Guam Environmental Protection Agency

2025-2030
NONPOINT SOURCE MANAGEMENT PLAN

GUAM ENVIRONMENTAL PROTECTION AGENCY
1973

TODO Y NILALA Y TANO MAN UNO
ALL LIVING THINGS OF THE EARTH ARE ONE

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List of Acronyms/Abbreviations

ACWA	Association of Clean Water Administrators
AIA	American Institute of Architects
ALUS	Aquatic Life Use Support
ATSDR	Agency for Toxic Substances and Disease Registry
ATTAINS	Assessment TMDL Tracking and Implementation System
AUs	Assessment Units
AWWA-HIWPS	American Water Works Association Hawaii Section, Western Pacific Subsection
BEACH	Beaches Environmental Assessment and Coastal Health
BMPs	Best Management Practices
BSP	Bureau of Statistics and Plans
CFR	Code of Federal Regulations
CIPs	Capital Improvement Projects
CIS	Center for Island Sustainability
CNAS	College of Natural and Applied Sciences
CNMI	Commonwealth of the Northern Marianas Islands
CWA	Clean Water Act
CWPP	Comprehensive Watershed Planning Process
CZARA	Coastal Zone Act Reauthorization Amendments
CZMA	Coastal Zone Management Act
DO	Dissolved Oxygen
DOAG	Department of Agriculture
DOD	Department of Defense
DPW	Department of Public Works
E&SC	Erosion & Sediment Control
EA	EA Engineering, Sciences, Technology, Inc.
ECP	Erosion Control Plan
EIA	Environmental Impact Assessment
EMAS	Environmental Monitoring and Analytical Services
EO	Executive Order
EPA	Environmental Protection Agency
FOG	Fats, Oils, and Grease
GCA	Guam Code Annotated
GCMP	Guam Coastal Management Program
GCRI	Guam Coral Reef Initiative
GFD	Guam Fire Department
GHRA	Guam Hotel and Restaurant Association
GNA	Guam Nature Alliance
GNSS	Global Navigation Satellite System
GPA	Guam Power Authority
GROW	Guam Restoration of Watersheds
GRTS	Grant Reporting and Tracking System
GSWA	Guam Solid Waste Authority
GVB	Guam Visitors Bureau
GWA	Guam Waterworks Authority
GWQS	Guam Water Quality Standards
HAZWOPER	Hazardous Waste Operations and Emergency Response
IAL	Interim Action Level

IR	Integrated Report
IWM	Impaired Waters Monitoring
LA	Load Allocation
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MST	Microbial Source Tracking
NARS	National Aquatic Resource Survey
NAVFAC	Naval Facilities Engineering Systems Command
NCCA	National Coastal Condition Assessment
NEIWPCC	New England Interstate Water Pollution Control Commission
NGLA	Northern Guam Lens Aquifer
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRSA	National Rivers and Streams Assessment
NWCA	National Wetland Condition Assessment
NWP	Nationwide Permit
ORSP	Office of Research and Sponsored Programs
PCBs	Polychlorinated biphenyls
PWM	Permits and Watershed Management
RBMP	Recreational Beach Monitoring Program
RCUOG	Research Corporation of the University of Guam
RFP	Request for Proposal
SSO	Sanitary Sewer Overflows
STMP	Status and Trends Monitoring Program
STVs	Statistical Threshold Values
SWCD	Soil and Water Conservation Districts
TMDLs	Total Maximum Daily Loads
TSS	Total Suspended Solids
UOG	University of Guam
US	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WALTERS	Water, Air, Land Territorial Electronic Reporting System
WERI	Water and Environmental Research Institute
WLA	Waste Load Allocation
WPC	Watershed Planning Committee
WQC	Water Quality Certification
WQX	Water Quality Exchange
WWTP	Wastewater Treatment Plant

List of Hyperlinks

Guam Public Law 37-105: Nitrogen Reducing Systems	https://epa.guam.gov/wp-content/uploads/2024/07/Governor-to-Speaker-Terlaje-Re-Substitute-Bill-No.-175-37-COR-nka-P.L.-37-105.pdf	31
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I. Introduction

A. Guam and Its Water Resources

The island of Guam is an unincorporated territory of the United States (US) lying at latitude 13°28"N and longitude 144°45"E or about 3,840 miles (6,180 km) west and slightly south of Honolulu, Hawaii, making it the westernmost point of the US (Figure 1).

Guam is the largest and southernmost island in the Mariana Islands archipelago and possesses the largest freshwater resources of these islands. Guam has an area of approximately 212 square miles (549 square km) and measures about 30 miles (48 km) long and 4 to 11 miles (6 to 18 km) wide. Guam's population in 2025 is estimated to be 168,999 people by mid-year[1]. Approximately 1 million tourists visit Guam annually, largely drawn by the tropical environment and clean recreational marine and fresh waters.

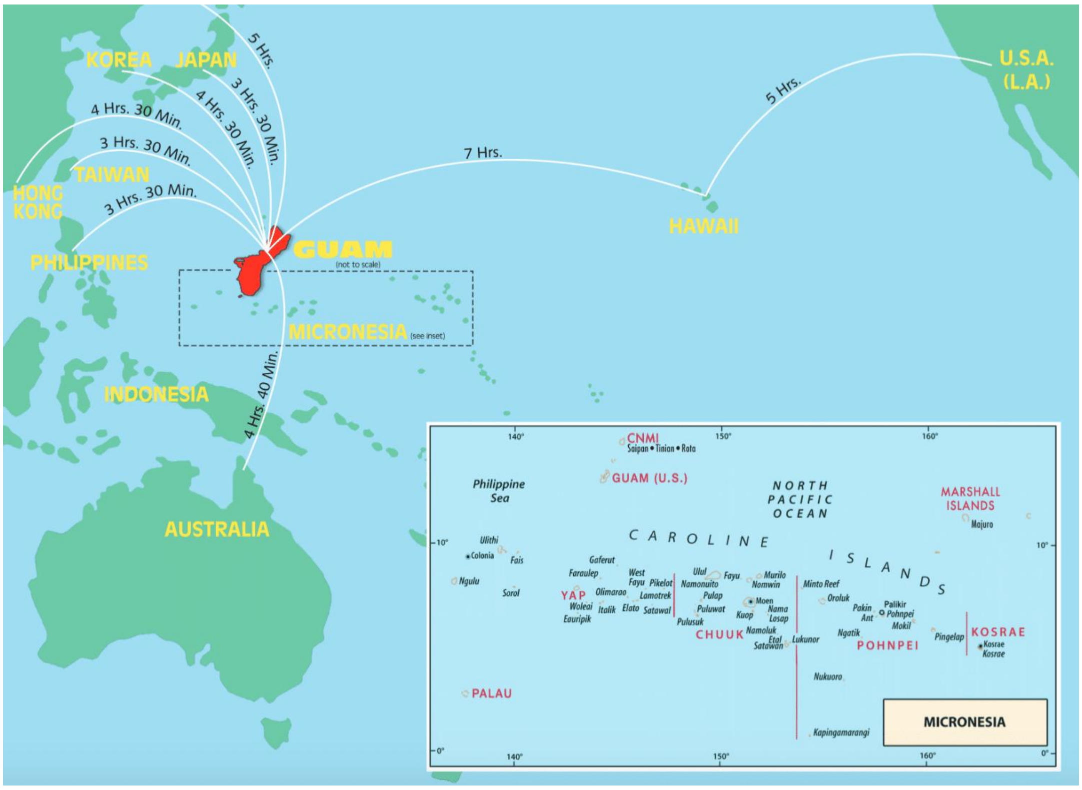


Figure 1. Map of Guam's Location

The entire island of Guam is classified as a coastal zone and is divided into two distinct geological formations by the Pago-Adelup fault line. The northern half, or the Northern Watershed, is mainly a broad sloping limestone plateau bordered by steep seaward cliffs and fringed by narrow coral reefs. The southern half is mountainous and composed of eroded volcanic formations with well-defined watersheds.

The Guam Waterworks Authority (GWA) delivers more than thirty-eight million gallons of water to the civilian population of Guam every day. The island's water comes from several sources including groundwater, fresh surface and spring water. Groundwater is pumped from 120 wells drawn from the Northern Guam Lens Aquifer (NGLA), which serves the residents of Northern and Central Guam. Water from the Ugum River, Santa Rita Springs, and the Navy Fena water treatment facility provide water to Southern Guam.

[1] United Nations Department of Economic and Social Affairs, Population Division

Groundwater. Groundwater in northern Guam is contained within the NGLA, which occupies approximately 49% of Guam's total land area and can supply 60 million gallons of fresh water per day (Figure 2). This aquifer was designated as the principal source aquifer in 1978 by the US Environmental Protection Agency (USEPA).

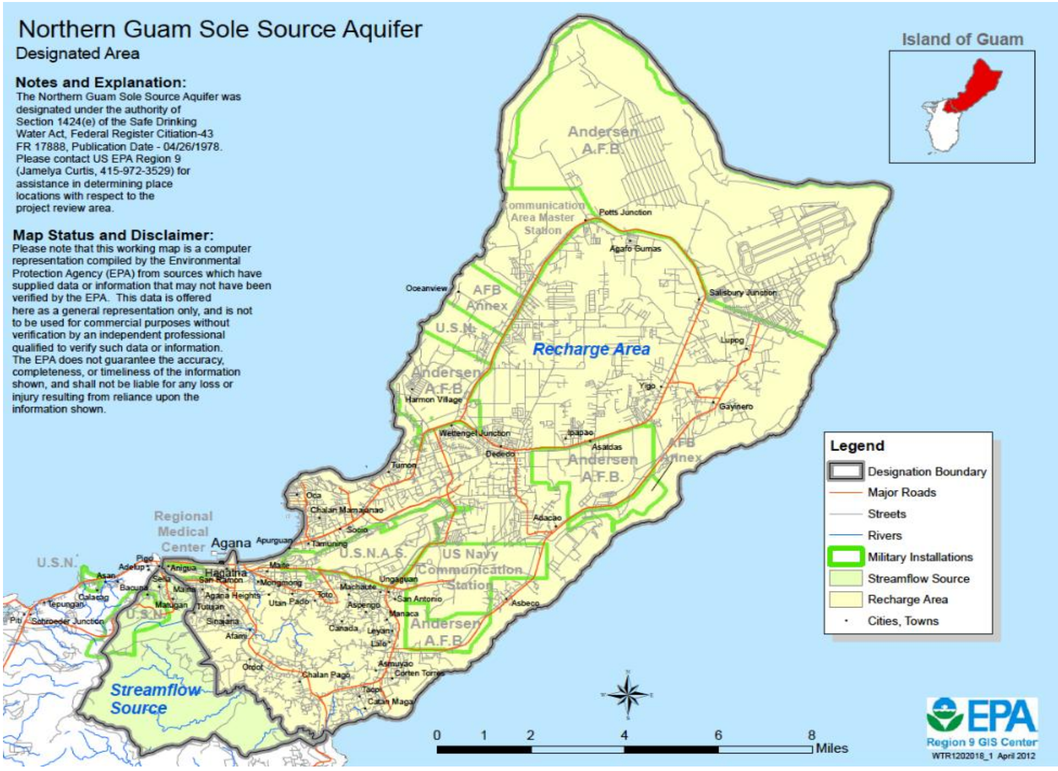
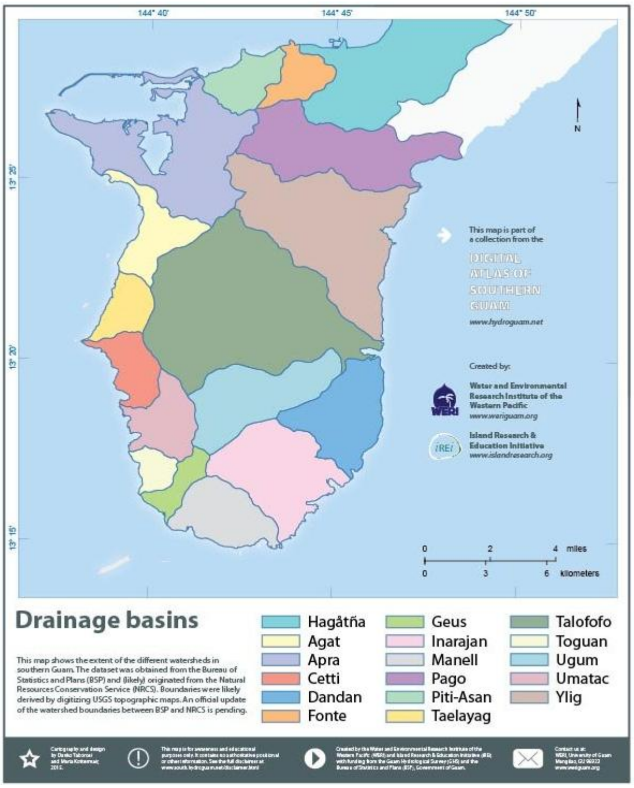


Figure 2. Northern Watershed Containing the NGLA



In the southern half of the island, fresh groundwater occurs in weathered volcanic rock of low permeability, unconsolidated sediments within river drainage basins (Figure 3), and along the eastern coast's fringing limestone formations. The water table in southern Guam reaches elevations of hundreds of feet above sea level in the volcanic rock and unconsolidated sediments. Other than a few springs, groundwater production in southern Guam is restricted to the narrow fringing limestone along the eastern coast, where the water table rarely reaches elevations greater than a few feet above sea level. Brackish to saline groundwater occurs along the southern and western coasts of the southern province within fractured limestone, artificial fill, and unconsolidated marine and estuarine sediments.

◄ **Figure 3. Southern Watersheds**

Rivers and Streams. The southern half of the island is generally composed of eroded volcanic mountainous formations with numerous rivers and streams (Figure 4). These tropical streams and those of most Pacific Islands are typically short in length and have very low mineral concentrations because the underlying geological formation is usually basalt. Another important characteristic of short tropical island streams is that photosynthesis by primary aquatic producers is not the dominant source of food. The major source of food for island stream ecosystems is usually the vegetation that falls into the streams from the plants along the banks and those that overhang the stream. These rivers are host to a wide variety of aquatic organisms, including gish, snails, shrimp, and plants. Guam's freshwater floral and faunal compositions are typical for oceanic islands. Gobies are the most abundant fish, nerites and thiarids are the common snails, and *Macrobrachium* and atyid shrimp are the dominant crustacians[2].

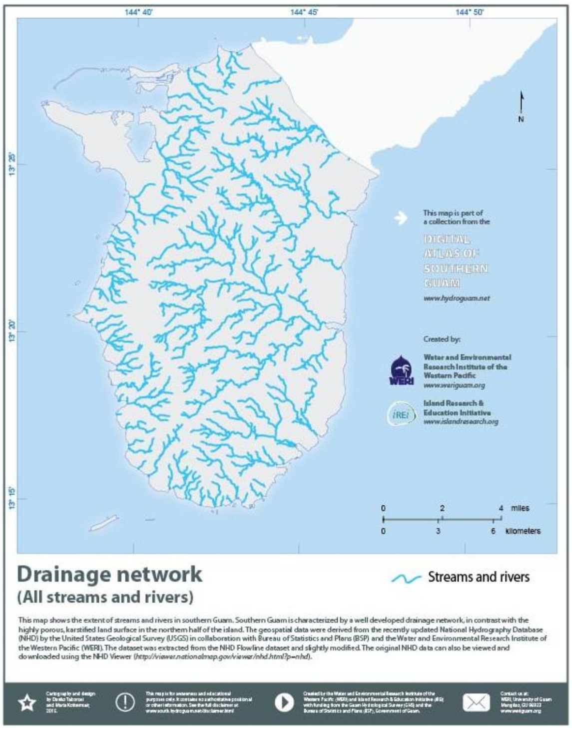
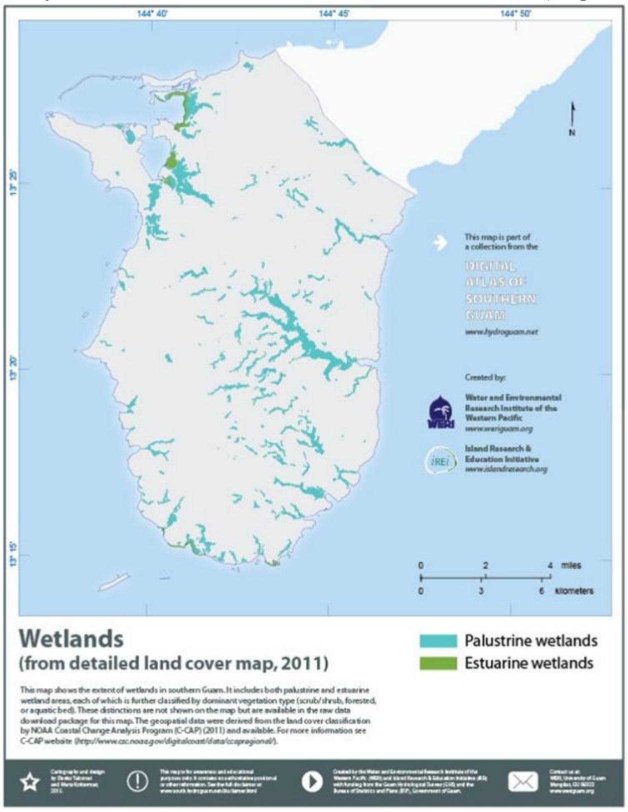


Figure 4. Streams and Rivers in Southern Guam ►

Wetlands. All five systems of the US Fish and Wildlife Service's classification system—marine, riverine, lacustrine, and palustrine—are found on Guam. The dominant wetland/deepwater habitat in the marine system is the coral reef. Guam has inventoried more than 14,000 acres of wetlands, half of which are coral reefs (National Wetlands Inventory, 1983). Inland freshwater wetlands make up only 3.8% of the total land area of Guam (Figure 5). Wetlands include swamps, marshes, mangroves, springs, and forested river valleys and are seasonally, but more often, permanently inundated with water or have soil that is saturated at the surface. Some wetlands dry up completely for several months each year. Guam wetlands are identified, for jurisdictional purposes, in accordance with the US Army Corps of Engineers (USACE) Wetland Delineation Manual. This manual employs a multi-parameter approach, which requires the combined presence of hydric soils, wetland hydrology and hydrophytic vegetation.

