpose of the Facilities Plan is to evaluate various treatment processes to determine the most appropriate disposal and treatment methods.	
Project Justification	▪ Existing facilities lack redundancy and reliability, are difficult to operate, and require significant repair. ▪ Existing disposal requirements cannot be achieved, so a different effluent disposal system must be identified.	
Project Budget	$2,000,000	
Funding Source(s)	USEPA: FY 2007 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	

Table 9-26 – Facilities Plan/Design for the Baza Gardens STP Replacement (continued)

Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:
Administrative Activities Underway	

Table 9-27 – Baza Gardens STP Replacement

PROJECT SUMMARY		
Project Name	Baza Gardens STP Replacement	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☒ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	45.1	
Project Description	Construction of new wastewater treatment facilities to reliably meet secondary treatment limits. In order to achieve regulatory compliance it is assumed that a new means of disposal will be constructed. The new facilities will incorporate provisions for redundancy to improve reliability and facilitate operations and maintenance activities. The MP budget model for the new facilities was based on the following (see Volume III, Chapter 5, Figure 5-47): ▪ mechanically cleaned bar screens ▪ grit removal ▪ primary clarifiers ▪ TFSC process (trickling filters, solids contact tanks, and recirculation pumping station) ▪ secondary clarifiers ▪ effluent pumping ▪ effluent disinfection two ▪ 300 feet injection wells Actual process design, project details, and construction documents are determined and provided in the Facilities Plan and Design documents.	
Project Justification	▪ Existing facilities lack redundancy and reliability, are difficult to operate, and require significant repair. • Existing disposal requirements cannot be achieved, so a different effluent disposal system must be constructed.	
Project Budget	$18,000,000	
Funding Source(s)	USEPA: FY 2011 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-28 – Facilities Plan/Design for Hagatna STP Improvements & Effluent WWPS

PROJECT SUMMARY		
Project Name	Facilities Plan for Hagatna STP Improvements & Effluent WWPS	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☒ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	41.9	
Project Description	Planning and design for wastewater treatment plant improvements. The following improvements should be considered: ▪ Based on current and future flow projections, at least one additional primary clarifier of similar size is required to meet current and future wastewater capacity and redundancy requirements. ▪ New headworks equipment (including mechanically cleaned screens and grit removal) is recommended to improve process performance, reduce wear on downstream equipment, and improve reliability. ▪ A new effluent pump station is required for the disposal of future flows at high tide conditions.	
Project Justification	Existing facilities lack redundancy to reliably treat existing and projected future flows. The Upstream screening facilities at the influent pump station are not functional and beyond repair. Relocating the preliminary treatment equipment to the STP will enhance operations and maintenance of the screens. Grit removal will reduce the amount of grit that gets into the clarifier and digester, improving performance and reducing O&M requirements.	
Project Budget	$ 1,900,000	
Funding Source(s)	USEPA: FY 2013 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-29 – Hagatna STP Improvements & Effluent WWPS

PROJECT SUMMARY		
Project Name	Hagatna STP Improvements and Effluent WWPS	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☒ System Redundancy	☒ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	41.9	
Project Description	Provide a new primary clarifier to meet current and future wastewater capacity and redundancy requirements. Provide screenings and grit removal for wastewater treatment plant improvements. The new headworks equipment will improve performance, reduce wear on equipment, and improve reliability. The new equipment includes screenings, grit removal and effluent WWPS sized for current and future (Year 2015 projected flow).	
Project Justification	Existing facilities lack redundancy to reliably treat existing and projected future flows. The upstream screening facilities at the Hagatna influent pump station are not functional and beyond repair. Relocating equipment at the STP will enhance operations and maintenance of the screens. Grit removal will reduce the amount of grit that gets into the clarifier and digester, improving performance and reducing O&M requirements. Effluent WWPS required to convey effluent to outfall during high flow and tide periods.	
Project Budget	$18,000,000	
Funding Source(s)	USEPA: FY 2015 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-30 – Facilities Plan/Design for Inarajan STP Expansion

