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ISSUANCE DATE: **September 11, 2025**

RFP NO.: **RFP No. ASPA25.069 – Aunu'u Wastewater Treatment Feasibility Study**

SUBJECT: **Addendum No. 1**

The American Samoa Power Authority hereby issues Addendum No. 1 to amend Request for Proposals (RFP) requirements. This addendum is issued pursuant to the conditions of the RFQ documents and is hereby made part of the RFP. The addendum serves to clarify, revise, and supersede information contained in the RFP. The Offeror must acknowledge receipt of this addendum in the appropriate space provided in the Addendum Form. Failure to do so may subject the Offeror to disqualification.

1. **Responses to queries received for this tender are included on page 2 of this Addendum.**

2. **Included with this Addendum #1 is the 2025 WW Secondary Treatment Feasibility Study.**

Should you have any questions or need clarification, please call me at (684) 699-3057 or procurement@aspower.com.

Sincerely,

Renee Leotele Togafau
Procurement Manager

Please sign and date below to acknowledge receiving Addendum 1. You may return this document via email at procurement@aspower.com, or the ASPA Procurement Office.

ACKNOWLEDGEMENT OF RECEIVING ADDENDUM 1

Received by _____, this _____day of _____ 2025.

Company _____ Title _____

Fax No. _____ Email Address _____

ASPA25.069 - Aunu'u WWT Feasibility Study		
#	**Question**	**Answer:**
1	Requesting a pre-proposal meeting for the Aunu'u WWT feasibility study.	Yes - Thursday, September 18 at 10:00AM using the link below: https://meet.google.com/ggk-yobh-gqp
2	Which agency is funding the engineering design and construction of this project? Is it the EPA or USA RD?	USEPA
3	What is the budget available for this project?	ASPA is looking for a bid that covers entire SOW, so that is why a budget is not mentioned.
4	What are the assumed permit conditions for this project if the discharge is sent to the ocean or the marsh (2007 preferred alternative)?	If discharge is sent to ocean, can assume permit conditions are similar to the Draft Tafuna WWTP NPDES Permit as shown in the 2025 WW Secondary Treatment Feasibility Study, but undersood that dilution factors are very site specific. If discharge is sent to the crater marsh lake, the ASEPA and EPA must be consulted first for their input.
5	Are you all aware of any known data from the National Marine Fisheries (or other agencies) for the straigt between Aunu'u & Tutuila?	ASPA is not aware of this data, but assumes that there is at least some data.
6	The 2007 Study determined that the preferred approach was primary treatement with septic, then constructed wetlands, and then discharge to the marsh. Is there a reason ASPA is not going with this approach? What has changed since 2007? Was this approach not accepted by USEPA?	The 2007 study recommendation was never pursued because of no apparent urgency; ww flow is relatively small and no indication of degraded water quality at the time, no funding and there were landowner objections that this would take up too much space. Also, the outfall dispersion/dillusion are such that the plume did not have an identifiable impact. The area of the discharge was not a marine sancuary in 2007, but now it is. For ASPA, a constructed wetlands seems like "high vegetation or landscaping type" maintenance.

SECONDARY TREATMENT FEASIBILITY STUDY

American Samoa Power Authority



March 2025

Prepared by:

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3/11/2025

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Common Acronyms and Abbreviations

ADF	Average Daily Flow
AC	Asbestos Cement Pipe
ACH	Air Changes per Hour
ACOE	Army Corps of Engineers
ACFM	Actual Cubic Feet Per Minute
ADWF	Average Dry Weather Flow
ALK	Alkalinity
AOTR	Actual Oxygen Transfer Rate
ASEPA	American Samoa Environmental Protection Agency
ASPA	American Samoa Power Authority
ASR	Alkali-Silica Reaction
AWWF	Average Wet Weather Flow
BNR	Biological Nutrient Removal
BOD	5-Day Carbonaceous Biochemical Oxygen Demand
CBOD	5-Day Carbonaceous Biochemical Oxygen Demand
CCTV	Closed Circuit Television
Cd	Cadmium
CEC	Cation Exchange Capacity
cf (CF)	Cubic Feet
CFR	U.S. Code of Federal Regulations
cfs	Cubic Feet Per Second
cfu	Colony Forming Units
CIP	Capital Improvement Plan
CMOM	Capacity, Management, Operations, and Maintenance
CMU	Concrete Masonry Units
COD	Chemical Oxygen Demand
CUP	Conditional Use Permit
DBP	Disinfection By-Products
CWA	Clean Water Act
d/D	Depth over Diameter
DIP	Ductile Iron Pipe
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
DP	Dissolved Phosphorus
E. coli	Escherichia Coliform Bacteria
EBPR	Enhanced Biological Phosphorus Removal
EID	Environmental Information Document
EPA	U.S. Environmental Protection Agency
ERU (or EDU)	Equivalent Residential Unit (or Equivalent Dwelling Unit)
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
fpm	Feet Per Minute
fps	Feet Per Second
ft	Feet
gal	Gallon(s)
GAO	Glycogen Accumulating Organism
gfd	Gallons Per Square Foot Per Day
gpcd	Gallons Per Capita Day
gpd	Gallons Per Day
gph	Gallons Per Hour
gpm	Gallons Per Minute
HDPE	High Density Polyethylene
HGL	Hydraulic Grade Line
hp	Horsepower
HRT	Hydraulic Residence Time
HVAC	Heating/Ventilation/Air Conditioning
I/I	Inflow and Infiltration
kW	Kilowatt
kwh	Kilowatt-Hour
lb/day	Pounds Per Day
LS	Lump Sum
MBR	Membrane Bioreactor
MCC	Motor Control Center
MCL	Maximum Contaminant Level
MF	Microfiltration
MFEM	Membrane Filtration Equipment Manufacturer
MG	Million Gallons
mg/l	Milligram Per Liter (Parts Per Million – ppm)
MGD	Million Gallons Per Day
MH	Manhole
mL	Milliliter
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
MM	Maximum Month
MMF	Maximum Month Flow

MPN	Most Probable Number	SCFM	Standard Cubic Feet Per Minute
ND	Non-Detectable	sf (SF)	Square Feet
ng/L	Nanogram Per Liter (Parts Per Trillion or ppt)	SMP	Solids Management Plan
NGVD	North American Vertical Datum	SRP	Soluble Reactive Phosphorus (PO_4-P)
NH_3-N	Ammonia Expressed as Nitrogen	SST	Stainless Steel
NO_3-N	Nitrate Expressed as Nitrogen	STEP	Septic Tank Effluent Pumping
NO_3-N & NO_2-N	Sum of Nitrate and Nitrite Nitrogen	SVI	Sludge Volume Index
NOAA	National Oceanic and Atmospheric Administration	TAN	Total Ammonia Nitrogen
NPDES	National Pollutant Discharge Elimination System	TDH	Total Dynamic Head
O&M	Operation and Maintenance	TIN	Total Inorganic Nitrogen
O_2	Oxygen	TKN	Total Kjeldahl Nitrogen
OR	Overflow Rate	TM	Technical Memorandum
ORP	Oxidation Reduction Potential	TMDL	Total Maximum Daily Load
OSHA	Occupational Safety and Health Administration	TMP	Transmembrane Pressure
P	Phosphorus	TN	Total Nitrogen
Pb	Lead	TOC	Total Organic Carbon
PDF	Peak Daily Flow	TP	Total Phosphorus
PER	Preliminary Engineering Report	TS	Total Solids
PF	Peaking Factor	TSS	Total Suspended Solids
pg/L	Picogram Per Liter (Parts Per Quadrillion or ppq)	µg/L	Microgram Per Liter (Parts Per Billion – ppb)
pH	Potential of hydrogen (acidity or basicity)	UF	Ultrafiltration
PHF	Peak Hourly Flow	USDA RD	US Department of Agriculture Rural Development
PLC	Programmable Logic Controller	USFWS	US Fish and Wildlife Service
POTW	Publicly Owned Treatment Work	USGS	United States Geological Survey
ppb	Parts Per Billion (µg/L)	UV	Ultraviolet
ppd	Pounds Per Day	VCO	Voluntary Consent Order
pph/sf	Pounds Per Hour Per Square Foot	VFA	Volatile Fatty Acid
ppm	Parts Per Million (mg/L)	VFC (or VFD)	Variable Frequency Controller (or Drive)
ppq	Parts Per Quadrillion (pg/L)	VOC	Volatile Organic Compounds
ppt	Parts Per Trillion (ng/L)	VSS	Volatile Solids
PQL	Practical Quantitation Limit	VSS	Volatile Suspended Solids
psia / psig	Pounds Per Square Inch (Absolute / Gauge)	WAS	Waste Activated Sludge
PVC	Polyvinyl Chloride	WLA	Waste Load Allocation
RAS	Return Activated Sludge	WQS	Water Quality Standards
SA	Surface Area	WRCC	Western Regional Climate Center
SBC	Submerged Biological Contactor	WWTP	Wastewater Treatment Plant
SBR	Sequencing Batch Reactor	WRF	Water Reclamation Facility
SCADA	Supervisory Control and Data Acquisition	Zn	Zinc

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Acknowledgements

J-U-B Engineers would like to acknowledge and thank the American Samoa Power Authority (ASPA) Project Manager and other staff for their ongoing input throughout the development of this document. They not only provided bimonthly reviews, but they participated in bimonthly meetings to discuss the findings as development progressed. Also attending these bimonthly meetings and providing input on the bimonthly drafts, were the EPA, Monica Moran, and the American Samoa EPA, Steve Brum. We are also grateful for their input and support. We have also appreciated the support of ASPA management including Executive Director Wallon Young, Chief Engineer William Sword, and Wastewater Division Manager Fa'i Mareko. Lastly, ASPA expresses appreciation to the US EPA for funding this study.

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J-U-B ENGINEERS, INC.

EXECUTIVE SUMMARY

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ES-1 Executive Summary

ES-1.1 Introduction

The American Samoa Power Authority (ASPA) contracted with J-U-B ENGINEERS, Inc. (J-U-B) to prepare a Wastewater Secondary Treatment Feasibility Study (Study) for the wastewater treatment systems and infrastructure under the ownership and control of ASPA. The US Environmental Protection Agency (EPA) has raised concerns about water quality in the receiving waters in its draft National Pollutant Discharge Elimination (NPDES) permit for the Tafuna WWTP. The draft NPDES permit has set forth conditions that would require secondary treatment and nutrient removal, as well as compliance with other pollutants not covered in ASPA's current Tafuna NPDES permit to satisfy water quality criteria in the ocean outfall. ASPA subsequently initiated this Study to determine how secondary treatment at the existing Tafuna (or Fogagogo) and Utulei wastewater treatment plants (WWTPs) could be implemented, or to determine if new WWTPs are required to achieve secondary treatment standards and nutrient removal.

This Study has been completed in parallel with ASPA's Wastewater Utility Plan, a separate document also prepared by J-U-B ENGINEERS, Inc. The goal of the Utility Plan is to provide an updated evaluation of the existing wastewater infrastructure for both current conditions and a 20-year planning outlook. The Utility Plan effort focused on identifying existing and future deficiencies in the Tafuna and Utulei wastewater treatment systems to aid in developing an updated capital improvement plan and maintenance schedules to provide optimal wastewater treatment based on the most current NPDES permits for both facilities.

ES-1.2 Background

The Tafuna WWTP currently serves approximately 19,860 people and accepts septage from the local community for treatment and disposal. The Tafuna WWTP utilizes primary treatment before discharging effluent to Vai Cove, which is located south of the Pago Pago International Airport on the island of Tutuila. The treatment process includes the headworks, where grit is manually removed from two grit channels and debris is removed with ½" mechanical coarse screens. Influent is then pumped to one of the three Clarigesters where settleable solids are removed. The wastewater then undergoes UV disinfection prior to discharge through a diffuser to dilute the effluent roughly 1,600 feet away from the shoreline in the Pacific Ocean. The Tafuna WWTP is shown in **Figure ES - 1**.

The Utulei WWTP serves approximately 7,680 people and utilizes primary treatment before discharging to Pago Pago Harbor. Influent enters the headworks and flows through a basket screen in the influent lift station where large particles are collected and manually removed by the operators. Grit settles out in the splitter box and is removed manually. Flow then continues to the Clarigesters. There are four Clarigesters at the Utulei WWTP. After settleable solids are removed, the wastewater then undergoes UV disinfection prior to discharge through a diffuser to dilute the effluent roughly 1,050 feet away from the shoreline in Pago Pago Harbor. The Utulei WWTP is shown in **Figure ES - 2**.

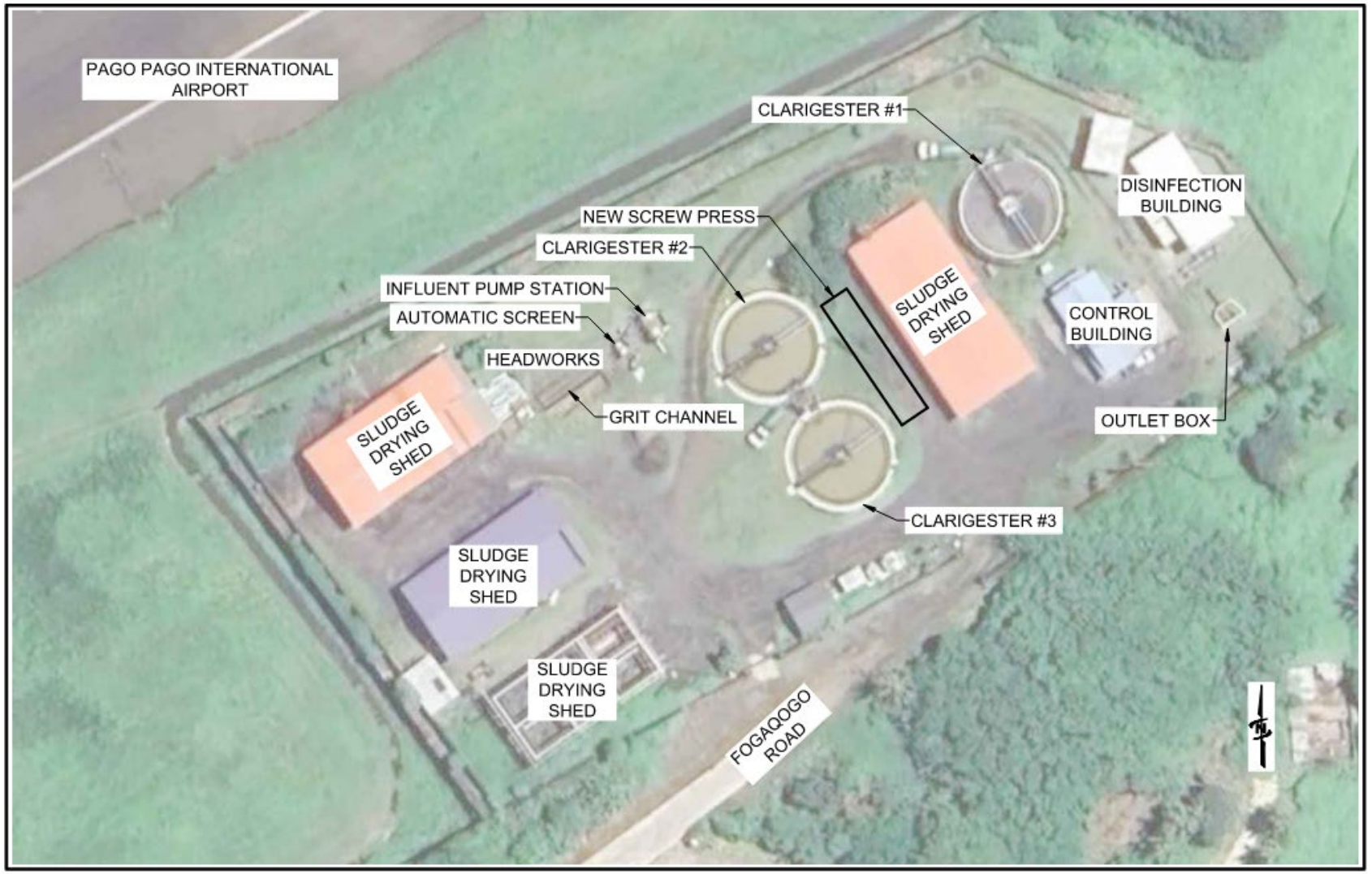


Figure ES - 1: Tafuna WWTP – Site Map



Figure ES - 2: Utulei WWTP – Site Map

ES-1.3 Goals and Challenges

Chapter 2 develops projects specific goals and challenges in implementing secondary treatment. ASPA identified multiple goals based on general age and condition of the existing treatment facilities, current and potential future regulatory conditions, operational needs, and monetary / non-monetary drivers. The primary goals developed through workshops with ASPA at the onset of the project are listed below in **Table ES - 1** and are intended to be used during ranking and selection of a preferred alternative. These goals reflect the need for this feasibility planning document to provide a wastewater treatment solution that meets the ASPA, ASEPA, USEPA, and other stakeholder's wastewater treatment goals within an acceptable timeframe.

Table ES - 1: **Goals for Secondary Treatment Feasibility Study**

Goal / Criteria	Definition
Ability to Satisfy Future NPDES Discharge Permits	The Tafuna and Utulei WWTPs have previously operated under a 301(h) waiver which effectively required only primary treatment. The draft Tafuna NDPES permit requires secondary treatment as well as nutrient removal. A draft permit for Utulei is not currently available, but similar discharge conditions could be established in future permits. The primary goal of this study is to evaluate the ability of both the facilities to achieve the effluent standards currently envisioned in the draft Tafuna NPDES permit.
Operational Simplicity	Current operations are relatively simple from a process standpoint. However, implementation of secondary treatment and nutrient removal will significantly increase the process complexity and the amount of equipment in operation. ASPA is seeking treatment processes that are time proven and relatively simple to operate and maintain. This is particularly critical since American Samoa is an isolated island community with inherent challenges associated with hiring and retaining qualified personnel to operate and maintain a WWTP. Operational simplicity is also critical since the existing treatment facilities experience difficulties with instrumentation and SCADA. A related concern is the need for more laboratory analyses to provide data for additional permit requirements, as well as process control.
Maintenance Simplicity	From an equipment perspective, the ability to obtain new equipment, replacement parts, consumables, and chemicals, as well as receive adequate vendor support, are very important to ASPA due to being located on an island where items require the additional time and costs associated with shipping. ASPA has experienced difficulty in obtaining suitable field support for troubleshooting equipment with other public works projects.
Minimize Power Consumption	Minimizing the amount of power that is required to operate the WWTPs is another high priority of ASPA. Renewable solar energy is developing on the island, but the main source of electricity is diesel generators – approximately 95% of the electricity generated on the island is produced through the combustion of imported fossil fuels. Consequently, the cost per kilowatt hour on American Samoa is roughly twice the cost compared to the average cost on the mainland United States. Not only do diesel generators emit carbon dioxide during combustion, but they also emit particulates that contribute to air pollution.
Affordability: Capital Cost + O&M	Capital costs, as well as a project's lifecycle cost from O&M, are critical factors in ASPA's decision-making process. American Samoa is an underserved community that has the lowest per capita income compared to the United States mainland and associated territories, with poverty rates four times higher than the U.S. mainland.
Land Requirement	The availability of sufficient land space to accommodate secondary treatment.

The goals identified above represent specific challenges that potential improvements can generally be tailored to address and subsequently ranked. In addition to those items, broader challenges facing American Samoa and noteworthy considerations in developing a subsequent project (or projects) to implement secondary treatment are noted below.

- Land availability and topography
- Environmental conditions
- Increasing complexity and staffing requirements
- Availability of contractors and time to construct
- Build America Buy America (BABA) requirements
- Infiltration and inflow (I/I)

It is expected that the challenges noted above, as well as many of the goals, are similar for other Pacific Island communities. A brief overview of other facilities is included in **Chapter 2** based on readily available information from permits, fact sheets, and other on-line sources.

ES-1.4 Flows and Loads

Chapter 3 reviews historical influent flows and loads for both the Tafuna and Utulei WWTPs and presents design loading for each facility as well as a regional facility. This Study relies on the information and data used in the Wastewater Utility Plan. Data utilized in this Study included both the DMR data required for NPDES permitting compliance and additional nutrient sampling ASPA collected to provide information regarding nitrogen and phosphorus in preparation of the draft Tafuna permit.

As noted in the WWUP, the observed influent BOD and TSS loading at the Tafuna WWTP on a per capita basis are unusually low when compared to per capita influent loads at the Utulei WWTP and typical literature values. Additionally, the influent TSS at the Tafuna WWTP has been considerably less than the influent BOD, whereas influent loading is generally similar absent significant industrial users. The influent per capita nutrient loads were similar to typical per capita loads. Influent sampling at Tafuna is at the end of a long channel and immediately upstream of the influent flume. This configuration may result in solids settling out of suspension and yielding errant results. To account for these discrepancies, typical per capita BOD and TSS loads were used for the Tafuna portion of the load for the regional secondary WWTP. The Tafuna sewage conveyance system is anticipated to expand into unsewered areas with a corresponding future population of approximately 30,170.

The Utulei WWTP has relatively typical per capita values for BOD, TSS, and nutrients loads. The per capita hydraulic flows are extremely high – 265 gallons per capita per day (gpcd) on average compared to 72 gpcd for Tafuna – and are attributed to inflow and infiltration (I/I) in the sewer conveyance system, including likely seawater intrusion. Based on discussions with ASPA, the sewered area contributing to the Utulei WWTP is anticipated to expand to a population of 8,085 people.

The combined sewered population of the two WWTPs is currently estimated at 27,530 people and is anticipated to grow to 38,255 people as unsewered areas are connected to the collection systems. Existing per capita I/I hydraulic loads were utilized to hydraulically design the regional facility. The

existing and projected loading for a regional facility, combining flows from both the Utulei and Tafuna collection systems, is included in **Table ES - 2**.

Table ES - 2: Design Conditions for a Regional Facility

Parameter	Probable Existing Conditions (2024) (1) (2)	Probable Future Conditions (2044) (1) (2)
Flow		
Average Day (MGD)	3.5	4.3
Maximum Month (MGD)	4.4	5.5
Peak Day (MGD)	8.6	10.7
Peak Hour (MGD)	10.7	13.9
BOD		
Average Day (mg/L)	189	213
Average Day (ppd)	5,510	7,650
Maximum Month (ppd)	8,680	12,090
Peak Day (ppd)	13,880	19,340
TSS		
Average Day (mg/L)	168	193
Average Day (ppd)	4,920	6,940
Maximum Month (ppd)	8,020	11,550
Peak Day (ppd)	11,420	16,240
TN		
Average Day (mg/L)	29	33
Average Day (ppd)	850	1,198
Maximum Month (ppd)	1,400	2,010
Peak Day (ppd)	-	-
TP		
Average Day (mg/L)	3.8	4.2
Average Day (ppd)	110	150
Maximum Month (ppd)	250	360
Peak Day (ppd)	-	-

(1) Flow values reflect the summation of the respective conditions from each facility, not a "paired" flow condition.

(2) Loading values reflect the summation of the respective conditions from each facility, not a "paired" loading.

ES-1.5 Permit Conditions and Discharge Standards

Chapter 4 reviews the current NPDES effluent requirements for both the Tafuna and Utulei WWTPs, the draft Tafuna NPDES permit, and potential discharge limits associated with combining both plants into a

regional secondary treatment facility. A more detailed analysis and review of the current and draft NPDES permits is provided in the Wastewater Utility Plan.

ES-1.5.1 Tafuna WWTP Discharge Permit

The Tafuna WWTP's current NPDES discharge permit expired in 1999 and the WWTP has been operating on this expired permit under an administrative extension, as well as an Administrative Order in 2011 which required disinfection improvements (and de-chlorination if necessary) and diffuser modifications to improve the outfall dilution factor. The current Tafuna permit is included in **Appendix B**.

The Tafuna WWTP was originally constructed in the 1970s and has historically received a Section 301(h) waiver as part of their NPDES permit. A Section 301(h) waiver allows the permittee to discharge to marine waters with less than secondary treatment. Over the years, improvements to the primary plant have been ongoing in efforts to improve treatment capabilities and address water quality concerns; however, water quality concerns have been identified by ASEPA historically. Specifically, EPA's draft Fact Sheet (see **Appendix B**) notes that the "Tafuna Plain watershed is included in the 2020 303(d) list for impaired ocean shorelines for undetermined nonpoint source stressors, Total Nitrogen, and Chlorophyll-a (ASEPA, 2020)." This conclusion was based on additional data collected following improvements to the facility in 2015 and re-evaluated beginning in 2021 as part of the most recent permit renewal. Per the draft Fact Sheet:

> *In 2021, EPA re-evaluated the updated mixing zone studies and recent data collected with the upgraded treatment system in place. Even with the upgrades, the discharge from the Tafuna STP does not meet several of the CWA Section 301(h) criteria. As described in EPA's 2023 CWA Section 301(h) Tentative Decision Document, the Tafuna STP exceeds water quality standards for light penetration, total suspended solids, total nitrogen, enterococcus, toxic pollutants, chronic toxicity, and ammonia after initial mixing, creating potential adverse impacts on human health, marine life, and receiving water quality.* ***Therefore, EPA denied renewal of the CWA Section 301(h) waiver and this NPDES permit includes secondary treatment requirements in accordance with CWA Section 301(b)(1)(B).*** *[emphasis added]*

The draft NPDES permit includes more stringent secondary treatment discharge limits. In addition to the increased removal of Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) associated with secondary treatment, the Tafuna draft NPDES permit sets discharge limits on nutrients (nitrogen and phosphorus). The draft NPDES permit sets effluent limits on three manmade chemicals previously measured in Tafuna's effluent at concentrations that may exceed ASEPA's water quality criteria based on EPA's reasonable potential analysis included in the draft fact sheet. These chemicals included 2,3,7,8-TCDD, bis(2-ethylhexyl) Phthalate, and 4,4'-DDT. The existing primary treatment processes at the Tafuna WWTP will not be able to meet the draft NPDES discharge permit limits without upgrading the facility to a secondary treatment process. The timing of a future permit is not known at this time.

In March 2024, ASEPA issued a technical memorandum assessing the water quality at the Tafuna outfall based on data collected from 2005 through 2023 (see **Appendix B**). Several key statements in the Summary section (pages 13 and 14) are included below.

Data presented here indicates overall excellent water column conditions for the receiving water for Outfall 001 and substantial compliance with the ASWQS over this period of 19 years [2005-2023]. Except for total nitrogen, violations of the ASWQS are relatively few and compliance is dominant throughout the data period.

Overall, AS-EPA has determined through this assessment that primary treatment can be effective to meet the ASWQS for ocean receiving water for the Tafuna Wastewater Treatment Plant, and that primary treatment is an appropriate level of technology for this remote part of the Pacific.

These statements indicate that a relaxation of the adopted water quality standards (WQSs) or adoption of site-specific criteria may be possible by ASEPA. It is not known to what degree this might be possible, nor if EPA would accept the revisions. ASPA should continue discussions with ASEPA and EPA to explore these possibilities since it could have a significant impact on the alternative investigated in this Study, including continued use of the Tafuna and Utulei facilities with improvements to address more critical water quality deficiencies.

ES-1.5.2 Utulei WWTP Discharge Permit

Utulei's current NPDES discharge permit became effective on January 1, 2020, and expired on December 31, 2024. The prior permit is expected to be administratively extended until a new permit is issued. The current Utulei permit is included in **Appendix C**, and the Utulei WWTP generally complies with the existing permit conditions. While future draft limits are not known, it is conceivable that the Utulei WWTP's next NPDES permit may be similar to the draft permit currently proposed for Tafuna. Consequently, the Utulei facility is expected to have similar challenges satisfying future permit limits. **Appendix D** provides additional ambient water quality information pertinent to secondary treatment, such as the 2018 American Samoa Water Quality Standards, example receiving water quality reports, and EPA correspondence.

ES-1.5.3 Regional WWTP Discharge Permit

Combining the effluent from the two collection systems into one regional WWTP will require a new NPDES discharge permit with a much higher plant design capacity, nominally 6.0 mgd based on the sum of the current design flows of each facility (3.0 mgd each, based on permit effluent BOD and TSS loads and concentrations). The higher flow from a regional facility may result in different dilution factors and could result in lower limits than currently envisioned in the Tafuna draft NPDES permit, although modifications to the outfall may mitigate these impacts. An effluent water quality analysis is beyond the scope of this study; therefore, the draft Tafuna NPDES permit values will be assumed. **Table ES - 3** provides the estimated discharge requirements for a regional WWTP that will be used in this study.

Table ES - 3: **Regional WWTP – Estimated Effluent Discharge Limits Assuming Tafuna Draft Limits**

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Frequency	Sample Type
	lbs/day	751	1,127	(2)	Weekly	24-hour

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Frequency	Sample Type
Biochemical Oxygen Demand (BOD_5) [1]	mg/L	30	45	[2]		composite
BOD removal percentage [1]		≥ 85%				
Total Suspended Solids (TSS) [1]	lbs/day	751	1,127	[2]	Weekly	24-hour composite
	mg/L	30	45	[2]		
TSS removal percentage [1]		≥ 85%				
pH [3]	S.U.	6.5-8.6, within 0.2 pH of the value which would occur naturally			Weekly	Grab
Oil and grease, total recoverable	mg/L	10	-	15	Monthly	Grab
Total Nitrogen (as N)	mg/L	14.2	-	30.5	Monthly	24-hour composite
Ammonia Impact Ratio [4]	Ratio	1.0		1.0	Monthly	Calculated
Total Phosphorus	mg/L	1.6	-	5.5	Monthly	24-hour composite
2,3,7,8-Tetrachlorodibenzodioxin (TCDD)	µg/L	-	-	5.6×10^{-7}	Quarterly	24-hour composite
bis(2-ethylhexyl) Phthalate	µg/L	-	-	40.3	Quarterly	24-hour composite
4,4'-DDT	µg/L			0.0033	Quarterly	24-hour composite
Enterococci	CFU /100 mL	3,815	-	14,170	Weekly	Grab
Chronic Toxicity with *Strongylocentrotus purpuratus* or *Dendraster excentricus,* Method 1008.0 WI33L [5]	Pass (0) or Fail (1), Percent (%) Effect			Pass (0)	Quarterly	24- hour composite

(1) The average monthly effluent concentration of Biochemical Oxygen Demand (5-day) and Total Suspended Solids shall not exceed 15 percent of the average monthly influent concentration collected at the same time. Both influent and effluent concentrations of BOD and TSS are monitored.

(2) No effluent limits are set at this time but monitoring and reporting is required.

(3) Temperature and pH reading should be taken at the same time as the ammonia sample is collected during ammonia sampling event. These parameters will be used to calculate ammonia impact ratio.

*(4) Ammonia Impact Ratio (AIR) is calculated as the ratio of the ammonia value in the effluent and the applicable ammonia standard in Appendix A of the draft NPDES permit which is included in **Appendix C** of this report. Ammonia standard is constant value dependent on the ambient salinity, effluent temperature, and effluent pH. The AIR value can be calculated using the following formula:*

$$AIR = \frac{Ammonia\ Concentration\ in\ Effluent}{109 \times Ammonia\ Objective\ from\ Appendix\ E\ of\ draft\ permit}$$

(5) Monitoring is conditional in that only one of these two test species must be monitored for chronic toxicity during the calendar month for DMR reporting. See Part II.C.3. "Chronic Test Species and WET Methods" of this permit. An exceedance occurs if the Pass-Fail result is Fail.

ES-1.6 Siting Concerns

Chapter 5 reviews the existing sites and land area required for secondary treatment. As shown in the figures above, the existing sites are generally fully developed. Based on a review of other Pacific Island facilities in **Chapter 2**, the probable footprint for secondary facilities is between 1 and 2.5 acres per mgd, although the actual footprint may vary considerably based on permit requirements, topography, parcel shape, and other factors. **Table ES - 4** provides existing and probable secondary treatment footprints for both facilities and a regional facility.

***Table ES - 4:* Secondary Treatment Footprint Requirements**

WWTP	Existing (acres)	Probable Required Area (acres) (1)
Tafuna	2.36 (2)	5+
Utulei	0.62	5+
Regional Facility	-	10+

(1) Probable acreage is 2.5 acre per MGD treated.
(2) Approximately half of the existing site is devoted to solids drying beds, which are land intensive.

The Tafuna WWTP abuts Pago Pago International Airport and resides within existing runway setbacks that are managed by the Federal Aviation Administration (FAA). Facility expansion to the north, east, south, and west is considered unfeasible due to restrictions associated with the Runway Object Free Area (ROFA) and preliminary discussions with the airport Chief engineer. The ROFA must be clear of parked aircraft, agricultural operations, and other non-aeronautical activities. If expansion into the airport buffer zones is desired, a formal application process with the FAA is required through FAA Form 7460. The time associated with initiating a formal review process with the FAA is not known. It is also not known if the endeavor would ultimately be successful. Expansion at the existing Tafuna site is therefore not incorporated into this Study. See **Appendix E** for a map illustrating the FAA setbacks.

The existing Utulei site is bordered by Route 001 to the north, steep mountain slopes to the south, and existing infrastructure owned by others to the east and west. The site is also adjacent to Utulei Park, which is the most popular swimming spot in the area. It is not feasible to construct a secondary treatment facility at the existing Utulei site unless adjacent properties are purchased. Alternate sites in the Utulei area do not appear available.

Because the Utulei facility cannot be reasonably expanded for secondary treatment, the Study assumes a regional facility, serving both the Tafuna and Utulei collection systems, will be required if secondary treatment is implemented. A regional facility will require 10+ acres assuming a future combined average

day flow of 4.3 mgd. Identifying specific parcels of land for a regional WWTP is beyond the scope of this Study. If secondary treatment is implemented, an initial phase of work should include identifying potentially feasible parcels, determining infrastructure improvements necessary to route influent wastewater to the sites, determining modifications to the existing outfall (or construction of a new outfall), total project cost to construct new facilities in the chosen location, negotiation of and acquisition of the preferred property, and related activities.

ES-1.7 Pre-Screening Potential Alternatives

Various treatment alternatives are developed and reviewed in **Chapter 6** for a regional WWTP. All alternatives assumed that the Utulei WWTP would be converted to a regional pump station and convey wastewater from that service area to a regional facility. The alternatives bracketed options from No Action, i.e. retaining the existing facility with minimal improvements, to advanced treatment facilities. The alternatives developed for pre-screening are summarized below relative to their ability to satisfy the draft Tafuna NPDES permit requirements.

- Alternative 1: No Action – Will not satisfy draft Tafuna NPDES permit requirements
- Alternative 2: Chemically Enhanced Primary Treatment (CEPT) – Improved removal of BOD and TSS; however, will not satisfy BOD concentration and percent removal requirements, may not achieve TSS concentration and percent removal requirements, will not reduce ammonia, and may not reliably meet total nitrogen
- Alternative 3: Biotower – Able to address most permit requirements, but will not satisfy total nitrogen requirements
- Alternative 4: Oxidation Ditch – Able to satisfy draft NPDES discharge permit limits
- Alternative 5: Moving Bed Biofilm Reactor (MBBR) – Able to satisfy draft NPDES discharge permit
- Alternative 6: Sequencing Batch Reactor (SBR) – Able to satisfy draft NPDES discharge permit
- Alternative 7: Membrane Bioreactor (MBR) – Able to satisfy draft NPDES discharge permit

All of the alternatives were scored qualitatively at the conclusion of Chapter 6 based on the goals previously defined by ASPA in **Table ES - 1**. Alternatives 1, 2 and 3 will not satisfy the draft Tafuna NPDES permit discharge requirements and were subsequently discarded. Alternatives 4, 6, and 7 received the highest non-weighted scores and were carried forward for a detailed evaluation.

ES-1.8 Analyzing Potential Treatment Alternatives

Chapter 7 evaluates two options for converting the Utulei WWTP to a regional pump station and the three pre-screened secondary treatment alternatives from **Chapter 6**.

ES-1.8.1 Utulei Regional Pump Station

The Utulei pump station alternatives include the following:

- Utulei Alternative 1: This alternative retains the existing lift station, headworks, and Clarigesters for normal operation, then constructs a pump station to convey wastewater to the regional

WWTP. The UV and outfall would be retained for emergency operation if the pump station and/or force main is out of commission.

- Utulei Alternative 2: This alternative retrofits the existing lift station, adding a new valve vault, and routing new force mains to a regional secondary treatment facility. The existing headworks, Clarigesters, UV disinfection, and outfall would be decommissioned and demolished. In the event of a pump station and/or force main failure, sewage would surcharge in the Utulei conveyance system and ultimately overtop the wet well resulting in uncontrolled sewage overflow at the site.

Three potential routes and discharge locations into the Tafuna collection system were evaluated at a cursory level to determine pumping requirements. A specific location of a new regional secondary WWTP has not been identified, and the alignments presented assume a property is procured in the Tafuna area relatively close to the existing facility. Dual force mains are recommended with a preliminary size of 16-in each to maintain velocities between 1.5 fps and 5 fps to minimize settling and limit maximum head loss, respectively. It is assumed that pumping from Utulei directly to the regional facility (approximately 7.7 miles), route three, will be implemented to avoid significant upgrades to the Tafuna gravity collection system pipes and lift stations. A detailed routing analysis will be required during pre-design to determine the optimum route and whether multiple pump stations will be required along the force main route.

Utulei Alternative 1 is preferred because the ability to discharge primary effluent in an emergency situation (i.e. when the pump station and/or force main is out of service) provides both reliability and flexibility for ASPA. While there would be a negative water quality impact to the receiving water, the duration would be short and prevent greater exposure to humans if raw sewage were discharged at the Utulei site or upstream in the collection system, both of which could contaminate the nearby shoreline. Additionally, there is not a significant difference in the capital cost for the two alternatives.

Figure ES - 3 provides a piping schematic for the Utulei Alternative 1.

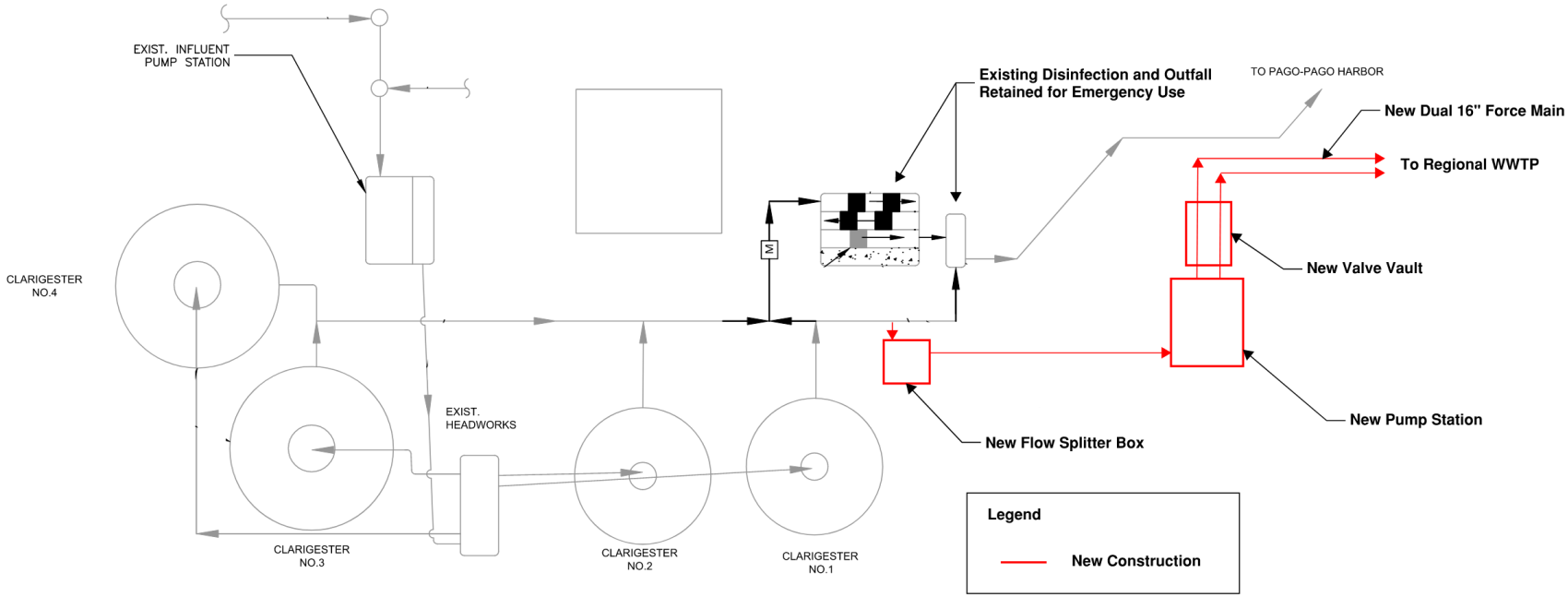


Figure ES - 3: Utulei Alternative 1 Piping Schematic

ES-1.8.2 New Regional WWTP

The three treatment alternatives carried forward for detailed evaluation share several common unit processes. Processes that are common to all alternatives are presented below and are included in the evaluation of all alternatives:

- Preliminary treatment: septage receiving station, influent lift station, 6-mm course screening, and grit removal.
- Disinfection: UV disinfection.
- Outfall: open water discharge assuming a diffuser similar to Tafuna's existing outfall.
- Chemical phosphorus removal: chemical metering and tankage and increased chemical solids production.
- Solids handling: waste activated sludge (WAS) pumping, WAS storage tank, mechanical solids dewatering, and landfill disposal.

The three treatment alternatives had the following unique unit processes:

- Alternative 4: Oxidation Ditch – process tankage, surface aerators, secondary clarifiers, and return activated sludge (RAS) pumping.
- Alternative 6: Sequencing Batch Reactor (SBR) – intermediate pumping into SBR, process tankage and controls, fine bubble aeration, and effluent flow equalization/UV capacity improvements.
- Alternative 7: Membrane Bioreactor (MBR) – intermediate pumping into 2-mm fine screening (in addition to 6-mm screening), process tankage, mixed liquor feed to MBR basins, fine bubble aeration, ultrafiltration membranes, chemicals and chemical feed pumps (MBR cleaning system), and coarse bubble aeration (membrane cleaning).

Planning level process calculations were completed for each alternative to establish component sizes and design criteria for each of the pre-screened alternatives, as well as overall process schematics and conceptual layouts. **Table ES - 5** includes a summary of costs for the pre-screened alternatives. The opinions of probable capital cost include contingency (30%), allowance for subsurface conditions / groundwater (5%), funding agency compliance (10%), engineering (20%), and legal and administrative (1%), and the O&M costs include equipment replacement, labor, electricity, chemical cost, etc. as detailed in **Appendix F**.

Table ES - 5: **Summary of Probable Costs**

Description	Oxidation Ditch	SBR	MBR
Utulei - Retain Existing Components and Pump to Tafuna	$136,887,000	$136,887,000	$136,887,000
Headworks - 6 mm screening and grit removal	$33,917,000	$33,917,000	$33,917,000
Headworks - 2 mm fine screening	_	_	$18,620,000
Oxidation Ditch - biological basins	$93,306,000	_	_
Secondary Clarification and RAS Pumping	$41,917,000	_	_
SBR - biological basins and post-SBR EQ	_	$75,322,000	_
MBR - biological basins and membranes	_	_	$141,781,000
UV Disinfection	$18,114,000	_	$18,114,000
UV Disinfection - SBR	_	$28,191,000	_
Outfall	$16,011,000	$16,011,000	$16,011,000
Chemical Phosphorus Feed / Mixing	$3,024,000	$3,024,000	$3,024,000
Biosolids Dewatering	$30,891,000	$30,891,000	$30,891,000
Administration, Laboratory, and Maintenance Buildings	$7,010,000	$7,010,000	$7,010,000
TOTAL (2025 DOLLARS)	**$381,077,000**	**$331,253,000**	**$406,255,000**
O&M Equivalent Annual Cost	**$6,563,000**	**$6,471,000**	**$8,945,000**

ES-1.9 Recommended Alternative

Chapter 8 assembles the data from the preceding chapters to determine the most feasible alternative for implementing secondary treatment. A pairwise analysis of the goals / criteria from **Chapter 2** was conducted with ASPA staff, as well as with a USEPA representative, to determine the relative weight of each criterion. Alternative 4: Oxidation Ditch received the highest weighted score. The weighting of each goal / criteria and the scores for each of the three pre-screened alternatives is shown in **Table ES - 6**.

Table ES - 6: Scoring and Ranking of the Alternatives

Goal	Criteria Weighting Factor	Alternative 4: Oxidation Ditch	Alternative 6: SBR	Alternative 7: MBR
Ability to satisfy future NPDES discharge permits	18.9%	**5**	4	5
Operational Simplicity	20.0%	**4**	2	2
Maintenance Simplicity	20.0%	**4**	3	1
Minimize Power Consumption	14.4%	**4**	3	1
Affordability: Capital Cost + O&M	20.0%	**1.32**	1.85	1
Land Requirement	6.7%	**1**	3	5
SUBTOTAL	100%	**19**	17	15
TOTAL (weighted x 100)		**345**	276	222
Ranking		**1**	2	3

It is anticipated that a new regional oxidation ditch secondary treatment plant will require 10 to 15 acres to accommodate treatment for liquids and solids management. A process schematic for the Oxidation Ditch alternative is shown in **Figure ES - 4** and a conceptual site layout is shown in **Figure ES - 5**.

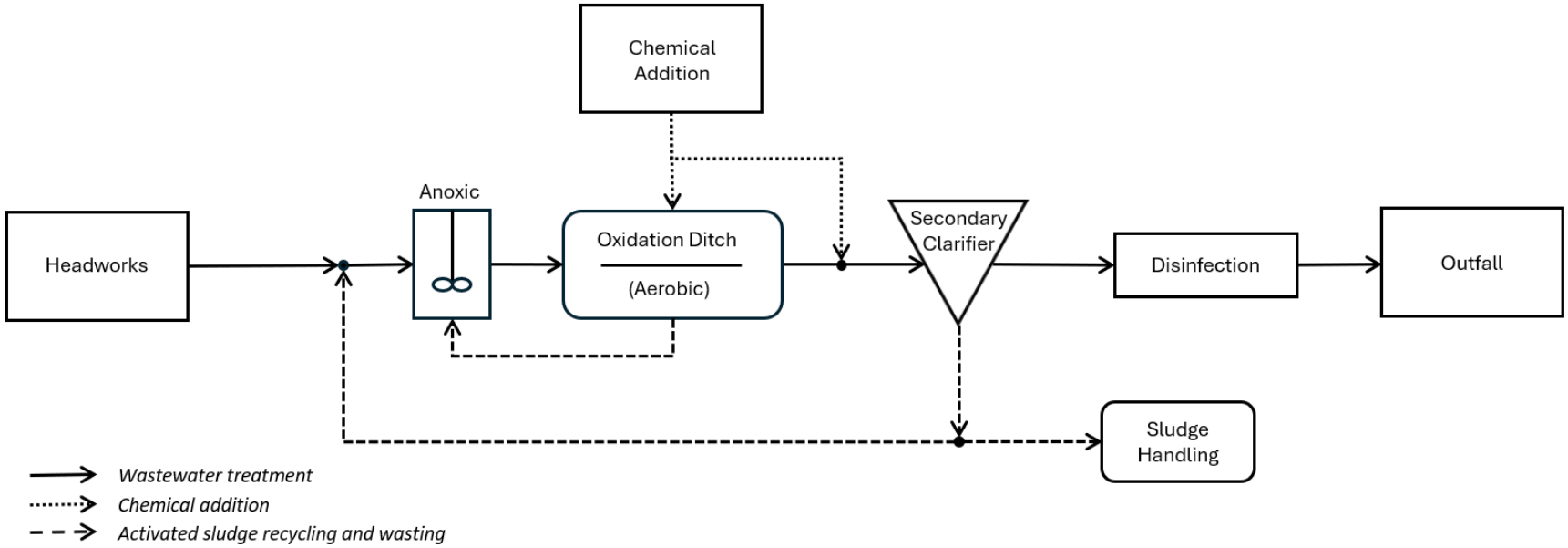
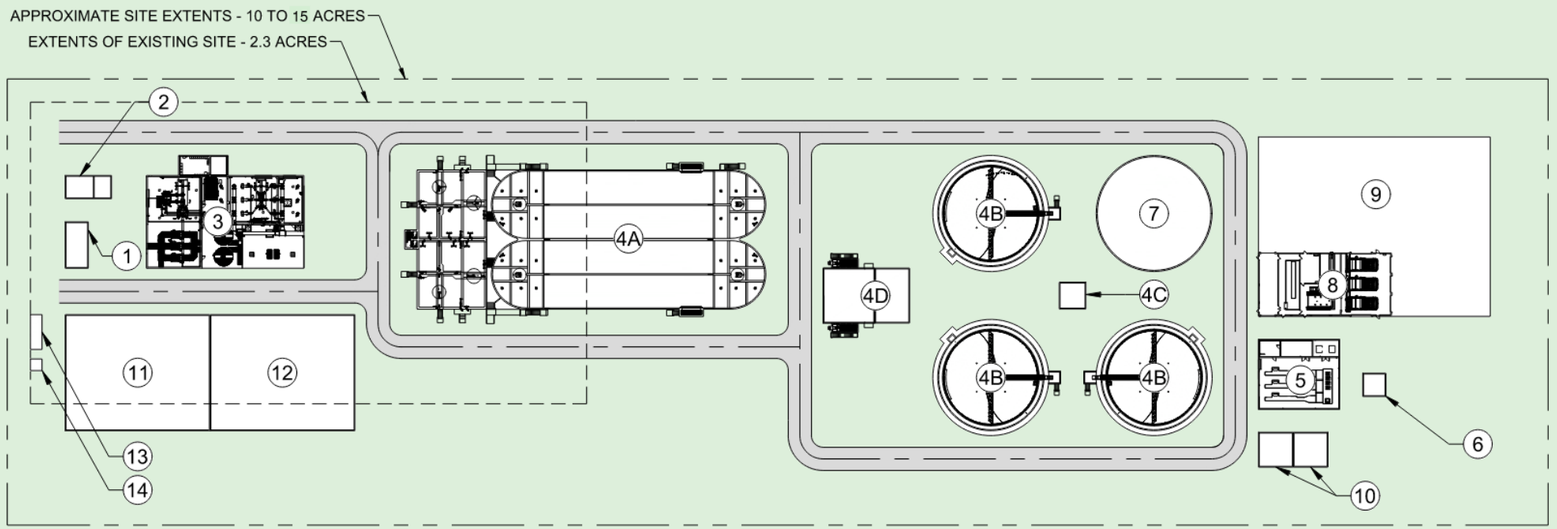


Figure ES - 4: **Regional Oxidation Ditch Schematic**



KEYED NOTES:	
1	SEPTAGE RECEIVING
2	INFLUENT LIFT STATION
3	HEADWORKS BUILDING
4A	OXIDATION DITCHES
4B	SECONDARY CLARIFIERS
4C	CLARIFIER FLOW SPLITTER
4D	RAS PUMPING
5	UV DISINFECTION
6	OUTFALL DISTRIBUTION BOX
7	WAS STORAGE
8	DEWATERING BUILDING
9	DEWATERED SLUDGE STORAGE
10	CHEMICAL PHOSPHORUS STORAGE / FEED
11	ADMINISTRATION / LABORATORY BUILDING
12	MAINTENANCE BUILDING
13	GENERATOR
14	TRANSFORMER

REGIONAL ALTERNATIVE 4: OXIDATION DITCH

0 50 100

SCALE IN FEET

Figure ES - 5: **Regional Oxidation Ditch WWTP Layout**

ES-1.9.1 Facility Classification, Staffing, and Certification Requirements

A regional secondary WWTP performing nitrification, denitrification, and phosphorus removal will be a Class IV facility. At least one Grade IV operator will be required, and a backup Grade IV operator is recommended. Two Grade III operators are also recommended to provide additional depth of experience. An additional 11 full-time operators are estimated to operate and maintain a new regional WWTP, plus additional staff for administration and maintenance of the collection systems. Additional O&M hours and staffing may be required for challenges specific to American Samoa, such as operator training and certification, workforce availability, environmental attack (corrosion and humidity), availability of spare parts due to an isolated location, etc.

A secondary treatment facility will also require considerably more monitoring, sampling, and laboratory testing. ASPA will have to review testing requirements and determine if some should be done in-house to expedite data availability compared to shipping samples off-island.

ES-1.9.2 Potential Timing and Construction Sequencing

Several items must be resolved before a schedule of improvements can be developed. The most critical is the timing and content of updated discharge permits. The Tafuna permit has expired, and the draft permit will require significant and expensive changes to the current wastewater treatment approaches. ASPA should continue discussions with ASEPA and EPA to explore options for site-specific criteria, as well as compliance schedules if enhancements to treatment are required. This should also include an outfall study to determine if modifications could be implemented to increase the dilution factor, thereby relaxing the discharge standards while still maintaining compliance with the water quality standards.

As a parallel effort, ASPA should continue I/I identification and reduction projects to reduce the excessive flows in its collection systems as noted in the WWUP, especially in Utulei. In doing so, the size and cost of the secondary treatment components could be reduced.

Land availability is a significant concern. If secondary treatment must be implemented, ASPA will have to find suitable parcels for construction of a new WWTP. If suitable parcels are not available, then partitioning the treatment in several areas – e.g. the existing Tafuna WWTP for primary treatment, a new site for secondary treatment, another site for solids handling, etc. – may be necessary. The design phase cannot begin until viable parcels are identified and secured.

Funding is a significant hurdle for ASPA. EPA has indicated in discussions with ASPA that grants may be available to cover a majority of the capital costs, which would ease the burden on the ratepayers. However, without a sound financial plan and the resources to support the long-term O&M costs, the secondary treatment facility will deteriorate quickly and could lead to an overall degradation of water quality compared to current conditions if processes are not fully functional.

Following these steps, design (estimated at 2 to 3 years) and construction (4 to 5 years) could proceed. The total time to transition to secondary treatment cannot be established because of several unknowns discussed above, but likely exceeds ten years.

ES-1.9.3 Financial Assessment

Chapter 9 provides the Financial Assessment if a regional WWTP was constructed utilizing Oxidation Ditch technology. The analysis presents a break-even analysis based on existing operating expenses and incorporation of all the capital projects presented in the Wastewater Utility Plan (separate document). A financial analysis is then presented for three funding scenarios: 1) 100% grant funding and 0% debt, 2) 50% grant and 50 % debt, and 3) 0% grant funding and 100% debt. Even with 100% grant funding, the project would have a significant impact on the rate payers. O&M costs would necessitate rates be increased to over $80 per month in 2031, reflecting an increase of approximately 70%. The rate impact was then compared to an affordability metric, which is assumed at 1.5% of Average Median Household Income (AMHI) based on guidance from the USDA Water and Waste Disposal Loan and Grant Program. The affordability metric would be breached by more than twofold. For these improvements to be affordable, ASPA would require considerable financial assistance with ongoing O&M expenses.

ES-1.9.4 Conclusions and Next Steps

The Tafuna and Utulei Wastewater Treatment Plants (WWTPs) currently provide primary treatment followed by disinfection and discharge to ocean outfalls. The existing permits are based on a 301(h) waiver by the EPA, allowing discharge to marine waters with less than secondary treatment. However, in mid-2023, the EPA issued a draft NPDES permit for the Tafuna WWTP that denied renewal of the 301(h) waiver due to non-compliance with several water quality standards.

The American Samoa Power Authority (ASPA) initiated a Secondary Treatment Feasibility Study to determine how secondary treatment at the existing WWTPs could be implemented or if new WWTPs are required to achieve secondary treatment standards. The study identified providing secondary treatment at a regional WWTP via an oxidation ditch as the most viable alternative. This process includes extended aeration for ammonia removal, an anoxic zone for denitrification, and chemical addition for phosphorus removal.

The draft permit requirements, if adopted, will necessitate significant changes at the Tafuna WWTP and possibly the Utulei WWTP. These changes will present a sizable financial burden on the residents of American Samoa, who already face economic challenges. ASPA will require substantial grant assistance for constructing the improvements and will face challenges in hiring and retaining experienced operators.

ASPA also questions whether the permit changes are warranted to address actual environmental problems, as data indicates overall compliance with water quality standards, except for total nitrogen. ASPA suggests that continued discussions with the EPA and ASEPA could explore the possibility of modifying the outfall to improve dilution and/or relaxing water quality standards or adopting site-specific criteria. Additionally, ASPA leadership noted during a workshop with J-U-B and ASEPA that they are concerned about offal discharge from Starkist which is east (up current) of the Tafuna outfall approximately 4 miles and may be negatively affecting water quality at the Tafuna WWTP outfall.

In conclusion, ASPA aims to run the most efficient, affordable, and quality wastewater system by not incurring unnecessary projects. Collaboration with the EPA and ASEPA will be vital for the success of the American Samoa people, and realistic milestones should be set to achieve the desired goals.

The following next steps are recommended:

1. Continue I/I identification and reduction projects to reduce the excessive flows in the collection systems, especially in Utulei. In doing so, the size and cost of any future secondary treatment components would be reduced. I/I is discussed at length in the WWUP and included in the resulting CIP.
2. Review the sampling location at Tafuna for influent BOD and TSS to collect representative samples. Influent loading on a per capita basis is much lower than observed at the Utulei WWTP, which generally matches typical literature values. This Study assumed typical literature values for process sizing, but the loading assumptions should be confirmed with subsequent testing. Additionally, autosamplers should be installed at both the Tafuna and Utulei WWTP's for flow-proportioned samples. This is discussed at length in the WWUP and included in the WWUP CIP.
3. Collaborate with EPA and ASEPA on water quality drivers and potential future NPDES permit conditions. This is expected to include the following:
    a. Explore improvements to the existing WWTPs to permit renewal of the 301(h) waivers for both the Tafuna and Utulei WWTPs by EPA.
    b. Undertake an outfall study to determine if modifications could be implemented to increase the dilution factor, thereby relaxing the effluent limits while maintaining compliance with the water quality standards. The study should be a collaborative effort with EPA and ASEPA so the resulting dilution factor is accepted in subsequent permit evaluations.
    c. Engage EPA and ASEPA about water quality standards for the receiving water bodies and the potential environmental impacts of current discharges to explore the possibility of different water quality criteria or adoption of site-specific criteria.
    d. Work with EPA to establish reasonable compliance schedules for any new or modified effluent limits included in subsequent discharge permits.

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J-U-B ENGINEERS, INC.

CHAPTER 1
INTRODUCTION

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Chapter 1 Introduction

1.1 Purpose

The American Samoa Power Authority (ASPA) contracted with J-U-B ENGINEERS, Inc. (J-U-B) to prepare a Wastewater Secondary Treatment Feasibility Study for the wastewater treatment systems and infrastructure under the ownership and control of ASPA. The US Environmental Protection Agency (EPA) has raised concerns about water quality in the receiving waters in its Draft NPDES Permit and has set forth permit conditions that would require secondary treatment and nutrient removal, as well as compliance with other pollutants not covered in ASPA's current Tafuna NPDES permit. ASPA subsequently initiated the Wastewater Secondary Treatment Feasibility Study to determine how secondary treatment at the existing Tafuna (or Fogagogo) and Utulei wastewater treatment plants (WWTPs) could be implemented or determine if new WWTPs are required to achieve secondary treatment standards. This Secondary Treatment Feasibility Study will develop and evaluate potentially viable alternatives and provide ASPA with the critical planning data required to understand how secondary treatment could potentially be incorporated. The results of the Secondary Treatment Feasibility Study will be incorporated into the Wastewater Utility Plan (a separate document being prepared by J-U-B) and provide a comprehensive wastewater management plan for ASPA.

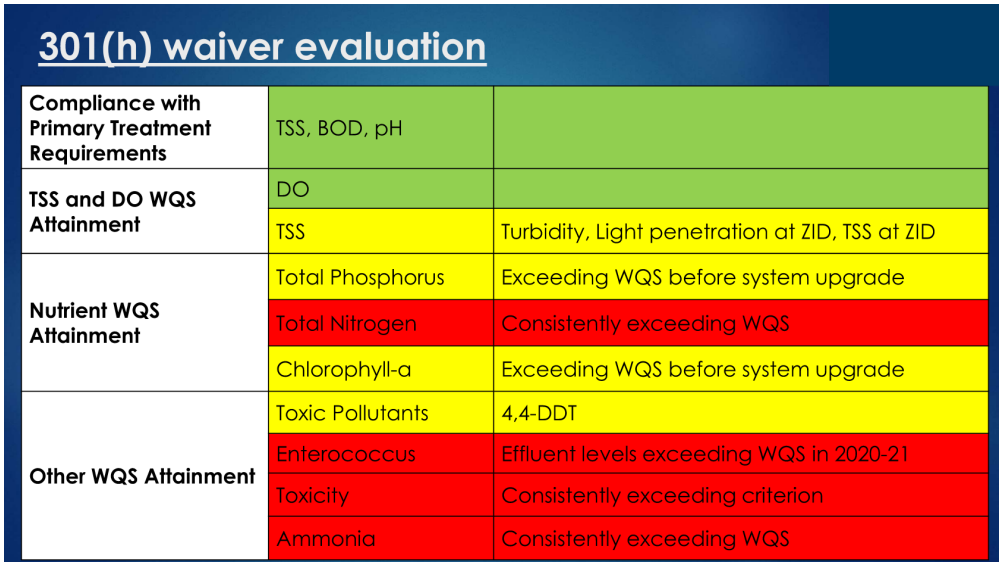
1.2 Background

The Tafuna WWTP currently serves approximately 19,860 people and accepts septage from the local community for treatment and disposal. The Tafuna WWTP utilizes primary treatment before discharging effluent to Vai Cove, which is located south of the Pago Pago International Airport on the island of Tutuila. The treatment process includes the headworks where grit is manually removed from two grit channels and debris is removed with ½" mechanical coarse screens. Influent is then pumped to one of the three Clarigesters where settleable solids are removed. The wastewater then undergoes UV disinfection prior to discharge through a diffuser to dilute the effluent roughly 1,600 feet away from the shoreline in the Pacific Ocean.

The Utulei WWTP serves approximately 7,680 people and utilizes primary treatment before discharging to Pago Pago Harbor. Influent enters the headworks and flows through a basket screen in the influent lift station where large particles are collected and manually removed by the operator. Grit settles out in the splitter box and is removed manually. Flow then continues to the Clarigesters. There are four Clarigesters at the Utulei WWTP. After settleable solids are removed, the wastewater then undergoes UV disinfection prior to discharge through a diffuser to dilute the effluent roughly 1,050 feet away from the shoreline in Pago Pago Harbor.

The United States Environmental Protection Agency (EPA) has developed a new draft National Pollutant Discharge Elimination (NPDES) discharge permit for the Tafuna wastewater treatment plant (WWTP) in May 2023. The draft is internal and has not been released for public comment as of January 2025. The prior NPDES permit was issued in 1999 and included a Clean Water Act (CWA) Section 301(h) waiver

from secondary treatment requirements. The Tafuna facility therefore only includes primary treatment, i.e. primary settling and disinfection, which is typical for ocean outfalls under a Section 301(h) waiver. Water quality concerns have been identified by ASEPA historically. Specifically, EPA's draft Fact Sheet from May 2023 (see **Appendix B**) notes that the "Tafuna Plain watershed is included in the 2020 303(d) list for impaired ocean shorelines for undetermined nonpoint source stressors, Total Nitrogen, and Chlorophyll-a (ASEPA, 2020)." The draft Fact Sheet also notes beach advisories have been issued due to potential bacteria exposure, with levels greater than 24,000 MPN/100 ml. A summary of the water quality concerns identified by EPA is included in **Figure 1-1**, which is a slide that was presented by EPA during a meeting with ASPA in March 2023.



301(h) waiver evaluation

Compliance with Primary Treatment Requirements	TSS, BOD, pH	
TSS and DO WQS Attainment	DO	
	TSS	Turbidity, Light penetration at ZID, TSS at ZID
Nutrient WQS Attainment	Total Phosphorus	Exceeding WQS before system upgrade
	Total Nitrogen	Consistently exceeding WQS
	Chlorophyll-a	Exceeding WQS before system upgrade
Other WQS Attainment	Toxic Pollutants	4,4-DDT
	Enterococcus	Effluent levels exceeding WQS in 2020-21
	Toxicity	Consistently exceeding criterion
	Ammonia	Consistently exceeding WQS

Figure 1-1: Tafuna WWTP Water Quality Concerns (EPA Presentation, 2023)

Per the draft Fact Sheet: "In July 2009, upon review of the ASPA's application, EPA issued a public notice of its tentative decision to deny renewal of the Tafuna STP's CWA Section 301(h) waiver due to the facility's inability to consistently meet American Samoa's bacteria and nutrient standards." EPA subsequently issued an Administrative Order in 2011 requiring disinfection improvements (and de-chlorination if necessary) and diffuser modifications to improve the outfall dilution factor. Additional data were collected following improvements to the facility in 2015 and re-evaluated beginning in 2021 as part of the most recent permit renewal. Per the draft Fact Sheet:

> *In 2021, EPA re-evaluated the updated mixing zone studies and recent data collected with the upgraded treatment system in place. Even with the upgrades, the discharge from the Tafuna STP does not meet several of the CWA Section 301(h) criteria. As described in EPA's 2023 CWA Section 301(h) Tentative Decision Document, the Tafuna STP exceeds water quality standards for light penetration, total suspended solids, total nitrogen, enterococcus, toxic pollutants, chronic toxicity, and ammonia after initial mixing, creating potential adverse impacts on human health, marine life, and receiving water quality.* ***Therefore, EPA denied renewal of the CWA Section 301(h) waiver and this NPDES permit includes secondary treatment requirements in accordance with CWA Section 301(b)(1)(B).*** *[emphasis added]*

The draft NPDES permit includes more stringent secondary treatment discharge limits. In addition to the increased removal of Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) associated with secondary treatment, the Tafuna draft NPDES permit sets discharge limits on nutrients (nitrogen and phosphorus). The draft NPDES permit sets effluent limits on three manmade chemicals previously measured in Tafuna's effluent at concentrations that may exceed ASEPA's water quality criteria based on EPA's reasonable potential analysis included in the draft fact sheet. These chemicals included 2,3,7,8-TCDD, bis(2-ethylhexyl) Phthalate, and 4,4'-DDT. The existing primary treatment processes at the Tafuna WWTP will not be able to meet the draft NPDES discharge permit limits without upgrading the facility to a secondary treatment process. The timing of a future permit is not known at this time.

In March 2024, ASEPA issued a technical memorandum assessing the water quality at the Tafuna outfall based on data collected from 2005 through 2023 (see **Appendix B**). Several key statements in the Summary section (pages 13 and 14) are included below.

> *Data presented here indicates overall excellent water column conditions for the receiving water for Outfall 001 and substantial compliance with the ASWQS over this period of 19 years [2005-2023]. Except for total nitrogen, violations of the ASWQS are relatively few and compliance is dominant throughout the data period.*
>
> *Overall, AS-EPA has determined through this assessment that primary treatment can be effective to meet the ASWQS for ocean receiving water for the Tafuna Wastewater Treatment Plant, and that primary treatment is an appropriate level of technology for this remote part of the Pacific.*

These statements indicate that a relaxation of the adopted water quality standards (WQS's) or adoption of site-specific criteria may be possible by ASEPA. It is not known to what degree this might be possible, nor if EPA would accept the revisions. ASPA should continue discussions with ASEPA and EPA to explore these possibilities since it could have a significant impact on the alternative investigated in this Study, including continued use of the Tafuna and Utulei facilities with improvements to address more critical water quality deficiencies.

The Utulei WWTP's NPDES permit expired in December 2024 and is expected to be continued through an administrative extension. While the draft limits are not known at this time, it is conceivable that the Utulei WWTP's next NPDES permit may be similar to the draft permit currently proposed for Tafuna. Consequently, the Utulei facility is expected to have similar challenges satisfying future permit limits.

The ASPA Wastewater Utility Plan includes additional information on both of ASPA's treatment facilities, Tafuna and Utulei. Below are site plans and process flow diagrams for each facility:

- **Figure 1-2: Tafuna WWTP – Site Map**
- **Figure 1-3: Tafuna WWTP – Process Flow Diagram**
- **Figure 1-4: Utulei WWTP – Site Map**
- **Figure 1-5: Utulei WWTP – Process Flow Diagram**

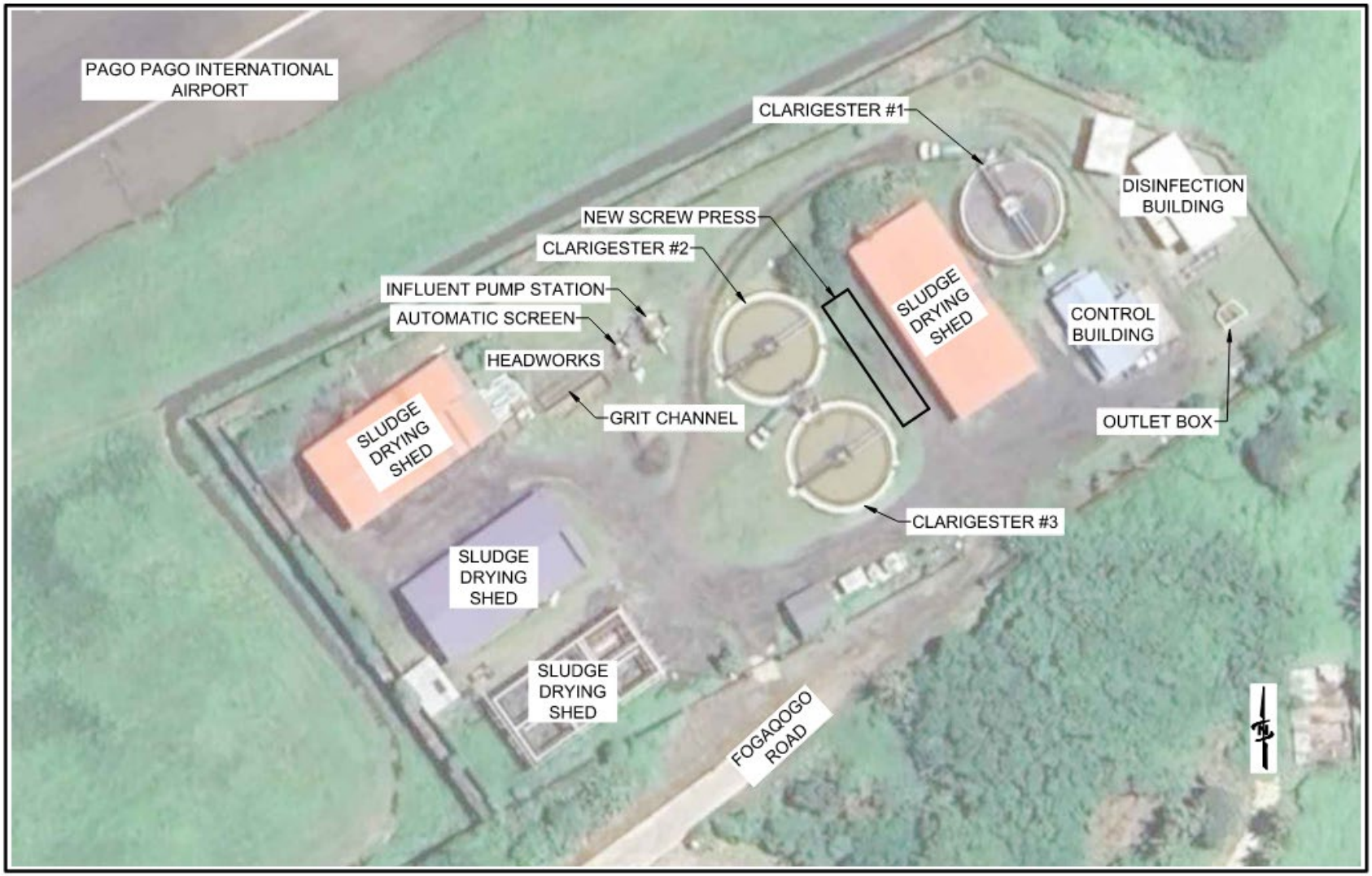


Figure 1-2: Tafuna WWTP – Site Map

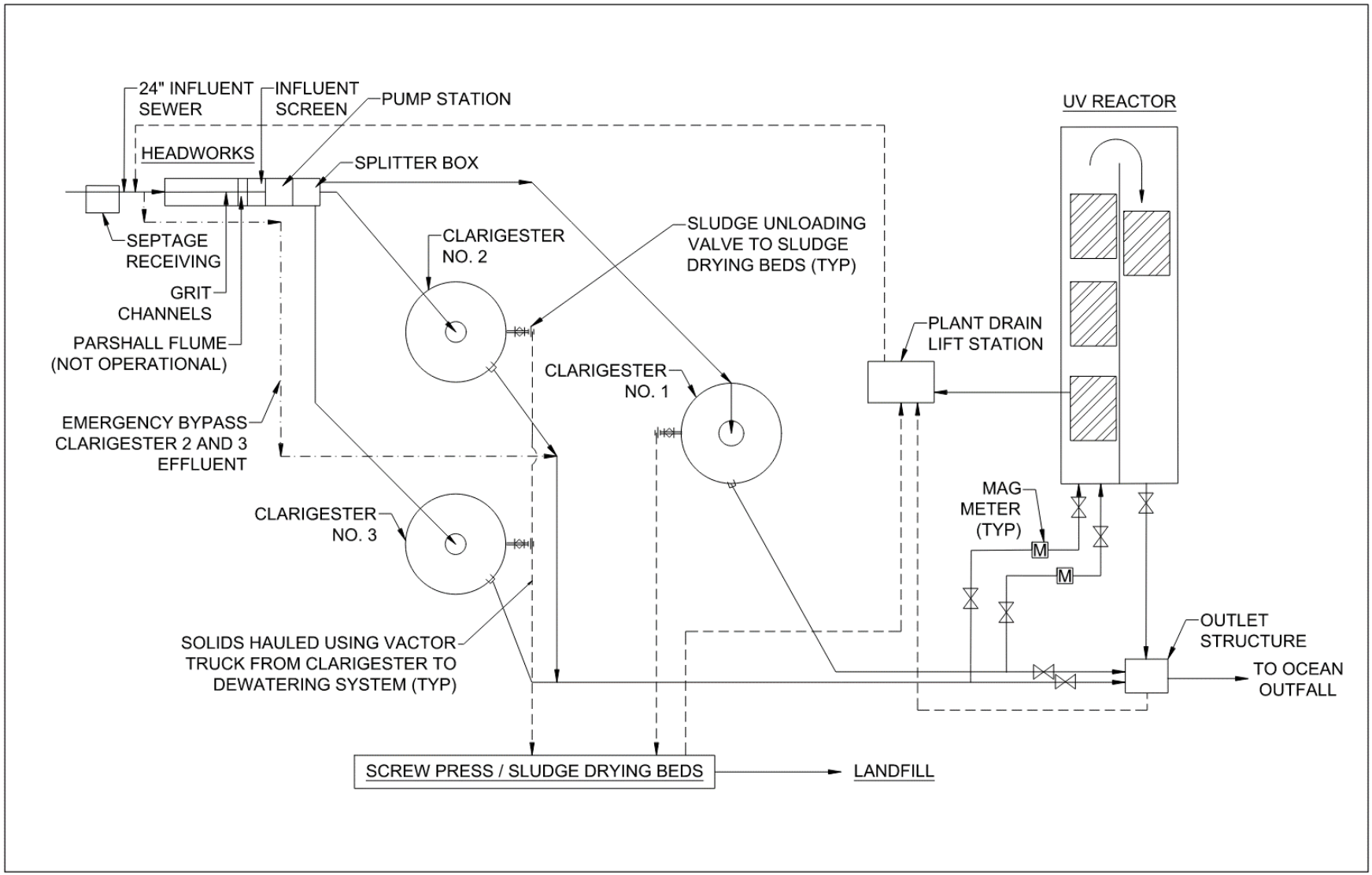


Figure 1-3: Tafuna WWTP – Process Flow Diagram

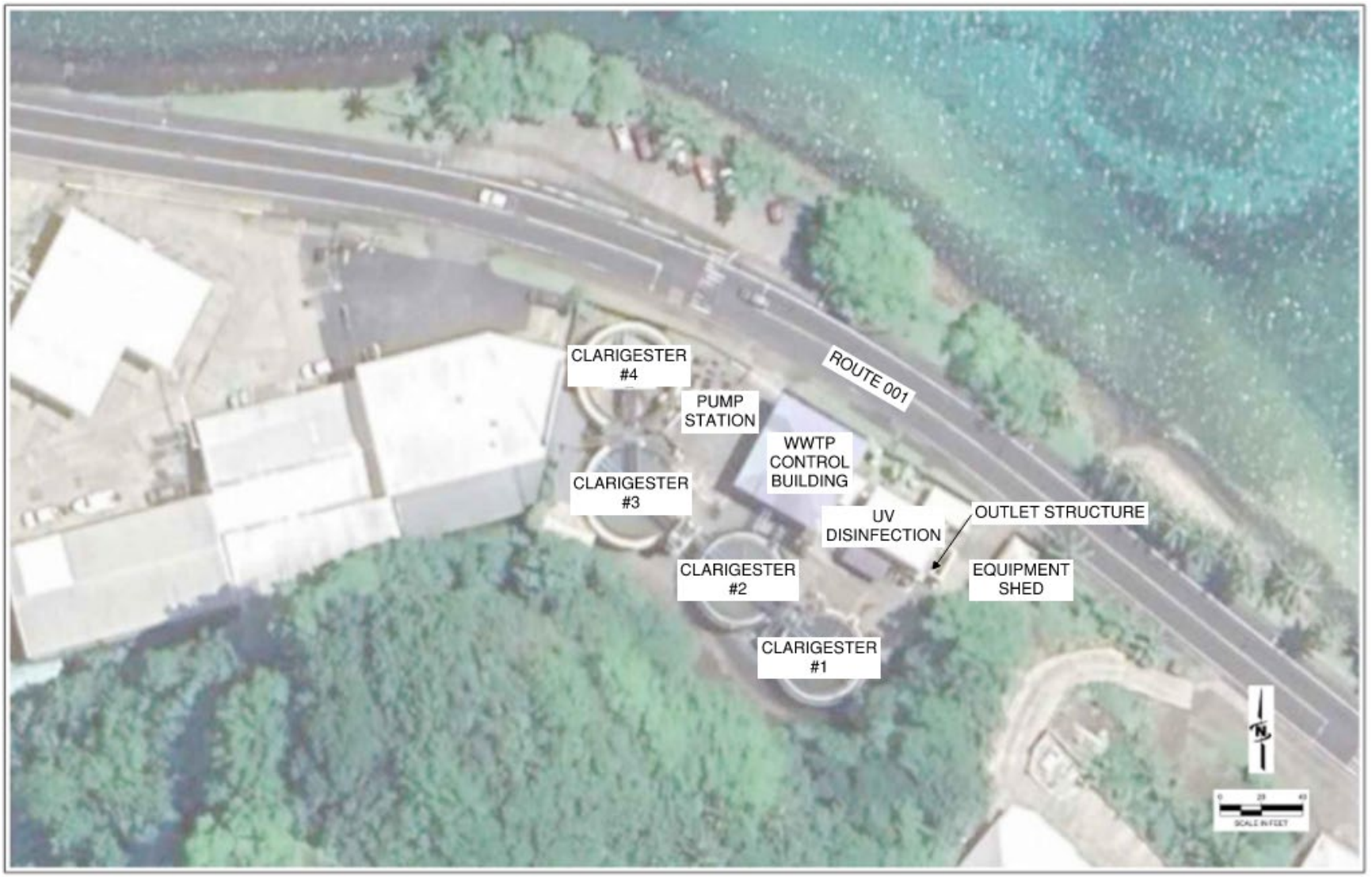


Figure 1-4: Utulei WWTP – Site Map

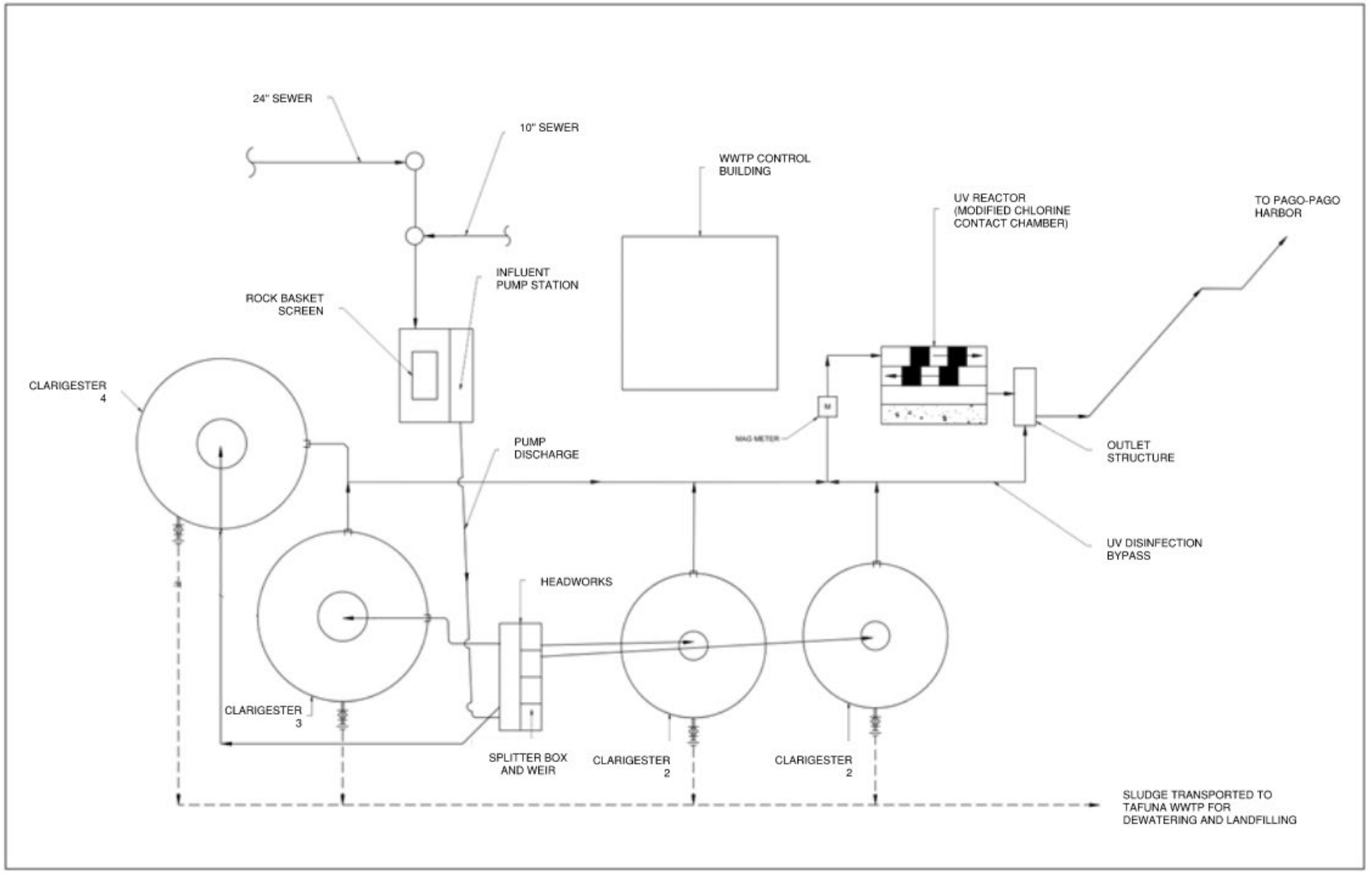


Figure 1-5: Utulei WWTP – Process Flow Diagram

1.3 Feasibility Study Organization

This Wastewater Secondary Treatment Feasibility Study consists of the following chapters:

Chapter 1 – Introduction

Introduction to the Wastewater Secondary Treatment Feasibility Study and background information.

Chapter 2 – Goals and Challenges

Overview of ASPA's goals associated with improving both the Tafuna and Utulei WWTPs, as well as challenges and risks associated with the transition from primary to secondary wastewater treatment.

Chapter 3 – Flows and Loads

Summary of the existing and 20-year projected flows and loads for the Tafuna and Utulei WWTPs.

Chapter 4 – Permit Conditions and Discharge Standards

Summary of the existing and draft permit conditions, including potential future regulatory drivers.

Chapter 5 – Siting Concerns

Discussion of the limitations for the Tafuna and Utulei sites, ability to expand, and approximate land requirements for future treatment needs.

Chapter 6 – Pre-Screening Potential Alternatives

Initial pre-screening of potential alternatives to satisfy projected loading and permit conditions.

Chapter 7 – Analyzing Potential Alternatives

Detailed development of treatment alternatives, including process description, major design criteria, expected effluent quality, advantages / disadvantages, and engineer's opinion of probable cost.

Chapter 8 – Recommended Alternative

Monetary and non-monetary evaluation of the potential improvements developed in Chapter 7 to achieve secondary treatment requirements, with selection of the preferred alternative.

Chapter 9 – Financial Assessment

The financial impacts to ASPA and its ratepayers of implementing the preferred alternative are assessed.

Chapter 10 – Conclusions

The report concludes with a discussion of the overall impacts of implementing secondary treatment on American Samoa and suggested next steps.

1.4 References

J-U-B ENGINEERS, Inc.; *American Samoa Power Authority Wastewater Utility Plan*; 2024 (in development).

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CHAPTER 2
GOALS AND CHALLENGES

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Chapter 2 Goals and Challenges

2.1 Goals

ASPA has identified multiple goals based on general age and condition of the existing treatment facilities, current and potential future regulatory conditions, operational needs, and monetary / non-monetary drivers. The primary goals developed through workshops with ASPA at the onset of the project are listed below and are intended to be used during ranking and selection of a preferred alternative. These goals reflect the need for this feasibility planning document to provide a wastewater treatment solution that meets the ASPA, ASEPA, USEPA, and other stakeholder's wastewater treatment goals within an acceptable timeframe.

Ability to Satisfy Potential Future NPDES Discharge Permits

The Tafuna and Utulei WWTPs have previously operated under a 301(h) waiver which effectively required only primary treatment. The draft Tafuna NDPES permit requires secondary treatment as well as nutrient removal. A draft permit for Utulei is not currently available, but similar discharge conditions could ay be established in future permits. The primary goal of this study is to evaluate the ability of both facilities to achieve the effluent standards currently envisioned in the draft Tafuna NPDES permit.

Operational Simplicity

Current operations are relatively simple from a process standpoint. However, implementation of secondary treatment and nutrient removal will significantly increase the process complexity and the amount of equipment in operation. ASPA is seeking treatment processes that are time proven and relatively simple to operate and maintain. This is particularly critical since American Samoa is an isolated island community with inherent challenges associated with hiring and retaining qualified personnel to operate and maintain a WWTP. Operational simplicity is also critical since the existing treatment facilities experience difficulties with instrumentation and SCADA. A related concern is the need for more laboratory analyses to provide data for additional permit requirements, as well as process control.

Maintenance Simplicity

From an equipment perspective, the ability to obtain new equipment, replacement parts, consumables, and chemicals, as well as receive adequate vendor support, are very important to ASPA due to being located on an island where items require the additional time and costs associated with shipping. ASPA has experienced difficulty in obtaining suitable field support for troubleshooting equipment with other public works projects.

Minimize Power Consumption

Minimizing the amount of power that is required to operate the WWTPs is another high priority of ASPA. Renewable solar energy is developing on the island, but the main source of electricity is

diesel generators – approximately 95% of the electricity generated on the island is produced through the combustion of imported fossil fuels. Consequently, the cost per kilowatt hour on American Samoa is roughly twice the cost compared to the average cost on the mainland United States. Not only do diesel generators emit carbon dioxide during combustion, but they also emit particulates that contribute to air pollution.

Affordability

Capital costs, as well as a project's lifecycle cost from O&M, are critical factors in ASPA's decision-making process. American Samoa is an underserved community that has the lowest per capita income compared to the United States mainland and associated territories, with poverty rates four times higher than the U.S. mainland. The American Samoa Government currently administers the Low-Income Household Water Assistance Program (LIHWAP) and the Low Income Household Energy Assistance Program (LIHEAP); these programs demonstrate that a significant segment of the American Samoa population presently experience an undue financial burden for utility costs. One stakeholder question is whether American Samoa households can afford to operate and maintain a secondary treatment facility. If not, the environmental impact of a non-functional treatment facility may be worse than current levels of treatment.

2.2 Challenges

The goals identified above represent specific challenges that potential improvements can generally be tailored to address and subsequently ranked. In addition to those items, broader challenges facing American Samoa and noteworthy considerations in developing a subsequent project (or projects) to implement secondary treatment are noted below.

Land Availability and Topography

The Tafuna WWTP is situated on approximately 2.4 acres. The facility is bordered by the airport to the north and west, the Pacific Ocean to the east, and a residential area to the south – see **Figure 2-1** While expansion may be possible to adjacent "open land", portions of the facility are within Federal Aviation Administration (FAA) clearance zones for the Pago Pago International Airport runway and further construction may not be permitted.

The Utulei WWTP is situated on approximately 0.6 acres. The facility borders Route 001 and Pago Pago Bay to the north, existing development to the east, steep slopes and mountains to the south, and the American Samoa Terminal office and storage tanks to the west. There is no available space to expand the Utulei WWTP in the current site footprint. **Figure 2-2** shows the Utulei WWTP and the surrounding area.

The existing plants consume most of the land on the existing sites and must remain in service during construction activities. Since the space requirements associated with secondary wastewater treatment are considerably larger than primary treatment, additional land or alternate sites will likely be required. Siting concerns are addressed specifically in **Chapter 5**.

Environmental Conditions

Due to the high humidity coupled with proximity to the Pacific Ocean, mechanical, electrical, and structural components experience significant and accelerated corrosion. As a general rule, steel and other ferrous metals will corrode ten times faster in a marine environment compared to an inland location at the same humidity. This is due to chlorides in the ocean waves being aerosolized, carried by the wind, and depositing on exposed surfaces. The materials of construction envisioned in the upgrades should consider these impacts, and O&M costs should include frequent recoating and/or replacement.

Tsunamis, although rare, pose a significant risk to the island and the wastewater facilities given their current locations. A tsunami that occurred on September 29, 2009, had waves of up to 72 feet and killed at least 34 people (NOAA, 2023).

Increasing Complexity and Staffing Requirements

Secondary treatment / nutrient removal processes require process monitoring that must be done daily to observe the health of the system. Additional staff will be needed for sample collection and testing, operations, and maintenance. As additional processes are integrated into the treatment facility, staff must be added accordingly. Additional permit requirements will also require considerably more sampling and testing, some of which is currently done in California at significant cost. Advanced certification (Level 3 or 4) will also be required which impacts staff availability in American Samoa.

Availability of Contractors and Time to Construct

It is expected that the number of local, qualified contractors for constructing a secondary treatment plant (including the more complex electrical, instrumentation, and controls systems) is limited. While non-local firms may pursue the project, construction costs should be expected to increase significantly. This factor, in addition to shipping times for construction materials, will likely result in prolonged construction activities and expose ASPA to change orders, inflationary pressures, and delays.

Build America Buy America Act (BABA) Requirements

Federal funding is currently requiring compliance with the Build America Buy America Act (BABA) that was recently enacted as part of the Infrastructure and Jobs Act in 2021. BABA stipulates that projects receiving federal funding are required to procure all iron, steel, manufactured goods, and construction materials be produced in the United States. Due to the remote location of American Samoa, it is anticipated that construction costs associated with satisfying BABA requirements will be significantly higher compared to sourcing materials from other parts of the world. ASPA may wish to investigate the potential for securing waivers if federal funding containing BABA requirements is secured.

Infiltration and Inflow (I/I)

Both the Tafuna and Utulei facilities experience varying flows as a result of I/I, with the Utulei facility being most impacted. Average flows at Utulei are approximately 300 gpcd and peak flows are over 1,000 gpcd (see **Chapter 3** of the Utility Plan for additional information), and preliminary data indicate considerable saltwater intrusion (salinity levels of 3,000 mg/L at Utulei compared to 200 mg/L at Tafuna). The I/I results in significantly diluted influent BOD and TSS concentrations, which negatively affect biological treatment and achieving percent removal requirements for secondary treatment. Additionally, the peak flows can cause biomass washout in the solids separation process, potentially leading to compromised plant performance for several days or weeks until the biomass can be restored. A benefit/cost analysis of removing I/I versus treatment is beyond the scope of this study; however, ASPA may wish to consider collection system improvements to reduce I/I, thereby lowering the cost of treatment and improving treatment performance.



Figure 2-1: Tafuna WWTP Aerial



Figure 2-2: Utulei WWTP Aerial

2.3 Secondary Treatment on other Pacific Islands

It is expected that the challenges noted above, as well as many of the goals, are similar for other Pacific Island communities. A brief overview of other facilities is included below in **Table 2-1** based on readily available information from permits, fact sheets, and other on-line sources. Aerial images are included in **Appendix A**. While not exhaustive, the information illustrates the various approaches island communities have adopted for secondary treatment. Some smaller facilities have utilized package plants, which results in relatively small footprints but with a limited ability for expansion. Larger facilities have used various activated sludge and extended aeration configurations, including oxidation ditches and sequencing batch reactors. Space constraints during design are unknown but based on the listed average day design flows and area estimated from the aerials, these facilities have generally required 1 to 2.5 acres per mgd.

Table 2-1: **Overview of other Pacific Island WWTPs**

WWTP Location and Name	Average / Design Flow (MGD)	Approximate Footprint (acre)	Treatment Level	Secondary Process
American Samoa				
Tafuna	6	2.36	Primary	N/A
Utulei	6	0.62	Primary	N/A
Hawaiian Islands				
Papaikou-Paukaa	~1	1.25	Secondary	Activated sludge
Kauai Wailua	1.5	2	Secondary	Activated sludge
Honouliuli	51	78	Secondary	Trickling filter/solids contact
Sand Island	77	20	Primary	N/A
Guam				
Northern District	12	16	Secondary	Oxidation ditch
Agana (Hagatna)	12	3	Primary	N/A
Agat-Santa Rita	12	11.4	Secondary	Trickling filter/contact stabilization
Umatac-Merizo (1)	0.4	2.5	Secondary	Lagoon
Baza Gardens	0.6	1.5	Secondary	Extended aeration
Inarajan (1)	0.2	7.3	Secondary	Aerated lagoon
Saipan				
Sadog Tasi	4.8	6.6	Secondary	Activated sludge
Agingan	3	1.8	Secondary	Oxidation ditch
Palau				
Koror-Airai	4	1	Secondary	Sequencing Batch Reactors (SBR)

(1) Percolation discharge

2.4 References

NOAA, “On this Day: 2009 Samoa Islands Tsunami” <https://www.ncei.noaa.gov/news/2009-Samoa-Tsunami, retrieved 6/21/2024>

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CHAPTER 3
FLOWS AND LOADS

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Chapter 3 Flows and Loads

3.1 Introduction

Wastewater treatment plants are designed to accommodate and treat the unique hydraulic flows and pollutant loads generated by the sewered community. The flows and loads for the Tafuna and Utulei WWTPs are described in detail in Chapter 3 of the ASPA Wastewater Utility Plan. This chapter summarizes the flows and loads information from the Utility Plan and provides an additional analysis of the flows and loads which may be generated with a regional WWTP combining the two existing facilities.

Critical design conditions for a WWTP are summarized below.

- Average Annual Day (AAD): the average annual condition observed at the facility. This value is used to estimate annual average pumping and chemical costs, and solids production.
- Maximum Month (MM): the observed condition for a peak month in the year. This value is typically used to design unit processes for permit compliance.
- Peak Day (PD): The maximum expected condition over a 24-hour period in a year. This value is generally used to size hydraulic capacity, maximum oxygen demand, peak solids generation, and similar parameters.
- Peak Hour (PH): The observed condition for a maximum one-hour period in a year. This value is typically used for flow and to size firm capacity for headworks, pump stations, and maximum hydraulic throughput for basins and channels.

3.2 Tafuna WWTP

3.2.1 Existing Flows and Loads

The observed influent conditions at the Tafuna WWTP are presented in **Table 3-1** (reference Chapter 3 of the Utility Plan for a detailed review of the data). The data indicate that both BOD and TSS per capita influent loads are unexpectedly low at the Tafuna WWTP when compared to values from Utulei (see Section 3.3) and typical literature values. Additionally, the influent TSS has been considerably less than the influent BOD, whereas influent loading for BOD and TSS is generally similar absent the influent of significant industrial users. These factors indicate a potential issue related to sample collection and may result in under sizing secondary treatment facilities.

Table 3-1: Tafuna WWTP – Existing Flows and Loads

Parameter	Observed Conditions	Observed Per Capita Values	Typical Values
Flow			
Average Day (MGD)	1.42	72 gpcd [1]	60 to 120 gpcd
Maximum Month (MGD)	1.70		
Peak Day (MGD)	3.50		
Peak Hour (MGD)	5.50		
BOD			
Average Day (mg/L)	161		
Average Day (ppd)	1,907	0.10 ppcd [2]	0.20 ppcd
Maximum Month (ppd)	3,039		
Peak Day (ppd)	4,864		
TSS			
Average Day (mg/L)	77		
Average Day (ppd)	910	0.05 ppcd	0.19 ppcd
Maximum Month (ppd)	1,553		
Peak Day (ppd)	2,177		
TN			
Average Day (mg/L)	52		
Average Day (ppd)	610	0.031 ppcd	0.037 ppcd
Maximum Month (ppd)	939		
Peak Day (ppd)	NA		
TP			
Average Day (mg/L)	6.8		
Average Day (ppd)	80	0.004 ppcd	0.005 ppcd
Maximum Month (ppd)	171		
Peak Day (ppd)	NA		

(1) gpcd = gallons per capita per day
(2) ppcd = pounds per capita per day

To investigate these discrepancies, an additional analysis on the relative pollutant loading ratios for the two plants was conducted. The load ratio calculation is provided below.

$$Load\ Ratio = \frac{Tafuna\ Load}{Utulei\ Load}$$

Ideally, influent pollutant data would be collected at the same time for the two plants for direct comparison. Directly comparable influent data for BOD and TSS was available for 2018 through 2022, and comparable nutrient data was provided for 2012 through 2017. **Figure 3-1** provides the influent loading ratios for BOD and TSS (2018-2022) and TAN and TN (2015-2017).

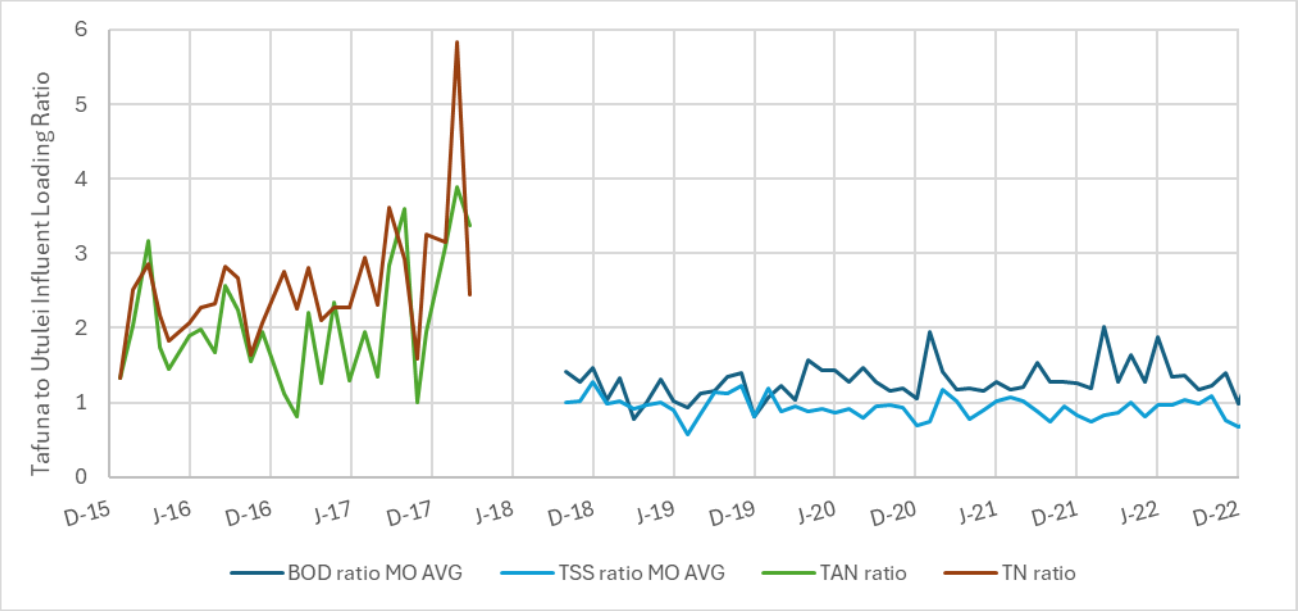


Figure 3-1: **Tafuna and Utulei Influent Load Ratio**

The first observation is that BOD and TSS influent loads are surprisingly similar at the two plants (a ratio of approximately 1:1). Based on the estimated sewered populations identified in Chapter 3 of the Utility Plan, it would be expected that influent BOD and TSS loads would be 2 to 3 times larger at the Tafuna WWTP. In comparison, the influent nitrogen loads are 2 to 3 times higher at the Tafuna WWTP compared to Utulei. Influent sampling at Tafuna is at the end of a long channel and immediately upstream of the influent flume. This configuration may result in solids settling out of suspension; however, nutrients are generally found in soluble forms and not likely affected by settling.

3.2.2 Recommended Design Flows and Loads

It is recommended that typical literature values be used in this feasibility study for BOD and TSS. The available nutrient data is similar to literature values and will be retained. The assumed existing sewered population for Tafuna is 19,854 people, and the projected future sewered population in the Tafuna service area is 30,172 – see Utility Plan, Chapter 3 which details service area expansions and the resulting population increases.

The observed loading conditions, estimated existing conditions at the assumed per capita BOD and TSS values, and 20-year projected values are included in **Table 3-2**. ASPA should evaluate the influent sampling location further for potential negative bias and install a flow-proportioned composite sampler for more representative sample collection throughout the day. As more data become available, the assumptions herein should be reviewed and modified accordingly.

Table 3-2: Tafuna WWTP – Probable Existing and Future Flows and Loads

Parameter	Observed Conditions	Probable Existing Conditions (1)(2)	Probable Future Conditions (2044) (1)(2)
Flow			
Average Day (gpcd)	72	72	72
Average Day (MGD)	1.42	1.42	2.17
Maximum Month (MGD)	1.70	1.70	2.60
Peak Day (MGD)	3.50	3.50	5.34
Peak Hour (MGD)	5.50	5.50	8.40
BOD			
Average Day (mg/L)	161	333	333
Average Day (ppd)	1,907	3,970	6,030
Maximum Month (ppd)	3,039	6,330	9,620
Peak Day (ppd)	4,864	10,130	15,390
TSS			
Average Day (mg/L)	77	317	317
Average Day (ppd)	910	3,770	5,730
Maximum Month (ppd)	1,553	6,440	9,780
Peak Day (ppd)	2,177	9,020	13,710
TN			
Average Day (mg/L)	52	52	52
Average Day (ppd)	610	610	930
Maximum Month (ppd)	939	950	1,440
Peak Day (ppd) (3)	-	-	-
TP			
Average Day (mg/L)	6.8	6.8	6.8
Average Day (ppd)	80	80	120
Maximum Month (ppd)	171	171	260
Peak Day (ppd) (3)	-	-	-

(1) Existing sewered population of 19,854 people and a projected 20-year service population of 30,172 people. Assumes influent BOD is 0.20 ppcd and influent TSS is 0.19 ppcd; observed nutrient loading data on a ppcd basis are retained.

(2) Maximum month and peak day values estimated assuming the same observed peaking factors.

(3) Insufficient data exist to determine peak day value.

3.3 Utulei WWTP

With an estimated service population of 7,675 people, the Utulei WWTP has relatively typical per capita values for BOD, TSS, and nutrients loads. The per capita hydraulic flows are extremely high – 265 gpcd average and 665 gpcd during peak day flows – and are attributed to inflow and infiltration (I/I) in the sewer conveyance system, some of which is likely due to seawater intrusion in lines that are below sea level. The I/I causes significant dilution of the influent constituents. Based on discussions with ASPA, the

sewered area contributing to the Utulei WWTP is anticipated to expand to a population of 8,085 people. **Table 3-3** summarizes the current and 20-year projected future influent flows and loads for the Utulei WWTP. The Wastewater Utility Plan delves further into I/I source identification and repair. If successful, the influent flows should be reduced and the influent concentrations increase; the pound per capita values will remain unchanged, however.

Table 3-3: Utulei WWTP – Existing and Future Flow and Loads Summary

Parameter	Observed Conditions	Observed Per Capita Values	Typical Values	Projected Future Conditions (2044)
Flow				
Average Day (MGD)	2.04	266	60 to 120 gpcd	2.15
Maximum Month (MGD)	2.70			2.86
Peak Day (MGD)	5.10			5.38
Peak Hour (MGD)	5.20			5.50
BOD				
Average Day (mg/L)	90		Varies with I/I	90
Average Day (ppd)	1,533	0.20	0.20 ppcd	1,620
Maximum Month (ppd)	2,345			2,480
Peak Day (ppd)	3,741			3,950
TSS				
Average Day (mg/L)	58		Varies with I/I	67
Average Day (ppd)	995	0.13	0.19 ppcd	1,210
Maximum Month (ppd)	1,370			1,670
Peak Day (ppd)	2,075			2,530
TN				
Average Day (mg/L)	14		Varies with I/I	14
Average Day (ppd)	241	0.031	0.037 ppcd	250
Maximum Month (ppd)	458			480
Peak Day (ppd)	565			590
TP				
Average Day (mg/L)	1.8		Varies with I/I	1.8
Average Day (ppd)	31	0.004	0.005 ppcd	32
Maximum Month (ppd)	79			82
Peak Day (ppd)	84			87

3.4 Design Loading for a Regional Facility

Subsequent chapters explore the potential for constructing a regional treatment facility. While the design values listed above could be summed together to determine a regional facility's influent conditions, the approach could be conservative since peak events may not occur simultaneously from the two service areas. Consequently, there is the potential to reduce the sizing of a single regional secondary treatment facility compared to two smaller treatment facilities.

Influent flow records for the two facilities were reviewed in "paired" fashion to determine if maximum month and peak day conditions from both the Tafuna and Utulei facilities occurred in the same month. **Figure 3-2** shows the average day effluent flow rates reported in the DMRs for the Tafuna and Utulei WWTPs and paired flows. Utulei has one third of the sewered population compared to Tafuna but contributes the majority of the average day flow to a regional WWTP facility due to excessive I/I. The paired annual average day flow (AADF) was approximately 3.5 mgd, which is consistent with adding the AADF for each plant. However, the paired maximum month flow (MMF) was 4.1 mgd compared to 4.4 mgd if the respective flow conditions are added.

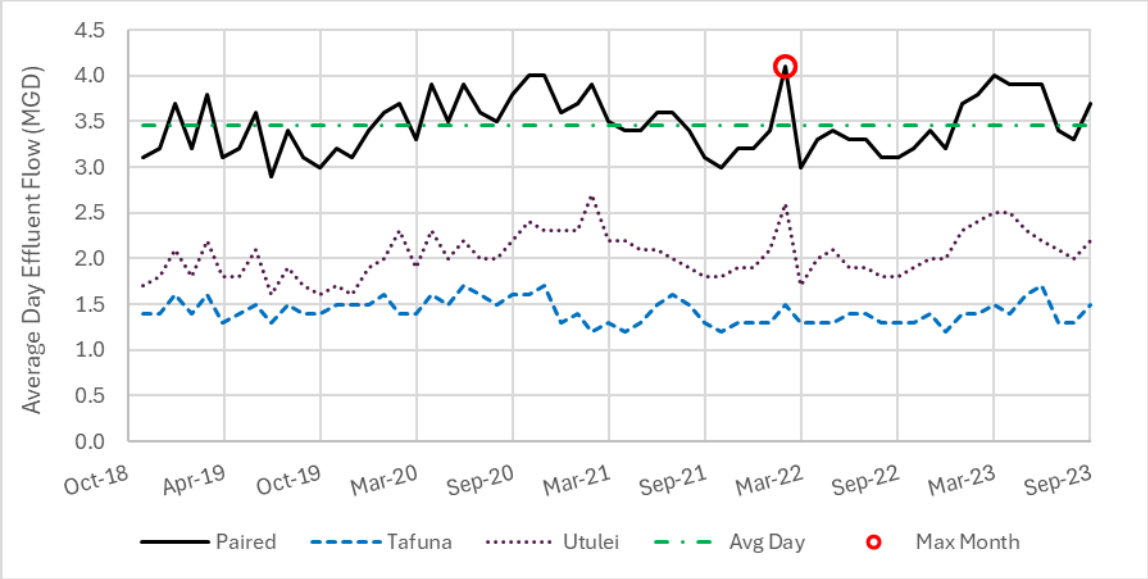


Figure 3-2: Paired Average Day Flows

The same analysis was conducted for peak day effluent flow and is shown in **Figure 3-3**. Utulei drives the combined regional flow due to I/I during peak events. However, because the data were obtained from DMRs and represent the peak flow within a month for each facility, it is not known if the peak day flows actually occurred on the same day. If the flows occurred on different days, the resulting flows would be less than shown herein. The paired PDF was 7.2 mgd compared to 9.0 mgd if the respective flow conditions are added.