The Guam Land Use Commission/Guam Seashore Protection Commission (Title XVIII and XIV of the Government Code of Guam) expands the federal definition of wetlands to include ponds, estuaries, and surface springs and refers to aquatic life in addition to aquatic vegetation.



◄ Figure 5. Wetlands

[2] Guam Comprehensive Wildlife Conservation Strategy, Guam Division of Aquatic and Wildlife Resources, Department of Agriculture, Government of Guam. November 7, 2006.

Marine Waters. Guam is surrounded by 116.5 miles of shoreline divided into three distinct classifications: rocky coastline, sandy beaches, and mangrove mud flats. The rocky coastline classification surrounds the northern end of the island with a few isolated stretches in the south. It is approximately 72.5 miles in length or 62% of the total shoreline. Sandy beaches are scattered intermittently around the island and comprise 35.9 miles of shoreline or 31% of the total. The remaining 8.1 miles or 7% of the total shoreline are classified as mangrove mud flats and are centered mainly within Apra Harbor and Malesso'. There are also approximately 14.2 square miles of coral reefs, 0.55 square miles of seagrass beds, 1.43 square miles of estuarine systems, and 21.73 square miles of marine bays.

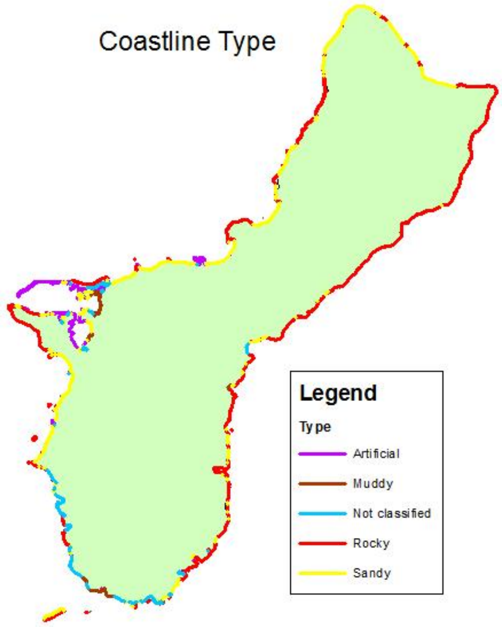


Figure 6. Coastline Types ►
(Source: Pacific Islands Data Portal Coastal and Marine Spatial Planning)

Shallow fringing coral reefs with outer slopes and margins supporting live coral colonies surround most of Guam. The bordering fringing reefs in the south are broader than in the north. The width of these reefs ranges from very narrow benches (as narrow as 3 to 6 meters) on the northeastern coast to broad reef flats (generally ranging from 100 meters to over 700 meters in width) forming the popular recreational fishing areas in Tumon, Hagåtña, Hågat, and Asan Bays and on the shore side of Cocos Lagoon. These reefs are extremely valuable in terms of marine life, aesthetics, food supply, recreation, and protection of Guam's highly erodible shorelines from storm waves, currents, and tsunamis. Two large barrier reef systems occur at Cocos Lagoon and Apra Harbor. Cocos Lagoon and its reefs form an atoll-like environment of about four square miles with the greatest lagoon depth of approximately 40 feet. The uplifted limestone plateau of Orote, Cabras Island, and a large artificial breakwater, which was built on a shallow reef platform and an adjacent submerged bank, bound the much deeper lagoon of Apra Harbor, with depths of over 120 feet.

Seaward, the island's reef front slopes gently downward to a terrace at a depth of approximately 20 to 30 feet. Here, submarine channels cut the surface of the reef. These channels are lined with living corals and contain the richest fauna to be found in any reef zone. The submarine terrace slopes gently download to a depth of 30 to 50 feet. This zone supports many scattered coral colonies.

Guam's inventory of marine waters include marine bays and beaches (coastal/recreational waters). Waters in this category must be of sufficient quality to allow for the propagation and survival of marine organisms, particularly shellfish and other similarly harvested aquatic organisms, corals, and other reef-related resources, as well as for whole body contact recreation. Other important intended uses include mariculture activities, aesthetic enjoyment, and related activities (22 GAR 05, Guam Water Quality Standards).

B. Guam's Nonpoint Source Program History

Nonpoint Source Program (1991). Guam's initial Nonpoint Source (NPS) Management Plan, along with the Governor's certification of authority to implement the plan, was fully approved on May 3, 1991. In September 1999, a required update to the Clean Water Act (CWA) Section (§) 319 NPS Program Management Plan was submitted, entitled "Protecting and Restoring Guam's Waters."

Other key documents that influenced the management and implementation of Guam's NPS program include:

1. Clean Water Action Plan for Guam – Unified Watershed Assessment
   The Clean Water Action Plan is Guam's response to the 1998 Clean Water initiative to speed up the restoration of the nation's waters. Via an existing interagency committee, the Water Planning Committee, a clean water action work group, was created with the Guam Environmental Protection Agency (Guam EPA) leading the completion of a watershed assessment for Guam. The group divided Guam into 20 watersheds, assessed them using available data and other information, then placed each watershed in one of four categories consistent with national guidelines (Table 1). Seven of the watersheds needing restoration because of impacts to the marine environment have been prioritized in this NPS Management Plan based on Guam EPA's 2022-2024 §303(d) List of Impaired Waters (See *Appendix A* for §303(d) List of Impaired Waters). Three watersheds needing restoration due to impacts to the marine environment are unranked as they are not on Guam EPA's 2022-2024 §303(d) List of Impaired Waters.

Table 1. Guam Watershed Assessment Categories

Category	Watershed	NRCS Number	Priority Ranking
I. Watersheds Needing Restoration (Drinking Water Sources)	Northern	20100003-000-001	1
	Ugum	20100003-000-009	2
	Talofofo	20100003-000-011	3
I. Watersheds Needing Restoration (Watersheds Experiencing Impacts to the Marine Environment)	Geus	20100003-000-020	1
	Piti-Asan	20100003-000-006	2
	Pago	20100003-000-003	3
	Agana	20100003-000-002	4
	Togcha	20100003-000-007	5
	Agat	20100003-000-010	6
	Apra	20100003-000-008	7
	Inarajan	20100003-000-017	
	Ylig	20100003-000-005	
	Asalonso	20100003-000-013	
IV. Watersheds With Insufficient Data	Cetti	20100003-000-014	
	Dandan	20100003-000-015	
	Fonte	20100003-000-004	
	Manell	20100003-000-019	
	Taelayag	20100003-000-012	
	Toguan	20100003-000-018	
	Umatac	20100003-000-016	

2. Executive Order (EO) 2004-04: Establishing the Watershed Planning Committee and Requiring the Implementation of a Comprehensive Watershed Planning Process
   - "Water Planning Committee" became the "Watershed Planning Committee" (WPC)
   - Established mandatory Government of Guam Agency members, with Guam EPA and the Bureau of Statistics and Plans (BSP) Guam Coastal Management Program (GCMP) as the lead agencies
   - Among other executive order provisions, directed the WPC to develop a Comprehensive Watershed Planning Process (CWPP), the programmatic basis for developing Watershed Management Plans
   - Established drinking water watersheds as priority watersheds

3. Guam Coastal Nonpoint Source Pollution Management Plan
   The purpose of the Guam Coastal NPS Pollution Management Plan is to develop and implement management measures for NPS pollution to restore and protect coastal waters, working in close conjunction with local authorities. This plan was fully approved on September 26, 2007 by the National Oceanic and Atmospheric Administration (NOAA) and the USEPA per §6217 of the Coastal Zone Act Reauthorization Amendments (CZARA). Guam was the 19th coastal nonpoint program to receive full approval. BSP and Guam EPA function as the lead agencies for implementing this plan. BSP administers and coordinates the GCMP and ensures that federal development in Guam meets Federal Consistency requirements. Guam EPA develops and adopts comprehensive programs for the prevention, control, and abatement of pollution from the waters of Guam and reviews and modifies such programs as the implementing and enforcement agency for NPS pollution issues through its rules and regulations.

NPS Program Transitions to the Permits and Watershed Management Program (2022). Guam's NPS Program is one of three programs under Guam EPA's Environmental Monitoring and Analytical Services (EMAS) Division. In 2022, the former NPS program was renamed the Permits and Watershed Management (PWM) Program and reorganized into three sections. The mission of the program is to analyze and summarize water quality data to make designated use determinations and address impairments by managing projects to correct impairments and provide timely and technical reviews of documents to support Agency determinations. Table 2 discusses these three sections within the PWM Program and their associated activities and goals.

Table 2. Permits and Watershed Management Program (formerly the NPS Program)

<table>
<tr><th>Section Name</th><th colspan="2">Activities</th><th>Goals</th></tr>
<tr><td rowspan="3">Reports and Assessment</td><td>Integrated Report (IR)

CWA §106 and CWA §319 Guam Consolidated Grant</td><td>• CWA §303(d) Threatened and Impaired Waters List
• CWA §305(b) National Water Quality Inventory</td><td>Every 2 years:
• Submit IR to the USEPA
• Develop a §303(d) list of Guam's threatened and impaired waters for USEPA approval
• Submit §305(b) Water Quality Inventory to the USEPA</td></tr>
<tr><td colspan="2">Total Maximum Daily Loads (TMDL)
Watershed Based Plans

CWA §319
Guam Consolidated Grant/Technical Assistance Funding</td><td>• Develop USEPA approvable TMDLs
• Develop a scope of work for project and implement activities to improve the water quality of impaired waterbodies and to restore watersheds</td></tr>
<tr><td colspan="2">Guam Water Quality Standards (GWQS)

CWA §106</td><td>• Review GWQS triennially and propose updates to standards
• Adjudicate revision of GWQS as required</td></tr>
<tr><td rowspan="4">Permit Review (WALTERS)
WATER, AIR, LAND TERRITORIAL ELECTRONIC RECORD SYSTEM</td><td>CWA §401 Water Quality Certification (WQC)</td><td>USACE Nationwide Permit (NWP)/Individual Permit

USEPA NPDES Permit</td><td>• Certify federal projects authorizing discharges into waters of the US</td></tr>
<tr><td colspan="2">Environmental Impact Assessment (EIA) Reviews</td><td>• Provide environmental reviews</td></tr>
<tr><td colspan="2">Federal Consistency Review and Response</td><td>• Implement federal consistency regulation</td></tr>
<tr><td colspan="2">Wetland delineation/verification</td><td>• Implement Guam EPA wetland mapping policy</td></tr>
</table>

Watershed Management	CWA §319 Projects		• Comply with GWQS • Improve, restore, maintain, and protect surface and marine water quality • Restore watersheds • Promote public awareness
	Engage with partner organizations to restore watersheds and reduce NPS pollution in surface and marine waters	• WPC • Guam Nature Alliance (GNA) • NGLA Technical Working Group • Soil and Water Conservation Districts (North and South) • GWA	• Develop Watershed Management Plans and implement watershed restoration projects • Facilitate/leverage partnerships to implement NPS projects • Reestablish public outreach activities via the GNA • Reduce the number of septic tank leaching field systems by increasing homeowner participation in GWA's Wastewater Revolving Loan Fund Program

II. Primary Causes of NPS Pollution

Major impacts to Guam's marine and surface water quality occur from NPS discharges related to fire, feral ungulates, uncontrolled off-roading activities, stormwater runoff and wastewater overflows, pesticides, and on-going urbanization of the island. See *Part IV. Partnerships and Collaborations* on page 29 for information on how NPS pollution is being addressed on the island.

Guam has two distinct seasons: a dry season from January to June and a rainy season from July to December. While typhoons on Guam occur frequently and can occur year-round, the likelihood of typhoons is greatest during the rainy season. The annual rainfall is approximately 80-100 inches. Heavy rainfall can lead to an increase in water pollution as sediment is transported by runoff from upland to rivers, streams, and coastal waters. Runoff due to stormwater, fires, and off-roading can result in elevated concentrations of phosphorus, nitrogen, and bacteria in waterbodies. Stormwater can pick up soil, chemicals, petroleum products, bacteria, and nutrients which are then deposited in coastal waters, surface waters, and groundwater. Fecal contamination from ungulates also contribute to nutrient pollution in Guam's rivers, streams, and coastal waters. Additional sources include construction sites with improper Best Management Practices (BMP)s, illegal dumping, and litter/trash.

The main categories of pollutants in Guam's impaired marine waters include pesticides, Polychlorinated biphenyls (PCBs), dioxins, nutrients, enterococci, and dissolved oxygen (DO). The suspected source categories include combined sewer overflows, agriculture, urban runoff/storm sewers, contaminated sediments, and groundwater seeps/springs. For freshwater rivers and streams, the main categories of pollutants include E. coli, DO, turbidity, total suspended solids (TSS), and nutrients. The suspected source categories include urban and stormwater runoff, wastewater overflows, erosion, septic systems, agricultural activities. Specific legacy sources include the Ordot Dump, the Agana Swamp, and the Agana Power Plant.

A. Fires

Between 2015-2021, over 2,200 fires occurred on Guam collectively burning approximately 23% of Guam's land surface. In 2024 alone, 6.22% of Guam's land surface was burned because of 267 wildfires that occurred. Fires are more common following peak El Niño years, which cause drier than normal conditions. Guam's landscape has become increasingly flammable due to the introduction and rapid spread of both native and non-native fire-prone grasses and shrubs.

Wildfires on Guam are mostly human-caused, often by hunters, farmers, and homeowners. Local hunters use fire to clear sight lines and draw pigs and deer into the open. Ungulates also enjoy eating saplings, making reforestation efforts difficult. Sometimes, farmers burn fields to clear them, while homeowners burn debris in their yards. These fires destroy vegetation, leaving the exposed soil susceptible to erosion during rain events which harm the island's ecosystem. Erosion not only removes the productive top soil and substrate, it also leaves scars which make growth difficult. The increased sediment loads in runoff decrease the water quality in Guam's rivers, streams, and coastal waters.

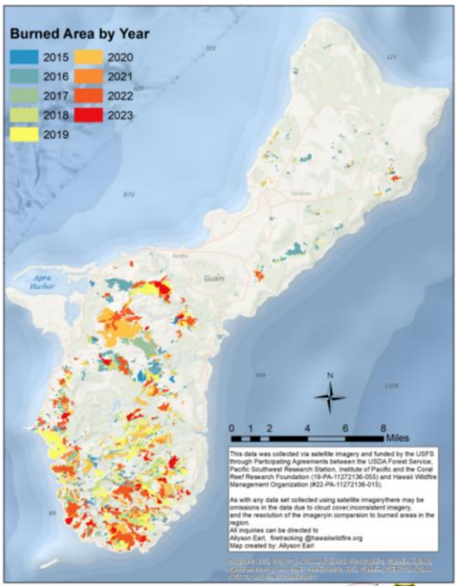


Figure 7. Wildfires on Guam from 2015-2023 ►

B. Feral Ungulates

Feral ungulates have substantially impacted Guam's forests by reducing native seedling survival, spreading disease, damaging root systems, and increasing erosion and runoff. Guam has two invasive feral ungulates: the Philippine deer (*Rusa marianna*), and the feral pig, also known as the wild boar (*Sus scrofa*). Both species negatively impact the health of Guam's streams, rivers, and coastal waters because of their constant grazing on native plants. These ungulates make revegetation efforts very difficult, as they enjoy eating young trees out-planted by volunteers and natural resource managers undertaking reforestation activities in Guam locations degraded by fires and other activities. The deforestation of these areas increases sediment input into Guam's water systems, decreasing water quality and the natural filtering that occurs through roots and ground fall in forested areas.

C. Off-Roading

Unauthorized activities, such as recreational off-roading, a popular activity where vehicles traverse through rough terrain, contribute to the degradation of the island's marine and coral resources. Off-roading disrupts soil and vegetation and can cause the affected area to develop into a badland where very few plants grow or regenerate. Heavy rains bring clay, dirt, and sediment from the mountains into the ocean via the rivers and streams, which can smother coral reefs and disrupt ecosystems.

Areas such as Pago Bay, a marine-sensitive zone, take in thousands of gallons of water runoff and sediment during continuous heavy rain. Sediment is carried out through a series of rivers until it reaches Pago Bay. Analysis done on the sediment carried out to Pago Bay showed that the sediment did not come from any nearby developments and that it closely matched the sediment in Leo Palace, where heavy off-roading activity occurs.

D. Pesticides

Dieldrin and chlordane were produced in the 1950s for use as pesticides and later used to control termites. The USEPA banned all uses of dieldrin in 1987 and chlordane in 1988 due to their environmental hazards and potential carcinogenic effects. Though production of these pesticides have ceased, their adverse effects on the environment continue to persist. Historically, these chemicals may have been used during maintenance, landscaping activities, and other applications. They may slowly be leaching into the aquifer, which could be exacerbated by the demolition of older buildings, due to their persistent characteristics and affinity to bind with water.