PROJECT SUMMARY		
Project Name	Facilities Plan/Design for Inarajan STP Improvements	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☒ OM&R ☐ Other _____
Pairwise Points	25.8	
Project Description	Planning and design to improve process performance and enhance O&M requirements We recommend that the Facility Plan consider addition of mechanically cleaned bar screens to enhance performance and reduce O&M requirements.	
Project Justification	Screenings improvements will reduce manpower requirements, and reliably remove undesirable material from entering the pond.	
Project Budget	$ 190,000	
Funding Source(s)	USEPA: FY 2016 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-31 – Inarajan STP Expansion

PROJECT SUMMARY		
Project Name	Inarajan STP Improvements	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☒ OM&R ☐ Other _____
Pairwise Points	25.8	
Project Description	Construction of plant improvements identified in the Facilities Plan to improve process performance and enhance O&M requirements We recommend the addition of mechanically cleaned bar screens to enhance performance and reduce O&M requirements.	
Project Justification	Screenings improvements will reduce manpower requirements, and reliably remove undesirable material from entering the pond.	
Project Budget	$420,000	
Funding Source(s)	USEPA: FY 2018 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-32 – Facilities Plan/Design for the Northern District STP Biosolids

PROJECT SUMMARY		
Project Name	Facilities Plan/Design for the Northern District STP Biosolids Treatment Facilities	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.1	
Project Description	Planning and design for repairs to the biosolids stabilization facilities (digesters) and dewatering system (centrifuges) for present and future flows. Facility Plan should include an evaluation of creating a centralized biosolids treatment and processing facility at this location. Evaluation should include consideration for: ▪ cogeneration opportunities ▪ processing and trucking of biosolids from other facilities ▪ downstream centrate affects ▪ biosolids reuse and disposal alternatives ▪ other stabilization options (anaerobic,vs. aerobic, operating temperature, etc) and system improvements if anaerobic digestion is recommended ▪ dewatering evaluation (centrifuge, filter press, etc.) and facilities improvements. Project assumed to be done in two phases.	
Project Justification	▪ Existing biosolids treatment facilities were damaged by the typhoon and have been out of service. ▪ Centralized processing of biosolids from smaller STPs may be more reliable and efficient than the current decentralized approach. ▪ The capacity of the existing solids treatment facilities should be adequate to process the solids from GWA's other treatment plants, although lacks redundancy.	
Project Budget	$2,300,000 (FY 2007-$500,000; FY 2016-$1,800,000)	
Funding Source(s)	USEPA: FY 2016 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-33 – Northern District STP Expansion – Biosolids

PROJECT SUMMARY		
Project Name	Northern District STP Biosolids Treatment Facilities	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	30.1	
Project Description	Construction of repairs to the biosolids stabilization facilities (digesters) and dewatering system (centrifuges) for present and future flows. Design will be based on Facilities Plan recommendations. Master Plan construction budget is based on repairs to existing anaerobic digesters, construction of one additional digester tank to provide redundancy and new centrifuge facilities to serve as\ a centralized facility for treating GWA biosolids Project assumed to be built in two phases.	
Project Justification	▪ Existing biosolids treatment facilities experienced typhoon damage and have been out of service. ▪ Centralized processing of biosolids from smaller STPs may be more reliable and efficient than the current decentralized approach ▪ The capacity of the existing solids treatment facilities should be adequate to process the solids from GWA's other treatment plants, although lacks redundancy.	
Project Budget	$21,000,000 (FY 2009 - $5,000,000; FY2017 - $16,000,000)	
Funding Source(s)	USEPA: FY 2009 and 2017 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-34 – Facilities Plan/Design for the Northern District STP Expansion