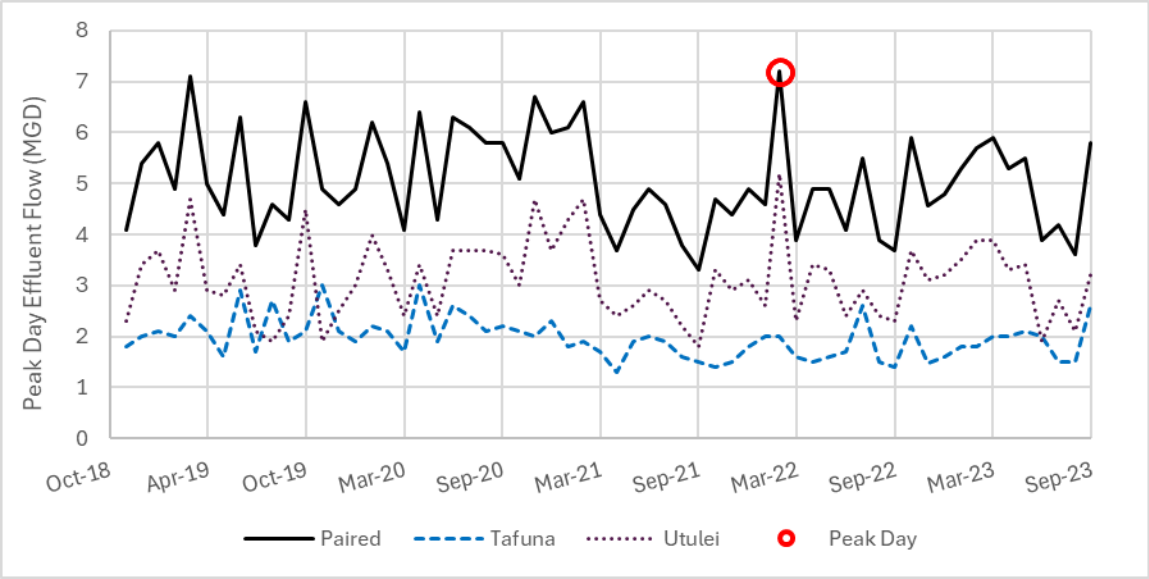


Figure 3-3: Paired Peak Day Flows

Table 3-4 provides the current and future AADF, MMF, PDF and peak hour flow (PHF) for the paired data and the summed values. For future conditions, it is assumed that the ratio of "paired" to "summed" conditions remains unchanged. A more robust analysis of the data (i.e. paired data on a daily basis over several years) should be undertaken to determine if the paired condition is a reasonable design assumption. For the purposes of this study, it is assumed that a regional facility will experience the sum of the flow values in **Table 3-2** (with the estimated per capita loading values for Tafuna) and **Table 3-3** as this is a more conservative assumption**.**

Table 3-4: *Hydraulic Loads for a Regional Facility*

Parameter	Existing Conditions		Projected Future Conditions (2044)	
	Summed	Paired	Summed	Paired
Average Day (MGD)	3.5	3.5	4.3	4.3
Maximum Month (MGD)	4.4	4.1	5.5	4.9
Peak Day (MGD)	9.0	7.2	10.7	8.7
Peak Hour (MGD)	10.7	*unknown*	13.9	*unknown*

A similar analysis could be undertaken for influent BOD, TSS, and nutrients. However, the uncertainty associated with the Tafuna plant's loading will likely yield questionable results. For the purposes of this study, it is assumed that loading for a regional facility consists of the sum of the values in **Table 3-2** (with the estimated per capita loading values for Tafuna) and **Table 3-3**. The resulting design values for a regional facility are shown in **Table 3-5**. These flows and loads were developed as illustrated in **Figure 3-4** at average day conditions. Observed peaking factors for each facility were then applied for peak conditions.

Table 3-5: *Design Conditions for a Regional Facility*

Parameter	Probable Existing Conditions (1) (2)	Probable Future Conditions (2044) (1) (2)
Flow		
Average Day (MGD)	3.5	4.3
Maximum Month (MGD)	4.4	5.5
Peak Day (MGD)	8.6	10.7
Peak Hour (MGD)	10.7	13.9
BOD		
Average Day (mg/L)	189	213
Average Day (ppd)	5,510	7,650
Maximum Month (ppd)	8,680	12,090
Peak Day (ppd)	13,880	19,340
TSS		
Average Day (mg/L)	168	193
Average Day (ppd)	4,920	6,940
Maximum Month (ppd)	8,020	11,550
Peak Day (ppd)	11,420	16,240
TN		
Average Day (mg/L)	29	33
Average Day (ppd)	850	1,198
Maximum Month (ppd)	1,400	2,010
Peak Day (ppd)	-	-
TP		
Average Day (mg/L)	3.8	4.2
Average Day (ppd)	110	150
Maximum Month (ppd)	250	360
Peak Day (ppd)	-	-

(1) Flow values reflect the summation of the respective conditions from each facility, not a "paired" flow condition.

(2) Loading values reflect the summation of the respective conditions from each facility, not a "paired" loading.

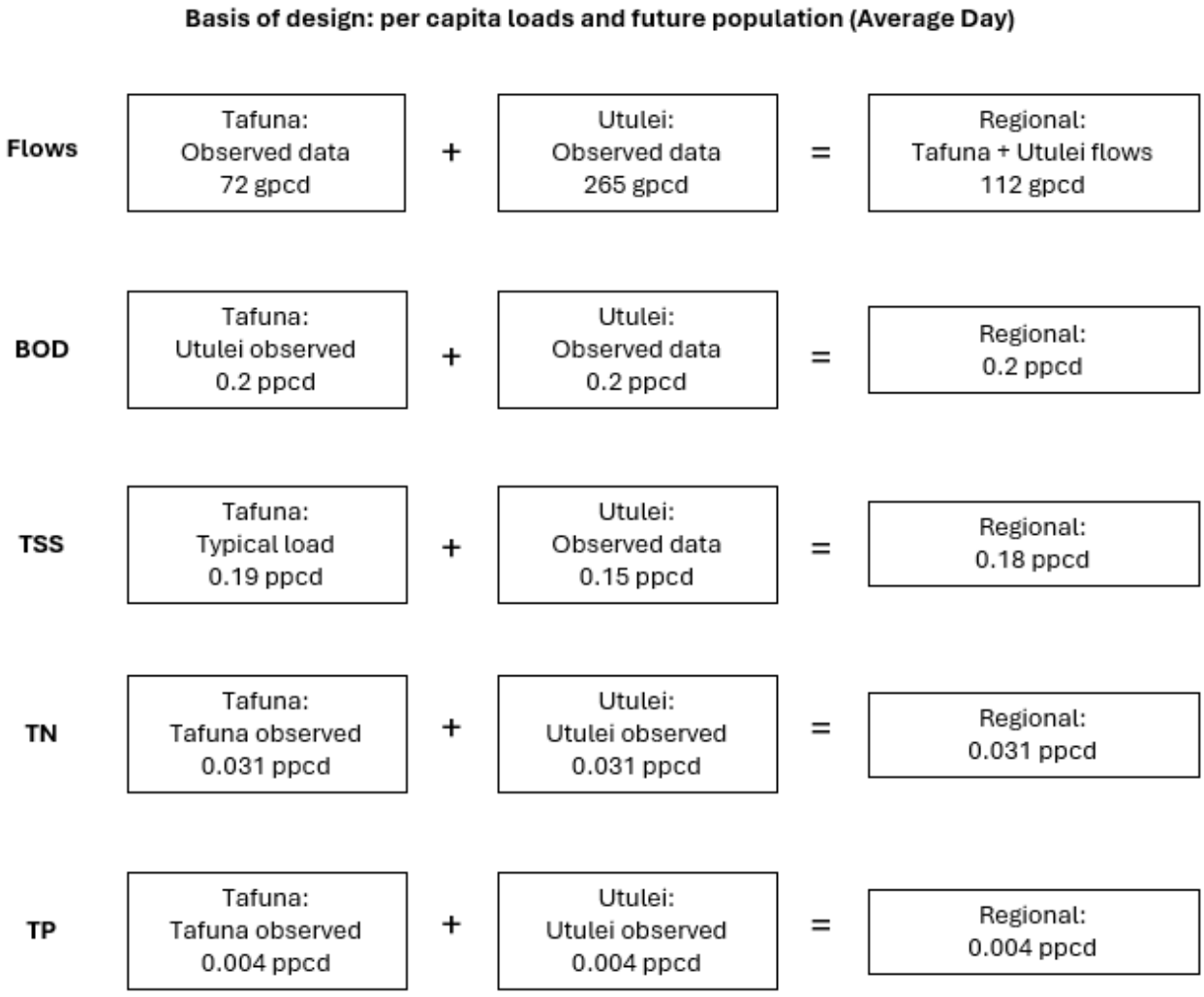


Figure 3-4: Loading Assumptions for a Regional Facility

3.5 References

J-U-B ENGINEERS, Inc. *American Samoa Power Authority Wastewater Utility Plan*; 2024 (in development)

J·U·B ENGINEERS, INC.

CHAPTER 4
PERMIT CONDITIONS AND DISCHARGE STANDARDS

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Chapter 4 Permit Conditions and Discharge Standards

4.1 Introduction

American Samoa Power Authority (ASPA) owns and operates two wastewater treatment plants that provide primary treatment. The Tafuna Wastewater Treatment Plant (WWTP) discharges disinfected effluent to the Vai Cove south of the Pago Pago International Airport into the shoreline of the South Pacific Ocean. Discharge has been permitted in accordance with the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Permit No. AS 0020010. The Utulei WWTP discharges disinfected effluent to the Outer Pago Pago Harbor in the South Pacific Ocean in accordance with the NPDES Permit No. AS 0020001.

The Tafuna and Utulei WWTPs have historically received Section 301(h) waivers as part of their NPDES permitting. A Section 301(h) waiver allows the permittee to discharge to marine waters with less than secondary treatment. The two primary treatments plants were originally constructed in the 1970s and future water quality standards are expected to become increasingly more stringent, especially for bacteria and nutrients, to protect public health and reduce the potential for eutrophication.

This chapter reviews the current NPDES effluent requirements for both plants, the draft Tafuna NPDES permit, and potential discharge limits associated with combining both plants into a regional secondary treatment facility. Chapter 4 of the Wastewater Utility Plan provides more detailed information regarding influent sampling, narrative limits, sampling timescales, ocean diffuser outfalls, receiving water environmental sampling, and permitting background.

Additional ambient water quality information pertinent to the facilities' NPDES discharge permits; including the 2018 American Samoa Water Quality Standards, example 2018 WWTP Receiving Water Monitoring reports, and 2021 EPA Notice of Opportunity to Resolve Clean Water Act Violations are provided in **Appendix D**.

4.2 Utulei WWTP Current NPDES Permit

The Utulei WWTP is currently permitted to discharge an average annual day flow (AADF) of 3 mgd and has a critical initial dilution (CID) of 121 per EPA (Utulei NPDES Factsheet, 2021). The shorelines in the Pago Pago harbor are listed as impaired for *Enterococci* per the Clean Water Act (CWA) Section 303(d) list. Previously, the discharge permit was reissued to include an effluent limit for *Enterococci* but the requirement for full secondary treatment was not implemented in the current permit due to limited resources in American Samoa (Utulei NPDES Fact Sheet, 2021). Utulei's current NPDES discharge permit became effective on January 1, 2020 and expired on December 31, 2024 – reference **Appendix C**. 2019). The prior permit is expected to be administratively extended until a new permit is issued.

Table 4-1 provides the current NPDES discharge requirements for the Utulei WWTP. The current permit requires 30 percent average monthly removal of influent BOD and TSS, and sets effluent concentration and mass limits on both parameters. The permit also sets discharge limits on total nitrogen (TN), ammonia impact ratio (AIR), total phosphorus (TP), and Enterococci. The Utulei WWTP generally

complies with the existing permit conditions. BOD and TSS removal is generally 50 percent, although some periods have shown removal in the lower 30 percent range. Compliance with nitrogen and phosphorus limits is generally achieved despite not having any nutrient removal capabilities in the facility. However, compliance is likely achieved due to dilution from I/I. Reference the Wastewater Utility Plan Chapter 6 for a complete evaluation of the existing facility, a condition assessment, and a review of overall performance.

Future permit conditions for Utulei are not known. Based on direction provided by ASPA at the onset of this study (reference Request for Proposal for Wastewater Secondary Treatment Feasibility Study Attachment B "Scope of Work" issued March 16, 2023), the Utulei WWTP will be evaluated to achieve secondary treatment. Consequently, a future permit for Utulei is assumed to be similar to the draft Tafuna permit (discussed below).

Table 4-1: Utulei WWTP - Effluent Discharge Limits based on Current NPDES Permit

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Monitoring Frequency	Sample Type
Biochemical Oxygen Demand (BOD_5) [2]	lbs/day	1,960	2,929	3,930	Weekly	24-hour composite
	mg/L	78.3	117	157		
BOD removal percentage [2]		≥ 30%				
Total Suspended Solids (TSS) [2]	lbs/day	1,878	2,829	3,755	Weekly	24-hour composite
	mg/L	75	113	150		
TSS removal percentage [2]		≥ 30%				
pH[3]	S.U.	6.5-8.6, within 0.2 pH of the value which would occur naturally				Weekly Grab
Oil and grease, total recoverable	mg/L	10	-	15	Monthly	Grab
Settleable Solids	mL/L	1	n/a	2	Monthly	Grab
Total Nitrogen (as N)	mg/L	18.2	-	45	Monthly	24-hour composite
Ammonia Impact Ratio [3,4]	Ratio	1.0		1.0	Monthly	Calculated
Total Phosphorus	mg/L	2.73	-	8.19	Monthly	24-hour composite

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Monitoring Frequency	Sample Type
Enterococci	CFU /100 mL	3,815	-	11,830	Weekly	Grab
Chronic Toxicity with *S. purpuratus*, Method 1008.0 WB33L [5]	Pass (0) or Fail (1), Test of Significant Toxicity (TST)	-	-	Pass (0)	Annually	24- hour composite
Chronic Toxicity with *D. excentricus*, Method 1008.0 WB33N [5]	Pass (0) or Fail (1), TST	-	-	Pass (0)	Annually	24- hour composite

(1) n/a = not applicable

(2) The arithmetic means of the BOD and TSS values, by concentration, for effluent samples collected over 30 consecutive calendar days shall not exceed 70% of the arithmetic mean, by concentration, for influent samples collected at approximately the same times during the same period. Both influent and effluent concentrations of BOD and TSS are monitored.

(3) Temperature and pH readings should be taken at the same time as the ammonia sample is collected during the ammonia sampling event. These parameters will be used to calculate the ammonia impact ratio.

(4) The Ammonia Impact Ratio (AIR) is calculated as the ratio of the ammonia value in the effluent and the applicable ammonia standard from Appendix A in the American Samoa Water Quality Standards (AS-WQS). Attachment E to the permit presents the applicable AS-WQS standards table, adjusted for the approved dilution factor for the permit. See Attachment D to the permit for a sample log to help calculate and record the AIR values. The AIR is the ammonia effluent limit and must be reported in the Discharge Monitoring Reports (DMRs) in addition to the ammonia, pH, and temperature values.

(5) Chronic WET testing can be conducted for either of these organisms based on spawning season during the reporting month. An exceedance occurs if the Pass-Fail result is Fail.

4.3 Tafuna WWTP Current NDPES Permit

The Tafuna WWTP's current NPDES discharge permit expired in 1999 and the WWTP has been operating on this expired permit under an administrative extension, as well as an Administrative Order in 2011 which required disinfection improvements (and de-chlorination if necessary) and diffuser modifications to improve the outfall dilution factor. **Table 4-2** provides the current NPDES discharge requirements for the Tafuna WWTP. The current permit requires 30 percent average monthly removal of influent BOD and TSS, and it sets effluent concentration and mass limits on both parameters.

Table 4-2: **Tafuna WWTP - Effluent Discharge Limits based on Current NPDES Permit**

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Monitoring Frequency	Sample Type
Biochemical Oxygen Demand (BOD_5)	lbs/day	1,669	2,504	3,338	Once/week	8 hr Composite
	mg/L	100	150	200		
BOD removal percentage (1)		≥ 30%				
Total Suspended Solids (TSS)	lbs/day	1,252	1,878	2,504	Once/week	8 hr Composite
	mg/L	75	113	150		
TSS removal percentage (1)		≥ 30%				
Settleable Solids	mL/L	1	n/a[2]	2	Once/day	Discrete
pH	std units		6.5 to 8.6		Once/day	Discrete

(1) The arithmetic means of the BOD and TSS values, by concentration, for effluent samples collected over 30 consecutive calendar days shall not exceed 70% of the arithmetic mean, by concentration, for influent samples collected at approximately the same times during the same period. Both influent and effluent concentrations of BOD and TSS are monitored.

4.4 Tafuna WWTP Draft NPDES Permit

EPA provided a preliminary draft NPDES permit in May 2023 for the Tafuna WWTP which is based on secondary treatment standards. The draft permit is written for a facility with an AADF of 3.0 mgd and a CID of 109 (NPDES Fact Sheet, 2023).

Table 4-3 provides a summary of the draft NPDES discharge requirements for the Tafuna WWTP.

Water quality concerns have been identified by ASEPA historically and incorporated into EPA's draft NPDES permit. Specifically, EPA's draft Fact Sheet from May 2023 (see **Appendix B**) notes that the "Tafuna Plain watershed is included in the 2020 303(d) list for impaired ocean shorelines for undetermined nonpoint source stressors, Total Nitrogen, and Chlorophyll-a (ASEPA, 2020)." The draft Fact Sheet also notes beach advisories have been issued due to potential bacteria exposure, with levels greater than 24,000 MPN/100 ml. A summary of the water quality concerns identified by EPA is included in **Figure 4-1**, which is a slide that was presented by EPA during a meeting with ASPA in March 2023.

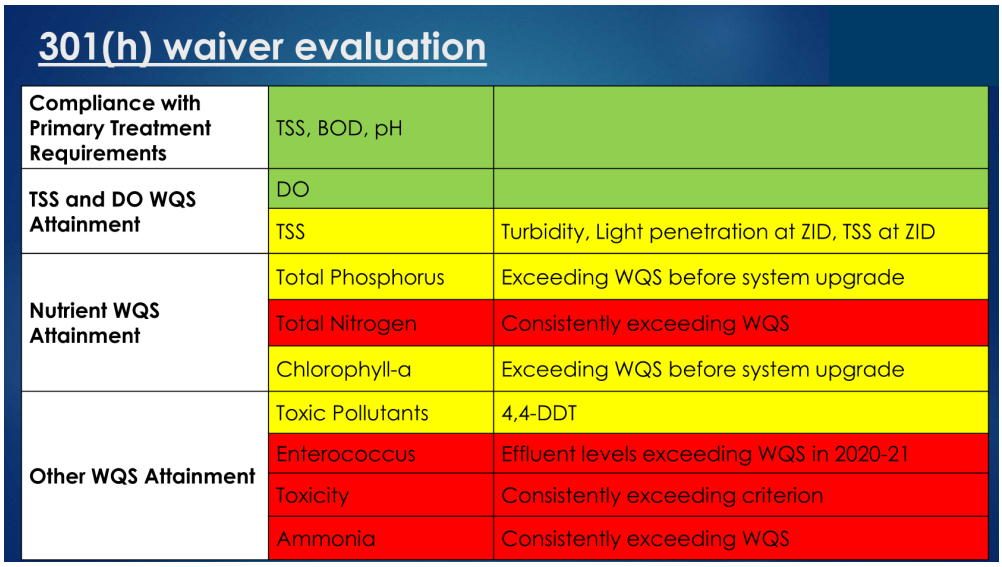


Figure 4-1: Tafuna WWTP Water Quality Concerns (EPA Presentation, 2023)

Per the draft Fact Sheet: "In July 2009, upon review of the ASPA's application, EPA issued a public notice of its tentative decision to deny renewal of the Tafuna STP's CWA Section 301(h) waiver due to the facility's inability to consistently meet American Samoa's bacteria and nutrient standards." EPA subsequently issued an Administrative Order in 2011 requiring disinfection improvements (and de-chlorination if necessary) and diffuser modifications to improve the outfall dilution factor. Additional data were collected following improvements to the facility in 2015 and re-evaluated beginning in 2021 as part of the most recent permit renewal. Per the draft Fact Sheet:

> *In 2021, EPA re-evaluated the updated mixing zone studies and recent data collected with the upgraded treatment system in place. Even with the upgrades, the discharge from the Tafuna STP does not meet several of the CWA Section 301(h) criteria. As described in EPA's 2023 CWA Section 301(h) Tentative Decision Document, the Tafuna STP exceeds water quality standards for light penetration, total suspended solids, total nitrogen, enterococcus, toxic pollutants, chronic toxicity, and ammonia after initial mixing, creating potential adverse impacts on human health, marine life, and receiving water quality.* ***Therefore, EPA denied renewal of the CWA Section 301(h) waiver and this NPDES permit includes secondary treatment requirements in accordance with CWA Section 301(b)(1)(B).*** *[emphasis added]*

The draft NPDES permit includes more stringent secondary treatment discharge limits, including 85 percent average monthly removal of influent BOD and TSS, and sets effluent concentration and mass limits on both parameters. The draft permit also sets discharge limits on TN, AIR, TP, three organic chemicals, and *Enterococci*.

BOD and TSS removal requirements are based on technology based effluent limits (TBEL) for secondary treatment. The parameters pH, TN, AIR, TP, and *Enterococci* have discharge restrictions intended to comply with the receiving water quality based effluent limits (WQBEL) set by the American Samoa Environmental Protection Agency (ASEPA) and were calculated using a critical dilution factor of 109 (ASWQS, 2018 Revision, 001-2019; NPDES Fact Sheet, 2023). Discharge limits for the three organic

chemicals (TCDD, Phthalate, and DTT) were calculated based on USEPA's recommended water quality criteria for human health for the consumption of aquatic organisms and a critical dilution factor of 109. A summary of the changes to water quality based effluent limitations (WQBELs) is provided in the Draft Permit Fact Sheet on pages 2 through 4 (reference **Appendix B**).

In March 2024, ASEPA issued a technical memorandum assessing the water quality at the Tafuna outfall based on data collected from 2005 through 2023 (reference **Appendix B**). Several key statements in the Summary section (pages 13 and 14) are included below.

> *Data presented here indicates overall excellent water column conditions for the receiving water for Outfall 001 and substantial compliance with the ASWQS over this period of 19 years [2005-2023]. Except for total nitrogen, violations of the ASWQS are relatively few and compliance is dominant throughout the data period.*
>
> *Overall, AS-EPA has determined through this assessment that primary treatment can be effective to meet the ASWQS for ocean receiving water for the Tafuna Wastewater Treatment Plant, and that primary treatment is an appropriate level of technology for this remote part of the Pacific.*

These statements indicate that a relaxation of the adopted water quality standards (WQS's) or adoption of site-specific criteria may be possible by ASEPA. It is not known to what degree this might be possible, nor if EPA would accept the revisions. ASPA should continue discussions with ASEPA and EPA to explore these possibilities since it could have a significant impact on the alternative investigated in this Study, including continued use of the Tafuna facility with improvements to address more critical water quality deficiencies.

Table 4-3: **Tafuna WWTP - Effluent Discharge Limits based on Draft NPDES Permit**

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Monitoring Frequency	Sample Type
Biochemical Oxygen Demand (BOD_5) (1)	lbs/day	751	1,127	(2)	Weekly	24-hour composite
	mg/L	30	45	(2)		
BOD removal percentage (1)		≥ 85%				
Total Suspended Solids (TSS) (1)	lbs/day	751	1,127	(2)	Weekly	24-hour composite
	mg/L	30	45	(2)		
TSS removal percentage (1)		≥ 85%				
pH (3)	S.U.	6.5-8.6, within 0.2 pH of the value which would occur naturally			Weekly	Grab

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Monitoring Frequency	Sample Type
Oil and grease, total recoverable	mg/L	10	-	15	Monthly	Grab
Total Nitrogen (as N)	mg/L	14.2	-	30.5	Monthly	24-hour composite
Ammonia Impact Ratio (4)	Ratio	1.0		1.0	Monthly	Calculated
Total Phosphorus	mg/L	1.6	-	5.5	Monthly	24-hour composite
2,3,7,8-Tetrachlorodibenzodioxin (TCDD)	µg/L	-	-	5.6×10^{-7}	Quarterly	24-hour composite
bis(2-ethylhexyl) Phthalate	µg/L	-	-	40.3	Quarterly	24-hour composite
4,4'-DDT	µg/L			0.0033	Quarterly	24-hour composite
Enterococci	CFU /100 mL	3,815	-	14,170	Weekly	Grab
Chronic Toxicity with Strongylocentrotus purpuratus or Dendraster excentricus, Method 1008.0 WI33L (5)	Pass (0) or Fail (1), Percent (%) Effect			Pass (0)	Quarterly	24- hour composite

(1) The average monthly effluent concentration of Biochemical Oxygen Demand (5-day) and Total Suspended Solids shall not exceed 15 percent of the average monthly influent concentration collected at the same time. Both influent and effluent concentrations of BOD and TSS are monitored.

(2) No effluent limits are set at this time but monitoring and reporting is required.

(3) Temperature and pH reading should be taken at the same time as the ammonia sample is collected during ammonia sampling event. These parameters will be used to calculate ammonia impact ratio.

(4) The Ammonia Impact Ratio (AIR) is calculated as the ratio of the ammonia value in the effluent and the applicable ammonia standard from Appendix A in the American Samoa Water Quality Standards (ASWQS). Attachment E to the permit presents the applicable ASWQS standards table. See Attachment D to the permit for a sample log to help calculate and record the AIR values. The AIR is the ammonia effluent limit and must be reported in the Discharge Monitoring Reports (DMRs) in addition to the ammonia, pH, and temperature values.

(5) Monitoring is conditional in that only one of these two test species must be monitored for chronic toxicity during the calendar month for DMR reporting. See Part II.C.3. "Chronic Test Species and WET Methods" of this permit. An exceedance occurs if the Pass-Fail result is Fail.

4.5 Regional WWTP Anticipated Permit Requirements

Combining the two treatment plants into one regional WWTP will require a new NPDES discharge permit with a much higher plant design capacity, nominally 6.0 mgd based on the sum of the current design flows of each facility (3.0 mgd each). The higher flow from a regional facility may result in different dilution factors and could result in lower limits than currently envisioned in the Tafuna draft NPDES permit, although modifications to the outfall may mitigate these impacts. An effluent water quality analysis is beyond the scope of this study; therefore, the draft Tafuna NPDES permit values will be assumed which include a critical dilution factor of 109. Outfall modifications may be required to achieve this dilution factor for a regional facility with higher flows.

Table 4-4 provides the estimated discharge requirements for a regional WWTP that will be used in this study. All parameters that have effluent limits based on ambient water quality concentrations are subject to change based on an EPA approved outfall diffuser critical initial dilution factor for a regional facility.

Hypothetical permitted BOD and TSS effluent loads will be doubled for a regional facility, but the concentration and percent removal are expected to remain the same as the draft Tafuna NPDES permit since TBELs are used to establish discharge criteria for these parameters. The parameters pH, TN, AIR, TP, and *Enterococci* have concentration-based limits and are expected to remain the same as the draft Tafuna permit since these parameters are based on WQBELs and an assumed critical dilution factor of 109. Similarly, the three organic chemicals are expected to have discharge limits from a regional WWTP the same as concentrations in the draft Tafuna NPDES permit since these pollutants are also permitted based on WQBELs.

Table 4-4: **Regional WWTP – Estimated Effluent Discharge Limits Assuming Tafuna Draft Limits**

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Monitoring Frequency	Sample Type
Biochemical Oxygen Demand (BOD_5) [2, 8]	lbs/day	1,503	2,255	[3]	Weekly	24-hour composite
	mg/L	30	45	[3]		
BOD removal percentage [2]		≥ 85%				
Total Suspended Solids (TSS) [2, 8]	lbs/day	1,503	2,255	[3]	Weekly	24-hour composite
	mg/L	30	45	[3]		
TSS removal percentage [2]		≥ 85%				
pH [4]	S.U.	6.5-8.6, within 0.2 pH of the value which would occur naturally			Weekly	Grab
Oil and grease, total recoverable	mg/L	10	-	15	Monthly	Grab
Total Nitrogen (as N)	mg/L	14.2	-	30.5	Monthly	24-hour composite

Ammonia Impact Ratio [5]	Ratio	1.0		1.0	Monthly	Calculated
Total Phosphorus	mg/L	1.6	-	5.5	Monthly	24-hour composite
2,3,7,8-Tetrachlorodibenzodioxin (TCDD)	µg/L	-	-	5.6×10^{-7}	Quarterly	24-hour composite
bis(2-ethylhexyl) Phthalate	µg/L	-	-	40.3	Quarterly	24-hour composite
4,4'-DDT	µg/L			0.0033	Quarterly	24-hour composite
Enterococci	CFU /100 mL	3,815	-	14,170	Weekly	Grab
Chronic Toxicity with *Strongylocentrotus purpuratus* or *Dendraster excentricus,* Method 1008.0 WI33L [5]	Pass (0) or Fail (1), Percent (%) Effect			Pass (0)	Quarterly	24- hour composite

(1) n/a = not applicable

(2) The average monthly effluent concentration of Biochemical Oxygen Demand (5-day) and Total Suspended Solids shall not exceed 15 percent of the average monthly influent concentration collected at the same time. Both influent and effluent concentrations of BOD and TSS are monitored.

(3) No effluent limits are set at this time but monitoring and reporting is required.

(4) Temperature and pH reading should be taken at the same time as the ammonia sample is collected during ammonia sampling event. These parameters will be used to calculate ammonia impact ratio.

*(5) Ammonia Impact Ratio (AIR) is calculated as the ratio of the ammonia value in the effluent and the applicable ammonia standard in Appendix A of the ASWQS which is included in **Appendix B** of this report. AIR is dependent on the specific diffuser dilution factor, ambient salinity, effluent temperature, and effluent pH. The AIR value can be calculated using the following formula:*

$$AIR = \frac{Ammonia\ Concentration\ in\ Effluent}{109 \times Ammonia\ Objective\ from\ Appendix\ E\ of\ draft\ permit}$$

(6) Monitoring is conditional in that only one of these two test species must be monitored for chronic toxicity during the calendar month for DMR reporting. See Part II.C.3. "Chronic Test Species and WET Methods" of this permit. An exceedance occurs if the Pass-Fail result is Fail

(7) *BOD and TSS effluent loads based on an assumed design flow for a regional WWTP of 6 MGD at the respective concentration limits.*

4.6 References

J-U-B ENGINEERS, Inc.; *American Samoa Power Authority Wastewater Utility Plan;* 2025.

J-U-B ENGINEERS, INC.

CHAPTER 5
SITING CONCERNS

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Chapter 5 Siting Concerns

5.1 Introduction

This chapter explores the siting concerns associated with converting the existing primary treatment facilities at the Tafuna and Utulei sites into secondary treatment facilities with advanced treatment for nutrient removal. In addition, the footprint required for expanding the Tafuna WWTP site into a regional facility to treat wastewater from both the Tafuna and Utulei sewer districts is also investigated.

As noted in **Chapter 2**, other Pacific Island communities have generally required between 1 to 2.5+ acres of space per million gallons per day (mgd) of plant capacity to achieve secondary standards. The reason this range varies considerably is a result of differences in NPDES discharge permitting requirements, flow equalization, treatment processes, biosolids management, and effluent disposal. These differences are briefly explained below. Additionally, the site configuration and number of required processes can greatly affect the land requirements.

- NPDES Permitting: Secondary treatment requires ≥85 percent removal of influent BOD and TSS, and an effluent concentration ≤30 mg/L for both parameters. Additional effluent limits may be included in the NPDES permit, such as total nitrogen and phosphorus removal. Additional processes and space are required to provide additional levels of treatment.
- Flow equalization: Stabilizing flows to and from treatment processes may be required if there are significant variations in daily and hourly flows. Flow equalization (EQ) is accomplished by storing peak hydraulic flows in basins which are then metered into the treatment process when influent flows recede. Seasonal, storm dependent, and persistent inflow and infiltration (I/I) may need to be equalized to protect downstream biological secondary treatment. If flow equalization is required, then the treatment footprint will increase due to additional tankage requirements.
- Treatment Processes: Biological secondary treatment comes in many shapes and forms. Configurations such as lagoons or oxidation ditches have large footprints but are generally less expensive from a capital and O&M standpoint when compared to compact facilities such as membranes, which have very small footprints but considerably higher capital and O&M cost.
- Nutrient Removal: Nitrogen removal requires larger biological basins to nitrify the wastewater (i.e. convert ammonia to nitrate), as well as additional basins for denitrification to accomplish nitrogen removal (i.e. convert nitrate to nitrogen gas in anoxic zones). Phosphorus removal can be achieved biologically with anaerobic basins or via chemical precipitation, both of which require additional space.
- Biosolids Management: Managing primary and/or secondary sludges is an important aspect in secondary wastewater treatment but varies considerably from facility to facility. WWTPs may use a variety of methods to manage waste activated sludge (WAS) such as gravity thickening, aerobic / anaerobic digestion, dewatering, temporary storage, composting, land application, landfilling, etc. The approach chosen for biosolids management and disposal greatly affect the space requirements for facilities.

- Effluent Disposal: If effluent disposal via reuse is implemented, a significant amount of land is required for effluent storage and crop production or percolation into the soil. For example, the Inarajan and Umatac Merizo WWTPs in Guam both utilize lagoons for secondary treatment and percolation as one of their discharge methods (see Chapter 2, Table 2-1). These two facilities require roughly 37 acres/mgd and 6.25 acres/mgd, respectively.

5.2 Tafuna WWTP

5.2.1 Existing Site

The existing primary treatment process, solids dewatering and storage beds, and operations buildings are constructed on a footprint of roughly 2.4 acres. Upgrading to secondary treatment could require upwards of 5 acres based on the range of values noted in Chapter 2. Additional land may be required to maintain uninterrupted service of the existing facilities during construction.

The facility is adjacent to the Pago Pago International Airport and apparent "green space" is located to the west of the existing facility. However, this open space is reserved and managed by the Federal Aviation Administration (FAA) and is subject to development restrictions. J-U-B's Airport Services Group reviewed the airport and prepared **Figure 5-1** which shows several runway features established by the FAA. Facility expansion to the north, east, south, and west is considered unfeasible due to restrictions associated with the Runway Object Free Area (ROFA) and preliminary discussions with the airport Chief engineer. The ROFA must be clear of parked aircraft, agricultural operations, and other non-aeronautical activities. The yellow lines are the Approach Runway Protection Zone (RPZ) and must remain free of incompatible objects and activities. Additionally, the blue lines represent the Part 77 Approach surface, extending out to 50,000 ft due to Runway 05's Instrument Landing System (ILS) precision approach. ASPA reached out to Natalia Palamo with the American Samoa Government Department of Port Administration about potential expansion into the runway area directly southwest of the existing plant and further southwest of the runway area. Natalia Palamo responded with the following on June 27, 2024: "Both options being proposed will increase the imposition of the facility within the Runway Safety Area. Unfortunately I don't think either option (for the areas that are extending into the airports AOA area - would be allowable." Appendix E provides the Pago Pago International Airport Layout Plan most recently updated in 2014 and adapted to produce **Figure 5-1**. The blue trapezoid identifies the airline approach runway protection zone (RPZ) and the orange lines identify the 800' wide runway object free area (ROFA). Both of these runway buffers restrict structures and land use within the boundaries.

Figure 5-2 shows the space requirement for secondary treatment if the existing Tafuna WWTP can be expanded at the current location abutting the airport runway. The orange dotted line identifies the existing primary treatment plant, operations buildings, and solids management area. The blue hatched area identifies the probable footprint anticipated for secondary treatment (approximately 5 acres).

If expansion into the airport buffer zones is desired, a formal application process with the FAA is required through FAA Form 7460. Additional requirements and documents may also be required. The time associated with initiating a formal review process with the FAA is not known. It is also not known if

the endeavor would ultimately be successful. This project does not include application for additional land at the airport.

5.2.2 Alternate Sites

If ASPA does not seek expansion into the airport area or the FAA does not grant an additional easement, then a new site is required to construct a new secondary treatment facility. **Figure 5-3** shows the area surrounding the existing Tafuna WWTP and a blue box identifying the probable footprint for a secondary treatment facility (~5 acres). Peak flow handling of I/I events may require additional land area.

5.3 Utulei WWTP

5.3.1 Existing Site

The existing primary treatment process train and operations buildings are constructed on a footprint of roughly 0.62 acres (**Figure 5-4**). Since no biosolids handling is accomplished at Utulei, a smaller footprint is possible for the existing facility. If the Utulei WWTP is upgraded to secondary treatment and continues to treat sewage from the Utulei sewer district, then approximately 5 acres of land area is required based on the estimated 2044 average day flow of 2.15 MGD. The existing Utulei site is bordered by Route 001 to the north, steep mountain slopes to the south, and existing infrastructure owned by others to the east and west. The site is also adjacent to Utulei Park, which is the most popular swimming spot in the area. It is not feasible to construct a secondary treatment facility at the existing Utulei site unless adjacent properties are purchased.

5.3.2 Alternate Sites

Figure 5-5 shows the area surrounding the existing Utulei WWTP and approximate land requirements for secondary treatment facility. Pago Pago Harbor is surrounded by steep mountains and most flat areas have already been developed within the existing Utulei sewer district. Relocating the facility, e.g. to the other side of the harbor, is not considered feasible given the amount of collection system routing that would be required. Consequently, relocating the Utulei facility within the greater Pago Pago area does not appear feasible.

Since expansion is necessary to treat future flows to secondary treatment standards, the remaining option is to send wastewater from the Utulei collection system to be treated at a regional WWTP in the Tafuna area. With this scenario, the influent lift station at the Utulei WWTP would be reconfigured to become a lift station to pump wastewater into the Tafuna collection system.

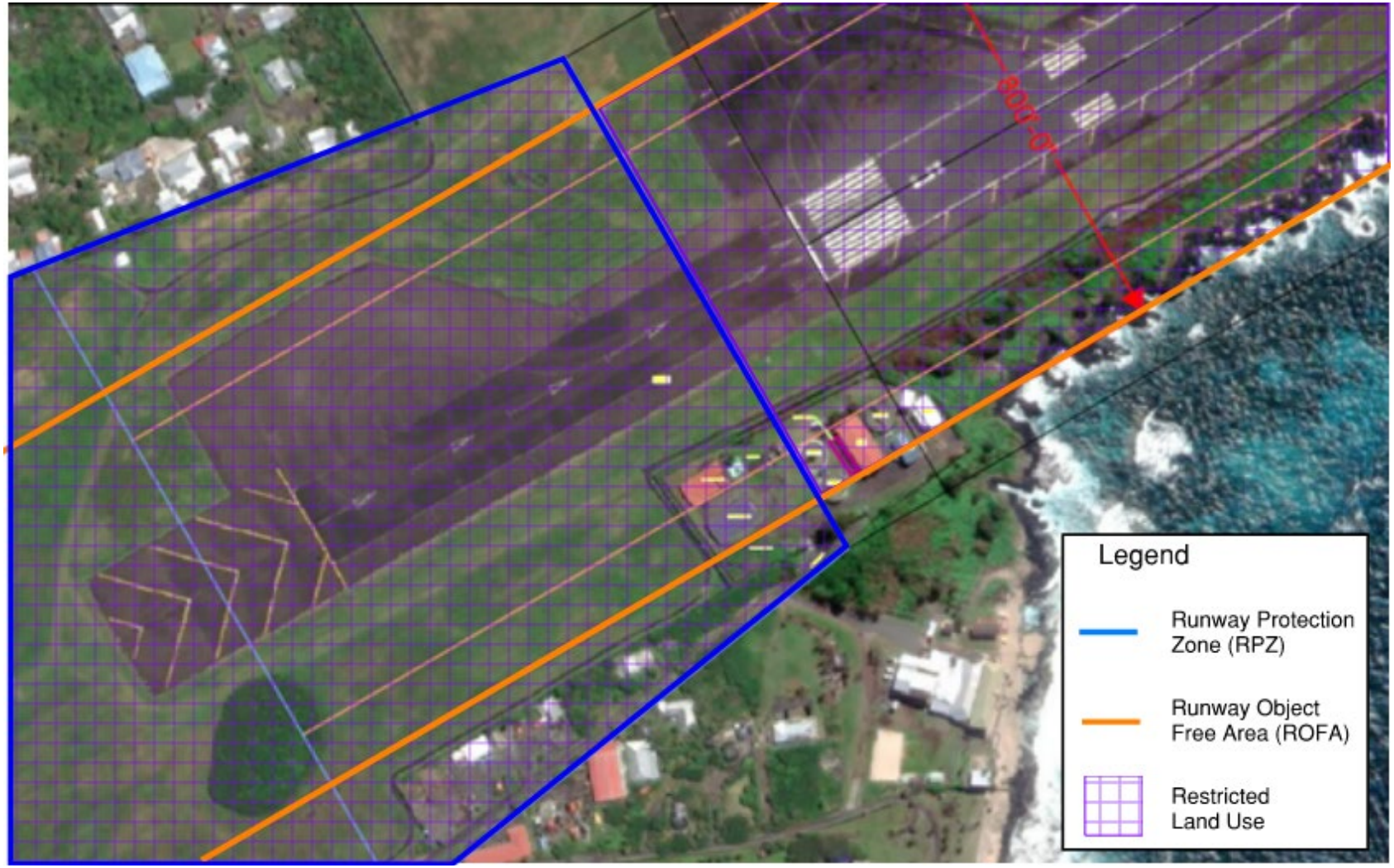


Figure 5-1: **Pago Pago International Airport Runway Setbacks**



Figure 5-2: Tafuna WWTP Secondary Treatment Footprint Requirements



Figure 5-3: **Tafuna Anticipated Secondary Treatment Footprint**



Figure 5-4: Existing Utulei WWTP Site

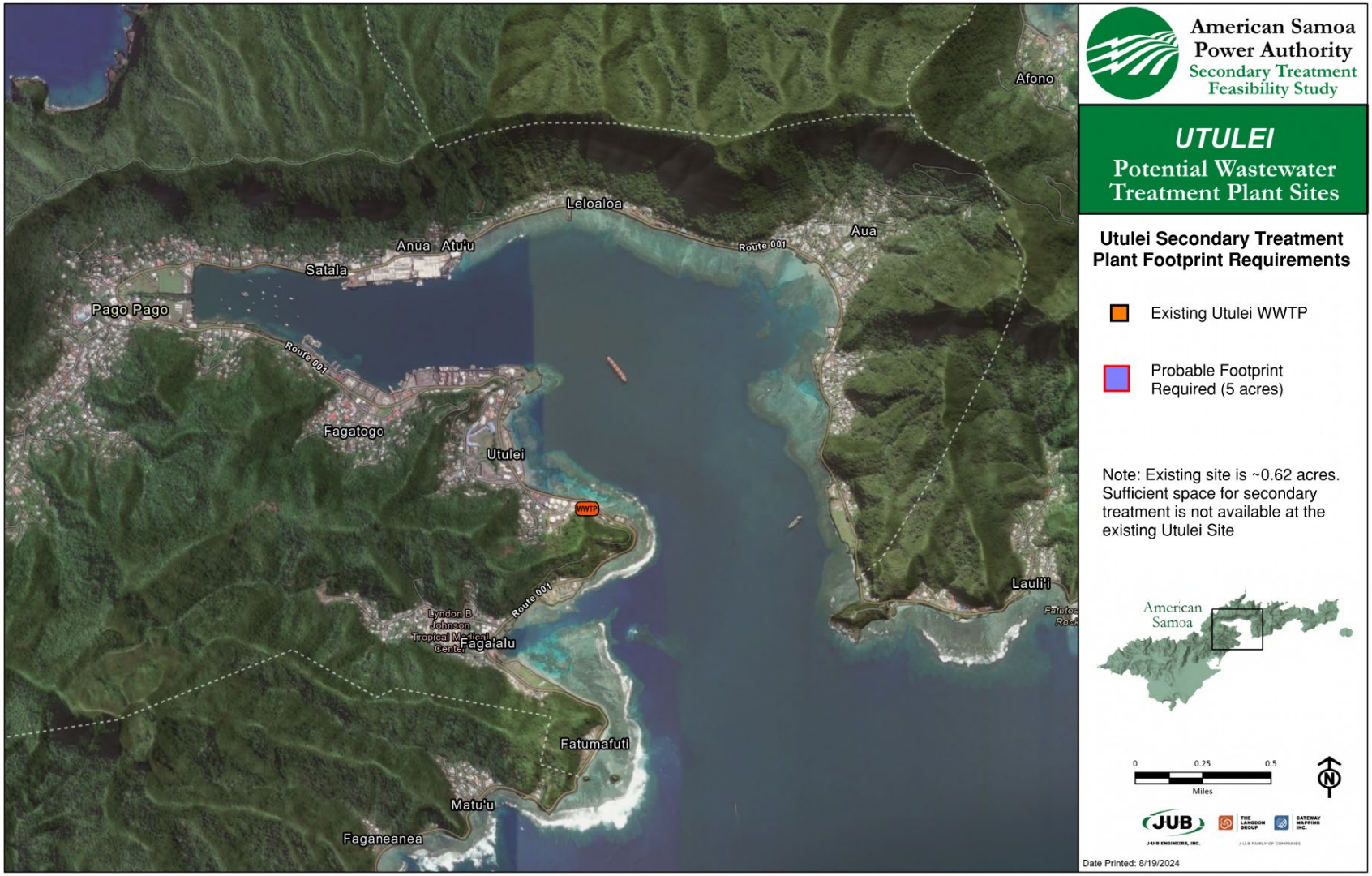


Figure 5-5: Utulei Anticipated Future Secondary Treatment Footprint

5.4 Potential Alternative Sites for a Regional Facility

If the two existing primary treatment plants are combined into one regional facility the footprint is anticipated to be 10+ acres assuming a future combined average day flow of 4.2 mgd. The required land is shown in an expanded aerial of the Tafuna area near the existing WWTP site in **Figure 5-6**. Note that the squares representing probable and existing acreage footprints are to scale with the aerial imagery in the figure. ASPA may wish to consider more than the noted amount of land in exploratory efforts since the regional facility would be expected to treat all future flows within the service area, i.e. beyond a 20-year planning period.

5.5 Conclusions

Estimated site footprints for secondary treatment are summarized for the Tafuna WWTP, the Utulei WWTP, and a regional WWTP in **Table 5-1**. Identifying specific parcels of land is beyond the scope of this Study. If secondary treatment is implemented, an initial phase of work should include identifying potentially feasible parcels, determining infrastructure improvements necessary to route influent wastewater to the sites, determining modifications to the existing outfall (or construction of a new outfall), total project cost to construct new facilities in the chosen location, negotiation of and acquisition of the preferred property, and related activities.

Table 5-1: **Estimated Secondary Treatment Space Requirements**

WWTP	Future Average Flow (mgd)	Existing (acres)	Probable Required Area (acres) [1]
Tafuna	2.17	2.36 [2]	5+
Utulei	2.15	0.62	5+
Regional Facility	4.3	-	10+

[1] *Probable acreage is 2.5 acre per MGD treated.*

[2] *Approximately half of the existing site is devoted to solids drying beds, which are land intensive.*



Figure 5-6: Regional Anticipated Secondary Treatment Footprint

5.6 References

AECOM, Pago Pago International Airport Layout Plan, Sheet 2 of 9, Revision 4; Airport Layout Plan Update, February 2014.

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J·U·B ENGINEERS, INC.

CHAPTER 6
PRE-SCREENING POTENTIAL ALTERNATIVES

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Chapter 6 Pre-Screening Potential Alternatives

6.1 Introduction

This chapter presents a range of potential secondary treatment improvements that may be able to achieve some or all the stated goals in **Chapter 2**. Alternatives selected for pre-screening are listed below and presented in subsequent sections. Those that are considered viable will be carried forward for detailed evaluation in **Chapter 7**.

- No Action
- Chemically Enhanced Primary Treatment (CEPT)
- Biotower
- Oxidation Ditch
- Moving Bed Biofilm Reactor (MBBR)
- Sequencing Batch Reactor (SBR)
- Membrane Bioreactor (MBR)

The following elements are considered common to all the alternatives and will be considered in further detail in **Chapter 7**:

- Headworks Improvements: Grit removal and influent flow measurement will be required for all secondary treatment alternatives. Grit in the secondary treatment processes will degrade pumps at an accelerated rate and will accumulate in the treatment basins. The ability to retain the existing headworks depends heavily on the secondary treatment process requirements, layout, space requirements, and construction phasing.
- Influent Equalization (EQ): With the historical I/I issues in the Tafuna and Utulei systems, peak flows have the ability to overwhelm biological and solids separation processes. The cost for constructing EQ is generally less than constructing larger downstream processes.
- Existing Clarigesters: The existing clarigesters at the Tafuna WWTP have the potential to continue to be utilized for primary treatment prior to secondary treatment depending on site restrictions (airport runway buffers). Similarly, the Utulei Clarigesters may be retained to reduce the potential for settling solids in a long force main if a regional facility is implemented. The ability to retain the existing clarigesters depends heavily on the secondary treatment process requirements, layout, space requirements, and construction phasing.
- Biosolids Management: All of the alternatives (with the exception of the No Action Alternative), will generate more biological and possibly chemical solids. Solids management will be considered for each alternative carried forward for detailed evaluation.
- Phosphorus Removal Approach: The two primary avenues for phosphorus removal are enhanced biological phosphorus removal (EBPR) and chemical removal, both of which can meet the expected phosphorus limits, although at different levels of cost and operational complexity. The alternatives developed below may include a brief discussion of potential advantages associated, but selection of a preferred phosphorus removal approach is included in **Chapter 7**.

- Septage: Currently, an estimated three loads of septage are disposed of at the Tafuna WWTP on a daily basis. Additional information regarding septage management will be required in the future based on the secondary treatment process utilized. The concerns are twofold. First, the high BOD, TSS, and TKN associated with septage should be metered into the influent over time (not dumped as an instantaneous slug load) to prevent overloading the biological treatment system. Second, the high concentration of inert solids associated with septage can accumulate in treatment basins if not properly managed, creating additional basin maintenance.
- Effluent Disposal: It is assumed that effluent will be disposed via the existing outfall(s). Modifications to the outfall may be required to satisfy plant design flows, especially if a regional facility is selected. Implementation of reuse is not considered viable given the climate, i.e. high rainfall amounts would preclude irrigation.
- Utulei Site Limitations: If future permit limits require secondary treatment standards (e.g. BOD and TSS below 30 mg/L, nutrient removal, etc.), upgrading the facility on the existing site or relocating the facility to an adjacent area is not possible (see **Chapter 5**). Construction of a regional facility is therefore assumed necessary if the Utulei permit conditions become more stringent. Then, the Utulei site would become a regional lift station with some pre-treatment potentially also occurring there.
- It is intended that the existing UV disinfection system will be retained, if possible. Alternate disinfection approaches are therefore not proposed. **Chapter 8 of the Wastewater Utility Plan** details improvements to the existing system.

Some alternatives may be able to integrate into the existing facility's headworks and disinfection systems, if adequate space is available. If that is considered a possibility, the schematics included below show those processes in dashed lines. Further development of the alternatives in **Chapter 7** will be necessary to determine if integration into the existing system is possible or if new processes are required. Some alternatives will likely require entirely new processes, which are shown in solid lines.

6.2 Alternative 1: No Action

Alternative 1 assumes no improvements are made to the WWTPs other than as required to maintain current levels of operation (reference the **Wastewater Utility Plan Chapter 8**). If the potential future permit limits noted in **Chapter 4** become realized, neither the Tafuna WWTP nor the Utulei WWTP would satisfy the effluent water quality criteria and would therefore be subject to potential discharge violations and fines.

This alternative is not considered viable at the Tafuna and Utulei treatment facilities based on the expected NPDES permit limits. However, if a 301(h) variance for an ocean outfall is permitted at either or both facilities, this option is viable and presents the lowest cost option for ASPA. A modification to the outfall may be necessary to achieve a 301(h) variance. Further discussion with ASEPA and EPA is strongly recommended required to determine the viability of modifying the outfall.

A summary of advantages / disadvantages is included in **Table 6-1**.

Table 6-1: No Action Advantages / Disadvantages

Advantages	Disadvantages
Minimal capital costs	Cannot satisfy secondary treatment requirements
Similar O&M costs	Continued negative impact to water quality

6.3 Alternative 2: Chemically Enhanced Primary Treatment (CEPT)

The primary change to the facility in Alternative 2 would be adding coagulants (e.g. metal salts such as alum or ferric chloride) prior to the existing clarigesters to enhance solids settling and provide chemical phosphorus removal. A generalized schematic of this alternative is included in **Figure 6-1**. The chemical addition will result in significantly more solids removal as well as chemical solids generation in the conversion of orthophosphate to a settleable floc. Solids loading on the existing clarigesters may exceed recommended values and the solids stabilization zone may become overloaded. This in turn would likely have impacts on the effectiveness of the UV disinfection system. Influent flow equalization (EQ) could be added to attenuate peak influent flows associated with I/I, which would allow more consistent operation of the chemical addition, coagulation/flocculation, and settling process.

This option does not satisfy all the potential future permit limits described in **Chapter 4**. However, it may be possible to modify the outfalls of both the Tafuna and the Utulei WWTPs to increase the critical initial dilution (CID) and retain some or all of the primary treatment effluent criteria in the existing permits. Further discussion with ASEPA and EPA is strongly recommended required to determine the viability of modifying the outfall and retaining the existing permit limits.

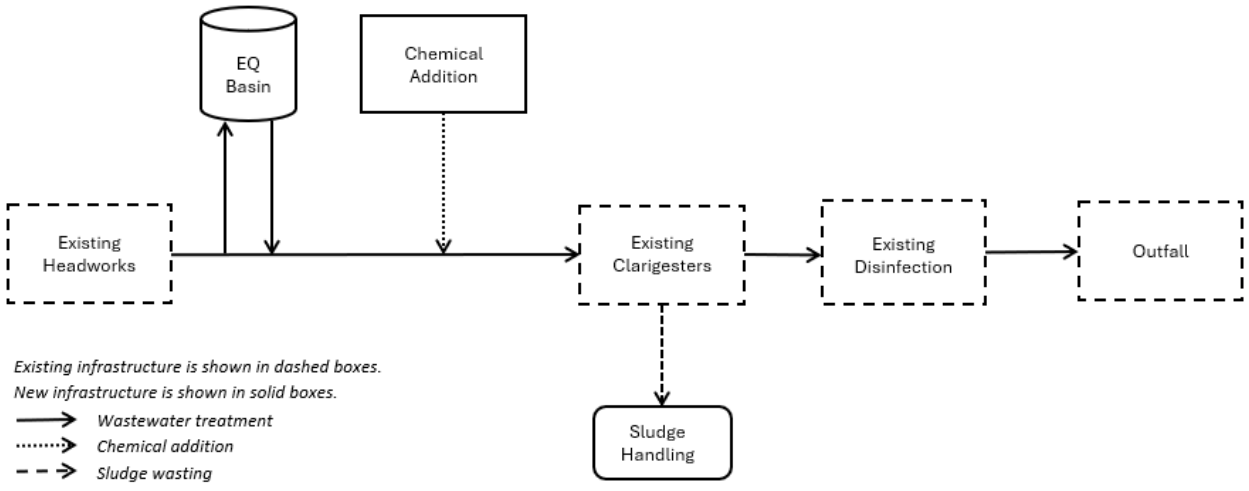


Figure 6-1: Alternative 2 CEPT Schematic

Advantages to CEPT include retaining the existing clarigesters and other WWTP infrastructure, which results in the lowest capital and O&M costs compared to other alternatives in this chapter. It is relatively easy to implement and will result in enhanced removal of BOD, TSS, and possibly phosphorus.

The primary disadvantage with CEPT is that neither facility will achieve secondary treatment standards. Targeted BOD removal of ≥85 percent is not likely, and negligible nitrogen removal will be experienced. CEPT may be able to achieve influent TSS reductions of 80 to 90 percent, but doing so will require close monitoring of influent solids, precise chemical addition rates, and proper mixing. Solids generation is also a potential problem as the stabilization zone at the bottom of the clarigesters will fill more rapidly and increase solids handling measures. If this alternative is carried forward, pilot testing should be undertaken to determine the most cost-effective combination of metal salts, coagulants, and polymers are used to maintain effluent quality, minimize chemical costs, and minimize pH adjustments while also minimizing chemical sludge production.

CEPT is not considered a viable alternative for secondary treatment at the Tafuna WWTP nor the Utulei WWTP since this option will not satisfy the draft NPDES discharge permit limits for BOD removal and total nitrogen. In addition, this alternative is not capable of nitrification and will not remove total ammonia nitrogen (TAN).

A summary of advantages / disadvantages is included in **Table 6-2**.

Table 6-2: Chemically Enhanced Primary Treatment Advantages / Disadvantages

Advantages	Disadvantages
Improved primary treatment compared to existing conditions	Does not satisfy secondary treatment standards for BOD and TSS removal
Utilize existing clarigesters and infrastructure	Does not remove nitrogen (ammonia and total)
Slightly higher capital costs	Increased chemical sludge production and associated handling / disposal costs
Slightly higher O&M costs	

6.4 Alternative 3: Biotower

Biotowers remove BOD, TSS and ammonia (i.e. nitrification) by promoting bacterial growth (fixed film) on a surface. A typical process schematic for a Biotower facility is shown in **Figure 6-2**. Biotowers are constructed of plastic media, although rock media can be used. Plastic media has more surface area for bacterial growth and is lighter, which allows for taller tanks and a smaller footprint compared to using rock media.

Implementing a biotower will achieve secondary treatment, but total nitrogen removal is not possible and solids capture may be problematic during periods of rapid bacterial growth and high flows. Influent flow equalization (EQ) could be added to attenuate peak influent flows associated with high I/I and reduce the potential for sloughing of biomass from the biotowers. New primary clarifiers are required to

remove fats, oil and grease (FOG) and solids. FOG can coat the biofilter media leading to operational problems, and excessive solids can clog media and lead to anaerobic conditions. Chemical addition will be required for phosphorus removal in the primary clarifiers, i.e. CEPT.

Counter-current airflow in biotowers is recommended to maintain an oxygenated tower and a recirculation stream should be provided to maintain proper hydraulic loading on the Biotower and return sloughed biomass back to the process for capture. Solids settling after the Biotower is used to remove solids from the process. The outfall diffuser may require modifications to increase the discharge capacity and/or dilution factor.

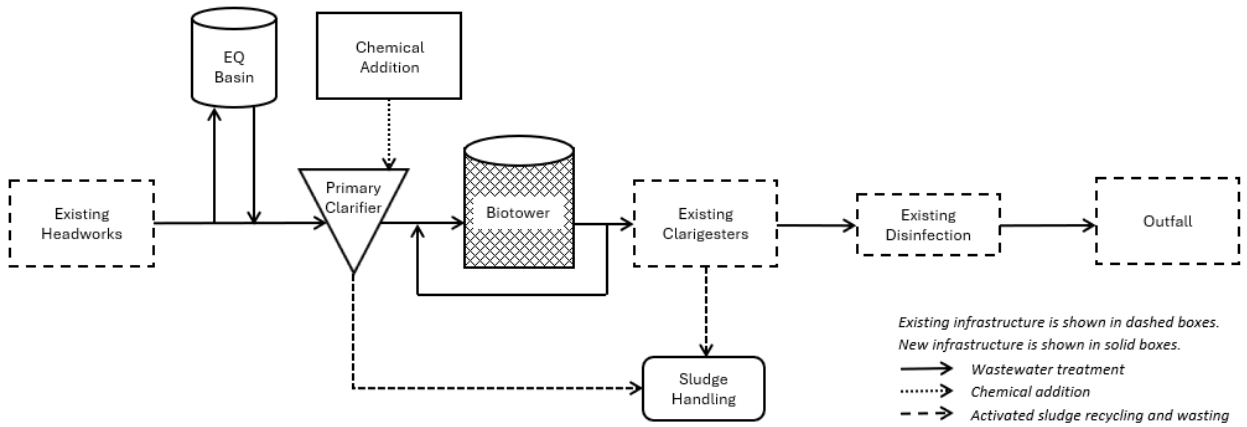


Figure 6-2: Alternative 3 Biotower Schematic

Advantages of biotowers include being able to satisfy secondary treatment discharge requirements for BOD, TSS and ammonia removal with relatively low power demand. Trickling filters require moderate skill levels to operate. Since trickling filters rely on fixed biofilms to perform biological treatment, they are more robust and require less operator attention to changes in influent flow rates and BOD loads compared to activated sludge processes.

The primary disadvantage of a biotower is inability to remove nitrogen through denitrification without supplemental processes – typically via high-rate solids contact, which includes an aeration basin and additional clarifiers. Biotowers can also clog with debris, produce odors if excessive biomass accumulates and becomes septic, create vector problems (filter flies), and may grow snails that feed on the biofilm (thereby creating additional clogging issues when shells accumulate within the biofilter media).

Although biotowers will satisfy secondary treatment standards, they cannot achieve the total nitrogen limit noted in **Chapter 4** without supplemental denitrification processes which increases process complexity.

A summary of advantages / disadvantages is included in **Table 6-3**.

Table 6-3: Biotower Advantages / Disadvantages

Advantages	Disadvantages
Relatively easy to operate	Will not meet total nitrogen (N) permit requirement / additional processes are required which adds complexity
Low O&M costs, minimal automation	Trickling filter can clog with debris and snail shells
Robust / more forgiving to I&I events	Chemical addition is required for phosphorus (P) removal
Vertical construction reduces footprint	

6.5 Alternative 4: Oxidation Ditch

Oxidation ditches are a robust extended aeration activated sludge process that routinely achieves nitrification. The process is commonly sized for a mixed liquor suspended solids (MLSS) of 3,000 to 4,000 mg/L. Most commonly, mechanical mixers are used to provide oxygen to the bacteria and maintain solids suspension. The mechanical components are therefore relatively simple and only require maintaining a motor and gear box for each aerator. The process can include a passive diversion through a vertically mounted gate into an anoxic zone thereby supporting denitrification and total nitrogen removal. If more process control is desired, a dedicated submersible pump is used to recirculate biomass to the anoxic zone. Following the oxidation ditch, secondary clarifiers remove solids for recirculation or to wasting. Secondary clarifier sizing must account for sustained and peak flows from I/I to prevent solids washout (i.e. loss of biomass due to insufficient settling). Clarified effluent is then disinfected and discharged to the outfall. Because of the additional size and layout of this alternative (which will require a new site), it is assumed that the existing headworks and disinfection processes cannot be retained. The existing outfall may be able to be retained, depending on the location of the regional facility. A typical process schematic is included in **Figure 6-3**.

If biological phosphorus removal is desired, an anaerobic basin upstream of the anoxic basin can be added (not shown in the schematic); however, process complexity increases significantly compared to chemical removal.

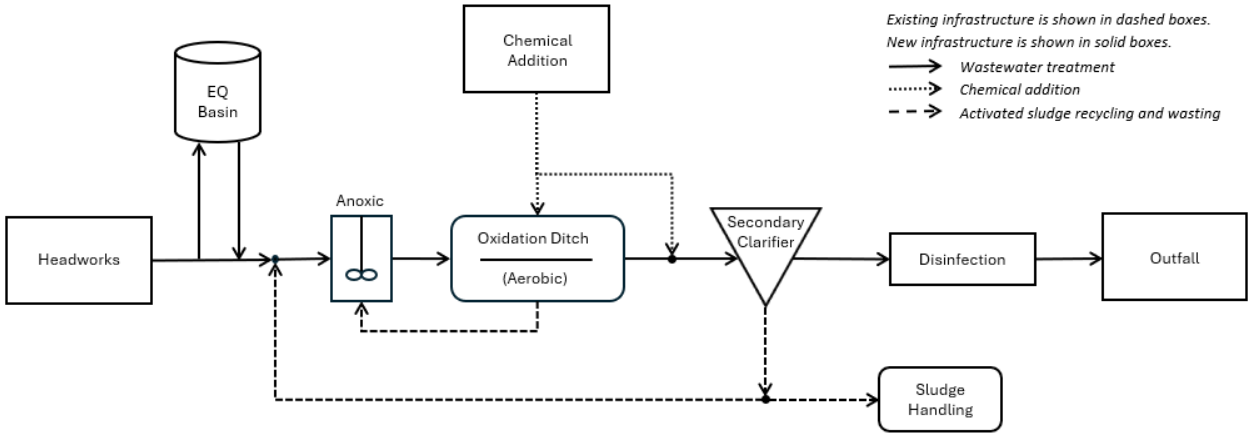


Figure 6-3: Alternative 4 Oxidation Ditch Schematic

A primary advantage of an oxidation ditch is that it is a very flexible process that can be expanded upon and modified to meet different treatment objectives. Activated sludge processes can be operated to biologically remove BOD, TN and TP. Enhanced biological phosphorus removal (EBPR) is possible with activated sludge processes and may alleviate the need to rely on chemical P removal, reducing both chemical procurement and chemical sludge disposal costs. If EBPR is pursued, then additional testing will be required to ensure sufficient volatile fatty acids (VFAs) are present in the influent since VFAs are required by the polyphosphate accumulating organisms (PAOs) responsible for EBPR. The impacts of I/I, which dilute the influent wastewater, must also be considered for process stability during maximum month and peak day flows. The equipment consists of pumps and mixers, which are relatively simple to maintain.

Disadvantages include that the activated sludge process is moderately complex to operate from a process management and control perspective. Since the draft Tafuna NPDES permit sets TN and TP discharge requirements, the process will be more complex than only BOD and TSS removal since anoxic zones for denitrification are required. The complexity will increase further if either EBPR or chemical phosphorus removal is implemented. Solids management becomes more complex than current operations since more sludge is produced compared to primary treatment. Oxidation ditches also require more land area compared to the other alternatives under consideration.

Implementation of an oxidation ditch to satisfy the expected effluent limits in **Chapter 4** is considered viable provided sufficient land area is available.

A summary of advantages / disadvantages is included in **Table 6-4.**

Table 6-4: Oxidation Ditch Advantages / Disadvantages

Advantages	Disadvantages
Proven process	Moderately complex to operate from a process management and control perspective
Multiple vendors available for equipment purchase / maintenance	Biological nutrient removal further increases process complexity
Flexible process configurations – can be configured for N and P removal (if desired)	Relatively large footprint
Equipment is primarily motor / gear box driven and generally available on the open market	

6.6 Alternative 5: Moving Bed Biofilm Reactor (MBBR)

Moving Bed Biofilm Reactors (MBBRs) accomplish secondary treatment through the use of a fixed film biological process, rather than using suspended biomass like in an oxidation ditch. MBBRs rely on biofilms that colonize plastic media that is suspended in the MBBR tank – an example photograph is included in **Figure 6-4**. They differ from biotowers in that the media in biotowers is in a fixed bed and wastewater

flows through the media, whereas in the MBBR the media is a moving bed with the media immersed in the wastewater. The media is retained in the bioreactor through the use of sieves located at the basin outlet that only allows water and sloughed biomass to exit. MBBRs are more versatile than biotowers/trickling filters in that they can perform denitrification for TN removal and have a lower footprint than other suspended growth systems such as oxidation ditches because the biomass is more concentrated. A typical schematic is included in **Figure 6-5**. Because of the additional size and layout of this alternative (which will require a new site), it is assumed that the existing headworks and disinfection processes cannot be retained. The existing outfall may be able to be retained, depending on the location of the regional facility.

This alternative would likely include EQ basins following grit removal and screening. Equalized influent is then sent to a MBBR for BOD and TN removal. Blowers and diffusers would provide mixing and aeration for BOD removal and nitrification. Ammonia would be removed biologically in the anoxic zone, with influent BOD providing the carbon source for denitrification. Phosphorus removal would likely be implemented using chemical addition of a metal salt followed by removal in the secondary clarifiers since the system has limited suspended solids (which are necessary for creating an anaerobic zone for phosphorus removal). Following disinfection, treated effluent would be discharged to the outfall.



Figure 6-4: Typical MBBR Media

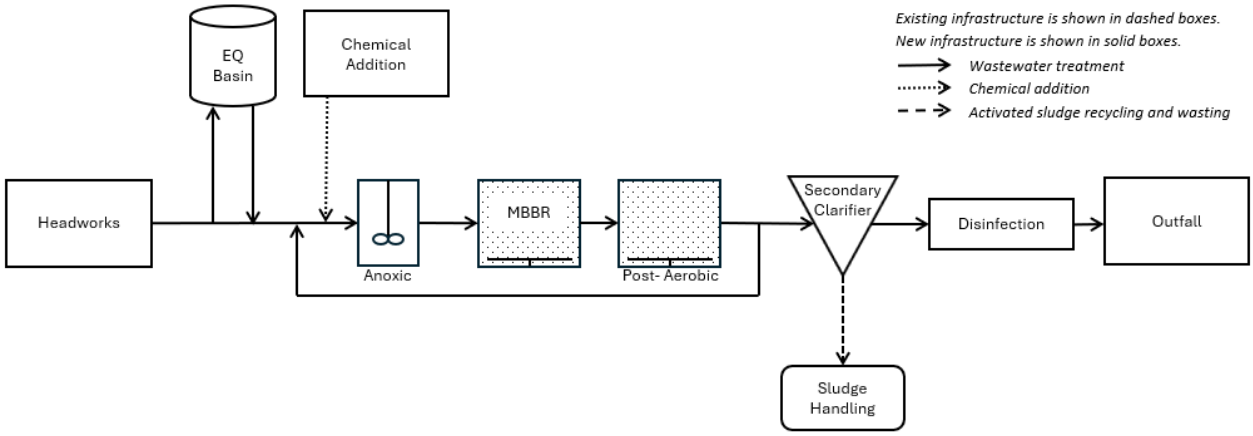


Figure 6-5: Alternative 5 MBBR Schematic

Advantages of MBBRs include a smaller footprint compared to conventional activated sludge processes while providing more robust treatment when compared to biotowers/trickling filters. Since MBBRs rely on fixed films for biological treatment, they tend to be more resilient to washout of biomass associated with high flow events due to I/I and shock loads of inhibitory and toxic substances. MBBRs can perform TN removal through biological denitrification.

Disadvantages include that MBBRs are a proprietary system with customized solutions provided by a vendor. While promising, the number of installations is relatively limited compared to more traditional technologies. MBBRs require proprietary media and process support, which may present a challenge due to American Samoa's remote location. Media will degrade over time and require replacement due to collision with other media, tank walls, and mechanical mixers in the anoxic zone. Given the remoteness of American Samoa and critical nature of receiving technical support and spare parts, the risk of implementing an MBBR is elevated. MBBRs also require more mixing energy compared to activated sludge processes and 'dead zones' may occur if aeration/mixing is not consistent across the basin.

Implementation of an MBBR is considered viable.

A summary of advantages / disadvantages is included in **Table 6-5.**

Table 6-5: MBBR Advantages / Disadvantages

Advantages	Disadvantages
Relatively compact footprint	Proprietary systems; locked in with one vendor for purchasing and O&M
Able to biologically remove nitrogen and possibly phosphorus	Higher levels of automation and operational complexity
	Moderate O&M
	Periodic media replacement or washing

6.7 Alternative 6: Sequencing Batch Reactor (SBR)

Alternative 6 accomplishes secondary treatment using sequencing batch reactors (SBRs). As the name implies, multiple basins sequence through different modes of operation to achieve complete secondary treatment in each individual basin. SBRs are operated in a reoccurring sequence of fill, fill/aerate, aerate, settle, and decant, with additional steps for "idle" and "wasting". A typical SBR consists of three or more basins, thereby allowing staggered sequencing and continuous processing of influent flows. Influent EQ can be added for peak flow handling due to I/I, or the SBRs can be operated in "storm mode" which consists of shorter time steps through each sequence. The storm mode of operation maintains throughput but at diminished biological capacity. A typical schematic of an SBR is included in **Figure 6-6**. Because of the additional size and layout of this alternative (which will require a new site), it is assumed that the existing headworks and disinfection processes cannot be retained. The existing outfall may be able to be retained, depending on the location of the regional facility.

By adjusting the sequence of operation, SBRs can provide aerobic and anoxic phases for BOD removal and nitrification / denitrification. An anaerobic phase can be created for biological phosphorus removal or chemicals can be added for precipitation of phosphorus. The basins would be equipped with mechanical mixers for non-aerated time sequences and blowers / diffused aeration for aerobic sequences. At the end of the cycle, an automated drain valve opens, which discharges the basin supernatant while the solids are retained. The drain cycle occurs quickly and results in significant downstream flows; therefore, post-SBR equalization is required to attenuate flows and not overwhelm the disinfection process and outfall capacity.

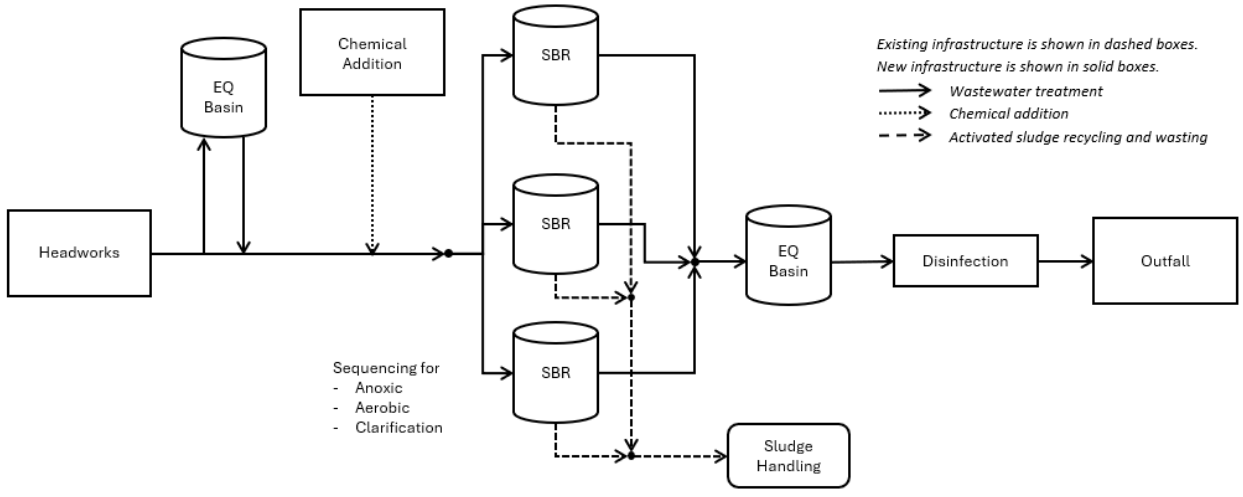


Figure 6-6: Alternative 6 SBR Schematic

Advantages of an SBR include a smaller footprint than other conventional activated sludge processes since the SBR provides biological treatment and secondary clarification in a single tank. The sequence of operation can also be adjusted (locally or remotely by the vendor) as needed to manage the biological processes and achieve different operating conditions for nitrogen and/or phosphorus removal.

The primary disadvantage of an SBR is that all operations must occur in one tank. Process troubleshooting and control are therefore limited compared to facilities with dedicated basins. For example, the fill and initial fill/aerate stages can promote filamentous bacteria growth due to high food and low oxygen conditions. There is also more involved automation that needs to be managed and maintained. SBRs tend to require more maintenance since there are more automated switches and valves than a conventional activated sludge process. Flow management, especially with I/I, is critical. Post-SBR equalization is required and influent equalization may be necessary as well.

SBRs are considered a viable option.

A summary of advantages / disadvantages is included in **Table 6-6**.

Table 6-6: SBR Advantages / Disadvantages

Advantages	Disadvantages
More compact footprint since treatment processes all occur in a single reactor	Process control and troubleshooting are harder since all treatment occurs in a single basin – a process upset affects subsequent cycles of the SBR
Can adjust performance by modifying the sequence of operations	Higher levels of automation
No separate solids separation process (like there is with Oxidation Ditch)	I&I can overwhelm the system because it operates in batch mode
	Moderate O&M
	Effluent equalization and pumping required

6.8 Alternative 7: Membrane Bioreactor (MBR)

Membrane bioreactors (MBRs) are an extended aeration system with a physical barrier (membranes) used for solids separation. Because the process relies on a physical barrier for solids separation rather than gravity settling like the options presented above, the process can operate at significantly higher MLSS values – typically 6,000 to 8,000 mg/L. The process configuration is similar to other extended aeration systems, but because the biological basins can operate at much higher MLSS values the basins are significantly smaller than other biological processes and have the lowest overall footprint.

Influent screening is critical for protecting the membranes and is much more complicated compared to the other alternatives presented in this chapter. As a minimum, fine screening at 2 mm is required with full redundancy. Some facilities also employ 6 mm screening upstream of the fine screens to reduce the solids load on the fine screens and reduce the chances of blinding the screens. Screening is followed by grit removal, similar to a traditional headworks.

The biological process configuration is similar to an oxidation ditch with an anoxic zone for denitrification and aerobic zone for BOD and ammonia removal. Blowers and diffusers provide mixing and aeration during the aerobic phase, and mechanical mixers keep the activated sludge suspended during the anoxic

phase. An anaerobic zone can be added for biological phosphorus removal or chemicals can be added for removal of precipitated phosphorus.

To prevent membrane fouling, the MLSS feed to the membrane basins must be four to five times greater than the plant flow. The excess feed is recirculated as Return Activated Sludge (RAS). The membrane basins also require diffused aeration to maintain an aerobic condition and prevent biosolids fouling on the membranes. The membranes must be maintained with weekly sodium hypochlorite cleaning and quarterly or biannual cleaning with sodium hypochlorite and citric acid (varies depending on the rate of organic and inorganic fouling). With proper maintenance and cleaning, membranes have an expected life of seven to ten years.

A typical process schematic for an MBR is included in **Figure 6-7**. Because of the additional size and layout of this alternative (which will require a new site), it is assumed that the existing headworks and disinfection processes cannot be retained. The existing outfall may be able to be retained, depending on the location of the regional facility.

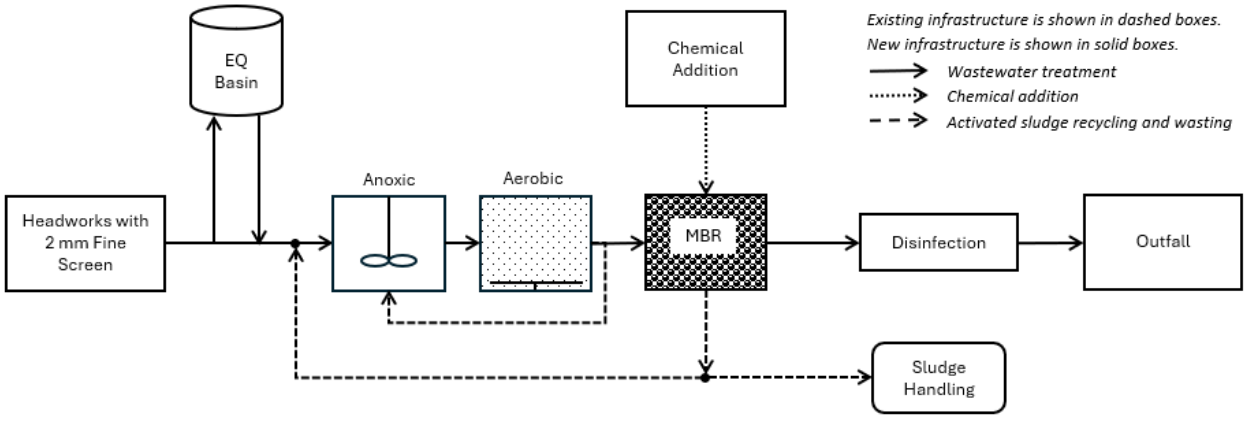


Figure 6-7: Alternative 7 MBR Schematic

Advantages of MBRs include a small footprint and high-quality effluent. Process troubleshooting and control is not as critical since the membranes provide a physical barrier and do not rely on gravity settling, which is a significant advantage if the facility experiences filamentous bacteria or pin floc growth.

MBRs present several significant disadvantages. The membranes and overall process are vendor specific and proprietary. While some equipment may be available from other sources (e.g. pumps, valves, actuators, etc.), the membranes must be procured from the vendor. The facility becomes “married” to the specific vendor and all future membrane replacement must be done with that particular vendor. The process is energy intensive due to needing additional aeration for maintaining a suspended biomass, additional pumping, and additional aeration for the membrane air scour. Influent screening is more complicated and will require more O&M compared to other facilities. Regular chemical cleaning is costly, time consuming, and poses a health / safety risk to the operators. The level of automation is also significantly higher than the other options. If equipment fails, it must be returned to service as quickly as possible to maintain proper operation of the biological system and membranes. MBRs generally have the

highest capital and O&M costs compared to the other alternatives presented above. Additionally, the typical life of the membrane fibers is approximately 10 years, resulting in significant and recurring replacement costs.

Membranes are considered a viable option, especially if land area is not readily available.

A summary of advantages / disadvantages is included in **Table 6-7**.

Table 6-7: MBR Advantages / Disadvantages

Advantages	Disadvantages
High level of treatment and effluent quality, no tertiary treatment required	Proprietary systems; locked in with one vendor for purchasing and O&M
Smallest footprint	High O&M cost: blowers, chemicals, automation, 2mm fine screens
Biological process troubleshooting is simplified	Sophisticated system, requires skilled operator and high levels of maintenance
No equalization and no separate separation of solids step	Completely automated – no manual control possible
	2 mm fine screens and high efficiency grit removal required (higher O&M cost)

6.9 Summary

The treatment alternatives presented in this study have distinct advantages and disadvantages which are compared against the stated study Goals (reference **Chapter 2**) and qualitatively scored with ***5*** being best and ***1*** being worst in **Table 6-8**. If an alternative cannot achieve the stated goal, a "FAIL" entry is included and the alternative is not considered viable. "Land Requirement" was added as a criterion since the existing sites are constrained and alternative site(s) are likely required. It should be noted that the goals often conflict, e.g. one process may provide exceptional water quality but at significantly higher capital and O&M costs. Based on these scores the following alternatives were selected for detailed evaluation in **Chapter 7**:

- Alternative 4: Oxidation Ditch
- Alternative 6: SBR
- Alternative 7: MBR

Table 6-8: Secondary Treatment Alternative Pre-screening

Goal	Alternative 1: No Action	Alternative 2: CEPT	Alternative 3: Biotower	Alternative 4: Oxidation Ditch	Alternative 5: MBBR	Alternative 6: SBR	Alternative 7: MBR
Ability to satisfy future NPDES discharge permits	FAIL [1]	FAIL [1]	FAIL [2]	5	4	4	5
Operational Simplicity	5	5	4	4	2	2	2
Maintenance Simplicity	5	4	4	4	2	3	1
Minimize Power Consumption	5	5	4	4	2	3	1
Affordability	5	5	3	3	2	3	1
Land Requirement	5	5	2	1	3	3	5
TOTAL SCORE (UNWEIGHTED)	**FAIL**	**FAIL**	**FAIL**	**21**	**15**	**18**	**15**
Carry Forward?	**No**	**No**	**No**	**Yes**	**No**	**Yes**	**Yes**

(1) If a 301(h) variance is provided for either Tafuna or Utulei, this option would receive a score of "1".

(2) The biotower option is not able to achieve total nitrogen removal without additional processes, which significantly increases operational complexity.

6.10 References

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J-U-B ENGINEERS, INC.

CHAPTER 7
ANALYZING POTENTIAL ALTERNATIVES

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Chapter 7 Analyzing Potential Alternatives

7.1 Introduction

The top three secondary treatment alternatives carried forward from the pre-screening in **Chapter 6** – Oxidation Ditch, SBR, and MBR – are developed further in this chapter to establish probable construction costs, schematics, site layouts, etc. Non-monetary considerations are integrated into the evaluation in **Chapter 8** to determine the preferred secondary treatment technology. As noted in both **Chapters 5** and **Chapter 6**, upgrading the Utulei WWTP to secondary treatment is not considered viable. Therefore, this analysis assumes a regional facility at the Tafuna site or a new parcel in the Tafuna area. Modifications to the Utulei site to convey wastewater to the regional facility are also considered.

The alternatives developed herein reflect work that has not been regularly and recently completed in American Samoa. Consequently, limited data exist for developing the opinions of probable cost for each of the alternatives. Project cost summary sheets (schedules of value) for several utility projects were reviewed, which aided in developing cost estimates for piping, manholes, surface repair, etc. Overall, utility costs were approximately 1.3 to 1.5 times higher than work on the U.S. mainland. ASPA's recent screw press purchase provided a comparison point for equipment. The screw press price was approximately 2.5 times that of a similar unit purchased on the mainland in the same timeframe. An Area Cost Factor (ACF) for government projects of 2.54 was established by the US Department of Defense in a May 2024 newsletter, with 1.00 being the US Average. Based on these data points, an area cost factor of 2.0 has been used in this study. If these projects are implemented, the project scope and probable costs should be reviewed during the initial design phase with likely constructors to establish budgetary costs. Additionally, the opinions of probable cost include contingency (30%), allowance for subsurface conditions / groundwater (5%), funding agency compliance (10%), engineering (20%), and legal and administrative (1%), and the O&M costs include equipment replacement, labor, electricity, chemical cost, land lease, etc., with detailed breakdowns included in Appendix F. Costs are in 2025 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes.

7.2 Utulei Regional Pump Station

7.2.1 Overview

A new regional pump station will be required at the Utulei site. Based on the range of flows resulting from I/I, the distance to the Tafuna collection system and resulting backpressure in the line, and the criticality of the conveyance system, dual force mains are recommended. Two alternatives for constructing a pump station at the Utulei site are presented for consideration. Potential discharge locations into the Tafuna collection system are identified and used to establish approximate pump sizes. If I/I identification and removal is undertaken in the collection system, the design flows would be reduced and could result in changes to the pumping and force main recommendations herein.

7.2.2 Alternatives for Utulei Regional Pump Station

7.2.2.1 Utulei Alternative 1: Retain Existing Components and Pump to Tafuna

This alternative would retain the existing lift station, headworks, and Clarigesters for normal operation. Following primary treatment, the wastewater would be routed to a new wet well, pump station, and force mains for conveyance to a new regional secondary WWTP. A submersible pump station is assumed; however, during pre-design, use of a dry pit pump station should be evaluated to determine if the additional cost is offset by improved accessibility, maintenance, and operations. The existing UV and outfall would be retained for emergency use (e.g. failure of the force main or the new pump station), provided EPA would allow an emergency discharge provision in the Utulei permit. This alternative is depicted in **Figure 7-1 Flow Schematic**, **Figure 7-2 Piping Schematic,** and **Figure 7-3 Site Plan.**

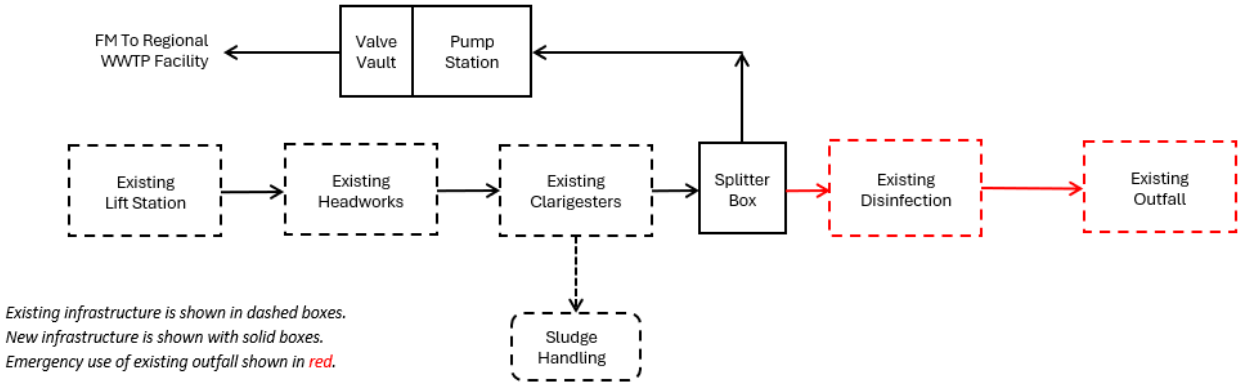


Figure 7-1: **Utulei Alternative 1 Flow Schematic**

Advantages of Alternative 1 include:

- The ability to provide primary treatment to remove grit and other solids prior to pumping the wastewater to a regional WWTP for secondary treatment. This will extend the life of the pumps and reduce the potential for plugging at the pumps and in the force main.
- Utilizing the existing anaerobic zone in the Clarigesters could reduce the mass of solids requiring disposal (but will require solids transport to the regional WWTP for dewatering and landfilling).
- The ability to provide primary treatment, UV disinfection, and utilize the outfall in an emergency event if the regional pump station and/or force main is out of service.

Disadvantages of this option include:

- Limited footprint to construct a new splitter box and pump station.
- Overall increase in O&M with the new pump station and force main(s), in addition to maintaining the existing primary treatment components.
- Foul odors will continue to be produced by anaerobic digestion at the Utulei primary treatment site. ASPA has expressed concerns that foul odors from the existing primary treatment process is undesirable since the site is located adjacent to Route 001 and across the street from a popular aquatic recreation area. The clarigesters could be covered and odor control added to mitigate some of the odors.

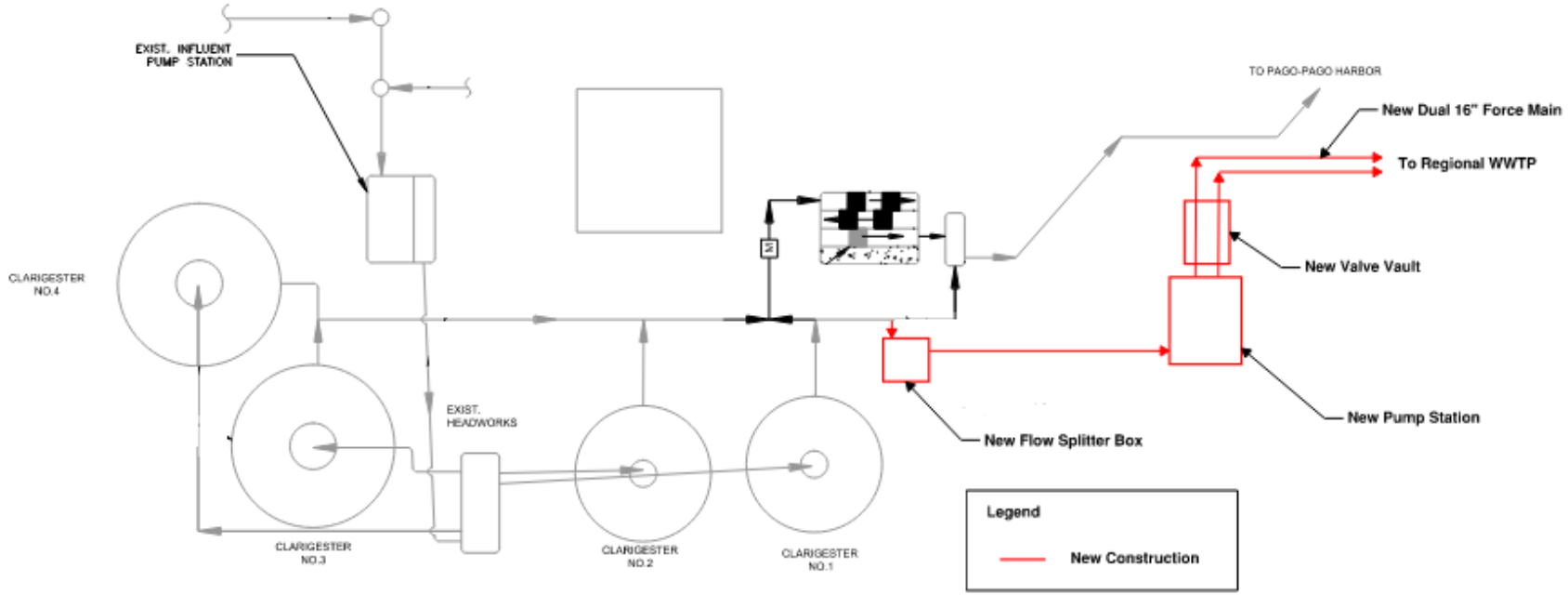


Figure 7-2: Utulei Alternative 1 Piping Schematic



Figure 7-3: **Utulei Alternative 1 Site Plan**

7.2.2.2 Utulei Alternative 2: Abandon Existing Components and Pump to Tafuna

Alternative 2 would involve retrofitting the existing lift station with submersible pumps, adding a new valve vault, and routing new force mains to a regional secondary treatment facility. During pre-design, use of a dry pit pump station should be evaluated to determine if the additional cost is offset by improved accessibility, maintenance, and operations. The existing headworks, Clarigesters, UV disinfection, and outfall would be decommissioned and demolished. In the event of a pump station and/or force main failure, sewage would surcharge in the Utulei conveyance system and ultimately overtop the wet well resulting in uncontrolled sewage overflow at the site. Emergency bypass provisions (e.g. with a portable pump system) would not be feasible given the high discharge pressures into the force main(s). A piping schematic is included in **Figure 7-4** and a site plan is included in **Figure 7-5** illustrating the changes.

Advantages of this option include:

- Able to repurpose the existing wet well and pumping system.
- Overall reduction in O&M because the Utulei primary treatment processes can be decommissioned.
- Less energy usage compared to Alternative 1.
- Odor sources would be significantly removed or eliminated.

Disadvantages of this option include:

- If the pump station or force main are out of service, uncontrolled overflows of raw sewage would occur because an emergency discharge to the outfall would not be available.
- Potential for solids build-up in the force main(s), especially during low flow periods. This could increase discharge pressures and require additional force main O&M.
- In the event the pump station and/or force mains are out of service, sewage will surcharge the Utulei conveyance system and result in uncontrolled overflows.
- Due to the relatively long FM conveyance time (>5hrs), influent septicity, increased hydrogen sulfide production, and additional odors will be produced and will need to be addressed both for corrosion control and biological treatment at the discharge point.

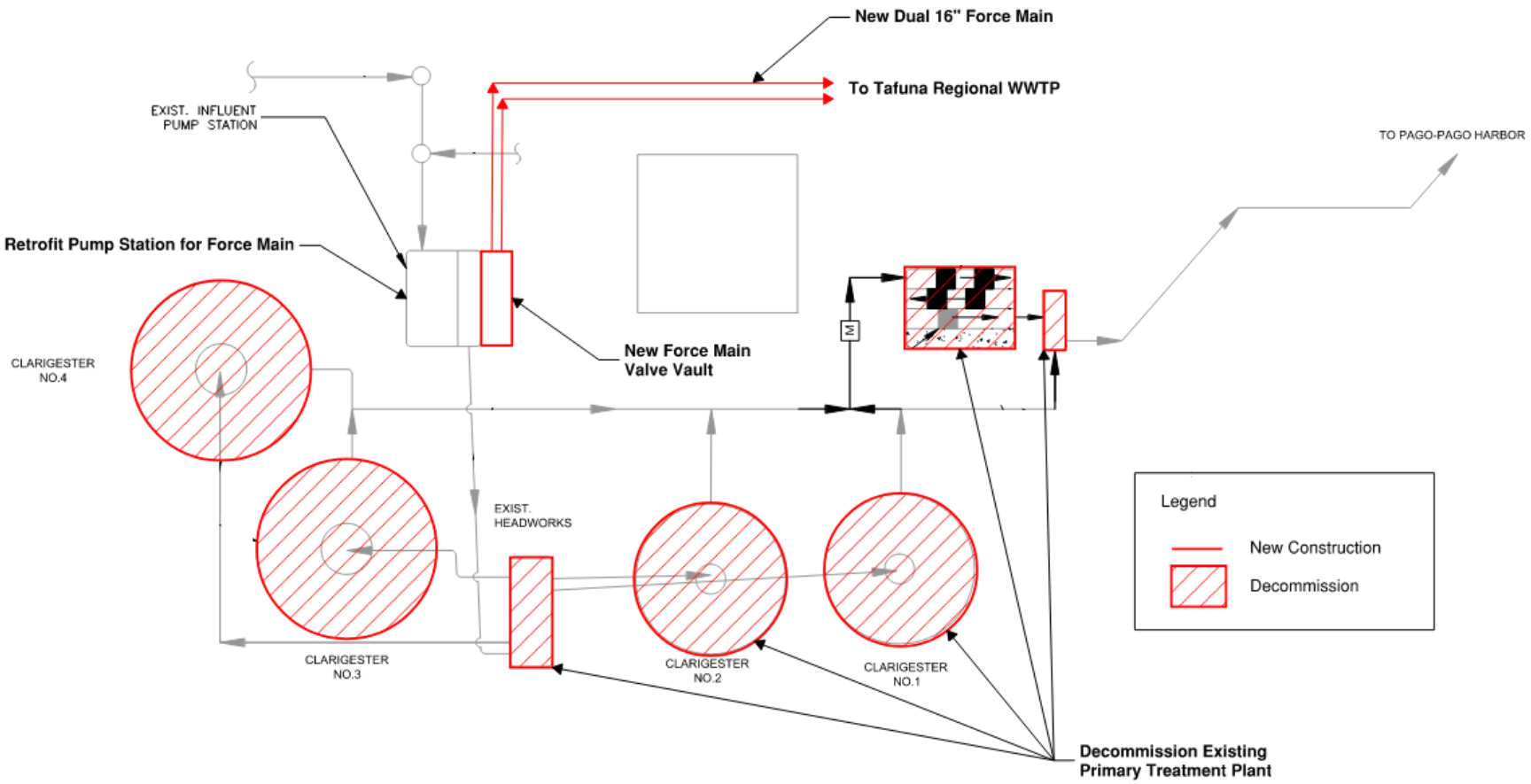


Figure 7-4: Utulei Alternative 2 Piping Schematic



Figure 7-5: **Utulei Alternative 2 Site Plan**

7.2.3 Force Main Discharge Locations

Three potential discharge locations into the Tafuna collection system are discussed below and illustrated in **Figure 7-6**. These potential routes and discharge locations were identified based on a review of the Tafuna collection system GIS and assume continued treatment at the existing Tafuna WWTP site. It should be noted that a specific location of a new regional secondary WWTP has not been identified, and the alignments presented assume a property is procured in the Tafuna area near the existing WWTP at the airport. These routes were not reviewed for conflicting utilities, potential low/high points which could require air release / vacuum stations or additional pump stations, or other site-specific conditions which could affect cost or feasibility of installing dual force mains. Additionally, impacts to the downstream collection system were identified qualitatively only. A detailed routing evaluation is required but is beyond the scope of this study.

Force Main Route 1 – Coconut Point/Andy Lift Station Discharge: The shortest force main alignment starts at the Utulei WWTP and parallels Route 001 with a discharge into the manhole receiving flows from the Coconut Point and Andy Lift Stations. This requires approximately 22,000 linear feet (4.2 miles) of force mains to the initial discharge point. This option will require significant modifications to Tafuna's existing gravity sewer lines and lift stations since they are currently undersized to accommodate the additional Utulei sewer flows. Approximately 19,300 linear feet (3.7 miles) of gravity sewer lines would need to be replaced, and three lift stations would have to be retrofitted for additional capacity.

Force Main Route 2 – Route 001 and Route 114 Discharge: The second shortest alignment starts at the Utulei WWTP and parallels Route 001 with discharge into the manhole and gravity conveyance line located at the intersection of Route 001 and Route 114. This requires approximately 31,000 linear feet (5.9 miles) of force main. This also impacts downstream gravity lines, requiring approximately 9,850 linear feet (1.9 miles) of new gravity sewer line. No improvements to the existing lift stations are required.

Force Main Route 3 – Conveyance Directly to Tafuna WWTP: The longest alignment for a force main from the Utulei WWTP to the Tafuna WWTP is to follow Route 001, Route 014 (Airport Road), and discharge directly into the Tafuna WWTP. This requires approximately 40,550 linear feet (7.7 miles) of force main. No improvements to the existing lift stations are required.

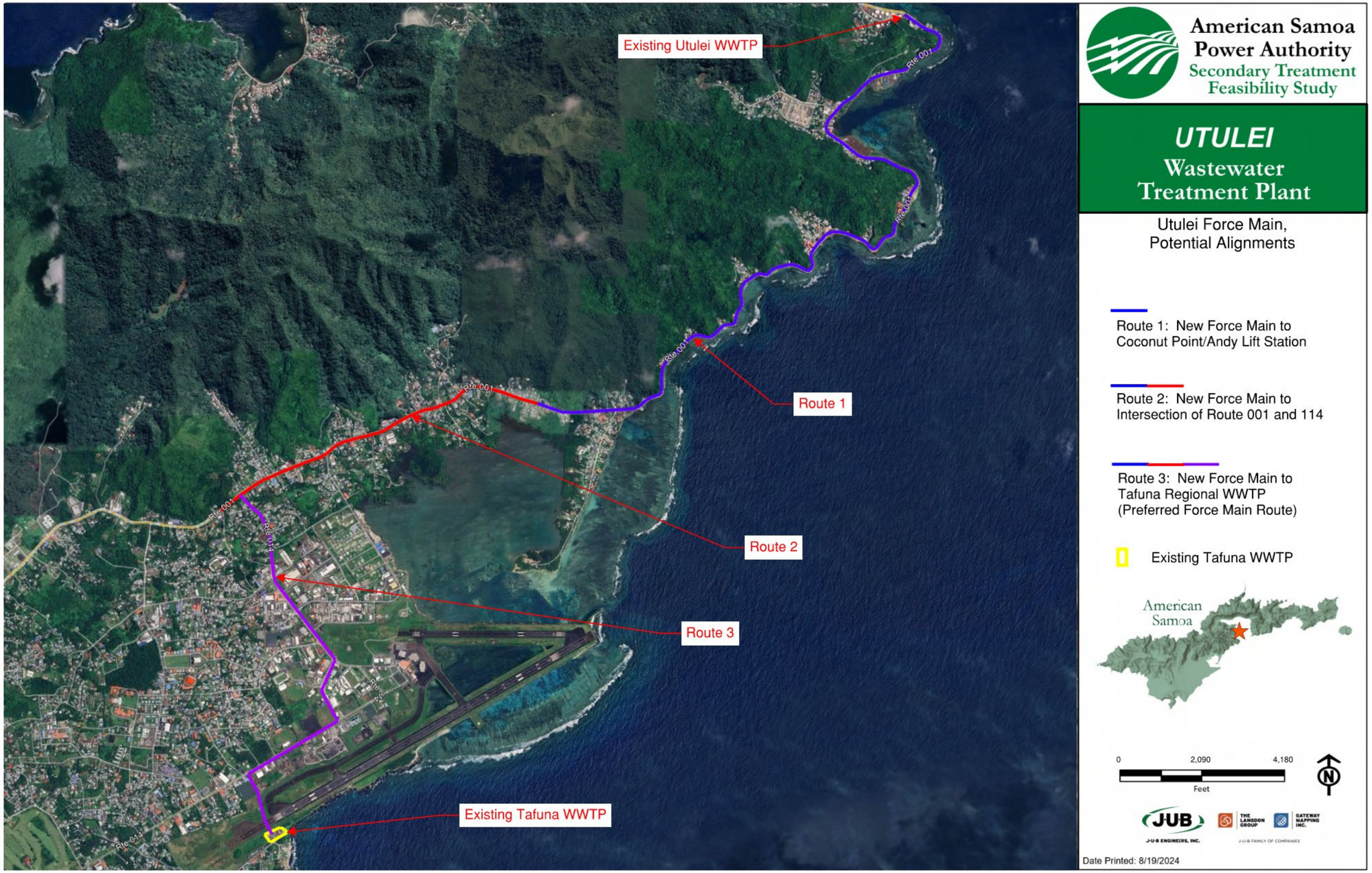


Figure 7-6: Utulei Force Main Alignments to the Tafuna WWTP Site

Table 7-1 provides the head losses associated with pumping wastewater from the Utulei WWTP directly to the Tafuna WWTP, i.e. Force Main Route 3 which represents the longest piping configuration and the highest discharge head conditions. As noted previously, dual force mains are recommended with a preliminary size of 16-in each, which would maintain velocities between 1.7 fps and 5 fps to minimize settling and limit maximum head loss, respectively. The resulting design criteria for the pumps is included in **Table 7-2.** There may be advantages to constructing two pump stations. For example, having a pump station midway between the Utulei WWTP and the Tafuna WWTP would reduce the operating pressures, thereby lowering motor horsepower sizing and decreasing the risk and consequence of leakage from the force mains. However, a detailed routing analysis is beyond the scope of this study.

Table 7-1: **Utulei Dual Force Main Head Losses**

Projected 2044 Flows	Flow		Number in Service		Velocity [1]	Head Loss [2]
	MGD	gpm	Pumps [3]	Force Mains	fps	ft
Minimum Flow	1.5	1,042	1	1	1.7	49
ADF	2.2	1,493	1	1	2.4	82
MMF	2.9	1,986	1	1	3.2	128
PDF	5.4	3,736	2	2	3.0	121
PHF	5.5	3,819	2	2	3.0	124

[1] Velocity in a 16" force main; targeting a velocity between 1.5 and 5 fps to minimize settling and head loss, respectively.

[2] Pumping to Tafuna WWTP, i.e. Force Main Route 3.

[3] Pump station will include at least one standby pump.

Table 7-2: **Utulei Regional Pump Station Design Criteria**

Parameter	Unit	Value	Notes
Pumps	(#)	3	2 duty and 1 standby
Maximum hp	(HP)	100	each
Flow Rate	(GPM)	2,000	each, at design point
Head	(feet)	120	at design point
Drive Type	-	Variable Speed	
Power Req.	(type)	460V/3P/60Hz	

7.2.4 Opinion of Probable Capital Costs

The probable capital cost is $137M for Utulei Alternative 1 and $138M for Utulei Alternative 2, both of which assume Force Maine Route 3 – reference Appendix F for the Engineer's Opinion of Probable Construction Cost. The cost difference is relatively minor since a majority of the cost is associated with construction of the dual force mains assuming the Route 3 alignment. If Utulei's wastewater is treated at a regional secondary WWTP in the Tafuna area, then either Force Main Routes 2 or 3 is recommended. Force Main Route 1 is not advised due to the large amount of existing gravity and pressurized conveyance system that would require upsizing. Since a location for a regional secondary WWTP has not been identified, it is expected that a force main will be required to convey Utulei

wastewater either directly to, or upstream of a regional secondary WWTP to take advantage of gravity conveyance. A more detailed analyses of a Utulei force main alignment and potential improvements to the Tafuna conveyance system requires identifying a site for a regional secondary WWTP.