Dieldrin, at various concentrations, is known to be in at least 80 of 120 drinking water production wells for at least one of the public water systems. As a result, Guam EPA has established an Interim Action Level (IAL) for Dieldrin in November of 2024 (see *Part IV. Partnerships and Collaboration* on page 29 for more information on the IAL). The wells with the highest concentrations of dieldrin are located over the aquifer.

See also *Tumon Bay Fish Sampling Project* on page 20 for information about chlordane and dieldrin impairments in Tumon Bay and *Table 5* for the chlordane and dieldrin Total Maximum Daily Loads (TMDLs) for Tumon Bay.

E. Urbanization and Development

Another significant threat to Guam's water quality is development without adequate infrastructure support, including aging infrastructure that can cause infiltration and inflow. Large-scale developments result in an increase in impervious surfaces, which alters the concentration, flow, and power of stormwater runoff as rainwater is unable to naturally percolate into the ground. If poorly managed, this can increase the effects of soil stripping. The island's most extensive population development is occurring in the Northern Watershed above the NGLA without adequate sewage infrastructure, largely due to government funding restraints. As a result, island residents in areas that are not sewered depend on septic tanks for wastewater disposal. Further urbanization with poor development practices has led to a high density of septic systems over a high permeability substrate, an insufficient and poorly maintained sewage treatment system, groundwater well over-production, and groundwater impacts from inadequate environmental practices of poorly managed light industries. Discharges from septic tanks contain biological and chemical contaminants which percolate through the limestone in northern Guam and reach the NGLA. Monitoring of Guam's production wells also shows that nitrate levels are increasing. As such, Guam EPA has also updated rules and regulations for the onsite treatment of wastewater, to include stricter requirements on the placement of septic systems and the addition of advanced nitrogen reducing septic systems in high-density areas over the NGLA. These regulations were approved by the Guam EPA Board in August 2025. As of January 2026, these regulations are pending action via the Guam adjudication process by the Attorney General's Office, the Governor's Office, and the Guam Legislature, respectively.

In southern Guam, increased construction and development disturbs the soil and greatly accelerates erosion following every rainfall event. Eroded top soils are transported to streams, rivers, reefs, and beaches, where recreational sites and wildlife habitats are destroyed. The fragile, filter feeding organisms of the reef are smothered, light penetration into the water is drastically reduced, and silt covers the bottom with a soft layer, unsuitable for bottom-dwelling plants and animals. As pollution increases, the productivity of reef plants and animals decreases, and the fish and other animals die or leave the area.

F. Illegal Dumping

Illegal dumping is an ongoing issue on Guam with waste varying from construction debris, abandoned derelict vehicles, household goods, organic waste, and green waste. Waste materials can seep into the soil and contaminate groundwater. It can also flow into rivers, streams, and oceans, threatening ecosystems and degrading water quality.

Illegal dumping occurs throughout the island. In January 2024, the Department of Public Works (DPW) cleared a recurring illegal dump site along the entrance of Two Lover's Point. In May 2025, the Guam Fire Department (GFD) responded to a fire in Dededo and discovered an illegal dumpsite, consisting of abandoned cars, white goods, and trash. This nearly one acre illegal dumpsite sits on CHamoru Land Trust property and is located within a wellhead protection zone.

III. Guam's PWM Program Water Restoration and Protection Goals

Guam's 2025-2030 NPS Management Plan includes four goals which support the USEPA's mission to (1) provide every American access to clean air, land, and water and (2) administer permitting reform, cooperative federalism, and cross-agency partnership. These four goals and the planned projects and activities to achieve them are discussed in the following section and broadly outlined in Table 3.

Adaptive Management

Given that there is substantial uncertainty regarding the most appropriate strategy for managing some of the water quality issues the territory faces and additional uncertainty in how priorities will change over a five-year period, this plan strives to set goals and priorities to guide Guam's work to reduce and protect from NPS of pollution while maintaining flexibility. As outcomes from management actions and other events become better understood, it may be necessary to adjust the approaches and goals in this plan as part of an iterative learning process. This will be done in cooperation and communication with USEPA and appropriate interested parties through annual work plans, annual reports and, as necessary, 5-year Plan updates.

Similarly, Guam faces increasing challenges from natural disasters such as typhoons, flooding, wildfire, rising temperatures, and drought, all of which can significantly impact water quality and watershed health. Natural disasters and emergency incidents, such as wildfires, storms, floods, landslides, earthquakes, and spills can cause or contribute to NPS pollution to waters of the state and may result in changes to the goals and priorities of this plan. These challenges require coordination with our partner agencies listed, as well as others, and are an opportunity for the PWM Program to further explore how to leverage existing resources to address NPS pollution from natural disasters and emergency incidents.

The projects and activities included in this NPS Management Plan also contribute to Guam's Integrated Report (IR).The federal CWA §305(b) requires that Guam submit a biennial water quality inventory report that summarizes the extent to which Guam waters provide for water resources that are swimmable, fishable, support aquatic life, and contain organisms that are consumable. CWA §303(d) additionally requires that Guam list impaired waters (that are deemed not swimmable, fishable, not supporting aquatic life, and contain organisms that are not suitable for human health) and to provide a priority ranking for development and implementation of management strategies (e.g., TMDLs) that will reduce the pollutant load(s) to impaired waters. The USEPA specifies the development of both sections at 40 Code of Federal Regulations (CFR) 130.7 and 40 CFR 130.8. Prior to 2006, the §305(b) and §303(d) reports were submitted separately. In 2006, the USEPA requested that states integrate the two reports and submit them on a biennial basis in April of even numbered years to satisfy both §303(d) and §305(b) requirements.

Guam's 2022-2024 IR was approved by the USEPA on September 3, 2025. Guam's 2022-2024 §303(d) list includes a total of 31 waters, with 11 new waters listed for one or more causes of impairment compared to Guam's 2020 §303(d) list. The leading causes of impairments are biostimulatory substances and their effects, pathogens, PCBs in fish tissue, and metals.

Table 3. Overview of Projects and Activities

Project/Activity	Objectives	Strategies	Target Completion Date
GOAL 1: ASSESSMENT OF GUAM'S MARINE AND SURFACE WATERS			
National Aquatic Resource Surveys (NARS)	Assess the quality of Guam's coastal waters, rivers and streams, and wetlands using a statistical survey design.	National Coastal Condition Assessment (NCCA)	2025
		National Wetland Condition Assessment (NWCA)	2026
		National Rivers and Streams Assessment (NRSA)	2027
Recreational Beach Monitoring Program (RBMP)	To monitor and test for the designated use "Whole Body/Primary Contact"	Weekly water grab samples collected and tested for the approved USEPA bacterial indicator	On-going
Impaired Waters Monitoring (IWM) Program	• Identify and verify sources of pollution • Mitigate pollution to improve water quality	Analyze and evaluate data, including Microbial Source Tracking (MST) screening results	2026-2027
Tumon Bay Fish Sampling Project	Determine if a Fish Consumption Advisory is needed	Sample fish tissue to determine exceedance of "consumption" criteria for chlordane and dieldrin	2028
GOAL 2: DEVELOP WATERSHED-BASED PLANS OR TMDLs			
Total Maximum Daily Loads (TMDLs)	Develop a TMDL for impaired or threatened waters identified on the §303(d) list	• Develop Request for Proposal (RFP) • Retain the services of a contractor for respective TMDL development	As needed
Manell-Geus Watershed Management Plan	Adopt Nine-Element Watershed Management Plan	Comprehensive Watershed Planning Process/Watershed Planning Committee	2025
Piti-Asan Watershed Management Plan	Develop Nine-Element Watershed Management Plan	Comprehensive Watershed Planning Process/Watershed Planning Committee	2027
Tumon-Yigo Sub-Basin (Northern Watershed)	Special Study: Freshwater Impacts to Tumon Bay	Partnership project with the WPC, Guam Visitors Bureau (GVB), Silver Jackets, American Institute of Architects (AIA) Marianas, Guam Hotel and Restaurant Association (GHRA)	2030
Upcoming Watershed Management Plans	Develop watershed management plans for watersheds in need of restoration	Collaborate with the Watershed Planning Committee and various stakeholders	On-going
GOAL 3: IMPLEMENT WATERSHED-BASED PLANS AND/OR TMDLS TO RESTORE IMPAIRED OR THREATENED WATERS			
Guam Restoration of Watersheds Initiative (GROW Initiative) - Ugum Watershed	• Revive island landscapes and downstream coral reefs • Improve and/or restore water quality	• Plant trees and install erosion BMPs (sediment socks, waffles, etc.) • Monitor and assess Ugum River water quality	2030
East Hagåtña Bacteria TMDL Project	• Reduce bacteria in marine waters • Identify and resolve sanitary sewer leaks and overflows	• Install recommended BMPs • Implement beach beautification program • Public education (signs) • Develop a pollutant source control program with GWA and DPW	2026-2030

GWA's Wastewater Revolving Loan Fund Program	Minimize wastewater discharges into groundwater	Sewer hook-up project in the Agafa Gumas and Adacao subdivisions	2030
Merizo Community Center Roof Rain Garden	Stormwater management Provide public education	Follow recommended project design in the Manell-Geus Watershed Management Plan	2029
GOAL 4: CONDUCT OTHER PROGRAM ACTIVITIES			
Triennial Review and Revision of Guam's Water Quality Standards (GWQS)	Meet requirement of CWA	§303(c)(1) of CWA and regulations at 40 CFR 131.20	2029
CWA 401 Water Quality Certification (WQC)	Meet regulations of GWQS	§5106, GWQS and regulations at 40 CFR Part 121	On-going
WALTERS (Water, Air, Land, Territorial Electronic Reporting System)	Record Federal Consistency Reviews, CWA §401 WQC actions, verification of wetland delineation and other permit related PWM program action(s)		On-going

A. Goal 1: Assessment of Guam's Marine and Surface Waters

National Aquatic Resource Survey (NARS). The NARS are statistical surveys designed to assess the status of and changes in quality of the nation's coastal waters, lakes and reservoirs, rivers and streams, and wetlands. Using sample sites collected at random, these surveys provide a snapshot of the overall condition of the nation's waters. As the surveys use standardized field and lab methods, results from different parts of the country and between years can be compared. The USEPA works with state, tribal, and federal partners to design and implement the NARS. When Guam participates in NARS, the authorized resulting survey data is used in applicable integrated reports. The NARS will be made up of three individual surveys: National Coastal Condition Assessment (Guam 2025), National Wetland Condition Assessment (Guam 2026), and National Rivers and Streams Assessment (Guam 2027). These surveys will be implemented on a rotating basis every five years. Guam does not participate in the National Lakes Assessment as Guam does not have any publicly owned lakes.

Recreational Beach Monitoring Program (RBMP). The 10 Guam Code Annotated (GCA) Chapter 47 mandates the monitoring of Guam's recreational beaches to protect public health from the adverse effects of swimming in polluted waters. Guam's RBMP is managed by Guam EPA's EMAS Division. The Division takes water samples of 44 recreational beaches every week and analyzes the samples for concentrations of enterococci bacteria. Enterococci bacteria are found in warm blooded fecal matter, and if detected in the water sample, indicate the possible presence of other more harmful microorganisms. Advisories are based on approved standards using the enterococci indicator. If concentrations of the bacteria are above approved standards, the beach is deemed 'polluted' and an advisory against swimming and wading is issued. All advisories are released and/or reported weekly, prior to the weekend, through media releases, to local government agencies, to private agencies, and posted on the Guam EPA website.

This program is supported and maintained by the Beaches Environmental Assessment and Coastal Health (BEACH) Act ($290k) and the Beach Monitoring-Government of Guam General Fund ($40k). Through the BEACH Act Grant Program, the USEPA provides grants to states, territories, tribes, and local governments to protect beach goers from contaminated water at coastal beaches, including the Great Lakes. Grant funds are used to develop and implement beach monitoring and notification programs.

Impaired Waters Monitoring (IWM) Program. Guam EPA began this one-year targeted monitoring project in January 2024 to assess fresh and marine waters impaired or threatened by stressors directly or indirectly impacting the waterbody's aquatic life and/or designated use. Stressors causing water quality impairment are identified in Guam EPA's 2022-2024 IR §303(d) List of Impaired Waters (see *Appendix A* on page 36). Guam EPA develops this list of stressors and their potential sources using internal data and data from other agencies and the public. The IWM Program also used data from the Agency's Status and Trends Monitoring Program (STMP) to identify stressors that exceed Aquatic Life Use Support (ALUS) parameter criteria specified in the GWQS by a frequency of 75% or more.

43 freshwater rivers and marine waters (Figure 8) were identified as assessment units (AUs) and cataloged by the Agency and the USEPA. *Appendix B* on page 39 shows the AUs and target sites in 13 watersheds: Agana, Apra, Dandan, Fonte, Inarajan, Manell, Northern, Pago, Piti-Asan, Taelayag, Talofofo, Togcha, and Toguan.

Figure 8. Map of IWM Program Sites

Guam EPA's EMAS Division collected water samples monthly within a bay or cross-section of the river in the water column via sample bottles and probes. The samples were analyzed for conventional physical and chemical stressors (i.e., DO, salinity, temperature, turbidity, TSS, and nutrients) and fecal bacteria stressors (i.e., E. coli, enterococci, and total coliform) (Table 4). Data analysis will be completed in 2026 or 2027. The Agency will make water quality attainment or impairment decisions for ALUS from the data generated by this project. Procedures described in the Agency's current IR Assessment Methodology will be used.

Table 4. IWM Data

Characteristic Name	Number of records	Minimum concentration	Maximum concentration	Average Concentration	Unit	Standard Deviation
Conductivity	165	0.39	57900	14934.0	milli-Siemens	19501.4
Dissolved oxygen (DO)	156	0.97	9.53	5.12	mg/L	1.62
DO saturation	156	0.29	151	68	%	28
Enterococcus	83	9 (non-detect)	24,197 (method max)	744	MPN/100 mL	2755
Escherichia coli	180	9 (non-detect)	24,197 (method max)	3034	MPN/100 mL	5459
Nitrate	144	0.010	2.270	0.342	ppm	0.567
Orthophosphate	108	0.000	1.870	0.096	ppm	0.188
pH	106	6.5	8.5	7.7		0.4
Salinity	175	0	52	11.0	ppt	12.7
Temperature, water	29	22.7	29.6	26.6	°C	1.7
Total Coliform	12	6488	19863	11068	MPN/100 mL	3524
Total Suspended Solids	99	2.5	549	36.8	mg/L	77.7
Turbidity	48	0.05	54	4.49	NTU	8.90

Tumon Bay Fish Sampling Project. Tumon Bay is located in the heart of Guam's tourist area (Figure 9) and is, therefore, important to the economy. In 1999, Tumon Bay was designated as a marine preserve, limiting the types of boating and fishing activities; however, it is possible that fish from Tumon Bay are part of the diet of subsistence fishers in the area and are also consumed by recreational fishers. Due to the ecological, economical, and recreational importance of Tumon Bay, its health and condition are a priority for the island.

Guam's marine waters are characterized as "good" overall; however, Tumon Bay has been listed as impaired for over two decades due to high dieldrin and total chlordane levels (Guam EPA, 2020). A recent study for Guam EPA and USEPA Region 9 sampled springs discharging into Tumon Bay as well as many marine locations, seven sediment locations, and four fish species (PG Environmental, 2020). Analysis of these data indicate that the chlordane and dieldrin impairments persist in Tumon Bay (Table 4); however, inputs of the pollutants of concern from the springs have decreased. Because the latest sampling study supported the continued impairment status for the parameters of concern, a draft TMDL for dieldrin and total chlordane was completed in January 2024 and subsequently approved by USEPA Region 9 on August 12, 2025.

Figure 9. Tumon Bay ►

The goal of the proposed Tumon Bay Fish Sampling Project is to determine if a fish consumption advisory for Tumon Bay is necessary.

Table 5. Causes of Impairment in Tumon Bay

Pollutant Group	Pollutant	Designated Uses	Designated Use Group
Pesticides	Chlordane	Consumption	Aquatic life harvesting
		Aquatic Life	Fish, shellfish, and wildlife protection and propagation
	Dieldrin	Consumption	Aquatic life harvesting
		Aquatic Life	Fish, shellfish, and wildlife protection and propagation

Guam's 2022-2024 IR does not specify sources that may be causing impairment; however, common uses and sources of these contaminants are identified below with links to details from the Agency for Toxic Substances and Disease Registry (ATSDR):

- Chlordane: pesticides, termite control, agricultural pest control (commercial use cancelled in 1988)
- Dieldrin: pesticides, termite control, agricultural pest control, lumber treatment (manufacturer voluntarily canceled use in 1987)

B. Goal 2: Develop Watershed-Based Plans or TMDLs

Total Maximum Daily Loads (TMDLs). A TMDL is a plan, usually based on monitoring information and scientific modeling that describes how pollutant loads coming from various types of sources must be reduced to meet water quality standards. Pollutant sources are characterized as either point sources that receive a waste load allocation (WLA) or NPS that receive a load allocation (LA). Each pollutant causing a waterbody to be impaired or threatened is referred to as a waterbody/pollutant combination, and typically a TMDL is developed for each waterbody/pollutant combination.

According to the CWA, each state must develop TMDLs for all the waters identified on their §303(d) list of impaired or threatened waters based on their priority ranking. States must submit TMDLs to the USEPA for approval. The USEPA recognizes that under certain circumstances, there are alternative restoration approaches that may be more immediately beneficial or practicable in achieving water quality standards than pursuing a TMDL. TMDL implementation is a crucial stage leading to impaired waters restoration which involves applying pollution control practices necessary to reduce the pollutant loads to the extent determined in the TMDL. These practices usually consist of point source control permits and/or NPS control BMPs. Guam's TMDLs approved by the USEPA are listed in Table 5.