PROJECT SUMMARY		
Project Name	Facilities Plan/Design for Northern District STP Expansion	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☒ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	25.6	
Project Description	Planning and design for a new primary clarifier to meet current and future wastewater capacity and redundancy requirements. In addition, planning should consider replacement of existing comminutors with mechanically cleaned screens.	
Project Justification	▪ Existing facilities lack redundancy to reliably treat existing and projected future flows. ▪ Mechanically cleaned bar screens will enhance performance and reduce O&M requirements.	
Project Budget	$1,200,000	
Funding Source(s)	USEPA: FY 2013 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-35 – Northern District STP Expansion

PROJECT SUMMARY		
Project Name	Northern District STP Expansion	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☒ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	25.6	
Project Description	Construction of a new primary clarifier to meet current and future wastewater capacity and redundancy requirements. Replacement of comminutors with mechanically cleaned screens.	
Project Justification	▪ Existing facilities lack redundancy to reliably treat existing and projected future flows. ▪ Mechanically cleaned bar screens will enhance performance and reduce O&M requirements.	
Project Budget	$10,000,000	
Funding Source(s)	USEPA: FY 2015 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-36 – Facilities Plan/Design for the Umatac-Merizo STP Improvements

PROJECT SUMMARY		
Project Name	Facilities Plan/Design for Umatac-Merizo STP Improvements	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☒ OM&R ☐ Other _____
Pairwise Points	25.8	
Project Description	Planning and design for a new mechanically cleaned bar screen facilities to improve reliability and facilitate operations and maintenance requirements.	
Project Justification	Mechanically cleaned bar screens will improve process performance and reduce O&M requirements.	
Project Budget	$140,000	
Funding Source(s)	USEPA: FY 2012 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-37 – Umatac-Merizo STP Improvements

PROJECT SUMMARY		
Project Name	Umatac-Merizo STP Improvements	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☒ OM&R ☐ Other _____
Pairwise Points	25.8	
Project Description	Construction of new mechanically cleaned bar screen facilities to improve reliability and facilitate operations and maintenance requirements.	
Project Justification	Mechanically cleaned bar screens will improve process and reduce O&M requirements.	
Project Budget	$420,000	
Funding Source(s)	USEPA: FY 2013 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-38 – Pago Socio STP Conversion

PROJECT SUMMARY		
Project Name	Pago Socio STP Conversion	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☒ OM&R ☐ Other _____
Pairwise Points	25.8	
Project Description	The Pago-Socio STP was built by a developer to serve 16 homes and was dedicated to GWA for operation and maintenance. It is a Class II facility as designated by GEPA. It consists of a packaged aerated treatment unit and a series of six subsurface percolation pits. Currently, the aeration system is not operating. This project includes constructing a new pump station and force main to convey the flow to the Hagatna collection system for treatment at the regional facility.	
Project Justification	The packaged aerated treatment unit is not working and has been difficult to maintain. Operation would be greatly improved by constructing a pump station and force main to convey the flow to the Hagatna collection system.	
Project Budget	$3,700,000	
Funding Source(s)	USEPA: FY 2016 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-39 – Electrical Upgrade – Agat-Santa Rita STP

PROJECT SUMMARY		
Project Name	Agat-Santa Rita STP - Electrical Upgrade	
Project Type	☒ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	38.1	
Project Description	This project is for the electrical upgrade at the Agat STP to replace the existing Main Distribution Board, Auto Transfer Switch, Motor Control Center, and install new underground duct from the Plant Building to the Generator Building. This project also replaces the motors with premium efficiency type, install transient voltage surge suppression (TVSS) equipment, and add power factor correction capacitors to reduce energy and improve the voltage stability. Included are a detailed engineering assessment and the preparation of design plans for the work involved.	
Project Justification	The Plant Building is powered through an overhead line from the emergency generator building. The present main distribution board and auto transfer switch is outdated and reached its expected useful life. The Motor Control Center has been modified and reached its useful life.	
Project Budget	$400,000	
Funding Source(s)	USEPA: FY 2007 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-40 – Electrical Upgrade – Baza Gardens STP