7.2.5 Preferred Utulei Regional Pump Station Alternative

Utulei Alternative 1 is preferred because the ability to discharge primary effluent in an emergency situation (i.e. when the pump station and/or force main is out of service) provides both reliability and flexibility for ASPA. While there would be a negative water quality impact to the receiving water, the duration would be short and prevent greater exposure to humans if raw sewage were discharged at the Utulei site or upstream in the collection system, both of which could contaminate the nearby shoreline. Additionally, there is not a significant difference in the capital cost for the two alternatives. Utulei Alternative 1 does result in increased O&M costs due to retaining functionality of the existing facility and maintaining the force mains to Tafuna.

7.3 New Regional WWTP at Tafuna

The following sections develop the Oxidation Ditch, Sequencing Batch Reactor (SBR), and Membrane Bioreactor (MBR) alternatives for a new regional WWTP at Tafuna. The influent loading criteria are included in **Chapter 3** and the facility sizing and configuration is based on achieved the permit conditions established in **Chapter 4**. Each section includes a detailed process schematic, discussion of major processes within the facility, planning level design criteria, a conceptual facility layout with corresponding land requirement, and a planning level cost estimate. A specific parcel has not been identified; therefore, a hypothetical rectangular parcel is assumed.

The existing Clarigesters at Tafuna are not incorporated into this evaluation for several reasons. First, the Clarigesters are only sized for the Tafuna flows, not a regional facility. Second, sizing a secondary facility based on not having primary treatment is conservative when seeking potential land parcels. Third, incorporating primary solids removal generally requires implementation of anaerobic digestion, which would significantly increase the capital costs and overall complexity of the facility. Fourth, the location of a potential regional WWTP is not known. Conceivably, however, the Tafuna area flows could still be routed to the existing Tafuna site where primary solids removal could be accomplished. Clarigester effluent could then be pumped to the new regional WWTP. The cost of retaining the Clarigesters would need to be compared to the additional capital and O&M cost of operating another facility and potentially adding anaerobic digestion.

7.3.1 Alternative 4: Oxidation Ditch

A detailed process schematic identifying major physical, biological, and chemical treatment processes is included in **Figure 7-7** for Alternative 4. Given the magnitude of changes (flows, loads, land requirements, etc.), all processes and infrastructure are assumed to be new. The following sections provide additional information regarding each unit treatment process.

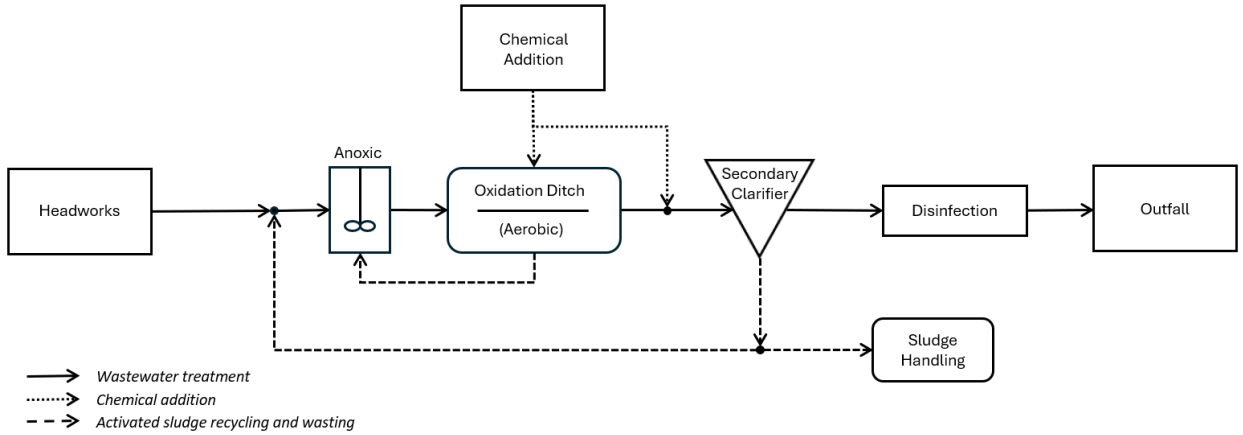


Figure 7-7: **Alternative 4 Oxidation Ditch Schematic**

7.3.1.1 Preliminary Treatment

The headworks for an oxidation ditch facility consists of septage receiving, influent pumping, influent screening, and grit removal. A septage receiving station protects downstream processes from inhibitory, and potentially toxic, slug loads of BOD, total ammonia nitrogen (TAN), TSS and other pollutants by monitoring discharges for abnormal pH (or other parameters). Design of a septage receiving station requires additional information regarding the volume and type of septage being accepted (household tank, community cesspit, portable toilets, sewer cleaning, etc.). This information will determine the amount of pretreatment that is required prior to metering the septage into the secondary treatment process. This feasibility study assumed that a septage receiving station would consist of a parking pad, manual coarse screening, septage storage tank, tank mixer, and flow metering.

The influent pump station will require a minimum of 2 (duty) +1 (standby) pumps. A submersible pump station is assumed, but given the size of the facility, a wet well / dry well configuration could be considered to improve operator accessibility and expandability in the future. Automatic screens at 6-mm (1/4-in) are recommended with a manually cleaned bar rack as a back-up. Grit removal using a vortex grit chamber or vortex stacked-tray system is recommended due to the high removal rate and relatively low footprint compared to an aerated grit chamber or settling channel. **Table 7-3** provides additional design information for preliminary treatment at a regional secondary WWTP.

Table 7-3: **Preliminary Treatment Design Criteria**

Parameter	Unit	Regional WWTP
Septage Receiving Station		
Quantity	(#)	1
Influent Lift Station		
Quantity, pumps	(#)	2 Duty / 1 Standby
Pump Type	-	Submersible
Capacity, each [1]	(gpm)	6,080
Drive	-	VFD
Fine Screening		
Quantity, screens	(#)	2
Quantity, washer/compactor	(#)	2
Capacity, each	(MGD)	7.0
Clear Opening	(in)	1/4
Manual Bar Screen		
Quantity	(#)	1
Bar Spacing	(in)	1/4
Grit Removal System		
Quantity	(#)	2
Type	-	Vortex
Capacity, each	(MGD)	7.0

[1] *Firm influent pumping capacity assumed to be 1.25 times PHF.*

Primary clarifiers could be added to remove a portion of the influent BOD and TSS, thereby reducing the biological basin volume of the oxidation ditch. However, the solids would either have to be stabilized through anaerobic digestion or processed directly, which would result in significant odor generation. Additionally, using primary clarifiers would lower the carbon to phosphorus ratio in the biological basins which could severely impact biological phosphorus removal (if desired). Primary clarifiers would add to the overall complexity of the facility and are therefore not included at the planning level.

7.3.1.2 Equalization

The regional WWTP is anticipated to receive influent hydraulic flows with hourly peaking factors greater than three times the average day flow. Flow equalization could be provided following the headworks to attenuate peak flows. If peak hour flows of 13.9 MGD are attenuated to peak day flows of 10.7 MGD, a minimum working volume of 0.13 MG is required (one hour of flow) with additional capacity required to contain rising and falling flows around the peak hour condition. Another rule-of-thumb is approximately 10 to 15 percent of the daily flow. Using a projected maximum month flow of 5.5 MGD, the resulting volume is approximately 0.5 MG.

The primary benefit to influent equalization would be reducing the size of downstream components and conveyance piping. It may be possible to reduce the size of the secondary clarifiers as well as the UV system and outfall, provided the "credit" for having attenuated flows is permitted by the regulatory agency. For the purposes of this study, component sizing will be based on no influent equalization which is conservative from a cost standpoint.

7.3.1.3 Biological Treatment

The biological treatment basins associated with an oxidation ditch will consist of anoxic zones for denitrification (nitrogen removal) and aerobic zones to accomplish BOD removal and nitrification (ammonia removal). The recommended design criteria are included in **Table 7-4**. The process could be expanded to include anaerobic selector(s) for biological phosphorus (bio-P) removal. The draft permit limit is 1.6 mg/L, and typical performance for a bio-P system is 0.5 to 1.0 mg/L. However, the process complexity increases considerably for both the biological system and the solids handling systems. Use of chemical addition for phosphorus compliance is therefore recommended – see Section 7.3.1.5 for additional discussion.

Table 7-4: **Oxidation Ditch Design Criteria**

Parameter	Unit	Regional WWTP	Typical [1]
Anoxic Zone			
Volume	MG	0.8	20 to 30% of treatment volume
HRT (Max Month)	hrs	4	
Aerobic Zone			
Volume	MG	3.0	-
Number of Basins	-	2	-
Depth	ft	15	15
MLSS	mg TSS/L	3,000 to 4,000	3,000 to 5,000
MLVSS	% of MLSS	80%	-
BOD Loading Rate (Average)	lbs BOD/ 1,000 ft^3	15	5 to 15
HRT (Max Month)	hrs	13	-
SRT (Max Month)	days	9 to 10	>4 to 30
F/M (Average)	lb BOD/lb MLVSS	0.10	0.04 to 0.10
Aerators			
Type	-	Surface Aerator	-
Quantity	-	4	-
Horsepower, each	HP	150 – 200	-
AOTR (Max Month) [2]	lbs O_2/day	22,740	-

[1] *Typical values from M&E, 2014.*

[2] *Assumes 1.5 lb oxygen per pound of BOD consumed and 4.6 lb of oxygen per pound of TKN; oxygen supplied by nitrate conversion in the anoxic zone (denitrification) is not included.*

7.3.1.4 Secondary Clarification

Secondary clarification is required to separate biosolids generated in the oxidation ditch from the effluent. Settled solids are returned to the oxidation ditch to maintain the desired MLSS values or wasted from the system as necessary. Clarifier sizing is based on the hydraulic overflow rate and the solids loading rate. **Table 7-5** provides information on the sizing of secondary clarifiers for the regional WWTP. Secondary clarification was designed based on ADF, MMF and PDF. **Figure 7-8** and **Figure 7-9**

show the surface overflow rate (SOR) and solids loading rate (SLR) across the range of existing and future flows at the regional WWTP utilizing one to three 90-ft diameter secondary clarifiers. Based on the information presented in these two figures it was determined to use three 90-ft diameter secondary clarifiers in order to be able to treat the future peak hour flow of 13.9 MGD.

Table 7-5: **Secondary Clarifier Design Criteria**

Parameter	Unit	Regional WWTP
Quantity	-	3 duty
Diameter	ft	90
Depth	ft	14
MLSS [1]	mg/L	4,000
RAS	% ADF	150%
Plant Drain	% ADF	10%

[1] *Includes chemical sludge.*

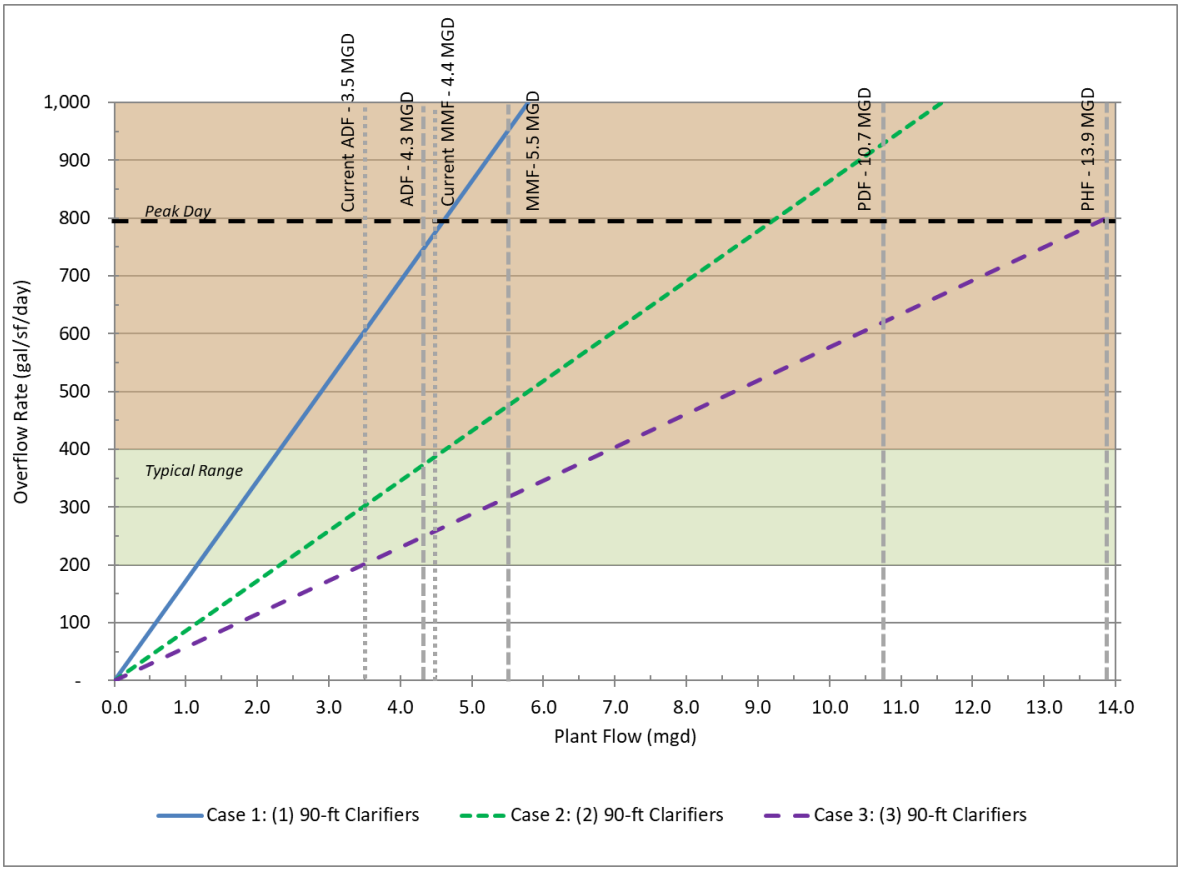


Figure 7-8: **Secondary Clarifier Surface Overflow Rates (Regional WWTP)**

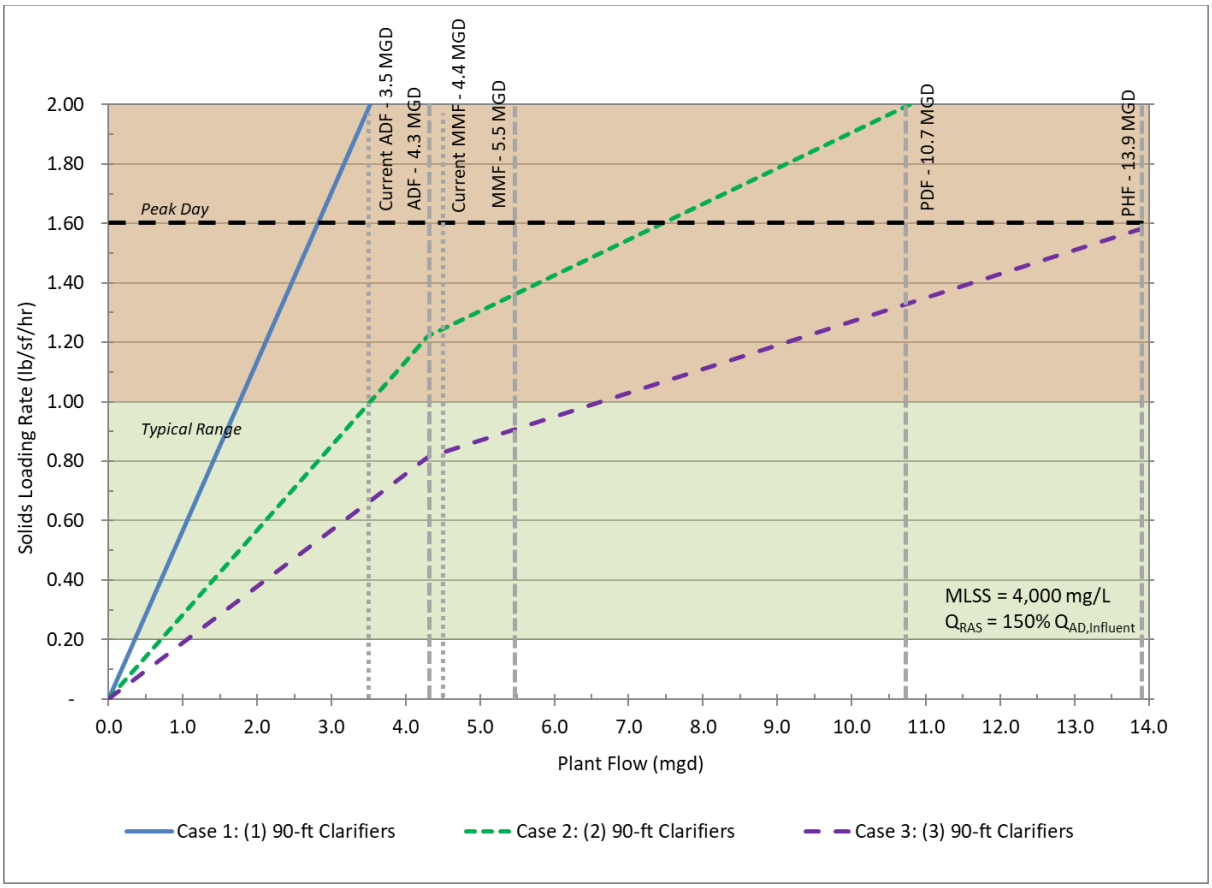


Figure 7-9: **Solids Loading Rates (Secondary Clarifiers, Regional WWTP)**

7.3.1.5 Phosphorus Removal

Chemical precipitation (ChemP) of phosphorus is the chemical treatment of phosphorous to remove soluble phosphate from water by forming solid precipitates. ChemP is accomplished by adding metal salts, such as iron or aluminum, which form insoluble compounds when combined with orthophosphate. The solids are then removed through clarification. Iron salts are typically avoided in facilities with UV since the iron can negatively affect UV transmittance and efficacy.

Common practice for ChemP employs addition of alum or iron salts directly to the aeration basins or between basins and final clarifiers. Sufficient mixing is required at the injection point to maximize chemical interaction with the orthophosphate. At the permit limit of 1.6 mg/L, a molar ratio of 1 metal to 1 phosphorus is generally sufficient to achieve removal. A suitable factor of safety should be included; therefore, a target effluent concentration of 1.0 mg/L was assumed. Assuming use of aluminum sulfate, the expected dosage at average day and maximum month conditions is provided in **Table 7-6** (bulk chemical based on a typical commercial alum solution of 48.5 percent strength). Use of ChemP generally results in 10 to 15 percent additional solids generation at the facility, depending on the level of phosphorus removal. The availability of alum in sufficient quantities must be confirmed during pre-design and may require relatively large storage containers to avoid depleting chemical supplies between shipments.

Table 7-6: **Chemical Phosphorus Precipitation**

Parameter	Unit	Regional WWTP
Average Day		
Alum Dose	mg Alum/L	31
Alum Required	gal/day	207
Chem Sludge	dry lbs/day	595
Maximum Month		
Alum Dose	mg Alum/L	61
Alum Required	gal/day	521
Chem Sludge	dry lbs/day	1,497

Another common method to remove P is enhanced biological phosphorus removal (EBPR), which utilizes specific bacteria groups, polyphosphate accumulating organisms (PAOs). PAOs remove dissolved phosphorus via a luxury uptake metabolism that is activated in a strictly anaerobic zone with sufficient readily biodegradable BOD, typically as volatile fatty acids (VFAs), and commences in a downstream aerobic zone. Phosphorus is removed from the treatment process by wasting the activated sludge and associated PAOs. Influent VFA testing is critical to ensure the correct ratio of VFA to microorganisms is present to perform EBPR. Excessive I/I is not conducive to EBPR since it dilutes influent VFAs and the VFA to microorganism ratio potentially becomes too low for EBPR to proceed without additional fermentation processes (i.e. additional tanks). EBPR has a higher capital cost, but lower operating cost, compared to ChemP since an additional anaerobic tank is required upstream of the anoxic tank performing denitrification. If VFAs are limiting, then competition between PAOs and denitrifiers for readily biodegradable BOD may result in incomplete nutrient removal and permit violations, and methanol addition may be required to provided sufficient carbon to drive the process. Due to potential biological upsets, ChemP is typically provided as a backup P removal strategy even if the facility is performing EBPR. The advantages of EBPR include no chemical sludge production and a more robust microbial community because of the additional anaerobic environment the microbial community needs to adapt to.

If ASPA is interested in pursuing EBPR as a P removal strategy, additional influent testing is required to confirm the influent contains sufficient concentrations of VFAs for both the Tafuna and Utulei waste streams. In should be noted that the relatively long force main conveyance time (>5 hrs) will produce additional VFAs, but sulfate reducing bacteria will utilize these VFAs in the force main to produce hydrogen sulfide and other noxious sulfur compounds. This is important since the Utulei collection system receives infiltration of seawater that is high in sulfates. Reducing I&I in the collection systems will reduce pumping costs, reduce hydraulic design capacities for secondary treatment (i.e. smaller footprint), reduce H_2S associated corrosion, reduce odors, and improve the biological treatment processes. In summary, EBPR is the preferred P removal strategy compared to ChemP, but there are too many unknowns and existing deficiencies to recommend EBPR. EBPR is also significantly more complex and could result in process upsets that would exceed the effluent phosphorus limits.

7.3.1.6 Sludge Production and Dewatering

Secondary treatment produces significantly more solids than primary treatment alone. This is because not only is more influent TSS removed, but additional biosolids are produced during biological secondary treatment. Biological solids are lighter with typical concentrations of 0.5 to 1.0 percent compared to 2 to 3 percent for primary solids. **Table 7-7** provides the estimated sludge production associated with secondary treatment and the anticipated operating conditions.

Table 7-7: **Waste Activated Sludge Production**

Parameter	Unit	Regional WWTP
Concentration	(%TS)	0.5%
Total WAS, Average Day	(lbs/day)	5,960
Total WAS, Average Day	(gal/day)	143,000
Total WAS, Max Month	(lbs/day)	9,680
Total WAS, Max Month	(gal/day)	232,480

It is assumed that the current solids handling approach (i.e. dewatering solids and then landfilling) will be retained with the secondary treatment improvements. A solids holding tank with at least three days of storage is recommended upstream of the dewatering equipment. Design criteria for dewatering are shown in **Table 7-8**. Potential dewatering technologies that should be evaluated and selected during pre-design are as follows:

- Screw Presses: The Tafuna WWTP currently uses screw presses. The feed rate is generally lower than other technologies; however, screw presses can be operated for long periods of a day unattended which likely makes them economically viable for facilities of this size.
- Belt Filter Presses: Belt filter presses have a higher capacity than screw presses, resulting in less installed equipment. However, belt filter presses require considerably more operator attention and clean-up, which results in fewer operating hours per day.
- Centrifuges: Centrifuges achieve the highest solids content in the cake but require considerably more energy. This technology is advantageous if hauling and disposal costs are significant.
- Fan Presses: A fan press is an enclosed dewatering system that relies on generating pressure to dewater the solids. The energy requirement is considerable, but the required footprint is relatively small.

The existing Tafuna primary WWTP is located roughly three miles from the Futiga landfill, the only landfill located on the island. If a new regional WWTP is constructed in the vicinity, then transporting dewatered sludge to the landfill will be a relatively easy task due to the close proximity. It is recommended that either a screw press or belt filter press be utilized for dewatering based on the power savings compared to the other technologies. Disposal will be to the landfill, consistent with current operations. The disposal of the combination of biological and chemical sludge will be subject to 40 CFR Part 258 and regulated in the NPDES permit. The chemical sludge produced during phosphorus removal is stable, nonhazardous, and can generally be accepted at the landfill, provided the solids pass a paint-filter test.

Table 7-8: **Dewatering Design Criteria**

Parameter	Unit	Regional WWTP
Average Day [1]		
Solids Loading Rate	(dry lbs/hr)	1,386
Volumetric Loading Rate	(gpm)	277
Discharge mass	(wet lbs/hr)	8,664
Discharge Volume	(CF/hr)	139
Discharge mass	(ton/day)	30
Discharge Volume	(CY/day)	36
Maximum Month [1]		
Solids Loading Rate	(dry lbs/hr)	2,254
Volumetric Loading Rate	(gpm)	450
Discharge mass	(wet lbs/hr)	14,087
Discharge Volume	(CF/hr)	226
Discharge mass	(ton/day)	49
Discharge Volume	(CY/day)	58
WAS Storage Tank		
Holding Time	(days)	3
Volume	(gal)	750,000
Mixing Approach	-	Diffused Aeration

[1] *Assumed dewatering operation of 7 hours per day (1 hour housekeeping), 5 days per week. Dewatered sludge concentration of 16%.*

Alternatively, the solids volume could be reduced through either aerobic or anaerobic digestion. Aerobic digestion requires a holding time of approximately 40 days (EPA, 1994) and significant power to maintain an oxygenated environment. A volatile mass reduction of approximately 40 to 50 percent is possible. Anaerobic digestion requires a solids residence time of 15 to 20 days and can achieve solids reduction of approximately 50 percent. Use of primary clarifiers is recommended for anaerobic digestion since primary solids have a higher volatile content than WAS solids. The digesters must be heated to approximately 100° F and continuously mixed. Methane produced from the anaerobic digestion process can be used for heating. Excess biogas production is typically disposed via flaring. Beneficial use of the biogas is possible, e.g. co-generation of power, but the biogas must be treated prior to use to prevent significant damage to the engine / generator. Both aerobic and anaerobic digestion will increase the O&M costs and complexity of operations at the facility and are therefore not included in this Feasibility Study.

The Futiga landfill has limited space and was estimated to be full by 2033 with ongoing compaction to create additional storage volume. A separate analysis is recommended to determine if the increased sludge production associated with secondary treatment will significantly impact the projected lifespan of American Samoa's only landfill. Stabilization through aerobic or anaerobic digestion could permit the beneficial use of the biosolids (rather than landfilling) under 40 CFR Part 503. A detailed solids management evaluation should be undertaken prior to or during predesign if biosolids stabilization and a reduction in biosolids mass is desired.

7.3.1.7 UV Disinfection

The existing UV system consists of a single channel designed for treating primary clarifier effluent with a minimum design UV transmittance (UVT) of 19.3% at 253.7 nm. The UVT of a secondary treatment effluent should be considerably higher, typically 60 to 65 percent. Conceivably, the existing system could be expanded with a second channel to handle the projected design flows. However, it is not known if a secondary treatment facility can be constructed near the existing Tafuna site. A new UV system consisting of two channels of UV modules (each sized at half of the facility's design peak hour flow) is therefore included in the conceptual site layout and cost opinions. Alternatively, chlorine disinfection could be implemented, which will require additional land and chemical usage for both chlorination and dechlorination. For the purposes of this study, a new UV disinfection system is assumed.

7.3.1.8 Outfall

The existing outfall at the Tafuna WWTP is comprised of 1,600 linear feet of 24" HDPE conveyance pipe discharging to the 24" effluent diffuser barrel. The diffuser consists of six 8" diameter goosenecks with 6" diameter orifice plates spaced 10' apart, and a 11" diameter orifice at the flanged termination (GDC, 2012). **Table 7-9** summarizes the regional WWTP's design hydraulic loads, flow velocities, and head losses though the existing outfall system.

Table 7-9: Tafuna Existing Outfall

Flow Scenario	Flow (MGD)	Velocity (ft/sec)	Outfall Head Loss (ft ASL)		
			24" Pipe	Diffuser	Total
Average Day	4.3	2.1	1.2	0.25	1.5
Maximum Month	5.5	2.7	1.8	0.4	2.2
Peak Day	10.7	5.3	6.9	1.5	8.4
Peak Hour	13.9	6.8	11.5	2.5	14.0

The majority of the head loss is associated with the 24" conveyance pipe, not the diffuser. From a design velocity perspective (i.e. to minimize head losses), the outfall reaches its capacity around the peak day flowrate (approximately 10 to 11 MGD). Higher flows may be possible, but additional head loss in the outfall pipe will occur and back up into the existing UV system (if it is retained).

Table 7-10 shows the percentage of the effluent flow routed through each port in the diffuser. Port #1 is the 11" diameter orifice at the end of the diffuser, and more than one third of the effluent is discharged through this orifice in the termination flange. The unequal distribution of flows through the orifices results in a non-optimal dilution factor. Removing the 6" orifice plates from each gooseneck (i.e. providing an 8" outlet) and replacing the 11" termination flange orifice with an 8" flange orifice will provide a more balanced discharge and a more optimal dilution factor for the existing outfall diffuser.

Table 7-10: Tafuna Diffuser Flow Distribution

Port #	Port Diam. (in)	% of Flow
1	11	38%
2	6	10%
3	6	10%
4	6	10%
5	6	10%
6	6	11%
7	6	11%

Although the overall dilution factor of the existing diffuser can be improved, a mixing zone analysis (a separate future study) should be completed to determine the impact of the regional facility's discharge and determine what modifications or changes are necessary to the outfall to improve dilution, assuming the existing outfall is retained. However, for the purposes of this study and for budgetary purposes, a new outfall is assumed, especially since a new WWTP site would be required.

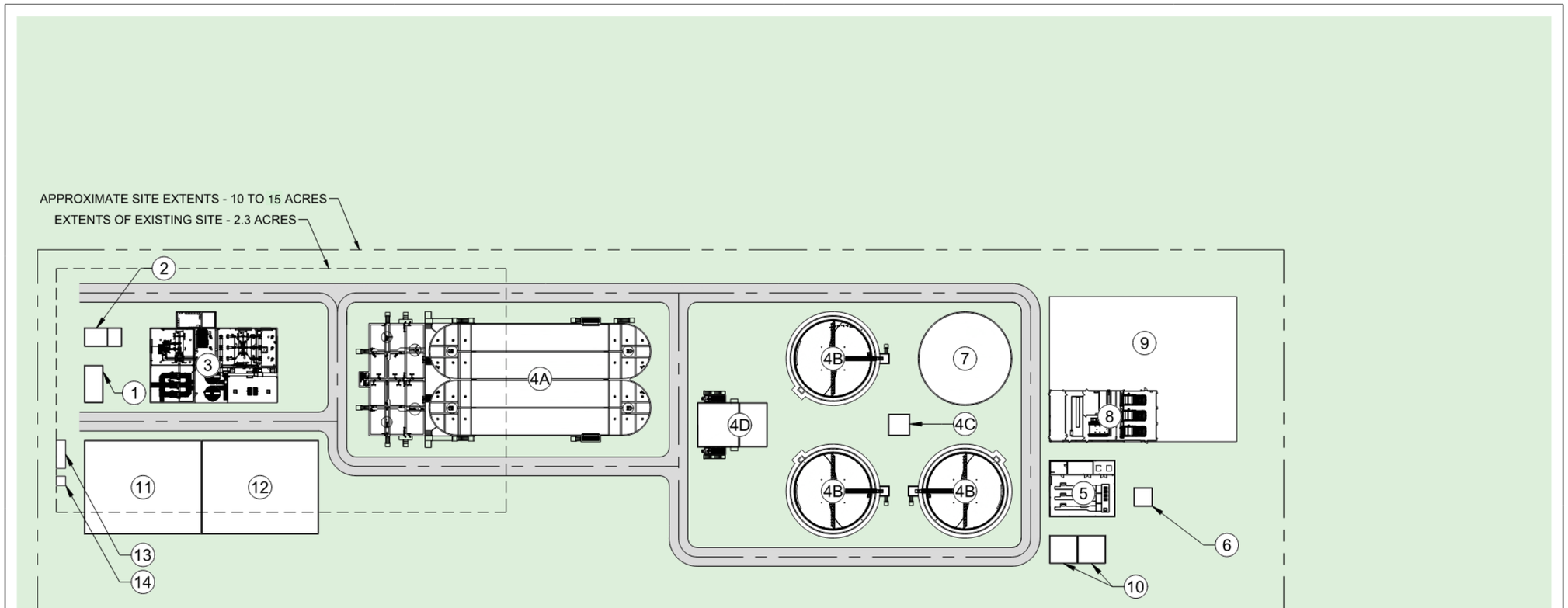
7.3.1.9 Conceptual Site Layout

A conceptual site plan is included in **Figure 7-10**. The estimated land requirement for an oxidation ditch is 10 to 15 acres. Additional acreage is recommended for facility expansion as required for additional growth or additional permit conditions.

7.3.1.10 Opinion of Probable Capital and O&M Costs

The probable capital cost for Alternative 4, oxidation ditch, is $244M, excluding the Utulei pump station and force main. This estimate includes the cost for 15 acres of land purchased at a cost of $700,000/acre. Appendix F includes the Engineer's Opinion of Probable Construction Cost and information provided by equipment vendors is in Appendix G.

The probable total operation and maintenance costs is $6.6M/year, including the Utulei pump station and force main.



KEYED NOTES:	
1	SEPTAGE RECEIVING
2	INFLUENT LIFT STATION
3	HEADWORKS BUILDING
4A	OXIDATION DITCHES
4B	SECONDARY CLARIFIERS
4C	CLARIFIER FLOW SPLITTER
4D	RAS PUMPING
5	UV DISINFECTION
6	OUTFALL DISTRIBUTION BOX
7	WAS STORAGE
8	DEWATERING BUILDING
9	DEWATERED SLUDGE STORAGE
10	CHEMICAL PHOSPHORUS STORAGE / FEED
11	ADMINISTRATION / LABORATORY BUILDING
12	MAINTENANCE BUILDING
13	GENERATOR
14	TRANSFORMER

REGIONAL ALTERNATIVE 4: OXIDATION DITCH

0 50 100

SCALE IN FEET

Figure 7-10: **Alternative 4 Oxidation Ditch Conceptual Site Layout**

7.3.2 Alternative 6: Sequencing Batch Reactor (SBR)

A detailed process schematic identifying major physical, biological, and chemical treatment processes is included in **Figure 7-11** for Alternative 6. Given the magnitude of changes (flows, loads, land requirements, etc.), all processes and infrastructure are assumed to be new. The following sections provide additional information regarding each unit treatment process unique to Alternative 6.

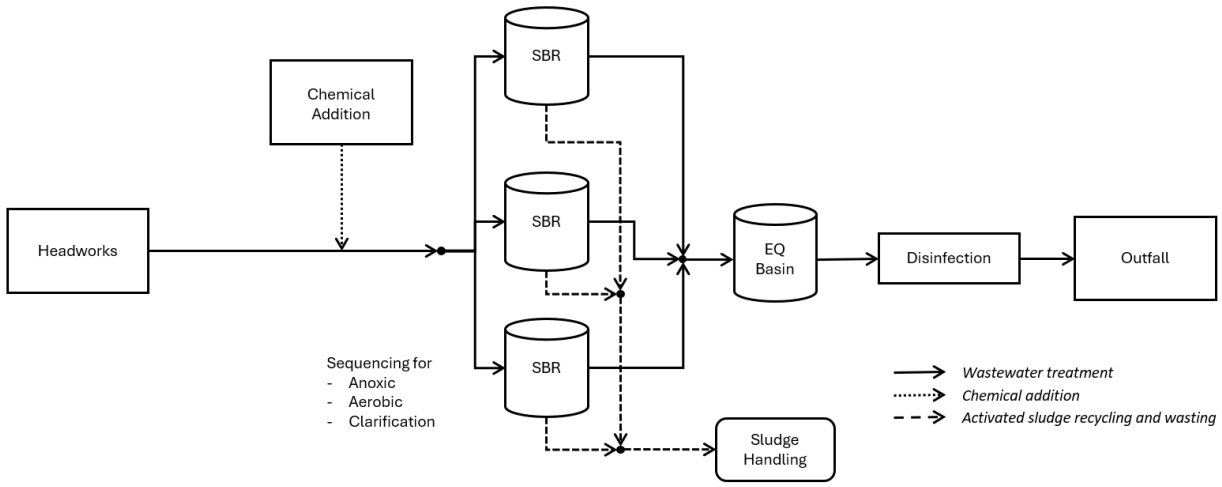


Figure 7-11: **Alternative 6 SBR Schematic**

7.3.2.1 Preliminary Treatment

For an SBR, the preliminary treatment steps are the same as the requirements for oxidation ditches. See discussion above in **Section 7.3.1.1**.

7.3.2.2 Equalization

The SBRs are designed to accommodate the PDF and influent flow equalization is not generally required. During peak flows, the control system can automatically switch over to "storm mode" and shorten the cycle times. Sizing for the SBR has incorporated the design peak hour flow assuming no influent equalization.

Equalization downstream of the SBRs is required, however, because of the rapid draining of the SBR basin following the settling phase which would otherwise significantly impact the sizing of the UV disinfection system and the outfall. Effluent from the SBRs is routed to a separate equalization tank. Effluent from the equalization tank is controlled via a modulating control valve and flow meter to achieve a relatively constant effluent flow. In the event the drainage volume from an SBR exceeds the capacity of the equalization tank, flow will be routed to an emergency overflow and result in extremely high flows to the UV system and outfall.

Table 7-11 provides the design criteria for the SBR effluent equalization basin.

Table 7-11: SBR Effluent Equalization

Parameter	Unit	Regional WWTP
Quantity	(#)	1
Volume	(MG)	0.57
Width x Width	(ft)	71
Depth (to overflow)	(ft)	15
SBR Effluent Flow	(MGD)	17.1
EQ Basin Effluent Flow	(MGD)	11
UV Capacity	(MGD)	11
EQ Discharge Time (each cycle)	(min.)	95

7.3.2.3 Biological Treatment

The biological treatment phases associated with each SBR cycle will consist of a mixed anoxic filling phase for denitrification and an aerobic react phase for BOD removal and nitrification (ammonia removal). Following the react phase, the SBRs have a settling phase followed by a decant phase to complete the cycle. Wasting occurs at the end of the decant phase during an "idle" phase.

The recommended design and operating criteria are included in **Table 7-12** and **Table 7-13** for the SBRs.

Table 7-12: SBR Design Criteria

Parameter	Unit	Regional WWTP
Quantity	(#)	3 duty
Length & Width (each)	(ft / ft)	133 / 90
Height	(ft)	25
Freeboard (min)	(ft)	2
High Water Level	(ft)	23
Low Water Level	(ft)	15
Decant Depth	(ft)	8
Volume Added per Cycle	(Mgal)	0.72
Working Volume, each	(Mgal)	2.06
Working Volume, total	(Mgal)	6.2
Peak Decant Rate (each)	(MGD)	17.1
Peak Decant Rate (each)	(gpm)	11,875
Cycle Times		
Fill Time (mixed / aerated)	(min.)	95
React Time (aeration / anoxic)	(min.)	103
Settle Time	(min.)	30
Decant Time	(min.)	60
Total Cycle Time	(min. / hr)	288 / 4.8
Idle Time (AD)	(min.)	141
Idle Time (MM)	(min.)	92
Idle Time (PD)	(min.)	0
Cycles Per Day (each)	(#/day)	5

Table 7-13: **SBR Operating Criteria**

Parameter	Unit	Regional WWTP
Design Loading (3 SBRs in operation)		
Design Average SRT	(days)	15.5
F/M ratio	(lb BOD/lb MLVSS)	0.08
MLSS (min. water level)	(mg/L)	4,500
MLSS (max water level)	(mg/L)	2,940
Mixers		
Quantity, per Basin	(#)	1
Horsepower	(BHP)	60
Transfer Pumps		
Quantity, per Basin	(#)	1
Type		Submersible
Horsepower	(BHP)	5
Blowers		
Blower Quantity, total	(#)	4 +1 standby
Blower Type		Positive Displacement
AOTR	(lbs O_2/day)	25,970
Peak O_2 Factor	(ratio)	1.07
Blower Horsepower, each	(BHP)	200
Blower Capacity, each	(SCFM)	3,935
Discharge Pressure	(psig)	11.5
Diffusers		
Type		Fine Bubble
Decanters		
Assemblies, per Basin	(#)	2

7.3.2.4 Secondary Clarification

Solids settling is accomplished within each SBR during the settling and decant phases. No secondary clarifiers are required.

7.3.2.5 Phosphorus Removal

The requirements for chemical phosphorus removal using a SBR are similar to an oxidation ditch. See discussion above in Section 7.3.1.5. Chemical would be dosed upstream of the SBRs.

7.3.2.6 Sludge Production and Dewatering

Table 7-14 provides the estimated sludge production associated with secondary treatment using SBRs and the anticipated operating conditions. **Table 7-15** provides the sludge dewatering requirements for operating the SBR at average day and maximum month loading conditions. WAS from the sludge storage tanks is assumed to be 1% total solids for dewatering.

Table 7-14: **SBR Waste Activated Sludge Production**

Parameter	Unit	Regional WWTP
Concentration	(%TS)	0.5%
Net Sludge Yield	(lbs WAS/lbs BOD)	0.767
Total WAS, Average	(dry lbs/day)	5,870
Total WAS, Average	(gal/day)	140,960
Total WAS, Max Month	(dry lbs/day)	9,280
Total WAS, Max Month	(gal/day)	222,720

Table 7-15: **SBR Dewatering Design Criteria**

Parameter	Unit	Regional WWTP
Average Day		
Solids Loading Rate [1]	(dry lbs/hr)	1,174
Volumetric Loading Rate	(gpm)	235
Discharge mass	(wet lbs/hr)	7,339
Discharge Volume	(CF/hr)	118
Discharge mass	(ton/day)	26
Discharge Volume	(CY/day)	30
Maximum Month [1]		
Solids Loading Rate	(dry lbs/hr)	1,855
Volumetric Loading Rate	(gpm)	371
Discharge mass	(wet lbs/hr)	11,596
Discharge Volume	(CF/hr)	186
Discharge mass	(ton/day)	41
Discharge Volume	(CY/day)	48
WAS Storage Tank		
Holding Time	(days)	3
Volume	(gal)	750,000
Mixing Approach	-	Diffused Aeration

1 Assumed dewatering operation of 7 hours per day (1 hour housekeeping), 5 days per week. Dewatered sludge concentration of 16%.

7.3.2.7 UV Disinfection

The existing UV system is designed to treat 6.0 MGD. Effluent flow equalization associated with the SBR decant phase provides flow attenuation; however, the peak discharge will be significantly higher than 6 mgd. The existing UV system is undersized for a regional WWTP and a new UV system will be required. See **Section 7.3.1.8** for additional information.

7.3.2.8 Outfall

Similar to Alternative 4, the outfall structure and diffuser will need modification and/or replacement when secondary treatment is adopted, especially with the peak drain flows from the SBRs. See **Section 7.3.1.8** for additional information.

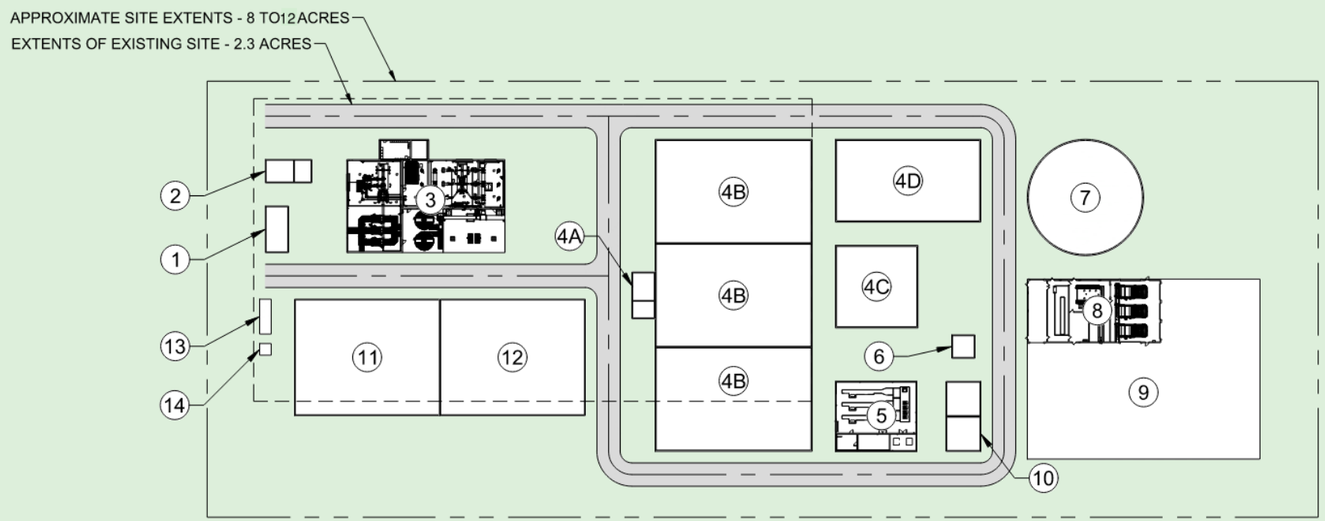
7.3.2.9 Conceptual Site Layout

A conceptual site plan is included in **Figure 7-12.** The estimated land requirement for a SBR is 8 to 12 acres. Additional acreage is recommended for facility expansion as required for additional growth or additional permit conditions.

7.3.2.10 Opinion of Probable Capital and O&M Costs

The probable capital cost for Alternative 6, SBR, is $195M, excluding the Utulei pump station and force main. This estimate includes the cost for 12 acres of land purchased at a cost of $700,000/acre. Appendix F includes the Engineer's Opinion of Probable Construction Cost and information provided by equipment vendors is in Appendix G.

The probable total operation and maintenance costs is $6.5M/year, including the Utulei pump station and force main.



KEYED NOTES:	
1	SEPTAGE RECEIVING
2	INFLUENT LIFT STATION
3	HEADWORKS BUILDING
4A	SBR LIFT STATION
4B	SBR TANKS
4C	EFFLUENT EQ
4D	SBR SUPPORT BUILDING
5	UV DISINFECTION
6	OUTFALL DISTRIBUTION BOX
7	WAS STORAGE
8	DEWATERING BUILDING
9	DEWATERED SLUDGE STORAGE
10	CHEMICAL PHOSPHORUS STORAGE / FEED
11	ADMINISTRATION / LABORATORY BUILDING
12	MAINTENANCE BUILDING
13	GENERATOR
14	TRANSFORMER

REGIONAL ALTERNATIVE 6: SBR

0 50 100

SCALE IN FEET

Figure 7-12: **Alternative 6 SBR Conceptual Site Layout**

7.3.3 Alternative 7: Membrane Bioreactor (MBR)

A detailed process schematic identifying major physical, biological, and chemical treatment processes is included in **Figure 7-13** for Alternative 7. Given the magnitude of changes (flows, loads, land requirements, etc.), all processes and infrastructure are assumed to be new. The following sections provide additional information regarding each unit treatment process unique to Alternative 7.

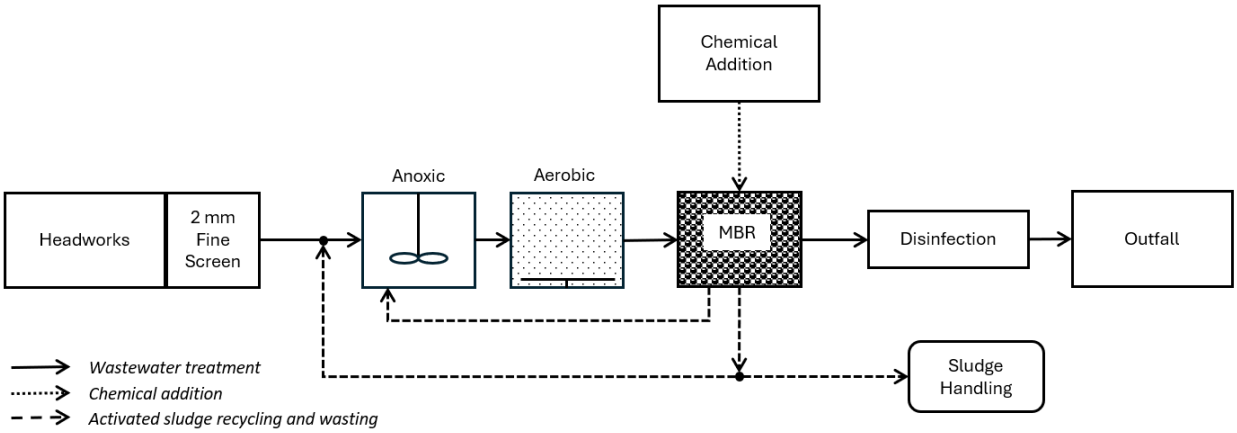


Figure 7-13: **Alternative 7 MBR Schematic**

7.3.3.1 Preliminary Treatment

For an MBR, the preliminary treatment steps are more stringent than the requirements for oxidation ditches and SBRs. In addition to the 6-mm coarse screening recommended for oxidation ditches and SBRs, membranes require an additional 2-mm fine screening process to prevent debris from damaging the membranes. Two duty fine screens are assumed with one fully redundant standby 2-mm fine screen to maintain membrane manufacturer warranties. Internally fed 2-mm drum screens are recommended because they prevent inadvertent bypassing of wastewater. It is expected that pumping after the 6-mm coarse screens will be required due to the head loss through the internally fed drum screens.

7.3.3.2 Equalization

Membrane bioreactor design is based primarily on two main components: biological treatment and solids separation through the membranes. The hydraulic flux of effluent (permeate) through the membrane is set by the membrane type and manufacturer specifications. Design flux varies considerably among manufacturers due to different membrane fiber pore sizes and cleaning regimens. If flows exceed the throughput capacity of the membranes, either influent flow equalization or additional membrane modules are required to maintain a reasonable membrane life. Consistent with the approach to the oxidation ditch alternative, component sizing will be based on no influent equalization.

7.3.3.3 Biological Treatment

The biological treatment phases associated with the MBR process consist of a mixed anoxic tank for denitrification and two aerobic tanks for BOD removal and nitrification (ammonia removal). MBRs require a smaller footprint than other activated sludge processes since they have much higher MLSS

concentrations, typically between 6,000 to 13,000 mg/L, that can be maintained in the reactor (M&E, 2014). Following the biological treatment, the activated sludge is separated from the treated effluent by membrane filtration (discussed in the subsequent section). **Table 7-16** and **Table 7-17** provide the biological design and operating criteria for the MBR secondary treatment process. **Table 7-18** provides the design criteria for the various mixers, pumps, and blowers required to operate the MBR processes for the regional WWTP. Membranes require significantly higher RAS rates to prevent the over-thickening of solids in the membrane basins; typical RAS recycle rates range between four to six times the influent flow rate.

Table 7-16: **MBR Design Criteria**

Parameter	Unit	Regional WWTP	Typical [1]
BOD Load Rate (AD)	(lbs BOD/1,000 ft^3)	55	33-88
Anoxic Volume (total)	(Mgal)	0.31	-
Aerobic Volume (total)	(Mgal)	1.04	-
Volume (total)	(Mgal)	1.35	
MBR Trains	(#)	4	-
Depth	(ft)	16	16+
Width (each)	(ft)	30	-
Length (anoxic, each)	(ft)	22	-
Length (aerobic, each)	(ft)	72	-
Length (MBR, each)	(ft)	30	-

[1] *Metcalf & Eddy, 2014.*

Table 7-17: **MBR Operating Criteria**

Parameter	Unit	Regional WWTP	Typical [1]
SRT	(days)	9	15 to 30
Average Day			
BOD Loading Rate	(lbs BOD/1,000 ft^3)	55	33 to 88
Aerobic HRT	(hrs)	5.8	4 to 6
MLSS	(mg TSS/L)	6,500	<13,000
F/M ratio	(lb BOD/lb MLVSS)	0.17	0.04 to 0.18
Maximum Month			
BOD Loading Rate	(lbs BOD/1,000 ft^3)	87	33 to 88
Aerobic HRT	(hrs)	4.6	4 to 6
MLSS	(mg TSS/L)	10,000	<13,000
F/M ratio	(lb BOD/lb MLVSS)	0.17	0.04 to 0.18

[1] *Metcalf & Eddy, 2014. For SRT, typical values reflect operation with temperatures generally between 10 and 20 °C.*

Table 7-18: **MBR Aeration, Mixing, and Pumping Design Criteria**

Parameter	Unit	Regional WWTP
Mixers (Anoxic)		
Quantity	(#)	`4
Horsepower	(BHP)	2.5
Feed Forward Pumps / RAS		
Quantity	(#)	4
Horsepower (each)	(BHP)	90
Flow (each)	(MGD)	11.0
WAS Pumps		
Quantity	(#)	2
Horsepower (each)	(BHP)	10
Blowers		
Pre-Aeration Basin		
Blower Quantity	(#)	4
Blower Type		Positive Displacement
Horsepower	(BHP)	50
Diffuser Type		Fine Bubble
MBR Basin		
Blower Quantity	(#)	4
Blower Type		Positive Displacement
Horsepower	(BHP)	100
Diffuser Type		Coarse Bubble
Total HP	(BHP)	990

7.3.3.4 Solids Separation

Solids separation is accomplished within the MBR process through membrane filtration. The two primary membrane types are hollow fiber and flat plates. Each have their advantages and disadvantages. For ASPA, use of flat plates may be preferred based on the following:

- Membranes are installed directly in the aeration basins, reducing the plant footprint
- Operating pressures are lower in flat plate membranes compared to hollow fiber membranes
- Less chemical usage compared to hollow fiber membranes
- Less complex controls / systems

If MBR treatment is ultimately implemented to achieve secondary treatment, competitive bidding of various membrane systems should be conducted and incorporate capital, O&M, and ancillary facility costs in the scoring criteria. For the purposes of developing costs in this study, budgetary costs from a flat plate membrane supplier are used.

The primary design parameter for membrane filtration is the permeate flux through the membrane, which is specified by manufacturers at a standard temperature of 20 °C. **Table 7-19** provides the required membrane surface area and flux in gallons per square foot per day (GFD) for the regional WWTP at the design influent flowrates based on typical values from a flat plate manufacturer at 27 °C.

Wastewater generated in American Samoa maintains an annual average temperature around 27 °C, and the viscosity of water decreases at higher temperatures. Reduced viscosity allows greater operating membrane fluxes, resulting in a 15 percent increase in the allowable operating fluxes at all design flowrates compared to typical operation at 20 °C.

Table 7-19: **MBR Design Hydraulic Fluxes (27 °C)**

Parameter	Unit	Regional
Surface Area (total)	(ft^2)	465,000
Flux ADF	(GFD)	10.2
Flux MMF	(GFD)	12.9
Flux PDF	(GFD)	25.4

7.3.3.5 Phosphorus Removal

The requirements for chemical phosphorus removal using an MBR are similar to an oxidation ditch. See discussion above in **Section 7.3.1.5**.

7.3.3.6 Sludge Production and Dewatering

Table 7-20 provides the estimated sludge production associated with secondary treatment using MBRs and anticipated operating conditions.

Table 7-20: **MBR Waste Activated Sludge Production**

Parameter	Unit	Regional WWTP
Concentration	(%TS)	0.65%
Net Sludge Yield	(lbs WAS/lbs BOD)	0.82
Total WAS, Average	(dry lbs/day)	6,887
Total WAS, Average	(gal/day)	127,195
Total WAS, Max Month	(dry lbs/day)	11,120
Total WAS, Max Month	(gal/day)	205,374

Table 7-21 provides the sludge dewatering requirements for operating the MBR at average day and maximum month loading conditions.

Table 7-21: **MBR Dewatering Design Criteria**

Parameter	Unit	Regional WWTP
Average Day [1, 2]		
Solids Loading Rate	(dry lbs/hr)	1,377
Volumetric Loading Rate	(gpm)	424
Discharge mass	(wet lbs/hr)	8,609
Discharge Volume	(CF/hr)	138
Discharge mass	(ton/weekday)	30
Discharge Volume	(CY/weekday)	36
Maximum Month [1, 2]		
Solids Loading Rate	(dry lbs/hr)	2,224
Volumetric Loading Rate	(gpm)	685
Discharge mass	(wet lbs/hr)	13,900
Discharge Volume	(CF/hr)	223
Discharge mass	(ton/weekday)	49
Discharge Volume	(CY/weekday)	58
WAS Storage Tank		
Holding Time	(days)	3
Volume	(gal)	750,000
Mixing Approach	-	Diffused Aeration

1. *Assumed dewatering operation of 7 hours per day (1 hour housekeeping), 5 days per week. Dewatered sludge concentration of 16%.*
2. *WAS collected from MBR tank ranges from 0.65% to ~1%.*

7.3.3.7 UV Disinfection

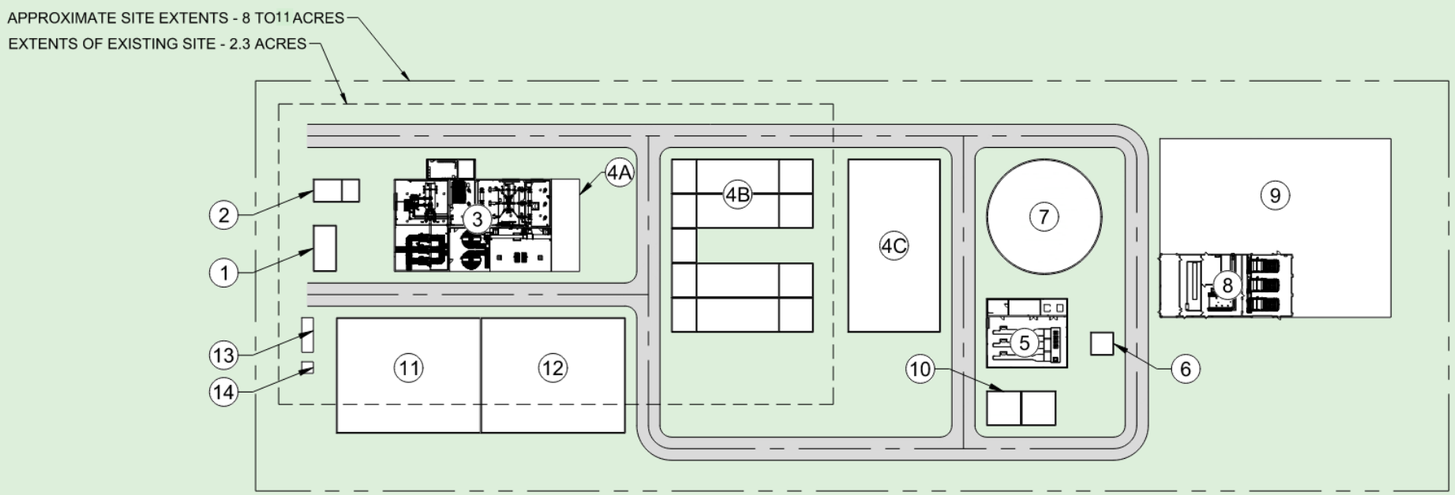
Although effluent from an MBR system has a higher UVT compared to the oxidation ditch or SBR effluent, the system size will be similar. A new UV system is therefore included in the conceptual site layout and cost opinions. See **Section 7.3.1.8** for additional information.

7.3.3.8 Outfall

Similar to the oxidation ditch, the outfall structure and diffuser will need modification and/or replacement when secondary treatment is adopted due to the higher facility flows. See **Section 7.3.1.8** for additional information.

7.3.3.9 Conceptual Site Layout

A conceptual site plan is included in **Figure 7-14** and the estimated land requirement for a MBR is 8 to 11 acres. Additional acreage is recommended for facility expansion as required for additional growth or additional permit conditions.



KEYED NOTES:	
1	SEPTAGE RECEIVING
2	INFLUENT LIFT STATION
3	HEADWORKS BUILDING
4A	2MM FINE SCREENS
4B	MBR TANKS
4C	MBR SUPPORT BUILDING
5	UV DISINFECTION
6	OUTFALL DISTRIBUTION BOX
7	WAS STORAGE
8	DEWATERING BUILDING
9	DEWATERED SLUDGE STORAGE
10	CHEMICAL PHOSPHORUS STORAGE / FEED
11	ADMINISTRATION / LABORATORY BUILDING
12	MAINTENANCE BUILDING
13	GENERATOR
14	TRANSFORMER

Figure 7-14: **Alternative 7 MBR Conceptual Site Layout**

7.3.3.10 Opinion of Probable Capital and O&M Costs

The probable capital cost for Alternative 7, MBR, is $270M, excluding the Utulei pump station and force main. This estimate includes the cost for 11 acres of land purchased at a cost of $700,000/acre. Appendix F includes the Engineer's Opinion of Probable Construction Cost and information provided by equipment vendors is in Appendix G.

The probable total operation and maintenance costs is $9.0M/year, including the Utulei pump station and force main.

7.4 Summary of Costs

Table 7-22 includes a summary of costs for the alternatives discussed above. The opinions of probable cost include contingency (30%), allowance for subsurface conditions / groundwater (5%), funding agency compliance (10%), engineering (20%), and legal and administrative (1%), and the O&M costs include equipment replacement, labor, electricity, chemical cost, land lease, etc., with detailed breakdowns included in **Appendix F**.

Table 7-22: **Summary of Probable Costs**

Description	Oxidation Ditch	SBR	MBR
Utulei - Retain Existing Components and Pump to Tafuna	$136,877,000	$136,877,000	$136,877,000
Headworks - 6 mm screening and grit removal	$33,917,000	$33,917,000	$33,917,000
Headworks - 2 mm fine screening	_	_	$18,620 ,000
Oxidation Ditch - biological basins	$93,306,000	_	_
Secondary Clarification and RAS Pumping	$41,917,000	_	_
SBR - biological basins and post-SBR EQ	_	$785,322,000	_
MBR - biological basins and membranes	_	_	$141,781,000
UV Disinfection	$18,114,000	_	$18,114,000
UV Disinfection - SBR	_	$28,191,000	_
Outfall	$16,011,000	$16,011,000	$16,011,000
Chemical Phosphorus Feed / Mixing	$3,024,000	$3,024,000	$3,024,000
Biosolids Dewatering	$30,891,000	$30,891,000	$30,891,000
Administration, Laboratory, and Maintenance Buildings	$7,010,000	$7,010,000	$7,010,000
TOTAL (2025 DOLLARS)	**$381,077,000**	**$331,253,000**	**$406,255,000**
O&M Equivalent Annual Cost	**$6,563,000**	**$6,471,000**	**$8,945,000**

7.5 References

GDC, *Diffuser Configuration and Performance: Scoping Studies for the Tafuna and Utulei WWTPs*, 2012

Metcalf & Eddy Inc., et al. *Wastewater Engineering: Treatment and Resource Recovery*. 5th ed., McGraw-Hill Professional; 2014.

US Environmental Protection Agency, *A Plain English Guide to the EPA Part 503 Biosolids Rule [EPA/832/R-93-003];* 1994.

US Department of Defense, *DOD Area Cost Factors (ACF) PAX; Newsletter No. 3.2.1, Dated 29 March 2024,* http://www.usace.army.mil/CostEngineering/ProgrammingAdministrationandExecutionSystemNe.aspx retrieved 11/25/2024.

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CHAPTER 8
RECOMMENDED ALTERNATIVE

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Chapter 8 Recommended Alternative

8.1 Introduction

This chapter develops a weighting approach for the criteria developed in **Chapter 2** to identify the most viable secondary treatment alternative developed in **Chapter 7**. Facility classification, staffing and certification requirements, laboratory and process control testing requirements, and operation and maintenance costs for the recommended alternative are developed to document the significant changes in operations which will be required if secondary treatment is implemented. A potential timeline of improvements is also provided to illustrate the likely phasing of activities that would be required to transform the existing primary treatment facilities to a regional secondary treatment facility.

8.2 Monetary and Non-Monetary Evaluation of the Pre-Screened Alternatives

Chapter 2 introduced the goals of this Secondary Treatment Feasibility Study which were subsequently used as criteria for scoring each treatment alternative. The goals / criteria are defined in **Table 8-1**. In **Chapter 6**, a preliminary ranking of the alternatives was developed, but the criteria were not weighted based on criticality for ASPA. A pairwise analysis of the criteria was conducted with ASPA staff, as well as with a US EPA representative, to determine the relative weight of each criterion during and following a workshop on September 26, 2024. In a pairwise analysis, each criterion is compared individually against the other criteria. The scoring is shown in **Figure 8-1** and the process is generally described as follows:

- The criteria in the first column are compared to the other criteria along the top row. Scoring is entered in the blue-shaded cells and a converse score is generated in the light grey cells. The blue-shaded cells are scored with the following: 5 – significantly more important / 4 – more important / 3 – equally important / 2 – less important / 1 – significantly less important.
- For example, the criterion “Minimize Power Consumption” (row 5) was compared to “Operational Simplicity” (column 3). ASPA believed that minimizing power consumption was slightly less critical than providing operational simplicity, and therefore scored this condition at “2”. This resulted in a score of “4” in the corresponding grey cell (row 3 for “Operational Simplicity”, column five for “Minimize Power Consumption”). The remaining criteria were scored similarly.
- The total of each row (column 8) is then used to determine the relative weight of the criteria and corresponding rank.

Operational Simplicity, Maintenance Simplicity, and Affordability were the three most important criteria to ASPA. The Ability to Satisfy Future NPDES Discharge Permits was the fourth most important, followed by minimizing Power Consumption. Although considered important, ASPA felt that acquiring a new parcel of Land for a regional WWTP was the least important criteria for determining the preferred secondary treatment alternative.

Table 8-1: **Pairwise Scoring Criteria and Definitions**

Goal / Criteria	Definition
Ability to Satisfy Future NPDES Discharge Permits	The Tafuna and Utulei WWTPs have previously operated under a 301(h) waiver which effectively required only primary treatment. The draft Tafuna NDPES permit requires secondary treatment as well as nutrient removal. A draft permit for Utulei is not currently available, but similar discharge conditions could be established in future permits. The primary goal of this study is to evaluate the ability of both the facilities to achieve the effluent standards currently envisioned in the draft Tafuna NPDES permit.
Operational Simplicity	Current operations are relatively simple from a process standpoint. However, implementation of secondary treatment and nutrient removal will significantly increase the process complexity and the amount of equipment in operation. ASPA is seeking treatment processes that are time proven and relatively simple to operate and maintain. This is particularly critical since American Samoa is an isolated island community with inherent challenges associated with hiring and retaining qualified personnel to operate and maintain a WWTP. Operational simplicity is also critical since the existing treatment facilities experience difficulties with instrumentation and SCADA. A related concern is the need for more laboratory analyses to provide data for additional permit requirements, as well as process control.
Maintenance Simplicity	From an equipment perspective, the ability to obtain new equipment, replacement parts, consumables, and chemicals, as well as receive adequate vendor support, are very important to ASPA due to being located on an island where items require the additional time and costs associated with shipping. ASPA has experienced difficulty in obtaining suitable field support for troubleshooting equipment with other public works projects.
Minimize Power Consumption	Minimizing the amount of power that is required to operate the WWTPs is another high priority of ASPA. Renewable solar energy is developing on the island, but the main source of electricity is diesel generators – approximately 95% of the electricity generated on the island is produced through the combustion of imported fossil fuels. Consequently, the cost per kilowatt hour on American Samoa is roughly twice the cost compared to the average cost on the mainland United States. Not only do diesel generators emit carbon dioxide during combustion, but they also emit particulates that contribute to air pollution.
Affordability: Capital Cost + O&M	Capital costs, as well as a project's lifecycle cost from O&M, are critical factors in ASPA's decision-making process. American Samoa is an underserved community that has the lowest per capita income compared to the United States mainland and associated territories, with poverty rates four times higher than the U.S. mainland.
Land Requirement	The availability of sufficient land space to accommodate secondary treatment.

Criteria	Ability to satisfy future NPDES discharge permits	Operational Simplicity	Maintenance Simplicity	Minimize Power Consumption	Affordability: Capital Cost + O&M	Land Requirement	Total Score	Weight	Rank
Ability to satisfy future NPDES discharge permits	x	3	3	3	3	5	17	18.9%	4
Operational Simplicity	3	x	3	4	3	5	18	20.0%	1
Maintenance Simplicity	3	3	x	4	3	5	18	20.0%	1
Minimize Power Consumption	3	2	2	x	2	4	13	14.4%	5
Affordability: Capital Cost + O&M	3	3	3	4	x	5	18	20.0%	1
Land Requirement	1	1	1	2	1	x	6	6.7%	6

Each criterion in the first column is compared against remaining criteria in the top row to establish relative importance as follows:
5 – significantly more important
4 – more important
3 – equally important
2 – less important
1 – significantly less important

Figure 8-1: **ASPA Secondary Treatment Goals / Criteria Pairwise Weighting Analysis**

The original scoring from **Chapter 6** has been retained with the exception of the score for Affordability, which has been updated to reflect the capital and O&M costs from **Chapter 7**. A score of "1" was assigned to Alternative 7 MBR, which is the highest cost alternative. A maximum score of "5" was assigned to a capital cost of $20M, which is the approximate opinion of probable cost for maintaining operation of the existing Tafuna WWTP per the Utility Plan. Scores for the Oxidation Ditch and SBR alternatives were based on a linear interpolation between those data points.

The raw and weighted scoring are shown in **Table 8-2**, and based on the established criteria and weighting factors, the oxidation ditch alternative is the most favorable option for implementing secondary treatment.

Table 8-2: Scoring and Ranking of the Alternatives

Goal	Criteria Weighting Factor	Alternative 4: Oxidation Ditch	Alternative 6: SBR	Alternative 7: MBR
Ability to satisfy future NPDES discharge permits	18.9%	**5**	4	5
Operational Simplicity	20.0%	**4**	2	2
Maintenance Simplicity	20.0%	**4**	3	1
Minimize Power Consumption	14.4%	**4**	3	1
Affordability: Capital Cost + O&M	20.0%	**1.32**	1.85	1
Land Requirement	6.7%	**1**	3	5
SUBTOTAL	100%	**19**	17	15
TOTAL (weighted x 100)		**345**	276	222
Ranking		**1**	2	3

8.3 Facility Classification, Staffing, and Certification Requirements

8.3.1 Regional WWTP Facility Classification

Wastewater treatment facilities are assigned a classification number to indicate the complexity of the treatment process, with the larger the number indicating a more complex system. In addition to characterizing the treatment facility complexity, the classification number is also used to set guidelines for the plant manager's and operators' certification requirements.

USEPA Region 9 does not provide an official region-specific wastewater treatment facility classification scoring system, but the state of Hawaii and other member states have developed wastewater treatment facility classification systems. To estimate a Tafuna Regional WWTP facility classification, the Hawaii Department of Health (DOH) guidelines were utilized for this study.

A regional secondary WWTP performing nitrogen and phosphorus removal is expected to be classified as a Class IV facility by the Hawaii Department of Health. A regional secondary WWTP scored 95 points per Hawaii's Criteria for Classification of Wastewater Treatment Plants, where a score greater than 76 meets the criteria for a Class IV facility (Hawaii DOH, 2001). The scoring worksheet for a regional secondary WWTP in Tafuna is provided in **Appendix H**. For perspective, the existing Tafuna primary WWTP scored 54 points based on current operations and would likely be classified as Class II facility per Hawaii's WWTP facility classification system.

8.3.2 Staffing Requirements

The New England Interstate Water Pollution Control Commission (NEIWPCC, 2008) guide for estimating staffing at publicly owned wastewater treatment plants was used to estimate staffing requirements at the regional secondary WWTP. The NEIWPCC staffing guide was developed to update the USEPA's 1973 publication *Estimated Staffing for Municipal Wastewater Treatment Facilities* since this original document quickly became outdated due to new treatment technologies, increasingly stringent permit requirements, incorporation of tertiary treatment, etc. The NEIWPCC staffing recommendations are based on the size of the WWTP, treatment processes utilized, treatment requirements that are more stringent than secondary treatment (i.e. nitrification, denitrification, and phosphorus removal), and permit monitoring requirements. These staffing estimates are based on managing a secondary WWTP only. The NEIWPCC does not estimate the following staffing requirements which are required to successfully operate a complete wastewater treatment program:

- Management (administration, human resources, budgeting, outreach, training, meetings, scheduling, etc.)
- Collection system maintenance (including pump stations)
- Alternative power sources
- Onsite construction and facility upgrades

Additional information regarding assumptions used the NEIWPCC staffing estimates and the scoring sheet for the ASPA Regional WWTP staffing estimate can be found in **Appendix H**.

Table 8-3 provides the estimated annual labor hours associated with managing a regional secondary WWTP and the resulting estimated staffing requirement. A total of 16,300 hours annually is estimated for facility operation and maintenance. Full-time staffing at 8 hours per day and 5 days per week is assumed in the ASPA Regional WWTP staffing estimate; weekend operation would be automated with staff on-call for emergencies. After subtracting hours for benefits, overhead, and training, each employee is estimated to contribute 1,500 working hours per year, thereby requiring approximately 11 fulltime operators. This estimate is similar to guidance provided by USEPA (1981), which suggests 11 fulltime staff to operate an advanced secondary municipal treatment plant at a design flow of approximately 5.5 mgd.

Additional O&M hours and staffing may be required for challenges specific to American Samoa, such as operator training and certification, workforce availability, environmental attack (corrosion and humidity), availability of spare parts due to an isolated location, etc.

Table 8-3: **Staffing Estimate for Operating Regional Oxidation Ditch Treatment Process**

Activity	Hour/Year	% of time
Operations	6,000	60%
Maintenance	2,900	
Laboratory	2,500	10%
Sludge Handling	4,300	25%
Yardwork	600	<5%
Total Hours	16,300	
Staff Required	11	

The values in **Table 8-3** reflect the following relative commitments. Facility operations plus maintenance is estimated to account for roughly 60% of the WWTP staff's time commitments. Yardwork is estimated to account for <5% of operator's time commitments. The staffing estimates for these items may be low given American Samoa's corrosive and humid marine environment. Solids handling and management is expected to account for 25% of the WWTP's annual labor budget. Laboratory testing is anticipated to account for roughly 10% of the labor budget, but this is also an underestimation since this is the laboratory time requirement to meet only the routine Draft NPDES discharge permit monitoring requirements (i.e. quarterly sampled parameters and the priority pollutant scan is outsourced for external analyses). It should also be noted that this laboratory time estimate assumes influent and effluent samples are collected at the same time and are analyzed in unison to optimize laboratory time commitments. Additional laboratory time commitments will be required to perform process control in addition to NPDES permitting requirements.

8.3.3 Operator Certification Requirements

Hawaii administrative code was used for determining the minimum operator certification requirements for a regional secondary WWTP in American Samoa. Hawaii requires the lead operator, or Chief Plant Operator (CPO), to be certified to the classification assigned to the treatment facility, which will be a

Grade IV operator for a secondary regional WWTP performing tertiary treatment per Hawaii Administrative Rules Section 11-61-3, Part a (Hawaii DOH, 2002). Other operators may require advanced certification, especially if the lead operator is unavailable.

Hawaii maintains full reciprocity for operator certifications obtained in different jurisdictions and provides educational opportunities to progress through the certification process. Certification requirements are defined in Hawaii Administrative Rules Section 11-61-4 and summarized in **Table 8-4** below. ASPA currently has no certified operators but is actively engaged in training existing staff to obtain classification. If the secondary treatment improvements listed in this study are implemented, ASPA will have to provide training and experience for current staff at higher classification facilities to achieve the appropriate certification for a Class IV facility, hire staff with advanced certification, or seek a temporary waiver of certification from EPA and ASEPA (if possible). At least one Grade IV operator will be required, and a backup Grade IV operator is recommended. Two Grade III operators are also recommended to provide additional depth of experience. Discussions with ASPA leadership also resulted in a recommendation to have the plant managed by an experienced manager, preferably an environmental engineer with at least five years' experience.

Table 8-4: **Operator Certification Experience Requirements (Hawaii)**

Path	Education		Operating Experience
Grade I			
1	High school diploma or equivalent	and	1 year operating experience
Grade II			
1	High school diploma or equivalent and 6 educational points	and	2 years operating experience OR
2			1.5 years of operating experience at Grade I
Grade III			
1	High school diploma or equivalent and 16 educational points	and	3 years operating experience OR
2			2.5 years of operating experience at Grade II
3	Associate degree including 15 basic science credits, or two years of college education including 15 basic science credits	and	2 years operating experience
Grade IV			
1	High school diploma or equivalent and 32 educational points	and	5 years operating experience OR
2			4 years of operating experience at Grade III
3	Associate degree including 15 basic science credits, or two years of college education including 15 basic science credits	and	4 years operating experience
4	Bachelor's degree in a field related to wastewater treatment	and	1 year operating experience

8.4 Laboratory Testing

Laboratory work generally consists of sampling and testing for NPDES permit compliance and process control monitoring. The Tafuna draft NPDES permit will require increased effluent monitoring and associated laboratory analyses compared to primary treatment. **Table 8-5** provides the parameters, location of sample, and laboratory responsible for the testing. The nutrient parameters TAN, TN, and TP can be measured via a combination of digestion, reaction, and filtration followed by analysis by UV spectroscopy, ion chromatograph, or other EPA certified method. UV spectroscopy is typical since it allows the measurement of a variety of other parameters, is easy to use, and is easy to maintain. The remaining parameters are sampled less frequently, require more specialized laboratory equipment, and are recommended to be analyzed by external laboratories.

Table 8-5: NPDES Effluent Monitoring Laboratory Testing Requirements

Parameter Analyzed	Permit (#/year) Influent	Permit (#/year) Effluent	Laboratory Utilized
BOD	52	52	ASPA
TSS	52	52	ASPA
Temperature	-	52	ASPA
pH	-	52	ASPA
Enterococci	-	52	ASPA
Oil and Grease	-	12	ASPA
TAN	-	12	ASPA
TN	-	12	ASPA
TP	-	12	ASPA
2,3,7,8-TCDD	-	4	Off Island
bis(2-ethylhexyl) Phthalate	-	4	Off Island
4,4'-DDT	-	4	Off Island
Chronic Toxicity	-	4	Off Island
Priority Pollutant Scan	-	1/permit cycle	Off Island

In addition to water quality monitoring to meet permit requirements, process control monitoring is critical to successfully operating a secondary WWTP performing nitrogen and phosphorus removal. **Table 8-6** provides an example process control sampling strategy that can be accomplished using the routine sampling laboratory methods presented in **Table 8-5**. The column labeled *Basin* refers to sampling unit processes, and the column labeled *Solids* indicates sampling for biosolids dewatering.

Table 8-6: Process Control Laboratory Testing Suggestions

Parameter	Process Control (#/year) Influent	Effluent	Basin	Solids	Laboratory
Temperature	-	-	probe	-	ASPA
pH	52	-	probe	-	ASPA
DO	-	-	probe	-	ASPA
ORP	-	-	probe	-	ASPA
BOD	-	-	52	-	ASPA
VSS	52	52	-	-	ASPA
MLSS	-	-	52	-	ASPA
MLVSS	-	-	52	-	ASPA
TS	-	-	-	52	ASPA
VS	-	-	-	52	ASPA
TAN	52	40	52	-	ASPA
TN	52	40	-	-	ASPA
NO_3-N & NO_2-N	-	52	52	-	ASPA
TP	52	40	-	-	ASPA
DP (or SRP)	52	52	52	-	ASPA
ALK	4	4	4	-	ASPA

Parameters not included in the Tafuna draft NPDES permit but suggested for process control in **Table 8-6** are briefly described below:

- Temperature is known to be very consistent and should be measured via probe in basin. Even if a dedicated temperature probe is not used, the DO probe measures temperature to calculate DO saturation.
- pH should be monitored in the basins to monitor and maintain optimal biological conditions for treatment in each biological process.
- Dissolved oxygen (DO) should be monitored by probe in the aeration basins to maintain a DO concentration of 2 mg/L. The DO probe should communicate with the blowers to provide the optimal amount of aeration to reduce energy consumption.
- Oxygen reduction potential (ORP) should be monitored in the anoxic basins to manage recycle rates where high ORP indicates too much DO and extremely low ORP indicates nitrate exhaustion.
- BOD can be sampled in the anoxic tank to ensure adequate BOD is available for denitrification.
- Volatile suspended solids (VSS) can be measured in the influent to calculate and monitor inert suspended solids, since an increase may suggest issues with the conveyance system. Monitoring the effluent will allow identification of any TSS infractions (biological versus chemical TSS).
- Mixed liquor suspended solids (MLSS) is the same test as TSS and is required to manage the mixed liquor concentrations.
- Mixed liquor volatile suspended solids (MLVSS) is the same test as VSS and characterizes the organic fraction of MLSS.
- Total solids (TS) is required for solids dewatering and solids disposal record keeping.
- Volatile solids (VS) characterizes the amount of organic matter in the TS.
- Measuring nutrients (TAN, TN, TP, DP, and NO_3-N and NO_2-N) weekly in the influent and effluent will allow optimization of biological nitrogen removal and will be required for alum dosing for chemical phosphorus removal. Dissolved phosphorus (DP) is the target phosphorus species for alum addition.
- Alkalinity (ALK) is required for nitrification to occur. If adequate ALK is in the influent, then less testing can occur. ALK testing should be investigated in the case of pH swings.

8.5 Operation and Maintenance Costs

8.5.1 Operation and Maintenance Assumptions

ASPA's fiscal year 2025 budget for maintaining the existing collection system, pump stations, and existing primary treatment wastewater services is provided in **Table 8-7**.

***Table 8-7*: ASPA 2025 Wastewater Services Budget**

Description	Personal Services	Material & Supplies	Contractual Services	Travel	All Others	Equipment	Total
Budget	$2,204,000	$1,551,000	$6,505,000	$19,000	$1,513,500	$690,500	$12,483,000

The following secondary WWTP and Utulei force main O&M costs are in addition to the current allocated wastewater services budget since the existing collection systems and primary treatment at Utulei prior to pumping to a regional WWTP are assumed to be utilized in this feasibility study.

The following assumptions were used to estimate annual O&M costs for a regional secondary WWTP based on an oxidation ditch.

- Labor
    - An addition 11 full time employees working 8-hour days and 5 days a week to operate secondary treatment, and 2 full time employees are responsible for the Utulei force main.
    - $30/hour for wages and benefits, weighted average for WWTP staff. This is based on the following:
        - Grade IV operators: A recent job posting for a Grade IV operator in Hawaii has a listed salary of $79,000 per year. ASPA expects a subsidy would be required for housing and a vehicle. For budgeting purposes, a housing stipend of $800/month and a vehicle stipend of $400/month is included for each Grade IV operator.
        - Grade III operators: Estimated based on the Hawaii job posting and current Grade II salaries.
        - The addition of Grade IV and Grade III operators may result in pay increases for other staff. Therefore, an additional $5/hr was applied to the calculated average.
        - ASPA's current fringe benefits are 26.7% of operator's salary.
        - 4% annual salary increase.
- Equipment Maintenance and Replacement
    - Equipment lifespan is estimated at 10 years, which is shorter than typical but accounts for the harsh marine environment. To fund replacement, the O&M cost is approximately 10% of the major equipment capital cost per year, i.e. pumps, mixers, clarifier mechanisms, blowers, etc. Additional funding for smaller equipment items, valves, etc. will be required.
- Electrical
    - The average day power demand for the surface aerators plus the power demand for the solids holding tank blowers represents the aeration demand. Aeration typically accounts for two-thirds to three-quarters of the total power demand for secondary treatment plants.
    - The current electrical cost is $0.36 per kW-hr; however, the analysis assumed $0.50 per kW-hr to be conservative since the full electrical load is not known and due to the volatility of electrical cost.
- Chem P (Alum)
    - Alum dosing at 31 mg Alum/L for average day flow.
    - 207 gallons per day at $3.00/gal of 48.5% alum.

- Solids Disposal
    - It is estimated that ~6,600 dry pounds per day of biological and chemical sludge are produced per day at average design conditions and is dewatered to 15% total solids.
    - Each week, ten 20 cubic yard dumpsters are estimated to be generated and will be taken to the Futiga landfill located 3 miles away from the plant.
    - The cost of transportation is $2/mile.
    - ASPA manages the landfill and no tipping fees are currently charged.

8.5.2 WWTP Operation and Maintenance

Table 8-7 provides the estimated annual O&M cost for the treatment facility alone of approximately $6.1M per year with a percentage breakdown of the estimated costs – reference Appendix F for a detailed breakdown of O&M costs. Labor accounts for almost half of the facility's estimated operating budget, which is typical for a secondary WWTP (EPA, 1981). Administrative costs are not included in the table below but are typically 8% of the WWTP's O&M budget (EPA, 1981).

***Table 8-8*: Regional WWTP Annual O&M**

Category	Cost
Equivalent Yearly O&M	$6.1M
% of O&M	
Equipment Maintenance / Replacement	53%
Labor	18%
Laboratory Analyses	4%
Chem P (Alum)	7%
Electrical	18%
Solids Disposal	0.2%

8.5.3 Utulei Pump Station Force Main Operation and Maintenance

Table 8-8 provides the estimated annual operation and maintenance for the pump station and force main from Utulei to a regional WWTP – reference Appendix F for a detailed breakdown of O&M costs. The largest cost associated with the annual pump station and force main operating budget is for personnel, and one third of the estimated budget is associated with pumping costs. Roughly 60% of a typical force main budget on the mainland is associated with personnel (EPA, 1981).

***Table 8-9*: Utulei Force Main Annual O&M**

Category	Cost
Equivalent Yearly O&M	$0.44M
% of O&M	
Labor	43%
Equip. Maintenance	11%
Pumping	46%

8.6 Potential Timing and Construction Sequencing

The following section outlines a potential sequence of events associated with implementing secondary treatment for ASPA. Several of these items could occur concurrently, particularly activities preceding design such as I/I identification and reduction.

8.6.1 NPDES Permit(s)

The most critical is the timing and content of updated discharge permits. The Tafuna permit has expired and the draft permit will require significant and expensive changes to the current wastewater treatment approaches. In March 2024, ASEPA issued a technical memorandum assessing the water quality at the Tafuna outfall based on data collected from 2005 through 2023 (see **Appendix B**). Several key statements in the Summary section (pages 13 and 14) are included below.

> *Data presented here indicates overall excellent water column conditions for the receiving water for Outfall 001 and substantial compliance with the ASWQS over this period of 19 years [2005-2023]. Except for total nitrogen, violations of the ASWQS are relatively few and compliance is dominant throughout the data period.*
>
> *Overall, AS-EPA has determined through this assessment that primary treatment can be effective to meet the ASWQS for ocean receiving water for the Tafuna Wastewater Treatment Plant, and that primary treatment is an appropriate level of technology for this remote part of the Pacific.*

These statements indicate that a relaxation of the adopted water quality standards (WQS's) or adoption of site-specific criteria may be possible by ASEPA. It is not known to what degree this might be possible, nor if EPA would accept the revisions. ASPA should continue discussions with ASEPA and EPA to explore these possibilities since it could have a significant impact on the alternative investigated in this Secondary Treatment Feasibility Study, including continued use of the Tafuna and Utulei facilities with improvements to address more critical water quality deficiencies. This may include an outfall study to determine if modifications could be implemented to increase the dilution factor, thereby relaxing the discharge standards while still maintaining compliance with the water quality standards.

It is also recommended that ASPA conduct additional sampling and monitoring of the ocean adjacent to and up current of the existing Tafuna outfall. ASPA leadership noted during a workshop with J-U-B and ASEPA that they are concerned about offal discharge from Starkist which is east (up current) of the Tafuna outfall approximately 4 miles. ASEPA noted that ocean discharge of Starkist's high-strength waste was reinstated in 2020 (it had been landfilled the preceding 8 years) and that all discharge points are monitored with GPS. While it is not known if that discharge is negatively impacting water quality at the Tafuna outfall and driving the draft permit limits, ASPA leadership noted negative impacts to fishing and believe that further investigation of background pollutants is warranted.

It is also noted that the draft Tafuna permit did not include a compliance schedule. However, inclusion of a long-term compliance schedule seems reasonable given the expansive changes to the treatment facility that would be required for compliance. The timing of a final permit is not known.

Additionally, the Utulei permit is set to expire on December 31, 2024, and it is not known if a 301(h) waiver might be granted for that facility. If a 301(h) waiver is granted, the design flows and loads used to develop the secondary treatment alternatives in **Chapter 7** will need to be revised and re-evaluated.

8.6.2 I/I Identification and Reduction

As noted in prior chapters of this study and the Wastewater Utility Plan (separate document), I/I is a significant concern for both treatment facilities. ASPA should continue I/I identification and reduction projects to reduce the excessive flows in its collection systems, especially in Utulei. In doing so, the size and cost of the secondary treatment components could be reduced.

8.6.3 Site Selection

Land availability is a significant concern. If secondary treatment must be implemented, ASPA will have to find suitable parcels for construction of a new WWTP. A new location will also impact the routing of the force main from the Utulei area and will require a new outfall. If suitable parcels are not available, then partitioning the treatment in several areas – e.g. the existing Tafuna WWTP for primary treatment, a new site for secondary treatment, another site for solids handling, etc. – may be necessary. Partitioning treatment over several noncontiguous parcels will significantly increase the capital and operations costs.

Based on feedback from ASPA, this study assumes land can be purchased for $700,000/acre.

Site selection should be included during the pre-design phase so the design engineer can evaluate potential sites and help ASPA select the preferred location.

8.6.4 Funding

Funding is a significant hurdle for ASPA. EPA has indicated in discussions with ASPA that grants may be available to cover a majority of the capital costs, which would ease the burden on the ratepayers. However, without a sound financial plan and the resources to support the long-term O&M costs, the secondary treatment facility will deteriorate quickly and could lead to an overall degradation of water quality compared to current conditions if processes are not fully functional.

8.6.5 Design

Once these foundational pieces are in place, design of a regional WWTP in Tafuna could begin, which would likely take up to two to three years because of the remote nature of the island and associated regulatory reviews. The design should consider the potential of an initial phase to process Tafuna's flows with a subsequent expansion to incorporate Utulei's flows and become a regional facility. Design of the Utulei pump station and force main could be done concurrently. An extensive underground utility investigation and corresponding mapping will be required prior to initiating design since the force main will be along Route 001. Other studies to be done in conjunction with or prior to design, include analyzing the impact of additional secondary treatment solids on the existing landfill and its future, and a mixing zone analysis to determine the design of the outfall.

8.6.6 Construction

Construction for a new WWTP will likely require four to five years to complete. Additional delays associated with labor availability, material availability, and other factors related to the island's location should be factored into the construction schedule. The schedule delays will also result in cost overruns which should be considered in the budgeting process.

The Utulei pump station and force main cannot be completed prior to the successful completion of the regional facility, and preferably after the successful commissioning and operation of the regional facility. Because the force main will be constructed on Route 001, there will be significant traffic impacts and the construction progress may be rather slow to maintain safety (e.g. minimizing open trench lengths).

8.6.7 Operations

The schedule will also need to incorporate training and/or hiring of operators with advanced certification to run the new treatment facility. Certified operators should be on staff during construction to familiarize themselves with the facility and begin initial commissioning and start-up activities as construction concludes. Facility start-up and process optimization could take several months to a year, depending on staffing levels. During this time, permit compliance may not be achieved.

8.7 References

Hawaii Department of Health, Hawaii Administrative Rules, Title 11, Chapter 61, Mandatory Certification of Wastewater Treatment Personnel in Wastewater Treatment Plants; 2002

New England Interstate Water Pollution Control Commission, *The Northeast Guide for Estimating Staffing at Publicly and Privately Owned Wastewater Treatment Plants*; 2008

USEPA, Operation and Maintenance Costs for Municipal Wastewater Facilities, Technical Report 430/9-81-004; 1981

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CHAPTER 9
FINANCIAL ASSESSMENT

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Chapter 9 Financial Assessment

9.1 Introduction

The purpose of this chapter is to provide a financial assessment if secondary treatment is implemented at a regional wastewater treatment plant in Tafuna. This analysis includes fully funding the capital improvement plan outlined in the Wastewater Utility Plan ("WWUP"), which is a stand-alone evaluation of the ASPA wastewater utility also developed by J-U-B. The recommendations in this chapter are intended to provide long-term financial sustainability of the wastewater utility operated by ASPA based upon the opinions of probable construction costs and O&M expenses developed in prior chapters. This chapter will begin with an overview of the general methodology utilized to analyze the financial sustainability of the wastewater utility. This will be followed by a review of each portion of the analysis. This chapter will conclude with findings and recommendations.

9.2 General Methodology

The first step in analyzing the implementation of a long-term capital plan is to analyze the current operation and maintenance of the system. This includes a 10-year projection of current operating costs. Prior to adding capital, the user rate is adjusted to find break-even while meeting specific financial metrics. Capital projects are then added along with new O&M needed for this new capital. Several scenarios are then run to include grant and debt to fund the capital improvement plan while continuing to modify the rate to meet the financial metrics. Conclusions and recommendations are then provided. The overall goal of this analysis is to present scenarios that generate sufficient annual revenue to ensure the system can successfully operate into the future while maintaining the lowest possible monthly user rate.

9.3 Operating Expenses

The first step is to provide a basic foundation for the operating costs needed to operate and maintain the current system. This analysis assumed a 3% inflation rate on the operating expenses. The following operating expense categories were projected for the next 10 years. The amounts provided are the 2025 budget including the GL account number.

- $2,204,000 - Personnel (5100)
- $1,551,000 - Material & Supplies (5200)
- $221,290 - Contractual Services (5300) – note: capital expenditures were pulled from this line item.
- $19,000 - Travel (5400)
- $1,513,500 - All Others (5500)
- $690,500 - Equipment (5600)
- New Operation and Maintenance from STFS

Total operating expenses were budgeted at $6.2M for these items in 2025 for current operations. Assuming a 3% growth rate, these expenses are estimated to grow to $7.0M in 2035. Adding the new

O&M for the STFS projects would be another $3.76M (in 2025 dollars) per year beginning in 2031 inflated in the analysis to 2031 at 3% to $4,486,052.

9.4 Break Even Analysis

After making the projections in Section 1.3, this analysis adjusted the user rate to break even each year until 2035 at 5% annually. Revenue is currently generated almost entirely by user rates. This analysis assumed the current estimated 10,315 user accounts would not grow through the 10-year period. Approximately 90% of the user accounts are residential connections. The others are industrial, government, and commercial. This analysis assumed a uniform percentage rate increase across all categories. A future analysis could review the specific cost recapture needed among and between specific categories if desired by ASPA.

9.5 Capital Improvement Plan

After analyzing the break-even scenario, the next step was to add the full capital improvement plan for the next 10-years from the Wastewater Water Utility Plan (WWUP) and then this Secondary Treatment Facility Study (STFS) into the analysis. The 0-5 year projects were averaged across the next 5 years as were the 6-10 year projects averaged over years 6 to 10 to create an average capital expense each year. The 0-5 year projects averaged $6.9M/year from the WWUP and $68.2M/year from the STFS. This analysis recognizes that the treatment plant is not likely to begin construction in 2026; however, the impacts of this system are being evaluated as if the STFS is built in the 0-5 year timeframe. The 6-10 year projects $2.9M/year from the WWUP. Projects beyond this timeframe will be analyzed in a future analysis.

9.6 Funding Options

This analysis assumes the following funding options:

1. 100% grant funding and 0% debt.
2. 50% grant and 50% debt.
3. 0% grant funding and 100% debt.

ASPA has many options to fund debt. This analysis is not a recommendation but simply an estimate of one widely available option which is the USDA's Water and Waste Disposal Loan & Grant Program. This debt was assumed to be issued every 3 years with a 40-year repayment at 4.0% interest rate.

9.7 Financial Metrics

Aside from simply breaking even, a financially healthy utility must also meet certain other financial metrics. The metrics utilized in this analysis were obtained from S&P Global Ratings Criteria for U.S. Public Finance: U.S. Municipal Water, Sewer, And Solid Waste Utilities: Methodology and Assumptions published on March 25, 2015.

These financial metrics allow for evaluation of a healthy utility regardless of the size of the system. The metrics are as follows:

- **Cash on Hand** – 100% of operating expense in a reserve fund for emergency purposes.
- **Debt Service Coverage** – 1.25x net debt service coverage. This metric measures the ability to service debt. For every $1 of debt service, the 1.25x net debt service coverage ratio assumes $1.25 of net operating revenue, after paying all operating expenses, is available.
- **Affordability** – the affordability ratio comes from the USDA Water and Waste Disposal Loan and Grant Program which recommends 1.5% of the territories Average Median Household Income (AMHI) is spent on sewer. In the 2020 US Census, the AMHI for American Samoa was $28,539 which provides an affordable monthly rate of $35.67 per month. The AMHI grew from $23,892 in 2010 to $28,539 in 2020 which is an average annual growth rate of 1.79%. The growth in AMHI was assumed at 1.79% over the next 10 years.

9.8 Scenario Analysis

This analysis provides four scenarios as follows. Each are provided below along with a set of charts that provide a summary of the financial metrics and outputs for each scenario. The financial models for each of the scenarios are included in **Appendix I**. Several cells are highlighted in yellow for the purpose of bringing attention to areas that ASPA and J-U-B/EFG Consulting can refine in the future if ASPA moves toward a final rate to fund projects in the future.

9.8.1 Scenario 1 – WWUP Projects, Oxidization Ditch, 100% Grant Funded, No Rate Increase

Scenario 1 fully funds the WWUP projects and the Oxidization Ditch through grant funds including the O&M for the new Oxidization Ditch. This scenario assumes no additional rate increases above the recommendations in the WWUP, which is 5% per year to break even. This is the only scenario that is affordable for rate payers. Outputs are shown in **Figure 9-1** and described below.

- **Expenditures:** This graph depicts operational expenses which are assumed to increase at 3% annually.
- **Revenues:** A 5% annual year-over-year rate increase is necessary to keep cash balances at break even in year 2035.
- **Cash Reserves:** Cash breaks even in year 2035. This is well below the cash reserve benchmark. This is due to a grouped cash balance for all of ASPA. Future analysis with ASPA may determine a more accurate allocation to each ASPA cost unit.
- **Coverage:** With no debt allocated currently to the wastewater unit, this graph provides no data for this scenario.
- **Rate Affordability:** The break-even analysis already pushes the necessary rate above the affordability metric.
- **Rate Change:** This graph depicts the rate change as a percentage and as revenue per account per month.
- **Grant Needs:** This graph demonstrates the large amount of annual grants needed to fund the projects in the WWTP, new STFS project, and O&M for the STFS project.



Figure 9-1: Scenario 1 Outputs – 100% Grant Funded, No Rate Increase

9.8.2 Scenario 2 – WWUP Projects, Oxidization Ditch, 100% Grant Funded, Rate Increase for O&M

This scenario has the same underlying assumptions as Scenario 1 with the exception that Scenario 2 increases rates to cover the new O&M from the STFS project starting in 2031. See **Figure 9-2**. This scenario would require a dramatic, unaffordable rate increase of 82.5% in 2031 when the new Oxidization Ditch is assumed to be fully functional. The affordability metric would be breached by more than 2x. This scenario is not financially feasible.

- **Expenditures:** This scenario assumes 3% annual O&M increases with the additional O&M for the Oxidization Ditch in 2031 which also grows at 3%.
- **Revenues:** Following the break-even scenario, this scenario assumes a 5% annual year over year increase until 2031 when an 82.5% increase is needed. Rates then increase by 4.2% thereafter each year to reach break-even by 2035.
- **Cash Reserves:** Cash breaks even in year 2035. This is well below the cash reserve benchmark. This is due to a grouped cash balance for all of ASPA. Future analysis with ASPA may determine a more accurate allocation to each ASPA cost unit.
- **Coverage:** With no debt allocated currently to the wastewater unit, this graph provides no data for this scenario.
- **Rate Affordability:** The break-even analysis already pushed the necessary rate above the affordability metric. This scenario pushes the rate more than 100% above the affordability metric.
- **Rate Change:** This graph depicts the rate change as a percentage and as revenue per account per month.
- **Grant Needs:** This graph demonstrates the large amount of annual grants needed to fund the projects in the WWTP and new STFS project.

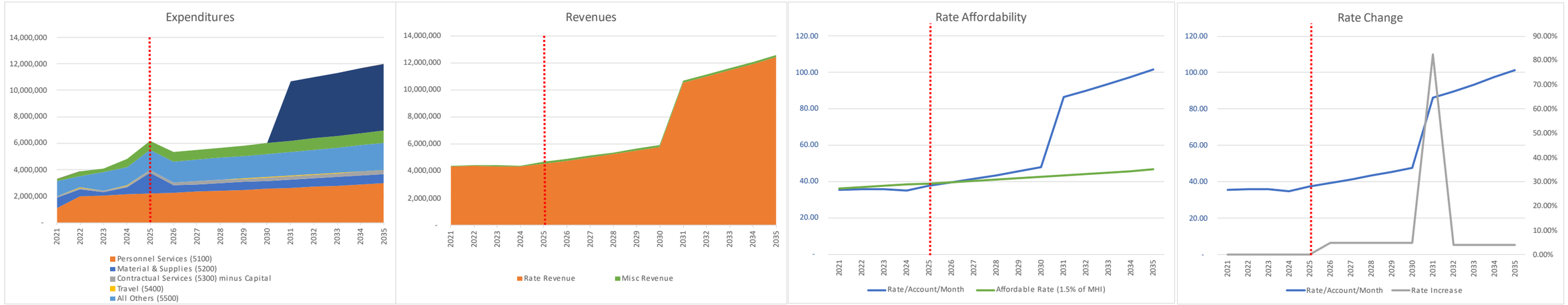


Figure 9-2: Scenario 2 Outputs – 100% Grant Funded, Rate Increase for O&M

9.8.3 Scenario 3 – WWUP, Oxidization Ditch, 50% Grant, 50% Bonds, Rate Increase

This scenario assumes 50% grant and 50% bonds with the debt assumptions from Section 1.6. This would require an even greater rate increase to cover the bonds. Rates would be more than 3x over the affordability metric. See **Figure 9-3.**

- **Expenditures:** This scenario assumes 3% annual O&M increases with the additional O&M for the Oxidization Ditch in 2031 which also grows at 3%. Debt service begins in 2030 after the project is complete.
- **Revenues:** Following the break-even scenario, this scenario assumes a 5% annual year over year increase until 2030 when a 101% increase is needed followed by a 45% increase in 2031. Rates then increase by 2% thereafter each year to reach break-even by 2035.
- **Cash Reserves:** Cash breaks even in year 2035. This is well below the cash reserve benchmark. This is due to a grouped cash balance for all of ASPA. Future analysis with ASPA may determine a more accurate allocation to each ASPA cost unit.
- **Coverage:** Debt coverage is right at 1.0 times which is below the metric. USDA may require something higher; however, this debt is unaffordable, so this scenario is purely for information purposes.
- **Rate Affordability:** The break-even analysis already pushed the necessary rate above the affordability metric. This scenario pushes the rate more than 400% above the affordability metric.
- **Rate Change:** This graph depicts the rate change as a percentage and as revenue per account per month.
- **Grant Needs:** This graph demonstrates the large amount of annual grants needed to fund the projects in the WWTP and new STFS project.

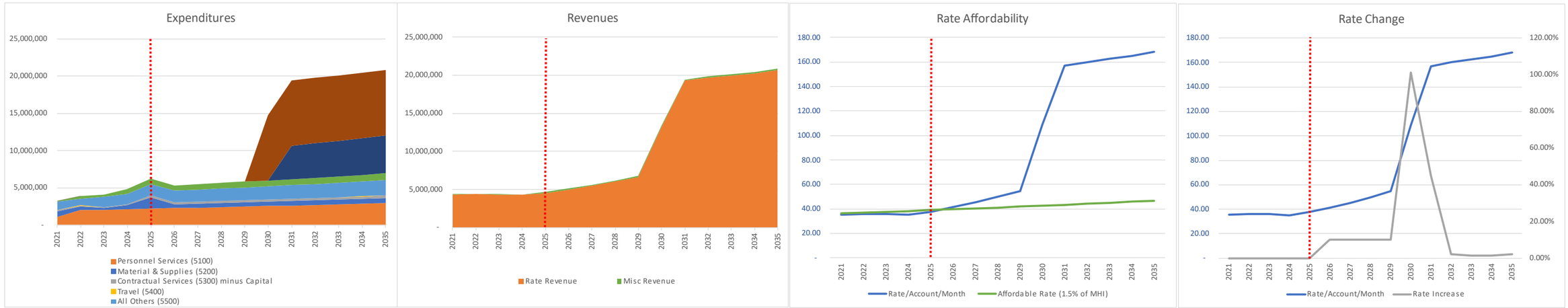


Figure 9-3: Scenario 3 Output – 50% Grant, 50% Bonds, Rate Increase

9.8.4 Scenario 4 – WWUP, Oxidization Ditch, 100% Bonds, Rate Increase

Scenario 4 demonstrates that the rates needed to support the STFS projects with bonds are completely unaffordable. Rates need to be 6x above the affordability metric. See **Figure 9-4**.

- **Expenditures:** This scenario assumes 3% annual O&M increases with the additional O&M for the Oxidization Ditch in 2031 which also grows at 3%. Debt service begins in 2030 after the project is complete.
- **Revenues:** Following the break-even scenario, this scenario assumes a 5% annual year over year increase until 2030 when a 350% increase is needed followed by a 13.6% increase in 2031. Rates then increase by 1% thereafter each year to reach break-even by 2035.
- **Cash Reserves:** Cash breaks even in year 2035. This is well below the cash reserve benchmark. This is due to a grouped cash balance for all of ASPA. Future analysis with ASPA may determine a more accurate allocation to each ASPA cost unit.
- **Coverage:** Debt coverage is right at 1.0 times which is below the metric. USDA may require something higher; however, this debt is unaffordable, so this scenario is purely for information purposes.
- **Rate Affordability:** The break-even analysis already pushed the necessary rate above the affordability metric. This scenario pushes the rate more than 600% above the affordability metric.
- **Rate Change:** This graph depicts the rate change as a percentage and as revenue per account per month.
- **Grant Needs:** This graph demonstrates the amount of annual grants needed to fund the projects in the WWTP.

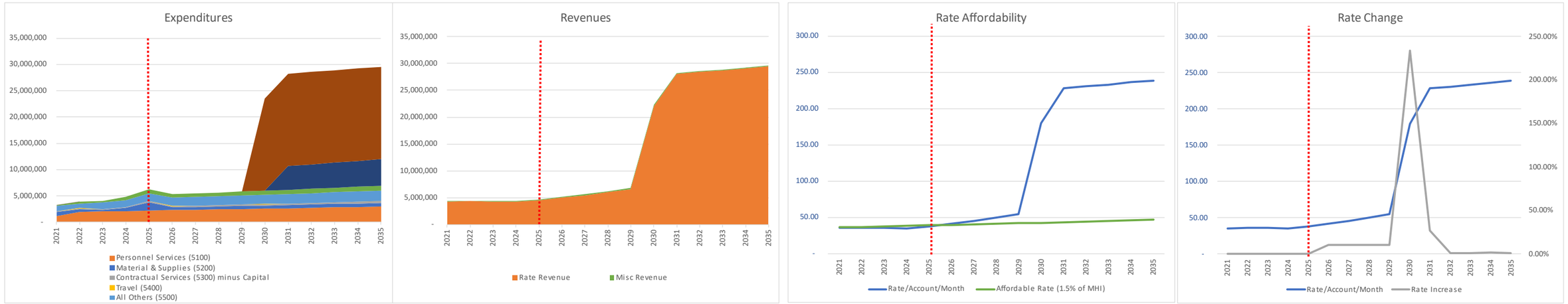


Figure 9-4: Scenario 4 Outputs – 100% Bonds, Rate Increase

9.9 Conclusions and Recommendations

This financial analysis has demonstrated that there are no practical feasible scenarios that are affordable for American Samoa to fund the STFS project. The break-even analysis without any STFS projects already pushes rates above the affordability metric. If all future capital and O&M costs are covered by grants, the rate would still be above the affordability metric. Scenario 1 is the closest scenario to the affordability metric. However, this scenario is not feasible due to the large amount of grants required for both operational costs and capital costs. Therefore, there are no practical financial alternatives to fund the STFS project recommended in this analysis.

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CHAPTER 10
CONCLUSIONS

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Chapter 10 Conclusions

10.1 Summary

The existing Tafuna and Utulei wastewater treatment plants (WWTPs) currently provide primary treatment followed by disinfection and discharge to ocean outfalls. The existing permits are based on a 301(h) waiver by EPA, which allows the permittee to discharge to marine waters with less than secondary treatment. The permits require a minimum removal of 30 percent for BOD and TSS, and both facilities routinely satisfy this requirement. The Wastewater Utility Plan presents a thorough evaluation of the existing facilities and compliance with existing permits.