TMDL priority rankings are based on the Guam EPA staff judgments concerning the:

1. Importance of uses to be made of the water
2. Magnitude of GWQS exceedances observed
3. The fit of TMDL developmental work with other assessment, planning, or pollution control activities planned by the Guam EPA
4. Degree of public interest in or concern about the waterbody

Table 6. Guam TMDLs

TMDL	Date Approved by the USEPA	Additional Notes
Sediment TMDL, Ugum Watershed, Guam USA	February 22, 2007	• Developed by Tetra Tech, Inc. • 5 Ugum River Segments
Guam Northern Watershed (Beach) Bacteria TMDLs	March 17, 2010	• Developed by Tetra Tech, Inc. • 17 Coastal Assessment Units
Bacteria TMDLs for 25 Guam Beaches	February 20, 2015	• Developed by Tetra Tech, Inc. • 25 Coastal Assessment Units
Chlordane and Dieldrin TMDLs for Tumon Bay	August 12, 2025	• Prepared by PG Environmental, LLC.

Manell-Geus Watershed Management Plan. The Manell-Geus watershed has been designated as a priority watershed by the Government of Guam and as a Habitat Focus Area by NOAA. This watershed drains to the island's only shallow water lagoon, the Cocos Lagoon, which extends into the Achang Reef Flat Marine Preserve (Figure 10). This area supports a strong fishing tradition in the village of Målesso' and is an important habitat for various marine wildlife species and seabirds. The coastal ecosystem is impacted by poor water linked to erosion on the steep hillsides and along streambanks which is accelerated by wildfires, feral ungulates, and off-roading. The impact of land-based sources of pollution is reflected in negative trends observed in coastal water quality and reef health.

Four rivers found in the Manell-Geus watershed are listed in Guam's §303(d) list of impaired waters because greater than ten percent (10%) of samples exceed water quality standards. The Ajayan River, Liyog River, Sumay River, and Manell River (Figure 10) have been monitored for DO, orthophosphates, TSS, and nitrates through the IWM Program.

The Manell-Geus Watershed Management Plan 2025-2030 (2025) offers a roadmap for achieving four watershed goals:

1. Minimize flooding in the present and in the future
2. Reduce watershed-based pollutant loads to nearshore waters
3. Restore habitat and improve biodiversity
4. Support community engagement

Implementation of the projects outlined in this plan will require a variety of funding resources and creative funding approaches. Existing funding has been allocated for some projects, such as the USACE's Manell river-realignment study, GWA's improvement on wastewater infrastructure, Guam Department of Agriculture (Guam DOAG)'s badlands restoration, DPW's drainage improvements, Guam EPA's water quality monitoring, and the Nature Conservancy's outreach and mangrove restoration. Federal funds are available for infrastructure repairs, rural land restoration, water quality, and habitat restoration such as funding under the USEPA's §319 and NPS program grants, the United States Department of Agriculture (USDA) landowner eligible funds, and coastal resiliency funds and grants. As funding availability changes with the federal government, Guam EPA and our partners are considering other potential sources for support of current and future projects.

Figure 10. Map of the Manell-Geus Watershed ►

Piti-Asan Watershed Management Plan. The Piti-Asan watershed is physically and socioeconomically very diverse with large areas under conservation status, including three War in the Pacific National History Park Units (Asan Beach, Asan Inland, and Piti Guns), the Masso Conservation Area, and the Piti Bomb Holes Marine Preserve (Figure 11). The major threats affecting the overall health of the watershed are erosion and associated sedimentation, development, wildland fires, invasive species, and bacteria (fecal coliform). Projects will be prioritized for this watershed in collaboration with the WPC.

The Piti-Asan Watershed Management Plan (2012) outlines two management strategies and objectives:

1. Protect and improve the water quality of rivers and the marine environment by reducing sediments and other pollutants caused by erosion and urban stormwater runoff
2. Promote watershed stewardship, historic preservation, and interagency coordination by developing a comprehensive management approach for the Piti-Asan watershed that can serve as a model for other watersheds on Guam

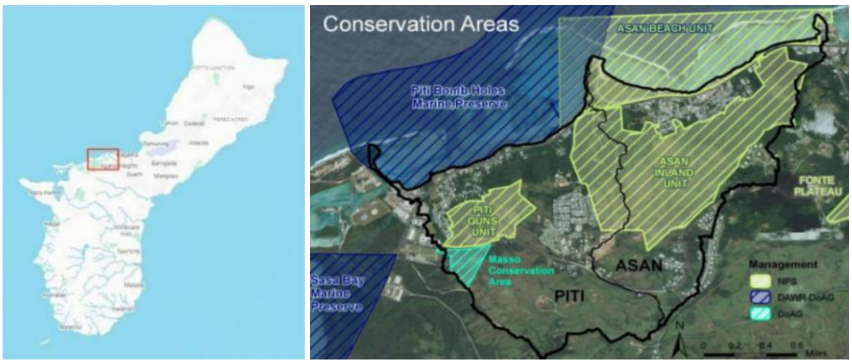


Figure 11. Map of Conservation Areas in the Piti-Asan Watershed
(Source: Piti-Asan Management Plan, 2012)

Guam DOAG's Guam Coral Reef Initiative (GCRI) is currently working on updating the 2012 Piti-Asan Watershed Management Plan in coordination with the WPC. The aim of updating this plan is to list the Piti-Asan watershed as a priority watershed, which opens up more funding opportunities for restoration projects.

Tumon-Yigo Sub-Basin Management Plan (Northern Watershed). Multiple agencies are working together to develop a Stormwater Management Plan for Tumon Bay. This special study seeks to analyze freshwater seep discharges and NPS stormwater discharges into the bay. To better understand the water resource challenges impacting Tumon Bay, the project is split up into four phases:

1. Phase one: BSP GCMP will lead the overall coordination of this project in partnership with the WPC, the Guam Silver Jackets, and other relevant stakeholders. The preliminary investigations team responsible for output one will be BSP GCMP and Guam EPA. BSP GCMP will organize site visits with partners to identify freshwater outfalls through field observations along the beach and in nearshore shallow waters (0.8m<1.5m) in Tumon Bay. The team will establish data points using Global Navigation Satellite System (GNSS) technology and produce a site conditions report. No funds will be allocated for this output. No funding is anticipated for this phase as it will be conducted as normal field operations.
2. Phase two: BSP GCMP will secure a Memorandum of Agreement (MOA) with the UOG Office of Research and Sponsored Programs (UOG ORSP) or the Research Corporation of the UOG (RCUOG) in order to work with Dr. Chris (Myeong-Ho) Yeo, PhD Associate Professor of Water Engineering and Hydrology, Water and Environmental Research Institute of the Western Pacific (WERI) as the lead Principal Investigator for output two. WERI will take the lead in developing a watershed hydrologic and hydraulic analysis of up to four freshwater outfalls. BSP GCMP anticipates using contractual funds to subgrant the funds to UOG through the MOA.
3. Phase three: BSP GCMP will obtain a MOA with the American Institute of Architects (AIA) Marianas, a non-profit organization, to provide technical professional expertise in achieving output three. AIA Marianas will be responsible for developing conceptual climate adaptive resiliency designed for the aforementioned sites. BSP GCMP anticipates using contractual funds to subgrant the funds to AIA Marianas through the MOA.
4. Phase 4: BSP GCMP, in conjunction with the WPC, the Guam Silver Jackets, public/private property owners, and private organizations such as the Guam Hotel and Restaurant Association (GHRA) and the Guam Chamber of Commerce will develop an implementation viability assessment through participation in at least four working group meetings. No funding is anticipated for this phase as it will be conducted as BSP GCMP normal planning operations.

Upcoming Watershed Management Plans. In collaboration with the WPC and various stakeholders, Guam EPA anticipates the development of more watershed management plans. The following is a brief, non-comprehensive discussion of watersheds in need of planning and restoration.

- In 2015, then-governor Eddie Calvo designated the Pago Watershed as a priority watershed. Human activities such as fires, uncontrolled off-roading activities, erosion, and poor construction practices have contributed to the declining health of the Pago Watershed. The Pago Watershed is located in the east of central Guam and is made up of parts of the Chalan Pago, Mangilao, and Yona villages (Figure 12). The Pago Watershed has a drainage area of 10.35 square miles, includes the Pago Bay reef flat, and has three main rivers: the Sigua River, the Lonfit River, and the Pago River. The Sigua River and the Lonfit River discharge to the Pago River which discharges into Pago Bay and into the Pacific Ocean. Pago Bay is the largest bay on Guam, with residents and visitors partaking in various recreational activities such as swimming, snorkeling, diving, and fishing.

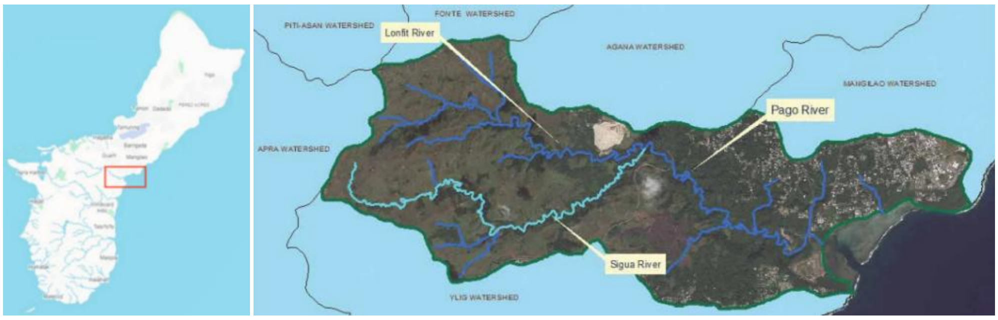


Figure 12. Pago Watershed.
The watershed's boundary is outlined in green and the streams are shown in blue.
(Source: Bureau of Statistics and Plans)

- The Talofofo Watershed was one of three watersheds listed as highest priority for restoration due to being a critical source of drinking water (Table 1). The Talofofo Watershed is the largest watershed in southern Guam at 53 square kilometers (21 square miles). The Fena Reservoir, also known as Fena Lake, occupies the southern half of the watershed (Figure 13). The Talofofo Watershed is partially regulated at the upper end of the drainage by the Fena Reservoir which also acts as a sediment trap and diversion. However, increased sediment influx to the reservoir led to reforesting portions of the watershed that drain into the reservoir.

Figure 13. Talofofo Watershed Outlined in Orange ►
(Source: UOG WERI Guam Hydrologic Survey's MAppFx of Southern Guam Watersheds Streamflow Duration Curves)

C. Goal 3: Implement Watershed-Based Plans and/or TMDLs to Restore Impaired or Threatened Waters

GROW Initiative (Ugum Watershed). The Ugum Watershed is located in southern Guam directly south of the Talofofo and Fena Watersheds (Figure 14). The Ugum Watershed covers an area of approximately 18.9 square kilometers (7.33 square miles; 4,691 acres) of rolling hills with areas of very steep slopes. The Ugum Watershed stretches from Mount Bolanos, which rises to 378.5 meters (1,241 feet) and forms the western limits of the watershed to the Talofofo River near the Pacific Ocean in the east. Mount Bolanos includes the headwaters of the Atate and Bubulao river systems which flow into the Ugum River. The 37 kilometers of rivers and streams in the Ugum Watershed spread from the mountains to sea level where the Ugum River drains into the Talofofo River only 1,300 meters (4,275 feet) inland from Talofofo Bay.

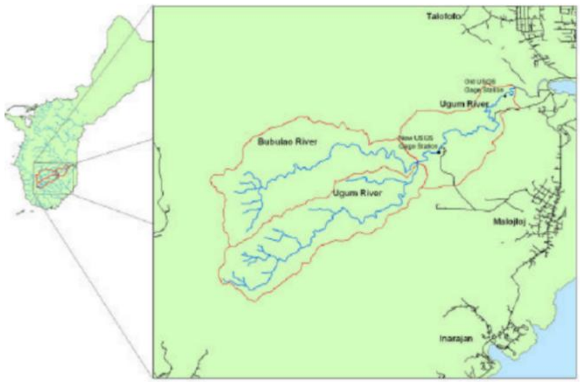


Figure 14. Location and boundary of the Ugum Watershed.
The watershed's boundary is shown in red and the streams are shown in blue.

Water quality in the Ugum River has declined in recent years as a result of human activities that have increased erosion and the resultant sedimentation in the streams and near shore waters. Off-road recreational vehicles, intentionally-set fires, and agricultural activities are the primary causes of the increased erosion and sedimentation. The increased sedimentation is considered especially significant in the Ugum Watershed because the Ugum Water Treatment Plant is a primary source of drinking water in southern Guam. During the past several years, the treatment plant has had to periodically shut down when suspended sediment at the intake reaches excessive levels. The increased sedimentation also contributes to poor quality in stream aquatic habitats, a smothering of the coral reefs, and a decline in fish populations.

A sediment TMDL for the Ugum Watershed was created in 2006 to address elevated turbidity as listed in Guam's 2004 CWA §319 §303(d) list. The TMDL analysis indicates that loads to waterways in the Ugum River need to be reduced by approximately 25% to attain the TMDL and remedy the impacts of excessive sedimentation on the river. A range of options is necessary for achieving the desired reduction in current sediment loadings. The various options need to be based on the practicality of implementation and the degree to which they would have a significant impact on the overall sediment yield (e.g., reducing the runoff from land in closer proximity to the stream and reducing runoff from upland areas).

The Guam Restoration Of Watersheds (GROW) Initiative is a program through the UOG Center for Island Sustainability (CIS) and Sea Grant that has been working to restore watersheds to prevent erosion and the smothering of Guam's coral reefs. The GROW Initiative has focused on restoration efforts, such as reforestation and installation of erosion control measures in the Ugum Watershed to combat sediment transport to surface water that would impact water quality. Other focus areas include seed collection, propagation, and maintaining nursery plants, planting methods, installation of other restoration intervention techniques, site preparation, out-planting events, fuel reduction, and firebreak maintenance.

The GROW Initiative began in 2019, and the first tree planting event open to the public was in 2020. In 2024, nearly 6,000 trees were planted during community planting events in the Ugum Watershed. Prior to the tree planting activity, the GROW Initiative team provides a short tour of the area and discusses the importance of watersheds and badland restoration and their goals for the Ugum Watershed. The GROW Initiative opens tree planting events to the public on the first Saturday of each month in September, October, and November every year.

The GROW Initiative provides program updates to stakeholders at the quarterly WPC meetings. In 2025, the GROW Initiative began monthly water quality sampling at three selected river locations. Samples are analyzed by the WERI Laboratory, and data is available by request. Analysis of the monitoring and assessment data can provide information about the effectiveness of restoration activities in the watershed in improving water quality. Guam EPA plans to analyze and store the data through the Water Quality Exchange (WQX) and Assessment TMDL Tracking and Implementation System (ATTAINS) which would be used in Guam's biennial IR.

Guam EPA's PWM Program aims to:

- Monitor and assess water quality to determine the effectiveness of tree planting activities
- Review GWA's Ugum Water Treatment Plant turbidity data to assess compliance with the Guam Water Quality Standards (GWQS) and to track the effectiveness of upstream BMPs
- Implement and support restoration activities
- Participate in partner agency informational outreach events
- Develop a Guam EPA watershed page with related digital outreach information in collaboration with the WPC

East Hagåtña Bay Bacterial TMDL Project (Northern Watershed, Hagåtña Basin). Portions of East Hagåtña Bay (Figure 15) are currently being monitored under Guam EPA's RBMP and IWM Program. Five sites throughout the bay are monitored under the RBMP for enterococci. One site, the storm drain (Figure 13), was monitored under the IWM Program as it is listed as a §303(d) impaired water due to >10% of samples exceeding water quality standards. This site was monitored for E. coli, DO, TSS, turbidity, salinity, and enterococci. Using the data generated from this program, Guam EPA will make a water quality attainment or impairment decision for ALUS. Additional total enterococcus monitoring and Microbial Source Tracking (MST) samples indicate that human contributions through sanitary sewer overflows are the likely dominant source of fecal bacteria loading into East Hagåtña Bay.

Phase II of the East Hagåtña Bay Bacteria TMDL project is to develop a pollutant source control program which aims to identify and resolve sanitary sewer leaks and overflows and to identify illicit discharges. With a target completion date of 2027, the goals of this project include:

1. Facilitate collaboration with DPW and GWA
2. Identify funding source(s) to support restoration project and bacteria impairment
3. Issue a Request for Proposal (RFP) for contractor installation of BMPs, as recommended by EA Engineering, Sciences, Technology, Inc.'s (EA) Technical Report (October 2019)
    - EA's Technical Report identified and ranked potential structural BMPs to reduce bacterial loads in stormwater. The results of the ranking system indicate that the most effective BMPs with respect to bacterial removal are infiltration basins, wetland structures, and bioretention structures.
    - The estimated minimum cost of this project is $300,000.
    - This has been put on hold due to funding concerns.
4. Develop monitoring and evaluation mechanism(s) to determine whether the constructed BMPs are effective

Figure 15. Hagåtña Bay

Actions needed to implement the Dungca Stream (Figure 16) Project include:

1. Identify funding source for the proposed scope of work and coordinate set-aside for an RFP
2. Design and install BMPs, such as a constructed extended detention wetland to maximize bacterial removal
3. Implement beach beautification program to enhance the site's natural beauty
4. Implement public education programs and place signs to inform the public about the functionality of the wetland and the types of wildlife that use the wetland as their habitat
5. Develop and employ source control measures to prevent pollutants from contacting site runoff, leaving the site, and entering the municipal storm drain system or waterways

Figure 16. Dungca's Stream
(Source: EA Engineering, Science, and Technology, Inc.)