PROJECT SUMMARY		
Project Name	Baza Gardens STP - Electrical Upgrade	
Project Type	☒ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	38.1	
Project Description	This project is for the electrical upgrade at the Baza Gardens STP to replace the existing Main Distribution Board and Auto Transfer Switch, upgrade with premium efficiency motors, install transient voltage surge suppression equipment (TVSS), improve the system grounding, and add power factor correction capacitors. Included is a detailed engineering assessment and preparation of design plans.	
Project Justification	The useful life of the main distribution equipment and auto transfer switch are scheduled for replacement. The improvements in efficiency and power factor correction are to reduce the energy consumption and stabilize the voltage. The addition of surge suppression equipment is to limit the effects of power surges within the plant.	
Project Budget	$300,000	
Funding Source(s)	USEPA: FY 2011 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-41 – Electrical Upgrade – Northern District STP

PROJECT SUMMARY		
Project Name	Northern STP - Electrical Upgrade	
Project Type	☒ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	38.1	
Project Description	This project is for the electrical upgrade at the Northern STP to replace the existing Main Distribution Board, Auto Transfer Switch, Motor Control Centers at the Digester, Centrifuge, Headworks, and Chlorination Buildings. Premium efficiency motors, transient voltage surge suppression equipment (TVSS), improvements in system grounding, and power factor correction capacitors will also be added. This includes a detailed engineering assessment and preparation of design plans and specifications.	
Project Justification	The original distribution board and motor control center has reached their useful life and have extensive signs of corrosion. Improvements in motor efficiency reduce energy costs and addition of Power factor correction improve the voltage stability. Inclusion of transient surge suppressions reduce plant voltage surges.	
Project Budget	$1,900,000	
Funding Source(s)	USEPA: FY 2008 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-42 – Electrical Upgrade – Umatac-Merizo STP

PROJECT SUMMARY		
Project Name	Umatac-Merizo STP - Electrical Upgrade	
Project Type	☒ Life and Safety ☐ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	38.1	
Project Description	This project is for the electrical upgrade at the Umatac–Merizo STP to replace the aging Motor Control Center, improve system grounding, and add transient voltage surge suppression equipment (TVSS). The major electrical aeration motors with be replaced with premium efficiency type to save energy. Included is a detailed engineering assessment and design plan preparation.	
Project Justification	The Motor Control Center has reached its useful life expectancy. The addition of surge suppression and grounding will limit the effects of power surges within the plant.	
Project Budget	$300,000	
Funding Source(s)	USEPA: FY 2009 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-43 – Wastewater Pump Station Electrical Upgrade

PROJECT SUMMARY		
Project Name	Wastewater Pump Station Electrical Upgrade	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	33.3	
Project Description	This project is to upgrade and standardize the electrical control system at the wastewater pumping stations as recommended in the GWA WRMP Report. An initial assessment using a standard checklist will be conducted. Project scope will include the reconnection of the electrical service to a grounded WYE system involve replacement of the electrical meter and service conductors. Transient voltage surge suppression will also be installed at the station main service. The level control system will be standardized with a level transducer to provide level indication and communication with the SCADA unit. The back-up will be a float located out of the wet well. Also included are dry well level sensor alarms that are connected to SCADA, where applicable. The motor starters will be replaced with electronic soft start type to reduce mechanical wear.	
Project Justification	This project is to improve the electrical reliability at each of the wastewater pump stations and minimize overflows by implementing the recommendations of the GWA WRMP. Priority stations that are critical to operations are to be completed first.	
Project Budget	$1,000,000	
Funding Source(s)	USEPA: FY 2007 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-44 – GWA SCADA System – Phase 1