In mid-2023, EPA issued a draft NPDES permit for the Tafuna WWTP that denied renewal of the Clean Water Act 301(h) waiver. As noted in **Chapter 4**, EPA's draft Fact Sheet notes that the "Tafuna Plain watershed is included in the 2020 303(d) list for impaired ocean shorelines for undetermined nonpoint source stressors, Total Nitrogen, and Chlorophyll-a (ASEPA, 2020)." EPA also noted the following in the draft Fact Sheet:

> *In 2021, EPA re-evaluated the updated mixing zone studies and recent data collected with the upgraded treatment system in place. Even with the upgrades, the discharge from the Tafuna STP does not meet several of the CWA Section 301(h) criteria. As described in EPA's 2023 CWA Section 301(h) Tentative Decision Document, the Tafuna STP exceeds water quality standards for light penetration, total suspended solids, total nitrogen, enterococcus, toxic pollutants, chronic toxicity, and ammonia after initial mixing, creating potential adverse impacts on human health, marine life, and receiving water quality. Therefore, EPA denied renewal of the CWA Section 301(h) waiver and this NPDES permit includes secondary treatment requirements in accordance with CWA Section 301(b)(1)(B).*

ASPA initiated this Secondary Treatment Feasibility Study to determine how secondary treatment at the existing Tafuna and Utulei WWTPs could be implemented or determine if new WWTPs are required to achieve secondary treatment standards and comply with potential future permit drivers. The pollutant limits contained in the draft Tafuna permit were a central assumption in this study since the draft permit reflects the current regulatory conditions affecting ASPA. It was also assumed that the discharge limits in the Utulei NPDES permit would be modified in the future to be similar to those in the draft Tafuna NPDES permit.

During the course of the study, ASPA and J-U-B conducted workshops to develop project goals, identify challenges unique to American Samoa, establish design criteria for the facilities, review interim conclusions, and ultimately identify the most viable alternative for implementing secondary treatment. Providing secondary treatment at a regional WWTP via an oxidation ditch was selected as the most viable alternative based on a weighted evaluation of ASPA's goals. The draft Tafuna permit also requires nutrient removal; therefore, the base oxidation ditch process was expanded to provide extended aeration to achieve ammonia removal (nitrification), and an anoxic zone was included for denitrification to achieve the total nitrogen limits. To achieve the required phosphorus levels, chemical addition was selected based on the relative simplicity of the process.

The draft permit requirements, if adopted by EPA, will necessitate significant changes at the Tafuna WWTP, and possibly the Utulei WWTP if similar limits are adopted in a future permit. The resulting capital and O&M costs will present a sizable burden on the residents of American Samoa, and maintaining operations will be a challenge given the advanced certification that will be required. These conditions were reviewed with ASPA during a workshop on December 5, 2024, and ASPA raised multiple concerns.

The cost of implementing the most viable alternative will have a significant impact on the American Samoa residents. While the financial impact on the rate payers is examined in this Study relative to the increased cost for debt service and funding ongoing O&M, the "real life" impact on households, i.e. hardship, is not evaluated. The US Census Bureau notes that the median household income in 2019 was $28,352 and 50.7 percent of families were in poverty. ASPA will require substantial grant assistance for constructing the improvements envisioned in the preceding chapters, and even if successful on that front, it will then be saddled with expensive O&M costs that are nearly twice the current amount. ASPA also faces challenges hiring and retaining experienced operators at the classifications that will be required for advanced treatment facilities. If the facilities are not adequately funded, maintained, and operated, the treatment processes will eventually fail and could have a more detrimental impact on the environment compared to current operations.

ASPA also questions whether the permit changes are warranted to address actual environmental problems. ASPA notes that Whole Effluent Toxicity (WET) testing typically results in toxicity levels below the permit requirements at the dilution afforded in the NPDES permit. This appears to be corroborated by the 2018 Tafuna WWTP Receiving Water Quality Monitoring Report by GDC (included in **Appendix D**) which states the following: "Based on the ongoing monitoring reports over the past few years, with the exception of the exceedances for TN, the Tafuna WWTP receiving water appears to be in overall compliance with the ASWQS. Previous exceedances of the ASWQS criterion for total nitrogen in recent years remain un-explained. Overall, compliance with NPDES permit conditions is demonstrated." GDC's May 2023 Effluent WET Testing and Priority Pollutant Analysis report (included in **Appendix D**) was prepared because ASPA had elevated WET results from the Tafuna WWTP in 2022 and 2023. The assessment included the following regarding effluent toxicity:

> *ASPA believes recent elevated WET testing results for TUc [toxicity unit chronic] at the Tafuna STP are attributed to elevated TSS in the effluent stream resulting from one of the plant's three clarifiers being offline. A PPS [priority pollutant scan] was performed and considering the plant's 173:1 dilution credit, none of the 126 parameters tested were considered probable candidates for elevated toxicity. Paired WET testing using filtered and unfiltered sample indicated significantly lower toxicity in the filtered sample. ASPA should bring the third clarifier back online as soon as possible. TSS should be measured in future WET samples prior to shipping the sample to the bioassay laboratory. TSS testing of the WET sample should continue until TUc values drop to levels that are routinely in compliance.*

ASPA also notes that ASEPA issued a memorandum on March 22, 2024 (included in **Appendix B**), which reviewed the current water quality standards, current Tafuna discharge conditions, and the observed

impact on the environment. Several key statements in the Summary section of that memorandum (pages 13 and 14) are included below.

> *Data presented here indicates overall excellent water column conditions for the receiving water for Outfall 001 and substantial compliance with the ASWQS over this period of 19 years [2005-2023]. Except for total nitrogen, violations of the ASWQS are relatively few and compliance is dominant throughout the data period.*
>
> *Overall, AS-EPA has determined through this assessment that primary treatment can be effective to meet the ASWQS for ocean receiving water for the Tafuna Wastewater Treatment Plant, and that primary treatment is an appropriate level of technology for this remote part of the Pacific.*

Taken together, these documents appear to indicate minimal impact on the existing marine environment with current discharge conditions. It may therefore be possible to realize a relaxation of the adopted water quality standards or adoption of site-specific criteria by ASEPA. It is not known to what degree this might be possible, nor if EPA would accept the revisions. ASPA should continue discussions with ASEPA and EPA to explore these possibilities since it could have a significant impact on the alternative investigated in this Study, including continued use of the existing Tafuna and Utulei facilities with improvements to address more critical water quality deficiencies.

If the water quality standards remain unchanged, other options for satisfying the water quality standards should be evaluated prior to implementing such significant changes to the WWTPs. As noted in **Chapter 8**, the outfall should be re-evaluated considering the different dilution factors estimated during its original design and in the resulting analysis by EPA in the draft Fact Sheet. If increased dilution credit is possible through modifications to the port size, length, number of diffusers, depth, etc., the impact could be considerable and impact the final permit limits, which may negate some or all the improvements considered in this Study. A more robust understanding of the background ocean water quality should also be considered. ASPA noted during a workshop with J-U-B and ASEPA that they are concerned about offal discharge from Starkist which is east (up current) of the Tafuna outfall approximately 4 miles. ASPA leadership noted negative impacts to fishing and believe that further investigation of background pollutants is warranted.

ASPA contends that it must run the most efficient, affordable, and quality wastewater system by not incurring wastewater projects that are not absolutely necessary. EPA has historically shown an interest in working with ASPA to obtain incremental improvements in water quality, and a continued commitment from EPA, as well as ASEPA, will be vital for the success of the American Samoa people. Part of that collaborative process should include setting realistic milestones to achieve the desired goals. If new permits are issued with significant changes in pollutant limits, compliance schedules should be included to allow ASPA time to obtain funding, develop design documents, complete construction, and operate and optimize any new processes or facilities.

10.2 Next Steps

Until final discharge permits are issued by EPA for the Tafuna and Utulei WWTPs, ASPA does not need to upgrade the WWTPs as discussed in this Study. ASPA should implement the recommended Capital

Improvement Plan (CIP) in the Wastewater Utility Plan (WWUP) to maintain suitable operations at the WWTPs. Specific to the potential future need of implementing secondary treatment, the following next steps are recommended.

1. Continue I/I identification and reduction projects to reduce the excessive flows in the collection systems, especially in Utulei. In doing so, the size and cost of any future secondary treatment components would be reduced. I/I is discussed at length in the WWUP and included in the resulting CIP.
2. Review the sampling location at Tafuna for influent BOD and TSS to collect representative samples. Influent loading on a per capita basis is much lower than observed at the Utulei WWTP, which generally matches typical literature values. This Study assumed typical literature values for process sizing, but the loading assumptions should be confirmed with subsequent testing. Additionally, autosamplers should be installed at both the Tafuna and Utulei WWTP's for flow-proportioned samples. This is discussed at length in the WWUP and included in the WWUP CIP.
3. Collaborate with EPA and ASEPA on water quality drivers and potential future NPDES permit conditions. This is expected to include the following:
    a. Explore improvements to the existing WWTPs to permit renewal of the 301(h) waivers for both the Tafuna and Utulei WWTPs by EPA.
    b. Undertake an outfall study to determine if modifications could be implemented to increase the dilution factor, thereby relaxing the effluent limits while maintaining compliance with the water quality standards. The study should be a collaborative effort with EPA and ASEPA so the resulting dilution factor is accepted in subsequent permit evaluations.
    c. Engage EPA and ASEPA about water quality standards for the receiving water bodies and the potential environmental impacts of current discharges to explore the possibility of different water quality criteria or adoption of site-specific criteria.
    d. Work with EPA to establish reasonable compliance schedules for any new or modified effluent limits included in subsequent discharge permits.

10.3 References

US Census Bureau, *2020 Island Areas Censuses Data on Demographic, Social, Economic and Housing Characteristics Now Available for American Samoa*, <https://www.census.gov/newsroom/press-releases/2022/2020-island-areas-american-samoa.html, retrieved 1/12/2025.

APPENDIX A
PACIFIC ISLAND FACILITIES

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A-1 Hawaiian Islands

County of Hawaii: Papaikou-Paukaa WWTP: 1.25 acres



County of Kauai: Wailua WWTP

- WPC Viewer (hawaii.gov)
- 1.5 MGD / 2.0 acres
- COK-DEA-letter-OPSD-ERP-part-1-signed.pdf (hawaii.gov)
- Reuse



Oahu: Honouliuli WWTP

- 78 acres, 27 MGD current (Primary, unless reuse), 51 MGD capable, 13 MGD goes to reuse, ocean outfall



Oahu: Sand Island WWTP

- 20 acres, 77 MGD



A-2 Guam

Northern District WWTP

- 12 MGD, ~16 acres, NPDES



Agana WWTP (Hagatna STP)

- 12 MGD, 3 acres, primary only NPDES



Agat-Santa Rita STP

- 11.4 acres, 12 MGD, secondary



Umatac-Merizo WWTP

- 0.4 MGD, 2.5 acre lagoon, 6 wetlands (percolation/evaporation)



Baza Gardens STP

- 1.5 acres



Inarajan STP

- 7.3 acres



A-3 Saipan

Sadog Tasi WWTP

- 6.6 acres, basically mechanically aerated lagoons)



Agingan WWTP

- 1.81 acre, Oxidation Ditch/common wall design; Master Plan (2015)



A-4 Palau Island

Koro-Airai (Malakal) Sanitation Project (1 acre)



APPENDIX B
NPDES PERMIT DOCUMENTATION FOR TAFUNA

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APPENDIX B-1
CURRENT TAFUNA NPDES PERMIT (1999)

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AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. 1251 *et seq*., the "Act"),

American Samoa Power Authority
P. O. Box PPB
Pago Pago, American Samoa 96799

is authorized to discharge treated wastewater from the Tafuna Sewage Treatment Plant outfall (Discharge Serial No. 001), located off Fogagogo on Tutuila Island, Territory of American Samoa,

Latitude: 14° 20' 54" S
Longitude: 170° 43' 30" W

to receiving waters named Vai Cove, South Pacific Ocean, in accordance with effluent limitations, monitoring requirements, and other conditions set forth herein, and in the attached USEPA Region 9 *Standard Federal NPDES Permit Conditions*, dated May 10, 1990.

This permit shall become effective on _____ ,1999.

This permit and the authorization to discharge shall expire at midnight, _____ , 2004.

Signed this _____ day of _____ , 1999.

For the Regional Administrator

_____
Alexis Strauss, Director
Water Division

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS, ZONE OF INITIAL DILUTION LIMITATIONS AND ZONE OF MIXING LIMITATIONS

1. Effluent limitations and monitoring requirements are based upon a project end-of-permit annual average flow of 0.088 m^3/sec (2.0 MGD). The permittee is authorized to discharge from Discharge Serial No. 001:

   a. Such discharge shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Maximum Discharge Limitations Unless Otherwise Noted						Monitoring Requirements	
	Average Monthly (lbs/day)	Average Weekly (lbs/day)	Maximum Daily (lbs/day)	Average Monthly (mg/L)	Average Weekly (mg/L)	Maximum Daily (mg/L)	Monitoring Frequency	Sample Type
Flow (m^3/day)	n/a [1]	n/a	n/a	[2]	[2]	[2]	Continuous	Continuous
Biochemical Oxygen Demand (5-day) [3]	1,669	2,504	3,338	100	150	200	Once/week	8 hr Composite
	Both the influent and the effluent shall be monitored. The arithmetic mean of the BOD_5 values, by concentration, for effluent samples collected over 30 consecutive calendar days shall not exceed 70% of the arithmetic mean, by concentration, for influent samples collected at approximately the same times during the same period.							

[1] n/a = not applicable.

[2] Monitoring and reporting required. No limitation set at this time.

[3] Concentration limitations for BOD_5 are based on the permittee's previous 301(h)-modified NPDES permit issued June 30, 1985. Mass emission rate limitations were calculated using a project end-of-permit annual average flow of 0.088 m^3/sec (2.0 MGD). These limitations were requested by the permittee in its 301(h) application dated March 26, 1992.

Effluent Characteristic	Maximum Discharge Limitations Unless Otherwise Noted						Monitoring Requirements	
	Average Monthly (lbs/day)	Average Weekly (lbs/day)	Maximum Daily (lbs/day)	Average Monthly (mg/L)	Average Weekly (mg/L)	Maximum Daily (mg/L)	Monitoring Frequency	Sample Type
Total Suspended Solids [4]	1,252	1,878	2,504	75	113	150	Once/week	8 hr Composite
	Both the influent and the effluent shall be monitored. The arithmetic mean of the TSS values, by concentration, for effluent samples collected over 30 consecutive calendar days shall not exceed 70% of the arithmetic mean, by concentration, for influent samples collected at approximately the same times during the same period.							
Settleable Solids	n/a			1 ml/L	n/a	2 ml/L	Once/day	Discrete
pH	Not less than 6.5 nor greater than 8.6.						Once/week	Discrete
Oil and grease	n/a			[2]	n/a	[2]	Quarterly (Nov/Feb/ May/Aug)	Discrete
Whole Effluent Toxicity (TUc) [5]	n/a			[2]	n/a	[2]	Quarterly (Nov/Feb/ May/Aug)	24 hr Composite

[4] Concentration limitations for TSS are based on the permittee's previous 301(h)-modified NPDES permit issued June 30, 1985. Mass emission rate limitations are calculated using a projected end-of-permit annual average flow of 0.088 m^3/sec (2.0 MGD). These limitations were requested by the permittee in its 301(h) application dated March 26, 1992.

[5] See Part A.4 of this permit for explanation of requirements.

2. The discharge shall be substantially free from:

   a. Materials attributable to sewage that will produce objectionable color, odor, or taste, either of itself or in combinations, or in the biota.

   b. Visible floating materials, grease, oil, scum, foam, and other floating material attributable to sewage.

   c. Materials attributable to sewage that will produce visible turbidity or settle to form objectionable deposits.

   d. Substances and conditions or combinations thereof attributable to sewage which may be toxic to humans, other animals, plants, and aquatic life or produce undesirable aquatic life.

3. The discharge shall not cause:

   a. The temperature in the receiving water to deviate more than 1.5° Fahrenheit from conditions which would occur naturally, to fluctuate more than 1° Fahrenheit on an hourly basis, or to exceed 85° Fahrenheit due to the influence of other than natural causes.

   b. Changes in basin geometry or freshwater inflow that will alter current patterns in such a way as to adversely affect existing biological populations or sediment distribution in the receiving water.

   c. The average turbidity in the receiving water at and beyond the Zone of Initial Dilution to exceed 0.25 NTU.

   d. The average total phosphorous in the receiving water at and beyond the Zone of Initial Dilution to exceed 15 ug/L.

   e. The average total nitrogen in the receiving water at and beyond the Zone of Initial Dilution to exceed 130 ug/L.

   f. The average chlorophyll a in the receiving water at and beyond the Zone of Initial Dilution to exceed 0.25 ug/L.

   g. The light penetration depth in the receiving water at and beyond the Zone of Initial Dilution to not exceed 130 ft 50 percent of the time.

   h. A dissolved oxygen content in the receiving water at and beyond the Zone of Initial Dilution less than 80% saturation, or less than 5.5 mg/L.

i. The pH in the receiving water at and beyond the Zone of Initial Dilution to range less than 6.5 nor greater than 8.6, and to deviate more than 0.2 pH units from that which occurs naturally.

j. Enterococci density (concentration) in the receiving water at and beyond the Zone of Mixing to exceed a geometric mean of 35 CFU/100 mL steady state geometric mean, nor any single sample to exceed 124 CFU/100 mL.

4. Whole Effluent Toxicity Monitoring Requirements

The USEPA Region 9 Laboratory will conduct only the quarterly or annual chronic toxicity test for the permittee. Any additional toxicity tests (see Parts A.4.e and A.4.f of this permit) shall be conducted by the permittee. The permittee is responsible for reporting toxicity test results to USEPA Region 9.

The permittee shall conduct quarterly toxicity tests on composite effluent samples. Samples shall be collected and shipped [6] in accordance with the Standard Operating Procedure (see Attachment 3) and the Memorandum of Agreement (effective 7/25/97) agreed upon by the permittee and USEPA Region 9. If, after two years of toxicity testing, measured toxicity is less than or equal to the chronic toxicity target values specified in Part A.4.b of this permit, then the monitoring frequency shall be reduced to annually (November).

a. Test Species and Methods

The permittee shall conduct toxicity tests with the sea urchin, *Strongylocentrotus purpuratus*, or sand dollar, *Dendraster excentricus* (fertilization test method 1008.0). The chronic toxicity of the effluent shall be estimated as specified in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms*, EPA/600/R-95/136, August 1995 (or most recent edition).

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[6] The permittee should coordinate with Utulei Sewage Treatment Plant (NPDES Permit No. AS0020001) so that effluent samples from both treatment plants can be collected and shipped at the same time to the USEPA Region 9 Laboratory (the Laboratory) where tests will be performed. In order to coordinate testing procedure, notice of the sampling schedule should be submitted to the Laboratory at least 30 days prior to shipment of each sample. The permittee shall attempt to ensure a total holding time from collection of the last portion of the composite sample until arrival at the Laboratory of not more than 36 hours. Should longer than a 36-hour holding time be anticipated, the permittee shall petition USEPA Region 9 (CMD-5) for an extension of the holding time (see Section 8.5.4, EPA/600/R-95/136). The extended holding time shall not exceed 72 hours.

b. Definition of Toxicity

Chronic toxicity measures a sublethal effect (*e.g.*, reduced growth, reproduction) to experimental test organisms exposed to an effluent compared to that of the control organisms. For this discharge, toxicity is defined by an exceedance of a chronic toxicity target value. These chronic toxicity target values are a Maximum Daily Value of 347 TUc, and an Average Monthly Value of 173 TUc.

c. Quality Assurance

(1) A series of five dilutions and a control shall be tested. The series shall include the two instream waste concentrations (IWCs) of 0.3% effluent and 0.6% effluent, one dilution below the IWC of 0.3% effluent, and two dilutions above the IWC of 0.6% effluent. The IWC is the percentage of effluent at the edge of the mixing zone over a specified averaging period.

(2) If organisms are not cultured in-house, concurrent testing with reference toxicants shall be conducted. Where organisms are cultured in-house, monthly reference toxicant testing is sufficient.

(3) If either the reference toxicant tests or the effluent tests do not meet all test acceptability criteria as specified in the test methods manual, then the permittee must re-sample and re-test within approximately 14 days.

(4) Reference toxicant tests shall be conducted using the same test conditions as effluent toxicity tests (*i.e.*, same test duration, *etc*.).

(5) Control and dilution water should be lab water, as described in the test methods manual. If the dilution water used is different from the culture water, a second control using culture water shall also be tested.

(6) When effluent monitoring frequencies for whole effluent toxicity and priority pollutants are concurrent, then chemical analyses for priority pollutants shall be performed on a split of the sample collected for whole effluent toxicity testing.

d. Preparation of Initial Investigation Toxicity Reduction Evaluation (TRE) Workplan

The permittee shall submit to USEPA Region 9 an initial investigation toxicity reduction evaluation (TRE) workplan [approximately 1-2 pages] within 90 days of the effective date of this permit. This workplan shall describe steps which the permittee intends to follow in the event that toxicity (as defined) is detected, and should include at minimum:

(1) A description of the investigation and evaluation techniques that would be used to identify potential causes/sources of toxicity, effluent variability, treatment system efficiency;

(2) A description of the facility's method of maximizing in-house treatment efficiency, good housekeeping practices, and a list of all chemicals used in operation of the facility;

(3) If a toxicity identification evaluation (TIE) is necessary, who (*e.g.*, contract laboratory, *etc.*) will conduct the TIE.

e. Additional Toxicity Testing and Toxicity Reduction Evaluation/Toxicity Identification Evaluation (TRE/TIE)

(1) If toxicity (as defined) is detected, then, based on an evaluation of the test results and additional available information, the permittee shall conduct additional toxicity tests and/or initiate a TRE, in accordance with the permittee's initial investigation TRE workplan and *Toxicity Reduction Evaluation Protocol for Municipal Wastewater Treatment Plants* (EPA/600/2-88/062, 1989), as directed by USEPA Region 9.

(2) As directed by USEPA Region 9, the permittee shall develop a detailed TRE workplan which includes:

(a) Further actions to investigate/identify the cause(s) of toxicity;

(b) Actions the permittee has taken/will take to mitigate the impact of the discharge, to correct the noncompliance, and to prevent the recurrence of toxicity;

(c) A schedule under which these actions will be implemented;

and shall submit this workplan to USEPA Region 9 for approval.

(3) As part of this TRE process, the permittee may initiate a TIE using the test methods manuals, EPA/600/R-96/054 (Phase I), EPA/600/R-92/080 (Phase II), and EPA/600/R-92/081 (Phase III), to identify the cause(s) of toxicity.

f. Reporting

(1) The permittee shall submit a full report of toxicity test results, including any toxicity testing required by Parts A.4.e of this permit, with the DMR for the month in which the toxicity tests are conducted. A full report shall

consist of: (1) toxicity test results; (2) dates of sample collection and initiation of each toxicity test; and (3) chronic toxicity target values. Toxicity test results shall be reported according to the test methods manual chapter on Report Preparation.

(2) Within 14 days of receipt of test results exceeding a chronic toxicity target value, the permittee shall provide written notification to USEPA Region 9 of:

(a) Findings of the TRE or other investigation to identify the cause(s) of toxicity;

(b) Actions the permittee has taken/will take, to mitigate the impact of the discharge and to prevent the recurrence of toxicity;

(c) When corrective actions, including a TRE, have not been *completed*, a schedule under which corrective actions will be implemented; or

(d) The reason for not taking corrective action, if no action has been taken.

g. Toxicity Reopener

This permit may be modified in accordance with the requirements set forth at 40 CFR 122 and 124, to include appropriate conditions or limitations to address demonstrated effluent toxicity based on newly available information, or to implement any USEPA Region 9-approved new Territory water quality standards applicable to effluent toxicity.

5. Samples taken in compliance with the effluent monitoring requirements specified above shall be taken at the following locations:

a. Influent samples shall be taken after the last addition to the collection system and prior to any in-plant return flows and the first treatment process, where representative samples of the influent can be obtained.

b. Effluent samples shall be taken after any in-plant return flows and the last treatment process and prior to mixing with the receiving waters, where representative samples of the effluent can be obtained.

B. DEFINITIONS

1. *Average monthly discharge limitation* means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

2. *Average weekly discharge limitation* means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

3. *8 hour Composite sample* means a combination of eight equal individual portions taken at equal time intervals over any 8-hour period that reasonably represents the calendar day. The volume of each individual portion shall be directly proportional to the discharge flow rate at the time of sampling.

4. *24 hour Composite sample* means a combination of 24 individual portions taken at equal time intervals over any 24-hour period that reasonably represents the calendar day. The volume of each individual portion shall be directly proportional to the discharge flow rate at the time of sampling.

5. *Daily discharge* means the "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

6. *Discrete sample* means any individual sample collected in less than 15 minutes. The sampling period shall coincide with the period of maximum discharge flow.

7. *Maximum daily discharge limitation* means the highest allowable "daily discharge."

C. NONINDUSTRIAL SOURCE CONTROL PROGRAM REQUIREMENTS

Under 40 CFR 125.66(d)(1), the permittee must implement a public education program designed to minimize the entrance of nonindustrial toxic pollutants into the Tafuna [2] Sewage Treatment Plant. In accordance with the Tentative Decision Document, the permittee shall continue to implement it's approved Nonindustrial Source Control Program. Copies of all public educational materials designed to minimize the entrance of nonindustrial toxic pollutants and pesticides into the Tafuna Sewage Treatment Plant from the period covering the previous calendar year shall be submitted with the quarterly water column monitoring report due January 28th to USEPA Region 9 and ASEPA.

D. SLUDGE/BIOSOLIDS LIMITATIONS AND MONITORING REQUIREMENTS

1. All biosolids [7] generated by the permittee shall be reused or disposed of in compliance with applicable portions of:

   a. 40 CFR 503: For biosolids that are land applied, placed on a surface disposal site (dedicated land disposal site or monofill), or incinerated; 40 CFR 503, Subpart B (land application) applies to biosolids applied for the purpose of providing nutrients or conditioning the soil for crops or vegetation. 40 CFR 503 Subpart C (surface disposal) applies to biosolids placed on the land for the purpose of disposal;

   b. 40 CFR 258: For biosolids disposed in municipal solid waste landfills;

   c. 40 CFR 257: For all biosolids use and disposal practices not covered in 40 CFR 258 or 503.

2. The permittee is responsible for assuring that all biosolids produced at the sewage treatment plant are used or disposed of in accordance with 40 CFR 257, 258, and 503, whether the permittee reuses or disposes of the biosolids directly or transfers the biosolids to another entity for further treatment, reuse, or disposal. The permittee is responsible for informing subsequent preparers, appliers, and disposers of the requirements which these entities must meet under 40 CFR 257, 258, and 503.

3. No biosolids shall be allowed to enter wetlands or other waters of the United States.

4. Biosolids treatment, storage, reuse, or disposal shall not contaminate groundwater.

5. Biosolids treatment, storage, reuse, or disposal shall be performed in a manner as to minimize nuisances such as objectionable odors or flies.

6. The permittee shall assure that haulers transporting biosolids for off-site treatment, reuse, or disposal take all necessary measures to keep the biosolids contained.

7. If biosolids are stored for over two years from the time it was generated, the permittee must ensure compliance with all requirements for surface disposal in 40 CFR 503 Subpart C, or must submit a written request for longer temporary storage, including information required in 40 CFR 503.20(b), to USEPA Region 9.

8. Sludge containing PCBs equal to or greater than 50 mg/kg of total solids (100% dry weight basis) shall be disposed of in accordance with 40 CFR 761.

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[7] Biosolids means stabilized, non-hazardous sewage sludge.

9. Any biosolids treatment, storage, or disposal site shall have adequate facilities which divert surface runoff from adjacent areas, protect site boundaries from erosion, and prevent any conditions that would cause drainage to escape from the site. Adequate protection is defined as protection from at least a 100-year storm and from the highest tidal stage that may occur.

10. Monitoring shall be conducted as follows:

    a. Biosolids shall be tested during November of years 1999 and 2002 for all pollutants listed under section 307(a) of the Act. Test results shall be expressed in mg pollutant per kg biosolids on a 100% dry weight basis.

    b. Biosolids shall be tested during November of years 1999 and 2002, or more frequently if necessary, to determine hazardousness using the Toxicity Characterization Leachate Procedure (see Method 1311 in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA Publication SW-846). Contaminants and regulatory levels are found in Table 1 in 40 CFR 261.24(b).

    c. Biosolids which are land applied or placed in a surface disposal site shall be tested for metals as required in 40 CFR 503.16 and 40 CFR 503.26 using *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (see 40 CFR 503.8(b)(4)), and for organic-N, ammonium-N, and nitrate-N using *Standard Methods for the Examination of Water and Wastewater* (1989). The appropriate monitoring frequency for these tests shall be determined by the biosolids volume land applied or placed in a surface disposal site. Test results shall be expressed in mg pollutant per kg biosolids on a 100% dry weight basis.

Biosolids Volume (dry metric tons/year)	Monitoring Frequency
0 - 290	Annually (Nov)
290 - 1500	Quarterly (Feb/May/Aug/Nov)
1500 - 15,000	Bi-Monthly (Feb/Apr/Jun/Aug/Oct/Dec)
> 15,000	Monthly

d. For biosolids which are land applied, the permittee shall demonstrate that biosolids meet Class A or Class B pathogen requirements by one of the methods listed in 40 CFR 503.32. The permittee shall track and keep records of the operational parameters used to achieve the vector attraction reduction requirements in 40 CFR 503.33(b).

e. Biosolids that are placed on a surface disposal site shall be monitored as follows:

(1) Biosolids shall be tested for metals as required in 40 CFR 503.26 using *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (see 40 CFR 503.8(b)(4)), at the appropriate frequency required by Part D.10.c of this permit. Test results shall be expressed in mg pollutant per kg biosolids on a 100% dry weight basis.

(2) Prior to placement on a surface disposal site, the permittee shall demonstrate that biosolids meet Class B pathogen requirements, or shall ensure that the site is covered at the end of each operating day.

(3) The permittee shall track and keep records of the operational parameters used to achieve the vector attraction reduction requirements in 40 CFR 503.33(b).

(4) When biosolids are placed on a surface disposal site, a qualified groundwater scientist shall develop a groundwater monitoring program for the site, or shall certify that the placement of biosolids on the site will not contaminate an aquifer.

f. Biosolids disposed of in a municipal solid waste landfill unit shall be tested semi-annually using the Paint Filter Test (Method 9095 in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*) to demonstrate compliance with 40 CFR 258.28 which prohibits disposal of materials with free liquids in a municipal solid waste landfill unit.

11. For biosolids which are land applied, the permittee, either directly or through contractual agreements with their biosolids management contractors, shall comply with the following 40 CFR 503 notification requirements:

a. A reuse/disposal plan shall be submitted to the USEPA Region 9 Biosolids Coordinator. The plan shall include: results of monitoring/analyses required for use or disposal at the new or previously unreported site(s); a description and topographic map of the proposed site(s) for use or disposal; names and addresses of the applier(s) and site owner(s); and a listing of any Territory or local permits which must be obtained. For land application sites, the plan shall be submitted by the land applier and shall include: a description of the crops or vegetation to be

grown; proposed nitrogen loading rates and determination of agronomic rates; depth to groundwater; and a groundwater monitoring plan (if one exists).

b. For biosolids that are land applied, if the permittee's biosolids do not meet 40 CFR 503.13 Table 3 metals concentration limitations, then the permittee must require the land applier to notify USEPA Region 9 of any previous site applications of biosolids subject to cumulative loading limitations and the cumulative amounts of pollutants applied to date at the site, per 40 CFR 503.12(e) and (j).

c. For biosolids that are land applied, the permittee shall notify the applier in writing of the nitrogen content of the biosolids, and of all the applier(s) requirements in 40 CFR 503, including the requirement that the applier certify that management practices, site restrictions, and any applicable vector attraction reduction requirements in 40 CFR 503 Subpart B have been met. The permittee shall require the applier to certify at the end of 38 months following application of Class B biosolids that harvesting restrictions in effect have been met.

d. If bulk biosolids are shipped to another State/Tribal/Territory Lands, the permittee must send notice prior to the initial shipment of bulk biosolids to permitting authorities in the receiving State/Tribal/Territory Land (the USEPA Regional Office for that area and the State/Tribal/Territory authorities).

12. The permittee shall submit an annual biosolids report to the USEPA Region 9 Biosolids Coordinator by February 19th of each year for the period covering the previous calendar year. The report shall include:

a. The amount of biosolids generated that year, in dry metric tons, and the amount accumulated from previous years.

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b. Results of all monitoring required by Part D.10 of this permit.

c. Descriptions of pathogen requirements, vector attraction reduction requirements, site and harvesting restrictions, management practices, and certifications, as required in 40 CFR 503.17 and 40 CFR 503.27.

d. Results of any required groundwater monitoring or certification by a groundwater scientist that the application/disposal will not contaminate an aquifer.

e. Names and addresses of land appliers, surface disposal site operators, and landfill operators; and volumes applied or disposed (dry metric tons).

f. Names, mailing addresses, and street addresses of entities who received biosolids for further treatment, storage, disposal in a municipal solid waste landfill, or for other use or disposal methods not covered above, and volumes delivered to each.

13. The permittee shall require any appliers contracted to manage their biosolids to submit an annual biosolids report to the USEPA Region 9 Biosolids Coordinator by February 19th of each year, for the period covering the previous calendar year. The report shall include: names and addresses of land appliers and surface disposal site operators, name, location (site addresses and latitude/longitude), and size (hectares) of site(s), volumes applied/disposed (dry metric tons) and for land application, biosolids loading rates (metric tons per hectare), nitrogen loading rates (kg/ha), dates of application, crops grown, dates of seeding and harvesting, and certifications that the requirements to obtain information in 40 CFR 503.12(e)(2), management practices in 40 CFR 503.14, and site restrictions in 40 CFR 503.32(b)(5) have been met.

14. The general requirements in 40 CFR 503.12 and the management practices in 40 CFR 503.14 do not apply when bulk biosolids are applied to land, if the biosolids meet the pollutant concentrations in 40 CFR 503.13(b)(3), the Class A pathogen requirements in 40 CFR 503.32(a), and one of the vector attraction reduction requirements in 40 CFR 503.33(b)(1) through (b)(8).

E. RECEIVING WATER MONITORING REQUIREMENTS AND CONDITIONS

1. The permittee shall conduct the following receiving water monitoring program (*i.e.*, water column monitoring) in Vai Cove.

   a. Water Column Monitoring Stations (see Attachment 4)

   The permittee shall verify all station locations (latitude and longitude) and depths during the first sampling survey and shall submit this information with the first quarterly water column monitoring report to USEPA Region 9 and ASEPA for approval.

Station		Location
n/a	Diffuser midpoint	Latitude: 14°20' 54" S Longitude: 170°43' 30" W
A1	Zone of Initial Dilution	27.4 m (90 ft) northeast of the diffuser midpoint; 27.4 m (90 ft) depth
A2	Zone of Initial Dilution	27.4 m (90 ft) southwest of the diffuser midpoint; 27.4 m (90 ft) depth
B	Zone of Mixing	190 m (627 ft) shoreward of the diffuser midpoint; 5.5 m (18 ft) depth
C	Reference	212 m (700 ft) northeast of the diffuser midpoint; 27.4 m (90 ft) depth

b. Water Column Monitoring

Receiving Water Characteristic	Units	Station	Monitoring Frequency	Sample Type/ Sampling Depths *
Turbidity	NTU	A1, A2, B, C	Quarterly (Nov/Feb/May/Aug)	Nephelometer
Total Phosphorus	ug/L	A1, A2, B, C	"	Grab
Total Nitrogen	ug/L	A1, A2, B, C	"	"
Chlorophyll a	ug/L	A1, A2, B, C	"	"
Light Penetration	ft	A1, A2, B, C	"	Secchi disk
Dissolved Oxygen	mg/L	A1, A2, B, C	"	Grab
pH	pH units	A1, A2, B, C	"	"
Enterococci	CFU/100 mL	A1, A2, B, C	"	"

* For grab samples, the sampling depth profile at Stations A1, A2, and C is 1 m below the surface, mid-depth, and 1 m above the bottom, and the sampling depth profile at Station B is mid-depth. Samples shall be collected and analyzed according to *Quality Assurance and Quality Control (QA/QC) for 301(h) Monitoring Programs: Guidance on Field and Laboratory Methods* (EPA 430/9-86-004).

(1) Water column monitoring data and an analysis of these data may be provided to the permittee by another entity, if a MOA has been agreed to by the permittee and this entity. A copy of the MOA must be submitted to USEPA Region 9 and ASEPA for approval before this alternative water column monitoring procedure is implemented by the permittee.

2. The permittee shall submit quarterly water column monitoring reports to USEPA Region 9 and ASEPA by January 28th, April 28th, July 28th, and October 28th for the period covering the previous three calendar months. These reports shall include:

a. A description of climatic and receiving water characteristics at the time of sampling (*e.g.*, weather observations, floating debris, discoloration, wind speed and direction, swell or wave action, time of sampling, tide height, *etc.*).

b. A description of sampling stations, including differences unique to each station (*e.g.*, station location, sediment grain size, distribution of bottom sediments, rocks, shell litter, calcareous worm tubes, *etc*.).

c. A description of the sample collection and preservation procedures used in the receiving water monitoring program.

d. A description of the specific method used for laboratory analysis.

e. An in-depth discussion of the results of the receiving water monitoring program with regard to compliance with the criteria for modifying the secondary treatment requirements under Section 301(h) of the Act. All tabulations and computations shall be explained.

Where water column monitoring data and/or data analyses are reported to USEPA Region 9 and ASEPA by another entity (see Part E.1.b.1 of this permit), the permittee's quarterly report shall include a copy of the approved MOU and citation(s) under which information provided in accordance with the approved MOU is submitted to USEPA Region 9 and ASEPA.

F. GENERAL MONITORING AND REPORTING REQUIREMENTS

1. All wastewater monitoring, and sludge/biosolids monitoring, receiving water monitoring, sample preservation, and analyses shall be performed as described in the most recent edition of 40 CFR 136, Appendix B, unless otherwise specified in this permit. For priority toxic pollutant and 301(h) pesticide effluent analyses, the permittee shall utilize an approved test procedure with a Method Detection Limit [8] (MDL) that is lower than the saltwater and/or human health (for consumption of organisms only) criteria concentrations listed in 40 CFR 131.36(b)(1). If the MDL is higher than the criteria concentrations, then the permittee shall utilize the approved test procedure with the lowest MDL. In accordance with 40 CFR 122.45(c), effluent analyses for metals shall measure "total recoverable metal", except for chromium (VI) which shall be measured as "dissolved metal."

2. The results of all monitoring required by this permit shall be submitted in such a format as to allow direct comparison with the limitations and requirements of this permit.

3. The permittee shall submit influent and effluent monitoring results on monthly Discharge Monitoring Report (DMR) forms (EPA No. 3320-1) to USEPA Region 9 and ASEPA by the 28th of March, June, September, and December for each period covering the previous three calendar months (*e.g.*, December, January and February monthly DMRs are due by March 28th). Unless otherwise specified, effluent flow shall be reported in terms of the arithmetic mean flow over each monthly period, and the maximum daily flow over that monthly period.

4. For the purposes of reporting, the permittee shall use the reporting threshold equivalent to

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[8] The Method Detection Limit (MDL) is the minimum concentration of an analyte that can be detected with 99% confidence, as defined by a specific laboratory method in 40 CFR 136, Appendix B.

the laboratory's method detection limit [8] (MDL). As such, the permittee must utilize a standard calibration where the lowest standard point is equal to or less than the concentration of the minimum level [9] (ML). Analytical results at or above the laboratory's MDL shall be reported on the DMR as the measured concentration. For analytical results between the MDL and the ML, the permittee shall report in the comment section on the DMR the standard deviation (S) value (determined by the laboratory during the MDL study). Analytical results below the laboratory's MDL shall be reported as zero (*i.e.*, "0").

5. Duplicate signed copies of all reports required herein shall be submitted to the Regional Administrator and ASEPA at the following addresses:

USEPA Region 9
Pacific Insular Area Program (CMD-5)
75 Hawthorne Street
San Francisco, CA 94105-3901
Telephone: 415/744-1484

ASEPA
Office of the Governor
Pago Pago, American Samoa 96799
Telephone: 684/633-2305

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[9] The Minimum Level (ML) is the concentration in a sample equivalent to the concentration of the lowest calibration standard analyzed in a specific analytical procedure, assuming that all the method-specific sample weights, volumes, and processing steps have been followed. Where a promulgated ML is not available, an interim ML is calculated using a factor of 3.18 times the MDL.

Attachment 1:

LOCATION MAP

Attachment 2:

PROCESS DIAGRAMS

Attachment 3:

STANDARD OPERATING PROCEDURE FOR WHOLE EFFLUENT TOXICITY

Attachment 4:

RECEIVING WATER MONITORING STATIONS

Attachment 5:

STANDARD NPDES PERMIT CONDITIONS

APPENDIX B-2
DRAFT TAFUNA NPDES PERMIT (2023)

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9
75 Hawthorne Street
San Francisco, CA 94105

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

NPDES PERMIT NO. AS0020010

In compliance with the provisions of the Clean Water Act ("CWA") (Public Law 92-500, as amended, 33 U.S.C. 1251 et seq.), the following discharger is authorized to discharge from the identified facility at the outfall location(s) specified below, in accordance with the effluent limits, monitoring requirements, and other conditions set forth in this permit. This permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application process.

Discharger Name	American Samoa Power Authority
Discharger Address	P.O. Box PPB Pago Pago, American Samoa 96799
Facility Name	Tafuna Sewage Treatment Plant ("STP") and Collection System.
Facility Location Address	Fogagogo, Pago Pago, Tutuila 96799 American Samoa
Facility Rating	Major

Outfall Number	General Type of Waste Discharged	Outfall Latitude	Outfall Longitude	Receiving Water
001	Treated Domestic Wastewater	14° 20' 54" S	170° 43' 30" W	South Pacific Ocean

This permit was issued on:	Date of signature below
This permit shall become effective on:	<1st of month following 33 days after issue date>
Permit reapplication due no later than:	<Effective date + 5 years – 180 days>
This permit shall expire at midnight on:	<Effective date + 5 years – 1 day>
In accordance with 40 CFR 122.21(d), the Permittee shall submit a new application for a permit at least 180 days before the expiration date of this permit, unless permission for a date no later than the permit expiration date has been granted by the Director.	

Signed for the Regional Administrator.

Tomás Torres, Director — Date
Water Division

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Part I. EFFLUENT LIMITS AND MONITORING REQUIREMENTS

A. Effluent Limits and Monitoring Requirements

1. Effluent Limits – Outfall Number 001
   The Permittee is authorized to discharge treated domestic wastewater in compliance with the effluent limits and monitoring requirement specified in Tables 1. The Permittee shall monitor both the effluent and influent to evaluate compliance with effluent limits, including for parameters with a "% removal" requirement (i.e. BOD_5 and TSS).

2. The discharge of pollutants at any point other than the outfall number specifically authorized in this permit is prohibited.

3. The discharge shall comply with all provisions of the American Samoa Water Quality Standards ("ASWQS") including the narrative standards at Section 24.0206, at the discharge point unless a zone of mixing has been authorized by the Environmental Quality Commission ("EQC") and approved by EPA consistent with ASWQS § 24.0207. Specifically, the receiving waters:

   a. Shall be substantially free from materials attributable to sewage, industrial wastes, or other activities of man that will produce objectionable color, odor, or taste, either of itself or in combinations, or in the biota;

   b. Shall be substantially free from visible floating materials, grease, oil, scum, foam, and other floating material attributable to sewage, industrial wastes, or other activities of man;

   c. Shall be substantially free from materials attributable to sewage, industrial wastes, or other activities of man that will produce visible turbidity or settle to form objectionable deposits;

   d. Shall be substantially free from substances and conditions or combinations thereof attributable to sewage, industrial wastes, or other activities of man which may be toxic to humans, other animals, plants, and aquatic life or produce undesirable aquatic life;

   e. The temperature shall not deviate more than 1.5 degrees Fahrenheit from conditions which would occur naturally and shall not fluctuate more than 1 degree Fahrenheit on an hourly basis or exceed 85 degree Fahrenheit (29.4 degree Celsius) due to the influence of other than natural causes;

   f. Concentration of dissolved oxygen shall not be decreased to less than 80% saturation at any time, as influenced by salinity or naturally occurring temperature variations. Where natural conditions cause lower dissolved oxygen levels, controllable water quality factors shall not cause further reductions.

g. The concentration of toxic pollutants shall not exceed the more stringent of the aquatic life criteria for marine waters or the human health concentration criteria for consumption of organisms found in EPA's National Recommended Water Quality Criteria 2002, EPA-822-R-02-047 or the most recent version of the National Recommended Water Quality Criteria.

h. The following additional toxic standards shall apply:

(1) Total Mercury: In addition to the methyl mercury criteria for human health from the EPA's National Recommended Water Quality Criteria, the water column concentration of mercury shall not exceed 0.05 µg/l.

(2) Total Residual Chlorine: Total residual chlorine in any ambient water shall not exceed 7.5 micrograms per liter for marine waters.

i. There shall be no changes in basin geometry or freshwater inflow that will alter current patterns in such a way as to adversely affect existing biological populations or sediment distribution. To protect estuarine organisms, no change in channels, basin geometry, or freshwater influx shall be made which would cause permanent changes in existing isohaline patterns of more than 10 percent.

B. Effluent Limits and Monitoring Requirements

Table 1. Effluent Limits and Monitoring Requirements

Parameter	Maximum Allowable Discharge Limits				Monitoring Requirements[1]	
	Concentration and Loading					
	Average Monthly	Average Weekly	Maximum Daily	Units	Frequency	Sample Type
Flow rate	[2]	[2]	[2]	MGD	Continuous	Continuous
Temperature	[2]	—	[2]	°C	Weekly[3]	Grab
pH	Within the range of 6.5 to 8.6 at all times, and within 0.2 pH units of the value which would occur naturally.			S.U.	Weekly[3]	Grab
Biochemical oxygen demand (5-day)	30	45	[2]	mg/L	Weekly	24-hour composite
	751	1,127	[2]	lbs/day		
	The average monthly percent removal shall not be less than 85 percent.[4]			%		
Total suspended solids	30	45	[2]	mg/L	Weekly	

Parameter	Maximum Allowable Discharge Limits				Monitoring Requirements[1]	
	Concentration and Loading					
	Average Monthly	Average Weekly	Maximum Daily	Units	Frequency	Sample Type
	751	1,127	[2]	lbs/day		24-hour composite
	The average monthly percent removal shall not be less than 85 percent.[4]			%		
Oil and grease, total recoverable	10	—	15	mg/L	Monthly	Grab
Total Ammonia (as N)	[2]	—	[2]	mg/L	Monthly	24-hour composite
Ammonia Impact Ratio	1.0[5]		1.0[5]	Ratio	Monthly	Calculated
Total Nitrogen (as N)	14.2	—	30.5	mg/L	Monthly	24-hour composite
Total Phosphorous	1.6	—	5.5	mg/L	Monthly	24-hour composite
2,3,7,8-TCDD	—	—	5.6×10^{-7}	µg/L	Quarterly	24-hour composite
bis(2-ethylhexyl) Phthalate	—	—	40.3	µg/L	Quarterly	24-hour composite
4,4'-DDT	—	—	0.0033	µg/L	Quarterly	24-hour composite
Enterococci	3,815	—	14,170	CFU /100 mL	Weekly	Grab
Priority Pollutant Scan[6]	—	—	[2]	µg/L	Once during 4th year of permit term	24-hour composite/ Grab[7]
Chronic Toxicity with *Strongylocentrotus purpuratus* or *Dendraster excentricus*, Method 1008.0 WI33L[8]	—	—	Pass (0)[9]	Pass (0) or Fail (1), Percent (%) Effect[10]	Quarterly	24-hour composite

(1) At minimum, at least one sample must be taken concurrent with the quarterly whole effluent toxicity monitoring.

(2) No effluent limits are set at this time, but monitoring and reporting is required.

(3) During sampling events where Ammonia data are collected, Temperature and pH samples readings to be taken at the same time as the ammonia sample is collected, and then used with the table in Attachment D to determine the Ammonia Impact Ratio as described in footnote (5) below. Note that Saltwater ammonia standards apply because the receiving water (South Pacific Ocean) is salt water.

(4) Both the influent and the effluent shall be monitored and reported. The average monthly effluent concentration of Biochemical Oxygen Demand (5-day) and Total Suspended Solids shall not exceed 15 percent of the average monthly influent concentration collected at the same time.

(5) The Ammonia Impact Ratio (AIR) is calculated as the ratio of the ammonia value in the effluent and the applicable ammonia standard from Appendix A in the American Samoa Water Quality Standards (ASWQS). Attachment E to this permit presents the applicable ASWQS standards table. See Attachment D for a sample log to help calculate and record the AIR values. The AIR is the ammonia effluent limit and must be reported in the Discharge Monitoring Reports (DMRs) in addition to the ammonia, pH, and temperature values.

(6) See Attachment F for list of priority pollutants. For the most current listing of all priority toxic pollutants see 40 CFR § 423, Appendix A. The required priority pollutant scan should be conducted concurrently with the scheduled Whole Effluent Toxicity test for that year.

(7) Certain priority pollutants are volatile compounds and should be collected using grab samples; whereas, the remaining priority pollutants are recommended be collected via composite samples.

(8) Monitoring is conditional in that only one of these two test species must be monitored for chronic toxicity during the calendar month for DMR reporting. See Part II.C.3. “Chronic Test Species and WET Methods” of this permit.

(9) An exceedance occurs if the Pass-Fail result is Fail (1). Pass–Fail results are coded as **Pass (0)** (TST null hypothesis is rejected and the instream waste concentration (IWC) is declared not toxic) and **Fail (1)** (TST null hypothesis is not rejected and the IWC is declared toxic). For this discharge, the TST null hypothesis (H_o) at the required discharge-specific IWC is: **IWC mean response (0.92 % effluent) ≤ 0.75 × Control mean response**. Rejection of the TST null hypothesis is determined by following the step-by-step instructions in *National Pollutant Discharge Elimination System Test of Significant Toxicity Technical Document*, Appendix B (EPA 833-R-10-004, 2010; TST Technical Document).

(10) For each toxicity test reported as Pass “0” or Fail “1”, the Permittee shall report the associated value for “Percent (%) Effect (also called % Effect or PE)” for the coded parameter, calculated as: **PE = [(Control mean response − IWC mean response) ÷ Control mean response] × 100**. For example, if the sample Fails the test and the Percent Effect is 48%, then report Pass/Fail=1 and PE= 48. If more than one toxicity test is initiated during the calendar month, then every test results shall be reported attached to the DMR form, except that the one toxicity test with a Fail (1), and the highest PE shall be reported on the DMR form.

C. Sampling

1. Samples shall be representative of the volume and quality of effluent discharged over the sampling and reporting period. All samples are to be taken during normal operating hours. The Permittee shall identify the effluent sampling location used for each discharge.

2. Samples shall be taken at the following locations:

a. Influent samples shall be taken after the last addition to the collection system and prior to in-plant return flow and the first treatment process, where representative samples can be obtained.

b. Effluent samples shall be taken after in-plant return flows and the last treatment process and prior to mixing with the receiving water, where representative samples can be obtained.

3. For intermittent discharges, the Permittee shall monitor on the first day of discharge. The Permittee is not required to monitor in excess of the minimum frequency required in Tables 1. If there is no discharge, the Permittee is not required to monitor either influent or effluent.

D. General Monitoring and Reporting

1. All monitoring shall be conducted in accordance with 40 CFR § 136 test methods, unless otherwise specified in this permit. For influent and effluent analyses required in this permit, the Permittee shall utilize 40 CFR § 136 test methods with Method Detection Limits (MDL) and Measurement Limits (ML) that are lower than the effluent limits in this permit. For parameters without an effluent limit, the Permittee must use an analytical method at or below the level of the applicable water quality criterion for the measured pollutant. If all MDLs or MLs are higher than these effluent limits or criteria concentrations, then the Permittee shall utilize the test method with the lowest MDL or ML. In this context, the Permittee shall ensure that the laboratory utilizes a standard calibration where the lowest standard point is equal to or less than the ML. Influent and effluent analyses for metals shall measure "total recoverable metal", except as provided under 40 CFR § 122.45(c).

2. As an attachment to the first Discharge Monitoring Report (DMR), the Permittee shall submit, for all parameters with monitoring requirements specified in this permit:

   a. The test method number or title and published MDL or ML;

   b. The preparation procedure used by the laboratory;

   c. The laboratory's MDL for the test method computed in accordance with Appendix B of 40 CFR §136;

   d. The standard deviation (S) from the laboratory's MDL study;

   e. The number of replicate analyses (n) used to compute the laboratory's MDL; and

   f. The laboratory's lowest calibration standard.

   As part of each DMR submittal, the Permittee shall notify EPA of any changes to the laboratory's test methods, MDLs, MLs, or calibration standards. If there are any changes to the laboratory's test methods, MDLs, MLs, or calibration standards, these changes shall be summarized in an attachment to the subsequent DMR submittal.

3. The Permittee shall develop a Quality Assurance ("QA") Manual for the field collection and laboratory analysis of samples. The purpose of the QA Manual is to assist in planning for the collection and analysis of samples and explaining data anomalies if they occur. The QA Manual shall be developed (or updated) within 90 days of the effective date of this Permit. At a minimum, the QA Manual shall include the following:

    a. Identification of project management and a description of the roles and responsibilities of the participants; purpose of sample collection; matrix to be sampled; the analytes or compounds being measured; applicable technical, regulatory, or program-specific action criteria; personnel qualification requirements for collecting samples;

    b. Description of sample collection procedures; equipment used; the type and number of samples to be collected including QA/Quality Control ("QC") samples; preservatives and holding times for the samples (see 40 CFR § 136.3); and chain of custody procedures;

    c. Identification of the laboratory used to analyze the samples; provisions for any proficiency demonstration that will be required by the laboratory before or after contract award such as passing a performance evaluation sample; analytical method to be used; MDL and ML to be reported; required QC results to be reported (e.g., matrix spike recoveries, duplicate relative percent differences, blank contamination, laboratory control sample recoveries, surrogate spike recoveries, etc.) and acceptance criteria; and corrective actions to be taken in response to problems identified during QC checks; and

    d. Discussion of how the Permittee will perform data review, report results, and resolve data quality issues and identify limits on the use of data.

4. Throughout all field collection and laboratory analyses of samples, the Permittee shall use the QA/QC procedures documented in their QA Manual. If samples are tested by a contract laboratory, the Permittee shall ensure that the laboratory has a QA Manual on file. A copy of the Permittee's QA Manual shall be retained on the Permittee's premises and available for review by regulatory authorities upon request. The Permittee shall review its QA Manual annually and revise it, as appropriate.

5. Samples collected during each month of the reporting period must be reported on Discharge Monitoring Report forms, as follows:

    a. For a *maximum daily* permit limit or monitoring requirement when one or more samples are collected during the month, report either:

    The *maximum value*, if the maximum value of all analytical results is greater than or equal to the ML; or
    NODI (Q), if the maximum value of all analytical results is greater than or equal

to the laboratory's MDL, but less than the ML; or
NODI (B), if the maximum value of all analytical results is less than the laboratory's MDL.

b. For an *average weekly* or *average monthly* permit limit or monitoring requirement when only one sample is collected during the week or month, report either:

The *maximum value*, if the maximum value of all analytical results is greater than or equal to the ML; or
NODI (Q), if the maximum value of all analytical results is greater than or equal to the laboratory's MDL, but less than the ML; or
NODI (B), if the maximum value of all analytical results is less than the laboratory's MDL.

c. For an *average weekly* or *average monthly* permit limit or monitoring requirement when more than one sample is collected during the week or month, report:

The *average value* of all analytical results where 0 (zero) is substituted for *NODI (B)* and the laboratory's MDL is substituted for *NODI (Q)*.

6. In addition to information requirements specified under 40 CFR § 122.41(j)(3), records of monitoring information shall include: the laboratory which performed the analyses and any comment, case narrative, or summary of results produced by the laboratory. The records should identify and discuss QA/QC analyses performed concurrently during sample analyses and whether project and 40 CFR § 136 requirements were met. The summary of results must include information on initial and continuing calibration, surrogate analyses, blanks, duplicates, laboratory control samples, matrix spike and matrix spike duplicate results, and sample condition upon receipt, holding time, and preservation.

7. The Permittee shall use CDX (https://cdx.epa.gov/) to access the NPDES Electronic Tool (NeT) and electronically submit the following program reports:

- NetDMR/Discharge Monitoring Report
- NeT Sewer Overflow and Bypass
- NeT Biosolids
- NeT Agriculture
- NeT Construction General Permit
- NeT Multi Sector General Permit
- NeT MS4
- NeT Pesticide General Permit
- Groundwater Remediation dewater & Hydrostatic Testing

If NeT reporting through CDX is not yet available for a particular program report, the Permittee shall report in NeT as soon as reporting for that program is available in NeT and no later than December 21, 2025. In accordance with the NPDES Electronic Reporting Rule, these program reports must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR § 3 (including, in all cases, subpart D to part 3), 40 CFR § 122.22, and 40 CFR § 127.

8. Monthly DMRs shall be submitted by the 28th day of the month following the previous reporting period. For example, under quarterly submission, the three DMR forms for January, February, and March are due on April 28th. Quarterly monitoring must be conducted starting in the first complete quarter following the permit effective date. For example, quarterly monitoring reports are due on January 1, April 1, July 1, or October 1 of each calendar year. Annual reporting for annual monitoring is due on January 28th of the following year. A DMR must be submitted for the reporting period even if there was not any discharge. If there is no discharge from the facility during the reporting period, the Permittee shall submit a DMR indicating no discharge as required.

9. The Permittee shall also submit an electronic or paper Discharge Monitoring Report to American Samoa EPA. Paper DMR forms shall be mailed to:

   American Samoa EPA
   P.O. Box PPA
   Pago Pago, American Samoa 96799
   attn: Fa'amao O. Asalele Jr.

E. Receiving Water Monitoring

1. The Permittee shall continue to conduct semi-annual receiving water monitoring that corresponds to tradewind and non-tradwind seasons, for the pollutants or parameters identified in Table 2 at all monitoring stations identified in Table 3 below. All samples shall be water column samples; surface and bottom grabs shall be collected at 1 meter below the surface and above sea floor, respectively.

2. During the first sampling survey, the Permittee shall verify the locations (latitude and longitude) and depths of each monitoring station identified in Table 3 below. The Permittee shall submit this information and any location changes with the first Semi-Annual water column monitoring report to USEPA Region 9 and American Samoa EPA (AS-EPA) for review and approval.

3. This permit may be reopened and modified to include an alternative receiving water monitoring program if the Permittee submits, and EPA approves, an alternative monitoring program.

4. All individual measurement values shall be reported as an attachment to the DMR form via the e-reporting system netDMR. Additional method guidance for water monitoring (e.g., volunteer, EMAP, etc.) may be found at: https://www.epa.gov/cwa-methods.

Table 2: Receiving Water Monitoring Requirements

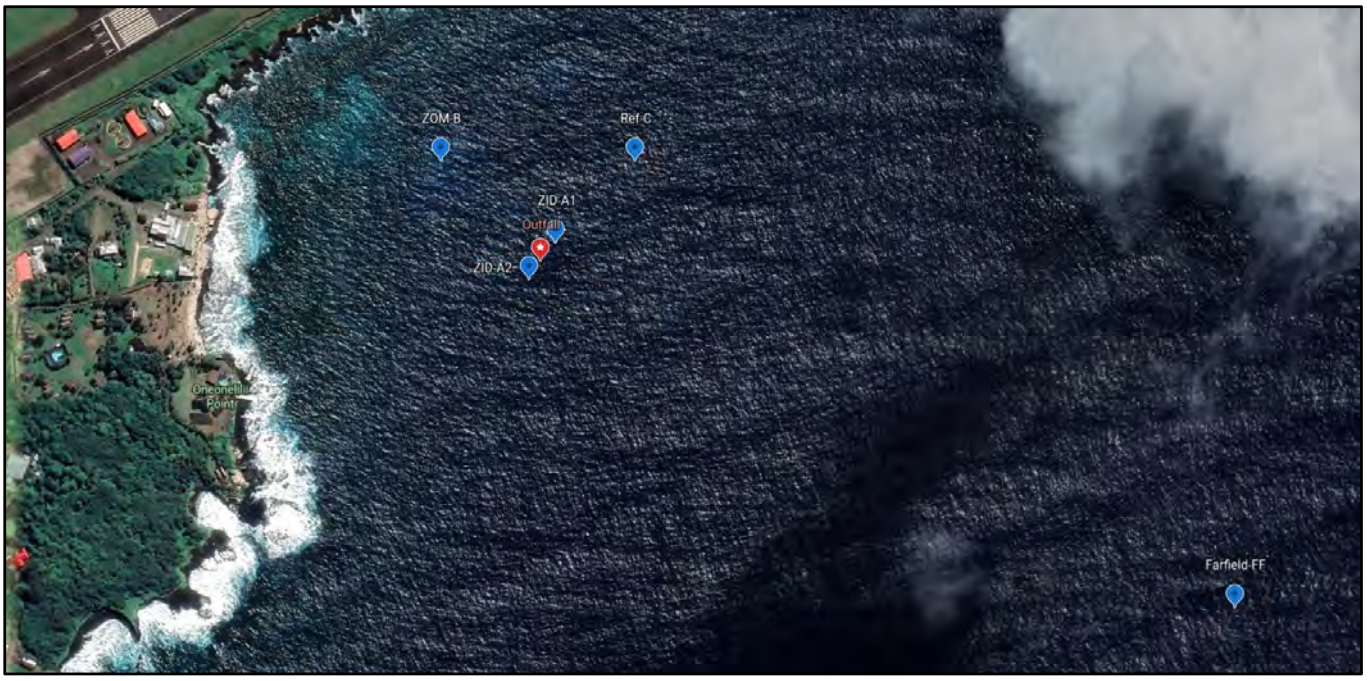
Parameter	Units	Monitoring Frequency	Sampling Depths (m)	Sample Type / Method
Temperature(1)	ºC	Semi-Annually (March, August)	1m below surface, mid-depth, and 1m above bottom	Field Sensor (e.g. CDT)
Salinity(1)	PSU			Field Sensor
Dissolved Oxygen	mg/L			Field Sensor
pH(1)	Standard Units			Field Sensor (pH meter)
Turbidity	NTU			Bench Meter or Field Sensor
Light Penetration	ft		Surface	Secchi disk
Total Phosphorous	µg/L as P		1m below surface, mid-depth, and 1m above bottom	Lab Sample (EPA 353.3)
Total Nitrogen	µg/L as N			Lab Sample (EPA 353.2 + EPA 351.2)
Chlorophyll a	µg/L			Lab Sample
Ammonia(1)	mg/L as NH_3			Lab Sample (EPA 350.1)
Enterococci	CFU / 100 mL			Lab Sample (AS-EPA)

(1) Temperature, salinity, and pH data collection must occur concurrently with sampling for Ammonia as the ASWQS ammonia standards depend on that information to determine compliance.

Table 3: Receiving Water Monitoring Locations

Stations		Location
U	Diffuser Midpoint station	Latitude: 14.3416° S Longitude: 170.7179° W
A1	Zone of Initial Dilution (ZID) stations	Latitude: 14.3414° S Longitude: 170.7178° W
A2		Latitude: 14.3418° S Longitude: 170.7181° W
B	Zone of Mixing (ZOM) station	Latitude: 14.3405° S Longitude: 170.7191° W
C	Reference station	Latitude: 14.3405° S Longitude: 170.7169° W

FF	Farfield Station	Latitude: 14.3454° S Longitude: 170.7101° W



Part II. SPECIAL CONDITIONS

A. Permit Reopener(s)

1. In accordance with 40 CFR §§ 122 and 124, this permit may be modified by EPA to include effluent limits, monitoring, or other conditions to implement new regulations, including EPA-approved water quality standards or TMDL; or to address new information indicating the presence of effluent toxicity or the reasonable potential for the discharge to cause or contribute to exceedances of water quality standards.

2. In accordance with 40 CFR § 122.44(c), EPA may promptly modify or revoke and reissue any permit issued to a treatment works treating domestic sewage (including "sludge only facilities") to incorporate any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the CWA, if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in the permit.

3. In accordance with 40 CFR §§ 122 and 124, this permit may be modified to include effluent limits or permit conditions to address toxicity (acute and/or chronic) in the effluent or receiving waterbody, as a result of the discharge; or to implement new, revised, or newly interpreted water quality standards applicable to toxicity.

4. In accordance with 40 CFR §§ 122 and 124, this permit may be modified by EPA to incorporate conditions of a POTW pretreatment program that has been approved in

accordance with the procedures in 40 CFR § 403.11 as enforceable conditions of the permit.

B. Twenty-four Hour Reporting of Noncompliance

1. The Permittee shall report any noncompliance which may endanger human health or the environment. The Permittee is required to provide an oral report by directly speaking with an EPA and American Samoa EPA (AS-EPA) Enforcement staff person within 24 hours from the time the Permittee becomes aware of the noncompliance. If the Permittee is unsuccessful in reaching a staff person, the Permittee shall provide notification by 9 a.m. on the first business day following the noncompliance to the attention of the EPA Wastewater Enforcement Section Manager at (415) 947-4179 or (415) 947-4510 and to AS-EPA at (684) 633-2304.

   The Permittee shall follow up with an electronic submission within five days of the date the Permittee becomes aware of the noncompliance. The electronic report submission shall be submitted to EPA using NeT-Sewer Overflow. See Section I.D. for more details. The submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2. The following shall be included as information which must be reported within 24 hours under this paragraph.

   a. Any unanticipated bypass which exceeds any effluent limit in the permit (see 40 CFR § 122.44(g)).

   b. Any upset which exceeds any effluent limit in the permit.

   c. Violation of a maximum daily discharge limit for any of the pollutants listed by the director in the permit to be reported within 24 hours (see 40 CFR § 122.44(g)).

3. EPA may waive the written report in writing on a case-by-case basis for reports required under Part II.B.2 above, if the oral report has been received within 24 hours.

C. Chronic Whole Effluent Toxicity (WET) Requirements

1. The chronic toxicity Instream Waste Concentration (IWC) required for the authorized discharge point is expressed as **0.92 percent (%) effluent** (i.e., 1/S × 100, also 1 part effluent to S−1 parts dilutant). The toxicity laboratory making the IWC for chronic toxicity testing shall use 1 part effluent to S−1 parts dilutant for a total of S parts.

Table 4. POTW Facility-specific Chronic Toxicity IWC.

POTW Facility Name and Discharge Point	Dilution Ratio	Required Chronic Toxicity IWC in % Effluent
Tafuna Sewage Treatment Plant Outfall 001	1 to 109	0.92%

2. Sampling and Monitoring Frequency

   Toxicity test samples shall be collected for the authorized discharge point in accordance with Part I.C.2.b of this Permit. The total sample volume shall be determined both by the WET method used (including, for non-continuous discharges, the additional sample volume necessary to complete the toxicity test) and the additional sample volume necessary for Toxicity Identification Evaluation (TIE) studies.

   The Permittee shall use the test species, WET method, monitoring frequency, and sample type specified in Part I, Table 1. A split of each effluent sample for toxicity testing shall be analyzed for all other monitored parameters (conventional, non-conventional, and priority toxic pollutants), at the minimum frequency of analysis specified during the reporting period for the month by the effluent monitoring program. All toxicity tests for the month shall be initiated during that calendar month.

3. Chronic Test Species and WET Methods

   The Permittee shall conduct toxicity tests with the parameter for chronic toxicity required in Part I, Table 1 (e.g., static non-renewal test with purple sea urchin, *Strongylocentrotus purpuratus*, or eccentric sand dollar, *Dendraster excentricus* (Fertilization Test Method 1008.0)). If supply cultures of purple sea urchin are not available for testing, then the Permittee shall conduct static non-renewal toxicity tests with the eccentric sand dollar. The Permittee shall use short-term WET methods for this test species for estimating the chronic toxicity of NPDES effluents specified in the first edition of *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995) and applicable water quality standards. (Also see 40 CFR §§ 122.41(j)(4) and 122.44(d)(1)(iv), and 40 CFR § 122.21(j)(5)(viii) for POTWs.)

4. Quality Assurance

   The Permittee shall follow all Quality Assurance specifications listed in each paragraph below in this section.

   a. Quality assurance measures, instructions, and other recommendations and requirements are found in the WET methods manual(s) specified in paragraph 3 above. Additional requirements are specified below.

b. **Hold time.** Based on the June 29, 2015 inter-office memorandum for the Pacific Island Permittees, the 72-hour hold time shall not be exceeded, which includes shipping time of the WET samples to the continental U.S. for toxicity testing. The WET methods manual hold time for NPDES samples used for toxicity testing begins when the 24-hour composite sampling period is completed (or the last grab sample in a series of grab samples is taken) and ends at the first time of sample use (initiation of toxicity test).

c. The discharge is subject to a determination of rejection or non-rejection of the TST null hypothesis (H_o) from a chronic toxicity test at the required IWC. For this discharge, the TST null hypothesis (H_o) at the required discharge-specific IWC is: **IWC mean response (0.92 % effluent) ≤ 0.75 × Control mean response**. For statistical flowchart and procedures using the TST statistical approach, see Appendix B of National Pollutant Discharge Elimination System Test of Significant Toxicity Technical Document (EPA 833-R-10-004, 2010; TST Technical Document). For the TST statistical approach, the associated value for "Percent (%) Effect" (also called "% Effect" or "PE") at the required IWC is calculated as: **% Effect = [(Control mean response − IWC mean response) ÷ Control mean response] × 100**.

d. **Controls.** Effluent dilution water and control water shall be prepared and used as specified in the applicable WET methods manual in paragraph 3 above. If the dilution water is different from test organism culture water, then a second control using culture water shall also be used. If the effluent sample at the IWC is adjusted using artificial sea salts or a saltwater brine, a "salting up/brine" control shall be prepared and used as specified in the applicable WET methods manual in paragraph 3 above.

e. If organisms are not cultured in-house in the testing laboratory, then concurrent testing with a reference toxicant shall be conducted. If organisms are cultured in-house in the testing laboratory, then monthly reference toxicant testing is sufficient. Reference toxicant tests and effluent toxicity tests shall be conducted using the same test conditions (e.g., same test duration, etc.).

f. If the effluent toxicity test during the reporting period for the month does not meet the Test Acceptability Criteria (TAC) described in the WET method specified in paragraph 3 above, then the Permittee shall resample and retest within 14 days. The results of this retest shall only replace that effluent toxicity test that did not meet TAC during the reporting period for the month.

g. **Removed Toxicants (chlorine, ammonia).** If the discharged effluent is chlorinated, then chlorine shall not be removed from the effluent sample prior to toxicity testing without written approval from EPA. Ammonia shall not be removed from the effluent sample prior to toxicity testing without written approval from EPA.

5. Initial Investigation Toxicity Reduction Evaluation (TRE) Work Plan

   Within 90 days of the permit effective date, the Permittee shall prepare and submit to the permitting authority a copy of its Initial Investigation TRE Work Plan (1-2 pages) for review. This plan shall include steps the Permittee intends to follow if a Maximum Daily Effluent result for chronic toxicity is reported as Fail (1) for the reporting month (see Part I, Table 1, Endnote 9), and should include the following, at minimum:

   a. A description of the investigation and evaluation techniques that would be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency.

   b. A description of methods for maximizing in-house treatment system efficiency, good housekeeping practices, and a list of all chemicals used in operations at the facility.

   c. If a TRE and Toxicity Identification Evaluation (TIE) are necessary, an indication of who would conduct these studies (i.e., an in-house expert or outside contractor).

6. Accelerated Toxicity Testing and TRE/TIE Process

   a. If the chronic toxicity Maximum Daily Effluent result is reported as Fail (1) (i.e., TST null hypothesis is not rejected and the IWC is declared toxic), then the Permittee shall conduct the following the accelerated toxicity testing, implement the initial investigation TRE workplan and conduct TRE/TIE process.

   b. If the chronic toxicity maximum daily effluent result is Fail (1) and the source of toxicity is known (e.g., a temporary plant upset), then the Permittee shall conduct one additional toxicity test using the same species and WET method. This toxicity test shall begin within 14 days of receipt of a maximum daily effluent result of Fail (1). If the additional toxicity test result is Pass (0), then the Permittee may return to the regular testing frequency.

   c. If the chronic toxicity maximum daily effluent result is Fail (1) and the source of toxicity is <u>not</u> known, then the Permittee shall conduct four additional toxicity tests using the same test species and WET method, approximately every two weeks, over a 12-week period. This testing shall begin within 14 days of receipt of a maximum daily effluent result of Fail (1). If all the additional toxicity test results are Pass (0), then the Permittee may return to the regular testing frequency.

   d. If one of the additional toxicity test results (in paragraphs 6.b or 7.c) is Fail (1), then, within 14 days of receipt of this test result, the Permittee shall initiate a TRE using—according to the type of treatment facility—EPA manual *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants* (EPA/833/B-99/002, 1999), or EPA manual *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations* (EPA/600/2-88/070, 1989).

e. In conjunction with TRE/TIE process initiation, the Permittee shall immediately develop and implement a Detailed TRE Work Plan which shall include the following: further actions undertaken by the Permittee to investigate, identify, and correct the causes of toxicity; actions the Permittee will take to mitigate the effects of the discharge and prevent the recurrence of toxicity; and a schedule for these actions. This Detailed work plan shall be submitted to EPA as an attachment to the Permittee's next toxicity DMR submittal.

f. The Permittee may initiate a TIE as part of a TRE to identify the causes of toxicity using the same species and WET method and, as guidance, EPA manuals: *Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures* (EPA/600/6-91/003, 1991); *Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/080, 1993); *Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/081, 1993); and *Marine Toxicity Identification Evaluation (TIE): Phase I Guidance Document* (EPA/600/R-96-054, 1996).

g. During a TRE, the chronic toxicity effluent monitoring results conducted for the TRE/TIE that meet the WET method's Test Acceptability Criteria at the IWC shall be reported on the DMR following the Endnotes in Part I, Table 1.

7. Reporting of Toxicity Monitoring Results on DMR

a. **Report no effluent monitoring result for Chronic Toxicity.** If no toxicity test monitoring for the calendar month is required and toxicity monitoring is not conducted, then the Permittee shall report "NODI(9)" (i.e., Conditional Monitoring – Not Required for This Period) on the DMR form.

Report Maximum Daily Effluent result(s) for Chronic Toxicity. See Part I, Table 1, Endnote 10).

b. If more than one toxicity test is conducted during the month, then those Pass (0) or Fail (1) results shall be reported attached to the DMR form, except that a Fail (1) result of any one of all the toxicity tests conducted during the month shall be reported on the DMR form.

c. For each chronic toxicity test reported as Pass (0) or Fail (1), the Permittee shall report the associated value for "Percent (%) Effect" calculated as: % Effect = [(Control mean response − IWC mean response) ÷ Control mean response] × 100.

d. The Permittee shall submit the <u>full toxicity laboratory report</u> for all toxicity testing as an attachment to the DMR for the month in which the toxicity tests are conducted. The laboratory report for toxicity shall contain: all toxicity test results

(raw data and statistical analyses) for each effluent and related reference toxicant tested; chain-of custody; the dates of sample collection and initiation of each toxicity test; control performance; all results for other effluent parameters monitored concurrently with the effluent toxicity tests; and schedule and progress reports on TRE/TIE studies.

e. **Quality-control reporting for toxicity laboratory control group.** To assist in reviewing within test variability, the toxicity laboratory report must include, for each test species/WET method: quality-control charts for the mean, standard deviation and coefficient of variation of the control group. Each toxicity laboratory report attached to the DMR shall include both a graphical control chart (with a long-term average printed below the chart) and a table of control-group data for the WET method/test species. These data shall be listed in the table: sample date, type of dilution water, number of replicates (n), control mean (cM), control standard deviation (cS), and control coefficient of variation (cK). The quality-control chart and the table shall report data for the last 50 toxicity tests conducted by the laboratory. If there are more than 30 tests with a different number of replicates (e.g., 20 tests of n=10 and 30 tests of n=20), then use separate control charts and tables. The table shall also report the following summary statistics separately for cM, cS, and cK: number of observations, average, standard deviation, and percentiles (minimum, 10^{th}, 25^{th}, 50^{th}, 60^{th}, 65^{th}, 70^{th}, 75^{th}, 80^{th}, 90^{th}, and maximum). This information is required for review of toxicity test results and the toxicity laboratory's performance of the test species/WET method by the Permittee and permitting authority. Also, see test species/WET method-specific percentiles for the mean, coefficient of variation, and standard deviation of control-group data in section 3 tables of the TST Technical Document.

f. **Notification reporting.** The Permittee shall notify the permitting authority in writing within 14 days of a **Maximum Daily Effluent result of Fail (1)**. Such notification shall describe actions the Permittee has taken (or will take) to investigate, identify, and correct the causes of toxicity; the status of actions required by this permit; and schedule for actions not yet completed; or reason(s) that no action has been taken.

D. Best Management Practices and Pollution Prevention

1. In accordance with section 304(e) of the CWA and 40 CFR § 122.44(k), the Permittee shall develop and implement appropriate pollution prevention measures or Best Management Practices (BMPs) designed to control site stormwater runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage which are associated with or ancillary to the maintenance, transportation, and storage of potential pollutants at the facility that may contribute significant amounts of such pollutants to surface waters. This includes, but is not limited to:

a. Good housekeeping: the Permittee must keep all exposed areas of the facility in a clean, orderly manner where such exposed areas could contribute pollutants to storm water and non-storm water discharges,

b. Minimizing exposure: where practicable, industrial materials and activities should be protected to prevent exposure to rain or runoff,

c. Preventive inspections and maintenance: timely inspections and maintenance of storm water and non-storm water management devices, (e.g., cleaning oil/water separators) as well as inspecting, testing, maintaining, and repairing facility equipment and systems to avoid breakdowns or failures that may result in discharges of pollutants to surface waters,

2. The Permittee shall develop and implement BMPs to assure reliable performance by the UV disinfection system and comply with bacteria limitations specified in Table 1 of the permit. This includes, but is not limited to:

a. The UV system shall be periodically cleaned such that there is no visible settling of solids within the UV bulb chambers.

b. The Permittee must maintain a spare part inventory for the UV disinfection system to prevent inadequate disinfection due to failure of hydraulic components of the UV system.

E. Biosolids

1. General Requirements

a. All biosolids generated by the Permittee shall be used or disposed of in compliance with the applicable portions of 40 CFR §§ 258 and 503. The Permittee is responsible for assuring that all biosolids produced at the facility are used or disposed of in accordance with these rules, whether the Permittee uses or disposes of the biosolids itself or transfers them to another party for further treatment and use or disposal. The Permittee is responsible for informing subsequent preparers, appliers, and disposers of the requirements that they must meet under these rules, and any monitoring requirements, including required frequencies of monitoring and maximum hold times for pathogen and indicator organism samples.

b. Duty to mitigate: The Permittee shall take all reasonable steps to prevent or minimize any biosolids use or disposal which has a likelihood of adversely affecting human health or the environment.

c. No biosolids shall be allowed to enter wetlands or other waters of the United States.

d. Biosolids treatment, storage, and use or disposal shall not contaminate groundwater.

e. Biosolids treatment, storage, and use or disposal shall be performed in a manner as to minimize nuisances such as objectionable odors or flies.

f. The Permittee shall assure that haulers transporting biosolids off site for further treatment, storage, use, or disposal take all necessary measures to keep the biosolids contained. The Permittee shall maintain and have haulers adhere to a spill clean-up plan. Any spills shall be reported to USEPA (attn: the EPA Wastewater Enforcement Section Manager) at (415) 947-4179 or (415) 947-4510 and AS-EPA at (684) 633-2304, within 24 hours from the time the Permittee becomes aware of the spill.

g. Biosolids shall not be stored for over two years from the time they are generated unless the Permittee submits a written notification to USEPA, demonstrating a need for longer temporary storage and plan for removal in accordance with 40 CFR § 503.20(b).

h. Any biosolids treatment, disposal, or storage site shall have facilities adequate to divert surface runoff from adjacent areas, to protect the site boundaries from erosion, and to prevent any conditions that would cause drainage from the materials in the site to escape from the site. Adequate protection is defined as protection from at least a 100-year storm and from the highest tidal stage that may occur.

2. Requirements for Disposal in a Municipal Landfill

"Disposal in a municipal landfill" is the placement of biosolids in a landfill subject to the requirements in 40 CFR § 258 where it is mixed with other materials being placed in the landfill, or used as alternative daily or final cover at the landfill.

a. The Permittee shall ensure that the landfill used is in compliance with 40 CFR § 258 requirements and applicable state or tribal requirements.

b. Biosolids disposed of in a municipal landfill shall be tested semi-annually, or more often if necessary, using the Paint Filter Liquids Test (Method Number 9095 in EPA Publication SW-846), to demonstrate that there are no free liquids prior to disposal in a municipal landfill (see 40 CFR § 258.28).

3. Notification Requirements

The Permittee either directly or through contractual arrangements with their biosolids management contractors, shall comply with the following notification requirements:

a. Notification of non-compliance: The Permittee shall notify USEPA and AS-EPA of any non-compliance within 24 hours by phone or e-mail if the non-compliance may seriously endanger public health or the environment. An electronic report

shall also be submitted within 5 working days of knowing the non-compliance. For other instances of non-compliance, the Permittee shall notify USEPA and AS-EPA of the non-compliance in writing within 5 working days of becoming aware of the non-compliance. The Permittee shall require their biosolids management contractors to notify USEPA (attn: EPA Wastewater Enforcement Section Manager) at (415) 947-4179 or (415) 947-4510 and AS-EPA at (684) 633-2304 of any non-compliance within the same time-frames.

b. If biosolids are shipped to another state or to Tribal Lands, the Permittee shall send 30 days prior notice of the shipment to the USEPA and permitting authorities in the receiving State/Tribal authority.

c. The Permittee shall notify USEPA and AS-EPA at least 60 days prior to starting a new biosolids use or disposal practice.

4. Reporting requirements

a. The Permittee shall submit an annual biosolids report into EPA's Central Data Exchange (CDX) electronic reporting system (see Part I.D.7. above) by February 19 of each year for the period covering the previous calendar year. The report shall include the tonnages of biosolids (reported in dry metric tons, 100% dry weight), that were land applied (without further treatment by another party), land applied after further treatment by another preparer, disposed in a sludge-only surface disposal site, sent to a landfill for alternative cover or fill, stored on site or off site, or used for another purpose. The report shall include the following attachments:

(1) Copies of the original monitoring reports from laboratories (results only, QA/QC pages not required). The lab reports must indicate whether the results are on a 100% dry weight basis. Lab reports for fecal coliforms must show the time the samples were collected and the time analysis was started.

(2) If operational parameters were used to demonstrate compliance with pathogen reduction and vector attraction reduction, the ranges of these parameters for each sampling period (i.e. ranges of times and temperatures).

(3) If biosolids are stored on-site or off-site for more than 2 years, the information required in 40 CFR § 503.20(b) to demonstrate that the storage is temporary.

F. Pretreatment

1. The Permittee shall notify USEPA and AS-EPA at least 60 days prior to receiving from nondomestic sources of pollutants.

2. In accordance with 40 CFR § 403.8, the Permittee may be required to develop a POTW pretreatment program if EPA finds that the nature of volume of the industrial

influent, treatment process upsets, violations of POTW effluent limitations, contamination of municipal sludge, or other circumstances warrant in order to prevent interference with the treatment plant or pass through.

G. Sanitary Sewer Overflows

1. A Sanitary Sewer Overflow (SSO) is an overflow, spill, release, or diversion of wastewater from a sanitary sewer collection system that occurs prior to a treatment plant. Sanitary sewer overflows include a) overflows or releases of wastewater that reach waters of the US, b) overflows or releases of wastewater that do not reach waters of the US, and c) wastewater backups into buildings that are caused by blockages or flow conditions in a sanitary sewer other a building lateral. SSOs are generally caused by high volumes of infiltration and inflow (I/I), pipe blockages, pipe breaks, power failure, and insufficient system capacity.

2. All Sanitary Sewer Overflows are prohibited.

3. SSOs must also be reported within twenty-four hours in accordance with Part II.B of this permit.

4. The Permittee shall submit with its DMRs, the following information for each SSO that occurs during the months covered by the respective DMR. Submittal or reporting of any of this information does not provide relief from any subsequent enforcement actions for unpermitted discharges to waters of the United States.

    a. The cause of the SSO;

    b. Duration and volume (estimate, if unknown);

    c. Description of the source (e.g., manhole cover, pump station, etc.);

    d. Type of collection system that overflowed (i.e., combined or separate);

    e. Location by street address, or any other appropriate method providing a location;

    f. Date and time of SSO; including time that the Permittee first became aware of the SSO and the time responders arrived on-site;

    g. The ultimate destination of the SSO, e.g., surface water body (direct), surface water body (via municipal separate storm sewer system), or land use location. The Permittee shall submit a USGS map or copy thereof with the location of the SSO, the flow path, and the destination marked; and

    h. Corrective action taken and steps taken or planned to eliminate reoccurrence of SSOs.

H. Asset Management and Climate Change

The Permittee shall develop an asset management program to cover the treatment plant and collection system.

1. Within two (2) years of the effective date of this permit, the Permittee shall procure, populate, and utilize asset management and work order management software. The software shall:

    a. Be populated with an inventory of all critical assets and assets valued over $5,000 into a single database. Assets may include, but are not limited to, sewer lines, manholes, outfalls, pump stations, force mains, catch basins, and wastewater treatment facility assets. Each entry shall include:

        (1) Name and identification number.

        (2) Location (GPS coordinate or equivalent identifier).

        (3) Current performance/condition.

        (4) Purchase and installation date.

        (5) Purchase price.

        (6) Replacement cost.

        (7) Quantitative consequence of failure.

        (8) Quantitative likelihood of failure.

    b. Automate work order production and tracking.

    c. Prioritize system maintenance and rehabilitation projects.

2. Within three (3) years of the effective date of this Permit, the Permittee shall create an Asset Management Plan (AMP) and submit a copy of the AMP to EPA. The AMP shall be updated and re-evaluated every five years. A copy of the permittee's AMP shall be retained on the permittee's premises and available for review by regulatory authorities upon request. The components of the AMP shall include:

    a. **Rehabilitation and Replacement Plan.** The plan shall identify and prioritize upcoming asset rehabilitation and replacement projects costing greater than $5,000 and outline a proposed schedule for completion of each project.

    b. **Maintenance Plan.** The plan shall identify individual or categories of maintenance activities and frequency with which they are performed. The plan shall estimate ongoing and projected cost of maintenance activities.

    c. **System Map.** A sewer collection system map shall incorporate assets from the asset management inventory. The map shall be color-coded to identify maintenance and rehabilitation priorities.

    d. **Funding.** The plan shall create an accounting of current and projected funding sources, relevant expenses, and financial reserves. Expenses may include

operational, administrative, interest, or capital expenses. Funding sources may include federal, state, local or private grants, loans, or bonds, as well as connection and user fees.

e. **Vulnerability Assessment for climate change.** The AMP shall include a vulnerability assessment to evaluate and manage climate change-related effects that may impact:

(1) Facility operation

(2) Water supplies

(3) Collection systems

(4) Water quality, including any projected changes to the influent water temperature and pollutant concentrations, and beneficial uses.

The permittee shall also identify new or increased threats to the sewer system resulting from climate change that may impact desired levels of service in the next 50 years. The concerns shall include but are not limited to flooding risks, volatile rain period impacts (both dry and wet weather), and financing.

f. **Sea Level Rise.** The AMP shall consider impacts from sea level rise. The permittee shall update contingency, emergency response, or hazard mitigation plans to incorporate projected sea level rise or associated groundwater rise.

I. Capacity Attainment and Planning

The Permittee shall submit to EPA a written report within ninety (90) days if the average dry weather wastewater treatment flow for any month exceeds 90 percent of the design capacity (i.e., 6 MGD) of the waste treatment and/or disposal facilities.

J. 401 Water Quality Certification

The Permittee shall comply with all requirements set forth in AS-EPA's 401 Water Quality Certification issued on [DATE]. See Attachment H.

K. Summary of Special Reports

The Permittee is required to submit special reports in this permit by the dates listed below in Table 5. For reports that are required to be submitted to "R9NPDES", the Permittee shall email reports to R9NPDES@epa.gov and include the following information in the subject line:

1. The permit number (AS0020010)
2. The name of the report as written in the table below.
3. The word "submittal"

Table 5. Special Reports to Submit to EPA.

Special Report Name	Due Date	Section of Permit	Submit Report to:
Initial Investigation TRE Work Plan	90 days of the permit effective date	Section II.C.5	R9NPDES
Annual Biosolids Report	February 19 of each year	Section II.E.4	EPA's CDX reporting system
Asset Management Plan	3 years after the permit effective date	Section II.H.2	R9NPDES

Part III. STANDARD CONDITIONS

The Permittee shall comply with all EPA Region 9 Standard Conditions below.

A. All NPDES Permits

In accordance with 40 CFR §122.41, the following conditions apply to all NPDES permits and are expressly incorporated into this permit.

1. Duty to comply; at 40 CFR §122.41(a).

   The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the CWA and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

   a. The Permittee shall comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under 405(d) of the CWA within the time provided in the regulations that established these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

   b. The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or

imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.[1]

c. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.[1]

2. Duty to reapply; at 40 CFR § 122.41(b).

   If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must apply for and obtain a new permit. Any Permittee with a currently effective permit shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Director.

3. Need to halt or reduce activity not a defense; at 40 CFR § 122.41(c).

   It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

[1] The civil and administrative penalty amounts are adjusted annually for inflation pursuant to the Federal Civil Penalties Inflation Adjustment Act Improvements Act of 2015, and the current penalty amounts are set forth in 40 CFR § 19.4.

4. Duty to mitigate; at 40 CFR § 122.41(d).

   The Permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

5. Proper operation and maintenance; at 40 CFR § 122.41(e).

   The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

6. Permit actions; at 40 CFR § 122.41(f).

   This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

7. Property rights; at 40 CFR § 122.41(g).

   This permit does not convey any property rights of any sort, or any exclusive privilege.

8. Duty to provide information; at 40 CFR § 122.41(h).

   The Permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

9. Inspection and entry; at 40 CFR § 122.41(i).

   The Permittee shall allow the Director, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

   a. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location.

10. Monitoring and records; at 40 CFR § 122.41(j).

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. Except for records of monitoring information required by this permit related to the Permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample measurement, report or application. This period may be extended by request of the Director at any time.

c. Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed

(4) The individuals(s) who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

d. Monitoring must be conducted according to test procedures approved under 40 CFR § 136 or, in the case of sludge use or disposal, approved under 40 CFR § 136 unless otherwise specified in 40 CFR § 503, unless other test procedures have been specified in the permit.

e. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

11. Signatory requirement; at 40 CFR § 122.41(k).

a. All applications, reports, or information submitted to the Director shall be signed and certified. (See 40 CFR § 122.22.) All permit applications shall be signed as follows:

(1) For a corporation. By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

Note: EPA does not require specific assignments or delegations of authority to responsible corporate officers identified in 40 CFR § 122.22(a)(1)(i). The Agency will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Director to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions under 40 CFR § 122.22(a)(1)(ii) rather than to specific individuals.

(2) For a partnership or sole proprietorship. By a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency. By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

b. All reports required by permits, and other information requested by the Director shall be signed by a person described in 40 CFR § 122.22(a), or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in 40 CFR § 122.22(a)

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of Plant manager, operator of a well or well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility

for environmental matters of the company, (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) and,

(3) The written authorization is submitted to the Director.

c. Changes to authorization. If an authorization under 40 CFR § 122.22(b) is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of 40 CFR § 122.22(b) must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

d. Certification. Any person signing a document under 40 CFR § 122.22(a) or (b) shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

e. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

12. Reporting requirements; at 40 CFR § 122.41(l).

a. Planned changes. The Permittee shall give notice to the Director as soon as possible of any planned physical alternations or additions to the permitted facility. Notice is required only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR § 122.29(b); or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR § 122.42(a)(1).

(3) The alteration or addition results in a significant change in the Permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing

permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;

b. Anticipated noncompliance. The Permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

c. Transfers. This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the CWA. (See 40 CFR § 122.61; in some cases, modification or revocation and reissuance is mandatory.)

(1) Transfers by modification. Except as provided in 40 CFR § 122.61(b), a permit may be transferred by the Permittee to a new owner or operator only if the permit has been modified or revoked and reissued (under 40 CFR § 122.62(b)(2)), or a minor modification made (under 40 CFR § 122.63(d)), to identify the new Permittee and incorporate such other requirements as may be necessary under CWA.

(2) Automatic transfers. As an alternative to transfers under 40 CFR § 122.61(a), any NPDES permit may be automatically transferred to a new Permittee if:

(i) The current Permittee notifies the Director at least 30 days in advance of the proposed transfer date in 40 CFR § 122.61(b)(2);

(ii) The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

(iii) The Director does not notify the existing Permittee and the proposed new Permittee of his or her intent to modify or revoke and reissue the permit. A modification under this subparagraph may also be a minor modification under 40 CFR § 122.63. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in 40 CFR § 122.61(b)(2).

d. Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices. As of December 21, 2016, all reports and forms submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR § 3 (including, in all cases, subpart D to part 3), 40 CFR § 122.22, and 40 CFR § 127.

(2) If the Permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR § 136 or, in the case of sludge use or disposal, approved under 40 CFR § 503, or as specified in the permit, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

(3) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

e. Compliance schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

f. Twenty-four-hour reporting.

(1) The Permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Permittee becomes aware of the circumstances. A report shall also be provided within 5 days of the time the Permittee becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times), and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (combined sewer overflows, sanitary sewer overflows, or bypass events), type of sewer overflow structure (e.g., manhole, combine sewer overflow outfall), discharge volumes untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the sewer overflow event, and whether the noncompliance was related to wet weather. As of December 21, 2025, all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR § 3 (including, in all cases, subpart D to part 3), 40 CFR § 122.22, and 40 CFR § 127. The Permittee shall electronically submit all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events using CDX (https://cdx.epa.gov/) in accordance with the reporting requirements specified in this permit. The Permittee must also sign and certify all electronic submissions in accordance with the signatory requirements specified at 40 CFR § 122.41(k).

(2) The following shall be included as information which must be reported within 24 hours under this paragraph.

(i) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR § 122.44(g).)

(ii) Any upset which exceeds any effluent limitation in the permit.

(iii) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within 24 hours. (See 40 CFR § 122.44(g).)

(3) The Director may waive the written report on a case-by-case basis for reports under 40 CFR § 122.41(l)(6)(ii) if the oral report has been received within 24 hours.

g. Other noncompliance. The Permittee shall report all instances of noncompliance not reported under 40 CFR § 122.41(l)(4), (5), and (6), at the time monitoring reports are submitted. The reports shall contain the information listed in 40 CFR § 122.41(l)(6).

h. Other information. Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

13. Bypass; at 40 CFR § 122.41(m).

a. Definitions.

(1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations. The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 40 CFR § 122.41(m)(3) and (m)(4).

c. Notice.

(1) Anticipated bypass. If the Permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The Permittee shall submit notice of an unanticipated bypass as required in 40 CFR § 122.41(l)(6) (24-hour notice).

(3) As of December 21, 2025 all notices submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR § 3 (including, in all cases, subpart D to part 3), 40 CFR § 122.22, and 40 CFR § 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of part 127, Permittees may be required to report electronically if specified by a particular permit or if required to do so by state law.

d. Prohibition of bypass.

(1) Bypass is prohibited, and the Director may take enforcement action against a Permittee for bypass, unless:

(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

(iii) The Permittee submitted notices as required under 40 CFR § 122.41(m)(3).

(2) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in 40 CFR § 122.41(m)(4)(i).

14. Upset; at 40 CFR § 122.41(n).

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent cause by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of 40 CFR § 122.41(n)(3) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the Permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated; and

(3) The Permittee submitted notice of the upset as required in 40 CFR § 122.41(l)(6)(ii)(B) (24-hour notice).

(4) The Permittee complied with any remedial measures required under 40 CFR § 122.41(d).

d. Burden of proof. In any enforcement proceeding the Permittee seeking to establish the occurrence of an upset has the burden of proof.

15. Reopener Clause; at 40 CFR § 122.44(c).

For any permit issued to a treatment works treating domestic sewage (including "sludge-only facilities"), the Director shall include a reopener clause to incorporate any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the CWA. The Director may promptly modify or revoke and reissue any permit containing the reopener clause required by this paragraph if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in the permit.

16. Minor modifications of permits; at 40 CFR § 122.63.

Upon the consent of the Permittee, the Director may modify a permit to make the corrections or allowances for changes in the permitted activity listed in this section, without following the procedures of 40 CFR § 124. Any permit modification not processed as a minor modification under this section must be made for cause and with 40 CFR § 124 draft permit and public notice as required in 40 CFR § 122.62. Minor modifications may only:

a. Correct typographical errors;

b. Require more frequent monitoring or reporting by the Permittee;

c. Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the existing permit and does not interfere with attainment of the final compliance date requirement; or

d. Allow for a change in ownership or operational control of a facility where the Director determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new Permittees has been submitted to the Director.

e. Change the construction schedule for a discharger which is a new source. No such change shall affect a discharger's obligation to have all pollution control equipment installed and in operation prior to discharge under 40 CFR § 122.29.

f. Delete a point source outfall when the discharge from that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits.

g. Incorporate conditions of a POTW pretreatment program that has been approved in accordance with the procedures in 40 CFR § 403.11 (or a modification thereto that has been approved in accordance with the procedures in 40 CFR § 403.18) as enforceable conditions of the POTW's permits.

17. Termination of permits; at 40 CFR § 122.64.

a. The following are causes for terminating a permit during its term, or for denying a permit renewal application:

(1) Noncompliance by the Permittee with any conditions of the permit;

(2) The Permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the Permittee's misrepresentation of any relevant facts at any time;

(3) A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination; or

(4) A change in any condition that requires either a temporary or permanent reduction or elimination of any discharge or sludge use or disposal practice controlled by the permit (for example, plant closure or termination of discharge by connection to a POTW).

18. Availability of Reports; pursuant to CWA § 308

Except for data determined to be confidential under 40 CFR § 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Regional Administrator. As required by the CWA, permit applications, permits, and effluent data shall not be considered confidential.

19. Removed Substances; pursuant to CWA § 301

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials entering waters of the U.S.

20. Severability; pursuant to CWA § 512

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and remainder of this permit, shall not be affected thereby.

21. Civil and Criminal Liability; pursuant to CWA § 309

    Except as provided in permit conditions on "Bypass" and "Upset", nothing in this permit shall be construed to relieve the Permittee from civil or criminal penalties for noncompliance.

22. Oil and Hazardous Substances Liability; pursuant to CWA § 311

    Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties to which the Permittee is or may be subject under Section 311 of the CWA.

23. State, Tribe, or Territory Law; pursuant to CWA § 510

    Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the operator from any responsibilities, liabilities, or penalties established pursuant to any applicable State, Tribe, or Territory law or regulation under authorities preserved by CWA section 510.

B. Specific Categories of NPDES Permits

In accordance with 40 CFR § 122.42, the following conditions, in addition to those set forth at 40 CFR § 122.41, apply to all NPDES permits within the category specified below and are expressly incorporated into this permit.

1. Publicly owned treatment works; at 40 CFR § 122.42(b).
   a. All POTWs must provide adequate notice to the Director of the following:

      (1) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 and 306 of the CWA if it were directly discharging those pollutants; and

      (2) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

      (3) For purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

b. The following condition has been established by EPA Region 9 to enforce applicable requirements of the Resource Conservation and Recovery Act. Publicly owned treatment works may not receive hazardous waste by truck, rail, or dedicated pipe except as provided under 40 CFR Part 270. Hazardous wastes are defined at 40 CFR Part 261 and include any mixture containing any waste listed under 40 CFR §§ 261.31 through 261.33. The Domestic Sewage Exclusion (40 CFR § 261.4) applies only to wastes mixed with domestic sewage in a sewer leading to a publicly owned treatment works and not to mixtures of hazardous wastes and sewage or septage delivered to the treatment plant by truck.

Attachment A: Definitions

1. "Average monthly discharge limitation" means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

2. "Average weekly discharge limitation" means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

3. "Best Management Practices" or "BMPs" are schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural, and/or managerial practices to prevent or reduce the pollution of waters of the U.S. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may further be characterized as operational, source control, erosion and sediment control, and treatment BMPs.

4. A "composite" sample means a time-proportioned mixture of not less than eight discrete aliquots obtained at equal time intervals (e.g., 24-hour composite means a minimum of eight samples with one sample collected every three hours over a 24-hour period). The volume of each aliquot shall be directly proportional to the discharge flow rate at the time of sampling, but not less than 100 ml. Sample collection, preservation, and handling shall be performed as described in the most recent edition of 40 CFR § 136.3, Table II. Where collection, preservation, and handling procedures are not outlined in 40 CFR § 136.3, procedures outlined in the 18th edition of Standard Methods for the Examination of Water and Wastewater shall be used.

5. A "daily discharge" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

6. A "daily maximum allowable effluent limitation" means the highest allowable "daily discharge."

7. A " "Discharge Monitoring Report" or "DMR" is an EPA uniform national form, including any subsequent additions, revisions, or modifications for reporting of self-monitoring results by the Permittee.

8. A "grab" sample is a single sample collected at a particular time and place that represents the composition of the discharge only at that time and place. Sample collection,

preservation, and handling shall be performed as described in 40 CFR § 136.3, Table II. Where collection, preservation, and handling procedures are not outlined in 40 CFR § 136.3, procedures outlined in the 18th edition of Standard Methods for the Examination of Water and Wastewater shall be used.

9. The "method detection limit" or "MDL" is the minimum concentration of an analyte that can be detected with 99% confidence that the analyte concentration is distinguishable from the method blank results, as defined by a specific laboratory method in 40 CFR § 136. The procedure for determination of a laboratory MDL is in 40 CFR § 136, Appendix B.

10. The "minimum level" or "ML" is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed in a specific analytical procedure, assuming that all the method-specific sample weights, volumes, and processing steps have been followed (as defined in EPA's draft National Guidance for the Permitting, Monitoring, and Enforcement of Water Quality-Based Effluent Limitations Set Below Analytical Detection/Quantitative Levels, March 22, 1994). If a published method-specific ML is not available, then an interim ML shall be calculated. The interim ML is equal to 3.18 times the published method-specific MDL rounded to the nearest multiple of 1, 2, 5, 10, 20, 50, etc. (When neither an ML nor MDL are available under 40 CFR § 136, an interim ML should be calculated by multiplying the best estimate of detection by a factor of 3.18; when a range of detection is given, the lower end value of the range of detection should be used to calculate the ML.) At this point in the calculation, a different procedure is used for metals, than non-metals:

    a. For metals, due to laboratory calibration practices, calculated MLs may be rounded to the nearest whole number.

    b. For non-metals, because analytical instruments are generally calibrated using the ML as the lowest calibration standard, the calculated ML is then rounded to the nearest multiple of (1, 2, or 5) x 10n, where n is zero or an integer. (For example, if an MDL is 2.5 µg/l, then the calculated ML is: 2.5 µg/l x 3.18 = 7.95 µg/l. The multiple of (1, 2, or 5) x 10n nearest to 7.95 is 1 x 101 = 10 µg/l, so the calculated ML, rounded to the nearest whole number, is 10 µg/l.)

11. "NODI(B)" means that the concentration of the pollutant in a sample is not detected. NODI(B) is reported when a sample result is less than the laboratory's MDL.

12. "NODI(Q)" means that the concentration of the pollutant in a sample is detected but not quantified. NODI(Q) is reported when a sample result is greater than or equal to the laboratory's MDL, but less than the ML.

Attachment B: Location Map



Figure 1. Map of Tutuila Island, American Samoa. Tafuna STP is the southernmost of the two treatment plants on the main island, indicated by a red dot.



Figure 2. Map of Tafuna STP and outfall. The STP site is the angular area with red-roofed rectangular buildings and 3 circular clarigesters marked.

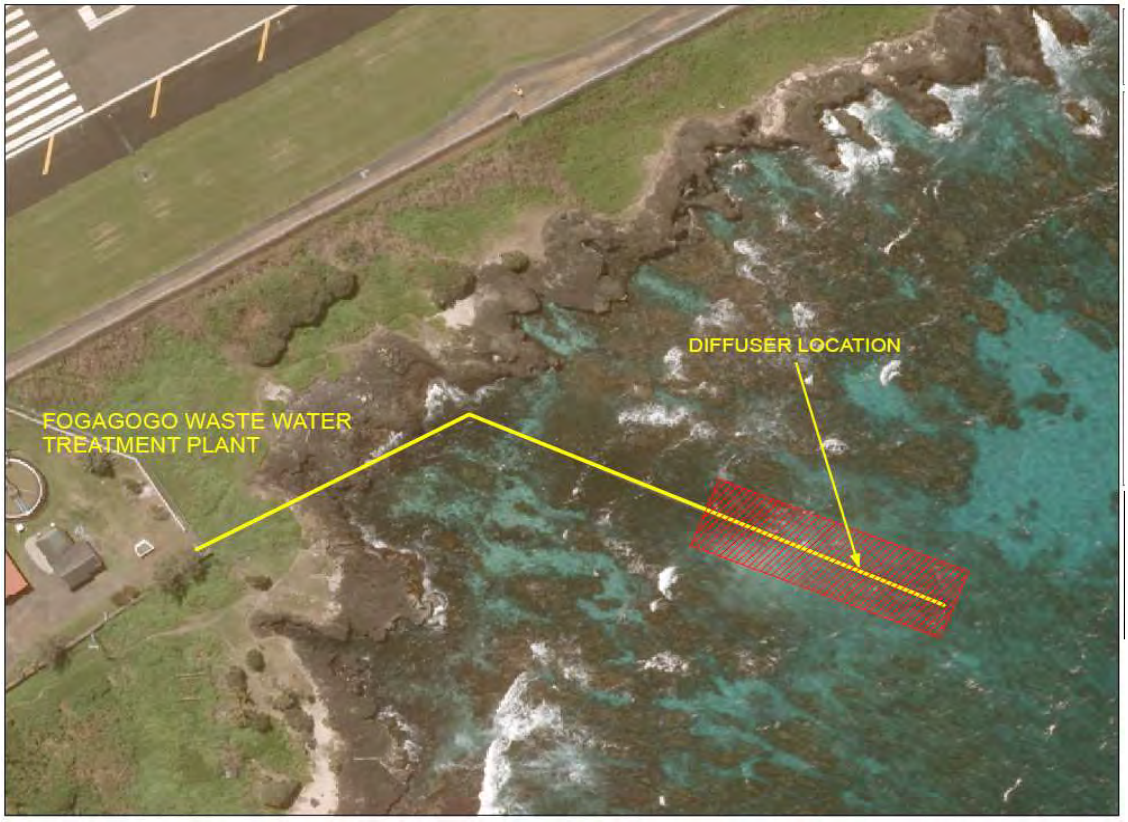


Figure 3. Location map of the diffuser.