GWA's Wastewater Revolving Loan Fund Program (Northern Watershed). GWA's Wastewater Revolving Loan Fund Program, also known as the GWA Sewer Hook-up Revolving Loan Fund, offers low-interest loans to Guam residents for qualifying sewer construction, installation, and connection to the public wastewater system. This will reduce use of their septic tank/leaching fields, reducing wastewater discharge into the groundwater and surface water resources. These loans are limited to property owners of residential non-commercial use properties to solely install service lateral connections to a public sewer main.

In July 2008, a Memorandum Of Understanding (MOU) between GWA and Guam EPA was signed. GWA is required to continually submit quarterly financial reports to Guam EPA. Guam EPA, in coordination with GWA, targeted the assessment of roughly 144 houses in the Agafa Gumas subdivision for implementation of the sewer hook-up program as these houses are located over the NGLA (Figure 17). Guam EPA provides NPS grant funding to finance low interest loans to residents electing to abandon their septic tank leaching field system. Guam EPA also has enforcement authority to cite residents and report those violating this regulation to the attorney general. GWA will need to conduct smoke tests on sewer lines to locate cracks and illegal sewer hook ups as it has been over five years since smoke testing was conducted. This program has provided only three loans, and about 40 homes still need to be connected to the public wastewater system.

Figure 17. Agafa Gumas Subdivision ►
(Source: GWA Cesspool and Septic Tank Elimination Study, 2021)

In 2023, the legislature appropriated $2 million to support this program by increasing the amount of loan dollars available to sewer loan applicants. The Consolidated Commission on Utilities also recently approved changes to the program which includes increasing the maximum loan amount from $9 thousand to $25 thousand per applicant, increasing the loan term from 10 years to 15 years for applicants on public assistance, deferring payments for 5 years for customers willing to connect to a sewer main when built, and allowing for a waiver or decrease of certain requirements given specific conditions.

The next area of focus is the Adacao subdivision (Figure 18). Guam EPA will coordinate with GWA regarding infrastructure upgrades and outreach to homeowners about hooking up to the public sewer.

Figure 18. Adacao Subdivision
(Source: GWA Cesspool and Septic Tank Elimination Study, 2021)

Merizo Community Center Roof Rain Garden Project (Manell-Geus Watershed). The Merizo Community Center is the former historic Merlyn G. Cook School located in Merizo Pier Park (Figure 19). Currently, roof runoff flows off the roof in all directions (no gutter), ponding behind the building The concept is to hold a hands-on community workshop in this location on watershed issues then build a rain garden with the participants. The existing drip line could be stabilized/formalized with stone to reduce erosion, and would also direct water into the rain garden where native vegetation would be planted. Educational signage would also be placed around the rain garden.

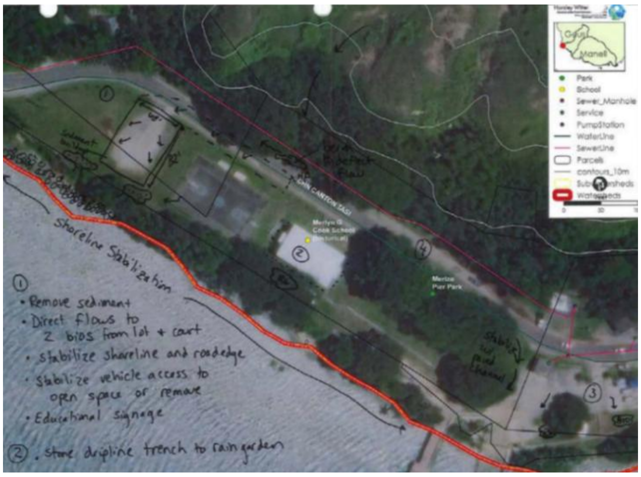


Figure 19. Site Sketch of the Merizo Community Center Roof Rain Garden Project ►
(Source: Manell-Geus Watershed Management Plan, 2025)

D. Goal 4: Conduct Other Program Activities

Guam Water Quality Standards (GWQS). Guam's Water Quality Standards (GWQS) are provisions of law which establish both the water quality goals for specific waters and the regulatory basis for treatment controls and strategies. Initially adopted in 1975, the GWQS must be reviewed and revised every three years to ensure that all water quality criteria are kept up to date. The last triennial review was conducted in 2017, where amendments include updated recreational water criteria, revised categories of waterbodies to which the recreational water criteria apply, and Statistical Threshold Values (STVs). The next triennial review will be initiated in October of fiscal year 2026.

Priority water quality standards issues under evaluation include, but are not limited to, the following:

- Additions of and changes to water quality criteria, adopted implementation procedures, or other general policies
- Development of biological indices for water quality in all waters
- Development of local wetland water quality standards
- Re-assessment of marine water classifications: M-1, M-2, M-3
- New parameters for sediment quality criteria for selected contaminants
- Changes to water quality standards for copper, nickel, and aluminum and/or clarification of mixing zone standards

CWA §401 Water Quality Certification (WQC). CWA §401 requires that any applicant for a federal license or permit which may result in a discharge into waters of the US must obtain a Water Quality Certification (WQC) from a certifying authority and that the discharge complies with all applicable water quality requirements. Guam EPA is the certifying authority that acts on CWA §401 WQC requests. Per Title 22 GAR 5 §5106, Guam EPA acts on certification requests within a reasonable time period mutually agreed upon by the federal licensing or permitting agency, typically USACE and the USEPA, and Guam EPA. Key components the certification process are:

- Pre-filing meeting request – Project proponents must request a pre-filing meeting from a certifying authority at least 30 days before requesting certification, unless the certifying authority waives or shortens this requirement.
- Request for certification – All requests for certification must include: (1) a copy of the federal license or permit application submitted to the federal agency (for individual licenses or permits) or a copy of a draft license or permit (for the issuance of general licenses or permits); and (2) any readily available water quality-related materials that informed the development of the application or the draft federal license or permit.
- Certification decision – A certifying authority may make one of four certification decisions on a request for certification: (1) grant certification; (2) grant certification with conditions; (3) deny certification; or (4) expressly waive certification.

Water, Air, Land Territorial Electronic Reporting System (WALTERS). WALTERS is a Guam EPA spatially linked electronic document storage system for data storage, access, management, and sharing. Permits are required for development projects via Guam EPA and DPW. Any Department of Defense (DOD) projects involving earth-moving activities are also required to obtain a permit from the Guam EPA. For any work in the water, permits (USACE, CWA §401 WQC, USEPA NPDES, etc.) are required. Additionally, Guam EPA reviews and provides additional information on:

- Federal Consistency Project Applications – A federal consistency is a provision in the Coastal Zone Management Act (CZMA) that requires the federal government to comply with a state's Coastal Management Program when taking actions that are likely to affect coastal resources. The PWM Program works closely with the Guam EPA's Water Pollution Control Program to respond to Federal Consistency Reviews in coordination with BSP.
- Environmental Impact Assessments (EIA) – Guam EPA has developed an EIA form for use by developers proposing projects or land use activities which may pose only insignificant environmental impacts. If potential environmental impacts and issues are assessed or determined to be significant either by the applicant or Guam EPA, a more detailed EIA may be required including a thorough presentation and discussion of alternatives.
- Verification of Wetland Delineated Boundaries – Guam EPA maintains copies of jurisdictional wetland delineation maps. Wetland verifications and determinations continue to be made, mostly involving small wetland systems (less than one acre). Most of these determinations and field verifications are required to facilitate development activities. As much as possible, Guam EPA recommends modifications to land development plans which circumvent impacts to wetlands.

IV. Partnerships and Collaboration

Guam EPA's PWM Program engages with local partners, including the public, to effectively implement watershed restoration projects. Participation and presence in partner organizations ensure that program goals are implemented and provide opportunities to leverage additional funding sources.

The PWM Program staff will participate in regularly scheduled partner meetings with the following, but not limited to, entities:

- NGLA Technical Working Group
- Northern and Southern Guam Soil and Water Conservation Districts
- Federal Consistency Determination Partners
- Habitat Conservation Plan Steering Committee
- Guam Watershed Planning Committee
- BSP GCMP Working Groups (such as the Guam Seashore Protection Plan, Forest System Plan, and the Guam Silver Jackets)

A. Agency Collaboration

Stormwater Management. Guam EPA continues to improve stormwater management via its permitting process which regulates any construction, land development, or earth-moving operations. Project applications are evaluated for stormwater runoff disposal and mandated to incorporate BMPs. Permitted projects must implement those BMPs to maximize on-site containment and/or treatment of stormwater prior to discharge, especially discharges into any near shore waters of Guam. In Tumon Bay, discharges to coastal waters have decreased with the elimination of most storm drains near the shoreline.

The Water Division continues to review procedures and applicable regulations by incorporating provisions for stormwater management based on criteria in the 2006 Commonwealth of the Northern Marianas Islands (CNMI)/Guam Stormwater Management Manual. Volume I provides a general overview on local stormwater issues as well as how to size and design BMPs to comply with stormwater performance standards. Volume II provides more detailed information on how to select and locate BMPs at a development site, landscaping guidelines, BMP construction specifications, BMP design examples, and other assorted design tools. §48102 of 10 GCA 48 (Toilet Facilities and Sewage Disposal) requires that no building shall be occupied or used as a dwelling, school, public building, commercial building, industrial building, or place of assembly without toilet excreta and other domestic wastes. In northern Guam, permitted housing density has been decreased to one residential dwelling unit per half acre of property in unsewered areas to protect the groundwater from contamination. In addition, permits are required for new and remodeled buildings. To ensure the installation of proper sewage disposal systems, the permitting process includes mandatory on-site inspection and building plan review, permit issuance, and final inspection of the completed disposal system. Building occupancy permits are only issued upon approval of the structure's sewage disposal system.

The Water Pollution Control Program is responsible for verifying connections to the public wastewater system in the Agafa Gumas subdivision through inspections and research of GWA records documenting billing of sewer charges. Owners of homes still needing to be connected to the public wastewater system are referred to GWA for assistance in applying to GWA's Wastewater Revolving Loan Fund Program.

Erosion and Sediment Control (E&SC). Guam EPA enforces the Guam Soil E&SC Regulations (22 GAR 10) to prevent, reduce, and control soil erosion or other environmental impacts to the community. Enforcement action is supported by an inspection program and an application review and approval process for all clearing, grading, or stockpiling permits. For most clearing and/or grading permits involving disturbed areas of one acre or more, there must be an accompanying Erosion Control Plan (ECP) which sets specific conditions to protect the quality and designated uses of the waters of Guam.

Interim Action Level (IAL) for Dieldrin. As dieldrin is not regulated by the USEPA but has been identified in at least two drinking water production wells at relatively high levels, Guam EPA established a health-based IAL for dieldrin in November of 2024 after reviewing available state and federal guidelines and risk assessments. The IAL applies to drinking water obtained from all public water systems (utilities such as GWA, US Navy, and US Air Force systems) and requires those public water systems to notify consumers. Effective Aug 2025, all public water systems must also monitor for dieldrin at least quarterly.

Environmental Monitoring and Analytical Services (EMAS) Division. The EMAS Division implements the Guam Water Quality Monitoring Strategy which aims to protect the quality of Guam's fresh and marine waters through consistent monitoring, assessment, and analysis. The Monitoring Program conducts sampling projects such as the RBMP and IWM Program. In addition, the Monitoring Program also participates in the NARS, specifically the National Coastal Condition Assessment (NCCA), National Rivers and Streams Assessment (NRSA), and the National Wetland Condition Assessment (NWCA). The Analytical Services and Laboratory Program provides support to the other divisions within Guam EPA by providing microbiological, physical, and chemical analyses of surface waters, groundwater, marine waters, and recreational waters. The PWM Program uses data from various projects to identify waters impaired by NPS pollution and unimpaired waters that are threatened or at risk from NPS pollution. These waters are reported in the biennial integrated report as Guam's §303(d) list of impaired waters.

Inspectors. Inspectors gather information about complaints, ensure that operations are being conducted within the confines of issued permits, and conduct other inspection duties as required. This includes inspecting construction sites to ensure that proper BMPs are installed and regularly maintained.

Guam Public Law 37-105. In 2024, Guam Public Law 37-105 was enacted to help mitigate the impact that septic systems have on the nitrate levels in wells. This law intends to:

- Reduce the number of nitrate-reducing septic systems from 6 to 4 per acre
- Establish a new Type 4 facility to provide options for landowners who, under past laws, cannot develop their property where sewer is unavailable
- Encourage sewer connections for existing dwellings having access to new sewer lines
- Empower Guam EPA to modernize the regulation of onsite wastewater disposal
- Authorize Guam EPA to permit the installation, operation, and maintenance of Type 4 toilet facilities
- Mandate Guam EPA to promulgate rules and regulations, future installation, operation, and maintenance as soon as practicable
- Requires close monitoring and reporting of nitrate levels in water wells
- Enhances Guam EPA's inspection and regulatory authority over septic systems

Type 4 facilities are toilets flushed with water and connected to an advanced nitrogen-reducing residential onsite disposal system.

B. Interagency Collaboration

Guam Department of Agriculture (Guam DOAG). The Guam DOAG's Forestry and Soil Resources Division (Guam Forestry) is essential in reducing fire risk. Guam Forestry is responsible for firefighting on conservation areas in the initial wildfire attack and supports GFD when requested. Outside of Guam Forestry's jurisdiction, they collaborate with GFD and federal fire departments from the Navy, Air Force, and Marine Corps to protect other wild land and rural areas. Additional primary activities include fuel load reduction, installation and maintenance of firebreaks, establishment of green belts, fire patrol, public education, and outreach. The education and outreach program includes pre-fire mitigation efforts, incident response, and post-fire activities. The Guam DOAG also has a conservation officer hotline where the public can report threats to Guam's fish and wildlife.

Guam EPA's collaboration with DOAG focuses on forestry activities which reduce NPS pollution, maintain, and improve surface water quality. Activities include tree planting in watershed locations with significant erosion issues which impact nearby waterbodies, participating in the review and update of the Forest Action Plan, and participating as a member of the steering committee regarding the Habitat Conservation Plan to protect populations of endangered plants and animals impacted by land clearing activities.

Guam Soil and Water Conservation Districts (Guam SWCD). Guam SWCD are comprised of the Southern SWCD (Southern District) and the Northern SWCD (Northern District). In conjunction with village mayors and the US Fish and Wildlife Services, they are implementing depredation techniques to address the growing population of feral ungulates.

The Southern District promotes the conservation of Guam's soil and water resources through education and outreach, technical assistance, and grassroots advocacy. They work closely with farmers, ranchers, and landowners in the southern region of Guam to build a lasting legacy of conservation that sustains Guam's natural beauty, bolsters agricultural productivity, and supports the livelihood of the community.

The Southern SWCD's Feral Swine Program provides resources and solutions to local farmers, ranchers, and landowners to mitigate the damage caused by feral swine. Effective feral swine management can minimize crop damage, soil erosion, and ecosystem disruption. The Southern SWCD's Soil Health Initiative aims to improve soil health through education, technical assistance, and innovative practices to enhance crop yields, prevent erosion, and increase resiliency.

The Northern District provides technical assistance, education, and collaboration to farmers and landowners in the northern region of Guam to raise awareness and promote environmental stewardship. They provide guidance on erosion control, water quality improvement, and conservation practices as well as partnering with local, federal, and non-governmental organizations to address broader conservation issues.

Guam EPA supports and collaborates with the Southern and Northern Districts by attending annual stakeholder planning meetings, participating in monthly partner meetings, writing letters of support for grant applications, and providing speakers for symposiums for farmers and teachers.

University of Guam Center for Island Sustainability (UOG CIS). To address the impacts of off-roading, policy makers have recommended establishing off-road areas and designated tails for recreational activities. In 2018, UOG CIS facilitated a round-table discussion aimed at developing guidelines for responsible off-roading. The TREAD Lightly Guam Pledge was established, inspired by an existing TREAD Lightly campaign. Cars Plus Guam, a locally-owned and operated automotive dealership, encourages off-roaders to pledge to the TREAD Lightly campaign. The main principles under the TREAD Lightly Pledge include the following:

- Travel responsibly on land by staying on designated roads, trails, and areas.
- Respect the rights of others.
- Educate yourself by learning the regulations from public agencies.
- Avoid sensitive areas.
- Do your part by modeling appropriate behavior.

UOG CIS has also partnered with the Island-wide Beautification Task Force, iRecycle, the Department of Parks and Recreation, DPW, Micronesia Islands Nature Alliance, and mayors to install bins and waste receptacles around the island to reduce littering and divert recyclable materials from the landfill.

Guam Waterworks Authority (GWA). GWA is responsible for operating the island's water and wastewater collection and treatment systems. Proper system operation ensures that Guam's water sources, especially the NGLA and coastal marine waters, are protected through appropriate treatment and discharge. To address aging infrastructure, GWA implements Capital Improvement Projects (CIPs) funded by the USEPA. CIPs include upgrading, improving, and replacing water and wastewater collection and treatment systems.

From 2018-2022, GWA invested over $200 million dollars to upgrade three of its wastewater treatment plants: Agat-Santa Rita Wastewater Treatment Plant (WWTP), Umatac-Merizo WWTP, and the Northern District WWTP. These upgrades will support GWA's goal toward meeting the requirements of the CWA and ensure 100% compliance with the USEPA National Pollutant Discharge Elimination System (NPDES). GWA also installed a multi-port diffuser at the deep ocean outfall serving the Northern District WWTP to spread out effluent discharge over a larger area which significantly improved the discharge pattern for the protection of marine resources. In collaboration with the Guam Power Authority (GPA), GWA provides treated wastewater to the new power plant in northern Guam to reduce the need for additional freshwater resources for industrial purposes.