PROJECT SUMMARY		
Project Name	GWA SCADA System Improvements– Phase 1	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	16.3	
Project Description	Phase 1 of this project includes reconnecting the existing Motorola SCADA System at the 21 Critical Water Wells and 10 Critical Wastewater Pumping Stations along with the Critical Chlorination System Wells, would be quickly activated and updated utilizing, in many cases, equipment already in place. The existing Government of Guam Public Safety radio system would be incorporated to convey SCADA data and status information to a GWA Central Dispatch Center where digital text messaging would be directed to key personnel.	
Project Justification	GWA present method of monitoring the water and wastewater pumping stations is through the use of "rover" personnel to visit each site. Often times this does not produce timely notification of an outage or overflow condition. A GWA SCADA (Supervisory Control and Data Acquisition) System would allow 24/7 monitoring and provide timely alarm and status information to operations personnel. This will greatly enhance the effective and efficient use of GWA personnel and resources.	
Project Budget	$250,000	
Funding Source(s)	USEPA: FY 2007 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-45 – GWA SCADA System – Phase 2

PROJECT SUMMARY		
Project Name	GWA SCADA Improvements– Phase 2	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	16.3	
Project Description	In Phase 1 of this project, the critical water and wastewater pumping stations are monitored by activating and updating the existing Motorola SCADA system. In this phase of the project, the balance of the pumping stations and the treatment facilities are updated and incorporated into the GWA SCADA System. The treatment facility alarms would be identified and activated to a digital telephone text messaging unit to call key operations personnel related to that specific area.	
Project Justification	This phase is a continuation of this project to improve the efficiency and effective utilization of GWA personnel and performance of the water and wastewater pumping systems.	
Project Budget	$1,100,000	
Funding Source(s)	USEPA: FY 2008 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-46 – GWA SCADA System – Phase 3

PROJECT SUMMARY		
Project Name	GWA SCADA Improvements – Phase 3	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	16.3	
Project Description	In Phase 3 of this Project, improvements in real time data acquisition for status monitoring and process control is expanded at the treatment facilities through the incorporation of Programmable Logic Controllers (PLCs). The data is conveyed to the GWA Central as well as identified engineering and operations personnel for analysis and process optimization through the use of Virtual Private Networks (VPNs) or other available secured technology. Further improvements and updating of the pumping station SCADA monitoring would be expanded using digital communications (the Gov Guam system is scheduled to be updated during this period) and the radio units would require replacement.	
Project Justification	This phase is a continuation of this project to improve the efficiency and effective utilization of GWA personnel and performance of the water and wastewater pumping systems.	
Project Budget	$2,500,000	
Funding Source(s)	USEPA: FY 2009 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-47 – GWA SCADA System – Phase 4

PROJECT SUMMARY		
Project Name	GWA SCADA Improvements – Phase 4	
Project Type	☐ Life and Safety ☒ Regulatory Compliance ☒ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☐ Other _____
Pairwise Points	16.3	
Project Description	In this Phase 4 of the project, accounting information such as equipment and part costs along with the condition data such as equipment operating time and preventive/predictive maintenance programs are to be incorporated into a asset management program. This portion is for the SCADA system role in being incorporated into the overall asset management program and for the updating of the SCADA equipment and hardware and software.	
Project Justification	This phase is a continuation of this project to improve the efficiency and effective utilization of GWA personnel and performance of the water and wastewater pumping systems.	
Project Budget	$850,000	
Funding Source(s)	USEPA: FY 2010 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		

Table 9-48 – GIS

PROJECT SUMMARY		
Project Name	Water and Wastewater Field Data Collection	
Project Type	☐ Life and Safety ☐ Regulatory Compliance ☐ System Reliability ☐ System Redundancy	☐ System Capacity ☐ OM&R ☒ Other Data collection and verification
Pairwise Points		
Project Description	Identify areas where water distribution and wastewater collection system assets are not represented in the GIS. Collect data needed to properly document the assets location using GPS, physical attributes (i.e. invert of manhole, pipe diameter, pipe material, etc).	
Project Justification	Project will further improve the quality and quantity of data available in the GIS. Data can be used for asset management, hydraulic model and other data analysis.	
Project Budget	$160,000	
Funding Source(s)	USEPA: FY 2007- 2011 Bond Issuance:	
GWA Project Manager		
Contractor, if any	Design: Construction:	
Project Schedule	Design Start: Design Completion: Construction Start: Construction Completion:	
Administrative Activities Underway		