Attachment C: Wastewater Flow Schematic

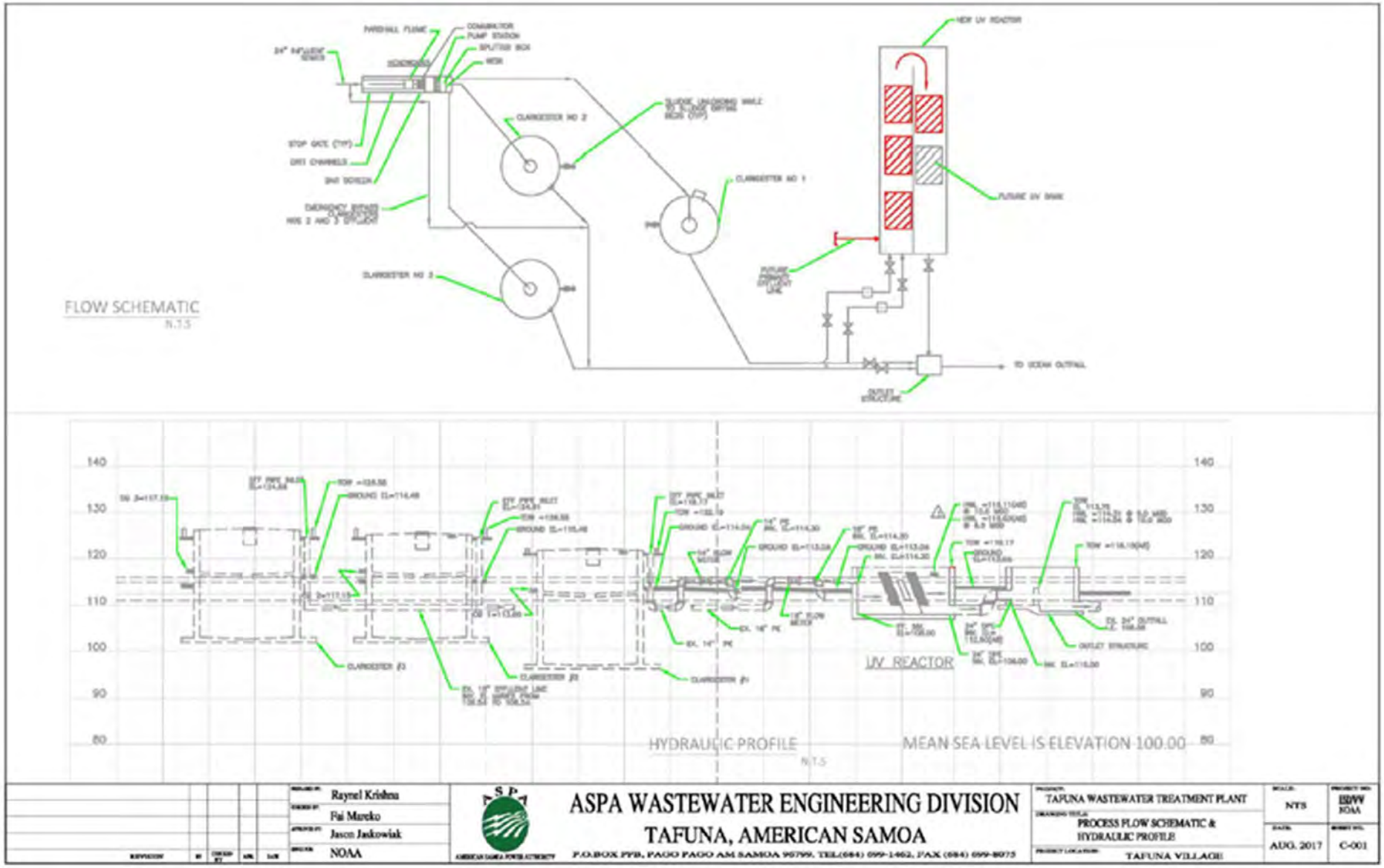


Figure 4. Diagram of Tafuna STP's wastewater treatment system.

Attachment D: Ammonia Impact Ratio Data Log

A	B	C	D	E	F	G	H
Date	Ammonia Concentration in Effluent (mg/L as N)	Ammonia Effluent Concentration divided by 109 (dilution) (mg/L as N) **Column B ÷ 109**	Ambient Salinity (g/kg)	Effluent Temperature (º C)	Effluent pH (S.U.)	Ammonia Objective from Attachment E (using data from columns D, E, and F)	Ammonia Impact Ratio (AIR) **Column C ÷ Column G**
	Maximum Daily Concentration					Acute Criteria for Saltwater in Attachment E	
	Average Monthly Concentration					Chronic Criteria for Saltwater in Attachment E	

Please copy and complete for each month of each year for the permit term, as directed in the monitoring requirements table. The Permittee may sample more frequently and record any additional results. Attach any additional pages as necessary.

Signature of Authorized Representative: _____

Attachment E. Ammonia (as N) Standards

Note: The values in the tables below are for total ammonia (NH_3 and NH_4) standards as expressed in milligrams of N per Liter (mg/L N), which is from the saltwater aquatic life-based water quality criteria in American Samoa Water Quality Standards, 2018 Revision, Appendix A.

If the value falls in between the values in the table, the Permittee should choose to enter the lower number in column G of the Ammonia Impact Ratio log above in Attachment D.

Acute Ammonia Criteria for Saltwater (mg/L) [1]

Temp (°C) ►	0	5	10	15	20	25	30	35
pH	Salinity = 10 g/kg							
7.0	270	191	131	92	62	44	29	21
7.2	175	121	83	58	40	27	19	13
7.4	110	77	52	35	25	17	12	8.3
7.6	69	48	33	23	16	11	7.7	5.6
7.8	44	31	21	15	10	7.1	5.0	3.5
8.0	27	19	13	9.4	6.4	4.6	3.1	2.3
8.2	18	12	8.5	5.8	4.2	2.9	2.1	1.5
8.4	11	7.9	5.4	3.7	2.7	1.9	1.4	1.0
8.6	7.3	5.0	3.5	2.5	1.8	1.3	0.98	0.75
8.8	4.6	3.3	2.3	1.7	1.2	0.92	0.71	0.56
9.0	2.9	2.1	1.5	1.1	0.85	0.67	0.52	0.44

Temp (°C) ►	0	5	10	15	20	25	30	35
pH	Salinity = 20 g/kg							
7.0	291	200	137	96	64	44	31	21
7.2	183	125	87	60	42	29	20	14
7.4	116	79	54	37	27	18	12	8.7
7.6	73	50	35	23	17	11	7.9	5.6
7.8	46	31	23	15	11	7.5	5.2	3.5
8.0	29	20	14	9.8	6.7	4.8	3.3	2.3
8.2	19	13	8.9	6.2	4.4	3.1	2.1	1.6
8.4	12	8.1	5.6	4.0	2.9	2.0	1.5	1.1
8.6	7.5	5.2	3.7	2.7	1.9	1.4	1.0	0.77
8.8	4.8	3.3	2.5	1.7	1.3	0.94	0.73	0.56
9.0	3.1	2.3	1.6	1.2	0.87	0.69	0.54	0.44

Temp (°C) ►	0	5	10	15	20	25	30	35
pH	Salinity = 30 g/kg							
7.0	312	208	148	102	71	48	33	23
7.2	196	135	94	64	44	31	21	15
7.4	125	85	58	40	27	19	13	9.4
7.6	79	54	37	25	21	12	8.5	6.0
7.8	50	33	23	16	11	7.9	5.4	3.7
8.0	31	21	15	10	7.3	5.0	3.5	2.5
8.2	20	14	9.6	6.7	4.6	3.3	2.3	1.7
8.4	12.7	8.7	6.0	4.2	2.9	2.1	1.6	1.1
8.6	8.1	5.6	4.0	2.7	2.0	1.4	1.1	0.81
8.8	5.2	3.5	2.5	1.8	1.3	1.0	0.75	0.58
9.0	3.3	2.3	1.7	1.2	0.94	0.71	0.56	0.46

Chronic Ammonia Criteria for Saltwater (mg/L)[1]

Temp (°C) ►	0	5	10	15	20	25	30	35
pH	Salinity = 10 g/kg							
7.0	41	29	20	14	9.4	6.6	4.4	3.1
7.2	26	18	12	8.7	5.9	4.1	2.8	2.0
7.4	17	12	7.8	5.3	3.7	2.6	1.8	1.2
7.6	10	7.2	5.0	3.4	2.4	1.7	1.2	0.84
7.8	6.6	4.7	3.1	2.2	1.5	1.1	0.75	0.53
8.0	4.1	2.9	2.0	1.40	0.97	0.69	0.47	0.34
8.2	2.7	1.8	1.3	0.87	0.62	0.44	0.31	0.23
8.4	1.7	1.2	0.81	0.56	0.41	0.29	0.21	0.16
8.6	1.1	0.75	0.53	0.37	0.27	0.20	0.15	0.11
8.8	0.69	0.50	0.34	0.25	0.18	0.14	0.11	0.08
9.0	0.44	0.31	0.23	0.17	0.13	0.10	0.08	0.07

Temp (°C) ►	0	5	10	15	20	25	30	35
pH	Salinity = 20 g/kg							
7.0	44	30	21	14	9.7	6.6	4.7	3.1
7.2	27	19	13	9.0	6.2	4.4	3.0	2.1
7.4	18	12	8.1	5.6	4.1	2.7	1.9	1.3
7.6	11	7.5	5.3	3.4	2.5	1.7	1.2	0.84
7.8	6.9	4.7	3.4	2.3	1.6	1.1	0.78	0.53

8.0	4.4	3.0	2.1	1.5	1.0	0.72	0.50	0.34
8.2	2.8	1.9	1.3	0.94	0.66	0.47	0.31	0.24
8.4	1.8	1.2	0.84	0.59	0.44	0.30	0.22	0.16
8.6	1.1	0.78	0.56	0.41	0.28	0.20	0.15	0.12
8.8	0.72	0.50	0.37	0.26	0.19	0.14	0.11	0.08
9.0	0.47	0.34	0.24	0.18	0.13	0.10	0.08	0.07

Temp (°C) ► 0 5 10 15 20 25 30 35

pH	Salinity = 30 g/kg							
7.0	47	31	22	15	11	7.2	5.0	3.4
7.2	29	20	14	9.7	6.6	4.7	3.1	2.2
7.4	19	13	8.7	5.9	4.1	2.9	2.0	1.4
7.6	12	8.1	5.6	3.7	3.1	1.8	1.3	0.90
7.8	7.5	5.0	3.4	2.4	1.7	1.2	0.81	0.56
8.0	4.7	3.1	2.2	1.6	1.1	0.75	0.53	0.37
8.2	3.0	2.1	1.4	1.0	0.69	0.50	0.34	0.25
8.4	1.9	1.3	0.90	0.62	0.44	0.31	0.23	0.17
8.6	1.2	0.84	0.59	0.41	0.30	0.22	0.16	0.12
8.8	0.78	0.53	0.37	0.27	0.20	0.15	0.11	0.09
9.0	0.50	0.34	0.26	0.19	0.14	0.11	0.08	0.07

[1] Ambient Water Quality Criteria for Ammonia (Saltwater)-1989, EPA 440/5-88-004, April 1989.

Attachment F: List of Priority Pollutants

Priority Pollutants are a set of chemical pollutants for which EPA has developed analytical methods. The Permittee shall test for all priority pollutants in: *40 CFR Part 423, Appendix A.* For reference, the 126 priority pollutants at time of issuance include:

1. Acenaphthene
2. Acrolein
3. Acrylonitrile
4. Benzene
5. Benzidine
6. Carbon tetrachloride
7. Chlorobenzene
8. 1,2,4-trichlorobenzene
9. Hexachlorobenzene
10. 1,2-dichloroethane
11. 1,1,1-trichloreothane
12. Hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. Chloroethane
~~17. (Removed)~~
18. Bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ethers
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
22. Parachlorometa cresol
23. Chloroform
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,3-dichloropropylene
34. 2,4-dimethylphenol
35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
38. Ethylbenzene
39. Fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. Bis(2-chloroisopropyl) ether
43. Bis(2-chloroethoxy) methane
44. Methylene chloride
45. Methyl chloride
46. Methyl bromide
47. Bromoform
48. Dichlorobromomethane
~~49. (Removed)~~
~~50. (Removed)~~
51. Chlorodibromomethane
52. Hexachlorobutadiene
53. Hexachlorocyclopentadiene
54. Isophorone
55. Naphthalene
56. Nitrobenzene
57. 2-nitrophenol
58. 4-nitrophenol
59. 2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
61. N-nitrosodimethylamine
62. N-nitrosodiphenylamine
63. N-nitrosodi-n-propylamine
64. Pentachlorophenol
65. Phenol
66. Bis(2-ethylhexyl) phthalate
67. Butyl benzyl phthalate
68. Di-N-Butyl Phthalate
69. Di-n-octyl phthalate
70. Diethyl Phthalate
71. Dimethyl phthalate
72. Benzo(a) anthracene
73. Benzo(a) pyrene
74. Benzo(b) fluoranthene
75. Benzo(k) fluoranthene
76. Chrysene

77. Acenaphthylene
78. Anthracene
79. Benzo(ghi) perylene
80. Fluorene
81. Phenanthrene
82. Dibenzo(a,h) anthracene
83. Indeno (1,2,3-cd) pyrene
84. Pyrene
85. Tetrachloroethylene
86. Toluene
87. Trichloroethylene
88. Vinyl chloride
89. Aldrin
90. Dieldrin
91. Chlordane
92. 4,4-DDT
93. 4,4-DDE
94. 4,4-DDD
95. Alpha-endosulfan
96. Beta-endosulfan
97. Endosulfan sulfate
98. Endrin
99. Endrin aldehyde
100. Heptachlor
101. Heptachlor epoxide
102. Alpha-BHC
103. Beta-BHC
104. Gamma-BHC
105. Delta-BHC
106. PCB-1242 (Arochlor 1242)
107. PCB-1254 (Arochlor 1254)
108. PCB-1221 (Arochlor 1221)
109. PCB-1232 (Arochlor 1232)
110. PCB-1248 (Arochlor 1248)
111. PCB-1260 (Arochlor 1260)
112. PCB-1016 (Arochlor 1016)
113. Toxaphene
114. Antimony
115. Arsenic
116. Asbestos
117. Beryllium
118. Cadmium
119. Chromium
120. Copper
121. Cyanide, Total
122. Lead
123. Mercury
124. Nickel
125. Selenium
126. Silver
127. Thallium
128. Zinc
129. 2,3,7,8-TCDD

Attachment G: 2015 Memorandum on Pacific Island Territory sample hold times for Toxicity testing

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

JUN 29, 2015

MEMORANDUM

SUBJECT: Sample Hold Time for Whole Effluent Toxicity Testing in Pacific Island Territories

FROM: Jamie Marincola, Acting Manager
NPDES Permits Office
Region IX

TO: John McCarroll, Manager
Pacific Islands Office
Region IX

Whole Effluent Toxicity (WET) testing consist of exposing living aquatic organisms (plants, vertebrates and invertebrates) to a sample of wastewater, usually a facility's effluent discharge, and measuring its effects on the organisms' ability to survive, grow and reproduce. Many National Pollutant Discharge Elimination System (NPDES) permittees have WET testing requirements in their permits.

40 CFR 136.3(e) states that the optimal hold time for WET testing samples is 36 hours; however a variance is available to extend hold time up to 72 hours between sample collection and first use of sample. In the Pacific Island Territories, facilities are limited in the availability of laboratories to receive and perform WET testing within the 36 hour timeframe. Specifically, samples which must be shipped to the continental U.S. are unlikely to arrive in accordance with optimal hold times. Therefore, for purposes of NPDES compliance, **Pacific Island Territories permittees that ship WET samples to the continental U.S. shall be allowed up to 72 hours between sample collection and first use of sample**. Sample shipment must continue to meet requirements in 40 CFR 136.3, Table II, including preservation of the sample at less than or equal to 6 ^{0}C and use of sufficient ice to ensure ice is still present when the samples arrive at the laboratory. This variance does not apply to samples shipped to Hawaii, where sample hold times must not exceed 36 hours.

Permittees shall ensure samples arrive to testing facilities as quickly as possible. EPA recommends that permittees use freight forwarders to expedite samples through customs. Freight forwarders have the ability to shepherd samples from commercial airline cargo through customs and then proceed with shipping via overnight delivery service. Using such a service helps ensure that samples arrive as soon as possible.

Attachment H: 401 Water Quality Certification

APPENDIX B-3
DRAFT TAFUNA NPDES FACT SHEET (2023)

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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
DRAFT PERMIT FACT SHEET
Date, 2023

Permittee Name:	American Samoa Power Authority - Tafuna Sewage Treatment Plant
Mailing Address:	P.O. Box PPB, Pago Pago, American Samoa 96799
Facility Location:	Fogagogo south of Pago Pago International Airport, Tualauta, Tutuila, American Samoa 96799
Contact Person(s):	Wallon Young, Executive Director, wallon@aspower.com Fa'i Mareko, Wastewater Manager; (684)-633-7799; faim@aspower.com
NPDES Permit No.:	AS0020010

Commented [SJ1]: [ASPA] Please confirm that all this information is correct.

I. STATUS OF PERMIT

American Samoa Power Authority, also known as ASPA (the "Permittee") has applied for the renewal of their National Pollutant Discharge Elimination System (NPDES) permit, including a renewal of a Clean Water Act (CWA) Section 301(h) waiver,[1] to authorize the discharge of primary treated effluent from the Tafuna Sewage Treatment Plant (Tafuna STP) to Vai Cove, located south of Pago Pago International Airport on the island of Tutuila, American Samoa. A complete application was submitted on May 4, 2004, and subsequently updated in 2013 and 2017-18. EPA has developed this permit and fact sheet pursuant to CWA Section 402, which requires point source dischargers to control the amount of pollutants that are discharged to waters of the United States through obtaining a NPDES permit.

The Permittee has been discharging primary treated wastewater under NPDES permit AS0020010 issued on November 2, 1999, which includes a CWA Section 301(h) waiver from secondary treatment requirements. Pursuant to 40 C.F.R. § 122.21, the terms of the existing permit are administratively extended until the issuance of a new permit. During the lengthy time which has passed since the issuance of the previous permit, the facility implemented major upgrades to its treatment system under a 2011 Administrative Order, including but not limited to the installation of a disinfection system and diffuser upgrades.

This Permittee has been classified as a Major discharger.

[1] In 1972, Congress passed the Federal Water Pollution Control Act amendments, which required Publicly Owned Treatment Works (POTWs) to achieve secondary treatment by 1977. In 1977, Congress added Section 301(h) to the CWA, which allowed the EPA, on a case-by-case basis, to grant waivers from secondary treatment requirements to POTWs discharging into marine waters. When EPA determines that an applicant for a CWA Section 301(h) waiver meets the criteria, EPA may issue a NPDES permit that allows an ocean discharge at less than secondary treatment.

II. SIGNIFICANT CHANGES TO PREVIOUS PERMIT

Permit Condition	Previous Permit	Re-issued permit	Reason for change
Projected average flow	Mass-based effluent limits determined based on the average flow of 2.0 MGD.	Mass-based effluent limits adjusted to reflect 3.0 MGD flow	Increase in the projected average discharge flow to 3.0 MGD
Biochemical oxygen demand, 5-day (BOD_5)	Primary treatment effluent limits based on § 301(h) waiver approval	Technology based effluent limits (TBELs) based on secondary treatment standards for BOD_5	Denial of § 301(h) waiver renewal and implementation of secondary treatment standards
Total suspended solids (TSS)	Primary treatment effluent limits based on § 301(h) waiver approval	TBELs based on secondary treatment standards for TSS	Denial of § 301(h) waiver renewal and implementation of secondary treatment standards
The average monthly percent removal of BOD_5 and TSS	Primary treatment effluent limit of more than 30 % removal based on § 301(h) waiver approval	Secondary treatment TBELs (i.e., not less than 85 % removal)	Denial of § 301(h) waiver renewal and implementation of secondary treatment standards
Settleable solids	The previous permit included settleable solids effluent limits.	Settleable solids limits were removed from this permit.	Denial of § 301(h) waiver renewal and implementation of secondary treatment standards. The settleable solids limitations replaced with more stringent secondary treatment limitations for TSS.
Ammonia	No limit or monitoring requirement	Effluent limits and monthly monitoring requirements for ammonia have been added to the permit, implementing 2018 American Samoa Water Quality Standards (ASWQS). Compliance with the ammonia effluent limit will be determined using the ammonia impact ratio ("AIR"). The permit limit is set to a value of 1.0.	Reasonable potential to exceed ASWQS. The AIR provides more flexibility than a specific, fixed effluent concentration and is easier than a floating limit to determine and report compliance.

Permit Condition	Previous Permit	Re-issued permit	Reason for change
Temperature	No temperature monitoring required	Temperature monitoring requirement added.	Temperature data are required for determining compliance with the ammonia limit
Dissolved Oxygen (DO)	Narrative DO limit based on pre-2005 ASWQS	Narrative DO limit based on the 2018 ASWQS updates.	Implementation of revised water quality standard for DO.
Total Nitrogen and Total Phosphorus	No limit or monitoring requirement, except receiving water monitoring	Effluent limits and monthly monitoring requirements for TN and TP have been added.	Reasonable potential to exceed ASWQS
2,3,7,8-TCDD, bis(2-ethylhexyl) Phthalate, and 4,4'-DDT	No limit or monitoring requirement	Effluent limits and quarterly monitoring requirements for 2,3,7,8-TCDD, bis(2-ethylhexyl) Phthalate, and 4,4'-DDT have been added.	Reasonable potentials exist for these pollutants. Quarterly monitoring is required to fully characterize the discharge and collect sufficient data for the next permit reissuance.
Enterococcus	No limit or monitoring requirement, except receiving water monitoring	Effluent limits and weekly monitoring requirements for enterococcus have been added.	Reasonable potential to exceed ASWQS
Chronic toxicity	No limit, only monitoring requirement with trigger	Effluent limits and quarterly monitoring requirements for chronic toxicity have been added.	Reasonable potential to exceed water quality criteria
Toxicity testing method	The previous permit required toxicity testing with the traditional hypothesis testing approach outlined in EPA's Technical Support Document (EPA, 1991).	The permit requires use of the Test of Significant Toxicity ("TST") statistical approach to evaluate chronic toxicity.	In 2010, EPA published the TST statistical approach in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA, 2010b). The permit implements this updated statistical approach.
Statement of dilution basis	The previous permit did not explicitly summarize the basis for dilution factors.	This permit references specific content in this fact sheet which documents the dilution factor granted for the pollutants and the analysis.	This permit fact sheet includes the basis of dilution influencing RP analysis and water quality based effluent limits.

Permit Condition	Previous Permit	Re-issued permit	Reason for change
Best Management Practices (BMPs)	The previous permit contained no specific BMPs.	New permit includes explicit BMP requirements.	BMPs are included to control site stormwater runoff, spillage/leaks, and sludge disposal as well as to assure reliable performance of the UV disinfection system.
Sanitary Sewer Overflow	The previous permit did not explicitly address sanitary sewer overflows.	The new permit incorporates sanitary sewer overflow restrictions and reporting requirements.	Sanitary Sewer Overflow provisions are now a standard part of EPA NPDES permits.
Asset Management	The previous permit did not explicitly address asset management.	The new permit requires development of an Asset Management Plan that considers short- and long-term vulnerabilities (including due to climate change) of all facilities, collection system, treatment systems, and outfalls.	Asset management planning, especially for climate change impacts, is required to continually operate quality assurance procedures and maintain a targeted level of service.
Capacity Attainment and Planning	The previous permit did not include a notification requirement for dry-weather flows approaching the facility's maximum treatment capacity	The new permit includes a notification requirement for dry-weather flows approaching the facility's maximum treatment capacity.	When dry-weather flows come close to a treatment plant's maximum capacity, expansion of the treatment plant is an eventuality both the Permittee and EPA often need to begin planning for. This notification requirement ensures adequate advance notice.
Electronic Reporting	The previous permit required monitoring data be submitted on the standard paper discharge monitoring report ("DMR") forms.	The permit requires electronic data submission through NetDMR.	Consistent with EPA's final rule, NPDES Electronic Reporting Rule (effective December 2015).

III. GENERAL DESCRIPTION OF FACILITY

The Tafuna STP is located in the township of Fogagogo on Tutuila Island, the largest and principal island of American Samoa. Tafuna STP is a primary treatment plant that collects and treats wastewater from the airport, a non-industrial business park, and several nearby residential areas within the Tafuna Plain region of the island. Attachment B to the permit shows the

locations of the facility, the outfall, and the diffusers. In the application, ASPA indicated that the wastewater collected from these areas is largely organic and domestic in nature (ASPA 2004). Domestic wastewater includes waste or wastewater from humans or household operations that is discharged to or otherwise enters the treatment plant (40 C.F.R. § 122.2). ASPA also indicated that there are currently no industrial sources of wastewater that flow to the treatment plant and none planned in the near future. The Tafuna STP currently serves a population of approximately 20,000 people.

The plant provides primary treatment, including grit removal, primary sedimentation, and anaerobic sludge digestion as well as ultraviolet (UV) disinfection prior to discharge into Vai Cove. Attachment C to the permit shows a diagram of the facility, including the UV disinfection system installed in December 2015. Influent enters the Facility, separates into two channels, and passes through automated bar racks. After screening, influent passes into a wet well that contains four submerged variable speed pumps and is pumped into a headworks. As flow leaves the headworks, it is distributed to three separate lines which lead to the Facility's three clarigesters. Clarigesters consist of an upper clarifier that removes settleable solids and skims off floatables and a lower anaerobic digester into which settleable solids are funneled directly. Gas from the digesters is vented near the top of the clarigesters. Following primary clarification, effluent from the clarigesters converges and continues to an elevated UV channel. The UV disinfection system consists of 4 banks of 32 UV lamps each, with a design capacity great enough to handle the 6 MGD (Million Gallons per Day) maximum design flow of the treatment plant.

Commented [SJ2]: [ASPA] Can you please confirm that this description of wastewater treatment processes is accurate?

Sewage sludge removed from the digesters at both Tafuna and Utulei plants is moved to the sludge drying beds until landfill disposal. During an inspection, EPA found that the Permittee failed to demonstrate that sewage sludge did not contain free liquids prior to disposal in a landfill due to insufficient sludge drying beds to meet the increased sludge production at the plant. Under an Administrative Order on Consent, effective August 2, 2022, the Permittee was required to improve sludge drying capacity by installing additional sludge drying beds and a sludge press. A new sludge drying bed building was completed in April 2023. Once a sludge press is installed in October 2024, sewage sludge will be moved from the digesters to the sludge press for dewatering more than 97 % and then dry sludge will be disposed of at the landfill. The sludge drying beds will be used when the need arises.

Commented [SJ3]: [ASPA] Please confirm the status of this project and update the up-to-date sludge handling and disposal method.

The Tafuna STP discharges primary treated effluent directly into the South Pacific Ocean through a 24-inch high-density polyethylene pipe and outfall. The terminus of the outfall is located approximately 1,562 feet from the southeastern portion of the island at a depth of 96 feet. This places the end of the outfall at 14º 20' 28.58" South latitude and 170º 43' 04.28" West longitude. Effluent is discharged horizontally in alternatively opposite directions through a linear multiport diffuser. The diffuser consists of six lateral ports, plus a separate "end gate" port, and has a total length of 54.2 feet, with the ports spaced approximately 10 feet apart between risers and 4.2 feet to the end gate port. The lateral ports have a diameter of 6 inches while the end gate port is 11 inches across. The port depths range from 87 feet to 94 feet with average depth of 91.5 feet. The existing outfall and diffuser first began operation in 1995 and were modified under the 2011 Administrative Order to improve the discharge by enhancing the initial dilution and dispersal of pollutants in the receiving water by reducing the size of existing ports from 7.75 inches to 6 inches and adding an 11-inch end gate port.

The climate in American Samoa is characterized as the humid tropics with wet weather occurring on a year-round basis. Therefore, no peak dry weather periods (seasons, often monsoonal) occur as observed on other Pacific Islands. Note that this does not preclude analysis of "dry weather" flow characteristics at the treatment plant (i.e. treatment plant flows during periods of minimum inflow and infiltration), as there are still shorter periods of limited or no rain on the island. The maximum design flow capacity of the Tafuna STP is 6 MGD, but the anticipated average daily discharge flow is 3 MGD, which is used to calculate the effluent mass-based limitations.

Commented [SJ4]: [ASPA] In the 2004 application, Tafuna requested to increase the average daily discharge flow from 2 MGD to 3 MGD. The maximum design capacity of 6 MGD has not been changed. Please confirm if this is correct.

IV. DESCRIPTION OF RECEIVING WATER

Tafuna STP discharges into "Open Coastal Waters" (as defined in the American Samoa Water Quality Standards) off Vai Cove, south of Pago Pago International Airport. Vai Cove is located on the southwestern portion of Tutuila Island in American Samoa and is part of the South Pacific Ocean.

The AS Environmental Quality Commission, in collaboration with American Samoa EPA (AS-EPA), has developed a specific subset of their water quality standards (the ASWQS) for Open Coastal Waters (ASEQC, 2013).

Protected uses for Open Coastal Waters include:

(A) Commercial, subsistence, and recreational fishing except for exclusions as specified under federal regulations such as no take zones;

(B) Scientific investigations;

(C) Whole and limited body-contact recreation, e.g., swimming, snorkeling, surfing, and scuba diving;

(D) Harbors and boat-launching ramps;

(E) Commercial and recreational boating;

(F) The support and propagation of marine life; and

(G) Aesthetic enjoyment.

The Tafuna Plain watershed is included on the 2020 303(d) list for impaired ocean shorelines for undetermined nonpoint source stressors, Total Nitrogen, and Chlorophyll-a (AS-EPA, 2020). Additionally, beach advisories have been issued near Tafuna STP and treatment plant effluent is a potential source for bacteria at nearby beaches. The recent bacteria effluent data indicated that enterococcus has been routinely detected at levels greater than 24,000 MPN/100 ml, which resulted in significant exceedances of enterococci ASWQS even after initial mixing in the receiving water. Collection system failures and overflows also pose a risk to water quality at nearby beaches.

V. DESCRIPTION OF DISCHARGE

A. History of the CWA Section 301(h) Waiver

The Tafuna STP is designed to provide primary treatment (30% removal of Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS)) as well as disinfection before discharge. EPA granted the facility a variance from secondary treatment requirements (referred to as a "waiver") pursuant to CWA Section 301(h) when it was initially permitted in 1985 and has re-evaluated and renewed the waiver with each permit reissuance since that time. In May 2004, the Permittee applied for a renewal of the permit, including a renewal of the CWA Section 301(h) waiver.

In July 2009, upon review of the ASPA's application, EPA issued a public notice of its tentative decision to deny renewal of the Tafuna STP's CWA Section 301(h) waiver due to the facility's inability to consistently meet American Samoa's bacteria and nutrient standards. On July 27, 2011, EPA issued an Administrative Order to resolve violations of the existing NPDES permit for Tafuna STP. The 2011 Administrative Order required disinfection and de-chlorination (if necessary) and diffuser modification to improve dilution. Since 2009, EPA has been working with ASPA to collect additional data, conduct modeling, and upgrade treatment at the Tafuna STP. The UV disinfection system was installed and fully operational in December 2015 and the Permittee submitted an updated mixing zone analysis using the upgraded diffuser in 2013.

In 2021, EPA re-evaluated the updated mixing zone studies and recent data collected with the upgraded treatment system in place. Even with the upgrades, the discharge from the Tafuna STP does not meet several of the CWA Section 301(h) criteria.[2] As described in EPA's 2023 CWA Section 301(h) Tentative Decision Document, the Tafuna STP exceeds water quality standards for light penetration, total suspended solids, total nitrogen, enterococcus, toxic pollutants, chronic toxicity, and ammonia after initial mixing, creating potential adverse impacts on human health, marine life, and receiving water quality. Therefore, EPA denied renewal of the CWA Section 301(h) waiver and this NPDES permit includes secondary treatment requirements in accordance with CWA Section 301(b)(1)(B).

Commented [SJ5]: [Placeholder] Change "tentative" to "final" when issuing this permit.

B. Permit Renewal Application Discharge Data

As part of the application for permit and CWA Section 301(h) waiver renewal submitted in 2004-2005, the Permittee provided data from an analysis of the facility's treated wastewater discharge, shown in Table 1. As material changes to the treatment system have been

[2] A POTW applying for a waiver must meet the criteria established in the CWA Section 301(h), including:
- Existence of and compliance with applicable water quality standards;
- Attainment or maintenance of water quality which assures protection of public water supplies and aquatic life, and allows recreational activities;
- Establishment of a monitoring program to assess impacts;
- No additional treatment requirements for other sources as a result of the waiver;
- All applicable pretreatment requirements for influent sources;
- Satisfactory toxics control programs, including an approved pretreatment program if over 5 MGD;
- Establishment of a program to eliminate toxic pollutant inputs from non-industrial sources;
- No new or substantially increased discharge volume specified in the permit from POTWs; and
- Providing a minimum of primary or equivalent treatment.

implemented since the application was submitted, EPA does not consider these data, except for priority pollutant data, to be representative of the current discharge and therefore has not included them in the reasonable potential analysis. Note that toxicity data are considered separately in section VI.B.5 of this Fact Sheet.

Table 1. Application Discharge Data.

Parameter	Units	Discharge Data[1]	
		Maximum Daily Discharge	Average Daily Discharge
Flow	MGD	5.2	1.66
pH	Standard Units	6.9 to 7.6 (min-max)	
Biochemical Oxygen Demand, 5-day (BOD_5)	mg/L	99	59.1
Total Suspended Solids (TSS)	mg/L	63	37.2
Ammonia (as N)	mg/L	23.3	22.5
Total Kjeldahl Nitrogen	mg/l	67.1	50.8
Total Phosphorus	mg/l	2.81	2.72
Total Residual Chlorine	mg/L	Not monitored	
Oil and Grease	mg/L	22	7.25
Settleable solids	ml/l	0.4	0.1

[1] Based on Permittee's NPDES renewal application.

C. Discharge Monitoring Report (DMR) Data

Table 2 provides a summary of effluent limitations and monitoring data reported over the facility's most recent 6 years of DMRs (2016 to 2022) after the Tafuna STP's disinfection system upgrade. More information is available on Enforcement and Compliance History Online (ECHO) at https://echo.epa.gov/detailed-facility-report?fid=AS0020010&sys=ICP

Pollutants that were not detected in the effluent are not included in Tables 2. The effluent data shows that monthly average effluent concentrations of BOD from August 2021 to March 2022 at times exceeded the monthly average effluent limitation of 100 mg/l. ASPA reported in the DMRs that the exceedances occurred as a result of the sludge drying beds being full to capacity and the sludge blankets inside the clarifiers being high. In addition, Tafuna STP's monthly average percent removal of BOD was reported as 22.4 % in September 2019, below the 30% BOD removal requirement in the existing permit.

Table 2. Discharge Monitoring Report Data for years 2016-2022. Note that Shaded cells indicate effluent data exceeding the existing permit limits.

Parameter	Units[1]	1999 Permit Effluent Limitations			Discharge Monitoring Data		
		Average Monthly	Average Weekly	Maximum Daily	Highest Average Monthly	Highest Average Weekly	Highest Maximum Daily
Flow Rate	MGD	Monitoring Only	--	Monitoring Only	1.7	--	4.4
Biochemical Oxygen Demand (5-day)	mg/L	100	150	200	**106**	126	--
	lbs/day	1,669	2,504	3,338	1,314	2,107	--
	Percent Removal	> 30 %[2]			**22.4 %** (minimum)		
Settleable Solids	mL/L	1	--	2	0.2	--	0.5
Total Suspended Solids	mg/L	75	113	150	68	91	--
	lbs/day	1,252	1,878	2,504	698	1,019	--
	Percent Removal	> 30 %[2]			32.2 % (minimum)		
pH	Standard Units	Not < 6.5 SU, Not > 8.6 SU; discharge shall not change pH in receiving water by more than 0.2 SU			6.8 – 7.8 (minimum – maximum)		
Chronic Toxicity	TUc	Monitoring Only	--	Monitoring Only	499.85	--	667
Oil & Grease	mg/l	Monitoring Only	--	Monitoring Only	33	--	33

(1) Mass-based limits (lbs/day) were calculated using 2 MGD flow.
(2) Both the influent and the effluent shall be monitored. The arithmetic mean of the BOD_5 values or of the TSS values, by concentration, for effluent samples collected over a calendar month shall not exceed 70 percent of the arithmetic mean, by concentration, for influent samples collected at approximately the same times during the same period (i.e. minimum 30 percent BOD_5 or TSS removal).

VI. DETERMINATION OF NUMERICAL EFFLUENT LIMITATIONS

EPA has developed effluent limitations and monitoring requirements in the permit based on an evaluation of the technology used to treat the pollutant (e.g., "technology-based effluent limits") and the water quality standards applicable to the receiving water (e.g., "water quality-based effluent limits"). EPA has established the most stringent of applicable technology-based or water quality-based standards in the permit, as described below.

A. Applicable Technology-Based Effluent Limitations (TBELs)

Because EPA has denied renewal of the CWA Section 301(h) waiver from secondary treatment, the Permittee is required to meet technology-based treatment standards for municipal treatment plants in accordance with CWA Section 301(b)(1)(B). The minimum levels of effluent quality attainable by secondary treatment for 5-day Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), and pH, as defined in 40 C.F.R. § 133.102, are listed below. In addition, mass-based limitations, as required by 40 C.F.R. § 122.45(f), are included for BOD_5 and TSS, which have been determined to reflect the anticipated increase in average flow to 3 MGD. Mass-based effluent limits are calculated by multiplying the concentration-based effluent limits (in mg/L), flow (in MGD), and a conversion factor of 8.345.

BOD_5
Concentration-based Limits
30-day average – 30 mg/L
7-day average – 45 mg/L
Removal Efficiency – minimum of 85%

Mass-based Limits
30-day average – (30 mg/L)(3 MGD)(8.345 conversion factor) = 751 lbs/day
7-day average – (45 mg/L)(3 MGD)(8.345 conversion factor) = 1,127 lbs/day

TSS
Concentration-based Limits
30-day average – 30 mg/L
7-day average – 45 mg/L
Removal efficiency – minimum of 85%

Mass-based Limits
30-day average – (30 mg/L)(3 MGD)(8.345 conversion factor) = 751 lbs/day
7-day average – (45 mg/L)(3 MGD)(8.345 conversion factor) = 1,127 lbs/day

pH
Instantaneous Measurement: 6.0 – 9.0 standard units (S.U.)
This secondary treatment standard for pH is superseded by more stringent American Samoa Water Quality Standards, as described in section VI.C.

Settleable Solids
The previous permit required settleable solids limitations as it was recommended for pre-secondary wastewater treatment plant based on the EPA Region IX Policy memo dated May 14, 1979. These limitations have been replaced with more stringent secondary treatment limitations for TSS.

B. Water Quality-Based Effluent Limitations (WQBELs)

Water quality-based effluent limitations are required in NPDES permits when the permitting authority determines that a discharge causes, has the reasonable potential to cause, or contribute to an excursion above any water quality standard (40 C.F.R. § 122.44(d)(1)).

When determining whether an effluent discharge causes, has the reasonable potential to cause, or contributes to an excursion above narrative or numeric criteria, the permitting authority shall use procedures which account for existing controls on point and non-point sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity) and where appropriate, the dilution of the effluent in the receiving water (40 C.F.R. § 122.44(d)(1)(ii)).

EPA evaluated the reasonable potential to discharge toxic pollutants according to guidance provided in the *Technical Support Document for Water Quality-Based Toxics Control* (TSD; EPA, 1991) and the *U.S. EPA NPDES Permit Writers' Manual* (EPA, 2010a). These factors include:

1. Applicable standards, designated uses and impairments of receiving water
2. Dilution in the receiving water
3. Type of industry
4. History of compliance problems and toxic impacts
5. Existing data on toxic pollutants - Reasonable Potential Analysis

1. Applicable Standards, Designated Uses and Impairments of Receiving Water

Applicable Ocean Discharge Criteria

EPA's Ocean Discharge Criteria establish guidelines for the issuance of NPDES permits for discharges into territorial seas, the contiguous zone, and the ocean (40 CFR § 125.120). Territorial seas are defined as the waters between the shore and 12 nautical miles offshore. Ocean Discharge Criteria are applicable because the permit authorizes discharge into a territorial sea. Ocean Discharge Criteria establish that point source discharges into territorial seas may not cause unreasonable degradation to the marine environment (40 CFR § 125.123). Discharges that are in compliance with section 301(g), 301(h), or 316(a) variance requirements or State water quality standards are presumed to be in compliance with Ocean Discharge Criteria (40 CFR § 125.122(b)). This discharge is in compliance with State water quality standards, so the discharge is in compliance with Ocean Discharge Criteria.

American Samoa Water Quality Standards

American Samoa has adopted water quality standards for marine waters. The American Samoa Water Quality Standards, 2018 Revision (Administrative Rule No. 001-2019) establish water quality criteria for the following protected uses in Open Coastal Waters, to which the Tafuna STP discharges:

(A) Commercial, subsistence, and recreational fishing except for exclusions as specified under federal regulations such as no take zones;
(B) Scientific investigations;
(C) Whole and limited body-contact recreation, e.g., swimming, snorkeling, surfing, and scuba diving;
(D) Harbors and boat-launching ramps;
(E) Commercial and recreational boating;
(F) The support and propagation of marine life; and

(G) Aesthetic enjoyment.

To protect these uses, ASWQS also establish prohibited uses that include but are not limited to the following:

(A) Offshore oil recovery;
(B) Dumping or discharge of solid or industrial waste material;
(C) Discharge of oil sludge, oil refuse, fuel oil, bilge waters, or any other wastewater from any vessel or unpermitted shore-side facility;
(D) Animal pens over or within 50 feet of any shoreline;
(E) Dredging and filling activities except when approved by the EQC;
(F) Toxic, hazardous and radioactive waste discharges; and
(G) Point source discharges in Manu'a off Ofu Park and between Ofu Park and the Ofu-Olosega Bridge within 1,000 feet of the bridge.

The Tafuna Plain watershed is listed as impaired for undetermined nonpoint source stressors, Total Nitrogen, and Chlorophyll-a (AS-EPA, 2020). There are no Total Maximum Daily Load (TMDL) provisions currently applicable to the Tafuna Plain watershed or the Open Coastal receiving waters off Fogagogo, therefore, this discharge is not subject to a TMDL Waste Load Allocation for any parameter. Although there are no bacteria TMDL requirements established in the Tafuna Plain watershed, beach advisories have been issued near Tafuna STP and treatment plant effluent is a potential source for bacteria at nearby beaches.

2. Dilution in the Receiving Water

The ASWQS specifically allow for dilution credit (Zones of Mixing) with requirements and procedures defined at §24.0207. Included in that section is a provision that "A zone of mixing shall not be granted if it would include the surface of the water body, any part of the shoreline, or any part of any barrier or fringing reef" (§24.0207(b)(9)), which made it necessary for EPA to carefully analyze the potential for the effluent plume to reach the shore, water surface, or any nearby reef area. Note also that the ASWQS specifically stipulate that "The granting of a mixing zone shall be subject to approval by USEPA." (§24.0207(c)(6)).

The discharge from Outfall 001 is to Open Coastal Waters of the South Pacific Ocean. Regular currents and a diffuser installed approximately 1500 feet offshore at over 90 feet deep contribute to dilution of the effluent. In 2004, the Permittee conducted mixing zone analysis and calculated minimum initial dilution under critical conditions[3] using the 1985 EPA-approved mixing zone model, UDKHDEN. The UDKHDEN model requires the specification of various parameters describing the diffuser configuration, effluent properties, and ambient conditions. The Permittee applied the physical outfall characteristics (e.g., six equal 7.75-inch ports) at that time and used the most critical density profile data collected in March 2002 from Station 5 (i.e., former

[3] The evaluation of the mixing zone was conducted based on conditions when pollutant concentrations are expected to be at their highest due to lowest dilution and mixing, known as "critical conditions." Critical conditions occur during periods of maximum stratification or during other periods when discharge characteristics, water quality, biological seasons, or oceanographic conditions are likely to further limit dilution and mixing. The minimum initial dilution can be predicted using a critical condition such as a combination of maximum vertical density stratification, minimum initial density difference between the effluent and the ambient seawater, maximum discharge flow rate, and minimum currents.

reference station for ASPA's Utulei STP receiving water monitoring program). Based on the UDKHDEN model in 2004, the Permittee estimated a critical initial dilution of 187:1 at the trapping depth of 16.1 feet for the predicted instantaneous maximum flow of 6.0 MGD (ASPA 2004).

After the upgrade of the outfall diffuser, the Permittee re-ran the UDKHDEN model in 2013 using the added 11-inch end-gate port and six 6-inch diameter ports. The various density profiles used to find critical environmental conditions with the model were collected from 4 receiving water quality monitoring stations including background stations and stations in the immediate vicinity of the Tafuna STP outfall on March 30, 2013. The Permittee believes Station C best represents the characteristics of the receiving water and is most appropriate for use in executing initial dilution models as this area is not influenced by the discharge plume, which can affect ambient temperature and salinity data. The Permittee also applied the effluent density of 996.351 kg/cm^3 based on the density of freshwater at 29 degrees Celsius and salinity of freshwater at 0.5 ppt. Based on the 2013 UDKHDEN model, the Permittee estimated dilution rates for the 6" and 11" ports which combine into a flux-averaged critical initial dilution of 290:1 at the trapping depth of around 9.6 feet.

EPA evaluated the performance of the updated diffuser using CORMIX, a more detailed modeling software. Based on the upgraded diffuser information and 2013 UDKHDEN model input values provided by the Permittee, EPA concluded that the critical value for initial dilution for the discharge is 109:1. To determine this value, EPA used the same data sets (e.g., density profiles, temperature, discharge flow rate, salinity, and current) and design parameters provided by the Permittee and accounted for several additional factors, including but not limited to plume boundary interaction, density current, plume surfacing, and possible alternate critical conditions (e.g., shoreline proximity and port exit velocity). Based on the preliminary CorHyd model analysis, EPA determined that the 7 diffuser ports do not appear to be functioning as a uniform line source and discharge from 11" end-gate port is dominant (i.e., 46 % of total flow discharge). A sensitivity analysis was conducted using the discharge plume models CORMIX and CorJet with 7 separate computer model cases with a range of input values provided by the Permittee, including uniform discharge from 6 of 6" ports, single discharge from 11" port, and uniform discharge from all 7 ports with an average port size, which resulted in the initial dilution ranging 71~146. EPA concluded that a dilution of 109:1 from the CorJet model using 7 average-sized ports was the most conservative and the maximum supportable critical dilution predicted for the instantaneous maximum flow of 6 MGD through the modified diffuser that remained protective of water quality.

The results of the EPA modeling indicate that the effluent plume behaves significantly differently from what the UDKHDEN model predicted. Specifically, under critical conditions, the CORMIX results indicate the plume rapidly rises to within less than 3 meters of the surface within minutes of being discharged, rather than reaching an equilibrium "trapping level". The discharge buoyancy is the dominating factor, and the plume is weakly deflected by the ambient current. Since applicable water quality standards prohibit a mixing zone from including the surface of the waterbody (ASWQS §24.0207(b)(9)), critical initial dilution ends as soon as the plume surfaces. EPA judged the particular model run indicating dilution of 109:1 at plume surfacing to be most representative of critical initial dilution because, among many factors, it was well within the range of dilutions established by flow-averaging dilution from port-by-port

models of predicted diffuser behavior (i.e, D_m of 71~146), and was consistent with the parametrization recommendations of the CORMIX software.

EPA, therefore, finds that a critical initial dilution of 109:1 provides an appropriately conservative estimate of initial dilution at the ZID boundary under critical conditions. Accordingly, this permit implements initial dilution of 109:1 to conduct reasonable potential analysis and determine the effluent limits for total nitrogen, total phosphorus, ammonia, 2,3,7,8-TCDD, Bis(2-ethylhexyl) Phthalate, 4,4'-DDT, enterococcus, and chronic toxicity. This dilution factor is smaller than the critical initial dilution of 211:1 used in the previous 1999 permit, mainly due to the updated diffuser configuration and the increase in model discharge flow from 2 MGD to 6 MGD.[4]

3. Type of Industry

Typical pollutants of concern in untreated and treated domestic wastewater such as that discharged by the Tafuna STP include ammonia, nutrients, oxygen demanding substances, pathogens (including enterococci), temperature, pH, oil and grease, and solids. Chlorine and turbidity are also typical in wastewater treatment plant effluent. This permit incorporates limits and/or monitoring requirements for all these parameters except chlorine, because chlorine is not used in the treatment process at the Tafuna STP.

4. History of Compliance Problems and Toxic Impacts

The Tafuna STP has previously missed monitoring under the NPDES permit (i.e., no oil and grease effluent monitoring from June 2020 to March 2021, no effluent toxicity monitoring from June 2020 to December 2021, and no receiving water monitoring from March 2020 to August 2022), failed to properly operate and maintain its UV disinfection system, and disposed of sewage sludge with free liquids in the local Futiga landfill in 2019 and 2020 due to limited sewage sludge drying bed capacity. The poor performance of the UV disinfection system and failure of its hydraulic components are recurring problems at the Tafuna STP. The Permittee has periodically bypassed the UV disinfection system to clean out the settled solids, which resulted in improperly disinfected or undisinfected effluent discharges near to a popular water recreation area. Recent effluent data shows that enterococcus has been periodically detected greater than 24,000 MPN/100 ml, significantly exceeding ASWQS even with consideration of critical initial dilution.

As a result of these issues, the Permittee agreed to an Administrative Order on Consent (AOC) issued by EPA, effective August 2, 2022, requiring the Permittee to resume and improve permit required monitoring and reporting, create a spare part inventory and maintain the UV disinfection system to ensure its continued operation to comply with water quality standards for enterococci, and improve sludge drying capacity by installing additional sludge drying beds and a sludge press.

[4] Critical initial dilution of 211:1 used in the 1999 Final Decision Document and the previous permit was based on the alternate diffuser configuration that contains six equal 7.75-inch ports and a peak two to three-hour effluent flow of 2.0 MGD.

5. Existing Data on Toxic Pollutants

For pollutants with effluent data available, EPA has conducted a reasonable potential (RP) analysis based on statistical procedures outlined in EPA's *Technical Support Document for Water Quality-based Toxics Control* herein after referred to as EPA's TSD (EPA, 1991). These statistical procedures result in the calculation of the projected maximum effluent concentration based on monitoring data to account for effluent variability and a limited data set. The projected maximum effluent concentrations were estimated using a coefficient of variation and the 99 percent confidence interval of the 99th percentile based on an assumed lognormal distribution of daily effluent values (sections 3.3.2 and 5.5.2 of EPA's TSD). EPA calculated the projected maximum effluent concentration for each pollutant using the following equation:

Projected maximum concentration = C_e × *RP multiplier factor* ÷ *available dilution*

Where, "C_e" is the reported maximum effluent value, the multiplier factor is obtained from Table 3-1 of the TSD, and available dilution is 109:1 in this case. The maximum effluent values for nutrients, oil and grease, enterococcus, and chronic toxicity RP analysis were collected from DMRs (2016 – 2021), data reported in accordance with the 2011 Administrative Order, and data submitted in 2021 in response to EPA's information request under CWA Section 308(a). For other priority toxic pollutants, effluent monitoring data submitted in September 2004 and March 2005 as part of the NPDES permit renewal application was used for RP analysis. Pollutants believed to be absent or never detected in the effluent are not included in this analysis.

Table 3. Summary of Reasonable Potential Statistical Analysis.

Parameter		Unit	Maximum Observed Effluent Concentration	*n*	CV	RP Multi-plyer	Projected Maximum Concentration	Dilution Factor	Projected Maximum receiving water Concentration[1]	Most Stringent Water Quality Criterion	RP?
General Inorganics											
Total Nitrogen[2]		mg/l	48	18	0.09	1.2	57.6	109	0.53	0.13[3]	**Y**
Total Phosphorous[2]		mg/l	8.3	18	0.34	1.7	14.11	109	0.13	0.015[3]	**Y**
Total Ammonia (as N)[2]	Acute	mg/l	39	18	0.11	1.2	46.8	109	0.43	1.6 [3,4]	N
	Chronic	mg/l	39	18	0.11	1.2	46.8	109	0.43	0.23[3,4]	**Y**
Metals											
Mercury		µg/l	0.07	2	0.6	7.4	0.52	109	0.005	0.05[3]	N
Copper	Acute	µg/l	7.4	2	0.6	7.4	54.8	109	0.50	5.8[5]	N
	Chronic	µg/l	7.4	2	0.6	7.4	54.8	109	0.50	3.7[5]	N
Zinc	Acute	µg/l	50.6	2	0.6	7.4	374.4	109	3.44	95.1[5]	N
	Chronic	µg/l	50.6	2	0.6	7.4	374.4	109	3.44	85.6[5]	N

Parameter	Unit	Maximum Observed Effluent Concentration	*n*	CV	RP Multi-plyer	Projected Maximum Concentration	Dilution Factor	Projected Maximum receiving water Concentration[1]	Most Stringent Water Quality Criterion	RP?
Organics										
2,3,7,8-TCDD[6]	µg/l	5.0×10^{-7}	2	0.6	7.4	3.7×10^{-6}	109	3.4×10^{-8}	5.1×10^{-9} [7]	**Y**
Methylene Chloride	µg/l	0.64	2	0.6	7.4	4.74	109	0.04	1,000[7]	N
Chloroform	µg/l	0.98	2	0.6	7.4	7.25	109	0.07	2,000[7]	N
Toluene	µg/l	4.7	2	0.6	7.4	34.8	109	0.32	520[7]	N
4-Nitrophenol	µg/l	6.6	2	0.6	7.4	48.8	109	0.45	–	N
Phenol	µg/l	84	2	0.6	7.4	621.6	109	5.70	300,000[7]	N
Bis(2-ethylhexyl) Phthalate	µg/l	22	2	0.6	7.4	162.8	109	1.49	0.37[7]	**Y**
Diethyl Phthalate	µg/l	7.5	2	0.6	7.4	55.5	109	0.51	600[7]	N
Butylbenzyl Phthalate	µg/l	1.2	2	0.6	7.4	8.88	109	0.08	0.10[7]	N
Di-n-Butyl Phthalate	µg/l	0.58	2	0.6	7.4	4.29	109	0.04	30[7]	N
1,4-Dichlorobenzene	µg/l	6.0	2	0.6	7.4	44.4	109	0.41	900[7]	N
gamma-BHC (Lindane)	µg/l	0.021	2	0.6	7.4	0.16	109	0.0014	0.16[5]	N
4,4'-DDT	µg/l	0.018	2	0.6	7.4	0.13	109	0.0012	0.00003[7]	**Y**
Others										
Oil and Grease	mg/l	33	21	0.56	2.2	72.6	109	0.67	Narrative WQS	**Y (BPJ)**
Enterococcus[8]	CFU / 100 mL	> 24,196	52	1.2	2.5	60,490	109	555	35[3]	**Y**
Whole Effluent Toxicity (Chronic)[9]	TU_c[10]	347	15	0.52	2.3	798.1	109	7.32	1.0[11]	**Y**

[1] Predicted receiving water concentration calculated by dividing the maximum effluent concentration by the critical initial dilution of 109:1.
[2] Available Data from 2016-2017 quarterly monitoring reports required under EPA's 2011 Administrative Order.
[3] ASWQS, 2018 Revision, at American Samoa Administrative Rule No. 001-2019
[4] ASWQS, Appendix A, The worst-case acute and chronic water quality standards for ammonia at pH of 8.4, temperature of 30°C, and salinity of 37 g/kg which are the worst-case values for from the last 10 years receiving water monitoring data.
[5] USEPA National Recommended Water Quality Criteria for Aquatic Life – Saltwater, 2013. Note that the water quality criteria for copper and zinc were converted from dissolved to total recoverable values using metal translators in Appendix A.

[6] Effluent concentration based on 2,3,7,8-TCDD Toxic Equivalency actors to determine toxic Equivalents.
[7] USEPA National Recommended Water Quality Criteria for Human Health for the consumption of organism only, 2015
[8] Data from EPA's request for information under CWA Section 308(a). Maximum monthly geometric mean of 5 enterococcus samples collected from 2016 to 2021 was used for this RP analysis.
[9] Chronic toxicity data analyzed in EPA R9 laboratory for the period between 2016 and 2021.
[10] Chronic toxic units (TU_c) are calculated from NOEC values (i.e., $TU_c = 100 \div NOEC$).
[11] Technical Support Document for Water Quality-based Toxics Control, EPA, 1991

C. Rationale for Numeric Effluent Limits and Monitoring

EPA evaluated the typical pollutants expected to be present in the effluent and selected the most stringent of applicable technology-based effluent limitations (TBELs) or water quality-based effluent limitations (WQBELs). Where effluent concentrations of toxic parameters are unknown or are not reasonably expected to be discharged in concentration that have the reasonable potential to cause or contribute to water quality violations, EPA may establish monitoring requirements in the permit. Where monitoring is required, data will be re-evaluated and the permit may be re-opened to incorporate effluent limitations as necessary.

Flow
The permit does not include limits for flow, but monitoring is required continuously with reporting of monthly and weekly averages, and daily maximum flow levels.

BOD_5 and TSS
The permit contains concentration-based effluent limitations for BOD_5 and TSS in accordance with the secondary treatment requirements at 40 C.F.R. § 133.102. The permit also contains mass-based effluent limitations for BOD_5 and TSS, as required by 40 C.F.R. § 122.45(f). Based on the projected flow of 3.0 MGD, the mass-based limits have been calculated as shown in Section VI.A above.
In addition to average monthly and average weekly limitations and maximum daily monitoring requirements for BOD_5 and TSS, the average monthly effluent concentration of BOD_5 and TSS shall not exceed 15 percent of the average monthly influent concentration collected at the same time. Influent BOD_5 and TSS monitoring are necessary to evaluate compliance with this 85 percent removal requirement. Monitoring is retained for weekly sampling and analysis of BOD_5 and TSS in both influent and effluent.

pH
This permit continues to include the effluent limits for pH to implement the ASWQS, which supersedes the secondary treatment effluent limits for pH as defined in 40 C.F.R. § 133.102. ASWQS specify a pH standard for Open Costal Waters based on both a fixed range (minimum of 6.5 and maximum of 8.6) and a peak allowable deviation from natural conditions of 0.2 pH units, where natural is defined as "free of substances or conditions, which are attributable to the activities of man" (ASWQS § 24.0206(o) and § 24.0201). pH is a significant parameter due both to its direct effects on aquatic organisms and the effect that pH has on the chemical form, and resultant toxicity potential, of ammonia. Monitoring is required once per week, which is retained from the previous permit.

Temperature
There is no effluent limit for temperature in this permit, but weekly temperature monitoring and reporting is required to assess compliance with the ammonia effluent limit.

Oil and Grease
The permit contains an average monthly limit of 10 mg/l and daily maximum limit of 15 mg/l of oil and grease. Domestic wastewater may often contain elevated levels of oil and grease from sources including kitchen drains and sanitary wastes, which can cause harm to marine life and form a problematic oily sheen on the receiving water. Oil and Grease limits are set in the permit based on EPA's best professional judgement (BPJ) of typical limits at other comparable wastewater treatment facilities in order to ensure the narrative water quality standard requiring waters to be "free from visible floating materials, grease, oil, scum, foam, and other floating material attributable to sewage, industrial wastes, or other activities of man" is met (ASWQS Section 24.206(b)). Monitoring is required monthly.

Ammonia
This permit requires effluent limits for ammonia due to the reasonable potential for ammonia to be present in the discharge at toxic levels (see Table 3). Effluent limitations are established for ammonia using the Ammonia Impact Ratio ("AIR") for the Tafuna STP. The AIR is calculated as the ratio of the ammonia value in the effluent to the applicable ammonia water quality standard. The ASWQS specify ammonia standards for the receiving water (ASWQS Appendix A), which are pH, temperature, and salinity dependent. Therefore, pH, temperature and ammonia sampling must be concurrent. AIR provides more flexibility than a specific, fixed effluent concentration and is protective of water quality standards since the value is set relative to the water quality standard, with consideration of dilution. If the reported value exceeds the AIR limitation of 1, then the effluent ammonia-N concentration exceeded the ammonia water quality criterion after dilution. Attachment D of the permit contains a sample log to calculate and record the AIR values and Attachment E lists applicable Water Quality Standards.

The Permittee must also monitor and report the sampled ammonia effluent values (as well as pH and temperature) used to calculate the AIR once every month, in addition to the calculated numeric AIR value itself.

Total Nitrogen and Total Phosphorous
This permit includes effluent limits and monthly monitoring requirements for both total nitrogen (TN) and total phosphorous (TP). Nitrogen and phosphorous are nutrients which are often over-abundant in biological wastes like domestic wastewater. Discharging such elevated levels of nutrients to natural waters can lead to the growth of nuisances like algae blooms and other undesirable effects, as well as potentially depleting the dissolved oxygen levels in the receiving water and suffocating marine life.

There is an available data set of TN and TP effluent samples post-dating the treatment plant upgrades, which were collected in 2016-2017 as required under EPA's 2011 Administrative Order. Based on the RP analysis using the maximum effluent concentrations of TN and TP and statistical factor recommended in the EPA's TSD, EPA has determined that the discharge has a RP to cause or contribute to an exceedance of the most stringent ASWQS for TN and TP after

initial dilution (see Table 3). Therefore, the permit includes effluent nutrient limits consistent with the ASWQS.

The ASWQS contain specific water quality standards for TN and TP that are expressed in terms of %-of-time-not-to-exceed values. These statistical standards are defined as concentrations which are not to be exceeded more frequently than 2%, 10%, and 50% (median) of the time. EPA has determined that it is appropriate to implement the "median" target as an average monthly permit limitation and the "not to exceed more than 2% of the time" limitation as a maximum daily limitation.

Limits were calculated as follows:
Concentration-based effluent limit (mg/l) = ASWQS (mg/l) × dilution factor

Table 4. Determination of total nitrogen and total phosphorous limits.

Parameters		ASWQS numeric standard for Open Costal Waters	Calculated effluent limits at 109:1 Dilution
Total Nitrogen	Average Monthly	0.13 mg/l	14.2 mg/l
	Maximum Daily	0.28 mg/l	30.5 mg/l
Total Phosphorous	Average Monthly	0.015 mg/l	1.6 mg/l
	Maximum Daily	0.05 mg/l	5.5 mg/l

2,3,7,8-TCDD, Bis(2-ethylhexyl) Phthalate, and 4,4'-DDT
The permit contains effluent limits for 2,3,7,8-TCDD, Bis(2-ethylhexyl) Phthalate, and 4,4'-DDT. Based on the reasonable potential analysis, EPA has determined that the discharge has reasonable potential to cause or contribute to an exceedance of the applicable criteria for 2,3,7,8-TCDD, Bis(2-ethylhexyl) Phthalate, and 4,4'-DDT (see Table 3 of the fact sheet). Quarterly monitoring is required to fully characterize the discharge and collect sufficient data for the next permit reissuance. Effluent limitations are calculated based on water quality criteria for protection of human health as follows:

Concentration-based Effluent Limit (mg/L) = water quality criteria × dilution factor (109)

2,3,7,8-TCDD effluent limit = $(5.1\times10^{-9}$ µg/l) × 109 = 5.6×10^{-7} µg/l

Bis(2-ethylhexyl) Phthalate effluent limit = 0.37 µg/l × 109 = 40.3 µg/l

4,4'-DDT effluent limit = 0.00003 µg/l × 109 = 0.0033 µg/l

Enterococci
The permit establishes the maximum daily and average monthly effluent limitations for enterococcus based on the ASWQS and 2019 ASWQS implementation guidance documents. Bacteria are a common component of wastewater discharge and of particular concern for their potential effect on human health. Enterococci are commonly used as indicator organisms for bacteria levels in a discharge. The UV disinfection system at the Tafuna STP appears to be controlling levels of enterococci in the effluent, but there have been issues with disinfection system due to high solids levels in the effluent and low UV transmissivity. In order to clean out

settled solids, the Permittee has periodically bypassed the UV disinfection system, which resulted in improperly disinfected or undisinfected effluent discharges. As shown above, there is reasonable potential for the discharge to cause or contribute to an excursion above the water quality standards for enterococcus.

The permit implements the two distinct ASWQS bacteria standards for enterococci, which embody different statistical approaches, as a pair of limits: a geometric mean of 35 CFU per 100 ml and a statistical threshold value of 130 CFU per 100 ml (ASWQS Section 24.0206(o)). The 2019 American Samoa Water Quality Standards Implementation Guidance Manual states that "[c]ompliance for maximum allowable bacteria levels for public health protection (e.g. beach advisories) shall be based on any single sample exceedance of the statistical threshold value (CFU/100ml) of specified bacteria for fresh and marine waters. For NPDES permittees, permit compliance for marine receiving waters shall be determined utilizing the geometric mean of all discrete measurements (all depths, all monitoring stations as included in the active NPDES permit that are associated with the discharge, excluding farfield and reference stations) over a 30-day period." Therefore, EPA has used Best Professional Judgement to implement a statistical threshold value of 130 CFU per 100 ml as a daily maximum limit and a geometric mean of 35 CFU per 100 ml as a limit on the average monthly concentration in the absence of sufficient data to calculate a true geometric mean from multiple data points per month. Monitoring is required weekly analyses of effluent and to report maximum daily and average monthly enterococcus concentrations. Translating these values by the approved initial dilution of 109:1 result in the following permit limits for enterococcus:

Daily Maximum: 130 CFU/100 mL × 109 = 14,170 CFU/100 mL

Monthly Average: 35 CFU/100 mL × 109 = 3,815 CFU/100 mL

Chronic Toxicity

The permit includes a chronic toxicity limit requiring that samples "pass" the Test of Significant Toxicity (TST). ASWQS § 24.0206(d) provides a narrative water quality standard for toxicity that all territorial waters be "…substantially free from substances and conditions or combinations thereof attributable to sewage, industrial wastes, or other activities of man which may be toxic to humans, other animals, plants, and aquatic life or produce undesirable aquatic life." ASWQS § 24.0206(h) specifies that all effluents containing materials attributable to the activities of man shall be considered harmful unless acceptable toxicity tests conducted on the effluent using an EPA WET method show otherwise. In the absence of a numeric ASWQS for chronic toxicity, the previous permit required chronic toxicity monitoring using a No Observed Effect Concentration (NOEC) statistical approach. For the reasonable potential analysis of discharge toxicity data reported in chronic toxicity units (TU_c), EPA used a water quality criteria of 1.0 TU_c, as identified in the EPA Regions 8, 9 and 10 Toxicity Training Tool (Denton et al. 2010): "For chronic protection, the CCC [Criterion Continuous Concentration] should be set at 1.0 chronic toxic units (TU_c) to the most sensitive of at least three test species." As shown in Table 3, EPA has determined that the discharge has the reasonable potential to cause or contribute to exceedances of the applicable water quality standard for chronic toxicity.

Following 40 CFR § 122.44(d)(1), in setting the permit's level for chronic WET and conditions for discharge, EPA is using an available short-term chronic WET method/test species at 40 CFR § 136 and an Instream Waste Concentration ("IWC") for the discharge representing the effluent

dilution necessary to protect the receiving water's narrative water quality standard for toxicity. This permit includes a chronic toxicity limit using the Test of Significant Toxicity ("TST") statistical approach described in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA, 2010b). The TST null hypothesis for chronic toxicity (H_o) is: IWC mean response (% effluent) ≤ 0.75 Control mean response. The TST alternative hypothesis is (H_a): IWC mean response (% effluent) > 0.75 Control mean response. The TST alternative hypothesis is used to set the chronic toxicity WQBEL as Pass (0) in this permit, where the result from a single chronic toxicity test is analyzed using the TST approach. An acceptable level of chronic toxicity is demonstrated by statistically rejecting the TST null hypothesis that the effluent is harmful (ASWQS § 24.0206(h)). The detailed chronic toxicity monitoring requirements are addressed in Part VIII.C of the fact sheet.

D. Anti-Backsliding

CWA Sections 402(o) and 303(d)(4) and 40 CFR § 122.44(l)(1) prohibit the renewal or reissuance of an NPDES permit that contains effluent limits and permit conditions less stringent than those established in the previous permit, except as provided in the statute and regulation.

No effluent limits in the permit are less stringent than those in the previous permit. The permit does not include settleable solids limitations, which were included in the previous permit. Settleable solids limitations would be superfluous in a permit that contains TSS limitations based on secondary treatment requirements.

E. Antidegradation Policy

EPA's antidegradation policy under CWA Section 303(d)(4) and 40 C.F.R. § 131.12 and the American Samoa's antidegradation policy at ASWQS § 24.0202 require that existing water uses and the level of water quality necessary to protect the existing uses be maintained. As described in this fact sheet, the permit establishes effluent limits and monitoring requirements to ensure that all applicable water quality standards are met. The permit includes a mixing zone, which has been set to ensure no degradation of water quality and conservative and appropriate protection of the receiving water. To evaluate other potential pollutants, a priority pollutant scan has been conducted of the effluent, demonstrating that most pollutants will be discharged below detection levels.

The permit allows increased projected average flow to 3.0 MGD. The previous permit authorized an average flow of 2.0 MGD. However, mass loadings of BOD and TSS will be much lower based on the more stringent concentration-based effluent limits for secondary treatment in this permit. Therefore, EPA has determined that there will be no degradation to water quality due to the increase in flow rate.

Due to the implementation of full secondary treatment, application of water quality-based effluent limitations protective of ASWQS, and an updated mixing zone modeling to derive the nutrient, bacteria, and pollutants limits, EPA finds that the discharge is not expected to adversely affect receiving water bodies or result in an increase in pollutants or any additional degradation of water quality. EPA, therefore, concludes the discharge meets antidegradation requirements.

VII. NARRATIVE WATER QUALITY-BASED EFFLUENT LIMITS

The American Samoa Water Quality Standards contain narrative water quality standards applicable to the receiving water (ASWQS, §24.0206). Therefore, the permit incorporates applicable narrative water quality standards in Part I.A.3. Based on the ASWQS, 2018 Revision, the previous DO concentration limit of 80 % or 5.5 mg/L has been replaced with a new minimum DO percent (%) saturation level of 80 % only as influenced by salinity or naturally occurring temperature variations.

VIII. MONITORING AND REPORTING REQUIREMENTS

The permit requires the Permittee to conduct monitoring for all pollutants or parameters where effluent limits have been established pursuant to 40 C.F.R. § 122.44, at the minimum frequency specified. Additionally, where effluent concentrations of toxic parameters are unknown or where data are insufficient to determine reasonable potential, monitoring may be required for pollutants or parameters where effluent limits have not been established.

A. Effluent Monitoring and Reporting

The Permittee shall conduct effluent monitoring to evaluate compliance with the permit limitations, understand facility operations, and conduct future reasonable potential analyses. The Permittee shall perform all monitoring, sampling and analyses in accordance with the methods described in the most recent edition of 40 C.F.R. § 136, unless otherwise specified in the permit. All monitoring data shall be reported on monthly DMRs and submitted quarterly as specified in the permit. All DMRs are to be submitted electronically to EPA using NetDMR.

B. Priority Toxic Pollutants Scan

A Priority Toxic Pollutants scan shall be conducted during the fourth year of the five-year permit term to ensure that the discharge does not contain toxic pollutants in concentrations that may cause a violation of water quality standards. The permittee shall conduct the priority pollutants scan concurrent with a whole effluent toxicity test. Attachment F of the permit provides a complete list of Priority Toxic Pollutants, including identifying the volatile compounds that should be collected via grab sample procedures, which is consistent with Priority Toxic Pollutants listed in 40 C.F.R. § 131.36. The Permittee shall perform all effluent sampling and analyses for the priority pollutants scan in accordance with the methods described in the most recent edition of 40 C.F.R. § 136, unless otherwise specified in the permit or by EPA.

C. Whole Effluent Toxicity (WET) Requirements

Aquatic life is a public resource protected in surface waters covered by the CWA. As evidence that CWA requirements protecting aquatic life from chronic and acute toxicity are met in surface waters receiving the NPDES discharge, samples are collected from the effluent and tested for toxicity in a laboratory using EPA's WET methods. These aquatic toxicity test results are used to determine if the NPDES effluent causes toxicity to aquatic organisms. Toxicity testing is important because for scores of individual chemicals and compounds, chemical-specific

environmentally protective levels for toxicity to aquatic life have not been developed, or set as water quality standards. In due course, some such chemicals and compounds can eventually make their way into effluents and their receiving surface waters. When this happens, toxicity tests of effluents can demonstrate toxicity due to present, but unknown, toxicants (including possible synergistic and additive effects), signaling a water quality problem for aquatic life.

EPA's WET methods are systematically-designed instructions for laboratory experiments that expose sensitive life stages of a test species (e.g., fish, invertebrate, algae) to both an NPDES effluent sample and a negative control sample. During the toxicity test, each exposed test organism can show a difference in biological response; some will be undesirable differences. Examples of undesirable biological responses include, but are not limited to, eggs not fertilized, early life stages that grow too slowly or abnormally, or death. At the end of a toxicity test, the different biological responses of the organisms in the effluent group and the organisms in the control group are summarized using common descriptive statistics (e.g., means, standard deviations, coefficients of variation). The effluent and control groups are then compared using an applicable inferential statistical approach (i.e., hypothesis testing or point estimate model) chosen by the permitting authority and specified in the NPDES permit. The chosen statistical approach is compatible with both the experimental design of the WET method and the applicable toxicity water quality standard. Based on this statistical comparison, a toxicity test will demonstrate that the effluent is either toxic or not toxic, in relation to the permit's toxicity level for the effluent.

EPA recommends inferential statistical approaches that a permitting authority chooses from to set a protective level for toxicity in an NPDES discharge. The statistical approach chosen for this permit is based on bioequivalence hypothesis testing and is called the Test of Significant Toxicity (TST) statistical approach. It is described in *National Pollutant Discharge Elimination System Test of Significant Toxicity Technical Document* (TST Technical Document; EPA, 2010c) and Denton DL, Diamond J, and Zheng L. 2011. Test of significant toxicity: A statistical application for assessing whether an effluent or site water is truly toxic. *Environ Toxicol Chem* (Denton et al., 2011). The TST approach explicitly incorporates statistical test power, which is the ability to correctly classify the effluent as acceptable under the NPDES WET program (i.e., non-toxic). This approach also provides a positive incentive to generate high quality, valid WET test results to make informed decisions regarding NPDES WET reasonable potential and permit compliance determinations (EPA, 2010c).

For ocean discharges governed by CWA Section 403(c) and implementing regulations, EPA also recommends the choice of TST to apply statistical considerations linking NPDES monitoring data, performance, and decision-making prior to data collection. See *CWA § 403: Procedural and Monitoring Guidance* (EPA, 1994). Examples of such statistical considerations include defining acceptable type I (α) and type II (β) errors[5]; applying power analysis to evaluate the appropriate number of replicates (n) based on a prior knowledge of variation observed in historical data; etc.). Accordingly, statistical rigor (trustworthiness) is considered by EPA under

[5] Type I error (α) is the error of rejecting the null hypothesis that should have been accepted. Type II (β) error is the error of accepting the null hypothesis that should have been rejected. For toxicity tests, the true population mean (μ) refers to the mean for a theoretical statistical population of results from indefinite repetition of toxicity tests on the same control water and sample (e.g., a 24-hour composite sample of effluent). For an individual toxicity test, there must be a statistical analysis to determine if the null hypothesis is rejected in favor of the alternative hypothesis—in other words, that the difference in sample and control means is real and not simply reflective of random variation among the tested organisms.

40 CFR § 125.122(a) in choosing the TST statistical approach for this permit because such components are explicitly considered.

As shown in Table 3, chronic toxicity WQBELs are required for the permitted discharge since reasonable potential for chronic toxicity has been established in accordance with 40 C.F.R. § 122.44(d)(1). Quarterly monitoring and reporting for compliance with maximum daily effluent limits for chronic toxicity are also required, so that effluent toxicity can be assessed in relation to these WQBELs for the permitted discharge (see Part I, Table 1 in NPDES permit).

In accordance with 40 C.F.R. § 122.44(d)(1)(ii), in setting the permit's levels for chronic toxicity and conditions for discharge, EPA is using a test species/chronic short-term WET method and a discharge Instream Waste Concentration (IWC) representing conservative assumptions for effluent dilution necessary to protect receiving water quality. The IWC is a discharge-specific term based on the permit's authorized mixing zone or initial dilution. Generally, the dilution model result "S" from Visual Plumes/CORMIX is used. S is the volumetric dilution factor (i.e. 1 volume effluent is diluted with S − 1 volumes surface water) = [(Ve + Va) / Ve]. Following the mass balance equation, if the dilution ratio D = Qs / Qe, then [(Qe + Qs) / Qe] = 1 + D = S. For this discharge, S = 109 (i.e., authorized dilution). The discharge-specific IWC = 1 to 109 dilution (1:109, 1/109) = **0.92 % effluent**. The IWC made by the toxicity laboratory is mixed as 1 part solute (effluent) to 108 parts dilutant for a total of 109 parts.

The TST's null hypothesis for chronic toxicity (H_o) is: In-stream Waste Concentration (IWC) mean response (% effluent) ≤ 0.75 Control mean response. The TST's alternative hypothesis is (H_a): IWC mean response (% effluent) > 0.75 Control mean response. For this permit, results obtained from a single chronic toxicity test are analyzed using the TST statistical approach, where the required chronic toxicity IWC for Outfall 001 is 0.92% effluent.

For NPDES samples for toxicity testing, the sample hold time begins when the 24-hour composite sampling period is completed (or the last grab sample in a series of grab samples is taken) and ends at the first time of sample use (initiation of toxicity test). 40 C.F.R. § 136.3(e) states that the WET method's 36-hour hold time cannot be exceeded unless a variance of up to 72-hours is authorized by EPA. In a June 29, 2015 inter-office memorandum, EPA Region 9 authorized a hold time variance of up to 72-hours applicable only to Pacific Island Territory permittees which ship the NPDES sample to the continental U.S. for toxicity testing, with conditions (see Attachment G of the permit).

For this discharge, EPA has set a maximum daily effluent limit (40 C.F.R. § 122.45(d)) of "Pass (0)" for chronic toxicity. This limit is set to restrict the discharge of toxic pollutants in toxic amounts and protect both applicable aquatic life water quality standards, including standards downstream of the discharge, and existing aquatic life beneficial uses in receiving waters (CWA Sections 101(a)(3) and 301(b)(1)(C)). The permit also establishes the following monitoring and reporting requirements for chronic toxicity:

> The WET test result is to be statistically analyzed and reported using the TST statistical approach. A test result that rejects the null hypothesis (H_0) described above is reported as "Pass (0)" on the DMR form. A test result that does not reject this null hypothesis is reported as "Fail (1)" on the DMR form. To determine either "Pass" or "Fail", the Permittee shall follow the instructions in *National Pollutant Discharge Elimination*

System Test of Significant Toxicity Implementation Document, Appendix A (EPA, 2010b). The Permittee shall conduct short-term tests with the sand dollar (*Dendraster excentricus*) or the Purple Sea Urchin (*Strongylocentrotus purpuratus*). These species are considered suitably sensitive indicators of potential toxic effects in the biological communities in the receiving water. For each toxicity test reported as Pass "0" or Fail "1", the Permittee shall report the associated value for "Percent (%) Effect (also called PE)" for the coded parameter on the DMR form, calculated as: % Effect = [(Control mean response − IWC mean response) ÷ Control mean response] × 100.

Species sensitivity screening for chronic toxicity is not an automatic requirement in this permit. However, the permit retains a species sensitivity screening condition as an option for the permitting authority to exercise, particularly when the quality of the permitted discharge has changed, or is expected to change, during the permit term.

D. Receiving Water Monitoring and Reporting

The Permittee shall continue the receiving water monitoring program which has allowed an accurate understanding of the context and effects of the discharge. Semi-annual receiving water monitoring for pollutants or parameters shall be conducted at 6 monitoring stations including diffuser midpoint, ZID, ZOM, reference, and farfield stations at three depths (i.e., surface, mid-depth, and bottom depth). Farfield station has been included in this permit as a control station to better characterize the receiving water and the impacts of the discharge from the Tafuna STP. Sampling for parameters that are influenced by temperature or pH (i.e., ammonia) shall be conducted during the period that the data is representative of critical conditions. Receiving water monitoring data shall be submitted as electronic attachments to NetDMR submissions. This monitoring program would validate the behavior of the effluent plume from the updated treatment system and ensure protection of newly listed threatened and endangered species.

IX. SPECIAL CONDITIONS

A. Biosolids

Standard requirements for the monitoring, reporting, recordkeeping, and handling of biosolids in accordance with 40 CFR § 503 are incorporated into the permit. The permit also includes electronic reporting requirements, which is required for all major POTWs (40 CFR § 127). Permittees shall submit biosolids annual reports using EPA's NPDES Electronic Reporting Tool ("NeT") by February 19th of the following year.

B. Pretreatment

The permit does not include pretreatment requirements. EPA has established pretreatment standards to prevent the introduction of pollutants into POTWs which will interfere with or pass through the treatment works, and to improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges (CWA Section 307). EPA requires any POTW with a total design flow greater than 5 MGD and receiving from nondomestic sources of pollutants which pass through or interfere with the operations of the POTW or are otherwise subject to

pretreatment standards to establish a pretreatment program. Since there are no nondomestic facilities discharging pollutants to the Tafuna STP, no pretreatment program is required in this permit. Given that the Permittee receives from industrial sources of pollutants in the future, in accordance with 40 CFR § 403.8, EPA may require the Permittee to develop a pretreatment program in order to prevent interference with the treatment plant or pass through.

C. Capacity Attainment and Planning

To prevent sanitary sewer overflows due to insufficient capacity of the wastewater treatment facility, the permit requires that a written report be filed within ninety (90) days if the average dry-weather wastewater treatment flow for any month exceeds 90 percent of the annual dry weather design capacity of the waste treatment and/or disposal facilities.

D. Development and Implementation of Best Management Practices

Pursuant to 40 C.F.R. § 122.44(k)(4), EPA may impose BMPs which are "reasonably necessary…to carry out the purposes of the Act." The pollution prevention requirements or BMPs in the permit operate as technology-based limitations on effluent discharges that reflect the application of Best Available Technology and Best Control Technology. Therefore, the permit requires that the Permittee develop and implement a Pollution Prevention Plan with appropriate pollution prevention measures or BMPs designed to prevent pollutants from entering Open Coastal Waters off Fogagogo and other surface waters while performing normal processing operations at the facility and during sampling events in the receiving waters.

This permit does not authorize stormwater discharges. The Permittee shall develop and implement Best Management Practices (BMPs) that are necessary to control site stormwater runoff, exposure to sludge or any pollutants, spillage or leaks, sludge or waste disposal, and drainage from storage tanks. In addition to storm water management, as part of the Pollution Prevention Plan, the Permittee shall develop and implement BMPs that are necessary to control bacteria levels in the discharge from the treatment plant and comply with bacteria limitations, including but not limited to periodic cleaning of the UV disinfection system to remove any deposition of solids within the UV bulb chambers and maintaining a spare part inventory for the UV system components.

E. Development of an Initial Investigation TRE Workplan for Whole Effluent Toxicity

Within 90 days of the permit effective date, the permit requires the Permittee to prepare and submit a copy of their Initial Investigation Toxics Reduction Evaluation (TRE) Workplan (1-2 pages) for chronic toxicity to EPA for review and approval. If the chronic toxicity test result is reported as "Fail (1)" (i.e., TST null hypothesis is not rejected and the IWC is declared toxic), the Permittee shall conduct additional toxicity testing and implement its TRE workplan to investigate potential causes and sources of toxicity, evaluate the treatment system efficiency, and mitigate the impacts of the discharge.

F. Asset Management and Climate Change

40 CFR § 122.41(e) requires the Permittee to properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. USEPA Region 9 published a guidance document entitled *Incorporating Asset Management Planning Provisions into NPDES Permits* (EPA Region 9, 2014) that directs municipalities "to manage their aging sewer and stormwater systems at a time of urban population growth, more stringent water quality protection requirements, and increased exposure to climate change-related risks." In addition, Executive Order 13990 directs federal agencies "to bolster resilience to the impacts of climate change." Asset management planning provides a framework for setting and operating quality assurance procedures and ensuring the permittee has sufficient financial and technical resources to continually maintain a targeted level of service. The Permittee shall develop an Asset Management Plan that considers short- and long-term vulnerabilities (including due to climate change) of collection systems, facilities, treatment systems, and outfalls. Intent is to ensure facility operations are not disrupted and compliance with permit conditions is achieved. Asset management and climate change requirements have been established in the permit to ensure compliance with the provisions of 40 CFR § 122.41(e).

X. OTHER CONSIDERATIONS UNDER FEDERAL LAW

A. Consideration of Environmental Justice

EPA's Environmental Justice policy establishes fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. As part of the environmental permitting process, EPA considers cumulative environmental impacts to disproportionately impacted communities.

In American Samoa, EPA is aware of several environmental burdens facing communities with limited resources, including but not limited to ongoing boil water notices on the local drinking water system, domestic wastewater treatment only to primary standards, industrial discharges, runoff from small-scale piggeries, unsewered area, and an abundance of cesspools for individual residences.

This permit was written to regulate a POTW as a potential source of pollution, to ensure the plant's discharge does not adversely impact human health and the water quality of the open coastal waters of the South Pacific Ocean. EPA has determined that Tafuna STP does not qualify for renewal of the 301(h) waiver from secondary treatment requirements. In order to protect ocean water quality and human health, this permit requires more stringent secondary treatment effluent limitations, consistent with the CWA.

EPA is aware that American Samoa faces severe resource constraints due to their small and low-income ratepayer base (i.e., approximately 50,000 ratepayers which is smaller even than the other US territories and the American Samoa per-capita GDP of less than $10,000 per year) and the Permittee currently has neither the technical skillset nor funding stream to construct or operate and maintain a secondary treatment plant. However, new funding resources are available

to the Permittee through the bipartisan infrastructure law (BIL) fund, in addition to Clean Water State Revolving Fund (CWSRF), and EPA intends to help facilitate the Permittee in seeking out additional funds. EPA has considered both the American Samoa community and the requirements of the CWA in issuing this permit.

B. Impact to Threatened and Endangered Species

Section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1536) requires federal agencies to ensure that any action authorized, funded, or carried out by the federal agency does not jeopardize the continued existence of a listed or candidate species, or result in the destruction or adverse modification of its habitat.

On January 21, 2022, EPA sent an email to the National Marine Fisheries Service (NMFS) NOAA Fisheries Pacific Islands Regional Office, requesting a list of threatened and endangered species in the South Pacific Ocean to assess the potential impacts in the action area by the wastewater discharges from the Tafuna STP. On January 24, 2022, NOAA/NMFS responded to EPA with the link to the marine protected species of American Samoa, including proposed critical habitat for Pacific coral. Based on IPaC, EPA identified that green sea turtle is listed under U.S. Fish and Wildlife Service (USFWS) jurisdiction as endangered species within the action area and sent an email to USFWS Pacific Islands Office on October 24, 2022, to confirm the listed species. In its November 2, 2022 response to EPA's email, the USFWS states that "[a]s this project did not include any action on land to modify or change nesting habitat or deter or disturb nesting sea turtles, FWS did not have any comments on the project."

EPA evaluated whether the discharges would affect threatened and endangered species and/or critical habitats in the vicinity of the discharge outfall. EPA concluded that the discharge may affect, but is not likely to adversely affect marine mammals, sea turtles, and corals in American Samoa, and would not affect other listed species. EPA also determined that the discharge is not likely to destroy or adversely modify proposed critical habitat for Pacific Coral. Additional details of EPA's Biological Evaluation ("BE"), as shared with the U.S. Fish and Wildlife Service ("FWS") and the National Marine Fisheries Service ("NMFS"), are available in the permit administrative record.

On Date, 2023, EPA initiated informal consultation with NMFS on this project. EPA provided both USFWS and NMFS with copies of the public noticed draft permit and fact sheet during the public notice period and act on any comments received.

C. Impact to Coastal Zones

The Coastal Zone Management Act (CZMA) requires that Federal activities and licenses, including Federally permitted activities, must be consistent with an approved state Coastal Management Plan (CZMA Sections 307(c)(1) through (3)). Section 307(c) of the CZMA and implementing regulations at 40 C.F.R. § 930 prohibit EPA from issuing a permit for an activity affecting land or water use in the coastal zone until either ASPA certifies that the activity complies with the State (or Territory) Coastal Zone Management program, and the State (or Territory) or its designated agency concurs with the certification. The designated agency of

American Samoa is the American Samoa Department of Commerce which administers American Samoa's Coastal Zone Management Program.

EPA has received a general concurrence from the American Samoa Coastal Zone Management Program for the renewal of all existing NPDES permits issued in American Samoa (American Samoa Department of Commerce, June 17, 2010 letter - See the permit administrative record). As this action is a reissuance of the existing NPDES permit for the Tafuna STP, the general concurrence applies, and EPA has assured consistency with the Territory's Coastal Zone Management program. EPA will provide the American Samoa Department of Commerce with copies of the public noticed draft permit and fact sheet during the public notice period.

D. Impact to Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act (MSA) set forth mandates for the National Marine Fisheries Service, regional fishery management councils and other federal agencies to identify and protect important marine and anadromous fish species and habitat. The MSA requires Federal agencies to make a determination on Federal actions that may adversely impact Essential Fish Habitat (EFH).

EPA has determined that the discharge may have adverse effects, but no more than minimal effects on designated EFH (i.e., deep corals). Additional details of EPA's EFH Assessment ("EFHA"), as shared with NMFS, are available in the permit administrative record. On Date, 2023, EPA requested initiation of EFH consultation and provided copies of the public noticed draft permit and fact sheet along with EFH assessment during the public notice period.

E. Impact to National Historic Properties

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effect of their undertakings on historic properties that are either listed on, or eligible for listing on, the National Register of Historic Places. Pursuant to the NHPA and 36 C.F.R. § 800.3(a)(1), EPA is making a determination that issuing this NPDES permit does not have the potential to affect any historic properties or cultural properties. As a result, Section 106 does not require EPA to undertake additional consulting on this permit issuance.

F. Water Quality Certification Requirements (40 C.F.R. §§ 124.53 and 124.54)

For States, Territories, or Tribes with EPA approved water quality standards, EPA requests certification from the affected State, Territory, or Tribe that the permit will meet all applicable water quality standards. EPA cannot issue the permit until the certifying State, Territory, or Tribe has granted certification under 40 C.F.R. § 124.53 or waived its right to certify. If the State, Territory, or Tribe does not respond within 60 days of the requested deadline, it will be deemed to have waived certification.

On Date, 2023, EPA forwarded the public noticed draft permit and fact sheet to AS-EPA and requested water quality certification under CWA Section 401 from AS-EPA.

XI. STANDARD CONDITIONS

A. Reopener Provision

In accordance with 40 C.F.R. §§ 122 and 124, this permit may be modified by EPA to include effluent limits, monitoring, or other conditions to implement new regulations, including EPA-approved water quality standards; or to address new information indicating the presence of effluent toxicity or the reasonable potential for the discharge to cause or contribute to exceedances of water quality standards.

B. Standard Provisions

The permit requires the Permittee to comply with EPA Region 9 Standard Federal NPDES Permit Conditions.

XII. ADMINISTRATIVE INFORMATION

A. Public Notice (40 C.F.R. § 124.10)

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a draft NPDES permit or other significant action with respect to an NPDES permit or application. This permit was public noticed in Date, 2023.

B. Public Comment Period (40 C.F.R. § 124.10)

Notice of the draft permit will be placed in the Samoa News and on the EPA Region 9's website on Date, 2023, for 30 days provided for interested parties to respond in writing to EPA. After the closing of the public comment period on Date, 2023, EPA is required to respond to all significant comments at the time a final permit decision is reached or at the same time a final permit is actually issued. The Response to Comments document will be provided along with the issuance of the final permit and fact sheet.

C. Public Hearing (40 C.F.R. § 124.12(c))

A public hearing may be requested in writing by any interested party. The request should state the nature of the issues proposed to be raised during the hearing. A public hearing will be held if EPA determines there is a significant amount of interest expressed during the 30-day public comment period or when it is necessary to clarify the issues involved in the permit decision.

XIII. CONTACT INFORMATION

Comments, submittals, and additional information relating to this proposal may be directed to:

Julie Song, (415) 972-3035
song.julie@epa.gov

XIV. REFERENCES

American Samoa EPA (ASEPA), 2019. *American Samoa Water Quality Standards* (2018 Revision). American Samoa Administrative Rule No. 001-2019

American Samoa EPA (ASEPA), 2019. *American Samoa Water Quality Standards Implementation Guidance Manual*. Administrative Rule No. 001-2019. March 2019.

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APPENDIX B-4
ASEPA TAFUNA WWTP ASSESSMENT (2024)

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LEMANU P.S. MAUGA
Governor

LA'APUI TALAUEGA E.V. ALE
Lt. Governor

AMERICAN SAMOA ENVIRONMENTAL PROTECTION AGENCY
P.O. Box PPA Pago Pago American Samoa 96799
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FA'AMAO O. ASALELE JR.
Director

WILLIAM S. SILI
Deputy Director

Serial No. 2024 – 106

March 22, 2024

Martha Guzman, Regional Administrator
US EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105
Email: guzman.martha@epa.gov

Subject: **AS0020010 Tafuna Wastewater Treatment Plant;**
Assessment of Discharge Impacts on Receiving Water

Dear Ms. Guzman:

American Samoa EPA (AS-EPA) is thankful for this opportunity to present this assessment of conditions for the receiving water in the vicinity of Outfall 001 for NPDES Permit AS0020010.

This assessment was prepared by the AS-EPA Water Quality Branch using analytical values from the original certified commercial laboratory analytical reports for 34 sampling events covering the 19-year period from 2005-2023 (inclusive). This assessment characterizes the overall ocean water quality in the vicinity of Outfall 001, in the context of the American Samoa Water Quality Standards (ASWQS 2018), over the long term. This assessment also presents information on the condition of benthic habitat, including coral, in the vicinity of Outfall 001. Prevailing oceanographic conditions for the region of American Samoa are briefly discussed for the benefit of those not familiar with the exposed coastal waters of the southern coast of Tutuila Island.

Oceanographic Conditions

Tutuila is located at 14 degrees south latitude, with the long-axis central ridge of the island oriented east-west in the flow of the South Equatorial Current. This major world ocean current flows east to west and at this location has a speed of 1-2 knots (nautical miles per hour), or 1½ - 2½ miles per hour. This is a substantial velocity. The region of Outfall 001 along the Tutuila south coast is swept constantly by this current which is enhanced locally by ocean bottom configuration and surface action of the prevailing southeast trade winds. Ocean waters of the south coast of Tutuila are known by local residents to be areas of persistent and strong currents that flow westward.

The ocean bottom in the region of Outfall 001 is sand, on which coral cannot establish (Figure 1(a)). Anchoring systems for Outfall 001 provide an artificial hard substrate on which coral can establish (Figure 1(b)), and robust coral growth occurs on the outfall structure. The presence of robust live coral on the outfall is indicative of good water quality favorable for support of reef habitat, if there is hard substrate to support establishment.

The homogeneous blue of the figures is not representative of actual colors, but is the result of the natural attenuation of light from the surface at this depth of 100 feet. Camera lighting and filters would be required for an image to show actual colors at this depth. Colors shown here are those seen by the unaided human eye.

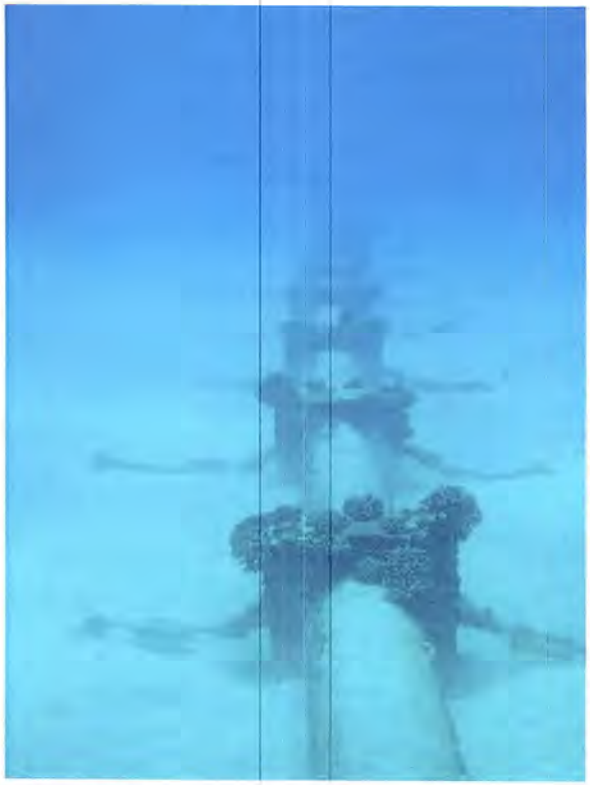


Figure 1(a)



Figure 1(b)

Coral Growth on Outfall 001 Anchoring System

Each parameter for which ASWQS has a numerical standard is presented and discussed below. Additional parameters as available are presented to further characterize water quality in the region of Outfall 001. All data, except for nitrogen, indicate that primary treatment substantially meets ASWQS for the receiving water in the region of Outfall 001.

Nitrogen

The principal concern for nitrogen concentration in receiving waters is that excess amounts of this nutrient can lead to excessive algae growth in the water column. This is especially of concern for

enclosed or semi-enclosed waters with limited water exchange (i.e., flushing). Excessive algae growth in tropical ocean waters can limit available sunlight to coral and can deplete dissolved oxygen. Sunlight and oxygen are necessary to support a healthy and diverse reef system of sessile and motile organisms.

It is important to note that nitrogen is not necessarily the only factor in algae growth. All plants need a wide range of nutrients at sufficient concentrations in order support growth. Nitrogen + Phosphorus, at sufficient concentrations of each, is required for robust algae growth. If one of these nutrients is in limited supply, algae growth is inhibited, no matter if there is an excess of the other. Moreover, not all nitrogen in the water column is available for algae growth. The type of nitrogen (various compounds) matters.

Figure 2 indicates that nitrogen chronically occurs above the ASWQS. Yet, evidence presented in Figures 1(a) & 1(b), and in the sections below for Nitrate + Nitrite, Phosphorus, Dissolved Oxygen, Chlorophyll-a, and Turbidity suggest that excessive nitrogen has limited impact on the receiving water at Outfall 001. Light penetration at a depth of 100 feet supports coral growth as shown in Figure 1(a) & 1(b), and dissolved oxygen in the water column remains consistently high at essentially 100% saturation (Figure 8). Phosphorus (Figure 5) is present in very limited concentration. Chlorophyll-a, a measure of phytoplankton in the water column shows compliance with ASWQS for more than half the time over the past 19 years (Figure 6). Water clarity as measured by turbidity is exceptional (Figure 7).

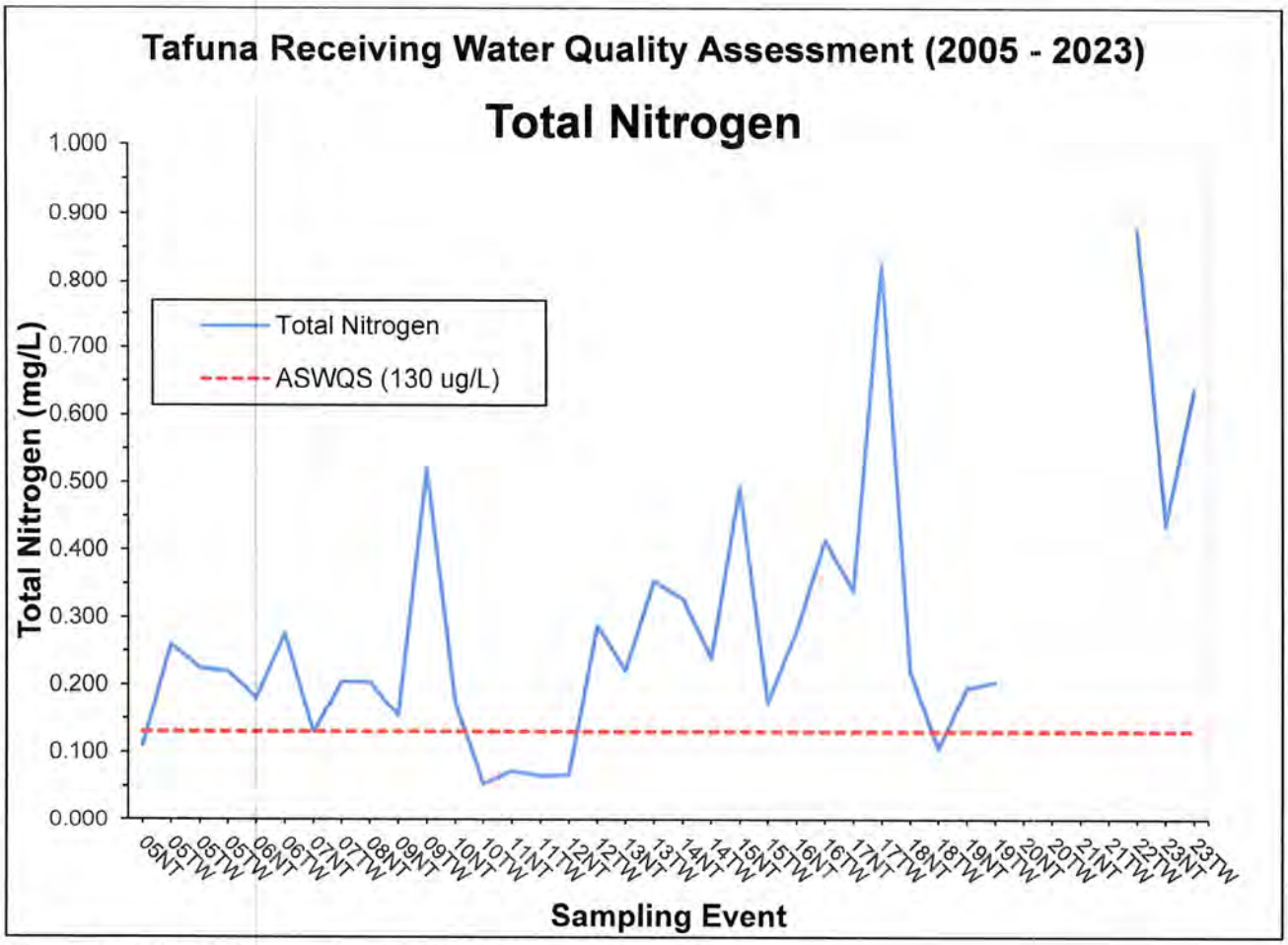


Figure 2. Total Nitrogen for AS0020010 Receiving Water

Data presented here supports that Total Nitrogen alone is not always the best indicator of nitrogen as an important pollutant. The total nitrogen present in the Outfall 001 receiving water is almost entirely organic nitrogen, which is not available to algae for growth. Total Kjeldahl Nitrogen (TKN) shown in Figure 3 is a measure of organic nitrogen. Organic nitrogen is a diverse and complex range of nitrogen containing organic molecules that are the result of progressive decomposition of organic wastes. A comparison of Figures 2 & 3 shows that the graphs are essentially the same, which indicates that nearly all of the Total Nitrogen is composed of TKN (organic compounds) and therefore is not available as a nutrient for algae growth.

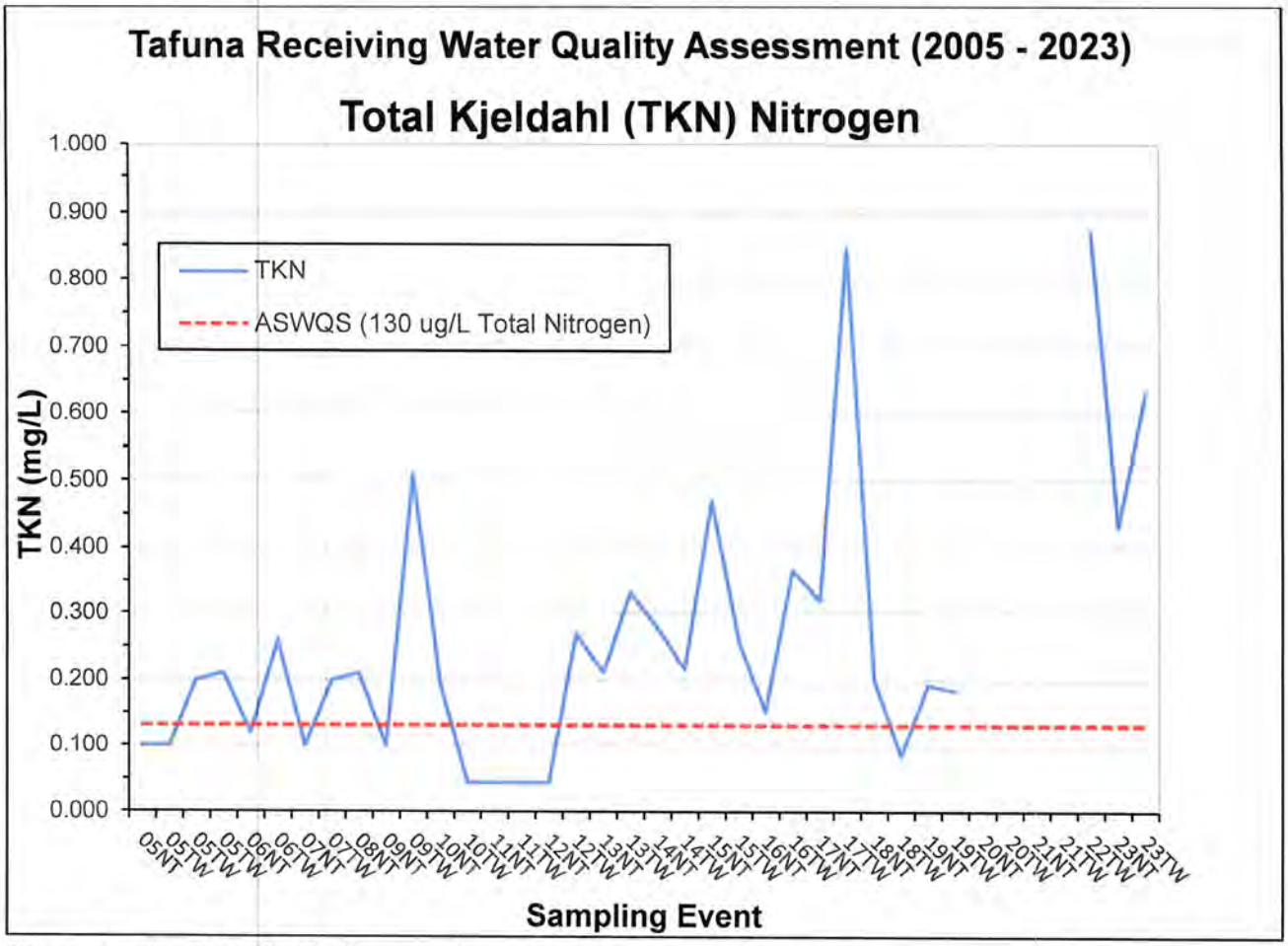


Figure 3. Total Kjeldahl Nitrogen for AS0020010 Receiving Water

The nitrogen compounds available for algae growth in the ocean water column are Nitrate and Nitrite. These forms of nitrogen occur at the end of a long and progressive process of decomposition of organic wastes. This process takes time, on the order of days to weeks. As shown in Figure 4, nitrate and nitrite occur at very low levels in the receiving water for Outfall 001. Therefore, there is very little nitrogen available for algae growth in the region of Outfall 001.

The Total Nitrogen and TKN indicated in Figures 2 & 3 is assumed to be in part from the discharge from the Tafuna Wastewater Treatment Plant. It is noted that nitrogen concentration in Tutuila ocean water is demonstrated to vary widely seasonally and annually, and this data can be compiled from a vast range of investigative work over a period of many decades if necessary. The portion of nitrogen presented in this data set that is of natural and variable origin is not known at this time, but it can be reasonably assumed that not all of this nitrogen is from the Tafuna Wastewater Treatment Plant discharge. The impact from this nitrogen, however, is negligible. The strong currents of the receiving water flush nitrogen away from this area quickly, and the nitrogen load is dispersed and diluted rapidly as the discharge plume is swept rapidly seaward to the west.