GWA also cleans over 60 miles of sewer lines per year to reduce the number of sanitary sewer overflows (SSO). To reduce the number of SSOs, GWA has launched the "Don't Clog with Fats, Oils, Grease (FOG)" campaign to raise awareness in protecting the island's wastewater collection system and encourage the public to not dispose of FOG in drains. Residents are encouraged to collect FOG in a sealed container and dispose of them at the Guam Solid Waste Authority (GSWA) Household Hazardous Waste Facility.

GWA's Cesspool Septic Tank Elimination Study (2021) identified priorities, costs, and alternative scenarios to expand GWA's wastewater collection system and connect more customers. This study aimed to connect sewers with onsite wastewater disposal systems to the public sewer.

One-Guam Water. The One-Guam Aquifer Monitoring Program provides basic hydrologic data needed for effective management of Guam's drinking water resources. This program is a collaborative effort between WERI and the US Geological Survey (USGS) Pacific Islands Water Science Center. In 2014, WERI and USGS recommended expanded hydrologic monitoring of the NGLA as the existing network of monitor wells was insufficient and upgrades to the existing wells were needed. In 2016, GWA was granted $3.7M for critical infrastructure improvements needed for the expanded hydrologic monitoring. In 2017, GWA entered an MOA with UOG for WERI and USGS to provide technical assistance for the One-Guam Well Installation and Rehabilitation Project. The One-Guam Water Resources Information Program is an understanding and agreement of shared responsibilities between the DOD and the Government of Guam on the management of the island's most valuable utility water source. In 2020, GWA and Naval Facilities Engineering Systems Command (NAVFAC) Marianas (NAVFAC) signed a One-Guam Water MOU to establish a strong partnership and collaborative commitment to improve the island's utility system. The MOU lays out an organizational structure which includes scientifically informed advisement from the island's technical experts on water resources. In 2022, GWA, NAVFAC Marianas, WERI, and USGS signed MOAs to best manage, protect, research, and improve the quality and sustainability of the NGLA.

Guam Solid Waste Authority (GSWA). As required by the 10 GCA 51 (Solid Waste Management and Litter Control), GSWA created an Integrated Solid Waste Management Plan (2023) which includes source reduction, recycling, composting, resource recovery, and sanitary landfilling. In accordance with 10 GCA §51115(b), illegal dumping is subject to fines of up to $1,000 per day, per violation, along with the clean-up cost associated with the violation. Violations can be reported to Guam EPA.

To reduce litter and illegal dumping, Public Law 38-39 mandates island-wide trash collection. When customers sign up for services with GWA, they will be enrolled in garbage collection services with either GSWA or a private hauler. A customer service program was also established to assist low-income residents.

C. Watershed Planning Committee (WPC)

The PWM Program, along with BSP GCMP, will continue to chair quarterly WPC meetings to discuss the implementation of NPS control measures in priority watersheds and to facilitate engagement among partners to undertake watershed restoration and coastal pollution prevention activities. Guam EPA continues to collaborate with agency representatives on watershed issues and provides support to subject projects and activities when Guam EPA resources are available.

Other members of the WPC include, but are not limited to, the following agencies:

- Guam Historic Resources Division
- Northern and Southern Guam SWCD
- Guam DOAG
- Department of Land Management
- DPW
- GWA
- Port Authority of Guam
- Department of Education
- Department of Parks and Recreation
- UOG Marine Laboratory
- WERI
- UOG College of Natural and Applied Sciences (CNAS)

Ongoing and upcoming WPC priorities include, but are not limited to, the following:

- Updating the Piti-Asan Watershed Management Plan
- Updating EO 2004-04
- Creating a database to store and organize watershed data
- Developing watershed maps, including refining watershed place names

V. Capacity Building - Training Activities

The primary method of Guam EPA staff training is deliberate on-boarding to equip new staff with tools, relationships, and information helpful to fulfilling their responsibilities. Informal mentoring by senior staff enables new staff to develop a practical understanding of their roles and responsibilities in relation to other programs. Applied learning occurs informally as new staff becomes familiar with their roles through hands-on experience working alongside existing staff. Currently, the PWM Program consists of two staff members.

The PWM Program staff will continue to attend and participate in local, online, and off-island workshops and conferences when possible. The following is a non-comprehensive list of training opportunities:

- Watershed Academy (Online, Self-Paced)
- Water Quality Standards Academy (Live Online, Biannually)
- National NPS Training Workshop
- Quarterly USEPA Pacific Islands NPS virtual meetings and workshops
- National Training Workshop on Water Quality Data, Assessment, and Plans
- Association of Clean Water Administrators' (ACWA) Clean Water Cross-Program Workshop
- American Water Works Association Hawaii Section, Western Pacific Subsection (AWWA-HIWPS) Conference
- Virtual webinars hosted by ACWA, New England Interstate Water Pollution Control Commission (NEIWPCC), Environmental Law Institute, etc.

The PWM Program staff currently and will continue to also partake in additional trainings and workshops as appropriate in regards to their duties and responsibilities, as well as any that the Guam EPA deems necessary, such as the Hazardous Waste Operations and Emergency Response (HAZWOPER) training and DOD Controlled Unclassified Information training.

VI. Program Management Review and Evaluation

Every year, the PWM Program will continue to create a mid-year report and an end-of-the-year report to be submitted to the USEPA Region 9 as part of the consolidated grant report. At least every 5 years, this NPS Management Plan will be reviewed and revised, as needed, in collaboration with the USEPA Region 9. Reports will be tailored according, but not limited, to the following:

- Significant NPS pollutant load reduction resulting from §319 funded watershed projects
- Restored waters resulting from the elimination of NPS impairments
- NPS impaired waters
- NPS threatened, healthy waters
- Emerging NPS issues
- Monitoring and evaluation strategies
- Collaboration with other agencies (report outs on WPC, etc.)
- Additional evaluation through regular meetings with the USEPA NPS Program

The Guam EPA will also submit success stories via the USEPA's Grant Reporting and Tracking System (GRTS) Portal.

APPENDIX A. GUAM EPA'S 2022-2024 §303(D) LIST OF IMPAIRED WATERBODIES

Waterbody Name	Assessment ID	Location	State	Water Type & Classification	Waterbody Size	Unit	Assessed Units	Pollutants	Basis for Listing	Priority Ranking
Agana River 1	GUAGRA-3	WATERSHED: Hagatna	GU	RIVER S2	0.52	MILES	0.52	Enterococcus, Dissolved Oxygen; PCBs in fish tissue	Exceeds WQS >10% of Samples; Fish Advisory (2001)	LOW
Agana River 2	GUAGRA-2-1A	WATERSHED: Hagatna	GU	RIVER S2	0.67	MILES	0.67	PCBs in fish tissue	Fish Advisory (2001)	LOW
Agana Swamp	GUG-1B	WATERSHED: Agana	GU	WETLAND	6.40	ACRES	6.40	PCBs in fish tissue	Fish Advisory (2001)	LOW
Agat Bay 1	GUG-010B-1	WATERSHED: Agat	GU	MARINE BAY M2	0.63	SQUARE MILES	0.63	PCBs in fish tissue, Chlordane in fish tissue, Dioxin in fish tissue	Fish Advisory (2001 & 2002)	LOW
Apra Harbor 1	GUG-008A-2	WATERSHED: Apra	GU	MARINE BAY M1	0.05	SQUARE MILES	0.05	PCBs in fish tissue	Fish Advisory (1999)	LOW
Apra Harbor 2	GUG-008A-1	WATERSHED: Apra	GU	MARINE BAY M2	4.61	SQUARE MILES	4.61	PCBs in fish tissue	Fish Advisory (1999)	LOW
Cocos Lagoon 1	GUG-020A-1	WATERSHED: Geus	GU	MARINE BAY M1	5.70	SQUARE MILES	5.70	PCBs in fish tissue	Fish Advisory (2006)	LOW
Cocos Lagoon 2	GUG-020A-2	WATERSHED: Geus	GU	MARINE BAY M2	0.34	SQUARE MILES	0.34	PCBs in fish tissue	Fish Advisory (2006)	LOW
North Orote Peninsula Sea Cliffs	GUG-042	WATERSHED: Apra	GU	MARINE BAY M1	0.23	SQUARE MILES	0.23	PCBs in fish tissue	Fish Advisory (1999)	LOW
South Orote Peninsula Sea Cliffs	GUG-043	WATERSHED: Apra	GU	MARINE BAY M2	0.02	SQUARE MILES	0.02	PCBs in fish tissue	Fish Advisory (1999)	LOW
Gabgab Beach	GU-GB43	WATERSHED: Apra	GU	COASTAL WATERS M2	0.65	MILES	0.65	PCBS in fish tissue	Fish Advisory (1999)	LOW

Waterbody Name	Assessment ID	Location	State	Water Type & Classification	Waterbody Size	Unit	Assessed Units	Pollutants	Basis for Listing	Priority Ranking
Lonfit River 2	GUPGRL-2	WATERSHED: PAGO	GU	RIVER-S2	1.07	MILES	1.07	Salinity, Total Coliform, E. Coli, Enterococcus, Iron,Temperature, Turbidity	Consent Decree; Exceeds WQS>10% of Samples	LOW
Lonfit River 3	GUPGRP-1-51B	WATERSHED: PAGO	GU	RIVER - S1	0.04	MILES	0.04	Salinity, Total Coliform, E. Coli, Enterococcus, Temperature	Consent Decree	LOW
Pago Bay	GUG-003A	WATERSHED: Pago	GU	MARINE BAY M2	0.70	SQUARE MILES	0.70	Enterococcus, Dissolved Oxygen, Nitrate	Exceeds WQS >10%of Samples	MEDIUM
Pago River 1	GUPGRP-1-51A	WATERSHED: Pago	GU	RIVER- S2	0.06	MILES	0.06	E. coli Turbidity	Exceeds WQS >10%of Samples	MEDIUM
Pago River 2	GUPGRP-2	WATERSHED: Pago	GU	RIVER - S3	4.74	MILES	4.74	E. coli, Dissolved Oxygen	Exceeds WQS >10%of Samples	MEDIUM
Storm Drain	GUAGRD	WATERSHED: Northern	GU	RIVER -S2	0.21	MILES	0.21	E. Coli, Dissolved Oxygen, Nitrates, Total Suspended Solids, Turbidity, Salinity	Exceeds WQS >10%of Samples	MEDIUM
Tanguisson Beach 2	GUG-001B-2	WATERSHED: Northern	GU	MARINE BAY M2	0.40	SQUARE MILES	0.40	Toxic substance in seaweed	Seafood Consumption Advisory	LOW
Tipalao Bay	GUG-010A	WATERSHED: Agat	GU	MARINE BAY M2	0.10	SQUARE MILES	0.10	PCBs in fish tissue	Fish Advisory (1999)	LOW
Tumon Bay	GUG-001C	WATERSHED: Northern	GU	MARINE BAY M2	1.98	SQUARE MILES	1.98	Dieldrin, Total Chlordane	Waters Not Attaining Designated Uses	HIGH
Ajayan River	GUMZRAJ	WATERSHED: Manell	GU	RIVER -S2	3.95	MILES	3.86	Dissolved Oxygen, Orthophosphates, Suspended Solids	Exceeds WQS >10% of Samples	MEDIUM
Liyog River	GUMZRL	WATERSHED: Manell	GU	RIVER -S2	1.83	MILES	1,81	Dissolved Oxygen, Orthophosphates, Suspended Solids, Nitrate (NO3)	Exceeds WQS >10% of Samples	MEDIUM

Waterbody Name	Assessment ID	Location	State	Water Type & Classification	Waterbody Size	Unit	Assessed Units	Pollutants	Basis for Listing	Priority Ranking
Sumay River	GUMZRSY	WATERSHED: Manell	GU	RIVER -S2	1.06	MILES	1.02	Dissolved Oxygen, Orthophosphates, Nitrates, Suspended Solids	Exceeds WQS >10% of Samples	MEDIUM
Toguan River 1	GUMZRT-2	WATERSHED: Toguan	GU	RIVER-S3	0.20	MILES	0.20	Orthophosphate	Exceeds WQS >10% of Samples	LOW
Pago River 4	GUPGMPW	WATERSHED: Pago	GU	RIVER-S3	0.52	MILES	0.52	Turbidity	Exceeds WQS >10% of Samples	MEDIUM
Manell River	GUMZRML	WATERSHED: Manell	GU	RIVER-S2	2.77	MILES	2.65	Nitrate (NO3), Orthophosphate	Exceeds WQS >10% of Samples	MEDIUM
Fonte River 1	GUAGRF-2	WATERSHED: Fonte		RIVER-S2	1.16	MILES	1.16	Nitrate (NO3)	Exceeds WQS >10% of Samples	MEDIUM
Aslinget River 3	GUINRAP-46B	WATERSHED: Dandan	GU	RIVER-S3	0.18	MILES	0.18	Orthophosphate	Exceeds WQS >10% of Samples	LOW
Togcha River 5	GUTURTG-1C	WATERSHED: Togcha	GU	RIVER-S3	0.50	MILES	0.50	Nitrate (NO3)	Exceeds WQS >10% of Samples	LOW
Tinago River	GU6TINAGO	WATERSHED: Dandan	GU	RIVER-S3	2.93	MILES	2.93	Orthophosphates	Exceeds WQS >10% of Samples	LOW
West Surface Drainage	GUSURW	WATERSHED: Dandan	GU	RIVER-S1	0.36	MILES	0.36	Iron, Nitrate, Total Suspended Solids, Uranium	Consent Decree; Exceeds WQS>10% of Samples	LOW

APPENDIX B. IWM PROGRAM ASSESSMENT UNITS AND TARGET SITES IN 13 WATERSHEDS

Labels are highlighted for contrast purposes.

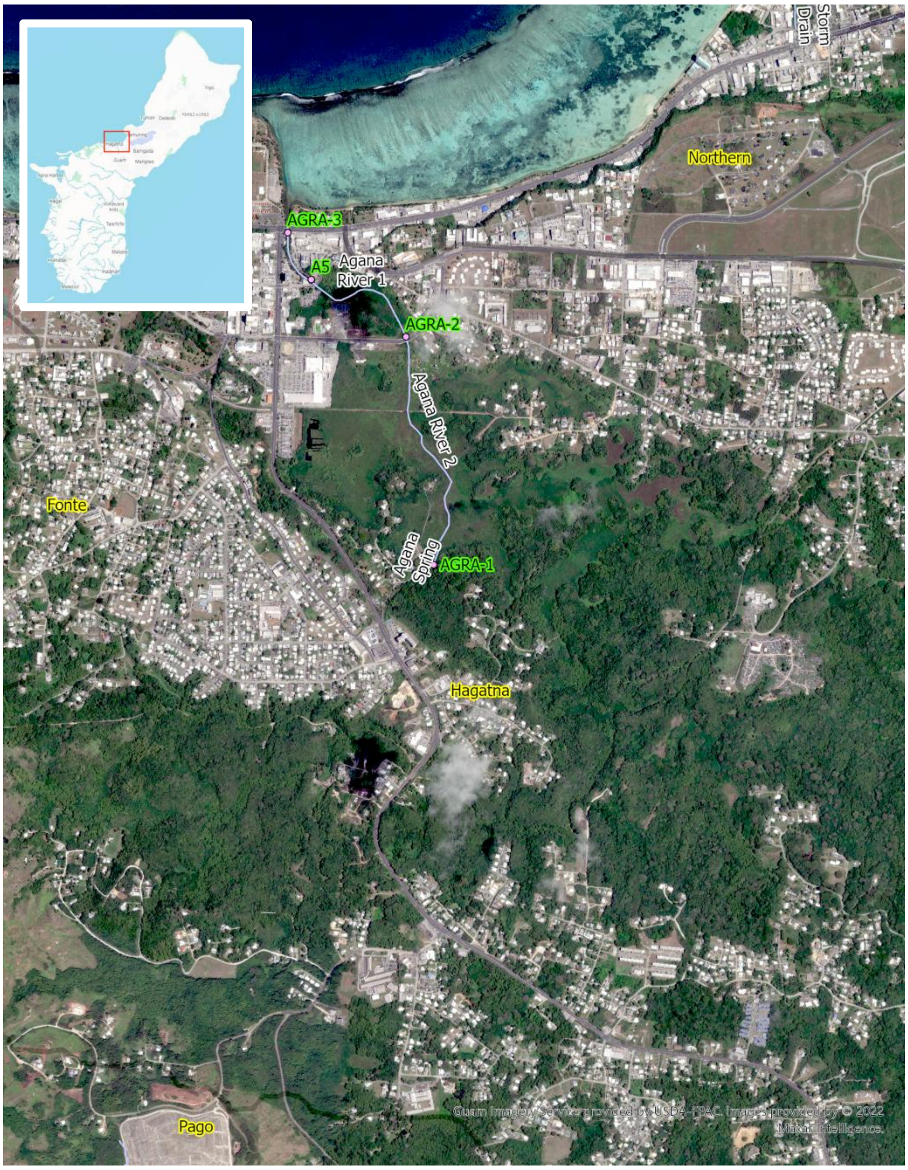


Figure B1: Agana Watershed

Table B1: Assessment Units in the Agana Watershed

Assessment Units	Site ID	Watershed	Status Aquatic Life Use	Parameter
Agana River 1	AGRA-3	Agana	Impaired	DO, Enterococci
Agana River 1	A5	Agana	Threatened	DO
Agana River 2	AGRA-2	Agana	Threatened	DO
Agana Springs	AGRA-1	Agana	Threatened	DO, E. coli, Nitrate