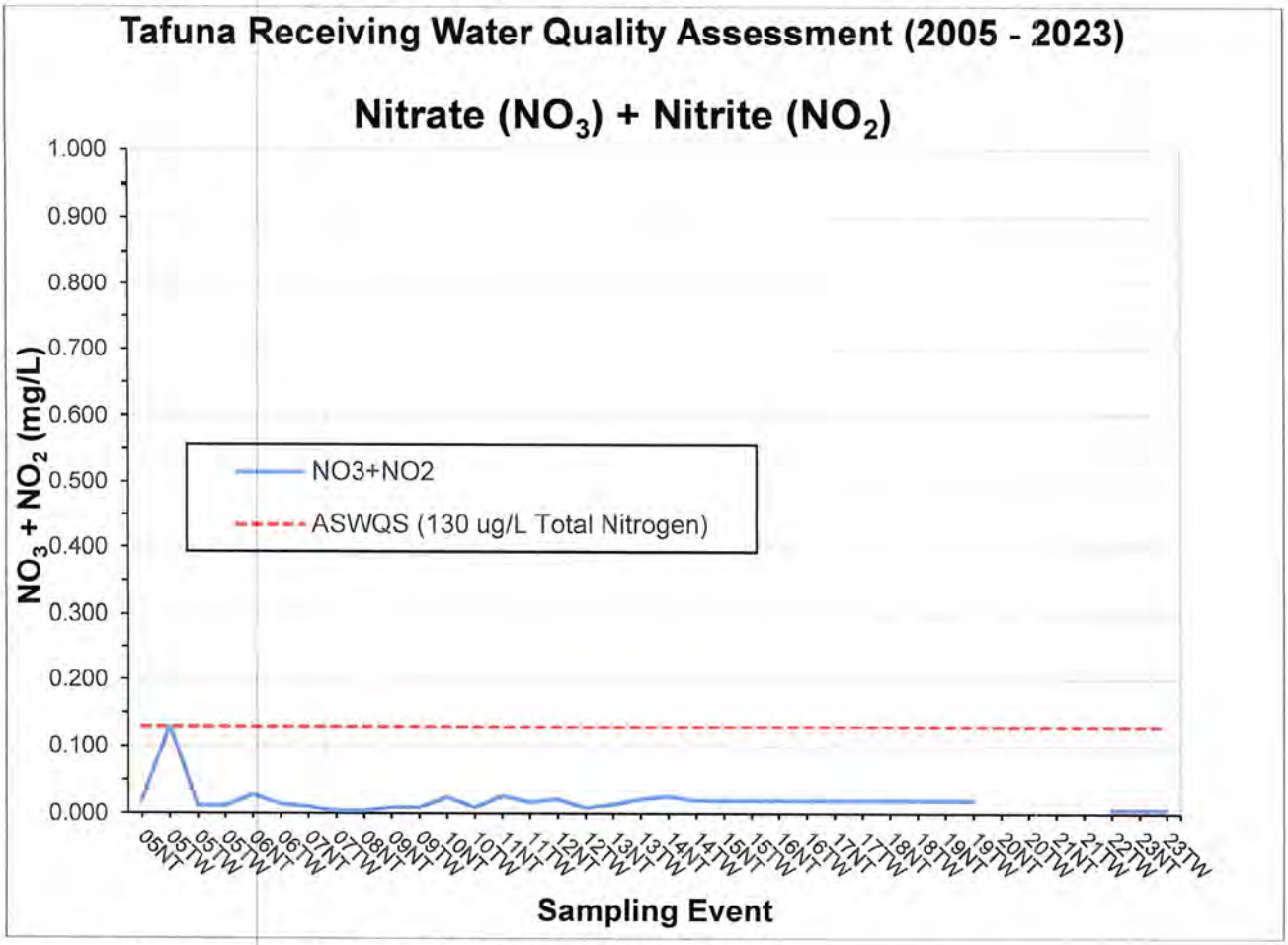


Figure 4. Nitrate + Nitrite for AS0020010 Receiving Water

As shown below, the other essential nutrient phosphorus occurs at very low levels in the receiving water, and would therefore limit algae growth in the water column in the vicinity of Outfall 001, no matter how much nitrogen is available.

Together, the multiple lines of evidence presented here support the inference that nitrogen has negligible impact on quality of the ocean water in the region of Outfall 001, even though nitrogen occurs chronically above the ASWQS.

Phosphorus

It is notable that the ASWQS of 15 µg/L for phosphorus is exceptionally strict. As discussed above for nitrogen, phosphorus is a principal nutrient for plant growth. In the presence of abundant nitrogen but limited phosphorus, algae growth will be inhibited. This appears to be the case for the receiving waters of Outfall 001, because coral growth, turbidity and chlorophyll-a indicate that algae growth is not excessive in the water column.

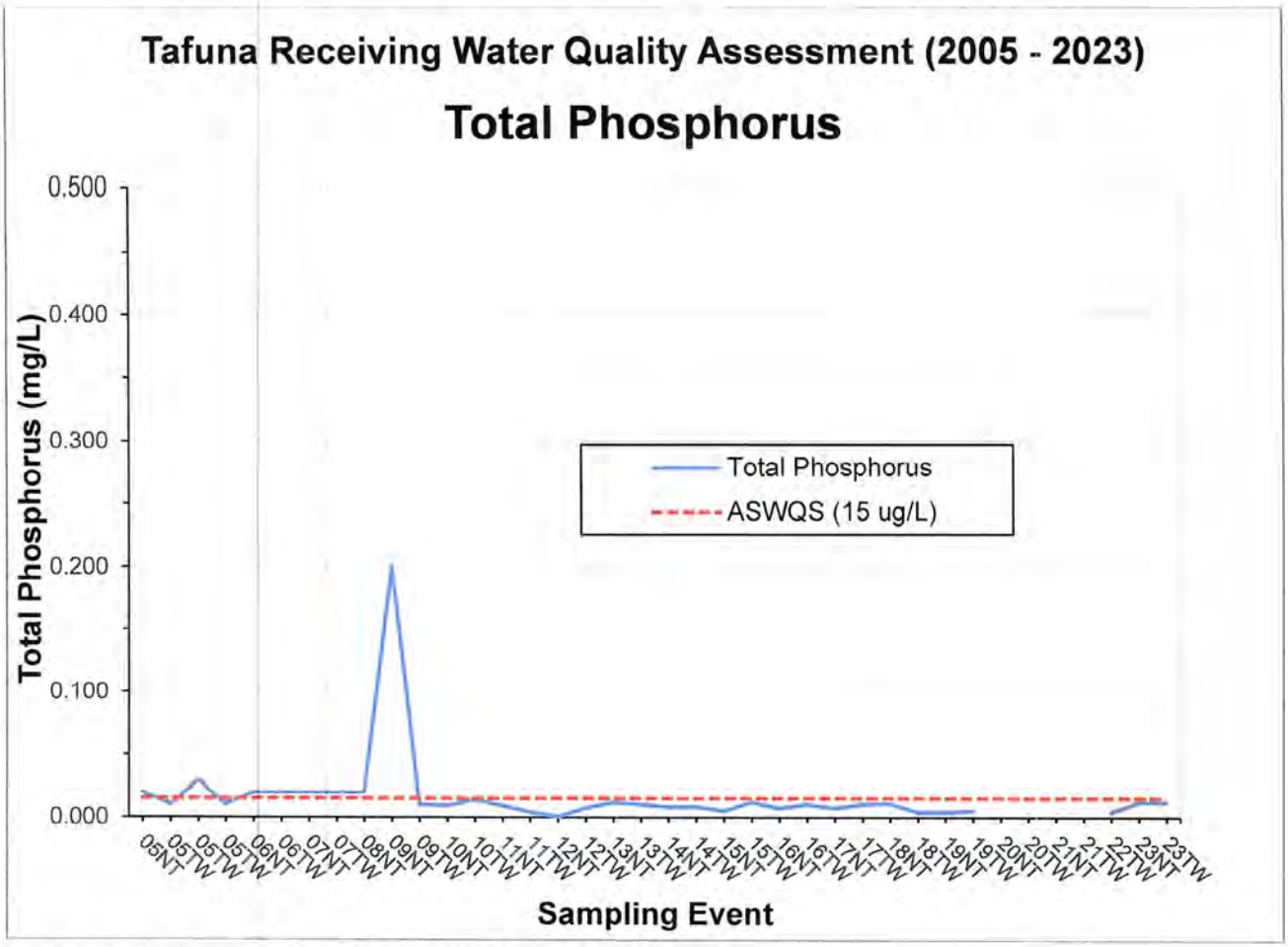


Figure 5. Phosphorus for AS0020010 Receiving Water

Chlorophyll-a

Chlorophyll-a (chl-a) is a compound that exists in the cells of plants that use sunlight as energy source, and this compound is used to indicate the presence of algae (phytoplankton) in the water column. Chl-a is also used as corroborative evidence of the presence of excessive nitrogen and phosphorus in the water column. Chl-a values will increase as algae growth increases. All ocean waters contain phytoplankton to variable extent. Near-shore tropical coral reef ecosystems are naturally very limited in phytoplankton which is one major reason for typically exceptional water clarity. Water clarity on tropical coral reefs is necessary for corals to thrive. Figure 6 shows chl-a ranges for the period 2005-2023. Similar to nitrogen, chl-a varies naturally seasonally and annually in tropical ocean waters, and it is not known which portion of chl-a is attributable to natural variation or to the discharge from Outfall 001. It is noted that chla-a is in compliance with the ASWQS for the majority of this 19 year period.

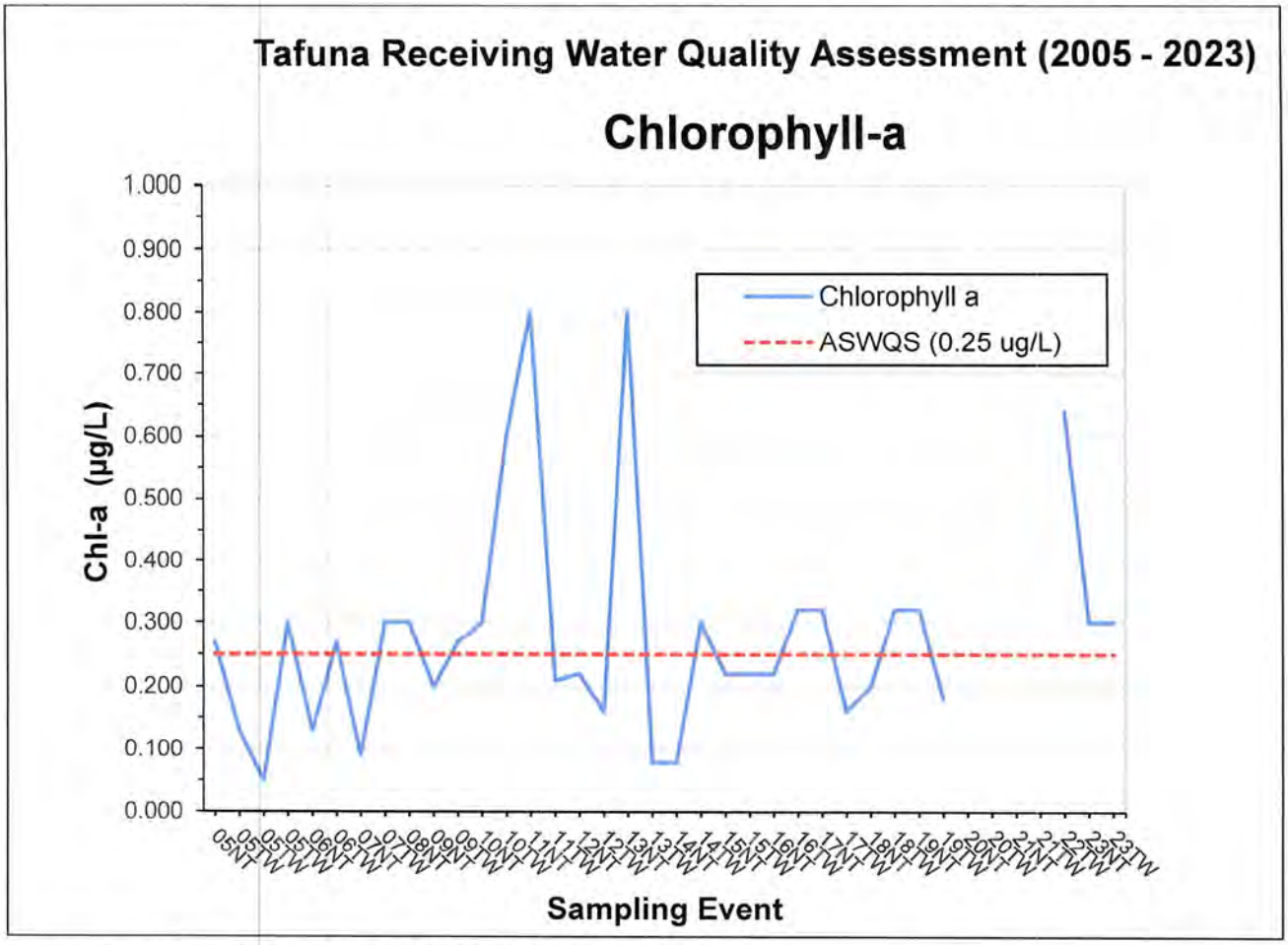


Figure 6. Chlorophyll-a for AS0020010 Receiving Water

Turbidity

This measure of water column "cloudiness" shows consistent ASWQS compliance over the past 19 years (Figure 7). It is notable that the ASWQS of 0.25 NTU for turbidity is exceptionally strict, and is approximately the clarity of bottled drinking water. The turbidity data shows that the receiving waters for Outfall 001 are exceptionally clear and further supports that there is no evidence of excessive algae growth due to nitrogen inputs or other organic waste constituents.

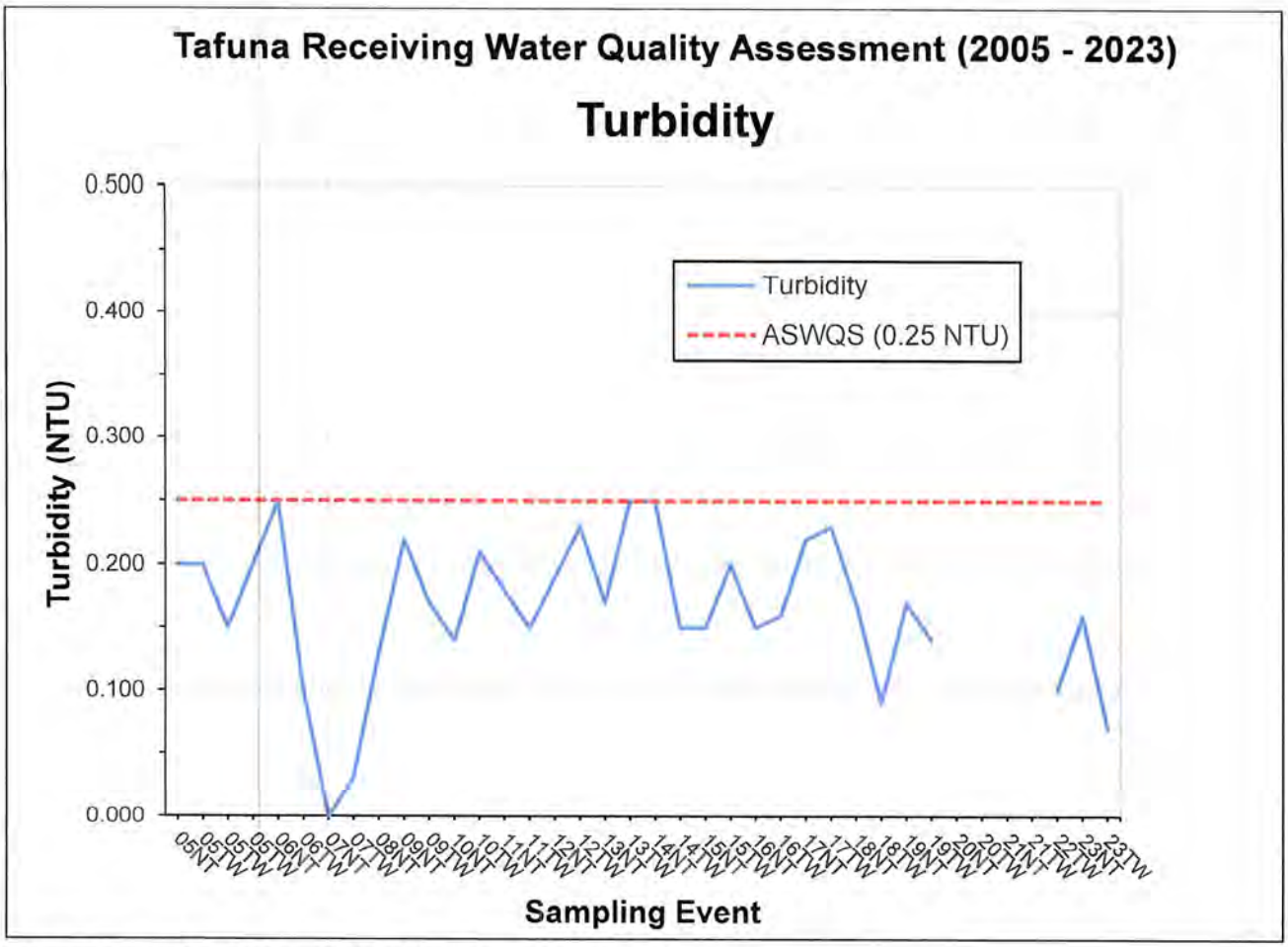


Figure 7. Turbidity for AS0020010 Receiving Water

Dissolved Oxygen

Dissolved Oxygen (DO) is a principal measure of water column environmental health. DO levels must remain high for water to support healthy and diverse ecosystems. Excessive organic wastes in the water lowers DO and reduces overall ecosystem health. The amount of DO that water can hold depends on temperature and salinity. For the range of ocean water temperature and salinity in the region of Outfall 001 the maximum DO concentration expected is approximately 6.0 mg/L. The ASWQS specify that DO levels cannot drop below 80% of maximum saturation, and for the receiving water in the region of Outfall 001 the 80% value is approximately 4.9 mg/L. Figure 8 shows that DO levels remain essentially at 100% over the past 19 years and that there has never been an exceedance of the ASWQS for DO.

This data indicates that the organic wastes from the Tafuna Wastewater Treatment Plant discharge are rapidly assimilated and dispersed into the natural environment and that there is no acute or chronic impact on DO levels in the water column. The science and engineering of wastewater management is founded on treatment processes that treat organic wastes to a certain level, then the effluent is released to the environment where natural processes complete waste degradation to harmless levels. Figures

6, 7 & 8 support that wastewater management through primary treatment at the Tafuna Wastewater Treatment Plant is consistent with standard wastewater management practices.

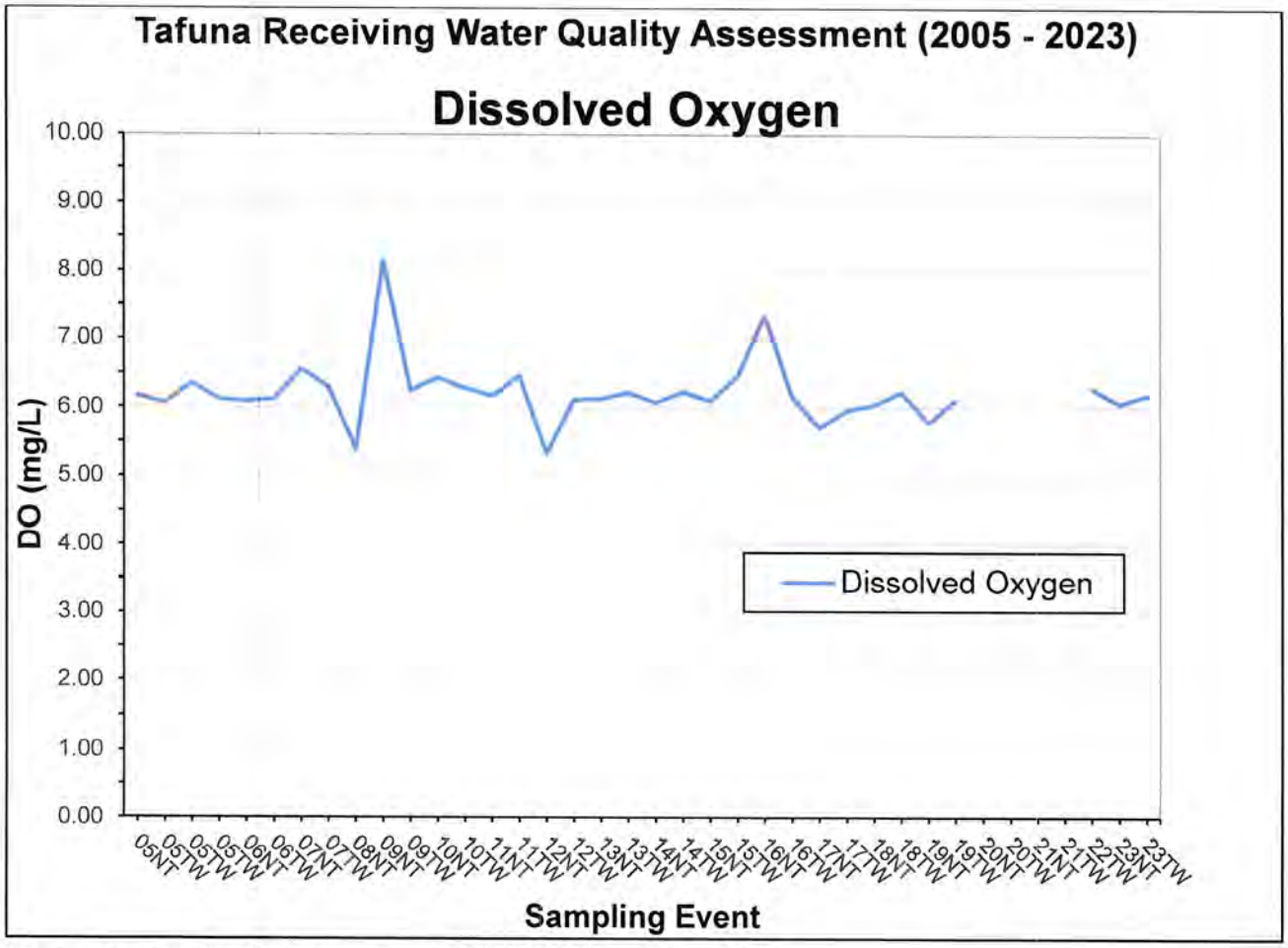


Figure 8. Dissolved Oxygen for AS0020010 Receiving Water

Temperature, pH and Salinity

These measures of water column environmental health indicate normal unimpacted conditions for receiving water for Outfall 001 (Figures 9, 10 & 11). The pH depression around the years 2008-2009 is almost certainly attributable to investigator or instrument error, because there is no other rational explanation for these values. The buffering capacity of ocean water is very great. To change pH from alkaline to acidic conditions over nearly 2 pH units in this volume of ocean water, and to maintain acidic conditions for a year or more, would require the constant addition of an extraordinary volume of a highly acidic solution or compound. It is reasonable to assume that this portion of the data set is anomalous and that overall pH is fully in compliance with the ASWQS over this period of 19 years.

Temperature and salinity also indicate expected normal conditions in Tutuila ocean waters and are consistent with a wide range of data collected over many years from many environmental investigations in American Samoa.

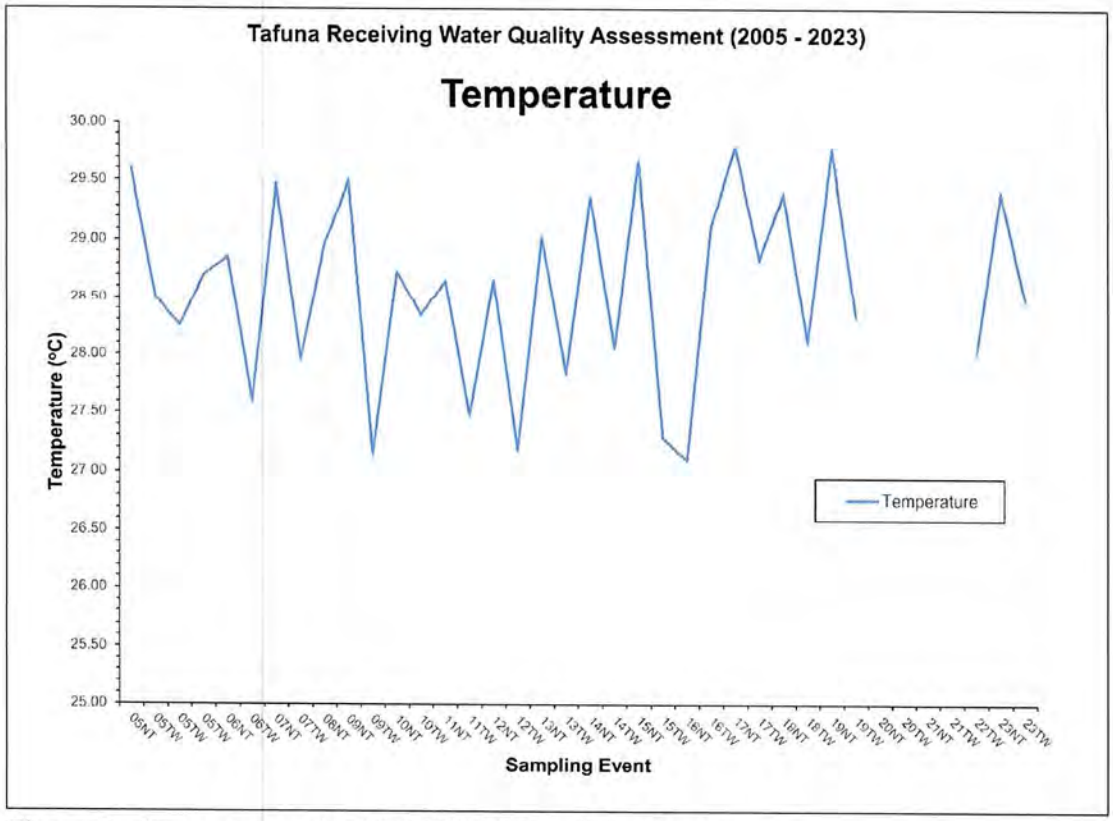


Figure 9. Temperature for AS0020010 Receiving Water

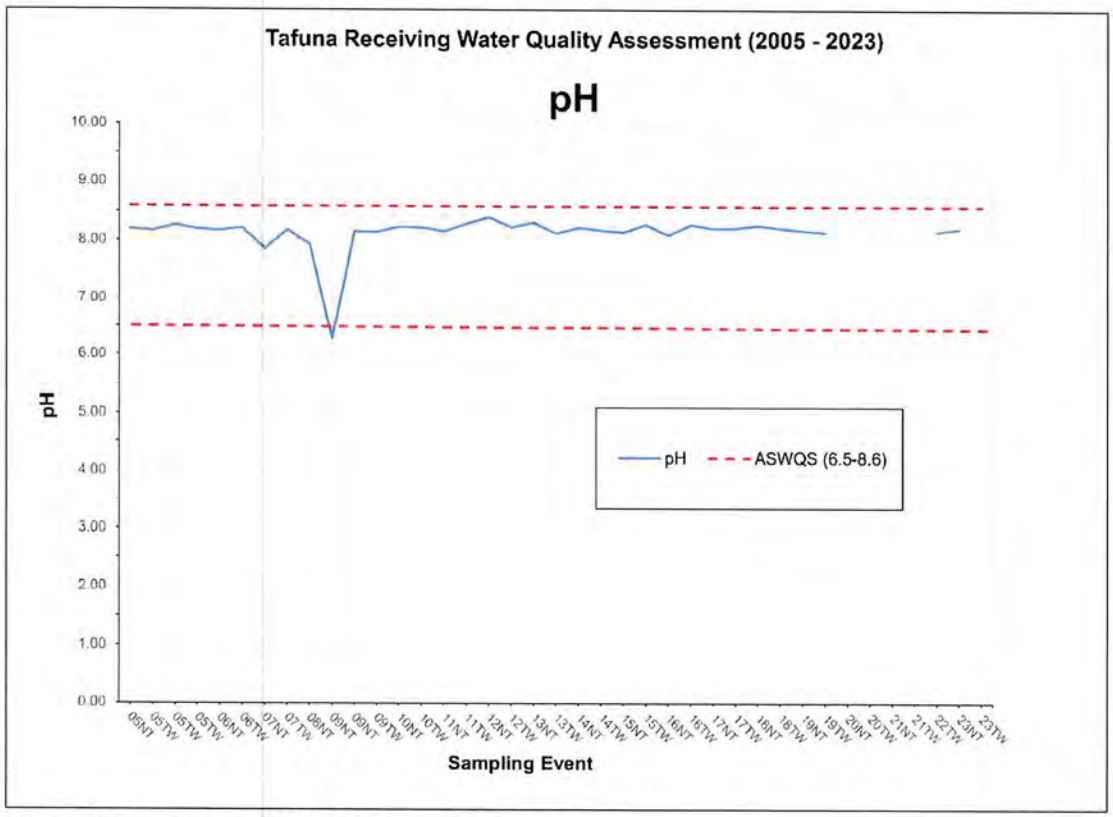


Figure 10. pH for AS0020010 Receiving Water

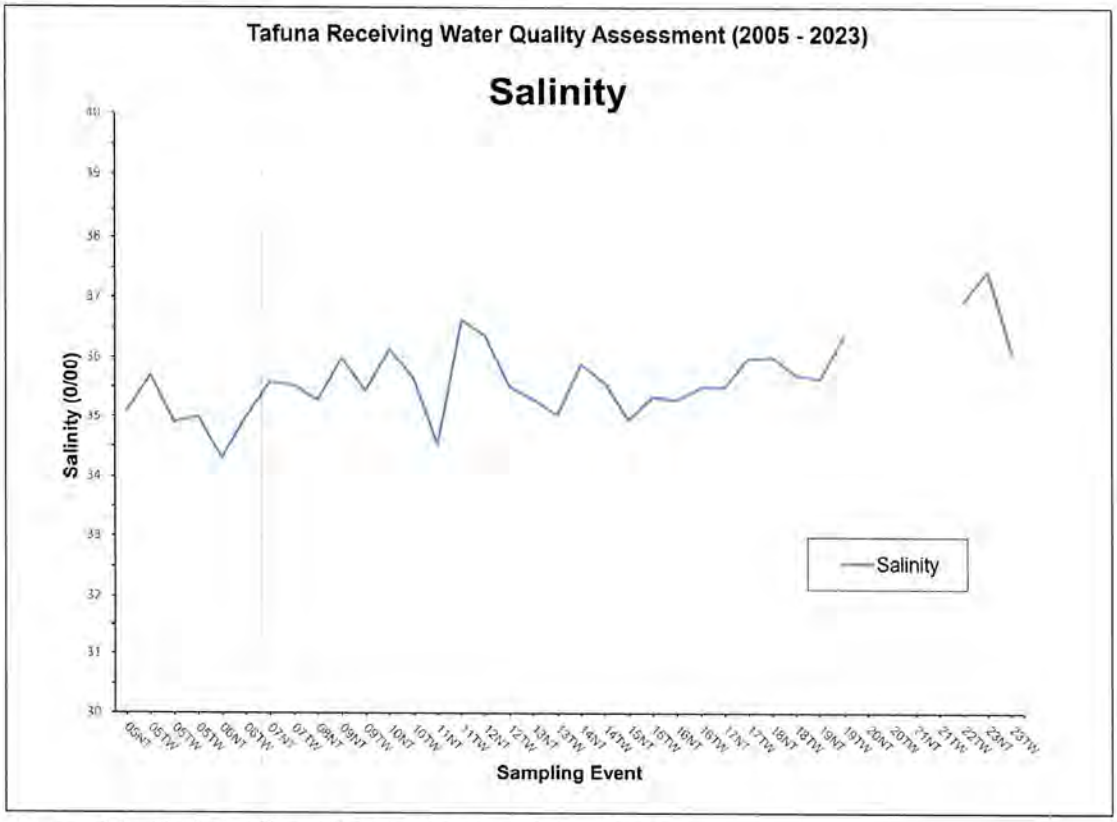


Figure 11. Salinity for AS0020010 Receiving Water

Enterococci Bacteria

Figure 12 shows compliance with the ASWQS for bacterial contamination for half or more of the time from 2005 until 2015, and all of the time (with noted data gaps) since the installation of a disinfection process in 2016.

The presence of bacterial contamination in the region of Outfall 001 cannot be fully equated in importance to similar contamination which might occur in other areas of Tutuila waters designated as Open Coastal. The current ASWQS classification of Open Coastal includes waters from the shoreline to the 100 fathom (600 feet) depth contour. Open Coastal waters of American Samoa are exceptionally heterogeneous and diverse, and include a wide range of conditions and environments from reef flats, to lagoons, to bays to fore-reefs, to off-shore exposed waters. Since bacterial contamination is principally a human health risk concern, waters within the Open Coastal designation should be considered in terms of use by people, with regard to bacterial contamination. Whereas reef flats, lagoons, bays and fore-reefs are extensively used by residents for recreation and artisanal fishing and gathering, the waters in the region of Outfall 001 from the Tafuna WTP are not used for these purposes. The powerful currents and high-energy wave action of this area is known by residents to create extremely dangerous conditions and these waters are avoided. The area of Outfall 001 is essentially an open ocean environment of strong currents and rough conditions and is not used for contact or immersion activities. Bacterial contamination in this area is therefore not as important from a human health risk perspective compared to Open Coastal waters more favorable to human use.

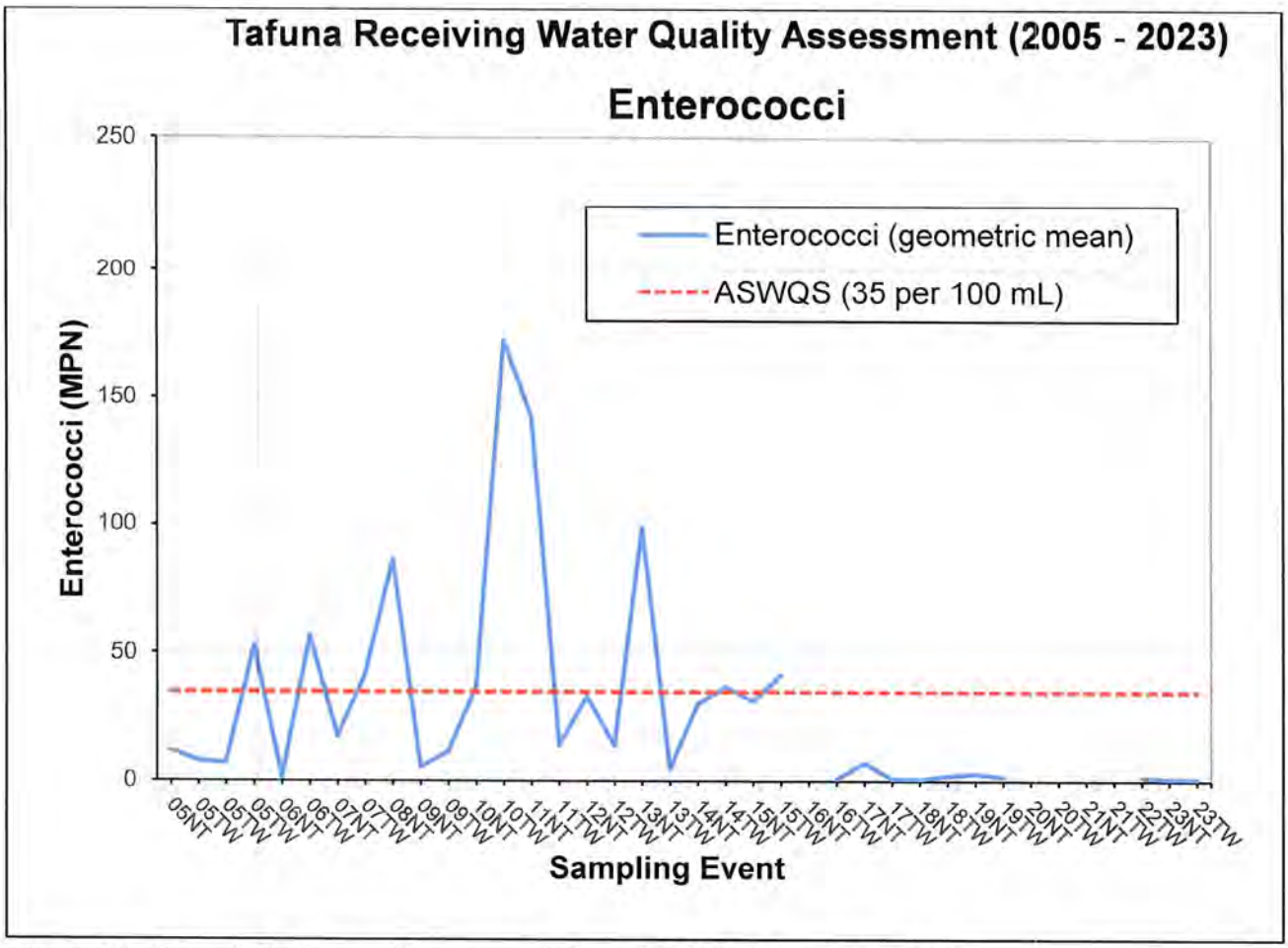


Figure 12. Bacteria Indicator (Enterococci) for AS0020010 Receiving Water

Summary

Data presented here indicates overall excellent water column conditions for the receiving water for Outfall 001 and substantial compliance with the ASWQS over this period of 19 years. Except for total nitrogen, violations of the ASWQS are relatively few and compliance is dominant throughout the data period. It is demonstrated that primary treatment achieves ASWQS compliance for the majority of the time, and that ocean water overall is substantially and adequately protected. A reasonable conclusion from this assessment is that violations of the ASWQS are due to operation and maintenance (O&M) issues and not due to ineffectiveness of primary treatment as a process. O & M challenges for wastewater treatment are pervasive throughout the Pacific Islands Countries and Territories.

The exceptionally corrosive near-shore tropical marine environment with consistently high chlorides, high humidity and warm temperatures greatly reduces equipment operational life compared to temperate continental environments. Electrical motor mechanisms, electronics, and instrumentation and control mechanisms, are especially vulnerable to these corrosive conditions. Accelerated deterioration, limited local availability of parts, and extended shipping schedules for off-island procurement, exacerbate delays for repair and maintenance work.

Workforce technical capacity is a principal challenge throughout the Pacific Islands Countries and Territories. Difficulties in maintaining a skilled workforce impacts O&M significantly. Remote locations and high travel costs impact the level of off-island training available for operators and maintenance staff. Small economies and limited educational facilities and programs impact the level of local training available. Small economies do not support wages that are consistent with comparable skilled worker positions in large economies of continental scale, and capable local staff often seek opportunities off-island. Expatriate contractor employees are used to some extent to fill skilled workforce deficiencies, but this has limitations. Contractor tenures typically extend for only several years, and recruitment takes administrative effort and time. There is a persistent challenge in attracting and keeping skilled expat workers.

With these O&M challenges, Pacific Islands utility providers typically prefer less complex systems when such systems prove sufficiently effective. Selection of Appropriate Technology (AT) is historically the well-established *modus operandi* for Pacific Islands utility providers, and is the logical outcome of practical necessity.

Overall, AS-EPA has determined through this assessment that primary treatment can be effective to meet the ASWQS for ocean receiving water for the Tafuna Wastewater Treatment Plant, and that primary treatment is an appropriate level of technology for this remote part of the Pacific. Financial and administrative resources are best allocated to improving O&M and making repairs to the existing Tafuna facility. Improved O&M appears to be a prudent use of resources to substantially reduce or eliminate occasional violations of the ASWQS in the area of Outfall 001 over the long term.

If you have any questions regarding this matter, please contact me at (684) 633-2304.

Sincerely,

Fa'amao O. Asalele Jr., Director

APPENDIX C
NPDES PERMIT DOCUMENTATION FOR UTULEI

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APPENDIX C-1
UTULEI NPDES PERMIT (2019)

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

NPDES PERMIT NO. AS0020001

In compliance with the provisions of the Clean Water Act ("CWA") (Public Law 92-500, as amended, 33 U.S.C. 1251 et seq.), the following discharger is authorized to discharge from the identified facility at the outfall location(s) specified below, in accordance with the effluent limits, monitoring requirements, and other conditions set forth in this permit. This permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application process.

Discharger Name	American Samoa Power Authority
Discharger Address	P.O. Box PPB Pago Pago, American Samoa 96799
Facility Name	Utulei Sewage Treatment Plant ("STP") and Collection System.
Facility Location Address	Tulutulu Point, Utulei, Pago Pago, Tutuila 96799 American Samoa
Facility Rating	Major

Outfall Number	General Type of Waste Discharged	Outfall Latitude	Outfall Longitude	Receiving Water
001	Treated Domestic Wastewater	14˚ 16' 59.6" S	170˚ 40' 28.1" W	Outer Pago Pago Harbor

This permit was issued on:	November 18, 2019
This permit shall become effective on:	January 1st, 2020
Permit reapplication due no later than:	July 4th, 2024
This permit shall expire at midnight on:	December 31st, 2024
In accordance with 40 CFR 122.21(d), the discharger shall submit a new application for a permit at least 180 days before the expiration date of this permit, unless permission for a date no later than the permit expiration date has been granted by the Director.	

Signed this **18th** day of **November**, 2019, for the Regional Administrator.

/s/
Tomás Torres, Director
Water Division

This permit was issued on November 18, 2019. On January 16, 2020, EPA provided notice that it withdrew four provisions and that the remainder of the permit would become effective on February 15, 2020, thirty days after EPA's notice. Consistent with 40 CFR § 124.6 and 40 CFR § 124.19(j), EPA then modified the permit (see permit Attachments D and E and Parts II.C for Instream Waste Concentration changes, and Part I.B., Table 1, Nitrogen and Phosphorous entries and Footnote #7). These modifications will become effective on August 1, 2021, and will expire on December 31, 2024, the same date as the other provisions of this permit.

Signed this 7th day of June, 2021, for the Regional Administrator.

TOMAS TORRES

Digitally signed by TOMAS TORRES
Date: 2021.06.07 17:22:24 -07'00'

Tomás Torres, Director
Water Division

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Part I. EFFLUENT LIMITS AND MONITORING REQUIREMENTS

A. Effluent Limits and Monitoring Requirements

1. Effluent Limits – Outfall Number 001
   The discharger is authorized to discharge treated domestic wastewater in compliance with the effluent limits and monitoring requirements specified in Table 1. The discharger shall monitor both the effluent and influent to evaluate compliance, specifically for parameters with a "% removal" requirement (BOD_5 and TSS).

2. The discharge of pollutants at any point other than the outfall number specifically authorized in this permit is prohibited.

3. With the exception of discharges to an officially granted Zone of Mixing of pollutants for which that discharge has been specifically authorized, the discharge shall be treated and controlled to ensure all of the following narrative standards are met in the receiving waters, in accordance with Section § 24.0206 of the latest approved American Samoa Water Quality Standards (ASWQS, available as American Samoa Administrative Rule 001-2013):

   a. They [the receiving waters] shall be substantially free from materials attributable to sewage, industrial wastes, or other activities of man that will produce objectionable color, odor, or taste, either of itself or in combinations, or in the biota, or that will produce visible turbidity or settle to form objectionable deposits;

   b. They shall be substantially free from visible floating materials, grease, oil, scum, foam, and other floating material attributable to sewage, industrial wastes, or other activities of man;

   c. They shall be substantially free from substances and conditions or combinations thereof attributable to sewage, industrial wastes, or other activities of man which may be toxic to humans, other animals, plants, and aquatic life or produce undesirable aquatic life;

   d. The temperature shall not deviate more than 1.5 degrees Fahrenheit from conditions which would occur naturally and shall not fluctuate more than 1 degree Fahrenheit on an hourly basis or exceed 85 degrees Fahrenheit due to the influence of other than natural causes;

   e. Toxic Substances:

      (1) All Embayments [which includes Pago Pago Harbor], Open Coastal Waters and Ocean Waters Except as may be allowed by the Environmental Quality Commission within a Zone of Mixing (ASWQS § 24.0207), the concentration of toxic pollutants shall not exceed the more stringent of the aquatic life criteria for marine waters or the human health concentration criteria for consumption of organisms found in EPA's National Recommended Water Quality Criteria 2002,

EPA-822-R-02-047 or the most recent version of the National Recommended Water Quality Criteria.

f. The following additional toxic standards shall apply:

(1) Total Mercury: In addition to the methyl mercury criteria for human health from the EPA 2002 publication, the water column concentration of mercury shall not exceed 0.05 µg/l.

(2) Total Residual Chlorine: Total residual chlorine in any ambient water shall not exceed 11 micrograms per liter for fresh water and 7.5 micrograms per liter for marine waters.

B. Effluent Limits and Monitoring Requirements – Outfall Number 001

Table 1. Effluent Limits and Monitoring Requirements

Parameter	Maximum Allowable Discharge Limits Concentration and Loading				Monitoring Requirements[2]	
	Average Monthly	Average Weekly	Maximum Daily	Units	Frequency	Sample Type
Flow rate	[1]	[1]	[1]	MGD	Continuous	Continuous
Temperature	[1]	—	[1]	˚C	Weekly[3]	Grab
Oil and grease, total recoverable	10	—	15	mg/L	Monthly	Grab
Settleable Solids	1.0		2.0	ml/L	Monthly	Grab
pH	Within the range of 6.5 to 8.6 at all times, and within 0.2 pH units of the value which would occur naturally.			S.U.	Weekly[3]	Grab
Biochemical oxygen demand (5-day)	78.3	117	157	mg/L	Weekly	24-hour composite
	1,960	2,929	3,930	lbs/day		
	The average monthly percent removal shall not be less than 30 percent [4]			%		
Total suspended solids	75	113	150	mg/L	Weekly	24-hour composite
	1,878	2,829	3,755	lbs/day		
	The average monthly percent removal shall not be less than 30 percent. [4]			%		
Ammonia, total (as N)	[1]	—	[1]	mg/L	Monthly	Grab
Ammonia Impact Ratio	1.0[5]		1.0[5]	Ratio	Monthly	Calculated
Enterococci	3,185	—	11,830	CFU /100 mL	Monthly	Grab
Nitrogen, total (as N)	24,200	—	60,500	µg/L	Monthly	24-hour composite

Parameter	Maximum Allowable Discharge Limits Concentration and Loading				Monitoring Requirements(2)	
	Average Monthly	Average Weekly	Maximum Daily	Units	Frequency	Sample Type
Phosphorous, Total	3,630	—	10,890	µg/L	Monthly	24-hour composite
Chronic Toxicity (WET) *S. purpuratus*, Method 1008.0 WB33L	--	--	Pass (0) (6)	Pass (0) or Fail (1), TST	Annually	24-hour composite
Chronic Toxicity (WET) *D. excentricus*, Method 1008.0 WB33N	--	--	Pass (0) (6)	Pass (0) or Fail (1), TST	Annually	24-hour composite
Priority Pollutant Scan(7)	—	—	(1)	µg/L	Once during 4th year of permit term	Grab

(1) No effluent limits are set at this time, but monitoring and reporting is required.

(2) At minimum, at least one sample per every year must be taken concurrent with the annual Whole Effluent Toxicity monitoring.

(3) During sampling events where ammonia data are collected, Temperature and pH samples readings to be taken at the same time as the ammonia sample is collected, and then used with the table in Attachment E to determine the Ammonia Impact Ratio as described in (5) below. Note that Saltwater ammonia standards apply because the receiving water (Pago Pago Harbor) is salt water.

(4) Both the influent and the effluent shall be monitored and reported. The average monthly effluent concentration of Biochemical Oxygen Demand (5-day) and Total Suspended Solids shall not exceed 70 percent of the average monthly influent concentration collected at the same time.

(5) The Ammonia Impact Ratio (AIR) is calculated as the ratio of the ammonia value in the effluent and the applicable ammonia standard from Appendix A in the American Samoa Water Quality Standards (AS-WQS). Attachment E to this permit presents the applicable AS-WQS standards table, adjusted for the approved dilution factor for this permit. See Attachment D for a sample log to help calculate and record the AIR values. The AIR is the ammonia effluent limit and must be reported in the Discharge Monitoring Reports (DMRs) in addition to the ammonia, pH, and temperature values.

(6) The permittee shall report Pass "0" or Fail "1" for the coded parameter. For each toxicity test conducted during the reporting period for the month, Pass "0" constitutes rejection (i.e., statistical fail) and Fail "1" constitutes non-rejection (i.e., statistical pass) of the Test of Significant Toxicity (TST) null hypothesis (H_o) at the requiredIWC: **IWC mean response (0.82 % effluent) ≤ 0.75 × Control mean response**. This is determined by following the instructions in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010), Appendix A. For each toxicity test reported as Pass "0" or Fail "1", the permittee shall report the associated value for "Percent (%) Effect" for the coded parameter, calculated as: % Effect = [(Control mean response − IWC mean response) ÷ Control mean response] × 100.

(7) See attachment F for list of priority pollutants. For a listing of all priority toxic pollutants see 40 CFR 131.36. The required priority pollutant scan should be conducted concurrently with the scheduled Whole Effluent Toxicity test for that year.

C. Sampling

1. Samples shall be representative of the volume and quality of effluent discharged over the sampling and reporting period. All samples are to be taken during normal operating hours. The Permittee shall identify the effluent sampling location used for each discharge.

2. Samples shall be taken at the following locations:

   a. Influent samples shall be taken after the last addition to the collection system and prior to in-plant return flow and the first treatment process, where representative samples can be obtained.

   b. Effluent samples shall be taken after in-plant return flows and the last treatment process and prior to mixing with the receiving water, where representative samples can be obtained.

3. For intermittent discharges, the Permittee shall monitor on the first day of discharge. The Permittee is not required to monitor in excess of the minimum frequency required in Table 1. If there is no discharge, the Permittee is not required to monitor influent or effluent.

D. General Monitoring and Reporting

1. All monitoring shall be conducted in accordance with 40 CFR Part 136 test methods, unless otherwise specified in this permit. For influent and effluent analyses required in this permit, the Permittee shall utilize 40 CFR Part 136 test methods with Method Detection Limits and Measurement Limits that are lower than the effluent limits in this permit. For parameters without an effluent limit, the Permittee must use an analytical method at or below the level of the applicable water quality criterion for the measured pollutant or the amount of the pollutant is high enough that the method detects and quantifies the level of pollutant in the discharge. If all MDLs or MLs are higher than these effluent limits or criteria concentrations, then the Permittee shall utilize the test method with the lowest MDL or ML. In this context, the Permittee shall ensure that the laboratory utilizes a standard calibration where the lowest standard point is equal to or less than the ML. Influent and effluent analyses for metals shall measure “total recoverable metal”, except as provided under 40 CFR §122.45(c).

2. As an attachment to the first Discharge Monitoring Report (DMR), the Permittee shall submit, for all parameters with monitoring requirements specified in this permit:

   a. The test method number or title and published MDL or ML;

   b. The preparation procedure used by the laboratory;

c. The laboratory's MDL for the test method computed in accordance with Appendix B of 40 CFR Part 136;

d. The standard deviation (S) from the laboratory's MDL study;

e. The number of replicate analyses (n) used to compute the laboratory's MDL; and

f. The laboratory's lowest calibration standard.

As part of each DMR submittal, the Permittee shall notify EPA of any changes to the laboratory's test methods, MDLs, MLs, or calibration standards. If there are any changes to the laboratory's test methods, MDLs, MLs, or calibration standards, these changes shall be summarized in an attachment to the subsequent DMR submittal.

3. The Permittee shall develop a Quality Assurance ("QA") Manual for the field collection and laboratory analysis of samples. The purpose of the QA Manual is to assist in planning for the collection and analysis of samples and explaining data anomalies if they occur. The QA Manual shall be developed (or updated) within 90 days of permit issuance. At a minimum, the QA Manual shall include the following:

   a. Identification of project management and a description of the roles and responsibilities of the participants; purpose of sample collection; matrix to be sampled; the analytes or compounds being measured; applicable technical, regulatory, or program-specific action criteria; personnel qualification requirements for collecting samples;

   b. Description of sample collection procedures; equipment used; the type and number of samples to be collected including QA/Quality Control ("QC") samples; preservatives and holding times for the samples (see 40 CFR § 136.3); and chain of custody procedures;

   c. Identification of the laboratory used to analyze the samples; provisions for any proficiency demonstration that will be required by the laboratory before or after contract award such as passing a performance evaluation sample; analytical method to be used; MDL and ML to be reported; required QC results to be reported (e.g., matrix spike recoveries, duplicate relative percent differences, blank contamination, laboratory control sample recoveries, surrogate spike recoveries, etc.) and acceptance criteria; and corrective actions to be taken in response to problems identified during QC checks; and

   d. Discussion of how the Permittee will perform data review, report results, and resolve data quality issues and identify limits on the use of data.

4. Throughout all field collection and laboratory analyses of samples, the Permittee shall use the QA/QC procedures documented in their QA Manual. If samples are tested by a contract laboratory, the Permittee shall ensure that the laboratory has a QA Manual on file. A copy of the Permittee's QA Manual shall be retained on the Permittee's premises and available for review by regulatory authorities upon request. The Permittee shall review its QA Manual annually and revise it, as appropriate.

5. Samples collected during each month of the reporting period must be reported on Discharge Monitoring Report forms, as follows:

   a. For a *maximum daily* permit limit or monitoring requirement when one or more samples are collected during the month, report either:

      The *maximum value*, if the maximum value of all analytical results is greater than or equal to the ML; or
      NODI (Q), if the maximum value of all analytical results is greater than or equal to the laboratory's MDL, but less than the ML; or
      NODI (B), if the maximum value of all analytical results is less than the laboratory's MDL.

   b. For an *average weekly* or *average monthly* permit limit or monitoring requirement when only one sample is collected during the week or month, report either:

      The *maximum value*, if the maximum value of all analytical results is greater than or equal to the ML; or
      NODI (Q), if the maximum value of all analytical results is greater than or equal to the laboratory's MDL, but less than the ML; or
      NODI (B), if the maximum value of all analytical results is less than the laboratory's MDL.

   c. For an *average weekly* or *average monthly* permit limit or monitoring requirement when more than one sample is collected during the week or month, report:

      The *average value* of all analytical results where 0 (zero) is substituted for *NODI (B)* and the laboratory's MDL is substituted for *NODI (Q)*.

6. In addition to information requirements specified under 40 CFR § 122.41(j)(3), records of monitoring information shall include: the laboratory which performed the analyses and any comment, case narrative, or summary of results produced by the laboratory. The records should identify and discuss QA/QC analyses performed concurrently during sample analyses and whether project and 40 CFR Part 136 requirements were met. The summary of results must include information on initial and continuing calibration, surrogate analyses, blanks, duplicates, laboratory control samples, matrix spike and matrix spike duplicate results, and sample condition upon receipt, holding time, and preservation.

7. The Permittee shall electronically submit Discharge Monitoring Reports and Biosolids/Sewage Sludge Reports using NetDMR (http://www.epa.gov/netdmr) and NeT (http://www.epa.gov/compliance/national-pollutant-discharge-elimination-system-npdes-electronic-reporting-tool-net-fact), respectively.

8. DMRs shall be submitted by the 28th day of the month following the previous reporting period. For example, under quarterly submission, the three DMR forms for January, February, and March are due on April 28th. Annual and quarterly monitoring

must be conducted starting in the first complete quarter or year following permit issuance. Reporting for annual monitoring is due on January 28th of the following year. A DMR must be submitted for the reporting period even if there was not any discharge. If there is no discharge from the facility during the reporting period, the Permittee shall submit a DMR indicating no discharge as required.

9. The Permittee shall also submit an electronic or paper Discharge Monitoring Report to American Samoa EPA. Paper DMR forms shall be mailed to:

   American Samoa EPA
   P.O. Box PPA
   Pago Pago, American Samoa 96799
   Attn: Fa'amao O. Asalele Jr.

E. Receiving Water Monitoring

1. The Permittee shall continue to conduct the established receiving water monitoring program (i.e., water column monitoring) in Pago Pago Harbor, as described below.

2. During the first sampling survey, the Permittee shall verify the locations (latitude and longitude) and depths of all monitoring stations currently in use and compare those locations with the locations previously identified to EPA (see table on this page in E.4, below). The Permittee shall submit this information with the first Semi-Annual water column monitoring report to USEPA Region 9 and American Samoa EPA (AS-EPA) for approval.

3. To verify compliance at the Zone of Initial Dilution (ZID), where §301(h) of the Clean Water Act specifies that compliance must be determined, the discharger shall begin monitoring at not less than two (2) ZID stations, located 150 feet from the nearest point on the outfall diffuser at suitable locations which lie up-current and down-current from the diffuser during typical conditions in the harbor.

4. The Permittee shall continue data collection at the existing receiving water monitoring stations, identified as:

Table 2: existing Receiving Water Monitoring stations

Stations		Location
U	Diffuser Midpoint station	Latitude: 14.2824° S Longitude: 170.6755° W
A1	Zone of Mixing (ZOM) stations	Latitude: 14.2833° S Longitude: 170.6745° W
B1		Latitude: 14.2848° S Longitude: 170.6736° W
C	Farfield Stations	Latitude: 14.2794° S Longitude: 170.6803° W

16		Latitude: 14.2814° S Longitude: 170.6726° W
18		Latitude: 14.2853° S Longitude: 170.6735° W
FF	Offshore Farfield Station	Latitude: 14.3144° S Longitude: 170.6661° W
5	Reference station	Latitude: 14.2950° S Longitude: 170.6690° W

5. This permit may be reopened and modified to include an alternative receiving water monitoring program if the Permittee submits, and EPA approves, an alternative monitoring program.

6. The discharger shall conduct semi-annual receiving water quality monitoring for the following parameters at all monitoring stations in the program:

Table 3: Receiving Water Monitoring parameters and details

Parameter	Units	Stations Monitored	Monitoring Frequency	Sampling Depths (m)	Sample Type / Method
Temperature	ºC	All	Semi-Annually (March, August)	1m, mid-depth, and 1m above bottom	Field Sensor (e.g. CDT)
Salinity	PSU	"	"	"	Field Sensor
Dissolved Oxygen	mg/L	"	"	"	Field Sensor
pH	Standard Units	"	"	"	Field Sensor (pH meter)
Turbidity	NTU	"	"	"	Bench Meter or Field Sensor
Light Penetration	ft	"	"	"	Secchi disk
Total Phosphorous	(µg/L as P)	"	"	"	Lab Sample (EPA 353.3)
Total Nitrogen	(µg/L as N)	"	"	"	Lab Sample (EPA 353.2 + EPA 351.2)
Chlorophyll a	(µg/L)	"	"	"	Lab Sample
Ammonia	mg/L as NH_3	"	"	"	Lab Sample (EPA 350.1)
Enterococci	CFU / 100 mL	"	"	"	Lab Sample (AS-EPA)

Note: pH and Temperature data collection must occur concurrently with sampling for ammonia, as the AS-WQS ammonia standards depend on that information to determine compliance

7. Receiving water monitoring shall be conducted for all monitoring periods during which the plant is operational and during which there is any discharge to Pago Pago Harbor and the waters surrounding Outfall Number 001. Monitoring is required unless the Plant is not discharging for the entire duration of the day/month/etc. period which the monitoring would represent. Samples shall be collected at sites up-current and down-current sufficiently far from the discharge to establish ambient values ("Reference" and "Far-field" stations as described under the receiving water

monitoring plan of the previous permit and applicable provisions of EPA administrative order CWA-309(1)-11-017). Samples shall also be taken at the perimeter of the regulatory Zone of Initial Dilution (ZID) and at the site of the outfall itself. These sites shall be sampled as close together in time as possible. Sampling for parameters that are influenced by temperature or pH (i.e., ammonia) shall be conducted once during the time period between noon and sunset to ensure critical (most stringent) conditions are reflected, which for ammonia would mean high ambient water temperatures and (if pH is expected to vary significantly) high pH. If sampling between noon and sunset is not feasible, discharger shall specify the time of collection for each sample and provide an explanation for why the data is representative of critical (worst-case) conditions for ammonia when submitting semi-annual receiving water data. All individual measurement values shall be reported as an attachment to the DMR form via the e-reporting system NetDMR. Additional method guidance for water monitoring (e.g., volunteer, EMAP, etc.) may be found at: https://www.epa.gov/cwa-methods.

8. Discharger shall prepare a revised sampling plan, including at least 2 permanent ZID stations in addition to the existing stations listed above. This revised sampling plan shall include a description of the sampling locations (e.g., distance from the outfall, seafloor depth, local currents etc.) and may be coordinated and jointly prepared with the monitoring plans of other facilities discharging into Pago Pago. This revised sampling plan shall be submitted to EPA for review and approval within 180 days of the permit effective date.

Part II. SPECIAL CONDITIONS

A. Permit Reopener(s)

1. In accordance with 40 CFR Parts 122 and 124, this permit may be modified by EPA to include effluent limits, monitoring, or other conditions to implement new regulations, including EPA-approved water quality standards; or to address new information indicating the presence of effluent toxicity or the reasonable potential for the discharge to cause or contribute to exceedances of water quality standards.

2. This permit may be modified by EPA specifically to address any deficiencies in operations and maintenance ("O&M") of the treatment system, including but not limited to operation and maintenance of the newly installed disinfection system and existing clarigesters, or the management of flow volumes within the collection and treatment system, all of which have the potential to cause or contribute to a violation of permit limits or applicable water quality standards.

3. In accordance with 40 CFR § 122.44(c), EPA may promptly modify or revoke and reissue any permit issued to a treatment works treating domestic sewage (including "sludge only facilities") to incorporate any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the CWA, if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in the permit.

B. Twenty-four Hour Reporting of Noncompliance

1. The Permittee shall report any noncompliance which may endanger human health or the environment. The Permittee is required to provide an oral report by directly speaking with an EPA and American Samoa EPA (AS-EPA) staff person within 24 hours from the time the Permittee becomes aware of the noncompliance. If the Permittee is unsuccessful in reaching a staff person, the Permittee shall provide notification by 9 a.m. on the first business day following the noncompliance. The Permittee shall notify EPA and AS-EPA at the following telephone numbers:

   U.S. Environmental Protection Agency
   Wastewater Enforcement Section (ENF-3-1)
   (415) 947-4179

   American Samoa EPA
   (684) 633-2304
   Attn: Fa'amao O. Asalele Jr., < faamao.asalele@epa.as.gov >
   OR, if unavailable,
   Attn: Jewel Potoae < jewel.tuiasosopo@epa.as.gov >

   The Permittee shall follow up with a written submission within five days of the date the Permittee becomes aware of the noncompliance. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2. The following shall be included as information which must be reported within 24 hours under this paragraph.

   a. Any unanticipated bypass which exceeds any effluent limit in the permit (see 40 CFR 122.44(g)).

   b. Any upset which exceeds any effluent limit in the permit.

   c. Violation of a maximum daily discharge limit for any of the pollutants listed by the director in the permit to be reported within 24 hours (see 40 CFR 122.44(g)).

3. EPA may waive the written report in writing on a case-by-case basis for reports required under paragraph B.2, if the oral report has been received within 24 hours.

C. Chronic Whole Effluent Toxicity (WET) Requirements

1. The chronic toxicity Instream Waste Concentration (IWC) required for the authorized POTW facility discharge point is expressed as 0.82 **percent (%) effluent** (i.e., 1/(D+1) × 100, where D is the dilution ratio of 121:1 and rounding to two decimal

places). The toxicity laboratory making the IWC for chronic toxicity testing shall use 1 part effluent to S−1 parts dilutant for a total of S parts.

Table 4. POTW Facility-specific Chronic Toxicity IWC.

POTW Facility Name and Discharge Point	Dilution Ratio	Required Chronic Toxicity Instream Waste Concentration (IWC) in % Effluent
Utulei Sewage Treatment Plant, Outfall 001	1 to 121	0.82%

2. Monitoring Frequency

Toxicity test samples shall be collected for the authorized discharge point at the designated NPDES sampling station for the effluent (i.e., downstream from the last treatment process and any in-plant return flows where a representative effluent sample can be obtained). Using the test species, WET method, and monitoring frequency specified in Part I, Table 1, the permittee shall conduct toxicity testing on 24-hour composite effluent samples. A split of each effluent sample for toxicity testing shall be analyzed for all other monitored parameters (conventional, non-conventional, and priority toxic pollutants), at the minimum frequency of analysis specified by the effluent monitoring program.

3. Test Species and WET Methods

For the Utulei Sewage Treatment Plant, which discharges to marine waters, test species and short-term WET methods for estimating the chronic toxicity of NPDES effluents are found in the first edition of *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995) and applicable water quality standards; also see 40 CFR §§ 122.41(j)(4) and 122.44(d)(1)(iv) and 40 CFR § 122.21(j)(5)(viii) for POTWs. As required by Part I, Table 1 of this permit, the permittee shall conduct static non-renewal toxicity tests with the purple sea urchin, *Strongylocentrotus purpuratus*, or sand dollar, *Dendraster excentricus* (Fertilization Test Method 1008.0); monitoring is conditional in that only one of these two test species must be monitored during the reporting month.

- If Purple Sea Urchin are not available because it is out of season for their spawning, it would be appropriate to perform toxicity testing using only sand dollars.
- If Sand Dollars are out of season for spawning, it would be appropriate to perform toxicity testing using only Purple Sea Urchins.
- At times when both species are available for testing, it would be most appropriate to test using the species for which the most tests have been conducted to provide the most consistent data set —typically this would be the urchin.

4. Chronic WET Limit or Non-limit WET Trigger

   See Part I, Table 1, for the WET limit for this discharge. If Part I, Table 1, does not have a WET limit, then the non-limit WET trigger for the discharge is—for any one chronic toxicity test—rejection of the TST null hypothesis (H_o) at the required IWC:

   IWC mean response (0.82 % effluent) ≤ 0.75 × Control mean response.

   For reporting, Pass "0" constitutes rejection (i.e., statistical fail) and Fail "1" constitutes non-rejection (i.e., statistical pass) of the TST null hypothesis at the required IWC. Rejection or non-rejection of the TST null hypothesis is determined by following the instructions in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010), Appendix A.

5. Quality Assurance

   a. Quality assurance measures, instructions, and other recommendations and requirements are found in the chronic test methods manual previously referenced. Additional requirements are specified below.

   b. Pacific Island Territory NPDES permittees and WET sample hold time.
   The WET methods manual hold time for NPDES samples used for WET testing begins when the 24-hour composite sampling period is completed, or the last grab sample in a series of grab samples is taken. It ends at the first time of sample use (initiation of WET test). 40 CFR 136.3(e) states that the WET method's 36-hour hold time cannot be exceeded unless a variance of up to 72-hours is authorized by EPA. In a June 29, 2015 inter-office memorandum, EPA Region 9 has authorized a hold time variance of up to 72-hours applicable only to Pacific Island Territory permittees **which ship the NPDES sample to the continental U.S. for WET testing**, with conditions. The 2015 memorandum is a WET requirement of this permit (Attachment G).

   c. The discharge is subject to a determination of rejection or non-rejection of the TST null hypothesis (H_o) from a chronic toxicity test at the required IWC. For statistical flowchart and procedures using the TST statistical approach see Appendix A of *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010). For the TST statistical approach, the associated value for "Percent (%) Effect" at the required IWC is calculated as: % Effect = [(Control mean response − IWC mean response) ÷ Control mean response] × 100.

   d. Effluent dilution water and control water should be prepared and used as specified in the applicable WET methods manual. If the dilution water is different from test organism culture water, then a second control using culture water shall also be used.

e. If organisms are not cultured in-house, then concurrent testing with a reference toxicant shall be conducted. If organisms are cultured in-house, then monthly reference toxicant testing is sufficient. Reference toxicant tests and effluent toxicity tests shall be conducted using the same test conditions (e.g., same test duration, etc.).

f. If either the reference toxicant or effluent toxicity test does not meet the Test Acceptability Criteria in the WET method, then the permittee shall resample and retest within 14 days.

g. When preparing samples for toxicity testing, in addition to the required monitoring for conductivity, etc., it is recommended that total alkalinity and total hardness be measured in the undiluted effluent, receiving water, dilution water, and culture water, following the WET methods manual.

h. Removed Toxicants (chlorine, ammonia). If the discharged effluent is chlorinated, then chlorine shall not be removed from the effluent sample prior to toxicity testing without written approval by the permitting authority. pH drift during the toxicity test may contribute to artifactual toxicity when ammonia (or other pH-dependent toxicants, e.g., metals) are present; ammonia shall not be removed from the effluent sample prior to toxicity testing without written approval by the permitting authority.

6. Initial Investigation TRE Work Plan

Within 90 days of the permit effective date, the Permittee shall prepare and submit to the permitting authority a copy of its Initial Investigation Toxicity Reduction Evaluation (TRE) Work Plan (1-2 pages) for review. This plan shall include steps the Permittee intends to follow if toxicity is measured above the WET limit (or WET trigger) and should include the following, at minimum:

a. A description of the investigation and evaluation techniques that would be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency.

b. A description of methods for maximizing in-house treatment system efficiency, good housekeeping practices, and a list of all chemicals used in operations at the facility.

c. If a Toxicity Identification Evaluation (TIE) is necessary, an indication of who would conduct the TIEs (i.e., an in-house expert or outside contractor).

7. Accelerated Toxicity Testing and TRE/TIE Process

a. If a toxicity test result is reported as Fail “1”, then the permittee shall conduct the following the accelerated toxicity testing and TRE/TIE process.

b. If the WET limit (or WET trigger) is exceeded and the source of toxicity is known (e.g., a temporary plant upset), then the permittee shall conduct one additional toxicity test using the same species and WET method. This toxicity test shall begin within 14 days of receipt of a test result exceeding the WET limit (or WET trigger). If the additional toxicity test does not exceed the WET limit (or WET trigger), then the permittee may return to the regular testing frequency.

c. If the WET limit (or WET trigger) is exceeded and the source of toxicity is not known, then the permittee shall conduct four additional toxicity tests using the same test species and WET method, approximately every two weeks, over a 12-week period. This testing shall begin within 14 days of receipt of a test result exceeding the WET limit (or WET trigger). If none of the additional toxicity tests exceed the WET limit (or WET trigger), then the permittee may return to the regular testing frequency.

d. If one of the additional toxicity tests (in paragraphs 7.a or 7.b) exceeds the WET limit (or WET trigger), then, within 14 days of receipt of this test result, the permittee shall initiate a TRE using—according to the type of treatment facility—EPA manual *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants* (EPA/833/B-99/002, 1999), or EPA manual *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations* (EPA/600/2-88/070, 1989). In conjunction, the permittee shall develop and implement a Detailed TRE Work Plan which shall include the following: further actions undertaken by the permittee to investigate, identify, and correct the causes of toxicity; actions the permittee will take to mitigate the effects of the discharge and prevent the recurrence of toxicity; and a schedule for these actions.

e. The permittee may initiate a TIE as part of a TRE to identify the causes of toxicity using the same species and WET method and, as guidance, EPA manuals: *Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures* (EPA/600/6-91/003, 1991); *Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/080, 1993); *Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/081, 1993); and *Marine Toxicity Identification Evaluation (TIE): Phase I Guidance Document* (EPA/600/R-96-054, 1996).

8. Reporting of Toxicity Monitoring Results on Monthly DMR

a. If no toxicity test monitoring for the month is required and toxicity monitoring is not conducted, then the permittee shall report “NODI(9)” (i.e., Conditional Monitoring – Not Required for This Period) on the DMR form. Nevertheless, all toxicity tests conducted during the month, whether or not monitoring is required, must be reported as described below.

For the WET limit (or WET trigger), the toxicity test result analyzed using the TST statistical approach shall be reported as Pass "0" or Fail "1" on the DMR form.

If more than one toxicity test is conducted during the month, then those Pass "0" or Fail "1" results shall be reported attached to the DMR form, except that a Fail "1" result of any one of all the toxicity tests conducted during the month shall be reported on the DMR form.

For each chronic toxicity test reported as Pass "0" or Fail "1", the permittee shall report the associated value for "Percent (%) Effect" calculated as: % Effect = [(Control mean response − IWC mean response) ÷ Control mean response] × 100.

The permittee shall submit the full laboratory report for all toxicity testing as an attachment to the DMR for the month in which the toxicity tests are conducted. The laboratory report for toxicity shall contain: all toxicity test results (raw data and statistical analyses) for each effluent and related reference toxicant tested; chain-of custody; the dates of sample collection and initiation of each toxicity test; all results for other effluent parameters monitored concurrently with the effluent toxicity tests via split samples; and schedule and progress reports on TRE/TIE investigations.

To assist in reviewing within test variability, control charting by the toxicity laboratory is recommended. Each laboratory report for toxicity attached to the DMR shall include both tabular and graphical control charting information for the WET method/test species control coefficient of variation, control standard deviation, and control mean for the last 12 months of toxicity tests conducted by the laboratory. This information is reported to facilitate the review of toxicity test results and the laboratory's performance of the WET method by the permittee and permitting authority.

b. The permittee shall notify the permitting authority in writing within 14 days of exceedance of the WET limit (or WET trigger). This notification shall describe actions the permittee has taken (or will take) to investigate, identify, and correct the causes of toxicity; the status of actions required by this permit; and schedule for actions not yet completed; or reason(s) that no action has been taken.

9. Permit Reopener for Toxicity

In accordance with 40 CFR 122 and 124, this permit may be modified to include effluent limits or permit conditions to address toxicity (acute and/or chronic) in the effluent or receiving waterbody, as a result of the discharge; or to implement new, revised, or newly interpreted water quality standards applicable to toxicity.

D. Best Management Practices and Pollution Prevention

The Permittee shall ensure that treatment technologies which depend on each other are managed with an awareness of those dependencies, as a matter of Best Management

Practices (BMP). The specific BMP requirement here is in addition to complying with the Asset Management and Planning provisions in Part II Sections H and I; and Part III (Pollution Prevention Plan), below.

As an example of a treatment process which is dependent on the effectiveness of an earlier step in the treatment system, the UV disinfection system at the Utulei STP cannot effectively neutralize bacteria unless the water flowing from the clarigesters earlier in the Plant is sufficiently clear and transparent (low enough solids level) for UV light to penetrate and reach bacteria throughout the chamber. This is measured using the parameter UV Transmissivity.

The Permittee shall implement the following BMPs to monitor and assure reliable performance by the UV disinfection system:

- The discharger shall maintain a log of UV transmissivity measurements in the UV treatment system, taken at least once per day, and these logs shall be submitted to EPA as an electronic attachment to the netDMR data submissions covering the same time period.
- The treatment system shall be managed such that there is no visible settling of solids within the UV bulb chambers, which shall be determined and logged by the discharger at the same time each day that the UV Transmissivity reading is collected.

The design specifications for the Utulei UV treatment system specify a minimum UV Transmissivity of 40.6 in order for the system to function effectively. Therefore, the discharger shall take prompt corrective action on any day where the UV transmissivity falls below a value of 42, and shall submit to EPA a description of the corrective action taken on any given day where the UV Transmissivity at Utulei STP falls below this value.

After the first full year of the permit term, if there is no evidence of degradation in UV system performance, EPA may consider a reduction in the frequency of the logging specified in this BMP as a modification to the permit.

E. Biosolids

"Biosolids" means non-hazardous sewage sludge, as defined in 40 CFR § 503.9. Sewage sludge that is hazardous, as defined in 40 CFR Part 261, must be disposed of in accordance with the Resource Conservation and Recovery Act.

1. General Requirements

    a. All biosolids generated by the Permittee shall be used or disposed of in compliance with the applicable portions of:

(1) 40 CFR Part 503 - for biosolids that are land applied, placed in a surface disposal site (dedicated land disposal site, monofill, or sludge-only parcel at a municipal landfill), or incinerated;

(2) 40 CFR Part 258 - for biosolids disposed of in a municipal solid waste landfill (with other material);

(3) 40 CFR Part 257 - for all biosolids use and disposal practices not covered under 40 CFR Part 258 or 503.

40 CFR Part 503, Subpart B (land application) sets requirements for biosolids that are applied for the purpose of enhancing plant growth or for land reclamation. 40 CFR Part 503, Subpart C (surface disposal) sets requirements for biosolids that are placed on the land for the purpose of disposal.

The Permittee is responsible for assuring that all biosolids produced at its facility are used or disposed of in accordance with these rules, whether the Permittee uses or disposes of the biosolids, itself, or transfers the biosolids to another party for further treatment, use, or disposal. The Permittee is responsible for informing subsequent preparers, appliers, and disposers of the requirements that they must meet under these rules.

b. Duty to mitigate: The Permittee shall take all reasonable steps to prevent or minimize any biosolids use or disposal which has a likelihood of adversely affecting human health or the environment.

c. No biosolids shall be allowed to enter wetlands or other waters of the United States.

d. Biosolids treatment, storage, use, or disposal shall not contaminate groundwater.

e. Biosolids treatment, storage, use, or disposal shall not create a nuisance such as objectionable odors or flies.

f. The Permittee shall assure that haulers transporting biosolids off site for treatment, storage, use, or disposal take all necessary measures to keep the biosolids contained. All haulers must have spill clean-up procedures. Trucks hauling biosolids that are not classified as Class A, as defined at 40 CFR § 503.32(a), shall be cleaned as necessary after loading and after unloading so as to have no biosolids on the exterior of the truck body or wheels. Trucks hauling biosolids that are not Class A shall be tarped. Trucks hauling biosolids that are not Class A may not be used for hauling food or feed crops after unloading the biosolids, unless the Permittee submits, for EPA approval, a hauling description of how trucks will be thoroughly cleaned prior to adding food or feed.

g. If biosolids are stored over two years from the time they are generated, then the Permittee must ensure compliance with all surface disposal requirements under 40

CFR Part 503, Subpart C, or must submit a written notification to EPA and AS-EPA with the information under 40 CFR § 503.20(b) demonstrating the need for longer temporary storage. During temporary storage (of any length of time) for biosolids that are not Class A, whether on the facility site or off-site, adequate procedures must be taken to restrict public access and access by domestic animals.

h. Any biosolids treatment, disposal, or storage site shall have facilities adequate to: divert surface runoff from adjacent areas, protect the site boundaries from erosion, and prevent any conditions that would cause drainage from the materials at the site to escape from the site. Adequate protection is defined as protection from at least a 100-year storm event and from the highest tidal stage that may occur.

i. There shall be adequate screening at the Plant headworks and/or at the biosolids treatment units to ensure that all pieces of metal, plastic, glass, and other inert objects with a diameter greater than 3/8" are removed.

2. Inspection and Entry

The EPA, AS-EPA, or an authorized representative thereof, upon presentation of credentials, shall be allowed by the Permittee, directly or through contractual arrangements with their biosolids management contractors, to:

a. Enter upon all premises where biosolids produced by the Permittee are treated, stored, used, or disposed of, either by the Permittee or another party to whom the Permittee transfers the biosolids for treatment, storage, use, or disposal;

b. Have access to and copy any records that must be kept under the conditions of this permit or 40 CFR Part 503, by the Permittee or another party to whom the Permittee transfers the biosolids for further treatment, storage, use, or disposal; and

c. Inspect any facilities, equipment (including monitoring and control equipment), practices, or operations used in biosolids treatment, storage, use, or disposal by the Permittee or another party to whom the Permittee transfers the biosolids for treatment, use, or disposal.

3. Monitoring

a. Biosolids shall be monitored for the following constituents, at the frequency specified in paragraph 3.b: arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, organic nitrogen, ammonia-nitrogen, and total solids. This monitoring shall be conducted using the methods *in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA publication SW-846), as required in 40 CFR § 503.8(b)(4). All results must be reported on a 100% dry weight basis. Records of all analyses must state on each page of the laboratory report whether the results are expressed in “100% dry weight” or “as is”.

b. The constituents in paragraph 3.a shall be monitored at the following frequency, based on the volume of sewage solids generated per year:

Table 5: Biosolids monitoring frequency requirements

Volume Generated (dry metric tons per year)	Monitoring Frequency *
>0 - <290	Once per year
290 - <1,500	Four times per year
1,500 - <15,000	Six times per year
≥15,000	12 times per year

* If biosolids are removed for use or disposal on a routine basis, then monitoring should be scheduled at regular intervals throughout the year. If biosolids are stored for an extended period of time prior to use or disposal, then monitoring may occur either at regular intervals, or prior to use or disposal corresponding to tonnage accumulated during the period of storage.

c. Class 1 facilities (facilities with pretreatment programs or other facilities designated as Class 1 by the Regional Administrator) and Federal facilities with >5 MGD influent flow shall sample biosolids twice per year for pollutants listed under CWA Section 307(a), using best practicable detection limits.

4. Pathogen and Vector Control

Prior to land application, the Permittee shall demonstrate that biosolids meet Class A or Class B pathogen reduction levels using one of the alternatives listed under 40 CFR § 503.32.

a. Prior to disposal in a surface disposal site, the Permittee shall demonstrate that the biosolids meet Class B pathogen reduction levels or shall ensure that the site is covered at the end of each operating day. If pathogen reduction is demonstrated using a Process to Significantly/Further Reduce Pathogens, then the Permittee shall maintain daily records of the operating parameters used to achieve this reduction.

If pathogen reduction is demonstrated by testing for fecal coliform and/or other pathogens, then samples must be drawn at the frequency described in paragraph 3.b, above. If Class B pathogen reduction levels are demonstrated using fecal coliform, then at least seven grab samples must be drawn during each sampling event and a geometric mean calculated from these seven samples.

The following sample holding times between sample collection and sample analysis shall not be exceeded: fecal coliform - 24 hours when cooled to 4 ˚C if

composted, mesophillically digested, or aerobically digested, 6 hours otherwise; Salmonella sp. - 24 hours when cooled to 4 ˚C; enteric viruses - 2 weeks when frozen; helminth ova - one month when cooled to 4 ˚C.

b. For biosolids that are land applied or placed in a surface disposal site, the Permittee shall track and keep records of the operational parameters used to achieve the Vector Attraction Reduction requirements in 40 CFR § 503.33(b).

5. Groundwater

If biosolids are placed in a surface disposal site (dedicated land disposal site or monofill), then a qualified groundwater scientist shall develop a groundwater monitoring program for the site or shall certify that the placement of biosolids on the site will not contaminate an aquifer.

6. Landfill Disposal

Biosolids placed in a municipal landfill shall be tested by the Paint Filter Liquids Test (Method Number 9095 in SW-846) at the frequency indicated in paragraph 3.b, above, or more often if necessary, to demonstrate that there are no free liquids.

7. Notification and Reporting

a. The Permittee, either directly or through contractual arrangements with their biosolids management contractors, shall comply with the following notification requirements:

(1) Notification of noncompliance: The Permittee shall notify EPA and AS-EPA of any noncompliance within 24 hours, if the noncompliance may seriously endanger health or the environment. For other instances of noncompliance, the Permittee shall notify EPA and AS-EPA, in writing, within five working days of becoming aware of the circumstances. The Permittee shall require their biosolids management contractors to notify EPA and AS-EPA of any noncompliance within these same timeframes.

(2) Interstate notification: If biosolids are shipped to another State, Tribal Lands, or Territory, then the Permittee shall send a 60-day prior notice of the shipment to permitting authorities in the receiving State, Tribal Lands, or Territory, and EPA Regional Office.

(3) Land Application: Prior to using any biosolids from this facility (other than composted biosolids) at a new or previously unreported site, the Permittee shall notify EPA and AS-EPA. The notification shall include: a description and topographic map of the proposed site(s), names and addresses of the applier and site owner, and a list of any state or local permits which must be obtained. The plan shall include a description of the crops or vegetation to be grown, proposed loading rates, and determination of agronomic rates.

If any biosolids within a given monitoring period do not meet the pollutant limits for metals under 40 CFR § 503.13, then the Permittee (or its contractor) must pre-notify EPA and determine the cumulative metals loading to date at that site, as required in 40 CFR § 503.12.

The Permittee shall notify the applier of 40 CFR Part 503 requirements that are applicable to the applier, including applier certification that management practices, site restrictions, and vector attraction reduction requirements have been met. The Permittee shall require the applier to certify at the end of 38 months following the application of Class B biosolids, that the harvesting restrictions in effect for up to 38 months have been met.

(4) Surface Disposal: Prior to disposal of biosolids at a new or previously unreported site, the Permittee shall notify EPA and AS-EPA. The notice shall include: a description and topographic map of the proposed site, depth to groundwater, whether the site is lined or unlined, site operator, site owner, and any State or local permits. The notice shall describe procedures for ensuring restricted public access and grazing restrictions for three years following site closure. The notice shall include a groundwater monitoring plan, or a description of why groundwater monitoring is not required.

b. The Permittee shall submit an annual biosolids report to the EPA Region 9 Biosolids Coordinator and AS-EPA by February 19 of each year for the period covering the previous calendar year. This report shall include:

(1) The amount of biosolids generated that year and the amount of biosolids accumulated from previous years, in dry metric tons.

(2) Results of all pollutant monitoring required in the Monitoring section, above, reported on a 100% dry weight basis.

(3) Demonstrations and certifications of pathogen reduction methods and vector attraction reduction methods, as required in 40 CFR §§ 503.17 and 503.27.

(4) Names, mailing addresses, and street addresses of persons who received biosolids for storage, further treatment, or disposal in a municipal waste landfill, or for other use or disposal methods not covered above, and the tonnages delivered to each.

(5) For land application sites, the following information must be submitted by the Permittee, unless the Permittee requires its biosolids management contractors to report this information directly to the EPA Region 9 Biosolids Coordinator:

The locations of land application sites used that calendar year (with field names and numbers), size of each field applied to, applier, and site owner; the volumes applied to each field (in wet tons and dry metric tons), nitrogen applied, and calculated plant available nitrogen; the crop planted, date of

planting, and date of harvesting; for biosolids exceeding 40 CFR § 503.13 Table 3 pollutant concentrations, the locations of sites where applied and cumulative metals loading at that site to date; certifications of management practices in 40 CFR § 503.14 and certifications of site restrictions in 40 CFR § 503.17(b)(6).

(6) For surface disposal sites: The locations of sites, site operator, site owner, and size of parcel on which disposed; the results of any required groundwater monitoring; certifications of management practices in 40 CFR § 503.24; and for closed sites, the date of site closure and certifications of management practices for the three years following site closure.

(7) All reports shall be submitted to:

Regional Biosolids Coordinator
U.S. Environmental Protection Agency
Region 9

via the online tool NeT (http://www.epa.gov/compliance/national-pollutant-discharge-elimination-system-npdes-electronic-reporting-tool-net-fact),

and copies submitted to

American Samoa EPA
P.O. Box PPA
Pago Pago, AS 96799
(684) 633-2304
24-hour emergency line: (684) 733 6149
Ask for: Jewel Potoae jewel.tuiasosopo@epa.as.gov
OR, if unavailable,
Ask for: Fa'amao O. Asalele Jr., faamao.asalele@epa.as.gov

F. Pretreatment

1. Under 40 CFR § 125.66(d)(1), the Permittee must implement a public education program designed to minimize the entrance of nonindustrial toxic pollutants into the Utulei STP, the Permittee shall continue to implement its approved Nonindustrial Source Control Program. Copies of all public educational materials designed to minimize the entrance of nonindustrial toxic pollutants and pesticides into the Utulei STP from the period covering the previous calendar year shall be submitted with the semi-annual water column monitoring report due January 28th to USEPA Region 9 and AS-EPA, or as an attachment to an electronic DMR submitted at that time.

G. Sanitary Sewer Overflows

1. A Sanitary Sewer Overflow (SSO) is an overflow, spill, release, or diversion of wastewater from a sanitary sewer collection system designed to carry only sewage

and prior to reaching the treatment plant. Sanitary sewer overflows include a) overflows or releases of wastewater that reach waters of the US, b) overflows or releases of wastewater that do not reach waters of the US, and c) wastewater backups into buildings that are caused by blockages or flow conditions in a sanitary sewer other a building lateral. SSOs are generally caused by high volumes of infiltration and inflow (I/I), pipe blockages, pipe breaks, power failure, and insufficient system capacity.

2. All Sanitary Sewer Overflows are prohibited.

3. The Permittee shall report all SSOs. The Permittee shall submit with its DMRs, the following information for each SSO that occurs during the reporting period covered by the respective DMR:

   a. The cause of the SSO;

   b. Duration and volume (estimate, if unknown);

   c. Description of the source (e.g., manhole cover, pump station, etc.);

   d. Type of collection system that overflowed (i.e., combined or separate);

   e. Location by street address, or any other appropriate method providing a location;

   f. Date and time of SSO; including time that ASPA staff first became aware of the SSO and the time responders arrived on-site;

   g. The destination of the SSO, e.g., surface water body (direct), surface water body (via municipal separate storm sewer system), or land. The Permittee shall submit a USGS map or copy thereof with the location of the SSO, the flow path, and the destination marked; and

   h. Corrective action taken and steps taken or planned to eliminate reoccurrence of SSOs.

   The Permittee shall refer to Part II.B (Twenty-four-hour reporting of noncompliance) of this permit which contains information about reporting any noncompliance that may endanger human health or the environment. Part II.B applies to SSOs. Submittal or reporting of any of this information does not provide relief from any subsequent enforcement actions for unpermitted discharges to waters of the United States.

H. Asset Management

The Permittee shall develop an asset management program (“AMP”) to cover the treatment plant and collection system.

1. The Permittee shall procure, populate, and utilize asset management and/or work order management software within two years of permit issuance. The software shall:

a. Inventory all critical assets and assets valued over $5,000 into a single database. Assets may include, but are not limited to, sewer lines, manholes, outfalls, pump stations, force mains, catch basins, and wastewater treatment facility assets. Each entry shall include:

(1) Name and identification number.
(2) Location (GPS coordinate or equivalent identifier).
(3) Current performance/condition.
(4) Purchase and installation date.
(5) Purchase price.
(6) Replacement cost.

b. Automate work order production and tracking.

c. Catalogue all daily, weekly, monthly, annual and other regular maintenance tasks.

2. The Permittee shall submit to EPA a description of its selected AMP system and status of its implementation within two years of permit issuance.

3. The Permittee may be deemed in compliance with the above asset management provisions by fully implementing EPA's Check Up Program for Small Systems ("CUPPS") Asset Management Tool, which is available at no cost from (https://www.epa.gov/dwcapacity/information-check-program-small-systems-cupss-asset-management-tool).

I. Capacity Attainment and Planning

1. The Permittee shall file a written report within ninety (90) days if the average dry weather wastewater treatment flow for any month exceeds 90 percent of the annual dry weather design capacity of the waste treatment and/or disposal facilities.

Part III. STANDARD CONDITIONS

The Permittee shall comply with all EPA Region 9 Standard Conditions below.

A. All NPDES Permits

In accordance with 40 CFR § 122.41, the following conditions apply to all NPDES permits and are expressly incorporated into this permit.

1. Duty to comply; at 40 CFR § 122.41(a).

   The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the CWA and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

   a. The Permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that established these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

   b. The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $54,833 per day for each violation. The CWA provides that any person who *negligently* violates Section 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such Sections in a permit issued under Section 402 of the Act, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act, and who knows at that

time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of note more than $250,000 or imprisonment of not more than 15 years, or both. In the case of second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, such as defined in Section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

c. Any person may be assessed an administrative civil penalty by the Administrator for violating Section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any such sections in a permit issued under Section 402 of this Act. Administrative penalties for Class I violations are not to exceed $21,393 per violation, with the maximum amount of any Class I penalty assessed not to exceed $53,484. Penalties for Class II violations are not to exceed $21,393 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $267,415. Values are subject to change in accordance with federal rules.

2. Duty to reapply; at 40 CFR § 122.41(b).

   If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must apply for and obtain a new permit. Any Permittee with a currently effective permit shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Director.

3. Need to halt or reduce activity not a defense; at 40 CFR § 122.41(c).

   It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. Duty to mitigate; at 40 CFR § 122.41(d).

   The Permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

5. Proper operation and maintenance; at 40 CFR § 122.41(e).

   The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by a Permittee

only when the operation is necessary to achieve compliance with the conditions of the permit.

6. Permit actions; at 40 CFR § 122.41(f).

   This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

7. Property rights; at 40 CFR § 122.41(g).

   This permit does not convey any property rights of any sort, or any exclusive privilege.

8. Duty to provide information; at 40 CFR § 122.41(h).

   The Permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

9. Inspection and entry; at 40 CFR § 122.41(i).

   The Permittee shall allow the Director, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

   a. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

   c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

   d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location.

10. Monitoring and records; at 40 CFR § 122.41(j).

    a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. Except for records of monitoring information required by this permit related to the Permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample measurement, report or application. This period may be extended by request of the Director at any time.

c. Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed

(4) The individuals(s) who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

d. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in the permit.

e. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

11. Signatory requirement; at 40 CFR § 122.41(k).

a. All applications, reports, or information submitted to the Director shall be signed and certified. (See 40 CFR § 122.22.) All permit applications shall be signed as follows:

(1) For a corporation. By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the

manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

Note: EPA does not require specific assignments or delegations of authority to responsible corporate officers identified in 40 CFR § 122.22(a)(1)(i). The Agency will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Director to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate positions under 40 CFR § 122.22(a)(1)(ii) rather than to specific individuals.

(2) For a partnership or sole proprietorship. By a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency. By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

b. All reports required by permits, and other information requested by the Director shall be signed by a person described in paragraph (a) of this section, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph (a) of this section;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of Plant manager, operator of a well or well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters of the company, (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) and,

(3) The written authorization is submitted to the Director.

c. Changes to authorization. If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

d. Certification. Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

e. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

12. Reporting requirements; at 40 CFR § 122.41(l).

a. Planned changes. The Permittee shall give notice to the Director as soon as possible of any planned physical alternations or additions to the permitted facility. Notice is required only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR § 122.29(b); or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR § 122.42(a)(1).

(3) The alteration or addition results in a significant change in the Permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or

disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;

b. Anticipated noncompliance. The Permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

c. Transfers. This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the CWA. (See 40 CFR § 122.61; in some cases, modification or revocation and reissuance is mandatory.)

(1) Transfers by modification. Except as provided in paragraph (b) of this section, a permit may be transferred by the Permittee to a new owner or operator only if the permit has been modified or revoked and reissued (under 40 CFR § 122.62(b)(2)), or a minor modification made (under 40 CFR § 122.63(d)), to identify the new Permittee and incorporate such other requirements as may be necessary under CWA.

(2) Automatic transfers. As an alternative to transfers under paragraph (a) of this section, any NPDES permit may be automatically transferred to a new Permittee if:

(A) The current Permittee notifies the Director at least 30 days in advance of the proposed transfer date in paragraph (b)(2) of this section;

(B) The notice includes a written agreement between the existing and new Permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

(C) The Director does not notify the existing Permittee and the proposed new Permittee of his or her intent to modify or revoke and reissue the permit. A modification under this subparagraph may also be a minor modification under 40 CFR § 122.63. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph (b)(2) of this section.

d. Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices. As of December 21, 2016, all reports and forms submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section

and 40 CFR Part 3 (including, in all cases, subpart D to Part 3), 40 CFR § 122.22, and 40 CFR Part 127.

(2) If the Permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 503, or as specified in the permit, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

(3) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

e. Compliance schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

f. Twenty-four-hour reporting.

(1) The Permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Permittee becomes aware of the circumstances. A report shall also be provided within 5 days of the time the Permittee becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times), and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (combined sewer overflows, sanitary sewer overflows, or bypass events), type of sewer overflow structure (e.g., manhole, combine sewer overflow outfall), discharge volumes untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the sewer overflow event, and whether the noncompliance was related to wet weather. As of December 21, 2020, all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR Part 3 (including, in all cases, Subpart D to Part 3), 40 CFR § 122.22, and 40 CFR Part 127.

(2) The following shall be included as information which must be reported within 24 hours under this paragraph.

(i) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR § 122.41(g).)

(ii) Any upset which exceeds any effluent limitation in the permit.

(iii) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within 24 hours. (See 40 CFR § 122.44(g).)

(3) The Director may waive the written report on a case-by-case basis for reports under 40 CFR § 122.41(l)(6)(ii) of this section if the oral report has been received within 24 hours.

g. Other noncompliance. The Permittee shall report all instances of noncompliance not reported under 40 CFR §§ 122.41(l)(4), (5), and (6) of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (l)(6) of this section.

h. Other information. Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

13. Bypass; at 40 CFR § 122.41(m).

a. Definitions.

(1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations. The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 40 CFR §§ 122.41(m)(3) and (m)(4) of this section.

c. Notice.

(1) Anticipated bypass. If the Permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The Permittee shall submit notice of an unanticipated bypass as required in paragraph (l)(6) of this section (24-hour notice).

(3) As of December 21, 2020 all notices submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR Part 3 (including, in all cases, Subpart D to Part 3), 40 CFR § 122.22, and 40 CFR Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, Permittees may be required to report electronically if specified by a particular permit or if required to do so by state law.

d. Prohibition of bypass.

(1) Bypass is prohibited, and the Director may take enforcement action against a Permittee for bypass, unless:

(i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

(iii)The Permittee submitted notices as required under paragraph (m)(3) of this section.

(2) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph (m)(4)(i) of this section.

14. Upset; at 40 CFR § 122.41(n).

a. Definition. “Upset” means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent cause by operational error, improperly

designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph (n)(3) of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the Permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated; and

(3) The Permittee submitted notice of the upset as required in paragraph (l)(6)(ii)(B) of this section (24-hour notice).

(4) The Permittee complied with any remedial measures required under paragraph (d) of this section.

d. Burden of proof. In any enforcement proceeding the Permittee seeking to establish the occurrence of an upset has the burden of proof.

15. Reopener Clause; at 40 CFR § 122.44(c).

For any permit issued to a treatment works treating domestic sewage (including "sludge-only facilities"), the Director shall include a reopener clause to incorporate any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the CWA. The Director may promptly modify or revoke and reissue any permit containing the reopener clause required by this paragraph if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in the permit.

16. Minor modifications of permits; at 40 CFR § 122.63.

Upon the consent of the Permittee, the Director may modify a permit to make the corrections or allowances for changes in the permitted activity listed in this section, without following the procedures of 40 CFR Part 124. Any permit modification not processed as a minor modification under this section must be made for cause and with 40 CFR Part 124 draft permit and public notice as required in 40 CFR § 122.62. Minor modifications may only:

a. Correct typographical errors;

b. Require more frequent monitoring or reporting by the Permittee;

c. Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the existing permit and does not interfere with attainment of the final compliance date requirement; or

d. Allow for a change in ownership or operational control of a facility where the Director determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new Permittees has been submitted to the Director.

e. Change the construction schedule for a discharger which is a new source. No such change shall affect a discharger's obligation to have all pollution control equipment installed and in operation prior to discharge under 40 CFR § 122.29.

f. Delete a point source outfall when the discharge from that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits.

g. Incorporate conditions of a POTW pretreatment program that has been approved in accordance with the procedures in 40 CFR § 403.11 (or a modification thereto that has been approved in accordance with the procedures in 40 CFR § 403.18) as enforceable conditions of the POTW's permits.

17. Termination of permits; at 40 CFR § 122.64.

a. The following are causes for terminating a permit during its term, or for denying a permit renewal application:

(1) Noncompliance by the Permittee with any conditions of the permit;

(2) The Permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the Permittee's misrepresentation of any relevant facts at any time;

(3) A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination; or

(4) A change in any condition that requires either a temporary or permanent reduction or elimination of any discharge or sludge use or disposal practice controlled by the permit (for example, plant closure or termination of discharge by connection to a POTW).

18. Availability of Reports; pursuant to CWA Section 308

    Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Regional Administrator. As required by the CWA, permit applications, permits, and effluent data shall not be considered confidential.

19. Removed Substances; pursuant to CWA Section 301

    Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials entering waters of the U.S.

20. Severability; pursuant to CWA Section 512

    The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and remainder of this permit, shall not be affected thereby.

21. Civil and Criminal Liability; pursuant to CWA Section 309

    Except as provided in permit conditions on "Bypass" and "Upset", nothing in this permit shall be construed to relieve the Permittee from civil or criminal penalties for noncompliance.

22. Oil and Hazardous Substances Liability; pursuant to CWA Section 311

    Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties to which the Permittee is or may be subject under Section 311 of the CWA.

23. State, Tribe, or Territory Law; pursuant to CWA Section 510

    Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the operator from any responsibilities, liabilities, or penalties established pursuant to any applicable State, Tribe, or Territory law or regulation under authorities preserved by CWA Section 510.

B. Specific Categories of NPDES Permits

In accordance with 40 CFR § 122.42, the following conditions, in addition to those set forth at 40 CFR § 122.41, apply to all NPDES permits within the category specified below and are expressly incorporated into this permit.

1. Publicly owned treatment works; at 40 CFR § 122.42(b).
    a. All POTWs must provide adequate notice to the Director of the following:

(1) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to Sections 301 and 306 of the CWA if it were directly discharging those pollutants; and

(2) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

(3) For purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

b. The following condition has been established by EPA Region 9 to enforce applicable requirements of the Resource Conservation and Recovery Act. Publicly-owned treatment works may not receive hazardous waste by truck, rail, or dedicated pipe except as provided under 40 CFR Part 270. Hazardous wastes are defined at 40 CFR Part 261 and include any mixture containing any waste listed under 40 CFR § 261.31 through 261-33. The Domestic Sewage Exclusion (40 CFR § 261.4) applies only to wastes mixed with domestic sewage in a sewer leading to a publicly owned treatment works and not to mixtures of hazardous wastes and sewage or septage delivered to the treatment plant by truck.

Attachment A: Definitions

1. "Average monthly discharge limitation" means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

2. "Average weekly discharge limitation" means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

3. "Best Management Practices" or "BMPs" are schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural, and/or managerial practices to prevent or reduce the pollution of waters of the U.S. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may further be characterized as operational, source control, erosion and sediment control, and treatment BMPs.

4. A "composite" sample means a time-proportioned mixture of not less than eight discrete aliquots obtained at equal time intervals (e.g., 24-hour composite means a minimum of eight samples collected every three hours). The volume of each aliquot shall be directly proportional to the discharge flow rate at the time of sampling, but not less than 100 ml. Sample collection, preservation, and handling shall be performed as described in the most recent edition of 40 CFR § 136.3, Table II. Where collection, preservation, and handling procedures are not outlined in 40 CFR § 136.3, procedures outlined in the 18th edition of Standard Methods for the Examination of Water and Wastewater shall be used.

5. A "daily discharge" means the "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

6. A "daily maximum allowable effluent limitation" means the highest allowable "daily discharge."

7. A "DMR" is a "Discharge Monitoring Report" that is an EPA uniform national form, including any subsequent additions, revisions, or modifications for reporting of self-monitoring results by the Permittee.

8. A "grab" sample is a single sample collected at a particular time and place that represents the composition of the discharge only at that time and place. Sample collection,

preservation, and handling shall be performed as described in the most recent edition of 40 CFR § 136.3, Table II. Where collection, preservation, and handling procedures are not outlined in 40 CFR § 136.3, procedures outlined in the 18th edition of Standard Methods for the Examination of Water and Wastewater shall be used.

9. The "method detection limit" or "MDL" is the minimum concentration of an analyte that can be detected with 99% confidence that the analyte concentration is distinguishable from the method blank results, as defined by a specific laboratory method in 40 CFR Part 136. The procedure for determination of a laboratory MDL is in 40 CFR Part 136, Appendix B.

10. The "minimum level" or "ML" is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed in a specific analytical procedure, assuming that all the method-specific sample weights, volumes, and processing steps have been followed (as defined in EPA's draft National Guidance for the Permitting, Monitoring, and Enforcement of Water Quality-Based Effluent Limitations Set Below Analytical Detection/Quantitative Levels, March 22, 1994). If a published method-specific ML is not available, then an interim ML shall be calculated. The interim ML is equal to 3.18 times the published method-specific MDL rounded to the nearest multiple of 1, 2, 5, 10, 20, 50, etc. (When neither an ML nor MDL are available under 40 CFR Part 136, an interim ML should be calculated by multiplying the best estimate of detection by a factor of 3.18; when a range of detection is given, the lower end value of the range of detection should be used to calculate the ML.) At this point in the calculation, a different procedure is used for metals, than non-metals:

    a. For metals, due to laboratory calibration practices, calculated MLs may be rounded to the nearest whole number.

    b. For non-metals, because analytical instruments are generally calibrated using the ML as the lowest calibration standard, the calculated ML is then rounded to the nearest multiple of (1, 2, or 5) x 10n, where n is zero or an integer. (For example, if an MDL is 2.5 µg/l, then the calculated ML is: 2.5 µg/l x 3.18 = 7.95 µg/l. The multiple of (1, 2, or 5) x 10n nearest to 7.95 is 1 x 101 = 10 µg/l, so the calculated ML, rounded to the nearest whole number, is 10 µg/l.)

11. A "NODI(B)" means that the concentration of the pollutant in a sample is not detected. NODI(B) is reported when a sample result is less than the laboratory's MDL.

12. A "NODI(Q)" means that the concentration of the pollutant in a sample is detected but not quantified. NODI(Q) is reported when a sample result is greater than or equal to the laboratory's MDL, but less than the ML.

Attachment B: Location Map



Figure 1: Map of Tutuila Island, American Samoa. Utulei STP is the northernmost of the two treatment plants on the main island, indicated by a red dot

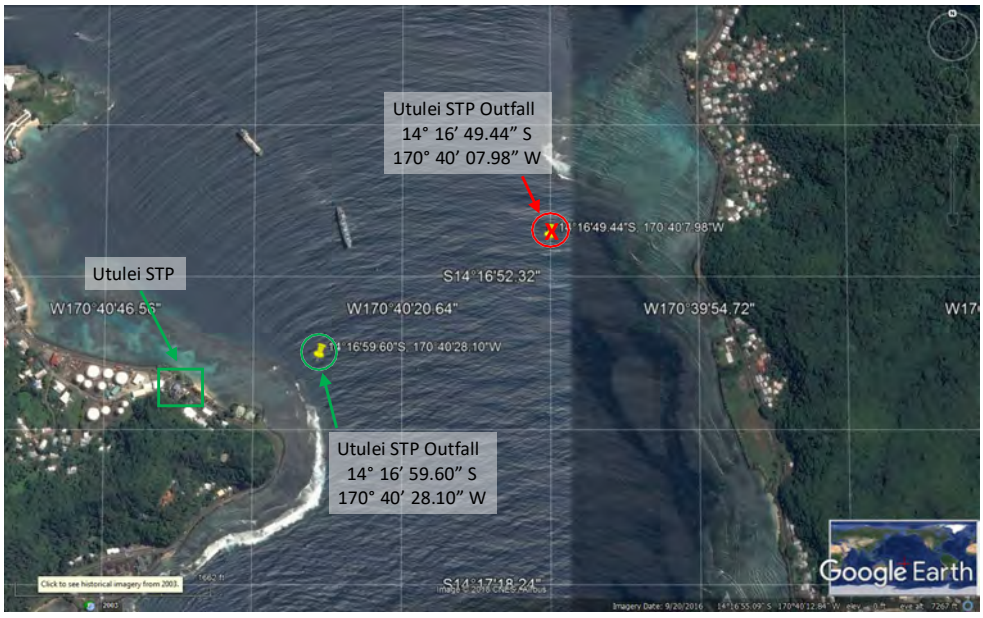


Figure 2: Map of Utulei STP and outfall (locations in green). Reprinted from discharger's 2018 submission of revised outfall coordinates. Diffuser location did not change, but use of old coordinate system (NAD 27 datum) led to inaccurate (red) position relative to physical coastlines.

Attachment C: Wastewater Flow Schematic

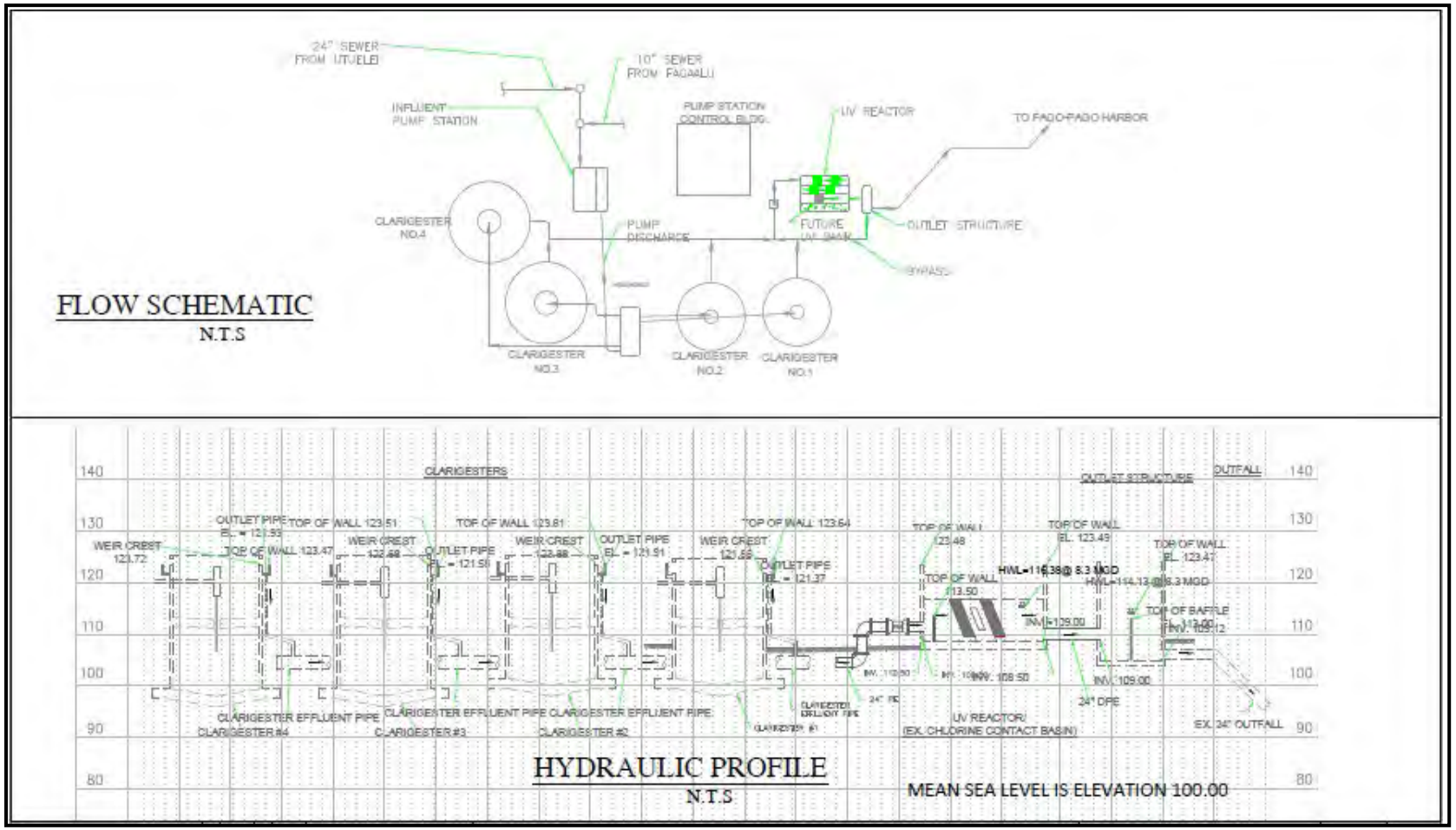


Figure 1 - Diagram of Utulei STP's wastewater treatment system. Reprinted from the 2017 engineering update to the section 301(h)-modified NPDES permit renewal application.

Attachment D: Ammonia Impact Ratio Data Log

A	B	C	D	E	F	G
Date of Sample	Ambient Salinity (g/kg)	Ammonia Concentration in Effluent (mg/L as N)	Effluent Temperature (° C)	Effluent pH (standard pH units)	Ammonia Objective with Dilution. (look up objective in Attachment E, using data from columns B, D, and E)[1]	Ammonia Impact Ratio (AIR) **(divide Column C by Column F, C ÷ F)**

Please copy and complete a data log for each quarter of each year for the permit term, as directed in the monitoring requirements table. Permittee may sample more frequently than directed, and should record and analyze any additional results. Attach any additional pages as necessary.

[1] For temperatures, pH values, and salinities between those values listed in the tables in Attachment E, you may enter either the lower Ammonia Objective (limit) value from the relevant table or interpolate the limit (using linear interpolation between the listed temperatures, pH values, or salinities).

Attachment E. pH-Dependent Ammonia (as N) Objectives with Dilution.

Note: values in these tables are expressed as milligrams of N per Liter (mg/L N). These tables convert the salt-water standards presented as American Samoa Water Quality Standards, 2020 Revision, Appendix A, into different units (ammonia-as-N from the original ammonia-as-NH_3, using the multiplier of 0.822 specified in Appendix A). Additionally, the limits presented in these tables incorporate the dilution factor of 121:1 authorized in this permit.

Table I: Acute Saltwater Criteria for Total Ammonia (use as daily maximum limit)
Acute Saltwater Criteria Based on 121:1 dilution for Total Ammonia-as-N mg/L[1]

	Temperature (°C)							
	0	**5**	**10**	**15**	**20**	**25**	**30**	**35**
pH	**Salinity = 10 g/kg**							
7	27,076.68	19,154.24	13,137.20	9,226.13	6,217.61	4,412.50	2,908.24	2,105.96
7.2	17,549.70	12,134.36	8,323.57	5,816.47	4,011.36	2,707.67	1,905.40	1,303.69
7.4	11,031.24	7,721.87	5,214.77	3,509.94	2,507.10	1,704.83	1,203.41	832.36
7.6	6,919.60	4,813.63	3,309.37	2,306.53	1,604.54	1,103.12	772.19	561.59
7.8	4,412.50	3,108.80	2,105.96	1,504.26	1,002.84	712.02	501.42	350.99
8	2,707.67	1,905.40	1,303.69	942.67	641.82	461.31	310.88	230.65
8.2	1,805.11	1,203.41	852.41	581.65	421.19	290.82	210.60	150.43
8.4	1,103.12	792.24	541.53	371.05	270.77	190.54	140.40	100.28
8.6	732.07	501.42	350.99	250.71	180.51	130.37	98.28	75.21
8.8	461.31	330.94	230.65	170.48	120.34	92.26	71.20	56.16
9	290.82	210.60	150.43	110.31	85.24	67.19	52.15	44.12
pH	**Salinity = 20 g/kg**							
7	29,182.64	20,056.80	13,738.91	9,627.26	6,418.18	4,412.50	3,108.80	2,105.96
7.2	18,351.97	12,535.50	8,724.71	6,017.04	4,211.93	2,908.24	2,005.68	1,403.98
7.4	11,632.94	7,922.44	5,415.34	3,710.51	2,707.67	1,805.11	1,203.41	872.47
7.6	7,320.73	5,014.20	3,509.94	2,306.53	1,704.83	1,103.12	792.24	561.59
7.8	4,613.06	3,108.80	2,306.53	1,504.26	1,103.12	752.13	521.48	350.99
8	2,908.24	2,005.68	1,403.98	982.78	671.90	481.36	330.94	230.65
8.2	1,905.40	1,303.69	892.53	621.76	441.25	310.88	210.60	160.45
8.4	1,203.41	812.30	561.59	401.14	290.82	200.57	150.43	110.31
8.6	752.13	521.48	371.05	270.77	190.54	140.40	100.28	77.22
8.8	481.36	330.94	250.71	170.48	130.37	94.27	73.21	56.16
9	310.88	230.65	160.45	120.34	87.25	69.20	54.15	44.12
pH	**Salinity = 30 g/kg**							
7	31,288.61	20,859.07	14,842.03	10,228.97	7,120.16	4,813.63	3,309.37	2,306.53

7.2	19,655.66	13,538.34	9,426.70	6,418.18	4,412.50	3,108.80	2,105.96	1,504.26
7.4	12,535.50	8,524.14	5,816.47	4,011.36	2,707.67	1,905.40	1,303.69	942.67
7.6	7,922.44	5,415.34	3,710.51	2,507.10	2,105.96	1,203.41	852.41	601.70
7.8	5,014.20	3,309.37	2,306.53	1,604.54	1,103.12	792.24	541.53	371.05
8	3,108.80	2,105.96	1,504.26	1,002.84	732.07	501.42	350.99	250.71
8.2	2,005.68	1,403.98	962.73	671.90	461.31	330.94	230.65	170.48
8.4	1,273.61	872.47	601.70	421.19	290.82	210.60	160.45	110.31
8.6	812.30	561.59	401.14	270.77	200.57	140.40	110.31	81.23
8.8	521.48	350.99	250.71	180.51	130.37	100.28	75.21	58.16
9	330.94	230.65	170.48	120.34	94.27	71.20	56.16	46.13

[1] Ambient Water Quality Criteria for Ammonia (Saltwater)-1989, EPA 440/5-88-004, April 1989, adjusted for 121:1 dilution and $NH_3 \rightarrow N$ conversion.

Table II: Chronic Saltwater Criteria for Total Ammonia (use as monthly average limit)

Chronic Saltwater Criteria Based on 121:1 dilution for Total Ammonia-as-N mg/L[1]

	Temperature (°C)							
	0	**5**	**10**	**15**	**20**	**25**	**30**	**35**
pH	**Salinity = 10 g/kg**							
7	4,111.64	2,908.24	2,005.68	1,403.98	942.67	661.87	441.25	310.88
7.2	2,607.38	1,805.11	1,203.41	872.47	591.68	411.16	280.80	200.57
7.4	1,704.83	1,203.41	782.22	531.51	371.05	260.74	180.51	120.34
7.6	1,002.84	722.04	501.42	340.97	240.68	170.48	120.34	84.24
7.8	661.87	471.33	310.88	220.62	150.43	110.31	75.21	53.15
8	411.16	290.82	200.57	140.40	97.28	69.20	47.13	34.10
8.2	270.77	180.51	130.37	87.25	62.18	44.12	31.09	23.07
8.4	170.48	120.34	81.23	56.16	41.12	29.08	21.06	16.05
8.6	110.31	75.21	53.15	37.11	27.08	20.06	15.04	11.03
8.8	69.20	50.14	34.10	25.07	18.05	14.04	11.03	8.02
9	44.12	31.09	23.07	17.05	13.04	10.03	8.02	7.02
pH	**Salinity = 20 g/kg**							
7	4,412.50	3,008.52	2,105.96	1,403.98	972.75	661.87	471.33	310.88
7.2	2,707.67	1,905.40	1,303.69	902.56	621.76	441.25	300.85	210.60
7.4	1,805.11	1,203.41	812.30	561.59	411.16	270.77	190.54	130.37
7.6	1,103.12	752.13	531.51	340.97	250.71	170.48	120.34	84.24
7.8	691.96	471.33	340.97	230.65	160.45	110.31	78.22	53.15
8	441.25	300.85	210.60	150.43	100.28	72.20	50.14	34.10
8.2	280.80	190.54	130.37	94.27	66.19	47.13	31.09	24.07

8.4	180.51	120.34	84.24	59.17	44.12	30.09	22.06	16.05
8.6	110.31	78.22	56.16	41.12	28.08	20.06	15.04	12.03
8.8	72.20	50.14	37.11	26.07	19.05	14.04	11.03	8.02
9	47.13	34.10	24.07	18.05	13.04	10.03	8.02	7.02
pH	**Salinity = 30 g/kg**							
7	4,713.35	3,108.80	2,206.25	1,504.26	1,103.12	722.04	501.42	340.97
7.2	2,908.24	2,005.68	1,403.98	972.75	661.87	471.33	310.88	220.62
7.4	1,905.40	1,303.69	872.47	591.68	411.16	290.82	200.57	140.40
7.6	1,203.41	812.30	561.59	371.05	310.88	180.51	130.37	90.26
7.8	752.13	501.42	340.97	240.68	170.48	120.34	81.23	56.16
8	471.33	310.88	220.62	160.45	110.31	75.21	53.15	37.11
8.2	300.85	210.60	140.40	100.28	69.20	50.14	34.10	25.07
8.4	190.54	130.37	90.26	62.18	44.12	31.09	23.07	17.05
8.6	120.34	84.24	59.17	41.12	30.09	22.06	16.05	12.03
8.8	78.22	53.15	37.11	27.08	20.06	15.04	11.03	9.03
9	50.14	34.10	26.07	19.05	14.04	11.03	8.02	7.02

[1] Ambient Water Quality Criteria for Ammonia (Saltwater)-1989, EPA 440/5-88-004, April 1989, adjusted for 121:1 dilution and NH3→N conversion.

Attachment F: List of Priority Pollutants

Priority Pollutants are a set of chemical pollutants for which EPA has developed analytical methods. The Permittee shall test for all priority pollutants in *40 CFR Part 423, Appendix A.* For reference, the 126 priority pollutants at time of issuance include:

1. Acenaphthene
2. Acrolein
3. Acrylonitrile
4. Benzene
5. Benzidine
6. Carbon tetrachloride
7. Chlorobenzene
8. 1,2,4-trichlorobenzene
9. Hexachlorobenzene
10. 1,2-dichloroethane
11. 1,1,1-trichloreothane
12. Hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. Chloroethane
~~17. (Removed)~~
18. Bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ethers
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
22. Parachlorometa cresol
23. Chloroform
24. 2-chlorophenol
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
28. 3,3-dichlorobenzidine
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. 2,4-dichlorophenol
32. 1,2-dichloropropane
33. 1,3-dichloropropylene
34. 2,4-dimethylphenol
35. 2,4-dinitrotoluene
36. 2,6-dinitrotoluene
37. 1,2-diphenylhydrazine
38. Ethylbenzene
39. Fluoranthene
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. Bis(2-chloroisopropyl) ether
43. Bis(2-chloroethoxy) methane
44. Methylene chloride
45. Methyl chloride
46. Methyl bromide
47. Bromoform
48. Dichlorobromomethane
~~49. (Removed)~~
~~50.~~ ~~(Removed)~~
~~51.~~ Chlorodibromomethane
~~52.~~ Hexachlorobutadiene
~~53.~~ Hexachlorocyclopentadiene
~~54.~~ Isophorone
~~55.~~ Naphthalene
~~56.~~ Nitrobenzene
~~57.~~ 2-nitrophenol
~~58.~~ 4-nitrophenol
~~59.~~ 2,4-dinitrophenol
~~60.~~ 4,6-dinitro-o-cresol
~~61.~~ N-nitrosodimethylamine
~~62.~~ N-nitrosodiphenylamine
~~63.~~ N-nitrosodi-n-propylamine
~~64.~~ Pentachlorophenol
~~65.~~ Phenol
~~66.~~ Bis(2-ethylhexyl) phthalate
~~67.~~ Butyl benzyl phthalate
~~68.~~ Di-N-Butyl Phthalate
~~69.~~ Di-n-octyl phthalate
~~70.~~ Diethyl Phthalate
~~71.~~ Dimethyl phthalate
~~72.~~ Benzo(a) anthracene
~~73.~~ Benzo(a) pyrene
~~74.~~ Benzo(b) fluoranthene

~~75.~~ Benzo(k) fluoranthene
~~76.~~ Chrysene
~~77.~~ Acenaphthylene
~~78.~~ Anthracene
~~79.~~ Benzo(ghi) perylene
~~80.~~ Fluorene
~~81.~~ Phenanthrene
~~82.~~ Dibenzo(a,h) anthracene
~~83.~~ Indeno (1,2,3-cd) pyrene
~~84.~~ Pyrene
~~85.~~ Tetrachloroethylene
~~86.~~ Toluene
~~87.~~ Trichloroethylene
~~88.~~ Vinyl chloride
~~89.~~ Aldrin
~~90.~~ Dieldrin
~~91.~~ Chlordane
92. 4,4-DDT
93. 4,4-DDE
94. 4,4-DDD
95. Alpha-endosulfan
96. Beta-endosulfan
97. Endosulfan sulfate
98. Endrin
99. Endrin aldehyde
100. Heptachlor
101. Heptachlor epoxide
102. Alpha-BHC
103. Beta-BHC
104. Gamma-BHC
105. Delta-BHC
106. PCB-1242 (Arochlor 1242)
107. PCB-1254 (Arochlor 1254)
108. PCB-1221 (Arochlor 1221)
109. PCB-1232 (Arochlor 1232)
110. PCB-1248 (Arochlor 1248)
111. PCB-1260 (Arochlor 1260)
112. PCB-1016 (Arochlor 1016)
113. Toxaphene
114. Antimony
115. Arsenic
116. Asbestos
117. Beryllium
118. Cadmium
119. Chromium
120. Copper
121. Cyanide, Total
122. Lead
123. Mercury
124. Nickel
125. Selenium
126. Silver
127. Thallium
128. Zinc
129. 2,3,7,8-TCDD

Attachment G: 2015 Memorandum on Pacific Island Territory sample hold times for Toxicity testing (WET)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

JUN 29 2015

MEMORANDUM

SUBJECT: Sample Hold Time for Whole Effluent Toxicity Testing in Pacific Island Territories

FROM: Jamie Marincola, Acting Manager
NPDES Permits Office
Region IX

TO: John McCarroll, Manager
Pacific Islands Office
Region IX

Whole Effluent Toxicity (WET) testing consist of exposing living aquatic organisms (plants, vertebrates and invertebrates) to a sample of wastewater, usually a facility's effluent discharge, and measuring its effects on the organisms' ability to survive, grow and reproduce. Many National Pollutant Discharge Elimination System (NPDES) permittees have WET testing requirements in their permits.

40 CFR 136.3(e) states that the optimal hold time for WET testing samples is 36 hours; however a variance is available to extend hold time up to 72 hours between sample collection and first use of sample. In the Pacific Island Territories, facilities are limited in the availability of laboratories to receive and perform WET testing within the 36 hour timeframe. Specifically, samples which must be shipped to the continental U.S. are unlikely to arrive in accordance with optimal hold times. Therefore, for purposes of NPDES compliance, **Pacific Island Territories permittees that ship WET samples to the continental U.S. shall be allowed up to 72 hours between sample collection and first use of sample**. Sample shipment must continue to meet requirements in 40 CFR 136.3, Table II, including preservation of the sample at less than or equal to 6 ^{0}C and use of sufficient ice to ensure ice is still present when the samples arrive at the laboratory. This variance does not apply to samples shipped to Hawaii, where sample hold times must not exceed 36 hours.

Permittees shall ensure samples arrive to testing facilities as quickly as possible. EPA recommends that permittees use freight forwarders to expedite samples through customs.

Freight forwarders have the ability to shepherd samples from commercial airline cargo through customs and then proceed with shipping via overnight delivery service. Using such a service helps ensure that samples arrive as soon as possible.

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APPENDIX C-2
UTULEI NPDES FACT SHEET (2019)

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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
FINAL PERMIT FACT SHEET
November, 2019

Permittee Name:	American Samoa Power Authority - Utulei Sewage Treatment Plant
Mailing Address:	P.O. Box PPB, Pago Pago, American Samoa 96799
Facility Location:	Tulutulu Point off Route 1, Utulei, Tutuila, American Samoa 96799
Contact Person(s):	William Spitzenberg, Wastewater Manager, (684)-733-3297; williams@aspower.com
NPDES Permit No.:	AS0020001

I. STATUS OF PERMIT

American Samoa Power Authority, also known as ASPA (the "permittee") has applied for the renewal of their National Pollutant Discharge Elimination System (NPDES) permit to authorize the discharge of treated effluent from the Utulei Sewage Treatment Plant (Utulei STP) to Pago Pago harbor, located near the center of the island of Tutuila, American Samoa. A complete application was submitted on May 1, 2006, and subsequently updated in 2008 and 2016-17. EPA Region IX has developed this permit and fact sheet pursuant to Section 402 of the Clean Water Act, which requires point source dischargers to control the amount of pollutants that are discharged to waters of the United States through obtaining a NPDES permit.

The permittee is currently discharging under NPDES permit AS0020001 issued on October 9, 2001. Pursuant to 40 CFR 122.21, the terms of the existing permit are administratively extended until the issuance of a new permit. The lengthy time which has passed since the issuance of the previous permit was to allow for implementation of an EPA administrative order which required major treatment system upgrades and operational changes at the facility, including the installation of a UV bacteria treatment/disinfection system and several process improvements.

This permittee has been classified as a major discharger.

II. GENERAL DESCRIPTION OF FACILITY

The Utulei STP is located in the township of Utulei on Tutuila Island, the largest and principal island of American Samoa. Utulei STP is a primary treatment plant that collects and treats wastewater from several nearby residential areas and the downtown area. The service area includes the villages of Faga'alu (including the hospital), Utulei, Fagatogo, Pago Pago (both upper and lower parts of the village), and Atu'u (including the sanitary wastewater from the two local tuna canneries). The service area also includes the villages of Leloaloa, Au'a, and Onesosopo which are not yet connected but were included in the original design of the Harbor Sewer System and the Utulei STP, and for which connection work is ongoing. In the

application, the applicant indicated that the wastewater collected from these areas is largely organic and domestic in nature (ASPA 2006). Domestic wastewater includes waste or wastewater from humans or household operations that is discharged to or otherwise enters the treatment plant (40 CFR 122.2). In the application, the applicant indicated that there are currently no industrial sources of wastewater that flow to the treatment plant and none planned in the near future. The Plant currently serves a population of approximately 13,000 people.

The plant provides grit removal, primary sedimentation, anaerobic sludge digestion, and ultraviolet (UV) disinfection prior to discharge into outer Pago Pago Harbor. Influent enters the plant at the influent wet well, which contains four submerged variable speed pumps. As influent exits the wet well, it is screened through a rock basket with two-inch square mesh. Influent is then pumped into an elevated grit channel. Additional grit is removed at the headworks. The plant's primary treatment unit is the clarigester. Clarigesters consist of an upper clarifier that removes settleable solids and skims off floatables and a lower anaerobic digester that settleable solids are funneled directly into. Gas from the digesters is vented near the top of the clarigesters. Following primary clarification, flow converges and continues to an elevated UV channel.

Attachment B to the permit, Figure 1, identifies the locations of the facility and Figure 2 details the location of the outfall. Attachment C to the permit shows a diagram of the facility, including the UV disinfection system installed in 2016. The UV disinfection system consists of a repurposed contact chamber containing 4 banks of 18 UV lamps each, with a design capacity great enough to handle the 6 MGD (Million Gallons per Day) maximum design flow of the treatment plant.

After treatment, the Utulei STP discharges treated effluent directly into Pago Pago Harbor through a 21-inch high-density polyethylene pipe and outfall. The terminus of the outfall is located approximately 954 feet off of Tulutulu Point in outer Pago Pago Harbor at a depth of 150 feet. This places the end of the outfall at 14º 16’ 59.6” South latitude and 170º 40’ 28.1” West longitude. Effluent is discharged horizontally in alternatively opposite directions through a linear multiport diffuser. The diffuser consists of six lateral ports, plus a separate “end gate” port, and has a total length of approximately 42.6 feet, with the ports spaced approximately 7.1 feet apart. The ports have a diameter of 5.5 inches while the end gate port is 11 inches across. The average depth of the ports is 145 feet.

The existing outfall and diffuser first began operation in 1996 and were constructed to improve the discharge by enhancing the initial dilution and dispersal of pollutants in the receiving water. The improvements included a 47 foot diffuser with six ports to enhance dilution and mixing within the water column. Sludge from the primary treatment process is transported to the Tafuna STP on the southwestern portion of the island where it is treated by anaerobic digestion and placed in drying beds until landfill disposal. The climate in American Samoa is characterized as the humid tropics with wet weather occurring on a year-round basis. Therefore, no peak dry weather periods (seasons, often monsoonal) occur as observed on other Pacific Islands. Note that this does not preclude analysis of “dry weather” flow characteristics at the treatment plant (i.e. treatment plant flows during periods of minimum inflow and infiltration), as there are still shorter periods of limited or no rain on the island.

III. DESCRIPTION OF RECEIVING WATER

Utulei STP discharges into the outer portion of Pago Pago Harbor. Pago Pago Harbor is located on the southeastern portion of Tutuila Island in American Samoa and empties into the South Pacific Ocean. In the application, the applicant indicated that outer Pago Pago Harbor has characteristics similar to open coastal ocean waters and is not characteristic of an estuarine system.

The American Samoa Government designated Pago Pago Harbor to be developed into a transshipment center for the South Pacific. The AS Environmental Quality Commission has developed a separate set of standards for Pago Pago Harbor due to its unique position as an embayment where water quality has been degraded from the natural condition (ASEQC, 2013).

Protected uses for Pago Pago Harbor include:

(i) Recreational and subsistence fishing except for exclusions as specified under federal regulations such as no take zones;

(ii) Boat-launching ramps and designated mooring areas;

(iii) Subsistence food gathering; e.g. shellfish harvesting except for exclusions as specified under federal regulations such as no take zones;

(iv) Aesthetic enjoyment;

(v) Whole and limited body-contact recreation, e.g. swimming, snorkeling, and scuba diving;

(vi) Support and propagation of marine life;

(vii) Industrial water supply;

(viii) Mariculture development except for exclusions as specified under federal regulations such as no take zones;

(ix) Normal harbor activities; e.g. ship movements, docking, loading and unloading, marine railways and floating drydocks; and

(x) Scientific investigations.

Pago Pago Harbor is listed as impaired for certain pollutants according to the CWA Section 303(d) List of Water Quality Limited Segments, and Total Maximum Daily Load (TMDL) requirements have been developed for those pollutants. Ocean Shorelines in the Pago Pago watershed are listed as impaired for enterococci and the inner harbor (this facility discharges to the outer harbor) is listed for lead, mercury, and PCBs. Note that in the 303(d) listing document, streams within the same watershed identifier (#24) are additionally listed as impaired for nutrients (Total Nitrogen, TN, and Total Phosphorous, TP), turbidity, and Dissolved Oxygen but these additional impairments do not apply to the sea-water segment of the harbor to which the Utulei STP discharges. The only 303(d)-listed pollutant for which the Utulei STP has a potential to be a source is enterococci, and the limits specified in the TMDL are identical to those specified in the American Samoa Water Quality Standards (AS-WQS). Therefore, compliance with AS-WQS for Enterococci will ensure compliance with the requirements of the TMDL.

IV. DESCRIPTION OF DISCHARGE

The Utulei STP is designed to provide primary treatment (30% removal of Biochemical Oxygen Demand, (BOD), and Total Suspended Solids, (TSS)) as well as disinfection before discharge. The Plant is designed so that influent is screened, and then the flow is split across 4 parallel clarigesters for treatment. After treatment in the clarigesters, the effluent passes through a newly installed UV disinfection system. Discharge is to an outfall in the ocean-mixed outer Pago Pago Harbor area. The terminus of the outfall is located approximately 954 feet off of Tulutulu Point in outer Pago Pago Harbor at a depth of 150 feet; see Attachment B in the permit, figure 2, for a map of the outfall location.

The use of primary treatment instead of secondary treatment was due to the tightly limited resources and support base available in American Samoa. This practice is allowed under CWA §301(h). EPA granted the facility a variance pursuant to CWA §301(h) when it was initially permitted in 1985 and has re-evaluated and renewed the variance with each permit reissuance since that time.

American Samoa water quality standards for various parameters, particularly nutrients and bacteria, have grown more stringent since the facility was initially permitted. Compliance with these increasingly stringent requirements has grown more difficult for the treatment system to achieve. A major refit which altered the permitting context was the construction of the offshore diffuser in 1996 to increased available dilution.

In 2009, EPA issued public notice of tentative decisions to deny renewal of the facility's §301(h) variance due to inability to consistently meet American Samoa's bacteria and nutrient standards. Since 2009, EPA has been working with the applicant to collect additional data, conduct modeling, and upgrade treatment at the Utulei STP. As a result, the quality of the discharge has improved and more thorough and representative data are now available.

EPA issued an Administrative Order on July 27, 2011 stipulating actions and a timeline on which to bring the Utulei STP into compliance and make renewal of the 301(h) variance possible. Upgrades were finally completed in 2016 and, after 1 year of data collection with the upgraded treatment system in place, data now show compliance with American Samoa water quality standards. Therefore, EPA is proposing to reissue this permit with renewal of the §301(h) variance from secondary treatment.

A. Application Discharge Data

As part of the application for permit renewal, the permittee provided data from an analysis of the facility's treated wastewater discharge, shown in Table 1. As material changes to the treatment system have been implemented since the application was submitted, EPA does not consider these data to be representative of the current discharge and therefore has not included them in the analysis below. Note that toxicity data are considered separately in section VI(B)(5) of this Fact Sheet.

Table 1. Application Discharge Data.

Parameter	Units	Discharge Data[1]	
		Maximum Daily Discharge	Average Daily Discharge
Flow	MGD	3.42	1.19
pH	Standard Units	6.5 to 8.6 (min-max)	
Biochemical Oxygen Demand, 5-day (BOD_5)	mg/L	94	61.7
Total Suspended Solids (TSS)	mg/L	74	26.4
Ammonia (as N)	mg/L	23.3	22.5
Total Kjeldahl Nitrogen	mg/l	67.1	50.8
Total Phosphorus	mg/l	2.81	2.72
Total Residual Chlorine	mg/L	Not monitored	
Oil and Grease	mg/L	6.3	5.9
Settleable solids	ml/l	0.5	0.13
Copper	ug/l	6.1	--
Mercury	ug/l	0.24	0.152
Zinc	ug/l	28.5	28.1
Chlorobenzene	ug/l	0.21	--
Chloroform	ug/l	1.5	--
Methylene chloride	ug/l	0.42	--
Toluene	ug/l	2.3	1.41
4-nitrophenol	ug/l	13	--
Phenol	ug/l	32	22
Bis (2-ethylhexyl)phthalate	ug/l	12	10.3
1,4-Dichlorobenzene	ug/l	4.3	3.3
Diethyl phthalate	ug/l	4.4	3.95
Fluorene	ug/l	0.38	--
Phenanthrene	ug/l	0.56	--

[1] Based on permittee's NPDES renewal application.

B. Recent Discharge Monitoring Report (DMR) Data (2007-2017)

Table 2 provides a summary of effluent limitations and monitoring data based on the facility's most recent 10 years of DMRs (2007 to 2017).

Table 2. Discharge Monitoring Report Data for years 2007-2017.

Parameter	Units	Current Permit Effluent Limitations			Discharge Monitoring Data		
		Average Monthly	Average Weekly	Maximum Daily	Highest Average Monthly	Highest Average Weekly	Highest Maximum Daily
Flow Rate	MGD	Monitoring Only	--	Monitoring Only	2.6	--	6.1[(1)]
Biochemical Oxygen Demand (5-day)	mg/L	78.3	117	157	Before treatment upgrade		
					88	107	110
					After treatment upgrade		
					67	99	99
	lbs/day	1085	1628	2170	Before treatment upgrade		--
					1423	3182	
					After treatment upgrade		
					1023	1569	
	Percent Removal	Both the influent and the effluent shall be monitored. The arithmetic mean of the BOD_5 values, by concentration, for effluent samples collected over a calendar month shall not exceed 70 percent of the arithmetic mean, by concentration, for influent samples collected at approximately the same times during the same period (i.e. 30 percent BOD_5 removal).			Minimum monthly average % removal was 32.9 % removal		
Settleable Solids	mL/L	1	--	2	0.2	--	1.1
Total Suspended Solids	mg/L	75	113	150	Before treatment upgrade		
					64	89	--
					After treatment upgrade		
					47	63	63
	lbs/day	1377	2065	2754	Before treatment upgrade		--
					805	1171	
					After treatment upgrade		
					773	1151	

Parameter	Units	Current Permit Effluent Limitations			Discharge Monitoring Data		
		Average Monthly	**Average Weekly**	**Maximum Daily**	**Highest Average Monthly**	**Highest Average Weekly**	**Highest Maximum Daily**
	Percent Removal	Both the influent and the effluent shall be monitored. The arithmetic mean of the TSS values, by concentration, for effluent samples collected over a calendar month shall not exceed 70 percent of the arithmetic mean, by concentration, for influent samples collected at approximately the same times during the same period (i.e. 30 percent TSS removal).			5.4% minimum monthly reported; however, appears to be error, as influent and effluent data for the same month represent a 57.9% removal		
pH	Standard Units	Not < 6.5 SU, Not > 8.6 SU; discharge shall not change pH in receiving water by more than 0.2 SU			6.5 – 7.6 (min-max)		
Chronic Toxicity	TUc	Monitoring only			666.7		
Oil & Grease	mg/l	Monitoring only			28		

(1) note that one mistyped report of "11.4 MGD" daily maximum flow , in August 2008, has been revised to 1.4 MGD.

V. SIGNIFICANT CHANGES TO PREVIOUS PERMIT

Permit Condition	Previous Permit	Re-issued permit	Reason for change
Ammonia effluent limit	No limit or monitoring requirement	Effluent limits and monitoring requirements for Ammonia monitoring have been added to the permit. Compliance with the ammonia effluent limit will be determined using the ammonia impact ratio ("AIR"). The permit limit is set to a value of 1.0. The permittee must also continue to monitor and report ammonia effluent values in addition to the AIR value.	Reasonable potential to exceed WQS. The AIR makes determination and reporting of compliance easier than floating limits based on pH and temperature.
Total Nitrogen and Total Phosphorus effluent limits	No limit or monitoring requirement	Effluent limits and monitoring requirements for TN and TP have been added	Reasonable potential to exceed WQS
Enterococcus effluent limits	No limit or monitoring requirement, except receiving water monitoring	Effluent limits and monitoring requirements for enterococcus have been added	Reasonable potential to exceed WQS
Chronic toxicity effluent limit	No limit, only monitoring with trigger	Effluent limits and monitoring requirements for chronic toxicity have been added	Reasonable potential to exceed WQS
BOD and TSS effluent limits	Effluent limits and monitoring requirements	Mass-based effluent limits adjusted to reflect 3.0 mgd flow	Increase in flow
Temperature monitoring	No temperature monitoring required	Temperature monitoring requirement added	Temperature data are required for determining compliance with the ammonia limit
Receiving Water Monitoring Program updated	The previous permits contained a receiving water monitoring program which did not include Zone of Initial Dilution (ZID) stations	Requirements for the receiving water monitoring program have been updated to include ZID stations	The §301(h) regulations determine compliance with several monitoring parameters at the boundary of the ZID. The existing monitoring program does not collect data at the ZID, and correcting this omission will make it easier for the discharger to track compliance.

Operations and Maintenance reopener provision	The previous permit contained no specific provisions for Operations and Maintenance (O&M)	The new permit includes an explicit reopener provision for addressing O&M deficiencies	Maintenance problems with clarigesters identified by EPA during recent site visits, as well as the high anticipated O&M burden of the UV disinfection system, make this an aspect of the treatment plant which requires close attention. EPA has specifically provided for modification of the permit if O&M problems are identified in future.
Best Management Practices (BMPs)	The previous permit contained no specific BMPs	New permit adds an explicit BMP requirement for daily review of UV transmissivity and an absence of solids deposition in the disinfection system	UV disinfection systems are highly reliant on having high UV transmissivity (clear effluent) to work effectively, and the combination of primary treatment with UV disinfection at Utulei STP is unusual in this regard. Therefore, the new permit contains BMPs to require daily logging of the UV transmissivity to identify and correct any problems.
Sanitary Sewer Overflow provisions	The previous permit did not explicitly address sanitary sewer overflows.	The new permit incorporates sanitary sewer overflow restrictions and reporting requirements	Sanitary Sewer Overflow provisions are now a standard part of EPA NPDES permits
Asset Management provisions	The previous permit did not explicitly address asset management.	The new permit incorporates standard asset management requirements for small utilities	Asset management is a proven approach which reduces both accidental discharges and maintenance costs over the long term. The Utulei STP's resource situation and past maintenance challenges make it a good candidate to benefit from EPA's free small-system asset management tool.
Capacity Attainment and Planning provision	The previous permit did not include a notification requirement for dry-weather flows approaching the facility's maximum treatment capacity	The new permit includes a notification requirement for dry-weather flows approaching the facility's maximum treatment capacity	When dry-weather flows come close to a treatment plant's maximum capacity, expansion of the treatment plant is an eventuality both the discharger and EPA often need to begin planning for. This notification requirement ensures adequate advance notice.

VI. DETERMINATION OF NUMERICAL EFFLUENT LIMITATIONS

EPA has developed effluent limitations and monitoring requirements in the permit based on an evaluation of the technology used to treat the pollutant (e.g., "technology-based effluent limits") and the water quality standards applicable to the receiving water (e.g., "water quality-based effluent limits"). EPA has established the most stringent of applicable technology-based or water quality-based standards in the proposed permit, as described below.

A. Applicable Technology-Based Effluent Limitations

Publicly Owned Wastewater Treatment Systems (POTWs)

EPA developed technology-based treatment standards for municipal wastewater treatment plants in accordance with Section 301(b)(1)(B) of the Clean Water Act. As the Utulei STP continues to operate under a §301(h) variance from secondary treatment requirements, the facility is permitted to discharge primary-treated effluent through its ocean outfall in accordance with the requirements under 40 CFR 125.58(r) and the limitations below, which have been carried over from the previous permit. In addition, mass limits, as required by 40 CFR 122.45(f), are included for BOD_5 and TSS and have been calculated to reflect the increase in flow to 3MGD.

BOD_5

Concentration-based Limits

30-day average – 78.3 mg/L
7-day average – 117 mg/L
Daily maximum – 157 mg/L
Removal Efficiency – minimum of 30%

Mass-based Limits

30-day average – (78.3 mg/L)(3 MGD)(8.345 conversion factor) = 1,960 lbs/day
7-day average – (117 mg/L)(3 MGD)(8.345 conversion factor) = 2,929 lbs/day
Daily maximum – (157 mg/L)(3 MGD)(8.345 conversion factor) = 3,930 lbs/day

TSS

Concentration-based Limits

30-day average – 75 mg/L
7-day average – 113 mg/L
Daily maximum – 150 mg/L
Removal efficiency – Minimum of 30%

Mass-based Limits

30-day average – (75 mg/L)(3 MGD)(8.345 conversion factor) = 1,878 lbs/day
7-day average – (113 mg/L)(3 MGD)(8.345 conversion factor) = 2,829 lbs/day
Daily maximum – (150 mg/L)(3 MGD)(8.345 conversion factor) = 3,755 lbs/day

pH

Instantaneous Measurement: 6.0 – 9.0 standard units (S.U.) – superseded by more stringent American Samoa Water Quality Standards, as described below.

Technology-based treatment requirements may be imposed on a case by case basis under Section 402(a)(1) of the Act, to the extent that EPA promulgated effluent limitations are inapplicable (i.e., the regulation allows the permit writer to consider the appropriate technology for the category or class of point sources and any unique factors relating to the applicant) (40 CFR 125.3(c)(2)).

The minimum levels of effluent quality attainable by secondary treatment for Settleable Solids, as specified in the EPA Region IX Policy memo dated May 14, 1979, are listed below:

Settleable Solids
30-day average – 1 mL/L
Daily maximum – 2 mL/L

Therefore, effluent limits for BOD_5, TSS, pH, and Settleable Solids are established in the permit as stated above.

B. Water Quality-Based Effluent Limitations

Water quality-based effluent limitations are required in NPDES permits when the permitting authority determines that a discharge causes, has the reasonable potential to cause, or contributes to an excursion above any water quality standard (40 CFR 122.44(d)(1)).

When determining whether an effluent discharge causes, has the reasonable potential to cause, or contributes to an excursion above narrative or numeric criteria, the permitting authority shall use procedures which account for existing controls on point and non-point sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity) and where appropriate, the dilution of the effluent in the receiving water (40 CFR 122.44(d)(1)(ii)).

EPA evaluated the reasonable potential to discharge toxic pollutants according to guidance provided in the *Technical Support Document for Water Quality-Based Toxics Control* (TSD) (Office of Water Enforcement and Permits, U.S. EPA, March 1991) and the *U.S. EPA NPDES Permit Writers Manual* (Office of Water, U.S. EPA, December 1996). These factors include:

1. Applicable standards, designated uses and impairments of receiving water
2. Dilution in the receiving water
3. Type of industry
4. History of compliance problems and toxic impacts
5. Existing data on toxic pollutants - Reasonable Potential Analysis

1. Applicable Standards, Designated Uses and Impairments of Receiving Water

The American Samoa Water Quality Standards, Administrative Rule No. 001-2013 (last updated 2013) establish water quality criteria for the following beneficial uses in Pago Pago Harbor, to which the Utulei STP discharges:

(A) Recreational and subsistence fishing except for exclusions as specified under federal regulations such as no take zones;
(B) Boat-launching ramps and designated mooring areas;

(C) Subsistence food gathering; e.g. shellfish harvesting except for exclusions as specified under federal regulations such as no take zones;
(D) Aesthetic enjoyment;
(E) Whole and limited body-contact recreation, e.g. swimming, snorkeling, and scuba diving
(F) Support and propagation of marine life;
(G) Industrial water supply;
(H) Mari-culture development except for exclusions as specified under federal regulations such as no take zones;
(I) Normal harbor activities; e.g. ship movements, docking, loading and unloading, marine railways and floating drydocks; and
(J) Scientific investigations.

Pago Pago Harbor is listed as impaired according to the CWA Section 303(d) List of Water Quality Limited Segments. Ocean Shorelines in the Pago Pago watershed are listed as impaired for enterococci and the inner harbor (this facility discharges to the outer harbor) is listed for lead, mercury, and PCBs. Note that streams within the same watershed identifier (#24) are additionally listed as impaired for nutrients (TN, TP), turbidity, and Dissolved Oxygen but these additional impairments do not apply to the sea-water segment of the harbor to which the Utulei STP discharges. The only 303(d)-listed pollutant for which the Utulei STP has a potential to be a source is enterococci, and the limits specified in the TMDL are identical to those specified in the American Samoa Water Quality Standards (AS-WQS). Therefore, compliance with AS-WQS for Enterococci will ensure compliance with the requirements of the TMDL.

2. Dilution in the Receiving Water

The discharge from Outfall 001 is to outer Pago Pago Harbor adjoining the South Pacific Ocean, where regular currents and a diffuser installed approximately 1000 feet offshore at 150 feet deep ensure effective dilution and providing the basis for this 301(h)-modified permit. In accordance with EPA's §301(h) Amended Technical Support Document (ATSD), EPA reviewed the calculation of initial dilution and trapping depth under both the proposed daily average flow and critical flow scenarios provided by the applicant. Based on its review, EPA believes that an average initial dilution and critical initial dilution of 127:1 and 91:1, respectively, are adequately calculated for the purpose of the section 301(h) evaluation. However, because section 301(h) regulations require that the applicant's diffuser be located and designed to provide initial dilution, dispersion, and transport sufficient to ensure compliance with water quality standards at the ZID boundary under *critical conditions* (see 40 CFR 125.62(a)(1)(iv)), EPA evaluated compliance with section 301(h) regulations based only on the critical initial dilution of 91:1. For more information, see the detailed analysis of dilution in the accompanying 2019 Utulei 301(h) Final Decision Document.

3. Type of Industry

Typical pollutants of concern in untreated and treated domestic wastewater such as that discharged by the Utulei STP include ammonia, nutrients, oxygen demand, pathogens (bacteria such as enterococci), temperature, pH, oil and grease, and solids. Chlorine and turbidity may also be of concern due to treatment plant operations. This permit incorporates limits and/or monitoring requirements for all these parameters except Chlorine, because that chemical is known not to be in use at the Utulei treatment plant.

4. History of Compliance Problems and Toxic Impacts

The Utulei STP has historically shown very high levels of enterococci bacteria as well as high levels of Nitrogen. These elevated levels led directly to EPA's 2009 tentative decision and 2011 administrative order. Toxic impacts were also infrequently measured. However, as described in the 2019 Utulei 301(h) Final Decision Document, the treatment upgrades have improved compliance with enterococcus water quality standards, and recent data has shown improvements in other areas. In addition, this permit includes limitations to ensure protection of water quality for all these pollutants.

5. Existing Data on Toxic Pollutants

For pollutants with effluent data available, EPA has conducted an analysis of reasonable potential to comply with water quality standards incorporating the dilution available to the discharger from their approved mixing zone. The maximum effluent concentrations were taken from the last five years of DMRs, including data reported in accordance with the 2011 Administrative Order. EPA calculated the projected maximum effluent concentration for each pollutant using the following equation:

Projected maximum concentration = C_e ÷ *available dilution (91:1 in this case).*

Where, "C_e" is the reported maximum effluent value.

Summary of Effluent Data Analysis:

Parameter	Maximum Observed Effluent Concentration	Projected receiving water concentration after 91:1 dilution	Most Stringent Applicable Water Quality Criterion	Reasonable Potential?
BOD_5	110 mg/L	1.21 mg/L	No applicable WQS	N/A
TSS	89 mg/L	0.98 mg/L	No applicable WQS	N/A
Enterococci*	3262 CFU / 100 mL	35.8 CFU/100 mL	35 CFU / 100 mL	Y
Settleable Solids	1.10 ml/L	0.012 ml/L	No applicable WQS	N/A
Total Nitrogen*	20,000 ug/l	220 ug/l	200 ug/l	Y
Total Phosphorous*	5,300 ug/l	58.2 ug/l	30 ug/l	Y
Chronic Toxicity	666.7	7.33TU_c	1.0 TU_c	Y
Ammonia*	20,000 ug/l	220 ug/l	Depends on pH and temperature data	Y

pH	Minimum of 6.9 and Maximum of 7.6	N/A	Minimum of 6.5 and Maximum of 8.6	N
Oil & Grease	28	N/A	Narrative WQS	Y

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*Data from monitoring required by 2011 Administrative Order

C. Rationale for Numeric Effluent Limits and Monitoring

EPA evaluated the typical pollutants expected to be present in the effluent and selected the most stringent of applicable technology-based standards or water quality-based effluent limitations. Where effluent concentrations of toxic parameters are unknown or are not reasonably expected to be discharged in concentration that have the reasonable potential to cause or contribute to water quality violations, EPA may establish monitoring requirements in the permit. Where monitoring is required, data will be re-evaluated and the permit may be re-opened to incorporate effluent limitations as necessary.

Flow

Flow rates must be monitored and reported to ensure any beyond-capacity situations are planned for, monitored, and tracked. Monitoring is required continuously with reporting of monthly and weekly averages, and daily maximum flow levels.

BOD_5 and TSS

Limits for BOD_5 and TSS are established for POTWs as described above under "technology-based effluent limitations" and are incorporated into the permit. The same concentration-based limitations have been carried over from the previous permit. Under 40 CFR Section 122.45(f), mass limits are also required for BOD_5 and TSS. Based on the proposed end-of-permit-term flow of 3.0 MGD, the mass-based limits have also been calculated as shown above and are included in the proposed permit.

Enterococci

Bacteria are a common component of wastewater discharge and of particular concern for their potential effect on human health. Enterococci are commonly used as indicator organisms for bacteria levels in a discharge. As shown above, there is reasonable potential for the discharge to cause or contribute to an excursion above the water quality standards for enterococcus. The permit implements the two distinct AS-WQS bacteria standards for enterococci, which embody different statistical approaches, as a pair of limits. The 90%-of-samples-not-to-exceed standard is a direct conversion of the statistical threshold value for Pago Pago Harbor by the approved dilution factor (130 CFU/100 mL * 91:1 = 11,830 CFU/100 mL before dilution), based on the definition of "statistical threshold value" in §24.0201 of the AS-WQS. The Median-not-to-exceed value in the permit addresses the stipulation in the AS-WQS implementation guidance of March 2014 that "For NPDES permittees, permit compliance for marine receiving waters shall be determined utilizing the geometric mean of all discrete measurements (all depths, all stations, as required in the permit) over a 30 day period." The geometric mean standard for bacteria in Pago Pago Harbor in the AS-WQS is 35 per 100 mL. Because monitoring is conducted by the permittee only once per month, there would be no data to calculate a representative geometric mean from multiple samples, but the geometric mean standard as specified in the AS-WQS would still apply. Translating this value by the approved dilution factor results in a monthly permit limit of (35 * 91) = 3,185

CFU/100 mL, which EPA has used Best Professional Judgement to implement as a limit on the average monthly concentration in the absence of sufficient data to calculate a true geometric mean from multiple data points per month.

Settleable Solids

Limits for Settleable Solids are established for POTWs based on the technology-based effluent limits defined for primary treatment, as described above. Applicable limits have been carried over from the previous permit.

Total Nitrogen and Total Phosphorous

Nitrogen and Phosphorous are nutrients which are often over-abundant in biological wastes like domestic wastewater. Discharging such elevated levels of nutrients to natural waters can lead to the growth of nuisances like algae blooms and other undesirable effects, as well as potentially depleting the dissolved oxygen levels in the receiving water and suffocating marine life. As shown in the reasonable potential analysis above, the facility has a reasonable potential to cause or contribute to an excursion above water quality standards. Therefore, the permit includes effluent limits consistent with the AS-WQS. Limits were calculated as follows:

> Concentration-based Effluent Limit (mg/L) = AS-WQS * dilution factor (91:1)
>
> Phosphorous median standard (30 µg/L) * 91 = 2,730 ug/L, implemented as a monthly average permit limit.
>
> Phosphorous 2% not-to-exceed standard (90 µg/L) * 91 = 8,190 ug/L, implemented as a daily maximum permit limit.
>
> Nitrogen median standard (200 µg/L) * 91 = 18,200 ug/L, implemented as a monthly average permit limit.
>
> Nitrogen 2% not-to-exceed standard (500 µg/L) * 91 = 45,000 ug/L, implemented as a daily maximum permit limit.

Chronic Toxicity (TST test)

The AS-WQS include prohibitions against discharges to marine waters which cause toxic effects, after allowing for initial dilution. As shown above, the discharge has the reasonable potential to cause or contribute to an excursion above the water quality standard for toxicity. In the absence of a numeric WQS, EPA uses a limit of 1.0 Chronic Toxicity Units (TU_c) as identified in the September 2007 EPA Region 9 and 10 Toxicity Training Tool, page 26: "For chronic protection, the CCC [Criterion Continuous Concentration] should be set at 1.0 chronic toxic units (TUc) to the most sensitive of at least three test species."

The permit includes a chronic toxicity limit requiring that samples "pass" the EPA Test of Significant Toxicity (TST).

Ammonia

American Samoa Water Quality Standards (AS-WQS) specify ammonia standards for the receiving water. Treated and untreated domestic wastewater, such as that discharged from the Utulei STP, may contain levels of ammonia that are toxic to aquatic organisms. Ammonia is

converted to nitrate during biological nitrification process, and then nitrate is converted to nitrogen gas through biological denitrification process. The water quality standards are pH and temperature dependent. Due to the potential for ammonia to be present in sanitary wastewater at toxic levels and due to the conversion of ammonia to nitrate, effluent limitations are established for ammonia using the Ammonia Impact Ratio ("AIR") for all facilities.

The AIR is calculated as the ratio of the ammonia value in the effluent to the applicable ammonia water quality standard. The ASWQS contain ammonia criteria which are pH and temperature dependent. Therefore, pH, temperature and ammonia sampling must be concurrent. Attachment D of the permit contains a sample log to calculate and record the AIR values and Attachment E lists applicable Water Quality Standards.

The permittee must also monitor and report the sampled ammonia effluent values (as well as pH and Temperature) used to calculate the AIR, in addition to the calculated numeric AIR value itself. AIR provides more flexibility than a specific, fixed effluent concentration and is protective of water quality standards since the value is set relative to the water quality standard, with consideration of dilution. If the reported value exceeds the AIR limitation, then the effluent ammonia-N concentration exceeded the ammonia water quality criterion after dilution.

pH and Temperature

Although the data shows no reasonable potential for the discharge to exceed WQS for pH, the permit retains the water quality-based effluent limits from the previous permit for pH to meet anti-backsliding requirements. In addition, temperature monitoring is required to assess compliance with the ammonia effluent limit.

Oil and Grease

Domestic wastewater may often contain elevated levels of oil and grease from sources including kitchen drains and sanitary wastes. As these constituents can cause harm to marine life and form a problematic oily sheen on the receiving water, limits are set in the permit based on EPA's best professional judgement of typical limits at other comparable wastewater treatment facilities (an average monthly of 10 mg/l and daily maximum of 15 mg/l) in order to ensure the narrative water quality standard requiring waters to be "free from visible floating materials, grease, oil, scum, foam, and other floating material attributable to sewage, industrial wastes, or other activities of man" is met. (ASWQS Section 24.206(b))

Chlorine, total residual

Treatment plants often discharge elevated levels of chlorine if they use the chemical for disinfection. The Utulei STP does not use chlorine for disinfection, therefore the permit does not implement a total chlorine limit.

D. Anti-Backsliding

Section 402(o) of the CWA prohibits the renewal or reissuance of an NPDES permit that contains effluent limits less stringent than those established in the previous permit, except as provided in the statute.

The permit does not establish any effluent limits less stringent than those in the previous permit. The permit allows higher mass-based limits for Biochemical Oxygen Demand and Total

Suspended Solids, derived from an expected increase in total flow to 3 MGD. These higher mass-based limits are permissible under Title 33 of the U.S. Code §1342(o)(1), by reference to §1313(d)(4) under the same Title (also known as CWA §303(d)(4)), which specifies that "for waters…where the quality of such waters equals or exceeds levels…required by applicable water quality standards, any effluent limitation based on…any water quality standard established under this section, or any other permitting standard may be revised…if such revision is subject to and consistent with the antidegradation policy". The receiving water is not impaired for the parameters in question (BOD and TSS), and EPA's analysis in the 301(h) TDD shows the receiving water meets WQS for DO and light penetration. Therefore, EPA has determined that allowing an increase in the mass-based effluent limitations for BOD and TSS meets antidegradation and anti-backsliding requirements.

E. Antidegradation Policy

EPA's antidegradation policy at 40 CFR 131.12 and the AS-WQS at American Samoa administrative rule No. 001-2013 require that existing water uses and the level of water quality necessary to protect the existing uses be maintained.

As described in this document, the permit establishes effluent limits and monitoring requirements to ensure that all applicable water quality standards are met. The permit includes a mixing zone, which has been approved by American Samoa EPA and reviewed by EPA for appropriate protection of the receiving water.

The permit allows higher mass loadings of BOD and TSS based on projected average flow than the previous permit. This change is permissible once dilution and ambient levels are accounted for because receiving water monitoring data show that existing mass loadings of these parameters have not resulted in a violation of the applicable standards. Furthermore, the waterbody is not listed as an impaired waterbody for these parameters under section 303(d) of the CWA.

Therefore, EPA concludes the discharge meets antidegradation requirements.

VII. NARRATIVE WATER QUALITY-BASED EFFLUENT LIMITS

The American Samoa Water Quality Standards contain narrative water quality standards applicable to the receiving water (AS-WQS, §24.0206). Therefore, the permit incorporates applicable narrative water quality standards in Part I.A.

VIII. MONITORING AND REPORTING REQUIREMENTS

The permit requires the permittee to conduct monitoring for all pollutants or parameters where effluent limits have been established pursuant to 40 CFR 122.44, at the minimum frequency specified. Additionally, where effluent concentrations of toxic parameters are unknown or where data are insufficient to determine reasonable potential, EPA may require monitoring for additional pollutants or parameters.

A. Effluent Monitoring and Reporting

The permittee shall conduct effluent monitoring to evaluate compliance with the proposed permit conditions. The permittee shall perform all monitoring, sampling and analyses in accordance with the methods described in the most recent edition of 40 CFR 136, unless otherwise specified in the proposed permit. All monitoring data shall be reported on monthly DMRs and submitted quarterly as specified in the proposed permit. All DMRs are to be submitted electronically to EPA using NetDMR.

In addition, the permittee shall continue the successful receiving water monitoring program which has allowed an accurate understanding of the context and effects of the discharge. This monitoring program shall be updated to incorporate permanent ZID stations, as necessary for renewal of the 301(h) variance, as well as direct monitoring of the effluent for parameters which were formerly only measured in the receiving water.

B. Priority Toxic Pollutants Scan

A Priority Toxic Pollutants scan shall be conducted during the fourth year of the five-year permit term to ensure that the discharge does not contain toxic pollutants in concentrations that may cause a violation of water quality standards. The permittee shall perform all effluent sampling and analyses for the priority pollutants scan in accordance with the methods described in the most recent edition of 40 CFR 136, unless otherwise specified in the proposed permit or by EPA. 40 CFR 131.36 provides a complete list of Priority Toxic Pollutants.

C. Whole Effluent Toxicity Testing

The permit establishes testing requirements for chronic toxicity.

Chronic toxicity testing evaluates reduced growth/reproduction at 100 percent effluent. Chronic toxicity is to be reported based on a determination of "Pass" or "Fail" from a single effluent-concentration chronic toxicity test at the IWC of 1.1 percent effluent using the Test of Significant Toxicity (TST) approach described in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010). For any one acute toxicity test, the chronic WET permit limit that must be met is rejection of the null hypothesis (H_o):

IWC (1.1 percent effluent) mean response $\leq 0.75 \times$ Control mean response.

A test result that rejects this null hypothesis is reported as "Pass" on the DMR form. A test result that does not reject this null hypothesis is reported as "Fail" on the DMR form. To calculate either "Pass" or "Fail", the permittee shall follow the instructions in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document*, Appendix A. The permittee shall conduct short-term tests with the sand dollar (*Dendraster excentricus*) or the Purple Urchin (*Strongylocentrotus purpuratus*).

IX. SPECIAL CONDITIONS

A. Biosolids

Standard requirements for the monitoring, reporting, recordkeeping, and handling of biosolids in accordance with 40 CFR Part 503 are incorporated into the permit. The permit also includes electronic reporting requirements for dischargers who are required to submit biosolids annual reports, which include major Publically Owned Treatment Works (POTW)s that prepare

sewage sludge and other facilities designated as "Class 1 sludge management facilities" (the Utulei STP is classified as a "major" POTW and must submit biosolids reports). Permittees shall submit biosolids annual reports using EPA's NPDES Electronic Reporting Tool ("NeT") by February 19th of the following year.

B. Pretreatment

EPA has established pretreatment standards to prevent the introduction of pollutants into POTWs which will interfere with or pass through the treatment works, and to improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges (Section 307 of the CWA). EPA requires any POTW (or combination of POTWs operated by the same authority) with a total design flow greater than 5 MGD and receiving from nondomestic sources pollutants which pass through or interfere with the operations of the POTW or are otherwise subject to pretreatment standards to establish a pretreatment program.

There are no nondomestic facilities discharging pollutants to Utulei STP. Therefore, the permit contains no pretreatment requirements other than the Non-Industrial Source Control Education Program required by CWA § 301(h). The purpose of the Non-Industrial Source Control Education Program is to minimize the entrance of toxic pollutants and pesticides to the Utulei STP from non-industrial sources. The Permittee can comply with the permit requirements by continuing to implement its current program, which includes newspaper articles, radio and television announcements, and informational pamphlets to increase awareness of the need for proper disposal of toxic pollutants.

C. Capacity Attainment and Planning

To ensure that adequate advance recognition and notice are given to capacity issues, the permit requires that a written report be filed within ninety (90) days if the average dry-weather wastewater treatment flow for any month exceeds 90 percent of the annual dry weather design capacity of the waste treatment and/or disposal facilities.

D. Development and Implementation of Best Management Practices

Pursuant to 40 CFR 122.44(k)(4), EPA may impose Best Management Practices (BMPs) which are "reasonably necessary…to carry out the purposes of the Act." The pollution prevention requirements or BMPs proposed in the permit operate as technology-based limitations on effluent discharges that reflect the application of Best Available Technology and Best Control Technology.

The permittee shall develop and implement BMPs that are necessary to control bacteria levels in the discharge, including daily logging of the UV transmissivity in the UV disinfection system and any deposition of solids in that same tank.

E. Development of an Initial Investigation TRE Workplan for Whole Effluent Toxicity

In the event effluent toxicity is identified or suspected from WET test results, the permit requires the permittee to develop and implement a Toxics Reduction Evaluation (TRE) Workplan. For chronic toxicity, unacceptable effluent toxicity is found in a single test result of "fail" (failure to reject the null hypothesis) when testing whether an IWC (1.1 percent effluent) mean response is $\leq 0.75 \times$ the mean response of the Control.
The draft permit also requires additional toxicity testing if a chronic toxicity monitoring event yields a result of "fail".

Within 90 days of the permit effective date, the permittee shall prepare and submit a copy of their Initial Investigation TRE Workplan (1-2 pages) for chronic toxicity to EPA for review.

F. Asset Management

40 CFR 122.41(e) requires permittees to properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. Asset management planning provides a framework for setting and operating quality assurance procedures and ensuring the permittee has sufficient financial and technical resources to continually maintain a targeted level of service. Asset management requirements have been established in the permit to ensure compliance with the provisions of 40 CFR 122.41(e).

X. OTHER CONSIDERATIONS UNDER FEDERAL LAW

A. Consideration of Environmental Justice

EPA's Environmental Justice policy establishes fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. As part of the environmental permitting process, EPA considers cumulative environmental impacts to disproportionately impacted communities.

In American Samoa, EPA is aware of several environmental burdens facing communities with limited resources, including ongoing boil water notices on the local drinking water system, wastewater treatment only to primary standards, industrial discharges, runoff from small-scale piggeries and an abundance of cesspools for individual residences.

This permit was written to regulate a publicly owned wastewater treatment plant as a potential source of pollution, to ensure the plant's discharge does not adversely impact the water quality of Pago Pago Harbor. In particular, and after careful consideration, EPA has set permit limits equal to or more stringent than those in the preceding permit, with the exception of the mass-based (lbs/day) limits on Biochemical Oxygen Demand and Total Suspended Solids. These two parameters are still required to maintain the same concentration-based (mg/L) limits as in the previous permit, and the changes to the mass-based limits are a reflection of the growing population served by the treatment plant.

In consideration of the above, EPA believes the permitted discharges should not contribute to undue incremental environmental burden and has made reasonable effort to ensure the community has, at a minimum, the same degree of protection as less burdened communities.

B. Impact to Threatened and Endangered Species

Section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1536) requires federal agencies to ensure that any action authorized, funded, or carried out by the federal agency does not jeopardize the continued existence of a listed or candidate species, or result in the destruction or adverse modification of its habitat.

EPA identified listed species in American Samoa and evaluated whether the proposed discharges would affect those species. Additional details of EPA's Biological Evaluation ("BE"), as shared with the U.S. Fish and Wildlife Service ("FWS") and the National Marine Fisheries Service ("NMFS") are available in the permit record.

EPA concluded that the discharge may affect, but is not likely to adversely affect, corals in American Samoa. EPA concluded the discharge will not affect other listed species.

EPA has concluded informal consultation with both USFWS and NMFS and both services have concurred with EPA's conclusion, in letters dated August 15, 2018 and June 5, 2019 respectively. Additionally, EPA provided both services with copies of the draft fact sheet and the draft permit during the public notice period and received no additional comments on the proposed permit requirements.

C. Impact to Coastal Zones

The Coastal Zone Management Act (CZMA) requires that Federal activities and licenses, including Federally permitted activities, must be consistent with an approved state Coastal Management Plan (CZMA Sections 307(c)(1) through (3)). Section 307(c) of the CZMA and implementing regulations at 40 CFR 930 prohibit EPA from issuing a permit for an activity affecting land or water use in the coastal zone until the applicant certifies that the proposed activity complies with the State (or Territory) Coastal Zone Management program, and the State (or Territory) or its designated agency concurs with the certification.

EPA has received a general concurrence from the American Samoa Coastal Zone Management Program for the renewal of existing NPDES permits issued in American Samoa (American Samoa Department of Commerce, June 17, 2010 letter). As this action is a reissuance of the existing NPDES permit for the Utulei STP, the general concurrence applies and EPA has assured consistency with the Territory's Coastal Zone Management program.

D. Impact to Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act (MSA) set forth mandates for the National Marine Fisheries Service, regional fishery management councils and other federal agencies to identify and protect important marine and anadromous fish species and habitat. The MSA requires Federal agencies to make a determination on Federal actions that may adversely impact Essential Fish Habitat (EFH).

The permit contains technology-based effluent limits and numerical and narrative water quality-based effluent limits consistent with the standards designed to protect applicable aquatic life uses, as defined in the American Samoa Water Quality Standards. Therefore, EPA has determined that the proposed permit will not adversely affect essential fish habitat. The National Marine Fisheries Service concurred with EPA's conclusion in an E-mail dated August 20, 2019, after reviewing the permit record.

E. Impact to National Historic Properties

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effect of their undertakings on historic properties that are either listed on, or eligible for listing on, the National Register of Historic Places. Pursuant to the NHPA and 36 CFR §800.3(a)(1), EPA is making a determination that issuing this proposed NPDES permit does not

have the potential to affect any historic properties or cultural properties. As a result, Section 106 does not require EPA to undertake additional consulting on this permit issuance.

XI. STANDARD CONDITIONS

A. Reopener Provision

In accordance with 40 CFR 122 and 124, this permit may be modified by EPA to include effluent limits, monitoring, or other conditions to implement new regulations, including EPA-approved water quality standards; or to address new information indicating the presence of effluent toxicity or the reasonable potential for the discharge to cause or contribute to exceedances of water quality standards.

B. Standard Provisions

The permit requires the permittee to comply with EPA Region IX Standard Federal NPDES Permit Conditions, dated July 1, 2001.

XII. ADMINISTRATIVE INFORMATION

A. Public Notice (40 CFR 124.10)

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a draft NPDES permit or other significant action with respect to an NPDES permit or application.

B. Public Comment Period (40 CFR 124.10)

Notice of the draft permit will be placed in a daily or weekly newspaper within the area affected by the facility or activity, with a minimum of 30 days provided for interested parties to respond in writing to EPA. After the closing of the public comment period, EPA is required to respond to all significant comments at the time a final permit decision is reached or at the same time a final permit is actually issued.

C. Public Hearing (40 CFR 124.12(c))

A public hearing may be requested in writing by any interested party. The request should state the nature of the issues proposed to be raised during the hearing. A public hearing will be held if EPA determines there is a significant amount of interest expressed during the 30-day public comment period or when it is necessary to clarify the issues involved in the permit decision.

D. Water Quality Certification Requirements (40 CFR 124.53 and 124.54)

For States, Territories, or Tribes with EPA approved water quality standards, EPA is requesting certification from the affected State, Territory, or Tribe that the proposed permit will meet all applicable water quality standards. Certification under section 401 of the CWA shall be in writing and shall include the conditions necessary to assure compliance with referenced applicable provisions of sections 208(e), 301, 302, 303, 306, and 307 of the CWA and appropriate requirements of Territory law.

XIII. CONTACT INFORMATION

Comments, submittals, and additional information relating to this proposal may be directed to:

Pascal Mues
mues.pascal@epa.gov
(415) 972-3768

EPA Region IX
75 Hawthorne Street (WTR 2-3)
San Francisco, California 94105

XIV. REFERENCES

American Samoa EPA (ASEPA), 2013. *American Samoa Water Quality Standards* (2013 revision). American Samoa Administrative Rule No. 001-2013

American Samoa EPA (ASEPA), 2014. *American Samoa Water Quality Standards Implementation Guidance Manual*. March 2014

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APPENDIX C-3
UTULEI NPDES FACT SHEET (2021)

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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
FINAL PERMIT MODIFICATION FACT SHEET
June 2021

Permittee Name:	American Samoa Power Authority - Utulei Sewage Treatment Plant
Mailing Address:	P.O. Box PPB Pago Pago, American Samoa 96799
Facility Location:	Tulutulu Point off Route 1 Utulei, American Samoa 96799
Contact Person(s):	Fa'i Mareko, Wastewater Manager faim@aspower.com; (684) 633-7799 Faaliga Tavila, Treatment Plant Supervisor faaliga@aspower.com
NPDES Permit No.:	AS0020001

I. STATUS OF PERMIT

American Samoa Power Authority, also known as ASPA (the "permittee" or "discharger") has applied for the renewal of their National Pollutant Discharge Elimination System (NPDES) permit to authorize the discharge of treated effluent from the Utulei Sewage Treatment Plant (Utulei STP) to Pago Pago harbor, located near the center of the island of Tutuila, American Samoa. The permittee submitted an application on May 1, 2006, and subsequently updated in 2008 and 2016-17. During this period, the facility implemented major upgrades to its treatment system under an EPA administrative order. EPA accepted public comments on a draft permit from May 24 thru July 12, 2019, then proceeded to revise the draft permit based on those comments, and issued the final permit on November 18, 2019. The discharger appealed four conditions of the permit to the Environmental Appeals Board (EAB) on December 20, 2019. Specifically, ASPA sought review of the underlying dilution factor and resulting effluent limitations for Total Nitrogen (TN), Total Phosphorous (TP), ammonia, and Whole Effluent Toxicity (WET).

EPA withdrew the four contested provisions and provided notice thereof on January 16, 2020, pursuant to 40 CFR § 124.19(j). As specified in 40 CFR § 124.16(a)(2), EPA determined that all remaining permit provisions were uncontested and severable and became fully effective and enforceable on February 15, 2020, 30 days after the notice of withdrawal. On January 22, 2020, the EAB granted EPA's motion to dismiss ASPA's petition as moot given that EPA had withdrawn the contested provisions.

Consistent with 40 CFR § 124.19(j), EPA provided a public notice and opportunity for comments regarding the four draft provisions that EPA withdrew as outlined above. EPA is also updating the permit to reflect one minor modification, which pursuant to 40 CFR § 122.63, is immediately effective and not subject to public comment. All other provisions of the permit have gone into effect and are not subject to public comment at this time. The first table below provides a summary of the changes to the draft permit provisions subject to public comment and the second table summarizes the minor modifications to the permit that are immediately effective.

Table 1. Draft Permit Provisions Subject to Public Comment

Modified Permit or Fact Sheet element[1]	Permit / Fact Sheet section reference	Page # in Permit / FS	Authority for, and Description of, permit modification	Rationale
Permit Nutrient and ammonia Limits, and Whole Effluent Toxicity (WET) IWC factor	Permit Part I.B, Table 1, entries for Nitrogen and Phosphorous, Part II.C IWC values, and values in Attachment E tables for ammonia and Fact Sheet Sections VI.B.2, VIB.5, VI.C, VI.D, and VIII.C	Permit pages 5-6, 14-15, and Attach-ment E and Fact sheet pages 14-16, 18-23	40 CFR § 122.62(a)(2) – New information from the discharger that was not considered in EPA's previous modeling has led to a re-evaluation of the critical dilution factor achievable for these parameters. And 40 CFR § 122.62(a)(2) – New information Revised dilution factor affecting the IWC value for Whole Effluent Toxicity (WET) test procedures	EPA's had initially included a dilution factor of 91:1. On appeal, EPA has re-evaluated the performance of the recently modified diffuser and finds that an increase in Critical Initial Dilution to 121:1 is appropriate. EPA has revised limits for these four parameters accordingly, including the new dilution factor's effect on the IWC for toxicity tests.
Permit - Inclusion of missing ammonia Data Log column (Salinity)	Permit Attachment D	Permit page 48	40 CFR §122.62(a)(3)(i)(A) – New Regulations - updated ASWQS	New ASWQS for ammonia incorporate the additional variable of salinity, making it necessary to include a column for salinity in the Ammonia Impact Ratio Data Log.
Permit - Inclusion of expanded ASWQS Ammonia Standards Table	Permit Attachment E	Permit pages 49-51	40 CFR §122.62(a)(3)(i)(A) – New Regulations - updated ASWQS	The permit incorporates the ASWQS ammonia standard, from AS Administrative Rule ASAC Title 24 Chapter 2, Appendix A. These changes to the standard were made by ASEPA and approved by USEPA on August 4, 2020.

[1] Only the enumerated sections of this Fact Sheet have been revised. All remaining sections of this Fact Sheet were developed to explain the conditions of the Permit issued on November 18, 2019 and refer to the status of the discharging facility at that time.

Table 2. Minor Modifications that are Immediately Effective (Not Subject to Public Comment)

Modified Permit or Fact Sheet element[1]	Permit / Fact Sheet section reference	Page # in permit / FS	Authority for, and Description of, permit modification	Rationale
Permit - Inclusion of missing Ammonia Data Log column (Temperature)	Permit Attachment D	Permit page 48	40 CFR § 122.63(a) – Typographical correction -re-insertion of missing column for Temperature data	The example Ammonia Data Log table now includes Column D (temperature). Column D was previously missing due to a typographic error.

EPA Region 9 has developed this permit and fact sheet pursuant to Section 402 of the Clean Water Act, which requires point source dischargers to control the amount of pollutants that are discharged to waters of the United States through obtaining a NPDES permit.

The permittee is currently discharging under NPDES Permit No. AS0020001 issued on November 18, 2019, and became effective on January 1, 2020, with the exception of the four withdrawn provisions.[2] Until EPA finalizes the four draft provisions that were withdrawn, the corresponding provisions from the previous permit apply as follows: 1) Parts A.1.a and A.4 of the 2001 permit will apply in place of the withdrawn WET requirement; 2) Part A.3.d of the 2001 permit will apply in place of the withdrawn TP requirements; and, 3) Part A.3.e will apply in place of the withdrawn TN requirements. There was no applicable limit for ammonia in the 2001 permit.

This permittee has been classified as a Major discharger.

II. SIGNIFICANT CHANGES TO PREVIOUS PERMIT

Table 3. Significant Changes to Previous Permit

Permit Condition	Previous Permit	Re-issued Permit	Reason for change
Ammonia effluent limit	No limit or monitoring requirement	Effluent limits and monitoring requirements for ammonia monitoring have been added to the permit. Compliance with the ammonia effluent limit	Reasonable potential to exceed WQS. The AIR makes determination and reporting of compliance easier than floating limits based on pH and temperature.

[2] The four withdrawn provisions involved the underlying dilution factor and resulting effluent limitations for Total Nitrogen (TN), Total Phosphorous (TP), ammonia, and Whole Effluent Toxicity (WET).

		will be determined using the Ammonia Impact Ratio ("AIR"). The permit limit is set to a value of 1.0. The permittee must also continue to monitor and report ammonia effluent values in addition to the AIR value.	
Total Nitrogen and Total Phosphorus effluent limits	No limit or monitoring requirement	Effluent limits and monitoring requirements for TN and TP have been added	Reasonable potential to exceed WQS
Enterococcus effluent limits	No limit or monitoring requirement, except receiving water monitoring	Effluent limits and monitoring requirements for enterococcus have been added	Reasonable potential to exceed WQS
Chronic toxicity effluent limit	No limit, only monitoring with trigger	Effluent limits and monitoring requirements for chronic toxicity have been added	Reasonable potential to exceed WQS
BOD and TSS effluent limits	Effluent limits and monitoring requirements	Mass-based effluent limits adjusted to reflect 3.0 mgd flow	Increase in flow
Temperature monitoring	No temperature monitoring required	Temperature monitoring requirement added	Temperature data are required for determining compliance with the ammonia limit
Receiving Water Monitoring Program updated	The previous permits contained a receiving water monitoring program which did not include Zone of Initial Dilution (ZID) stations	Requirements for the receiving water monitoring program have been updated to include ZID stations	The §301(h) regulations determine compliance with several monitoring parameters at the boundary of the ZID. The existing monitoring program does not collect data at the ZID, and correcting this omission will make it easier for the discharger to track compliance.
Operations and Maintenance reopener provision	The previous permit contained no specific provisions for Operations and Maintenance (O&M)	The new permit includes an explicit reopener provision for addressing O&M deficiencies	Maintenance problems with clarigesters identified by EPA during recent site visits, as well as the high anticipated O&M burden of the UV disinfection system, make this an aspect of the treatment plant which requires close attention. EPA has specifically provided for

			modification of the permit if O&M problems are identified in future.
Best Management Practices (BMPs)	The previous permit contained no specific BMPs	New permit adds an explicit BMP requirement for daily review of UV transmissivity and an absence of solids deposition in the disinfection system	UV disinfection systems are highly reliant on having high UV transmissivity (clear effluent) to work effectively, and the combination of primary treatment with UV disinfection at Utulei STP is unusual in this regard. Therefore, the new permit contains BMPs to require daily logging of the UV transmissivity to identify and correct any problems.
Sanitary Sewer Overflow provisions	The previous permit did not explicitly address sanitary sewer overflows.	The new permit incorporates sanitary sewer overflow restrictions and reporting requirements	Sanitary Sewer Overflow provisions are now a standard part of EPA NPDES permits
Asset Management provisions	The previous permit did not explicitly address asset management.	The new permit incorporates standard asset management requirements for small utilities	Asset management is a proven approach which reduces both accidental discharges and maintenance costs over the long term. The Utulei STP's resource situation and past maintenance challenges make it a good candidate to benefit from EPA's free small-system asset management tool.
Capacity Attainment and Planning provision	The previous permit did not include a notification requirement for dry-weather flows approaching the facility's maximum treatment capacity	The new permit includes a notification requirement for dry-weather flows approaching the facility's maximum treatment capacity	When dry-weather flows come close to a treatment plant's maximum capacity, expansion of the treatment plant is an eventuality both the discharger and EPA often need to begin planning for. This notification requirement ensures adequate advance notice.

III. GENERAL DESCRIPTION OF FACILITY

The Utulei STP is located in the township of Utulei on Tutuila Island, the largest and principal island of American Samoa. Utulei STP is a primary treatment plant that collects and treats wastewater from several nearby residential areas and the downtown area. The service area includes the villages of Faga'alu (including the hospital), Utulei, Fagatogo, Pago Pago (both upper and lower parts of the village), and Atu'u (including the sanitary wastewater from the two local tuna canneries). The service area also includes the villages of Leloaloa, Au'a, and Onesosopo which are not yet connected but were included in the original design of the Harbor Sewer System and the Utulei STP, and for which connection work is ongoing. In the application, the applicant indicated that the wastewater collected from these areas is largely organic and domestic in nature (ASPA 2006). Domestic wastewater includes waste or wastewater from humans or household operations that is discharged to or otherwise enters the treatment plant (40 CFR 122.2). In the application, the applicant indicated that there are currently no industrial sources of wastewater that flow to the treatment plant and none planned in the near future. The Plant currently serves a population of approximately 13,000 people.

The plant provides grit removal, primary sedimentation, anaerobic sludge digestion, and ultraviolet (UV) disinfection prior to discharge into outer Pago Pago Harbor. Influent enters the plant at the influent wet well, which contains four submerged variable speed pumps. As influent exits the wet well, it is screened through a rock basket with two-inch square mesh. Influent is then pumped into an elevated grit channel. Additional grit is removed at the headworks. The plant's primary treatment unit is the clarigester. Clarigesters consist of an upper clarifier that removes settleable solids and skims off floatables and a lower anaerobic digester that settleable solids are funneled directly into. Gas from the digesters is vented near the top of the clarigesters. Following primary clarification, flow converges and continues to an elevated UV channel.

Attachment B to the permit, Figure 1, identifies the locations of the facility and Figure 2 details the location of the outfall. Attachment C to the permit shows a diagram of the facility, including the UV disinfection system installed in 2016. The UV disinfection system consists of a repurposed contact chamber containing 4 banks of 18 UV lamps each, with a design capacity great enough to handle the 6 MGD (Million Gallons per Day) maximum design flow of the treatment plant.

After treatment, the Utulei STP discharges treated effluent directly into Pago Pago Harbor through a 21-inch high-density polyethylene pipe and outfall. The terminus of the outfall is located approximately 954 feet off of Tulutulu Point in outer Pago Pago Harbor at a depth of 150 feet. This places the end of the outfall at 14º 16’ 59.6” South latitude and 170º 40’ 28.1” West longitude. Effluent is discharged horizontally in alternatively opposite directions through a linear multiport diffuser. The diffuser consists of six lateral ports, plus a separate “end gate” port, and has a total length of approximately 42.6 feet, with the ports spaced approximately 7.1 feet apart. The ports have a diameter of 5.5 inches while the end gate port is 11 inches across. The average depth of the ports is 145 feet.

The existing outfall and diffuser first began operation in 1996 and were constructed to improve the discharge by enhancing the initial dilution and dispersal of pollutants in the receiving water. The improvements included a 47 foot diffuser with six ports to enhance dilution and mixing within the water column. Sludge from the primary treatment process is transported to the Tafuna STP on the southwestern portion of the island where it is treated by anaerobic digestion and placed in drying beds until landfill disposal. The climate in American Samoa is characterized as the humid tropics with wet weather occurring on a year-round basis. Therefore, no peak dry weather periods (seasons, often monsoonal) occur as observed on other Pacific Islands. Note that this does not preclude analysis of "dry weather" flow characteristics at the treatment plant (i.e. treatment plant flows during periods of minimum inflow and infiltration), as there are still shorter periods of limited or no rain on the island.

IV. DESCRIPTION OF RECEIVING WATER

Utulei STP discharges into the outer portion of Pago Pago Harbor. Pago Pago Harbor is located on the southeastern portion of Tutuila Island in American Samoa and empties into the South Pacific Ocean. In the application, the applicant indicated that outer Pago Pago Harbor has characteristics similar to open coastal ocean waters and is not characteristic of an estuarine system.

The American Samoa Government designated Pago Pago Harbor to be developed into a transshipment center for the South Pacific. The AS Environmental Quality Commission has developed a separate set of standards for Pago Pago Harbor due to its unique position as an embayment where water quality has been degraded from the natural condition (ASEQC, 2013).

Protected uses for Pago Pago Harbor include:

(i) Recreational and subsistence fishing except for exclusions as specified under federal regulations such as no take zones;

(ii) Boat-launching ramps and designated mooring areas;

(iii) Subsistence food gathering; e.g. shellfish harvesting except for exclusions as specified under federal regulations such as no take zones;

(iv) Aesthetic enjoyment;

(v) Whole and limited body-contact recreation, e.g. swimming, snorkeling, and scuba diving;

(vi) Support and propagation of marine life;

(vii) Industrial water supply;

(viii) Mariculture development except for exclusions as specified under federal regulations such as no take zones;

(ix) Normal harbor activities; e.g. ship movements, docking, loading and unloading, marine railways and floating drydocks; and,

(x) Scientific investigations.

Pago Pago Harbor is listed as impaired for certain pollutants according to the CWA Section 303(d) List of Water Quality Limited Segments, and Total Maximum Daily Load (TMDL) requirements have been developed for those pollutants. Ocean Shorelines in the Pago Pago watershed are listed as impaired for enterococci and the inner harbor (this facility discharges to the outer harbor) is listed for lead, mercury, and PCBs. Note that in the 303(d) listing document, streams within the same watershed identifier (#24) are additionally listed as impaired for nutrients (Total Nitrogen, TN, and Total Phosphorous, TP), turbidity, and Dissolved Oxygen but these additional impairments do not apply to the sea-water segment of the harbor to which the Utulei STP discharges. The only 303(d)-listed pollutant for which the Utulei STP has a potential to be a source is enterococci, and the limits specified in the TMDL are identical to those specified in the American Samoa Water Quality Standards (ASWQS). Therefore, compliance with ASWQS for Enterococci will ensure compliance with the requirements of the TMDL.

V. DESCRIPTION OF DISCHARGE

The Utulei STP is designed to provide primary treatment (30% removal of Biochemical Oxygen Demand, (BOD), and Total Suspended Solids, (TSS)) as well as disinfection before discharge. The Plant is designed so that influent is screened, and then the flow is split across 4 parallel clarigesters for treatment. After treatment in the clarigesters, the effluent passes through a newly installed UV disinfection system. Discharge is to an outfall in the ocean-mixed outer Pago Pago Harbor area. The terminus of the outfall is located approximately 954 feet off of Tulutulu Point in outer Pago Pago Harbor at a depth of 150 feet; see Attachment B in the permit, figure 2, for a map of the outfall location.

The use of primary treatment instead of secondary treatment was due to the tightly limited resources and support base available in American Samoa. This practice is allowed under CWA §301(h). EPA granted the facility a variance pursuant to CWA §301(h) when it was initially permitted in 1985 and has re-evaluated and renewed the variance with each permit reissuance since that time.

American Samoa water quality standards for various parameters, particularly nutrients and bacteria, have grown more stringent since the facility was initially permitted. Compliance with these increasingly stringent requirements has grown more difficult for the treatment system to achieve. A major refit which altered the permitting context was the construction of the offshore diffuser in 1996 to increased available dilution.

In 2009, EPA issued public notice of tentative decisions to deny renewal of the facility's §301(h) variance due to inability to consistently meet American Samoa's bacteria and nutrient standards. Since 2009, EPA has been working with the applicant to collect additional data, conduct modeling, and upgrade treatment at the Utulei STP. As a result, the quality of the discharge has improved, and more thorough and representative data are now available.

EPA issued an Administrative Order on July 27, 2011 stipulating actions and a timeline on which to bring the Utulei STP into compliance and make renewal of the 301(h) variance

possible. Upgrades were finally completed in 2016 and, after 1 year of data collection with the upgraded treatment system in place, data now show compliance with American Samoa water quality standards. Therefore, EPA is proposing to reissue this permit with renewal of the §301(h) variance from secondary treatment.

A. Application Discharge Data

As part of the application for permit renewal, the permittee provided data from an analysis of the facility's treated wastewater discharge, shown in Table 4. As material changes to the treatment system have been implemented since the application was submitted, EPA does not consider these data to be representative of the current discharge and therefore has not included them in the analysis below. Note that toxicity data are considered separately in Section VI(B)(5) of this Fact Sheet.

Table 4. Application Discharge Data.

Parameter	Units	Discharge Data[(1)]	
		Maximum Daily Discharge	Average Daily Discharge
Flow	MGD	3.42	1.19
pH	Standard Units	6.5 to 8.6 (min-max)	
Biochemical Oxygen Demand, 5-day (BOD_5)	mg/L	94	61.7
Total Suspended Solids (TSS)	mg/L	74	26.4
Ammonia (as N)	mg/L	23.3	22.5
Total Kjeldahl Nitrogen	mg/l	67.1	50.8
Total Phosphorus	mg/l	2.81	2.72
Total Residual Chlorine	mg/L	Not monitored	
Oil and Grease	mg/L	6.3	5.9
Settleable solids	ml/l	0.5	0.13
Copper	ug/l	6.1	--
Mercury	ug/l	0.24	0.152
Zinc	ug/l	28.5	28.1
Chlorobenzene	ug/l	0.21	--
Chloroform	ug/l	1.5	--
Methylene chloride	ug/l	0.42	--
Toluene	ug/l	2.3	1.41
4-nitrophenol	ug/l	13	--
Phenol	ug/l	32	22
Bis (2-ethylhexyl)phthalate	ug/l	12	10.3
1,4-Dichlorobenzene	ug/l	4.3	3.3
Diethyl phthalate	ug/l	4.4	3.95
Fluorene	ug/l	0.38	--
Phenanthrene	ug/l	0.56	--

[(1)] Based on permittee's NPDES renewal application.

B. Recent Discharge Monitoring Report (DMR) Data (2007-2017)

Table 5 provides a summary of effluent limitations and monitoring data based on the facility's most recent 10 years of DMRs (2007 to 2017).

Table 5. Discharge Monitoring Report Data for years 2007-2017

Parameter	Units	Current Permit Effluent Limitations			Discharge Monitoring Data		
		Average Monthly	Average Weekly	Maximum Daily	Highest Average Monthly	Highest Average Weekly	Highest Maximum Daily
Flow Rate	MGD	Monitoring Only	--	Monitoring Only	2.6	--	6.1[(1)]
Biochemical Oxygen Demand (5-day)	mg/L	78.3	117	157	Before treatment upgrade		
					88	107	110
					After treatment upgrade		
					67	99	99
	lbs/day	1085	1628	2170	Before treatment upgrade		--
					1423	3182	
					After treatment upgrade		
					1023	1569	
	Percent Removal	Both the influent and the effluent shall be monitored. The arithmetic mean of the BOD_5 values, by concentration, for effluent samples collected over a calendar month shall not exceed 70 percent of the arithmetic mean, by concentration, for influent samples collected at approximately the same times during the same period (i.e. 30 percent BOD_5 removal).			Minimum monthly average % removal was 32.9 % removal		
Settleable Solids	mL/L	1	--	2	0.2	--	1.1
Total Suspended Solids	mg/L	75	113	150	Before treatment upgrade		
					64	89	--
					After treatment upgrade		
					47	63	63
	lbs/day	1377	2065	2754	Before treatment upgrade		--
					805	1171	
					After treatment upgrade		
					773	1151	

Parameter	Units	Current Permit Effluent Limitations			Discharge Monitoring Data		
		Average Monthly	Average Weekly	Maximum Daily	Highest Average Monthly	Highest Average Weekly	Highest Maximum Daily
	Percent Removal	Both the influent and the effluent shall be monitored. The arithmetic mean of the TSS values, by concentration, for effluent samples collected over a calendar month shall not exceed 70 percent of the arithmetic mean, by concentration, for influent samples collected at approximately the same times during the same period (i.e. 30 percent TSS removal).			5.4% minimum monthly reported; however, appears to be error, as influent and effluent data for the same month represent a 57.9% removal		
pH	Standard Units	Not < 6.5 SU, Not > 8.6 SU; discharge shall not change pH in receiving water by more than 0.2 SU			6.5 – 7.6 (min-max)		
Chronic Toxicity	TUc	Monitoring only			666.7		
Oil & Grease	mg/l	Monitoring only			28		

(1) Note that one mistyped report of "11.4 MGD" daily maximum flow, in August 2008, has been revised to 1.4 MGD.

VI. DETERMINATION OF NUMERICAL EFFLUENT LIMITATIONS

EPA has developed effluent limitations and monitoring requirements in the permit based on an evaluation of the technology used to treat the pollutant (e.g., "technology-based effluent limits") and the water quality standards applicable to the receiving water (e.g., "water quality-based effluent limits"). EPA has established the most stringent of applicable technology-based or water quality-based standards in the permit, as described below.

A. Applicable Technology-Based Effluent Limitations

Publicly-Owned Wastewater Treatment Systems (POTWs)

EPA developed technology-based treatment standards for municipal wastewater treatment plants in accordance with Section 301(b)(1)(B) of the Clean Water Act. As the Utulei STP continues to operate under a Section 301(h) variance from secondary treatment requirements, the facility is permitted to discharge primary-treated effluent through its ocean outfall in accordance with the requirements under 40 CFR § 125.58(r) and the limitations below, which have been carried over from the previous permit. In addition, mass limits, as required by 40 CFR § 122.45(f), are included for BOD_5 and TSS and have been calculated to reflect the increase in flow to 3MGD.

BOD_5

Concentration-based Limits

30-day average – 78.3 mg/L
7-day average – 117 mg/L
Daily maximum – 157 mg/L
Removal Efficiency – minimum of 30%

Mass-based Limits

30-day average – (78.3 mg/L)(3 MGD)(8.345 conversion factor) = 1,960 lbs/day
7-day average – (117 mg/L)(3 MGD)(8.345 conversion factor) = 2,929 lbs/day
Daily maximum – (157 mg/L)(3 MGD)(8.345 conversion factor) = 3,930 lbs/day

TSS

Concentration-based Limits

30-day average – 75 mg/L
7-day average – 113 mg/L
Daily maximum – 150 mg/L
Removal efficiency – Minimum of 30%

Mass-based Limits

30-day average – (75 mg/L)(3 MGD)(8.345 conversion factor) = 1,878 lbs/day
7-day average – (113 mg/L)(3 MGD)(8.345 conversion factor) = 2,829 lbs/day
Daily maximum – (150 mg/L)(3 MGD)(8.345 conversion factor) = 3,755 lbs/day

pH

Instantaneous Measurement: 6.0 – 9.0 standard units (S.U.) – superseded by more stringent American Samoa Water Quality Standards, as described below.

Technology-based treatment requirements may be imposed on a case by case basis under Section 402(a)(1) of the Act, to the extent that EPA promulgated effluent limitations are inapplicable (i.e., the regulation allows the permit writer to consider the appropriate technology for the category or class of point sources and any unique factors relating to the applicant) (40 CFR § 125.3(c)(2)).

The minimum levels of effluent quality attainable by secondary treatment for Settleable Solids, as specified in the EPA Region IX Policy memo dated May 14, 1979, are listed below:

Settleable Solids
30-day average – 1 mL/L
Daily maximum – 2 mL/L

Therefore, effluent limits for BOD_5, TSS, pH, and Settleable Solids are established in the permit as stated above.

B. Water Quality-Based Effluent Limitations

Water quality-based effluent limitations are required in NPDES permits when the permitting authority determines that a discharge causes, has the reasonable potential to cause, or contributes to an excursion above any water quality standard (40 CFR § 122.44(d)(1)).

When determining whether an effluent discharge causes, has the reasonable potential to cause, or contributes to an excursion above narrative or numeric criteria, the permitting authority shall use procedures which account for existing controls on point and non-point sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity) and where appropriate, the dilution of the effluent in the receiving water (40 CFR § 122.44(d)(1)(ii)).

EPA evaluated the reasonable potential to discharge toxic pollutants according to guidance provided in the *Technical Support Document for Water Quality-Based Toxics Control* (TSD) (Office of Water Enforcement and Permits, U.S. EPA, March 1991) and the *U.S. EPA NPDES Permit Writers Manual* (Office of Water, U.S. EPA, December 1996). These factors include:

1. Applicable standards, designated uses and impairments of receiving water
2. Dilution in the receiving water
3. Type of industry
4. History of compliance problems and toxic impacts
5. Existing data on toxic pollutants - Reasonable Potential Analysis

1. Applicable Standards, Designated Uses and Impairments of Receiving Water

The American Samoa Water Quality Standards, Administrative Rule No. 001-2013 (last updated 2013) establish water quality criteria for the following beneficial uses in Pago Pago Harbor, to which the Utulei STP discharges:

(A) Recreational and subsistence fishing except for exclusions as specified under federal regulations such as no take zones;
(B) Boat-launching ramps and designated mooring areas;
(C) Subsistence food gathering; e.g. shellfish harvesting except for exclusions as specified under federal regulations such as no take zones;
(D) Aesthetic enjoyment;
(E) Whole and limited body-contact recreation, e.g. swimming, snorkeling, and scuba diving
(F) Support and propagation of marine life;
(G) Industrial water supply;
(H) Mari-culture development except for exclusions as specified under federal regulations such as no take zones;
(I) Normal harbor activities; e.g. ship movements, docking, loading and unloading, marine railways and floating drydocks; and
(J) Scientific investigations.

Pago Pago Harbor is listed as impaired according to the CWA Section 303(d) List of Water Quality Limited Segments. Ocean Shorelines in the Pago Pago watershed are listed as impaired for enterococci and the inner harbor (this facility discharges to the outer harbor) is listed for lead, mercury, and PCBs. Note that streams within the same watershed identifier (#24) are additionally listed as impaired for nutrients (TN, TP), turbidity, and Dissolved Oxygen but these additional impairments do not apply to the sea-water segment of the harbor to which the Utulei STP discharges. The only Section 303(d)-listed pollutant for which the Utulei STP has a potential to be a source is Enterococci, and the limits specified in the TMDL are identical to those specified in the ASWQS. Therefore, compliance with ASWQS for Enterococci will ensure compliance with the requirements of the TMDL.

2. Dilution in the Receiving Water

The discharge from Outfall 001 is to outer Pago Pago Harbor adjoining the South Pacific Ocean, where regular currents and a diffuser installed approximately 1000 feet offshore at 150 feet deep ensure effective dilution and providing the basis for this § 301(h)-modified permit. In accordance with EPA's Section 301(h) Amended Technical Support Document (ATSD), EPA reviewed the calculation of initial dilution and trapping depth under both the proposed daily average flow and critical flow scenarios provided by ASPA. Based on its initial review, EPA concluded that available modeling supported an average initial dilution of 127:1 and a critical initial dilution of 91:1. However, § 301(h) regulations require that the applicant's diffuser be located and designed to provide initial dilution, dispersion, and transport sufficient to ensure compliance with water quality standards at the ZID boundary under *critical conditions* (see 40 CFR § 125.62(a)(1)(iv)). On this basis, EPA has evaluated compliance with § 301(h) regulations based only on the critical initial dilution of 91:1 and found that permit limits could be met using this dilution alone.

Based on information provided by ASPA on the upgraded diffuser, EPA concluded that the critical value for initial dilution for the discharge is 121:1. To determine this value, EPA contracted dilution modeling experts MixZon, Inc. to assess the critical initial dilution based on the same data sets and design parameters provided by the discharger using a more detailed modeling software (CORMIX) and making efforts to account for several additional factors, including but not limited to reef proximity, plume behavior, and possible alternate critical conditions. Based on a sensitivity analysis using nine separate cases in the model using a range of input values provided by the discharger, and in consultation with modeling experts from both MixZon, EPA modeling experts determined that this was the most conservative (lowest) dilution predicted for the total flow through the modified diffuser. The specific behavior predicted by the model was one of several cases of plume surfacing, here with a plume centerline depth shallower than 2 feet, and the plume's predicted vertical spread significantly exceeding that separation (over 8 feet) therefore triggering the criterion that initial dilution ends as soon as the plume surfaces or density effects cease to drive plume rise. EPA judged the particular model run resulting in plume surfacing and 121:1 dilution to be most representative of critical initial dilution because, among many factors, it used direct density profile data as opposed to a temperature-salinity parametrization, was well within the range of dilutions established by flow-averaging dilution from port-by-port models of predicted diffuser behavior, and was consistent with the parametrization recommendations of the CORMIX software.

Additionally, the recent Endangered Species Act listing of several corals present in the waters around American Samoa (see section X.B of this fact sheet) made it imperative that EPA's assessment ensure the effluent plume did not pose a risk of impinging upon nearby reefs, some of which are present in close proximity to the discharge point. The results of EPA's re-modeling of the discharge in CORMIX provide confidence that the credited dilution value (121:1) occurs before any potential impingement of the plume upon the nearby reefs, thereby ensuring that the reefs are not subjected to pollutant levels in excess of the protective ASWQS.

As ASPA appealed only the dilution values used to calculate the effluent limits for TN, TP, ammonia, and WET, EPA has now revised the dilution values for these four parameters. The dilution value of 91:1 approved in November 2019 is achievable and still applies to all other parameters, excluding those for which no dilution was credited (pH, oil & grease). The effluent limits for all parameters other than TN, TP, ammonia, and WET remain unchanged. For more information, see the detailed analysis of dilution in the accompanying 2019 Utulei Section 301(h) Final Decision Document.

3. Type of Industry

Typical pollutants of concern in untreated and treated domestic wastewater such as that discharged by the Utulei STP include ammonia, nutrients, oxygen demand, pathogens (bacteria such as enterococci), temperature, pH, oil and grease, and solids. Chlorine and turbidity may also be of concern due to treatment plant operations. This permit incorporates limits and/or monitoring requirements for all these parameters except chlorine, because that chemical is known not to be in use at the Utulei treatment plant.

4. History of Compliance Problems and Toxic Impacts

The Utulei STP has historically shown very high levels of enterococci bacteria as well as high levels of Nitrogen. These elevated levels led directly to EPA's 2009 tentative decision and 2011 administrative order. Toxic impacts were also infrequently measured. However, as described in the 2019 Utulei 301(h) Final Decision Document, the treatment upgrades have improved compliance with enterococcus water quality standards, and recent data has shown improvements in other areas. In addition, this permit includes limitations to ensure protection of water quality for all these pollutants.

5. Existing Data on Toxic Pollutants

For pollutants with effluent data available, EPA has conducted an analysis of reasonable potential to comply with water quality standards incorporating the dilution available to the discharger from their approved mixing zone. The maximum effluent concentrations were taken from the last five years of DMRs, including data reported in accordance with the 2011 Administrative Order. EPA calculated the projected maximum effluent concentration for each pollutant using the following equation:

Projected maximum concentration = C_e ÷ *available dilution (121:1 for TN, TP, WET, and ammonia; 91:1 for all other parameters).*

Where, "C_e" is the reported maximum effluent value.

Table 6. Summary of Effluent Data Analysis

Parameter	Maximum Observed Effluent Concentration	Projected receiving water concentration after 91:1 dilution (or 121:1 where noted[2])	Most Stringent Applicable Water Quality Criterion	Reasonable Potential?
BOD_5	110 mg/L	1.21 mg/L	No applicable WQS	N/A
TSS	89 mg/L	0.98 mg/L	No applicable WQS	N/A
Enterococci[1]	3262 CFU / 100 mL	35.8 CFU/100 mL	35 CFU / 100 mL	Y
Settleable Solids	1.10 ml/L	0.012 ml/L	No applicable WQS	N/A
Total Nitrogen[1,2]	20,000 µg/l	280.5 µg/l	200 µg/l	Y, See discussion in section C below
Total Phosphorous[1,2]	5,300 µg/l	43.8 µg/l	30 µg/l	Y
Chronic Toxicity[2]	666.7 TU_c	5.51 TU_c	1.0 TU_c	Y
Ammonia[1,2,3]	20,000 ug/l	165 ug/l	Depends on pH and temperature data	Y
pH	Minimum of 6.9 and Maximum of 7.6	N/A	Minimum of 6.5 and Maximum of 8.6	N
Oil & Grease	28	N/A	Narrative WQS	Y

[1] Data from monitoring required by 2011 Administrative Order
[2] Dilution factor for TN, TP, ammonia, and WET is 121:1
[3] Note that the ammonia standards tables in the ASWQS are expressed in terms of ammonia-as-NH_3, whereas this permit expresses limits in terms of ammonia-as-N for consistency with other permits. The difference is units is converted using a simple multiplier equal to the ratio of molecular masses of N to NH_3. ASWQS have identified the multiplier as 0.822.

C. Rationale for Numeric Effluent Limits and Monitoring

EPA evaluated the typical pollutants expected to be present in the effluent and selected the most stringent of applicable technology-based standards or water quality-based effluent limitations. Where effluent concentrations of toxic parameters are unknown or are not reasonably expected to be discharged in concentration that have the reasonable potential to cause or contribute to water quality violations, EPA may establish monitoring requirements in the permit. Where monitoring is required, data will be re-evaluated and the permit may be re-opened to incorporate effluent limitations as necessary.

Flow

Flow rates must be monitored and reported to ensure any beyond-capacity situations are planned for, monitored, and tracked. Monitoring is required continuously with reporting of monthly and weekly averages, and daily maximum flow levels.

BOD_5 and TSS

Limits for BOD_5 and TSS are established for POTWs as described above under "technology-based effluent limitations" and are incorporated into the permit. The same concentration-based limitations have been carried over from the previous permit. Under 40 CFR Section § 122.45(f), mass limits are also required for BOD_5 and TSS. Based on the proposed end-of-permit-term flow of 3.0 MGD, the mass-based limits have also been calculated as shown above and are included in the permit.

Enterococci

Bacteria are a common component of wastewater discharge and of particular concern for their potential effect on human health. Enterococci are commonly used as indicator organisms for bacteria levels in a discharge. As shown above, there is reasonable potential for the discharge to cause or contribute to an excursion above the water quality standards for enterococcus. The permit implements the two distinct ASWQS bacteria standards for enterococci, which embody different statistical approaches, as a pair of limits. The 90%-of-samples-not-to-exceed standard is a direct conversion of the statistical threshold value for Pago Pago Harbor by the approved dilution factor (130 CFU/100 mL * 91:1 = 11,830 CFU/100 mL before dilution), based on the definition of "statistical threshold value" in § 24.0201 of the ASWQS. The Median-not-to-exceed value in the permit addresses the stipulation in the ASWQS implementation guidance of March 2014 that "For NPDES permittees, permit compliance for marine receiving waters shall be determined utilizing the geometric mean of all discrete measurements (all depths, all stations, as required in the permit) over a 30-day period." The geometric mean standard for bacteria in Pago Pago Harbor in the ASWQS is 35 per 100 mL. Because monitoring is conducted by the permittee only once per month, there is insufficient data to calculate a representative geometric mean from multiple samples. Nevertheless, the geometric mean standard as specified in the ASWQS would still apply. Translating this value by the approved dilution factor results in a monthly permit limit of (35 * 91) = 3,185 CFU/100 mL, which EPA used Best Professional Judgment to implement as a limit on the average monthly concentration in the absence of sufficient data to calculate a true geometric mean from multiple data points per month.

Settleable Solids

Limits for Settleable Solids are established for POTWs based on the technology-based effluent limits defined for primary treatment, as described above. Applicable limits have been carried over from the previous permit.

Total Nitrogen and Total Phosphorous

Nitrogen and Phosphorous are nutrients which are often over-abundant in biological wastes like domestic wastewater. Discharging such elevated levels of nutrients to natural waters can lead to the growth of nuisances like algae blooms and other undesirable effects, as well as potentially depleting the dissolved oxygen levels in the receiving water and suffocating marine life. As shown in the reasonable potential analysis above, the facility has a reasonable potential to cause or contribute to an excursion above water quality standards for Phosphorous.

In the case of Nitrogen, applying the statistical factor recommended in the TSD also indicates a reasonable potential to exceed the ASWQS for Total Nitrogen. There is an available data set of n=12 Total Nitrogen samples post-dating the treatment plant upgrades, which were collected as required under EPA's 2011 Administrative Order. Those data points show a Coefficient of Variation (CV) of 0.345. The Reasonable Potential analysis procedure specified in the TSD (EPA/505/2-90-001, page 54) recommends applying a statistical Multiplying Factor of not less than 1.7 (for CV between 0.3 and 0.4 and n=12) to the projected receiving water concentration(s) to account for the low number of data points. In that context, (165 µg/L * 1.7) = 280.5 µg/L as a statistical reasonable potential concentration, greater than the most stringent water quality criterion of 200 µg/L, and therefore indicating there remains a statistical reasonable potential for the discharge to exceed the ASWQS for Total Nitrogen.

EPA has considered the revised dilution value of 121:1 and determined that there is reasonable potential for TP and TN in the discharge to exceed the water quality standards. Therefore, the permit includes effluent limits for TP and TN, consistent with the ASWQS. Limits were calculated as follows:

> Concentration-based Effluent Limit (mg/L) = ASWQS * dilution factor (121:1)
>
> Phosphorous median standard (30 µg/L) * 121 = 3,630 ug/L, implemented as a monthly average permit limit.
>
> Phosphorous 2% not-to-exceed standard (90 µg/L) * 121 = 10,890 ug/L, implemented as a daily maximum permit limit.
>
> Nitrogen median standard (200 µg/L) * 121 = 24,200 ug/L, implemented as a monthly average permit limit.
>
> Nitrogen 2% not-to-exceed standard (500 µg/L) * 121 = 60,500 ug/L, implemented as a daily maximum permit limit.

Chronic Whole Effluent Toxicity ("WET") Testing

The ASWQS include prohibitions against discharges to marine waters which cause toxic effects, after allowing for initial dilution. As shown above, the discharge has the reasonable potential to cause or contribute to an excursion above the water quality standard for toxicity. In following 40 CFR § 122.44(d)(1) to set the permit level for chronic WET and conditions for the effluent discharge, EPA uses an available short-term chronic WET method/test species at 40 CFR Part 136 and an Instream Waste Concentration (IWC) for the discharge representing the effluent dilution necessary to protect the receiving water's narrative water quality standard for toxicity. EPA has chosen the Test of Significant Toxicity (TST) statistical approach. It is described in EPA's *National Pollutant Discharge Elimination System Test of Significant Toxicity Technical Document* (EPA 833-R-10-004, 2010; TST Technical Document) and Denton DL, Diamond J, and Zheng L. 2011. The TST null hypothesis for chronic toxicity (H_o) is: IWC mean response (% effluent) ≤ 0.75 Control mean response. The TST alternative hypothesis is (H_a): IWC mean response (% effluent) > 0.75 Control mean response. The TST alternative hypothesis is used to set the chronic toxicity WQBEL in this permit, where the result from a single chronic toxicity test is analyzed using only the TST approach. An acceptable level of chronic toxicity is demonstrated by statistically rejecting the TST null hypothesis. The TST provides for rejection of the rebuttable presumption that the effluent is harmful (ASWQS § 24.0206(h)).

The required chronic toxicity IWC for the discharge and WQBEL is 0.826 % effluent (1/S × 100), where S is 121, which is carried over from the previous permit and is consistent with the dilution applied to ammonia, which is the suspected primary source of toxicity. For each chronic toxicity test, the permittee is required to report Pass "0" or Fail "1" on the DMR form. Pass "0" constitutes rejection (i.e., statistical fail) and Fail "1" constitutes non-rejection (i.e., statistical pass) of the TST null hypothesis (Ho), at the required IWC (i.e., IWC mean response (0.826 % effluent) ≤ 0.75 × Control mean response). This is determined by following the instructions in the TST Technical Document, Appendix A.

Ammonia

ASWQS specify ammonia standards for the receiving water. Treated and untreated domestic wastewater, such as that discharged from the Utulei STP, may contain levels of ammonia that are toxic to aquatic organisms. Ammonia is converted to nitrate during biological nitrification process, and then nitrate is converted to nitrogen gas through biological denitrification process. The water quality standards are pH and temperature dependent. Due to the potential for ammonia to be present in sanitary wastewater at toxic levels and due to the conversion of ammonia to nitrate, effluent limitations are established for ammonia using the Ammonia Impact Ratio ("AIR") for all facilities.