Figure B2: Apra Watershed

Table B2: Assessment Units in the Apra Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Atantano River 3	BG4	Apra	Threatened	DO, E. coli

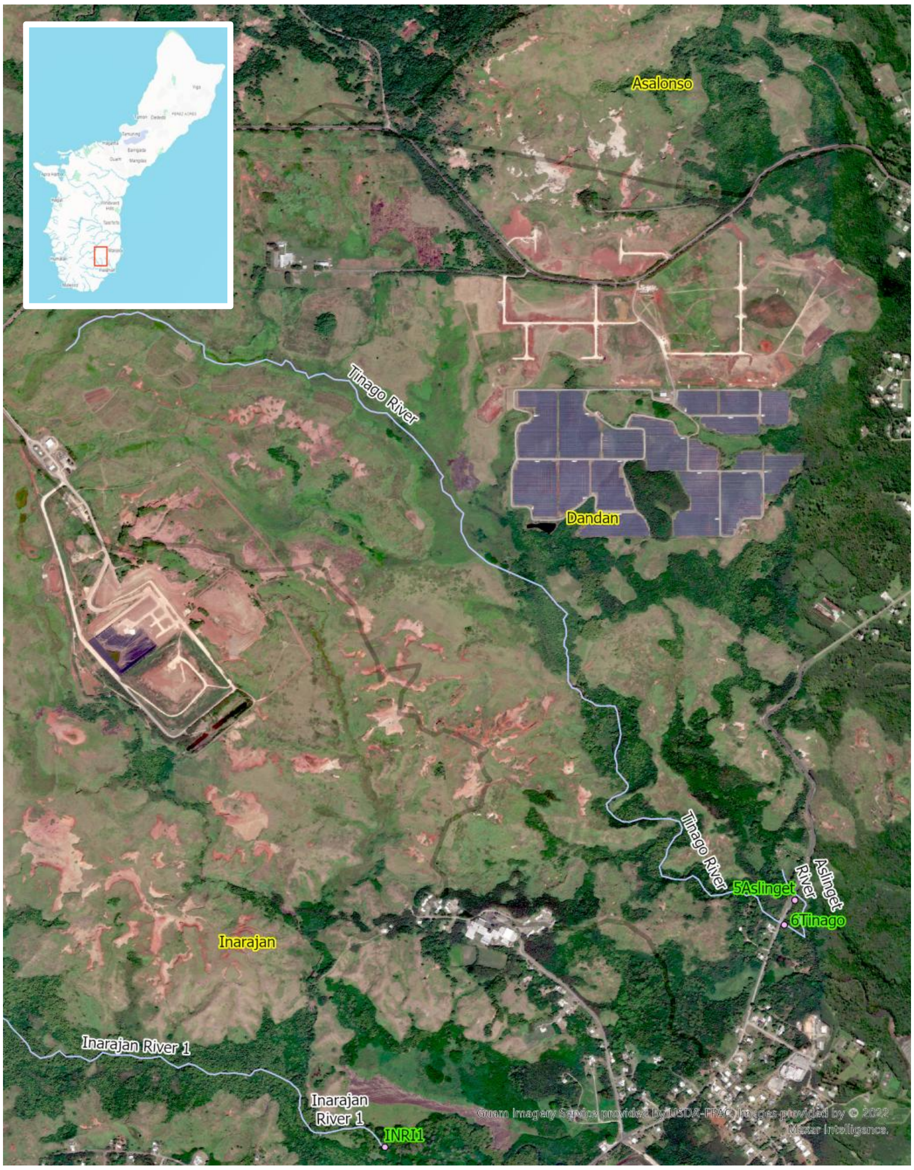


Figure B3: Dandan Watershed

Table B3: Assessment Units in the Dandan Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Aslinget River 3	5Aslinget / INRAP-46B	Dandan	Impaired	Orthophosphate
Tinago River	6TINAGO	Dandan	Impaired	Orthophosphate

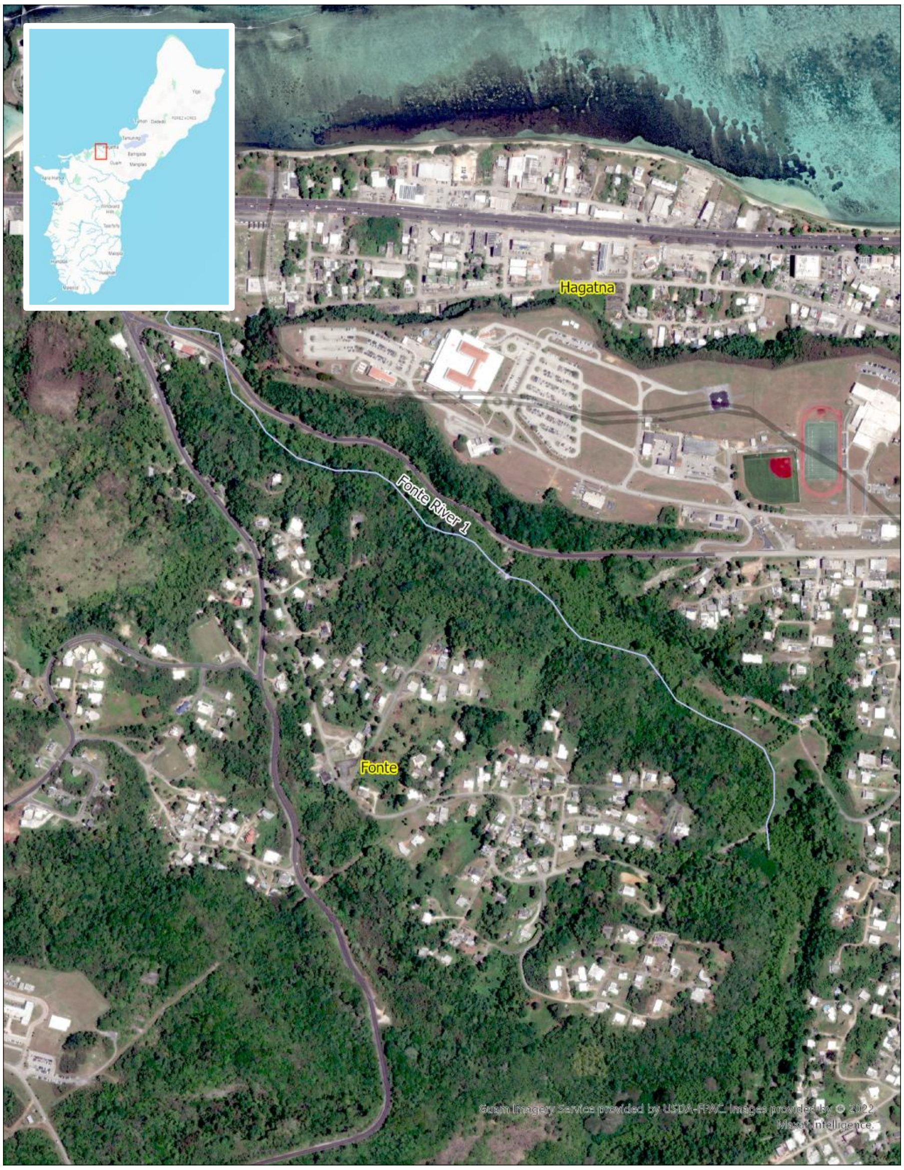


Figure B4: Fonte Watershed

Table B4: Assessment Units in the Fonte Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Fonte River 1	AGRF-2	Fonte	Impaired	Nitrate

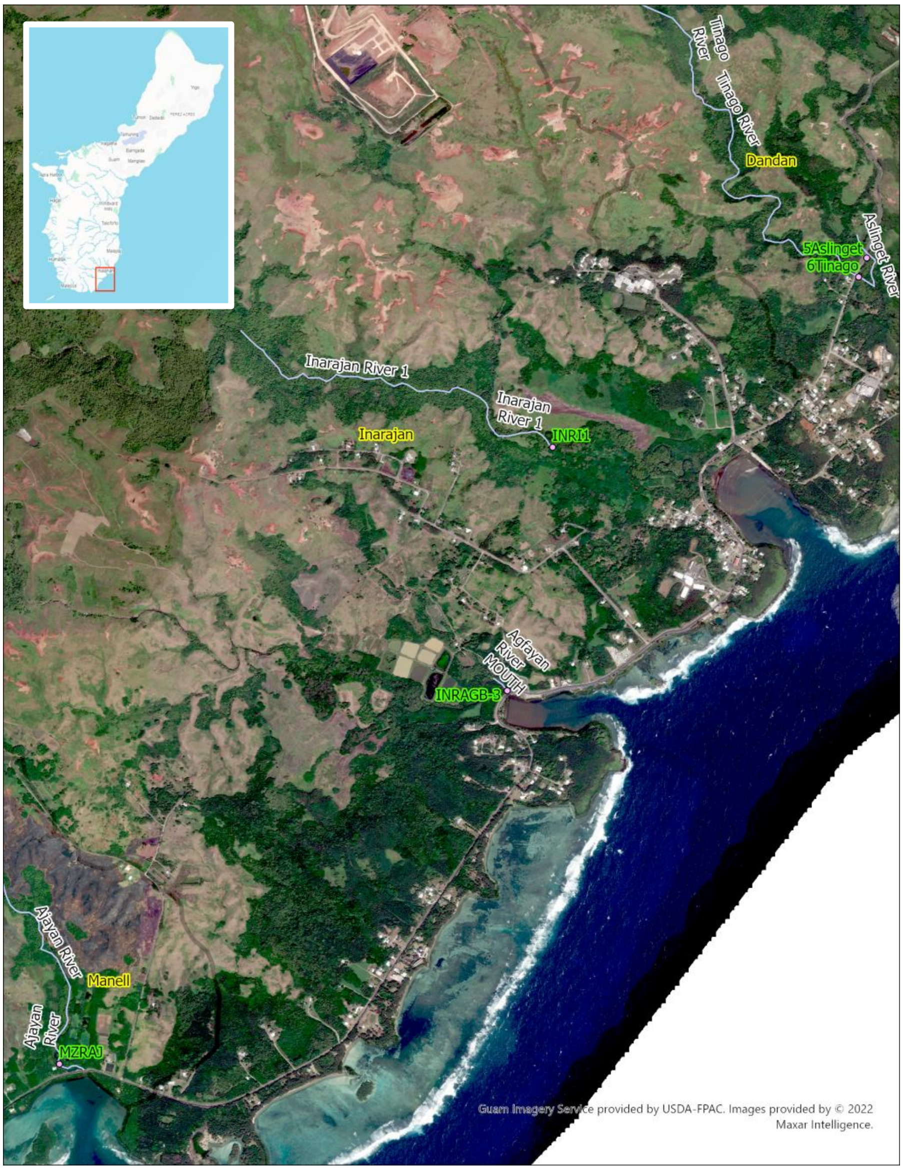


Figure B5: InarajanWatershed

Table B5: Assessment Units in the Inarajan Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Agfayan River MOUTH	INRAGB-3	Inarajan	Threatened	E. coli
Inarajan River 1	INRI1	Inarajan	Threatened	Nitrate

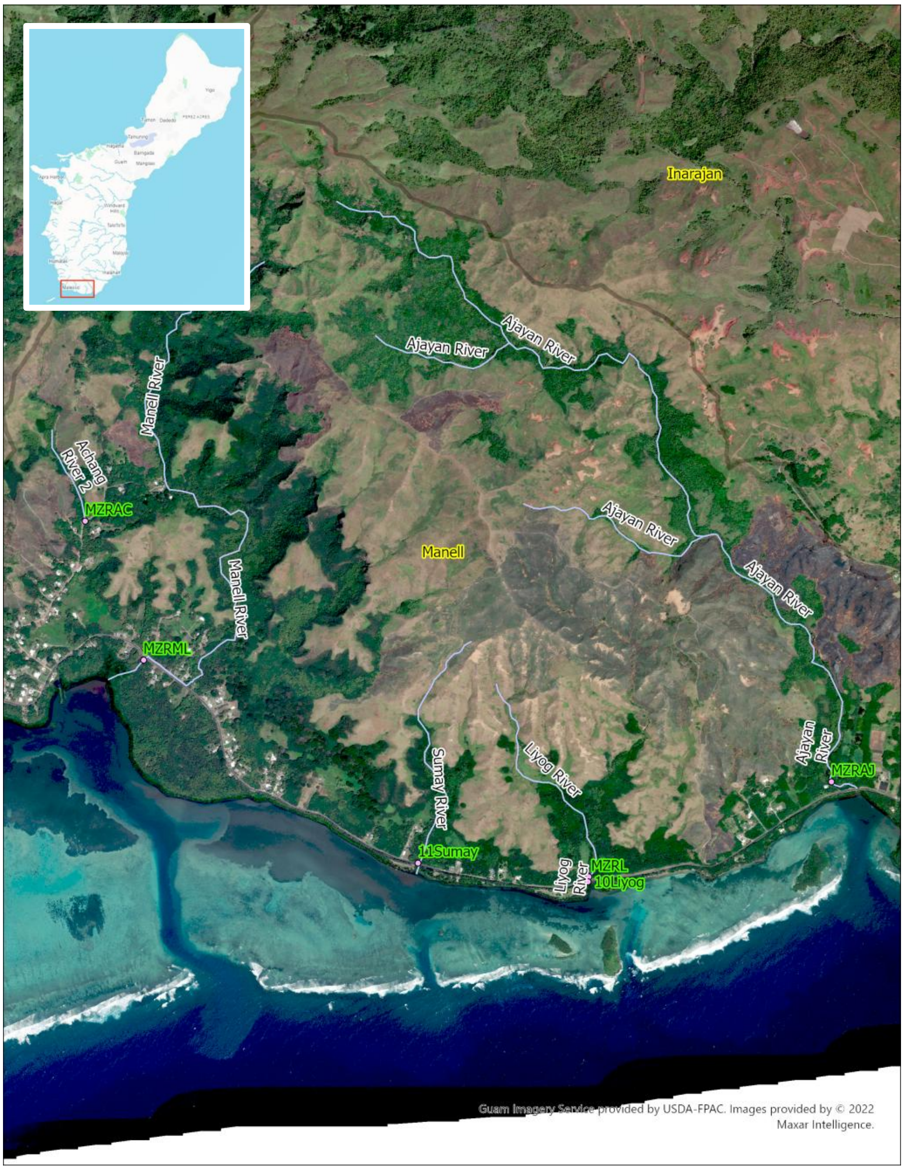


Figure B6: Manell Watershed

Table B6: Assessment Units in the Manell Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Achang River 2	MZRAC	Manell	Threatened	E. coli, Orthophosphate
Ajayan River	9Ajayan / MZRAJ	Manell	Impaired	DO, Orthophosphate, TSS
Ajayan River	9Ajayan / MZRAJ	Manell	Threatened	E. coli
Liyog River	10Liyog / MZRL	Manell	Impaired	DO, Orthophosphate, TSS, Nitrate
Liyog River	10Liyog / MZRL	Manell	Threatened	E. coli
Manell River	MZRML / 12Manell	Manell	Impaired	Nitrate, Orthophosphate
Sumay River	11Sumay / MZRSY	Manell	Impaired	DO, Orthophosphate, Nitrate, TSS

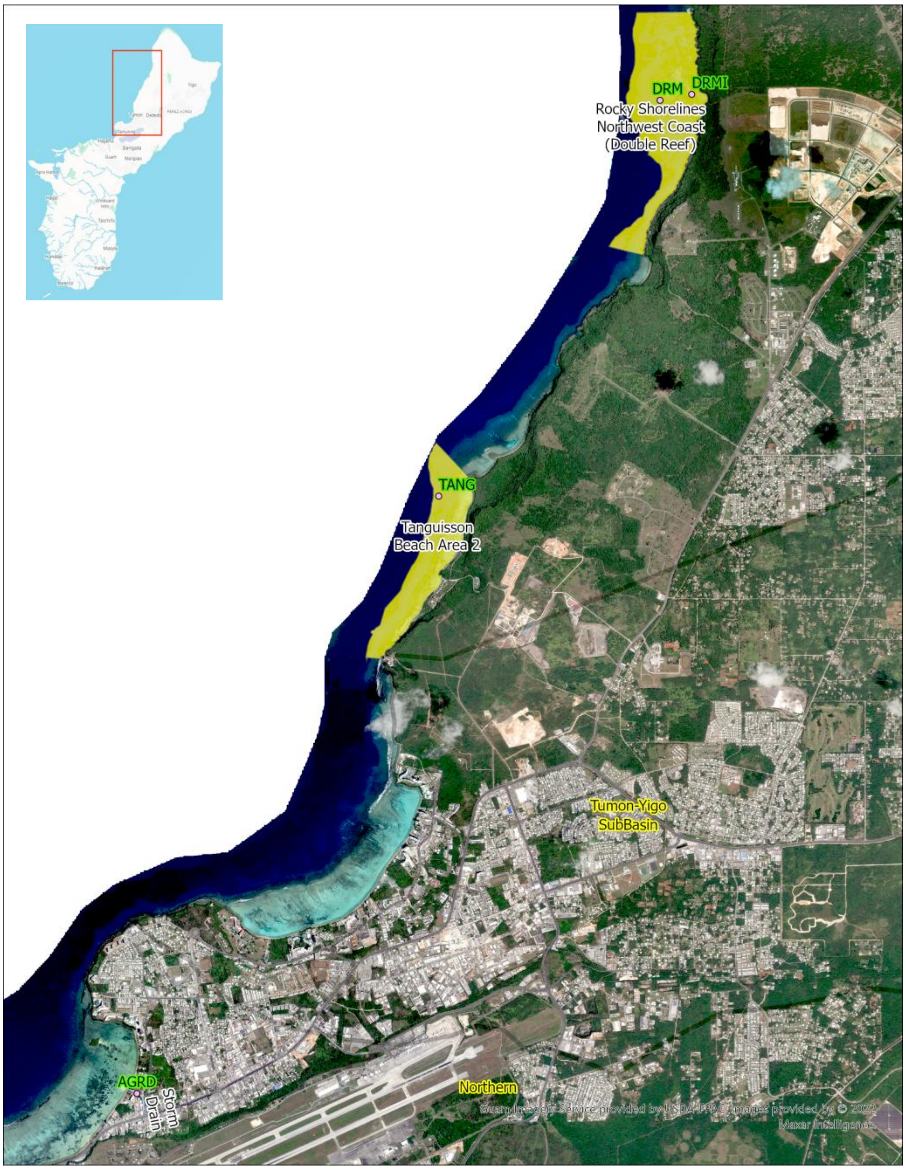


Figure B7: Northern Watershed
Yellow areas are the boundaries of the impaired waterbodies.

Table B7: Assessment Units in the Northern Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Storm Drain	AGRD	Northern	Impaired	DO, Salinity, E. coli, Nitrate, TSS, Turbidity, Enterococci
Rocky Shorelines Northwest Coast (Double Reef)	DRM	Northern	Threatened	TSS
Rocky Shorelines Northwest Coast (Double Reef)	DRMI	Northern	Threatened	TSS
Tanguisson Beach Area 2	TANG	Northern	Threatened	Enterococci

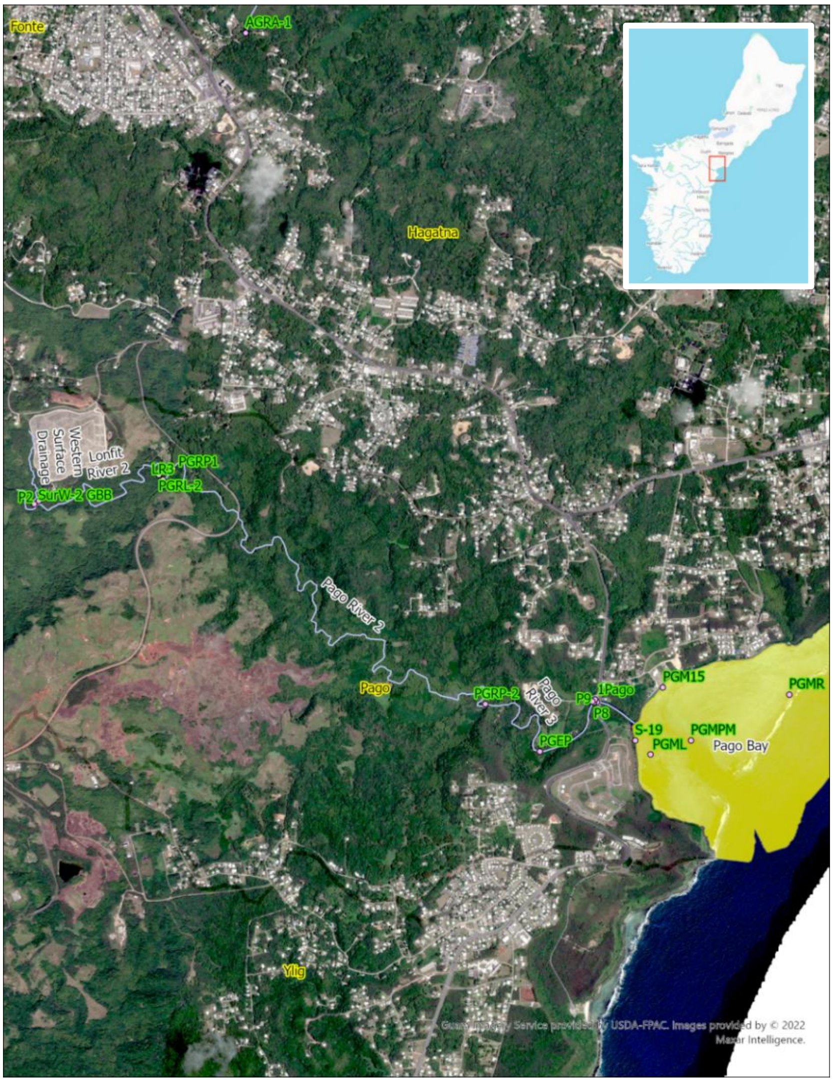


Figure B8: Pago Watershed
Yellow area is the boundary of the impaired waterbody.

Table B8: Assessment Units in the Pago Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Lonfit River 2	PGRL-2	Pago	Impaired	Salinity, Enterococci, E. coli, Total Coliform, Temperature, Turbidity, (iron)
Lonfit River 3 (small section to confluence)	LR3 / PGRP-1-51B	Pago	Impaired	Salinity, Enterococci, E. coli, Total Coliform, Temperature, Turbidity
Pago River 1	PGRP-1	Pago	Impaired	DO, E. coli, Turbidity storm flows
Pago River 2	PGRP-2	Pago	Impaired	DO, E. coli
Pago River 3	PGEP	Pago	Threatened	DO
Pago River 4	PGMPW / 1Pago / P8 / P9	Pago	Impaired	Turbidity
Pago River 4	PGMPW / 1Pago / P8 / P9	Pago	Threatened	DO
West Surface Drainage	SURW (SurW-2)	Pago	Impaired	Nitrate, TSS
West Surface Drainage	SURW (SurW-2) / P2	Pago	Threatened	DO

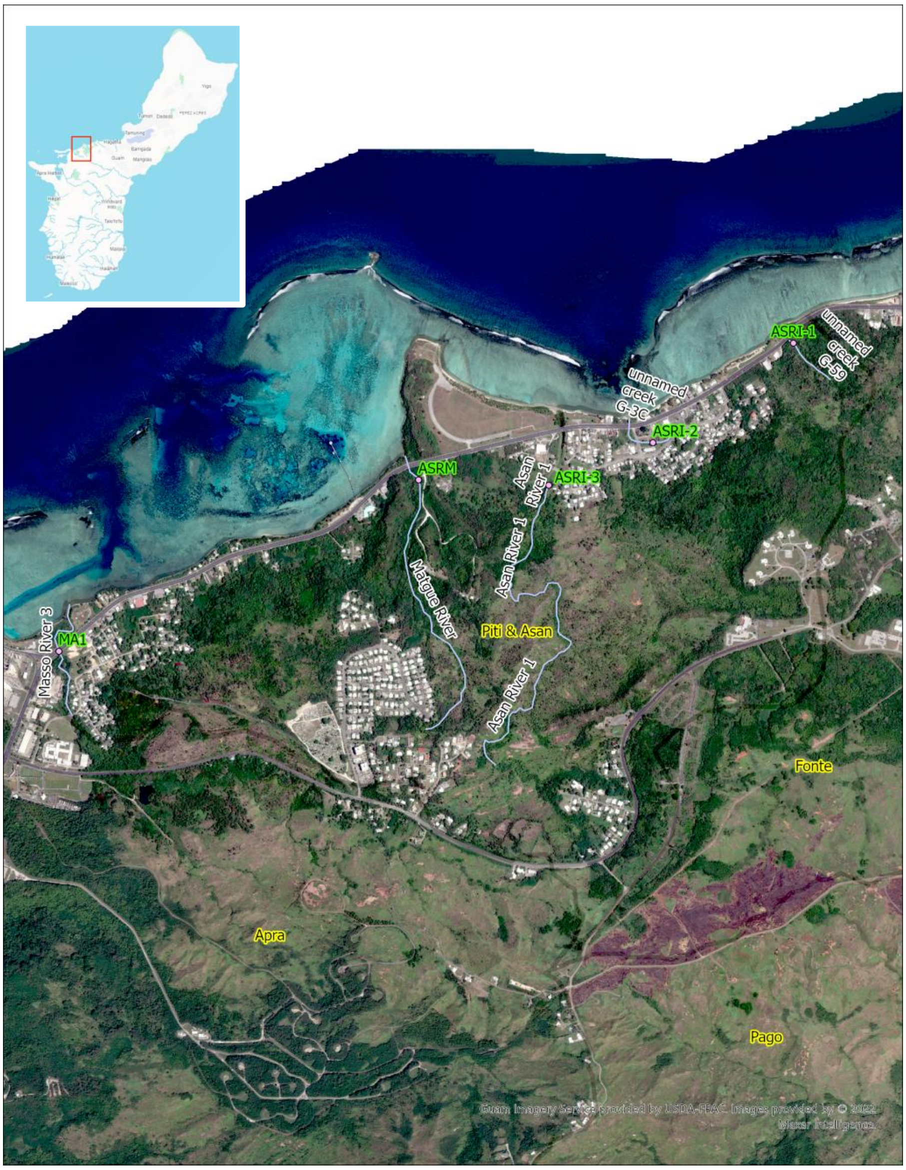


Figure B9: Piti-Asan Watershed

Table B9: Assessment Units in the Piti-Asan Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Asan River 1	ASRI-3	Piti-Asan	Threatened	E. coli
Masso River 3	MA1	Piti-Asan	Threatened	E. coli
Matgue River	ASRM	Piti-Asan	Threatened	E. coli
unnamed creek G-3C	ASRI-2	Piti-Asan	Threatened	Nitrate
unnamed creek G-59	ASRI-1	Piti-Asan	Threatened	E. coli

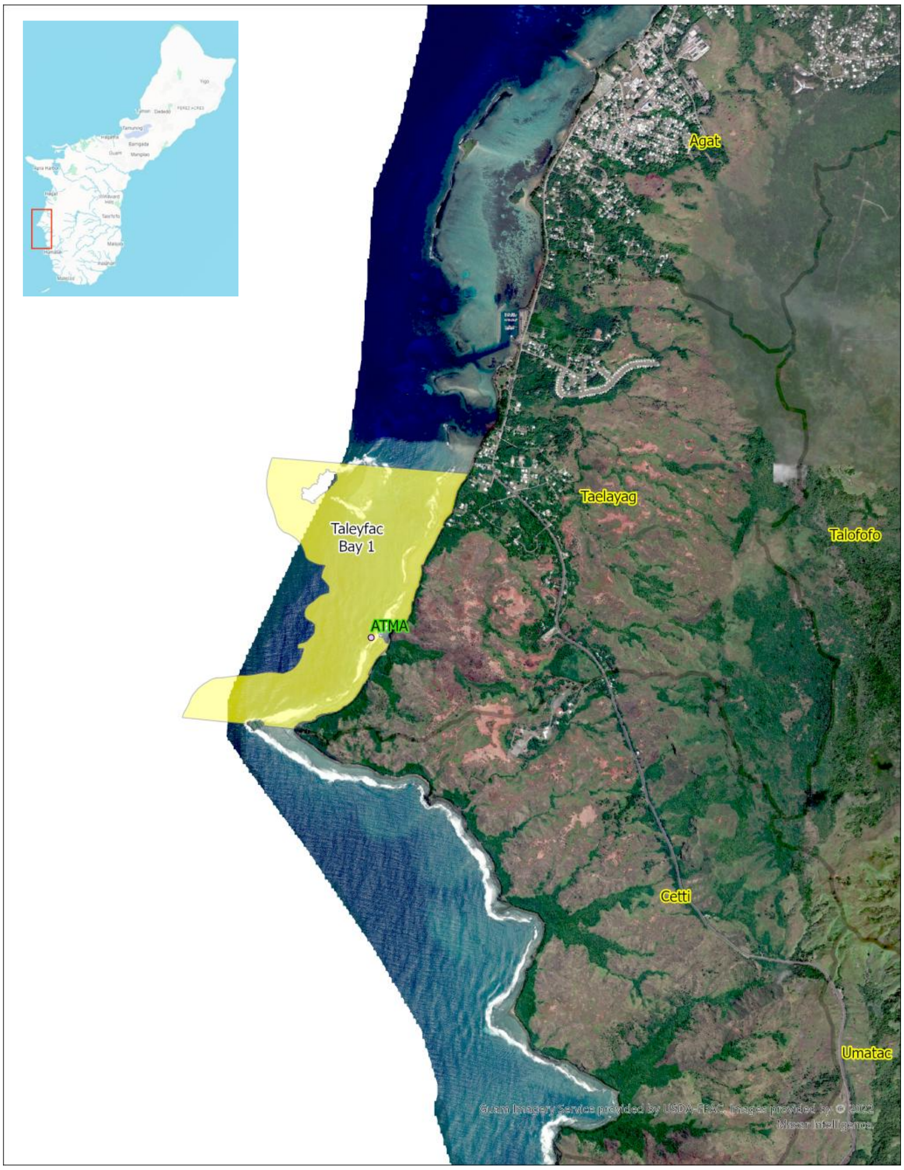


Figure B10: Taelayag Watershed
Yellow area is the boundary of the impaired waterbody.

Table B10: Assessment Units in the Taelayag Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Taleyfac Bay 1	ATMA	Taelayag	Threatened	TSS

Figure B11: Talofofo Watershed
Yellow area is the boundary of the impaired waterbody.

Table B11: Assessment Units in the Talofofo Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Talofofo Bay	TUM11	Talofofo	Threatened	Enterococci

Figure B12: Togcha Watershed

Table B12: Assessment Units in the Togcha Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Togcha River 1	TURTG-C	Togcha	Threatened	E. coli
Togcha River 2	TURTG-1B	Togcha	Threatened	Orthophosphate
Togcha River 5	3Togcha / TURTG-1C	Togcha	Impaired	Nitrate

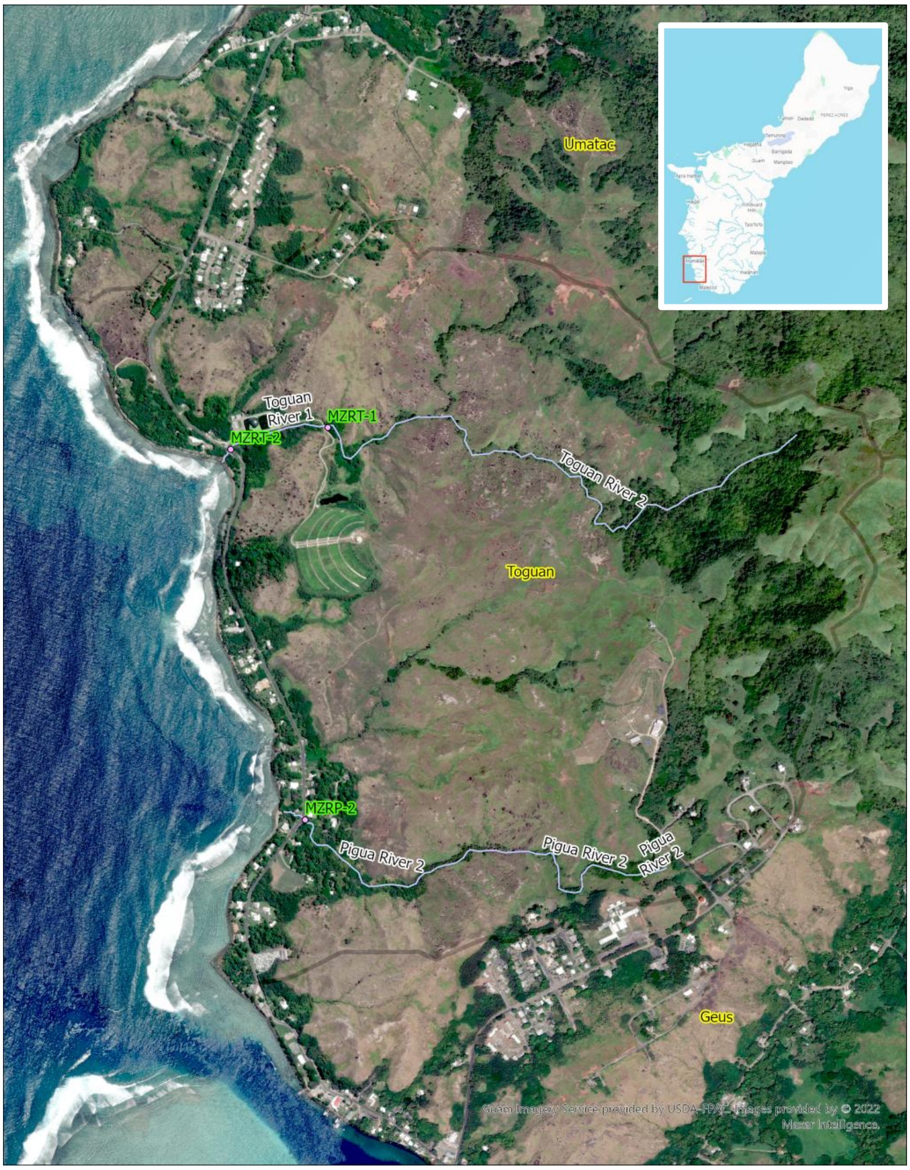


Figure B13: Toguan Watershed

Table B13: Assessment Units in the Toguan Watershed

Assessment Unit	Site ID	Watershed	Status Aquatic Life Use	Parameter
Pigua River 2	MZRP-2	Toguan	Threatened	DO, E. coli
Toguan River 1	MZRT-2 / 14Toguan	Toguan	Impaired	Orthophosphate
Toguan River 2	MZRT-1	Toguan	Threatened	E. coli