The AIR is calculated as the ratio of the ammonia value in the effluent to the applicable ammonia water quality standard. The ASWQS contain ammonia criteria which are pH and temperature dependent. Therefore, pH, temperature and ammonia sampling must be concurrent. Attachment D of the permit contains a sample log to calculate and record the AIR values and Attachment E lists the applicable Water Quality Standards.

The permittee must also monitor and report the sampled ammonia effluent values (as well as pH and Temperature) used to calculate the AIR, in addition to the calculated numeric AIR value itself. AIR provides more flexibility than a specific, fixed effluent concentration and is protective of water quality standards since the value is set relative to the water quality standard, with consideration of dilution. If the reported value exceeds the AIR limitation, then the effluent Ammonia-N concentration exceeded the ammonia water quality criterion after dilution.

pH and Temperature

Although the data shows no reasonable potential for the discharge to exceed WQS for pH, the permit retains the water quality-based effluent limits from the previous permit for pH to meet anti-backsliding requirements. In addition, temperature monitoring is required to assess compliance with the ammonia effluent limit.

Oil and Grease

Domestic wastewater may often contain elevated levels of oil and grease from sources including kitchen drains and sanitary wastes. As these constituents can cause harm to marine life and form a problematic oily sheen on the receiving water, limits are set in the permit based on EPA's best professional judgment of typical limits at other comparable wastewater treatment facilities (an average monthly of 10 mg/l and daily maximum of 15 mg/l) in order to ensure the narrative water quality standard requiring waters to be "free from visible floating materials, grease, oil, scum, foam, and other floating material attributable to sewage, industrial wastes, or other activities of man" is met. (ASWQS Section 24.206(b))

Chlorine, total residual

Treatment plants often discharge elevated levels of chlorine if they use the chemical for disinfection. The Utulei STP does not use chlorine for disinfection, therefore the permit does not implement a total chlorine limit.

D. Anti-Backsliding

Section 402(o) of the CWA prohibits the renewal or reissuance of an NPDES permit that contains effluent limits less stringent than those established in the previous permit, except as provided in the statute.

The permit allows higher mass-based limits for Biochemical Oxygen Demand and Total Suspended Solids, derived from an expected increase in total flow to 3 MGD. These higher mass-based limits are permissible under Title 33 of the U.S. Code § 1342(o)(1), by reference to § 1313(d)(4) under the same Title (also known as CWA § 303(d)(4)), which specifies that "for waters…where the quality of such waters equals or exceeds levels…required by applicable water quality standards, any effluent limitation based on…any water quality standard established under this section, or any other permitting standard may be revised…if such revision is subject to and consistent with the antidegradation policy". The receiving water is not impaired for the parameters in question (BOD_5 and TSS), and EPA's analysis in the CWA § 301(h) TDD shows the receiving water meets WQS for DO and light penetration. Therefore, EPA has determined

that allowing an increase in the mass-based effluent limitations for BOD and TSS meets antidegradation and anti-backsliding requirements.

The 2020 permit modification contains effluent limits for TN, TP, ammonia, and WET that are less stringent than those established in the previous permit. As described above, EPA has revised the dilution value based on information provided by the discharger in the permit appeal. EPA has calculated effluent limits for Total Nitrogen, Total Phosphorous, and ammonia based on the revised dilution value of 121:1; other limits are unmodified.

The effluent limits for TN, TP, ammonia, and WET are established to achieve compliance with applicable WQS. Section 303(d)(4)(B) of the CWA permits the modification of such effluent limits if WQS are attained in the receiving water and the discharge is consistent with the applicable policy on antidegradation. The applicable policy on antidegradation for Pago Pago Harbor is found at ASWQS § 24.0202 and specifies that, for waters which do not "constitute an outstanding public resource or in waters of exceptional recreational or ecological significance" degradation of water quality is allowable if four conditions (listed below) are met. ASWQS § 24.0205(e)(1) specifies that Pago Pago Harbor does not constitute an outstanding public resource and is not a water of exceptional recreational or ecological significance. The effluent limits for Pago Pago Harbor can be modified if the following four conditions are met:

1. The proposed degraded level of water quality will support existing uses;
2. A compelling economic or social need of the Territory is served by allowing limited degradation;
3. The highest practicable statutory and regulatory requirements will be met by existing and new point sources of pollutants; and
4. All cost-effective and reasonable best management practices for non-point sources of pollutants will be achieved.

As the permit requires the discharge to comply with all WQS protective of existing uses, point 1 is met. Point 2 is met by the compelling need of the territory to treat and dispose of its wastewater for public health and environmental reasons. Point 3 is met by EPA and AS-EPA's imposition of the highest practicable requirements on existing and any new facilities, and Point 4 is addressed through AS-EPA's non-point-source reduction efforts such as the successful American Samoa piggery discharge control program.

Based on the discharge and related aspects meeting this four-part test in the ASWQS provisions allowing for limited degradation, EPA finds that the discharge is consistent with the provisions of Section 303(d)(4)(B) of the CWA, and therefore, the effluent limitations for TN, TP, ammonia, and WET can be modified in the manner described in Section C of this Fact Sheet.

E. Antidegradation Policy

EPA's antidegradation policy at 40 CFR § 131.12 and the ASWQS at American Samoa administrative rule No. 001-2013 require that existing water uses and the level of water quality necessary to protect the existing uses be maintained.

As described in this document, the permit establishes effluent limits and monitoring requirements to ensure that all applicable water quality standards are met. The permit includes a mixing zone, which has been approved by AS-EPA and reviewed by EPA for appropriate protection of the receiving water.

The 2019 permit allows higher mass loadings of BOD_5 and TSS based on increased projected average flow relative to the previous permit This change is permissible once dilution and ambient levels are accounted for because receiving water monitoring data show that existing mass loadings of these parameters have not resulted in a violation of the applicable standards. Furthermore, the waterbody (outer Pago Pago Harbor) is not listed as an impaired waterbody for these parameters under Section 303(d) of the CWA.

The 2020 modified permit allows increased TN, TP, and ammonia limits based on improved dilution. To ensure protection of existing uses and harbor water quality, EPA has used computer modeling to derive the permit limits for TN and TP. This modeling was conducted with modern software to account for complexities of mixing behavior in Pago Pago Harbor, implemented boundary conditions to account for limited input data, and was constrained not to allow for water-surface mixing in accordance with the ASWQS mixing zone policy.

To evaluate other potential pollutants, a priority pollutant scan of the effluent demonstrated that most pollutants not already regulated by the permit will be discharged below detection levels.

Therefore, due to application of water quality-based effluent limitations protective of ASWQS, the discharge is not expected to adversely affect receiving water bodies or result in degradation of water quality. EPA therefore concludes the discharge meets antidegradation requirements.

VII. NARRATIVE WATER QUALITY-BASED EFFLUENT LIMITS

The American Samoa Water Quality Standards contain narrative water quality standards applicable to the receiving water (ASWQS, § 24.0206). Therefore, the permit incorporates applicable narrative water quality standards in Part I.A.

VIII. MONITORING AND REPORTING REQUIREMENTS

The permit requires the permittee to conduct monitoring for all pollutants or parameters where effluent limits have been established pursuant to 40 CFR § 122.44, at the minimum frequency specified. Additionally, where effluent concentrations of toxic parameters are unknown or where data are insufficient to determine reasonable potential, EPA may require monitoring for additional pollutants or parameters.

A. Effluent Monitoring and Reporting

The permittee is required to monitor its effluent to evaluate compliance with the permit. The permittee must perform all monitoring, sampling and analyses in accordance with the methods described in the most recent edition of 40 CFR Part 136, unless otherwise specified in the permit. All monitoring data shall be reported on monthly DMRs and submitted quarterly as specified in the permit. All DMRs are to be submitted electronically to EPA using NetDMR.

In addition, the permittee must continue the successful receiving water monitoring program which has allowed an accurate understanding of the context and effects of the discharge. This monitoring program shall be updated to incorporate permanent ZID stations, as necessary for renewal of the CWA Section 301(h) variance, as well as direct monitoring of the effluent for parameters which were formerly only measured in the receiving water.

B. Priority Toxic Pollutants Scan

The permittee is required to conduct a Priority Toxic Pollutants scan during the fourth year of the five-year permit term to ensure that the discharge does not contain toxic pollutants in concentrations that may cause a violation of water quality standards. The permittee must perform all effluent sampling and analyses for the priority pollutants scan in accordance with the methods described in the most recent edition of 40 CFR Part 136, unless otherwise specified in the permit or by EPA. 40 CFR § 131.36 provides a complete list of Priority Toxic Pollutants.

C. Whole Effluent Toxicity Testing

The permit establishes testing requirements for chronic toxicity.

Chronic toxicity testing evaluates reduced growth/reproduction at 100 percent effluent. Chronic toxicity is to be reported based on a determination of "Pass" or "Fail" from a single effluent-concentration chronic toxicity test at the IWC of 0.82 percent effluent using the Test of Significant Toxicity (TST) approach described in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010). For any one acute toxicity test, the chronic WET permit limit that must be met is rejection of the null hypothesis (H_o):

IWC (0.82 percent effluent) mean response $\leq 0.75 \times$ Control mean response.

A test result that rejects this null hypothesis is reported as "Pass" on the DMR form. A test result that does not reject this null hypothesis is reported as "Fail" on the DMR form. To calculate either "Pass" or "Fail", the permittee shall follow the instructions in *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document*, Appendix A. The permittee shall conduct short-term tests with the sand dollar (*Dendraster excentricus*) or the Purple Urchin (*Strongylocentrotus purpuratus*). These species are suitably sensitive indicators of potential toxic effects in the biological communities in the receiving water. The WET test result is to be statistically analyzed and reported using the Test of Significant Toxicity ("TST") statistical approach.

IX. SPECIAL CONDITIONS

A. Biosolids

Standard requirements for the monitoring, reporting, recordkeeping, and handling of biosolids in accordance with 40 CFR Part 503 are incorporated into the permit. The permit also includes electronic reporting requirements for dischargers who are required to submit biosolids annual reports, which include major POTWs that prepare sewage sludge and other facilities designated as "Class 1 sludge management facilities" (the Utulei STP is classified as a "major" POTW and must submit biosolids reports). The permittee must submit biosolids annual reports using EPA's NPDES Electronic Reporting Tool ("NeT") by February 19th of the following year.

B. Pretreatment

EPA has established pretreatment standards to prevent the introduction of pollutants into POTWs which will interfere with or pass through the treatment works, and to improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges (Section 307 of the CWA). EPA requires any POTW (or combination of POTWs operated by the same authority) with a total design flow greater than 5 MGD and receiving from nondomestic sources pollutants which pass through or interfere with the operations of the POTW or are otherwise subject to pretreatment standards to establish a pretreatment program.

There are no non-domestic facilities discharging pollutants to Utulei STP. Therefore, the permit contains no pretreatment requirements other than the Non-Industrial Source Control Education Program required by CWA § 301(h). The purpose of the Non-Industrial Source Control Education Program is to minimize the entrance of toxic pollutants and pesticides to the Utulei STP from non-industrial sources. The permittee can comply with the permit requirements by continuing to implement its current program, which includes newspaper articles, radio and television announcements, and informational pamphlets to increase awareness of the need for proper disposal of toxic pollutants.

C. Capacity Attainment and Planning

To ensure that adequate advance recognition and notice are given to capacity issues, the permit requires that a written report be filed within ninety (90) days if the average dry-weather wastewater treatment flow for any month exceeds 90 percent of the annual dry weather design capacity of the waste treatment and/or disposal facilities.

D. Development and Implementation of Best Management Practices

Pursuant to 40 CFR § 122.44(k)(4), EPA may impose Best Management Practices (BMPs) which are "reasonably necessary…to carry out the purposes of the Act." The pollution prevention requirements or BMPs proposed in the permit operate as technology-based limitations on effluent discharges that reflect the application of Best Available Technology and Best Control Technology.

The permittee must develop and implement BMPs that are necessary to control bacteria levels in the discharge, including daily logging of the UV transmissivity in the UV disinfection system and any deposition of solids in that same tank.

E. Development of an Initial Investigation TRE Workplan for Whole Effluent Toxicity

In the event effluent toxicity is identified or suspected from WET test results, the permit requires the permittee to develop and implement a Toxics Reduction Evaluation (TRE) Workplan. For chronic toxicity, unacceptable effluent toxicity is found in a single test result of "fail" (failure to reject the null hypothesis) when testing whether an IWC (0.82 percent effluent) mean response is $\leq 0.75 \times$ the mean response of the Control.

The permit also requires additional toxicity testing if a chronic toxicity monitoring event yields a result of "fail".

Within 90 days of the modified-permit effective date, the permittee must submit a copy of their Initial Investigation TRE Workplan (1-2 pages) for chronic toxicity to EPA for review.

F. Asset Management

40 CFR § 122.41(e) requires permittees to properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. Asset management planning provides a framework for setting and operating quality assurance procedures and ensuring the permittee has sufficient financial and technical resources to continually maintain a targeted level of service. Asset management requirements have been established in the permit to ensure compliance with the provisions of 40 CFR § 122.41(e).

X. OTHER CONSIDERATIONS UNDER FEDERAL LAW

A. Consideration of Environmental Justice

EPA's Environmental Justice policy establishes fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. As part of the environmental permitting process, EPA considers cumulative environmental impacts to disproportionately impacted communities.

In American Samoa, EPA is aware of several environmental burdens facing communities with limited resources, including ongoing boil water notices on the local drinking water system, wastewater treatment only to primary standards, industrial discharges, runoff from small-scale piggeries and an abundance of cesspools for individual residences.

This permit was written to regulate a publicly owned wastewater treatment plant as a potential source of pollution, to ensure the plant's discharge does not adversely impact the water quality of Pago Pago Harbor. In particular, and after careful consideration, EPA has set permit limits equal to or more stringent than those in the preceding permit, with the exception of the mass-based (lbs/day) limits on Biochemical Oxygen Demand and Total Suspended Solids. These two parameters are still required to maintain the same concentration-based (mg/L) limits as in the

previous permit, and the changes to the mass-based limits are a reflection of the growing population served by the treatment plant.

In light of the above considerations, EPA believes the permitted discharge would not contribute to undue incremental environmental burden and has made reasonable effort to ensure the community has, at a minimum, the same degree of protection as less burdened communities.

B. Impact to Threatened and Endangered Species

Section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1536) requires federal agencies to ensure that any action authorized, funded, or carried out by the federal agency does not jeopardize the continued existence of a listed or candidate species, or result in the destruction or adverse modification of its habitat.

EPA identified listed species in American Samoa and evaluated whether the proposed discharges would affect those species. Additional details of EPA's Biological Evaluation ("BE"), as shared with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) are available in the permit record.

EPA concluded that the discharge may affect, but is not likely to adversely affect, corals in American Samoa. EPA concluded the discharge will not affect other listed species.

EPA has concluded informal consultation with both USFWS and NMFS and both services have concurred with EPA's conclusion, in letters dated August 15, 2018 and June 5, 2019 respectively. Additionally, EPA provided both services with copies of the draft fact sheet and the draft permit during the public notice period and received no additional comments on the proposed action.

C. Impact to Coastal Zones

The Coastal Zone Management Act (CZMA) requires that Federal activities and licenses, including Federally permitted activities, must be consistent with an approved state Coastal Management Plan (CZMA Sections 307(c)(1) through (3)). Section 307(c) of the CZMA and implementing regulations at 40 CFR Part 930 prohibit EPA from issuing a permit for an activity affecting land or water use in the coastal zone until the applicant certifies that the proposed activity complies with the State (or Territory) Coastal Zone Management program, and the State (or Territory) or its designated agency concurs with the certification.

EPA has received a general concurrence from the American Samoa Coastal Zone Management Program for the renewal of existing NPDES permits issued in American Samoa (American Samoa Department of Commerce, June 17, 2010 letter). As this action is a reissuance of the existing NPDES permit for the Utulei STP, the general concurrence applies and EPA has assured consistency with the Territory's Coastal Zone Management program.

D. Impact to Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act (MSA) set forth mandates for the National Marine Fisheries Service, regional fishery

management councils and other federal agencies to identify and protect important marine and anadromous fish species and habitat. The MSA requires Federal agencies to make a determination on Federal actions that may adversely impact Essential Fish Habitat (EFH).

The permit contains technology-based effluent limits and numerical and narrative water quality-based effluent limits consistent with the standards designed to protect applicable aquatic life uses, as defined in the American Samoa Water Quality Standards. Therefore, EPA has determined that the permit will not adversely affect essential fish habitat. NMFS concurred with EPA's conclusion in an E-mail dated August 20, 2019, after reviewing the permit record.

E. Impact to National Historic Properties

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effect of their undertakings on historic properties that are either listed on, or eligible for listing on, the National Register of Historic Places. Pursuant to the NHPA and 36 CFR § 800.3(a)(1), EPA has determined that issuing this NPDES permit does not have the potential to affect any historic properties or cultural properties. As a result, Section 106 does not require EPA to undertake additional consulting on this permit issuance.

XI. STANDARD CONDITIONS

A. Reopener Provision

In accordance with 40 CFR Parts 122 and 124, this permit may be modified by EPA to include effluent limits, monitoring, or other conditions to implement new regulations, including EPA-approved water quality standards; or to address new information indicating the presence of effluent toxicity or the reasonable potential for the discharge to cause or contribute to exceedances of water quality standards.

B. Standard Provisions

The permit requires the permittee to comply with EPA Region 9 Standard Federal NPDES Permit Conditions.

XII. ADMINISTRATIVE INFORMATION

A. Public Notice (40 CFR § 124.10)

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a NPDES permit or other significant action with respect to an NPDES permit or application. This permit modification was public noticed in November 2020.

B. Public Comment Period (40 CFR § 124.10)

Notice of the draft permit modification was placed in the Samoa News and on EPA Region 9's website on November 20, 2020, for 30 days for interested parties to respond in writing to EPA. The public comment period for interested parties to respond in writing to EPA closed on December 20, 2020. EPA received comments only from the permittee during the public

comment period and provided a response to all significant comments in the Response to Comments (RTC) document provided along with the issuance of the final permit modification and fact sheet.

C. Public Hearing (40 CFR § 124.12(c))

A public hearing may be requested in writing by any interested party. The request should state the nature of the issues proposed to be raised during the hearing. A public hearing will be held if EPA determines there is a significant amount of interest expressed during the 30-day public comment period or when it is necessary to clarify the issues involved in the permit decision.

During the public comment period, EPA did not receive a request from an interested party to hold a public hearing.

XIII. CONTACT INFORMATION

Comments, submittals, and additional information relating to this permit modification may be directed to:

Elizabeth Sablad, Supervisor, NPDES Permits Section (WTR-2-3)
Sablad.Elizabeth@epa.gov
(415) 972-3044

OR

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(415) 972-3511

XIV. REFERENCES

American Samoa EPA (ASEPA), 2013. *American Samoa Water Quality Standards* (2013 revision). American Samoa Administrative Rule No. 001-2013

American Samoa EPA (ASEPA), 2014. *American Samoa Water Quality Standards Implementation Guidance Manual.* March 2014

EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control*. Office of Water, EPA. EPA/505/2-90-001.

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EPA. 2013. *National Recommended Water Quality Criteria*. Office of Water, EPA. Aquatic Life Criteria Table. https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#table

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EPA. 2010. *U.S. EPA NPDES Permit Writers' Manual*. Office of Water, EPA. EPA-833-K-10-001.

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APPENDIX C-4
EPA RESPONSE TO AS-EPA COMMENTS (2019)

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American Samoa Power Authority – Utulei Sewage Treatment Plant
NPDES Permit No. AS0020001

Response to Comments Document
U.S. EPA Region 9
November 14, 2019

Comments submitted by American Samoa EPA (AS-EPA) on July 12, 2019:

Formatting Corrections: EPA acknowledges AS-EPA's suggestions for various minor formatting edits to improve clarity in the permit and fact sheet and has incorporated the suggested changes.

Specific Questions posed by AS-EPA:

(A) Why is Total Ammonia reported as Nitrogen (N) if the purpose for monitoring is for toxicity?

This is a unit-of-measurement convention which has no effect on implementing the underlying American Samoa Water Quality Standard (AS-WQS) for Ammonia. When laboratories test for Ammonia, they can report results either in terms of "Ammonia as mg/L NH_3", or "Ammonia as mg/L N", without affecting the total amount of ammonia detected. "Ammonia as N" does not represent a lab test which would pick up other sources of Nitrogen, i.e., it is still specifically an Ammonia test.

The conversion to "…as N" is only mathematical, factoring out the mass of the 3 hydrogen atoms in each ammonia molecule:

$$\frac{1\ molecule\ of\ Ammonia\ (as\ N)}{1\ molecule\ of\ Ammonia\ (as\ NH_3)} = \frac{average\ atomic\ mass\ of\ a\ Nitrogen\ atom}{average\ atomic\ mass\ of\ 1\ Nitrogen\ and\ 3\ Hydrogen\ atoms} = \frac{14.00643}{14.00643+3*(1.00784)} = 0.8224$$

..., so "Ammonia as N" is always 0.822 times the value of "Ammonia as NH_3". This is reflected in the 2013 revision of the AS-WQS: Appendix A (page 37) specifies a factor of 1 mg/L ammonia-as-NH_3 → 0.822 mg ammonia-as-N, and that is the factor EPA has used.

To minimize any potential confusion which could be caused by unit conversions, EPA has revised the Ammonia limits table (Attachment E to the permit) to pre-calculate the variable limits in terms of "Ammonia as N", eliminating the need for the discharger to apply the factor of 0.822.

(B) Provide a clear and concise description of compliance determination using Ammonia Impact Ratio (AIR) along with an example of its use related to the Utulei Sewage Treatment Plant.

The AIR is a tool meant to streamline determination of compliance with ammonia standards which are dependent on pH and Temperature, like those in the AS-WQS. A permittee can tell whether their discharge is in compliance with the permit limit based directly on the result of the AIR calculation (a value less than 1 indicates compliance), rather than submitting raw pH, temperature, and ammonia concentration data to EPA and waiting to find out from EPA whether compliance was achieved. The AIR result is then reported to EPA along with the data used to calculate it.

For example, if the following data are collected during a monthly ammonia sampling event:

- Effluent temperature 25ºC,
- Effluent pH 7.2,
- Effluent ammonia concentration 16 mg/L ammonia (as NH_3),

then the steps for completing the AIR analysis would be:

1) Convert the "ammonia as NH_3" concentration into "ammonia as N", as described in response (A) above.
   16 mg/L ammonia as NH_3 * 0.822 = 13.152 mg/L ammonia as N

2) Enter the values into the next empty line of the Ammonia Impact Ratio Data Log (permit attachment D). Note that separate lines should be used for checking the Daily Maximum and Monthly Average limit:

Date of Sample	Ammonia Concentration in Effluent (mg/L as N)	Effluent Temperature (º C)	Effluent pH (standard pH units)	Ammonia Objective with Dilution. (look up objective in Attachment E, using data from columns C and D)	Ammonia Impact Ratio (AIR) **(divide Column B by Column E, B ÷ E)**
…	…	…	…	…	…
30 February, 2050	13.152 mg/L	25 ºC	7.2		

3) Determine the closest available value of the Ammonia Objective from the tables in permit attachment E. Looking at the tables, a pH of 7.2 is below any of the values listed, so as a conservative assumption use the row for the next higher available value, 7.8. Then look up the closest (or next higher) temperature column (25ºC) and find that the first table gives a Daily Maximum limit of 590.9 mg/L Ammonia-as-N, while the second table gives a Monthly Average limit of 89.8 mg/L ammonia-as-N.

4) Enter these values in the Ammonia Objective column of the AIR Data Log (attachment D):

30 February, 2050	13.152 mg/L	25 ºC	7.2	590.9 (daily max)	
"	"	"	"	89.8 (monthly avg)	

5) Calculate the respective AIRs (13.152 divided by 590.9 and 89.8, respectively)

30 February, 2050	13.152 mg/L	25 ºC	7.2	590.9 (daily max)	0.0222

"	"	"	"	89.8 (monthly avg)	0.146

6) Because both AIR values are less than 1.0, this sample shows an ammonia concentration that is in compliance with the permit limit. Report the following 6 values in the appropriate spaces on this month's Discharge Monitoring Report (DMR):

Parameter	**Units**	**Reported Value on DMR**
Temperature	ºC	25
pH	standard pH units	7.2
Ammonia (as N), monthly avg.	mg/L	13.152
Ammonia (as N), daily maximum	mg/L	13.152
Ammonia Impact Ratio (monthly avg.)	n/a	0.146
Ammonia Impact Ratio (daily max)	n/a	0.0222

Note that if *more* than one ammonia sample is collected in any given month, the two "Ammonia (as N)" lines should not show the same value. And in addition to properly calculating and reporting the monthly average and daily maximum values based on those multiple samples, the temperature and pH values associated with *each separate* ammonia sampling event must also be reported on the DMR.

(C) Why is the pH and Temperature important for the Plant's 'effluent' monitoring in the calculation of AIR when the receiving waters are at the harbor (saltwater) outfall?

As American Samoa's ammonia standards are pH- and temperature dependent, pH and temperature data must be collected at the same time as ammonia samples in order to determine whether the standard and permit limit(s) have been met. Receiving water monitoring for pH and temperature at the same frequency as ammonia sampling (monthly) would potentially increase the monitoring workload considerably. The AIR protocol therefore allows use of effluent pH and Temperature as an alternative source of data, to avoid imposing a requirement for additional receiving water data collection on the permittee.

(D) Implementation of American Samoa fresh vs salt water ammonia standards:

EPA acknowledges AS-EPA's inquiry about the applicability of the saltwater vs. freshwater Ammonia standards issued as Appendix A to the American Samoa Water Quality Standards (AS-WQS), given the sample collection location within the treatment plant. NPDES permit limits apply to the "discharge of pollutants" which is defined at 40 CFR §122.2 to specifically mean "*addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source.* " The Water of the United States which this permit is designed to protect from potential effects of Ammonia (and other) discharge is a body of salt water (Pago Pago Harbor), and EPA Region 9 has therefore found the saltwater ammonia standard to be most applicable. Any contact the effluent may have with fresh water would occur within the treatment plant, prior to discharge and addition to a water of the United States (i.e., Pago Pago Harbor) – meaning that the "addition of a pollutant" takes place to the salt water.

Comments submitted by the discharger, American Samoa Power Authority (ASPA), on July 12, 2019:

(E) Comment I.B-1: Calculation of the Ammonia Impact Ratio (AIR)

See discussion in response to AS-EPA comments on the same topic, comments (B) and (C) above. Note also that the requested conversion of permit Attachment E to Ammonia-as-N basis (multiplication by 0.822) has been made.

EPA notes the request to extend the American Samoa Water Quality Standards (AS-WQS) Appendix A tables to lower pH values. However, EPA's permit must implement the territory's water quality standards in the form they were approved. It is not within the allowable scope of an EPA permitting action to modify or extend the existing water quality standards, which requires a separate standards process including formal submission, review, public comment, and approval by EPA.

(F.1) Comment I.B-2: ASPA requests that Enterococci limitations be based on the reassessed dilution of 313:1 for the new diffuser configuration

Increasing the permitted dilution for enterococci from the existing value of 91:1 to 313:1 would allow a substantially increased discharge of Enterococci and other pollutants (see response (G) below). Based on prior experiences with elevated bacteria levels in Pago Pago Harbor, allowing such an increase in discharges of bacteria could potentially impair the protected uses of Pago Pago Harbor specified in the American Samoa Water Quality Standards (AS-WQS), such as "whole and limited body-contact recreation, e.g. swimming, snorkeling, and scuba diving" (American Samoa Administrative Rule 001-2013, §24.0205(e)(1)(A)(v)). Thus allowing an increased discharge of bacteria relative to the previous permit could fail to be protective of the AS-WQS.

Under section 301(h) of the Clean Water Act, the 9th condition to be eligible for a §301(h) variance from secondary treatment requirements is that the discharged effluent must meet the criteria established under Clean Water Act §304(a)(1), which are the applicable water quality standards (implemented through permit effluent limits). Therefore, for the discharge to remain eligible for a 301(h) variance, bacteria levels must be controlled to avoid interference with the designated uses in the AS-WQS.

Additionally, as discussed in the fact sheet, the Anti-Backsliding provisions of Clean Water Act section 402 and provisions of AS-WQS §24.0202 (prohibiting "water quality degradation which would interfere with or become injurious to these existing uses") do not permit EPA to reissue the permit with such an increased discharge of enterococci.

The diffuser upgrades installed by the discharger remain helpful in ensuring protection of water quality, and thus contribute to the basis for renewal of the 301(h) variance.

(F.2) Comment I.B-2, second paragraph: ASPA requests that the limitations for the effluent be based on a minimum of five sequential samples…and the geometric mean and statistical threshold values be applied rather than daily maximum and monthly average.

Adjusting the statistical methods used to determine compliance permit limits in the suggested manner would potentially allow an increase in the discharge of pollutants, which is not permissible in the context of anti-backsliding and the requirements a permit variance under §301(h)(9); see response (F.1).

(G) Comment I.B-3: Total Nitrogen (TN) and Total Phosphorus (TP) limitations

EPA cannot grant the requested increase in dilution credit in the context of a §301(h)-modified permit for the reasons discussed in response (F.1), above, as an increased dilution credit could allow a greater total discharge of these pollutants and potentially interfere with the designated and existing uses of Pago Pago Harbor as specified in the AS-WQS. Increased TN and TP discharges can have undesirable effects such as stimulating algae blooms, which would impair the protected uses of Pago Pago harbor such as Recreational and subsistence fishing, Aesthetic enjoyment, Whole and limited body-contact recreations, and Support and Propagation of marine life (see American Samoa Administrative Rule 001-2013, §24.0205(e)(1)(A) subsections i, iv, v, and vi).

EPA also notes that the discharger's concerns lie with single data points exceeding the monthly average TN and TP limits, at a frequency well under 50% of the time (8% for TN and 36% for TP), although those data points do not exceed the maximum daily limit. In this context, it may be appropriate for the discharger to collect additional nutrient samples in any given sensitive month, in order to arrive at more representative monthly average nutrient values for the discharge. Based on the data presented with this comment, and assuming the effluent data statistically follow a Normal Distribution, it is feasible that collecting a second sample would resolve the discharger's concerns and bring the monthly average value into compliance.

Permit Part I.E.4 Stations to be monitored:

(H) Comment I.E.4-1: request to eliminate monitoring at Diffuser Station U

EPA does not agree that stations whose data are not used for compliance determination are unnecessary. Data on receiving water characteristics in the immediate vicinity of the discharge are important for assessing plume behavior (they are key inputs in dilution modeling) as well as for determining potential effects on endangered species which may be transient or resident within the zone of mixing. Data collection only on the edge of the ZID / ZOM is not sufficient to evaluate these effects and meet EPA's obligations under the Endangered Species Act and other federal regulations. EPA has retained this monitoring location in the permit.

(I) Comment I.E.4-2: request to eliminate monitoring at Reference Station 5

EPA does not agree that stations whose data are not used for compliance determination are unnecessary. Note also that Pago Pago Harbor has different standards under the AS-WQS than the open ocean, therefore a reference station for a harbor discharge must reasonably collect its reference / background data from within the harbor, where those standards apply. The suggested alternate reference station, station FF, is significantly more distant from the harbor than station 5, placing station FF clearly within waters where a different set of water quality standards apply. Station FF is therefore unrepresentative of background levels in the harbor, which is what the reference station data are intended to provide. For these reasons and for the sake of data continuity to track long-term trends, EPA will retain the monitoring requirement at station 5 in the permit at this time. If a more representative *within-harbor* reference station can be identified, EPA may consider adoption of a new reference station as a modification to the permit. There will at minimum need to be a transition period of data collection at both stations to enable comparison of baselines.

(J) Comment I.E.4-3: request to eliminate monitoring at ZOM Stations A1 and B1

EPA agrees that ZID stations should be used in preference to ZOM stations for compliance determination for this 301(h)-modified NPDES permit, as the 301(h) regulations only grant mixing credit for dilution within the ZID. However, because data collection has not occurred at the ZID for many years, a transition period of data collection at both the new ZID stations and the existing ZOM stations is necessary in order for the anticipated new ZID data to be cross-correlated with the older ZOM data. The Final Permit includes a requirement that the discharger submit 2 ZID stations for EPA consideration and approval. EPA has the ability to re-open the permit to phase out ZOM data collection once sufficient data have been collected for the transition.

Permit Part I.E.6: Parameters to be monitored:

(K) Comment I.E.6-1: Request for expansion of allowable semi-annual monitoring date ranges from "March" to "February thru April", and "August" to "August thru October".

EPA finds that the requested broad date ranges for sampling have the potential to introduce too much variability in the collected data and would thus hinder comparison of interannual (year-to-year) performance of the treatment system. In particular, average rainfall in American Samoa varies significantly between the month of February and the month of April, and similarly average rainfall in August is much different from October. Rainfall remains a significant factor in the treatment burden faced by the Utulei STP due to collection system infiltration and other factors. While rainfall will vary naturally from year to year, introducing additional variability through less-consistent monitoring times would exacerbate this uncertainty. EPA prefers to retain the monitoring schedule with specific months designated for sampling to minimize this additional source of uncertainty.

(L) Comment I.E.6-2: ASPA requests that the sampling depths "*1m, mid-depth, and 1 m above the bottom*" be qualified to say that if the water depth is greater than the discharge depth the samples will be at "*1 m below the surface, mid-depth between the surface and the discharge depth, and at the discharge depth*".

EPA does not agree that sampling collection which may occur below the discharge depth is not useful. One major purpose of receiving water monitoring is to assess the reaction(s) of the harbor environment as a whole, and therefore consistency in how "bottom" samples are collected across stations is more relevant than constraining sampling depths to an arbitrary depth based on the bathymetry of the outfall location.

(M) Comment I.E.6-3: ASPA requests that the "Sample Type/Method" for Turbidity in the table on page 10 be stated as "Bench Meter *or Field Sensor*" rather than "Bench Meter".

EPA appreciates that discharger's consultant is seeking to evaluate alternate and simpler methods of data collection for the permit and has incorporated this change in the permit language.

(N) Comment I.E.6-4: ASPA requests that ammonia be reported as N rather than as NH3

EPA has incorporated this change to the format of the ammonia limit, see response to comment (A), above.

(O) Comment I.E.6-5: ASPA requests that the Sample Type /Method for ammonia be listed as "*Lab Sample (EPA 350.1)*" rather than "*Lab Sample (AS-EPA)*"

EPA appreciates discharger's sharing this update to their monitoring arrangements and has made the requested edit to the permit language.

(P) Comment I.E.6-6: ASPA requests that Enterococci be monitored at five stations: the two ZID Stations (to be determined) and the farfield Stations (C, 16, and 18), eliminating the diffuser, reference, and ZOM stations.

EPA does not agree that data collection at stations which are not used for compliance determination is unnecessary. As discussed in the responses to comments (H), (I), (J), and (L), above, a significant purpose of receiving water monitoring is to gather information on the response of the receiving water (harbor) as a whole. Thorough collection of bacteria data is particularly important for this permit because of the context of the newly installed UV disinfection equipment which was vital to the discharger's eligibility for reissuance of a waiver from secondary treatment requirements. For example:

- Bacteria data from the diffuser station are useful for comparison with the new ZID data to validate dilution performance for Enterococci
- Data from the reference station are useful to establish a baseline bacteria level for the harbor against which the effects of the discharge can be evaluated, and
- Data from the existing ZOM stations are needed during a transition period to allow correlations to be drawn with the new ZID data. As discussed under comment (K), EPA retains the ability to phase out ZOM monitoring once sufficient data have been collected for the transition.

Permit Part I.E.7: Sampling Times for Selected Parameters:

(Q) Comment I.E.7-1: The permit requires that: "*Sampling for parameters that are influenced by temperature or pH (i.e., Ammonia) shall be conducted once during the time period between noon and sunset to ensure critical (most stringent) high ambient water temperatures are reflected.*" ASPA requests that this requirement be removed because it is not technically required and it could add considerably to the cost of sampling.

Current American Samoa Water Quality Standards set ammonia standards which are dependent on temperature and pH (appendix A to the AS-WQS). For §301(h)-modified permits in particular, EPA must evaluate compliance "based upon conditions… during… periods when discharge characteristics, water quality, biological seasons, or oceanographic conditions indicate more critical situations may exist " (40 CFR §125.62(a)(iv), emphasis added). The permit language has been revised to more clearly specify that sampling must be representative of these "critical conditions". Because higher receiving water temperatures correlate to more stringent ammonia requirements under the AS-WQS, monitoring should be conducted as close as possible to these most-critical conditions (anticipated peak of daily temperature).

Permit Part I.E.8: Description of Sampling Locations:

(R) Comment I.E.8-1: ASPA requests that this condition be removed and/or incorporated in Part I.E.2

EPA has clarified the language in the permit to make more apparent that Part I.E.2 refers to verifying the coordinates of the existing sampling locations (U, A1, B1, C, 16, 18, 5, FF) during the first receiving water sampling event under this permit, while Part I.E.8 refers to providing details of the new (e.g. ZID) sampling locations once these are identified through development of a revised sampling plan.

Comments on Chronic Whole Effluent Toxicity (WET) Requirements: Permit Part II.C

(S) Comment II.C.1-1: Request for clarification on number of species to use for toxicity testing

EPA has clarified the conflicting language in sections II.C.1 and II.C.2, in addition to adding further detail to the permit limits table (Table 1). The correct species for marine testing are two, the purple sea urchin and the sand dollar. Furthermore, the two species are available as backups for each other and are not required to be tested at the same time:

- If Purple Sea Urchin are not available because it is out of season for their spawning, it would be appropriate to perform toxicity testing using only sand dollars.
- If Sand Dollars are out of season for spawning, it would be appropriate to perform toxicity testing using only Purple Sea Urchins.
- At times when both species are available for testing, it would be most appropriate to test using the species for which the most tests have been conducted—typically this would be the urchin.

(T) Comment II.C.1-2: Request for clarification on frequency of toxicity testing (annual vs semi-annual)

The reference to semi-annual testing was an accidental inclusion of old template language and has been corrected. The toxicity monitoring frequency for this permit is annual, as now listed in the permit limits table (Table 1).

(U) Comment II.C.3-1: Request that toxicity limits be revised on basis of 313:1 dilution with resulting decrease in the Instream Waste Concentration (IWC)

See responses (F.1) and (G) for the reasons EPA cannot grant the increase in dilution for toxicity as it would requested relaxation of permit limits in the context of §301(h). Backsliding on limits for Toxic effects from a discharge would be of particular concern due to the potential effect on marine organisms and potential endangered species in the vicinity of the discharge, as well as risking the protected uses of Pago Pago Harbor described in response (G).

APPENDIX C-5
301 (H) FINAL DECISION DOCUMENT (2019)

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 9
75 Hawthorne Street
San Francisco, CA 94105

AMERICAN SAMOA POWER AUTHORITY'S UTULEI SEWAGE TREATMENT PLANT APPLICATION FOR A MODIFIED NPDES PERMIT UNDER SECTION 301(h) OF THE CLEAN WATER ACT	FINAL DECISION OF THE REGIONAL ADMINISTRATOR PURSUANT TO 40 CFR PART 25, SUBPART G

I have reviewed the attached evaluation analyzing the merits of the application submitted by the American Samoa Power Authority requesting renewal of the variance from secondary treatment requirements for the Utulei Sewage Treatment Plant (STP), pursuant to Section 301(h) of the Clean Water Act. It is my decision that the American Samoa Power Authority be granted a variance in accordance with the terms, conditions and limitations of the attached evaluation, based on Section 301(h) of the Act.

My decision is based on available evidence specific to this particular discharge. It is not intended to assess the need for secondary treatment in general, nor does it reflect on the necessity for secondary treatment by other publicly owned treatment works discharging to the marine environment. This decision and the National Pollutant Discharge Elimination System (NPDES) permit implementing this decision are subject to revision on the basis of subsequently acquired information relating to the impact of the less-than-secondary treated discharge on the marine environment.

Under the procedures of permit regulations at 40 CFR Part 124, public notice and comment regarding the draft version of this decision and accompanying NPDES permit were made available to all interested persons.

Dated: 18th November, 2019 /s/

Michael Stoker
Regional Administrator

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INTRODUCTION

The American Samoa Power Authority (Applicant), has requested renewal of its variance[1] under Section 301(h) of the Clean Water Act (the Act or CWA), 33 U.S.C. § 1311(h), from the secondary treatment requirements contained in Section 301(b)(1)(B) of the Act, 33 USC § 1311(b)(1)(B), for the Utulei Sewage Treatment Plant (STP), a publicly owned treatment works (POTW). The Section 301(h) variance would allow the discharge of wastewater receiving less-than-secondary treatment to the Pago Pago Harbor. The Applicant submitted its renewal application to the U.S. Environmental Protection Agency, Pacific Southwest Region (the EPA Region 9 or EPA), on May 1, 2006, and a revised version on March 1, 2008.

The Applicant first obtained a CWA Section 301(h) modified permit to discharge primary treated effluent from the Utulei STP in 1985. The permit was reissued with the variance in 2001. In 2006 the Applicant requested renewal of the variance at the time of permit reapplication. EPA tentatively proposed to deny the variance in 2009 because the Applicant had not shown that it could consistently achieve Water Quality Standards (WQS) beyond the zone of initial dilution (ZID), had not analyzed known or suspected sources of industrials pollutants and pesticides in its effluent, had not implemented a source control program or a sufficient monitoring program, and based on the information available, it appeared that the proposed discharge could have had the potential to interfere with the protection and propagation of a Balanced Indigenous Population (BIP) of shellfish, fish, and wildlife. Since 2009, EPA has been working with the Applicant to collect additional data, conduct modeling, and upgrade treatment and practices at the Utulei STP. As a result, the quality of the discharge has improved and more thorough and representative data are now available.

Secondary treatment is defined at 40 CFR Part 133 in terms of effluent quality for total suspended solids (TSS), biochemical oxygen demand (BOD), and pH. The secondary treatment requirements for effluent TSS, BOD, and pH are listed below:

TSS: (1) The 30-day average shall not exceed 30 mg/l.
(2) The 7-day average shall not exceed 45 mg/l.
(3) The 30-day average percent removal shall not be less than 85 percent.

BOD: (1) The 30-day average shall not exceed 30 mg/l.
(2) The 7-day average shall not exceed 45 mg/l.
(3) The 30-day average percent removal shall not be less than 85 percent.

pH: At all times, shall be maintained within the limits of 6.0 to 9.0 units.

The application is based on a "current" discharge, as defined at 40 CFR 125.58(h). The Applicant is requesting a modification to the TSS and BOD requirements. A modification for pH

[1] The variance is also called a "modification" or, informally, a "waiver."

is not requested. The Applicant's proposed alternative effluent limits for TSS and BOD have not changed from the existing modified permit. The proposed effluent limits are:

TSS: (1) The 30-day average shall not exceed 75 mg/l.
(2) The 7-day average shall not exceed 113 mg/l.
(3) The 30-day average percent removal shall not be less than 30 percent.

BOD: (1) The 30-day average shall not exceed 78.3 mg/l.
(2) The 7-day average shall not exceed 117 mg/l.
(3) The 30-day average percent removal shall not be less than 30 percent.

EPA has concluded that the Applicant's proposed discharge will comply with the criteria set forth in Section 301(h) of the Act, as implemented by regulations contained in 40 CFR Part 125, Subpart G. Therefore, EPA is proposing to grant the Applicant a variance of secondary treatment requirements for TSS and BOD. This document presents EPA's findings and conclusions.

DECISION CRITERIA

Under Section 301(b)(1)(B) of the Act, U.S.C. § 1311(b)(1)(B), POTWs in existence on July 1, 1977, were required to meet effluent limits based on secondary treatment as defined by the Administrator of EPA (the Administrator). Secondary treatment is defined by the Administrator in terms of three parameters: TSS, BOD, and pH. Uniform national effluent limitations for these pollutants were promulgated and included in National Pollutant Discharge Elimination System (NPDES) permits for POTWs issued under section 402 of the Act. POTWs were required to comply with these limitations by July 1, 1977.

Congress subsequently amended the Act, adding Section 301(h) which authorizes the Administrator, with State[2] concurrence, to issue NPDES permits which modify the secondary treatment requirements of the Act with respect to certain discharges. P.L. 95-217, 91 Stat. 1566, as amended by P.L. 97-117, 95 Stat. 1623; and section 303 of the Water Quality Act of 1987. Section 301(h) provides that:

> The Administrator, with the concurrence of the State[2], may issue a permit under section 402 [of the Act] which modifies the requirements of subsection (b)(1)(B) of this section [the secondary treatment requirements] with respect to the discharge of any pollutant from a publicly owned treatment works into marine waters, if the Applicant demonstrates to the satisfaction of the Administrator that:
>
> (1) there is an applicable water quality standard (WQS) specific to the pollutant for which the modification is requested, which has been identified under Section 304(a)(6) of this Act;
>
> (2) the discharge of pollutants in accordance with such modified requirements will not interfere, alone or in combination with pollutants from other sources, with the attainment or maintenance of that water quality which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish, and wildlife, and allows recreational activities, in and on the water;
>
> (3) the Applicant has established a system for monitoring the impact of such discharge on a representative sample of aquatic biota, to the extent practicable, and the scope of the monitoring is limited to include only those scientific investigations which are necessary to study the effects of the proposed discharge;
>
> (4) such modified requirements will not result in any additional requirements on any other point or nonpoint source;

[2] In the context of the Clean Water Act, the definition of "State" includes entities like U.S. territories and recognized Tribal nations.

(5) all applicable pretreatment requirements for sources introducing waste into such treatment works will be enforced;

(6) in the case of any treatment works serving a population of 50,000 or more, with respect to any toxic pollutant introduced into such works by an industrial discharger for which pollutant there is no applicable pretreatment requirement in effect, sources introducing waste into such works are in compliance with all applicable pretreatment requirements, the Applicant will enforce such requirements, and the Applicant has in effect a pretreatment program, which, in combination with the treatment of discharges from such works, removes the same amount of such pollutant as would be removed if such works were to apply secondary treatment to discharges and if such works had no pretreatment program with respect to such pollutant;

(7) to the extent practicable, the Applicant has established a schedule of activities designed to eliminate the entrance of toxic pollutants from non-industrial sources into such treatment works;

(8) there will be no new or substantially increased discharges from the point source of the pollutant to which the modification applies above that volume of discharge specified in the permit; and

(9) the Applicant at the time such modification becomes effective will be discharging effluent which has received at least primary or equivalent treatment and which meets the criteria established under Section 304(a)(1) of the Act after initial mixing in the waters surrounding or adjacent to the point at which such effluent is discharged.

In addition, any modification to secondary treatment requirements must not conflict with applicable provisions of state; local; or other Federal laws, including the Endangered Species Act, Coastal Zone Management Act; or Executive Orders. 40 C.F.R. § 125.59(b)(3).

The plant currently serves a population of approximately 13,000 and discharges an average flow of 2.2 MGD, with a projected increase to 3.0 MGD. Based on the definition in 40 CFR 125.58(c), the Applicant is a small discharger.

EPA may grant the Utulei STP a variance to secondary treatment requirements if the Administrator determines that the Applicant meets the statutory criteria and regulatory requirements. EPA has evaluated the Applicant's proposed discharge in accordance with the statutory criteria and regulatory requirements, as described below, and has concluded that the Applicant is eligible for a modification of the requirements for TSS and BOD.

SUMMARY OF FINDINGS

Based upon review of the data, references, and empirical evidence furnished in the application and other relevant sources, EPA Region 9 makes the following findings with regard to the statutory and regulatory criteria:

1. The Applicant's proposed discharge will comply with primary treatment requirements. [CWA Section 301(h)(9); 40 CFR 125.60]

2. The Applicant's proposed modified discharge will comply with American Samoa water quality standards, including light penetration, dissolved oxygen, and pH. The Applicant has sent a letter to the American Samoa Environmental Protection Agency (ASEPA) requesting determination that the proposed discharge complies with applicable law including water quality standards. [CWA Section 301(h)(1); 40 CFR 125.61]

3. The Applicant has demonstrated it can consistently achieve American Samoa water quality standards at and beyond the zone of initial dilution. [CWA Section 301(h)(9); 40 CFR 125.62(a)]

4. The Applicant's proposed modified discharge, alone or in combination with pollutants from other sources, will not adversely impact public water supplies or interfere with the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife, and will allow for recreational activities. [CWA Section 301(h)(2); 40 CFR 125.62(b), (c), and (d)]

5. The Applicant has proposed to continue, and in some cases will be required to enhance, a successful monitoring program which is sufficient to meet the needs of the facility and the Clean Water Act. [CWA Section 301(h)(3); 40 CFR 125.63]

6. The Applicant's proposed discharge would not result in any additional treatment requirements on any other point or non-point source. [CWA Section 301(h)(4) of the CWA; 40 CFR 125.64]

7. As there are no known or suspected industrial sources of toxic pollutants in the service area, the Applicant is exempt from the requirement to develop and implement a pretreatment program and is therefore exempt from the requirement to enforce such a program. [CWA Section 301(h)(5); 40 CFR 125.66 and 125.68].

8. As the plant serves, and will continue to serve, a population of less than 50,000 in the foreseeable future, the Applicant is exempt from the provisions of the urban area pretreatment program. [CWA Section 301(h)(6) of the Act; 40 CFR 125.65]

9. The Applicant has submitted a chemical analysis of its current discharge for toxic pollutants, which were not found at levels of concern. The facility does not serve any significant non-industrial customers likely to contribute toxicants to facility influent. Therefore, additional action by the Applicant to address non-industrial sources of toxicants is not necessary to meet this criterion. [CWA Section 301(h)(7); 40 CFR 125.66]

10. There will be no new or substantially increased discharges from the point source of the pollutants to which the Section 301(h) variance would apply above those specified in the permit. [CWA Section 301(h)(8); 40 CFR 125.67]

11. This decision along with the accompanying draft permit were shared with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and American Samoa Department of Commerce (Coastal Zone Management Program), as well as AS-EPA, at the time of public notice to seek concurrence that the discharge is consistent with all applicable federal and Territorial laws. Each of these agencies has concurred with EPA's decision and therefore the issuance of this final 301(h)-modified permit does not conflict with applicable provisions of federal and Territorial laws. [40 CFR 125.59].

CONCLUSION

EPA concludes that the Applicant's proposed discharge will satisfy the requirements of CWA Section 301(h) and 40 CFR 125, Subpart G.

RECOMMENDATION

It is recommended that the Applicant be granted a CWA Section 301(h) variance in accordance with the above findings, based upon satisfaction of the following conditions:

1. The determination by the ASEPA that the proposed discharge will comply with applicable provisions of Territorial law, including water quality standards, in accordance with 40 CFR 125.61(b)(2). Certification under §401 of the Clean Water Act, of the permit to be issued by EPA based on this decision, was received from ASEPA on August 9 2019 and serves as determination of compliance.

2. The determination by ASEPA that the proposed discharge will not result in any additional treatment requirements on any other point or nonpoint sources, in accordance with 40 CFR 125.64. Certification under §401 of the Clean Water Act, of the permit to be issued by EPA based on this decision, was received from ASEPA on August 9 2019 and serves as determination of compliance with this condition.

3. The final permit contains the applicable terms and conditions required by 40 CFR 125.68, for establishment of a monitoring program.

4. The determination by the American Samoa Department of Commerce, granted on June 17, 2010, that renewal of a 301(h)-modified permit does not conflict with the Coastal Zone Management Act, as amended.

5. The determination by the U.S. Fish and Wildlife Service, issued July 25 2018, that no critical habitat or federally listed terrestrial species occur within the immediate vicinity and that therefore issuance of a 301(h)-modified permit does not conflict with applicable provisions of the federal Endangered Species Act, as amended.

6. The concurrence by the NOAA National Marine Fisheries Service, dated June 5 2019, with EPA's conclusion that issuance of a 301(h)-modified permit "may affect, but is not likely to adversely affect" endangered marine species in the vicinity of the discharge and therefore does not conflict with applicable provisions of the federal Endangered Species Act, as amended,

7. The determination by the NOAA National Marine Fisheries Service, Pacific Islands Regional Office, on August 20 2019 that the permit would pose "no more than minimal" risk of effects to Essential Fish Habitat and therefore meets the applicable provisions the Magnuson-Stevens Fishery Conservation and Management Act, as amended.

8. Issuance of the 301(h)-modified permit shall assure compliance with all applicable requirements of 40 CFR 122 and 40 CFR 125, Subpart G.

DESCRIPTION OF TREATMENT SYSTEM

Utulei STP is located in the town of Utulei on Tutuila Island, the largest and principal island of American Samoa. Utulei STP is a primary treatment plant that collects and treats wastewater from several nearby residential areas and the downtown area, serving a population of approximately 13,000 people. The service area includes the villages of Faga'alu (including the hospital), Utulei, Fagatogo, Pago Pago (both the upper and lower part of the village), and Atu'u (including the sanitary wastewater from two local tuna canneries). The service area also includes the villages of Leloaloa, Au'a, and Onesosopo which are not yet connected but were included in the original design of the Harbor Sewer System (collection system) and the Utulei STP it feeds into. There are no existing or planned industrial sources of wastewater that discharge to Utulei STP.

The plant provides grit removal, primary sedimentation, anaerobic sludge digestion, and ultraviolet (UV) disinfection prior to discharge into outer Pago Pago Harbor. Influent enters the plant at the influent wet well, which contains four submerged variable speed pumps. As influent exits the wet well, it is screened through a rock basket with two-inch square mesh. Influent is then pumped into an elevated grit channel. Additional grit is removed at the headworks. The plant's primary treatment unit is the clarigester. Clarigesters consist of an upper clarifier that removes settleable solids and skims off floatables and a lower anaerobic digester

that settleable solids are funneled directly into. Gas from the digesters is vented near the top of the clarigesters. Following primary clarification, flow converges and continues to an elevated UV channel. Disinfected effluent is discharged horizontally in alternatively opposite directions through a linear multiport diffuser located approximately 954 feet from Tulutulu Point at a depth of 150 feet in outer Pago Pago Harbor at 14º 16' 59.6" South latitude and 170º 40' 28.1" West longitude. The diffuser consists of six lateral ports, plus a separate "end gate" port, and has a total length of approximately 42.6 feet, with the ports spaced approximately 7.1 feet apart. The lateral ports have a diameter of 5.5 inches while the end gate port is 11 inches in diameter and discharges at a 15-degree angle upwards and parallel to the diffuser barrel. The plant currently discharges 2.2 million gallons per day (MGD) of treated effluent into outer Pago Pago Harbor.

Sludge from the primary treatment process is transported to the Tafuna Sewage Treatment Plant on the southeastern portion of the island, where it is treated by anaerobic digestion and placed in drying beds until landfill disposal.

Since 2011, the Applicant made several improvements to the plant, including: (1) the addition of a UV disinfection component to the treatment process to reduce bacteria in the effluent; (2) modifying the diffuser to enhance the initial dilution and dispersal of the discharge in the receiving water by reducing the size of existing ports from 6 inches to 5.5 inches and adding an 11-inch end port; (3) repairing manholes to reduce inflow and infiltration to the system; and (4) increasing monitoring.

DESCRIPTION OF RECEIVING WATERS

Utulei STP discharges into the outer portion of Pago Pago Harbor. Pago Pago Harbor is located on the southeastern portion of Tutuila Island in American Samoa and empties into the South Pacific Ocean. In the application, the Applicant indicated that outer Pago Pago Harbor has characteristics similar to open coastal ocean waters and is not characteristic of an estuarine system.

Currents

No recent data exist for current speed and direction at the discharge site. In the application, the Applicant indicated that wind direction is generally from the east and southeast during the tradewind season (i.e., April/May through October/November). However, during the non-tradewind season, winds from the northwest to northeast become more prevalent, though southeast winds still dominate. The Applicant also notes that the regional scale ocean currents are
relatively constant causing no apparent oceanographic variability that would affect the transport of the discharge plume. The Applicant described the tides in the vicinity of the discharge as semi-diurnal with a range of 2.5 feet and little diurnal inequality. Since current data for the area around the diffuser was sparse, the Applicant used a worst-case scenario of zero current velocity to model the critical initial dilution.

Stratification

The application indicates that there is little seasonal variation in the water column with respect to temperature and salinity (ASPA 2006). Density profiles at the outfall taken during tradewind and non-tradewind seasons indicate that thermoclines and haloclines do not form, which allows for the constant mixing of the water column throughout the year. In addition, the Applicant indicated that little freshwater drains from Tulutulu Point, the land feature closest to the outfall, which might otherwise affect stratification. The Applicant also indicated that ambient water temperatures near the outfall range from 27.2 to 30.6 degrees Celsius with an average of 28.7 based on receiving water monitoring data collected during the tradewind and non-tradewind seasons (2002-2005), and that salinity ranges from 33.0 to 36.4 parts per thousand, with an average of 34.9 parts per thousand. Salinity in the open ocean of American Samoa has generally been found to be 36 parts per thousand and, therefore, the Applicant concluded that the outer portion of Pago Pago Harbor, where the outfall is located, is characteristic of open coastal waters.

PHYSICAL CHARACTERISTICS OF THE DISCHARGE

Outfall/Diffuser and Initial Dilution

40 CFR 125.62(a)(1) requires that the proposed outfall and diffuser be located and designed to provide adequate initial dilution, dispersion, and transport of wastewater to meet all applicable WQSs and all applicable EPA water quality criteria for which there is no applicable EPA-approved WQS at and beyond the boundary of the ZID. This evaluation is based on conditions occurring during periods of maximum stratification and during other periods when discharge characteristics, water quality, biological seasons, or oceanographic conditions indicate more critical situations may exist.

The Applicant has demonstrated that there is only one critical environmental period in the receiving water near the discharge point based on density profile data collected during both tradewind and non-tradewind seasons. The Applicant is only able to provide an instantaneous maximum effluent flow rather than a peak two to three-hour effluent flow for the new end-of-permit year as specified by EPA's Amended Section 301(h) Technical Support Document (ATSD). However, EPA believes that the Applicant's instantaneous maximum effluent flow is an appropriately conservative measure of its most critical flow condition for the proposed modified discharge during the next permit period. Therefore, for the purpose of the Section 301(h) evaluation, EPA accepted the following information that was used by the Applicant to compute critical initial dilution: the predicted instantaneous maximum effluent flow, the most critical density profile of the receiving water, and a current speed conservatively assumed to be zero in the absence of significant monitoring data.

In the application, the Applicant calculated critical initial dilution using the 1985 EPA-approved mixing zone model, UDKHDEN, based on the predicted instantaneous maximum flow of 6.0 MGD. The UDKHDEN model requires the specification of various parameters describing the diffuser configuration, effluent properties, and ambient conditions. When required by the model,

the Applicant applied the physical outfall characteristics as they were at the time of application. The Applicant also ran the model using characteristics of a proposed altered diffuser, with port restriction plates removed, resulting in 7.75-inch diameter ports. In addition, the Applicant modeled based on the worst-case assumption of zero ambient current in the absence of detailed current data. The various density profiles used to find critical environmental conditions with the model were collected at station U (the diffuser midpoint station), with up-cast and down-cast profiles showing good agreement for each monitoring event. Profiles were collected for five monitoring events, from the 2002 tradewind season through the 2003 and 2004 non-tradewind and tradewind seasons. Based on the results of the UDKHDEN model, the Applicant determined the most critical case is represented by the March 2003 (2003 non-tradewind) season, with a density gradient between the surface and 150-foot depth of 0.72 σ-t (sigma-t units). This profile also matches the description of a typical worst-case profile on page A-3 of EPA's ATSD, as "having sufficiently steep density gradients some distance [on the order of 16 feet] above a diffuser port". The diffuser is at 150 feet and this profile shows a rapid and significant change in density at the 150-foot depth. The Applicant did not account for effluent temperature effects and based the density of the effluent on the density of freshwater at standard conditions, 1.00 g/cm^3. Based on the UDKHDEN model, the Applicant estimated a critical initial dilution of 91:1 at the trapping depth of 17.6 feet. For comparison purposes, the Applicant estimated an initial dilution of 127:1 for the proposed annual average end-of-permit flow of 3.0 MGD (ASPA 2008).

In accordance with EPA's ATSD, EPA reviewed the calculation of initial dilution and trapping depth under both the proposed daily average flow and critical flow scenarios provided by the Applicant. Based on its review, EPA has determined that an average initial dilution and critical initial dilution of 127:1 and 91:1, respectively, are adequately calculated for the purpose of this Section 301(h) evaluation. However, because Section 301(h) regulations require that the Applicant's diffuser be located and designed to provide initial dilution, dispersion, and transport sufficient to ensure compliance with water quality standards at the ZID boundary under *critical conditions* (see 40 CFR 125.62(a)(1)(iv)), EPA evaluated compliance with Section 301(h) regulations based only on the critical initial dilution of 91:1.

EPA also finds this critical initial dilution of 91:1 as appropriately conservative in reviewing the Applicant's upgraded diffuser characteristics, as the reduction in port size and added end port will aid in dispersion of the plume. In addition, the design capacity of the plant has not changed.

Application of Initial Dilution to Water Quality Standards

Based on the information summarized in the previous section, EPA concludes: (1) the outfall and diffuser system are well designed and achieve a high degree of dilution; and (2) the critical initial dilution factor of 91:1 provides a conservative estimate of initial dilution for evaluation of compliance with applicable American Samoa Water Quality Standards (ASWQS). The ASWQS allow for a zone of mixing (ZOM) that does not exceed the zone of initial dilution for toxics and some narrative standards, but allow for a zone of mixing larger than the ZID to be applied to the standards for turbidity, total phosphorus, total nitrogen, chlorophyll-*a*, light penetration, ammonia, dissolved oxygen, pH, and enterococcus, provided that certain conditions are met (ASWQS section 24.0207(b)(6),(7), and (8)).

Zone of Initial Dilution

As defined in 40 CFR 125.58(dd), the ZID is a region of mixing surrounding, or adjacent to, the end of the outfall or diffuser, provided that the ZID may not be larger than allowed by mixing zone restrictions in applicable water quality standards. EPA's ATSD limits the ZID to the area including the bottom area and the water column above that area circumscribed by distance “d” from any point of the diffuser, where “d” is equal to the water depth. Per the application, the ZID is characterized as having a horizontal distance of 150 feet from the diffuser, or 300 feet wide, and 350 feet in length. This is consistent with EPA’s ATSD.

Monitoring stations A and B are considered ZID boundary stations and were sampled for sediment quality. As the ASWQS allow for a ZOM on a pollutant-by-pollutant basis, the permit included a ZOM, situated around the ZID. The ZOM is characterized as having a horizontal distance of 550 feet from the midpoint of the diffuser and an 18 foot depth. In 2002, subsequent to the 2001 permit reissuance, and in accordance with the regional monitoring provision in the permit, monitoring stations were changed to provide a more comprehensive approach to water quality monitoring in Pago Pago Harbor. Some of the monitoring stations were relocated to facilitate the use of common farfield and reference stations in coordination with the tuna canneries. This resulted in all water quality monitoring conducted at the ZOM, not the ZID. Monitoring stations A1 and B1 are considered ZOM boundary stations.

Although the ASWQS allow a ZOM, CWA Section 301(h) requires facilities with variances from secondary treatment to meet water quality standards at the ZID. Where data is available at the ZID, EPA has evaluated whether the proposed discharge would comply with water quality standards at the edge of the ZID; however, where data is not available from the ZID, data from the ZOM is considered, as allowed by the ASWQS.

APPLICATION OF STATUTORY AND REGULATORY CRITERIA

A. Compliance with Federal Primary Treatment Requirements

The Applicant is required under CWA Section 301(h)(9) and 40 CFR 125.60 to demonstrate, at the time the 301(h) variance becomes effective, it will be discharging effluent that has received at least primary or equivalent treatment. According to 40 CFR 125.58(r), primary treatment means treatment by screening, sedimentation, and skimming adequate to remove at least 30 percent of the biological oxygen demanding material and of the suspended solids in the treatment plant influent, and disinfection, where appropriate.

1. Total Suspended Solids

In order to comply with the federal primary treatment requirements, the Applicant proposes renewal of the following effluent limits for total suspended solids as established in the existing permit:

TSS: (1) The 30-day average shall not exceed 75 mg/l.
(2) The 7-day average shall not exceed 113 mg/l.
(3) The 30-day average percent removal shall not be less than 30 percent.

Under the existing permit, the Applicant takes weekly composite samples of the plant influent and effluent to analyze for TSS. EPA reviewed influent and effluent monitoring data reported over the most recent 5 years (2013-2017). Discharge monitoring data for total suspended solids is summarized in the following tables.

Table 1. Monthly average and annual average influent concentrations for total suspended solids (mg/l) at Utulei STP.

Month	**2013**	**2014**	**2015**	**2016**	**2017**
January	94	80	95	48	97
February	104	54	82	82	96
March	104	104	76	95	70
April	72	66	85	109	95
May	80	62	111	104	101
June	48	58	72	84	114
July	116	92	57	76	62
August	103	97	83	96	87
September	89	96	81	103	97
October	116	105	56	99	93
November	108	83	41	105	102
December	118	85	33	88	92
Annual Average	96	82	73	91	92
Maximum Month	118	105	111	109	114
Minimum Month	48	54	33	48	62

Table 2. Monthly average and annual average effluent concentrations for total suspended solids (mg/l) at Utulei STP.

Month	**2013**	**2014**	**2015**	**2016**	**2017**
January	49	30	53	24	43
February	45	32	38	28	40
March	54	26	36	46	36
April	29	30	46	40	38
May	36	23	64	36	41
June	34	22	39	34	46
July	36	34	29	32	25
August	53	34	40	35	35
September	44	38	46	41	40
October	46	35	24	44	40
November	44	36	23	47	43

December	40	48	22	40	39
Annual Average	42.5	32.3	38.3	37.3	38.8
Maximum Month	54.0	48.0	64.0	47.0	46.0
Minimum Month	29.0	22.0	22.0	24.0	25.0

Table 3. Monthly average and annual average percent removals for total suspended solids (%) at Utulei STP.

Month	**2013**	**2014**	**2015**	**2016**	**2017**
January	48.3	58.8	44.4	49.4	55.9
February	56.2	50.7	54.8	64.1	58.
March	48.4	65.5	52.8	51.2	48.
April	71.6	55.3	45.1	63.6	58.1
May	68.	62.2	42.1	65.	58.9
June	55.7	56.4	44.7	57.8	59.7
July	68.8	62.8	48.	5.4[3]	57.6
August	49.5	65.	52.3	63.9	60.2
September	51.2	59.5	41.9	60.5	59.
October	60.1	66.9	57.4	56.4	56.6
November	59.4	56.1	45.9	53.9	57.3
December	63.6	39.	33.	54.4	58.
Annual Average	58.4	58.2	46.9	53.8	57.3
Maximum Month	71.6	66.9	57.4	65.0	60.2
Minimum Month	48.3	39.0	33.0	5.4	48.0

Excluding the apparent data submission error noted in Table 3 (see footnote 3 below), the plant consistently meets the federal primary treatment requirement of at least 30% removal. Table 2 shows the highest monthly average effluent concentration of total suspended solids was 64.0 mg/l, which meets the Applicant's proposed monthly average effluent limit of 75 mg/l.

2. Biochemical Oxygen Demand

In order to comply with the federal primary treatment requirements, the Applicant proposes renewal of the following effluent limits for biochemical oxygen demand as established in the existing permit:

BOD: (1) The 30-day average shall not exceed 78.3 mg/l.
(2) The 7-day average shall not exceed 117 mg/l.
(3) The 30-day average percent removal shall not be less than 30 percent.

[3] The Total Suspended Solids removal value of 5.4% for July 2016 is believed to be a reporting error (entered 5.4 instead of ~57.4). Recalculation of the effluent – influent ratio can be performed with the available data and yields [1- (32 mg/L ÷ 76 mg/L)] = a 57.9% removal rate, well above the required 30% removal.

Under the existing permit, the Applicant takes weekly composite samples of the plant influent and effluent to analyze for BOD. EPA reviewed influent and effluent monitoring data reported over the most recent 5 years (2013-2017). Discharge monitoring data for biochemical oxygen demand is summarized in the following tables.

Table 4. Monthly average and annual average influent concentrations for biochemical oxygen demand (mg/l) at Utulei STP.

Month	**2013**	**2014**	**2015**	**2016**	**2017**
January	98	74	103	91	102
February	114	71	122	121	103
March	129	1114	109	85	101
April	53	80	80	107	77
May	91	63	107	91	100
June	77	54	94	96	106
July	98	122	101	85	58
August	121	99	111	101	104
September	113	124	91	108	108
October	98	125	106	91	90
November	101	99	112	88	110
December	133	118	124	119	111
Annual Average	102	179	105	99	98
Maximum Month	133	1114	124	121	111
Minimum Month	53	54	80	85	58

Table 5. Monthly average and annual average effluent concentrations for biochemical oxygen demand (mg/l) at Utulei STP.

Month	**2013**	**2014**	**2015**	**2016**	**2017**
January	56	46	53	56	52
February	68	34	66	67	51
March	62	61	50	47	48
April	45	46	50	54	41
May	66	38	64	47	53
June	47	39	42	45	65
July	59	60	47	41	38
August	71	55	60	48	55
September	59	62	48	58	63
October	50	63	61	43	46
November	50	47	66	42	63
December	67	67	59	56	57
Annual Average	58.3	51.5	55.5	50.3	52.7
Maximum Month	71.0	67.0	66.0	67.0	65.0

Minimum Month	45.0	34.0	42.0	41.0	38.0

Table 6. Monthly average and annual average percent removals for biochemical oxygen demand (%) at Utulei STP.

Month	**2013**	**2014**	**2015**	**2016**	**2017**
January	41.4	46.	48.3	32.9	48.4
February	40.4	48.7	44.	44.9	48.2
March	51.4	46.3	47.6	45.9	50.6
April	41.3	45.7	38.3	49.7	44.9
May	47.9	44.2	38.7	48.6	46.8
June	52.6	45.2	53.8	51.9	38.3
July	40.7	50.5	49.4	49.	33.9
August	41.1	44.3	45.6	52.	47.2
September	47.9	49.6	46.8	46.6	41.7
October	48.6	48.9	42.6	50.	48.7
November	49.8	52.5	41.	52.2	42.9
December	49.3	43.	50.	52.2	48.3
Annual Average	46.0	47.1	45.5	48.0	45.0
Maximum Month	52.6	52.5	53.8	52.2	50.6
Minimum Month	40.4	43.0	38.3	32.9	33.9

Table 6 shows the plant's monthly average percent removals of biochemical oxygen demand ranged from 32.9% to 53.8% over the permit term, consistently meeting the federal primary treatment requirement of at least 30% removal. Table 5 shows the highest monthly average effluent concentration of biochemical oxygen demand was 71.0 mg/l, which meets the Applicant's proposed monthly average effluent limit of 78.3 mg/l.

B. Attainment of Water Quality Standards for TSS and BOD

Section 301(h)(1) of the CWA, implemented by 40 CFR 125.61(a), requires the existence of water quality standards applicable to the pollutants for which a Section 301(h) modified permit is requested, including: (1) water quality standards for biochemical oxygen demand or dissolved oxygen; (2) water quality standards for suspended solids, turbidity, light transmittance, light scattering, or maintenance of the euphotic zone; and (3) water quality standards for pH. Under 40 CFR 125.61(b)(1), the Applicant must demonstrate the proposed modified discharge will comply with these standards. American Samoa water quality standards applicable to the Utulei STP discharge are specified in the 2013 ASWQS. The Applicant did not request a modification for pH, so it is discussed under section C.1. Attainment of Other Water Quality Standards and Criteria.

1. Dissolved Oxygen

The Applicant requests modified effluent limits for biochemical oxygen demand, which can affect the ambient dissolved oxygen concentration. Section 24.0206(m) of the ASWQS requires the dissolved oxygen of Pago Pago Harbor to be "not less than 70% saturation or less than 5.0 mg/l. If the natural level of dissolved oxygen is less than 5.0 mg/l, the natural level shall become the standard."

Both the Applicant and EPA modeled the potential for: (1) dissolved oxygen depression following initial dilution during the period of maximum stratification (or other critical period); and (2) farfield dissolved oxygen depression associated with biochemical oxygen demand exertion in the wastefield. As the Applicant is a small discharger, they are not required to provide information regarding the dissolved oxygen depression associated with steady-state sediment oxygen demand or resuspension of sediments.

a. Dissolved Oxygen Depression upon Initial Dilution

Using the method described in the ATSD, the Applicant predicted a dissolved oxygen depression following initial dilution of 0.08 mg/l. The Applicant assumed an immediate dissolved oxygen demand (IDOD) of 5 mg/l, initial dilution of 127:1, ambient dissolved oxygen concentration of 5.63 mg/l and effluent dissolved oxygen concentration of 0 mg/l. The 127:1 dilution factor was based on the projected annual average flow of 3.0 MGD at the end of the permit term. The ambient dissolved oxygen concentration was the minimum concentration reported at the diffuser station U during the monitoring period. The immediate dissolved oxygen demand (IDOD) was based on the maximum daily BOD effluent limit of 157 mg/l and travel time through the diffuser of 29 minutes, resulting in an IDOD of 5.0 mg/l. The predicted final dissolved oxygen concentration after initial dilution was 5.55 mg/l, representing a 0.08 mg/l or 1.4% reduction in dissolved oxygen.

EPA recalculated this depression, in compliance with the ATSD, using the critical initial dilution of 91:1 based on a peak flow of 6.0 MGD, and an ambient dissolved oxygen value of 6.16 mg/l based on water quality monitoring data from reference station 5. As previously discussed, the Applicant modeled a critical initial dilution of 91:1 from the March 2003 data. EPA used the critical initial dilution and ambient dissolved oxygen concentration from the March 2003 data as it best represented critical conditions in the receiving water. A summary of the values used is included in Table 7.

Table 7. Summary of values used to estimate final DO concentrations and predicted DO upon critical initial dilution.

Parameter	Applicant Values	EPA Values
Critical flow, MGD	3.0	6.0
Sa	127:1	91:1
IDOD, mg/l	5.0	5.0
DOe, mg/l	0.0	0.0
DOa, mg/l	5.63	6.16

DOf , mg/l	5.55	6.04
ΔDOa-f , mg/l	-0.08	-0.12

Based on a critical initial dilution of 91:1 and a DO_a of 6.16 mg/l, EPA calculated a DO_f of 6.04 mg/l, which results in a depression of 0.12 mg/l or 1.9% from ambient conditions. Thus, even under the worst-case conditions, the maximum predicted reduction in dissolved oxygen is less than 2% and the final DO concentration in the receiving water is still predicted to be above the ASWQS of 5.0 mg/l.

b. Dissolved Oxygen Depression due to BOD in the Farfield

After initial dilution, dissolved oxygen may be consumed by biochemical oxygen demand in the wastefield. The Applicant evaluated whether the dissolved oxygen standard (DO_{STD}) is less than or equal to the dissolved oxygen concentration after initial dilution (DO_f) minus the biochemical oxygen demand after initial dilution (BOD_f) and multiplied by a factor of 1.46. This equation is presented in the ATSD:

$$DO_{STD} \leq DO_f - (BOD_f * 1.46)$$

The ATSD states that if the inequality is true, the discharge will not violate the dissolved oxygen standard due to BOD exertion and no further analysis is necessary. To evaluate this inequality, the Applicant assumed a DO_{STD} of 5.0 mg/l. The DO_f computed in the above section is 5.55 mg/l. Based on the Applicant assuming an effluent BOD concentration of 157 mg/l, an initial dilution of 127:1, and an ambient BOD concentration of 0 mg/l, the BOD_f is 1.23 mg/l. Applying the variables to the inequality yielded a value of 3.8 mg/l, which is less than the DO_{STD}, thus the inequality is false.

EPA re-evaluated the inequality, assuming a DO_f computed above of 6.04 mg/l and calculated BOD_f of 1.73 mg/l assuming a dilution of 91:1, yielding a value of 3.5 mg/l, which is less than the DO_{STD}. Thus, the inequality is false and additional analysis is required.

To assess DO concentrations after initial dilution, the Applicant evaluated receiving water monitoring data for the existing modified discharge and modeled the exertion of BOD in the farfield on DO concentrations under critical conditions. In accordance with EPA's ATSD, DO depression in the farfield due to the consumption of BOD in the receiving water was estimated using a simplified farfield depletion model for open coastal waters.

The DO concentration in the receiving waters following critical initial dilution can be expressed as a function of travel time using Equation B-16 from EPA's ATSD:

$$DO(t) = DO_a + [(DO_f - DO_a) \div D_s] - [(L_{fc} \div D_s)(1-\exp^{-k_c t})] - [(L_{fn} \div D_s)(1-\exp^{k_n t})]$$

where:

$DO(t)$ = DO concentration, in mg/l, in submerged wastefield as a function of travel time, t;

DO_a = Affected ambient DO concentration, in mg/l, immediately up current of the diffuser;

DO_f = DO concentration, in mg/l, at the completion of initial dilution calculated using Equation B-5 described in EPA's ATSD;

k_c = CBOD decay rate coefficient;
k_n = NBOD nitrification rate;
L_{fc} = Ultimate CBOD concentration, in mg/l, above ambient at completion of initial dilution, in mg/l;
L_{fn} = Ultimate NBOD concentration in mg/l above ambient at completion of initial dilution; and
D_s = Dilution attained subsequent to initial dilution as a function of travel time, t.

Table 8 provides a summary of values the Applicant and EPA used to calculate DO(t) concentrations immediately following critical initial dilution as a function of time.

Table 8. Summary of values used by the Applicant and EPA to predict DO concentrations, DO(t), as a function of time.

Parameter	Applicant Values	EPA Values
DOa, mg/l	5.63	6.16
DOf , mg/l	5.55	6.04
kc, day-1	0.325	0.35
kn, day-1	0.141	0.200
Lfc, mg/l	2.63	2.09
Lfn, mg/l	1.04	1.46
Ds	See Table 9	See Table 9

The Applicant used a DO_a value of 5.63 mg/l and a DO_f of 5.55 mg/l. In contrast, EPA used the previously calculated DO_a and DO_f values of 6.16 and 6.04 mg/l, respectively.

For the CBOD decay rate coefficient, k_c, the Applicant calculated a CBOD decay rate of 0.325/day (base e) based on an average ambient water temperature of 27.5 degrees Celsius, since maximum water temperatures have shown to be between 28 and 29 degrees Celsius. In contrast, EPA calculated a k_c of 0.35/day based on an average water temperature of 29 degrees Celsius, which EPA calculated from critical (conservative) conditions from the March 2003 receiving water data at reference station 5.

Similarly, for the nitrogenous BOD (NBOD) decay rate coefficient, k_n, the Applicant calculated a NBOD decay rate of 0.141/day (base e) based the same temperature correction factor and ambient water temperature of 27.5 degrees Celsius. In accordance with EPA's ATSD, studies indicate that a temperature correction factor of 1.08 is valid between 10 and 30 degrees Celsius for nitrogen oxidation. Thus, using this factor and an ambient temperature of 29 degrees Celsius, EPA calculated a k_n of 0.200/day

As described in EPA's ASTD, NBOD may not always contribute to oxygen depletion. However, in embayments such as Pago Pago Harbor where there are other discharges in the vicinity (notably urban/residential runoff and the oxygen demand of waste from the tuna cannery outfall), nitrification may be more important as a source of oxygen depletion. Consequently, EPA has assumed that, in the vicinity of modified discharge, oxygen depletion occurs due to both

carbonaceous BOD (CBOD) and nitrogenous BOD (NBOD) and that both must be considered when modeling farfield dissolved oxygen.

In calculating the ultimate CBOD concentration above ambient at completion of initial dilution, L_{fc}, the Applicant incorrectly applied the default factor of 1.46 twice instead of calculating the L_{fc} based on the equation in the ATSD, resulting in an L_{fc} value of 2.63 mg/l. The Applicant's L_{fc} value would have been 1.54 mg/l, if calculated correctly. EPA calculated an L_{fc} value with the calculated k_c factor of 0.35/day and BOD_f of 1.73 mg/l, resulting in an L_{fc} value of 2.09 mg/l. The L_{fn} values in Table 8 were calculated similarly in accordance with EPA's ATSD.

In the application, the Applicant calculated D_s using an initial width of the sewage field, b, of 100 feet, which corresponds to the length of the diffuser plus half widths of the plume on either end of the diffuser for the critical conditions. Based on the ATSD, the Applicant and EPA predicted dilution, D_s, in the receiving waters as a function of travel time. Table 9 provides a comparison of time intervals and corresponding dilutions calculated by the Applicant and EPA. In the application, the Applicant predicted dilutions based on one day, at 1/6-hour intervals, as well as for 10 days, at 6-hr intervals, to better predict the potential impact of oxygen demand on ambient DO concentrations in the farfield.

In the application, the Applicant estimated that a maximum farfield DO depression of 0.082 mg/l resulted 600 seconds (1/6 hour) after the completion of initial dilution resulting in a DO concentration of 5.548 mg/l in the wastefield. The Applicant concluded that DO is not reduced below 5.0 mg/l in the farfield and that this would comply with American Samoa water quality standards.

EPA reviewed the calculation of the DO concentration in submerged wastefield as a function of travel time for the proposed modified discharge provided by the Applicant. Because the Applicant's lowest modeled DO concentration occurred at the earliest time-step in their modeling, EPA decided to model on a shorter interval. Based on EPA's input values listed in Table 8, the maximum farfield DO depression was found to be 0.0028 mg/l at a time of 330 seconds after completion of initial dilution resulting in a DO concentration of 6.034678 mg/l in the wastefield. This would represent a maximum DO depression of 2.04 percent at the plume trapping depth from the affected ambient condition. Although both EPA and the Applicant predicted a depression of DO after initial dilution, final concentrations were predicted to be above the ASWQS of 5.0 mg/l for DO for Pago Pago Harbor. Therefore, EPA has concluded that the Applicant has demonstrated that the proposed modified discharge after initial dilution would comply with the water quality criterion for DO based on predictive modeling.

Table 9. Comparison of predicted dilution, Ds, and dissolved oxygen concentrations, DO(t), in the farfield calculated by the Applicant and EPA as a function of travel time.
Shaded cells represent the maximum DO depression, i.e., lowest DO concentration, predicted by the Applicant and EPA, occurring at a specific time. EPA calculated on a 30-second timestep (vs. the Applicant's 600-second basis) and the minimum DO occurred before 600 seconds.

Time, t, in seconds	Applicant Calculations		EPA Calculations	
	D_s	DO(t)	D_s	DO(t)
0	-	5.55	-	6.04
30	-	-	1.000000	6.037029
60	-	-	1.000000	6.036695
90	-	-	1.000000	6.036362
120	-	-	1.000004	6.036028
150	-	-	1.000038	6.035699
180	-	-	1.000182	6.035384
210	-	-	1.000570	6.035099
240	-	-	1.001348	6.034863
270	-	-	1.002651	6.034693
300	-	-	1.004579	6.034601
330	-	-	1.007190	6.034596
360	-	-	1.010515	6.034678
390	-	-	1.014554	6.034849
…				
600	1.06048	5.5480727	1.060484	6.038070
1200	1.28713	5.5571618	1.287126	6.054371

c. Dissolved Oxygen Monitoring

As part of Utulei STP's existing permit, the Applicant is required to conduct seasonal (semi-annual) monitoring of DO in the receiving water. EPA reviewed data from monitoring reports submitted between January 2013 and March 2017 to evaluate receiving water concentrations of DO. According to the 2014 American Samoa Water Quality Standards Implementation Guidance Manual, compliance with the DO WQS for NPDES permittees is determined based on a median of all data over a 12-month period at "all depths, all sampling stations, as required in the permit." The previous NPDES permit for the Utulei STP states, "the discharge shall not cause a dissolved oxygen content in the receiving water at and beyond the zone of initial dilution less than 70% saturation, or less than 5.0 mg/l." The permit also requires DO monitoring at stations A and B (ZID stations), C and D (farfield stations), and OH4 (reference station). As noted above, in 2002, the sampling stations for DO changed to A1 and B1 (ZOM stations), C (D farfield station was removed and stations 16 and 18 were added for joint monitoring with the canneries), and 5 (replacing OH4 as the reference station). Thus, EPA calculated median DO concentrations for each 12-month period incorporating all depths and stations A1, B1, C, 16, 18, and 5 collectively (see Table 10).

Table 10. Median DO concentrations for years 2013-2017 at Utulei STP receiving water monitoring stations at or beyond the ZID

Year	Median DO Concentration (mg/l)
2013	6.25
2014	6.16
2015	6.02
2016	5.86
2017	6.10

As shown in Table 10, DO concentrations in the receiving water at and beyond the ZID meet water quality standards. Therefore, EPA has concluded based on current monitoring and the predictive modeling discussed above, the proposed discharge will comply with ASWQS for DO.

2. Total Suspended Solids

The Applicant requests modified effluent limits for TSS. Turbidity, light transmittance, light scattering, and maintenance of the euphotic zone are all measures of the amount of suspended solids in the water column. Section 24.0206(m) of ASWQS provides that turbidity in Pago Pago Harbor shall not exceed 0.75 Nephelometric Turbidity Units (NTU) more than 50% of the time, 1.0 NTU more than 10% of the time, and 1.5 NTU more than 2% of the time and that light penetration depth shall exceed 65.0 feet 50% of the time, 45 feet 10% of the time, and 35 feet 2% of the time. EPA can grant the Applicant a variance from the secondary treatment requirements for TSS if the Applicant demonstrates that the modified discharge would comply with the WQS for turbidity and light penetration (33 USC §1311(h)(2)).

a. Turbidity

EPA reviewed turbidity receiving water monitoring data from 2013 through 2017. According to the 2014 American Samoa Water Quality Standards Implementation Guidance Manual, compliance with the turbidity WQS for NPDES permittees is determined utilizing all data over a 12-month period at "all depths, all sampling stations, as required in the permit." These implementation procedures also provide a screening analysis method to compare the data to the median, 90th percentile, and 98th percentile WQS. The previous NPDES permit states, "the discharge shall not cause the average turbidity in the receiving water at and beyond the ZID to exceed 0.75 NTU." Using the screening method in the implementation procedures and utilizing the data from all depths at and beyond the ZID (stations A1, B1, C, 16, 18, and 5), EPA found the receiving water consistently meets WQS for tubidity, as shown in Table 11.

Table 11. Screening Level Analysis: Compliance for Turbidity

ASWQS percentile	ASWQS criteria (NTU)	Data set percentile value (NTU)				
		2013	2014	2015	2016	2017
50th	0.75	0.23	0.25	0.20	0.19	0.26
90th	1.0	0.42	0.31	0.46	0.25	0.64
98th	1.5	0.52	0.51	0.60	0.29	0.70

b. Light Penetration

EPA also evaluated light penetration based on measurements of Secchi disc depth. By deriving a relationship between visible light and Secchi disc depth, the impact of suspended solids on light penetration in the receiving water can be evaluated using Equation B-54 of EPA's ATSD:

$$\alpha = k_2 \div SD$$

where α = Extinction coefficient of visible light, in meters^{-1};
k_2 = A constant; and
SD = Secchi disc depth in meters for a 30 cm disc.

However, since the water quality criterion for light penetration is expressed as a proportion of light transmitted along a pathway to a specific depth and not as an extinction coefficient, α, the extinction coefficient needs to be estimated. Based on Equation B-51 of EPA's ASTD, the extinction coefficient of visible light can be calculated using the Beer-Lambert law:

$$T_d = e^{-\alpha d}$$

where T_d = Proportion of light transmitted along a path of length d, in meters;
e = the mathematical constant Euler's Number, approximately 2.71828
d = Length of the path, in meters; and
α = Extinction coefficient of visible light, in meters^{-1}.

Based on Equations B-51 and B-54, the Applicant determined that light penetration of one percent at 65.0 feet (19.8 meters) in Pago Pago Harbor, as specified in ASWQS, corresponded to a Secchi disc depth of 24 feet (7.3 meters), which gives the necessary information to determine the value of k_2 in equation B-54. $T_d = e^{-\alpha d}$, so $0.01 = e^{-\alpha * 19.8}$, and $\ln(0.01) = \ln(e^{-\alpha * 19.8})$, or simplifying, $\ln(0.01) = -\alpha * 19.8$, and $\alpha = -(\ln(0.01) / 19.8) \sim= -0.232$. From there, $\alpha = k_2 \div SD$ implies $-0.232 = k_2 \div 7.3$, or $k_2 = -0.232 * 7.3 = -1.6979$.

Based on an extinction coefficient of 0.232 per meter and the calculated k_2 of -1.6979, EPA then used Equation B-54 to estimate a Secchi disc depth which would indicate compliance with the standard. $\alpha = k_2 \div SD$ so $SD = k_2 \div \alpha = -1.6979 \div -0.232 = 7.32$ meters or 24 feet.

Therefore, for the purpose of the Section 301(h) evaluation, EPA believes that a Secchi disc depth of 24 feet is appropriate to evaluate compliance with the water quality criterion for light penetration. Note also that the 2013 revision of the ASWQS also specify light penetration criteria which must be met 90% of the time (45 feet) and 98% of the time (35 feet); using the same series of calculations as above converts these to Secchi depth equivalents of 16.6 feet and 12.9 feet,

respectively. Table 12 provides a summary of Secchi disc depth in the receiving water at stations at and beyond the ZID.

Table 12. Summary of Secchi disc depth recorded at each monitoring station for the Utulei STP.

Site	Station	Secchi Disc Depth (ft) by Year									
		2013		2014		2015		2016		2017	
ZOM	A1	61	40	45	30	70	35	n/a	43	27	30
	B1	62	30	50	35	64	44	n/a	45	43	28
Farfield	C	54	45	45	25	65	29	n/a	33	33	30
	16	56	30	60	35	67	30	n/a	41	35	30
	18	61	25	60	40	80+	42	n/a	43	30	33
REF	5	64	45	85	45	90+	56	n/a	53	27	67

Note: n/a = data not available

Based on receiving water monitoring data, Secchi disc depth was recorded greater than 24 feet at all stations for all of the monitoring events. Therefore, EPA concludes that the Applicant has demonstrated that the discharge meets the WQS for light penetration.

c. Analysis of Suspended Solids Based on Predictive Modeling

i. Suspended Solids Deposition

The Applicant must predict the seabed accumulation due to the discharge of suspended solids into the receiving water. Following the method in EPA's ATSD, the Applicant predicted a steady-state solids accumulation rate of less than 50 g/m^2 based on the effluent flow of 2.2 MGD and the average monthly effluent limitation (emission rate) of 625 kg/day (1,377 lbs/day) for total suspended solids. Since the sediment accumulation rate is less than 50 g/m^2, the Applicant concluded that there would be minimal biological effects associated with the Utulei STP discharge.

EPA calculated a steady-state solids accumulation rate using the requested permit annual average flow of 3.0 MGD and critical instantaneous peak flow of 6.0 MGD, height-of-rise predicted for each flow scenario, and corresponding mass emission rates based on an average monthly effluent limitation of total suspended solids concentration of 75 mg/l. Based on the Applicant's predicted trapping depths for each flow described in the application, EPA calculated a height-of-rise of 131 feet for an effluent flow of 3.0 MGD and a height-of-rise of 120 feet for an effluent flow of 6.0 MGD. Based on a hypothetical high-case discharge flow of 3.0 and 6.0 MGD, EPA calculated the average monthly effluent limitation (emission rate) of 851 kg/day (1,876 lbs/day) and 1,702 kg/day (3,753 lbs/day), respectively, for total suspended solids. Using Figure B-1 of EPA's ATSD and the Applicant's predicted height-of-rise for effluent flows and mass emission rates for each flow scenario, EPA confirmed the predicted steady-state solids accumulation rate would be less than 50 g/m^2.

ii. Suspended Solids Concentration following Initial Dilution

In accordance with EPA's ATSD, the Applicant and EPA estimated the concentration of suspended solids at the completion of initial dilution for the modified discharge. The concentration of suspended solids following critical initial dilution, i.e., at the boundary of the ZID, can be calculated using Equation B-31 of EPA's ATSD:

$$SS_f = SS_a + (SS_e - SS_a) \div S_a$$

where SS_f = Suspended solids concentration at completion of initial dilution, in mg/l;
SS_a = Affected ambient suspended solids concentration immediately up-current of the diffuser averaged from the diffuser port depth to the trapping level, in mg/l;
SS_e = Effluent suspended solids concentration, in mg/l; and
S_a = Initial dilution.

Table 13 provides a summary of predicted suspended solids concentrations at completion of initial dilution predicted by EPA and the values used to estimate these concentrations.

Table 13. Summary of factors used to predict ambient suspended solids concentrations, SS_f, upon critical initial dilution and predicted SS_f values.

Parameter	EPA Value
S_a	91:1
SS_a, mg/l	2.0
SS_e, mg/l	157
SS_f, mg/l	3.7
ΔSS_{a-f}, mg/l	+1.70
ΔSS_{a-f}, %	+85

Table 14. Summary of 2005 quarterly receiving water monitoring data for suspended solids concentrations at the surface, middle and bottom depths at reference station 5.

Reference Station 5 - Depth	Suspended Solids Concentration (mg/l)		Avg. Suspended Solids Concentration (mg/l) at Each Depth
	February 2005	August 2005	
Surface	2	1	1.5
Middle	3	2	2.5
Bottom	2	2	2
Total Average Suspended Solids Concentration			2

In the application, the Applicant predicted a change of 1.0 mg/l; however, EPA predicted a change of 1.7 mg/l. EPA's calculation is based on the very limited ambient monitoring data available from 2005 (see Table 14), a S_a of 91:1, and SS_e of 157 mg/l, resulting in a SS_f of 3.7 mg/l upon initial dilution. This is a discharge-related increase in ambient suspended solids concentration of 1.70 mg/l, which is an 85 percent increase from the affected ambient concentration of 2.0 mg/l.

According to EPA's ATSD, an increase in suspended solids at the completion of initial dilution of less than 10 percent is generally not likely to present a substantial effect in the water column,

although in some cases accumulation of suspended solids in the seabed is possible. Based on the Applicant's and EPA's results, an increase of greater than 10 percent in affected ambient suspended solids concentration was predicted in the receiving water at the ZID; however, as this predictive modeling is based on data more than a decade old, it does not outweigh the more recent direct ambient monitoring data collected for turbidity and light penetration. Therefore, EPA concludes that the Applicant has demonstrated that these applicable water quality standards, indicative of suspended solids in the water column, are being met.

C. Attainment of Other Water Quality Standards and Impact of the Discharge on Public Water Supplies; Shellfish, Fish and Wildlife; and Recreation

Section 301(h)(2) of the CWA, implemented under 40 CFR 125.62, requires the modified discharge not interfere, either alone or in combination with pollutants from other sources, with the attainment or maintenance of water quality that assures protection of public water supplies; protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife; and allows recreational activities in and on the water. In addition, Section 301(h)(9) of the CWA, implemented under 40 CFR 125.62(a), requires the modified discharge meet all applicable EPA-approved Territorial water quality standards and, where no such standards exist, EPA's 304(a)(1) aquatic life criteria for acute and chronic toxicity and human health criteria for carcinogens and noncarcinogens, after initial mixing in the waters surrounding or adjacent to the outfall.

1. Attainment of Other Water Quality Standards and Criteria

40 CFR 125.62(a) requires the Applicant's outfall and diffuser to be located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge does not exceed, at and beyond the zone of initial dilution, all applicable Territorial water quality standards. Where there are no such standards, the discharge must not exceed 304(a)(1) aquatic life and human health criteria.

In addition to DO and TSS, discussed above, Pago Pago Harbor has WQS for nutrients, toxic pollutants, pathogens, toxicity, pH, and ammonia (ASWQS Section 24.0206). EPA's ATSD requires that WQS compliance be reviewed during critical environmental periods, such as periods with maximum stratification and a density profile producing the lowest initial dilution. According to the application, there is little seasonal variation in the water column of Pago Pago Harbor with respect to temperature and salinity. EPA's ATSD also states that compliance with WQS in marine waters can be determined by the Applicant's documenting water quality in the vicinity of the ZID boundary, at control or reference stations, and at areas beyond the ZID where discharge impacts might reasonably be expected. Where receiving water monitoring is available, it is used in the compliance determination below. Where only effluent data is available, calculation of the final receiving water concentration is based on the critical initial dilution of 91:1 discussion above,

a. Nutrients

Nutrients include phosphorus, nitrogen, and chlorophyll-*a*. EPA reviewed monitoring data from 2013 to 2017 to evaluate whether the concentration of nutrients in the receiving water exceeded WQS.

i.Total Phosphorus

Section 24.0206(m) of ASWQS provides that total phosphorus in Pago Pago Harbor shall not exceed 30 ug/l more than 50% of the time, 60 ug/l more than 10% of the time, and 90 ug/l more than 2% of the time. EPA reviewed total phosphorus receiving water monitoring data from 2013 through 2017. According to the 2014 American Samoa Water Quality Standards Implementation Guidance Manual, compliance with the total phosphorus WQS for NPDES permittees is determined utilizing all data over a 12-month period at "all depths, all sampling stations, as required in the permit." These implementation procedures also provide a screening analysis method to compare the data to the median, 90th percentile, and 98th percentile WQS. The previous NPDES permit states, "the discharge shall not cause the average total phosphorus in the receiving water at and beyond the ZID to exceed 30 ug/l." Using the screening method in the implementation procedures and utilizing the data from all depths at and beyond the ZID (stations A1, B1, C, 16, 18, and 5), EPA found the receiving water consistently meets WQS for total phosphorus, as shown in Table 15.

Table 15. Screening Level Analysis: Compliance for Total Phosphorus

ASWQS percentile	**ASWQS criteria (ug/l)**	**Data set percentile value (ug/l)**				
		2013	**2014**	**2015**	**2016**	**2017**
50th	30	12	4	8	13	7
90th	60	24	15	17	15	13
98th	90	27	17	18	26	16

Therefore, EPA concludes that the Applicant has demonstrated that the discharge meets the WQS for total phosphorus.

ii. Total Nitrogen

Section 24.0206(m) of ASWQS provides that total nitrogen in Pago Pago Harbor shall not exceed 200 ug/l more than 50% of the time, 350 ug/l more than 10% of the time, and 500 ug/l more than 2% of the time. EPA reviewed total nitrogen receiving water monitoring data from 2013 through 2017. According to the 2014 American Samoa Water Quality Standards Implementation Guidance Manual, compliance with the total nitrogen WQS for NPDES permittees is determined utilizing all data over a 12-month period at "all depths, all sampling stations, as required in the permit." These implementation procedures also provide a screening analysis method to compare the data to the median, 90th percentile, and 98th percentile WQS. The previous NPDES permit states, "the discharge shall not cause the average total nitrogen in the receiving water at and beyond the ZID to exceed 200 ug/l." Using the screening method in the implementation procedures and utilizing the data from all depths at and beyond the ZID (stations

A1, B1, C, 16, 18, and 5), EPA found that historically, the receiving water exceeded WQS for total nitrogen, as shown in Table 16.

Table 16. Screening Level Analysis: Compliance for Total Nitrogen

ASWQS percentile	ASWQS criteria (ug/l)	Data set percentile value (ug/l)				
		2013	2014	2015	2016	2017
50th	200	383	241	358	333	423
90th	350	530	458	607	548	642
98th	500	580	506	695	722	844

The preliminary screening analysis indicates that TN concentrations exceed water quality standards in the receiving water. Further analysis of reference sites unaffected by the discharge shows that this is because ambient conditions in the receiving water exceed the screening thresholds.

EPA is aware of more recent data which indicate nitrogen levels in the harbor may be improving, Per AS-EPA's recent 303(d) list, the territorial agency has identified a need for additional data collection to determine the status of the harbor with regard to nitrogen. To ensure the discharge complies with applicable water quality standards for TN, the proposed permit includes water quality-based effluent limitations for total nitrogen. Therefore, EPA concludes that the discharge will comply with the applicable WQS for TN.

iii.Chlorophyll-a

Section 24.0206(m) of ASWQS provides that chlorophyll-*a* in Pago Pago Harbor shall not exceed 1.0 ug/l more than 50% of the time, 3.0 ug/l more than 10% of the time, and 5.0 ug/l more than 2% of the time. EPA reviewed chlorophyll-*a* receiving water monitoring data from 2013 through 2017. According to the 2014 American Samoa Water Quality Standards Implementation Guidance Manual, compliance with the chlorophyll-*a* WQS for NPDES permittees is determined utilizing all data over a 12-month period at "all depths, all sampling stations, as required in the permit." These implementation procedures also provide a screening analysis method to compare the data to the median, 90th percentile, and 98th percentile WQS. The previous NPDES permit states, "the discharge shall not cause the average chlorophyll-*a* in the receiving water at and beyond the ZID to exceed 1.0 ug/l." Using the screening method in the implementation procedures and utilizing the data from all depths at and beyond the ZID (stations A1, B1, C, 16, 18, and 5), EPA found the receiving water consistently meets WQS for chlorophyll-*a*, as shown in Table 17.

Table 17. Screening Level Analysis: Compliance for Chlorophyll-a

ASWQS percentile	ASWQS criteria (ug/l)	Data set percentile value (ug/l)				
		2013	2014	2015	2016	2017
50th	1.0	0.8	0.8	0.43	0.64	0.53
90th	3.0	0.8	1.3	0.64	1.71	1.71
98th	5.0	0.8	1.5	0.85	2.67	1.92

Based on statistical screening of monitoring data, EPA finds that the discharge of Total Phosphorus and chlorophyll-a comply with WQSs. Also, as the proposed permit includes water quality based effluent limitations for Total Nitrogen, EPA finds the discharge will also comply with WQS for Total Nitrogen. Therefore, EPA concludes that the proposed discharge will comply with WQSs for nutrients.

a. Toxic Pollutants

Section 24.0206(g) of ASWQS provides that except as may be allowed within a zone of mixing, the concentration of toxic pollutants shall not exceed the more stringent of the aquatic life criteria for marine water or the human health concentration criteria for consumption of organisms found in EPA's National Recommended Water Quality Criteria. The Applicant conducted effluent monitoring for priority toxic pollutants in September 2004 and March 2005. Appendix A shows the effluent concentrations of priority toxic pollutants, the calculated concentration in the receiving water considering critical initial dilution, and the applicable criteria. Toxic pollutants including copper, mercury, zinc, cyanide, dioxins, chlorobenzene, chloroform, methylene chloride, toluene, 4-nitrophenol, phenol, bis(2-ethylhexyl)phthalate, 1,4-dichlorobenzene, diethyl phthalate, fluorene, phenanthrene, alpha-BHC, delta-BHC, and 4,4'-DDT were detected in the effluent. All but 4.4'-DDT were found at concentrations below water quality criteria after consideration of dilution. The concentration of 4.4'-DDT found in 2004 and 2005 exceeded the updated 2015 human health water quality criteria after consideration of dilution; however, this data is more than a decade old. More recent tests have shown no toxic effects in the discharge. Therefore, EPA concludes that the Applicant has demonstrated the discharge will meet applicable water quality standards for individual toxic pollutants at and beyond the ZID. However, in the proposed permit EPA will require the Applicant to collect additional data and will reevaluate if the data indicates that 4.4'-DDT is present in the discharge.

b. Pathogens

To protect whole and limited body-contact recreation in Pago Pago Harbor, ASWQS provide that the number of enterococcus bacteria shall not exceed 35 per 100 ml geometric mean indicator density and 130 per 100 ml statistical threshold value. The 2014 American Samoa Water Quality Standards Implementation Guidance Manual states that "compliance for maximum allowable bacteria levels for public health protection (e.g. beach advisories) shall be based on any single sample exceedance of the statistical threshold value (CFU/100ml) of specified bacteria for fresh and marine waters. For NPDES permittees, permit compliance for marine receiving waters shall be determined utilizing the geometric mean of all discrete measurements (all depths, all stations, as required in the permit) over a 30-day period." Utilizing the data from all depths at and beyond the ZID (stations A1, B1, C, 16, 18, and 5), EPA found the geometric means for each semiannual receiving water sampling event were well below the WQS, as shown in Table 18.

Table 18. Enterococci Semiannual Sampling Event Geometric Mean Concentrations in Pago Pago Harbor

ASWQS criteria (CFU/100ml)	Enterococci Geometric Mean (CFU/100ml)									
	2013		2014		2015		2016		2017	
35	2.2	4.6	2.9	1.6	2.1	2.2	n/a	1.2	1	8.7

In addition, in March 2016, the Utulei STP's UV disinfection system became fully operational. The quarterly reports since the installation of the system indicate the disinfection system has significantly improved levels of enterococci in the effluent. The monitoring data shows that the WQS have not been exceeded at and beyond the ZID. Therefore, EPA concludes that the discharge meets WQS for pathogens.

c. Toxicity

To protect beneficial uses, Section 24.0206(d) of the ASWQS includes a narrative water quality standard that all Territorial waters be "…substantially free from substances and conditions or combinations thereof attributable to sewage, industrial wastes, or other activities of man which may be toxic to humans, other animals, plants, and aquatic life or produce undesirable aquatic life."

In the absence of a numeric criterion for the parameter toxicity, EPA uses a criterion continuous concentration (CCC) of 1.0 Toxic Unit$_{chronic}$ (TU_c) to ensure aquatic life are protected from chronic toxicity in the receiving water. Section 1.3.1 of the TSD defines TUs as 100 divided by the measured effect concentration expressed as a percentage of whole effluent. Thus, TUc = 100/NOEC. The NOEC is the highest concentration of toxicant to which organisms are exposed in a toxicity test that causes no observable adverse effects on the test organisms. With consideration of critical initial dilution, the criterion is 91 TUc.

EPA reviewed data from whole effluent toxicity testing collected between 2013 and 2017 to assess effluent toxicity following critical initial dilution. The Applicant conducted quarterly WET tests on flow-weighted 24-hour composite effluent samples using the Purple Urchin, *Strongylocentrotus purpuratus*, as shown in Table 19.

Table 19. Summary of WET test results for the Utulei STP, 2013-2017.

	2013	2014	2015	2016	2017
Quarter 1	41.7	41.67	41.67	83.3	41.67
Quarter 2	666.7	333.	41.7	41.67	83.3
Quarter 3	167.	166.67	41.7	41.67	41.67
Quarter 4	355.	166.67	41.67	250.	41.67

As shown in Table 19, the Applicant has previously had some test results above 91 TUc; however, all 4 quarters of data in 2017 were below 91 TUc. Also, the previous permit included a trigger for additional monitoring of 333 TUc, and the last three years have been consistently below that level, indicating that treatment performance has reached a level to consistently

achieve compliance with applicable limits. As shown, the discharge has improved over time and there have been no recent toxicity in the discharge. Therefore, EPA concludes the discharge meets the ASWQS for toxicity.

d. Ammonia

Section 24.0206(m) of ASWQS provides that ammonia in Pago Pago Harbor shall not exceed the ammonia toxicity standards in Appendix A of those standards. The ammonia water quality standards are pH and temperature dependent. Using a worse case receiving water pH of 8.3 and temperature of 30 degrees Celsius, the acute water quality standard falls between 1.6 and 2.3 mg/l and the chronic water quality standards falls between 0.23 and 0.34 mg/l. EPA evaluated effluent monitoring data performed as part of the treatment upgrades effectiveness monitoring for 2017 and determined that with dilution of 91:1, the calculated receiving water concentrations of ammonia consistently meet these water quality standards, as shown in Table 20. Therefore, EPA concludes the discharge meets the WQS for ammonia.

Table 20. 2017 Ammonia effluent concentrations for the Utulei STP.

Sampling Event	Effluent concentration of Ammonia (mg/l)	Calculated receiving water concentration using 91:1 dilution (mg/l)
January 2017	20	0.22
February 2017	19	0.21
March 2017	17	0.19
April 2017	16	0.18
May 2017	13	0.14
June 2017	18	0.20
July 2017	16	0.18
August 2017	20	0.22
September 2017	12	0.13
October 2017	3.4	0.04
November 2017	10	0.11
December 2017	6.1	0.07

e. pH

Section 24.0206(m) of the ASWQS provides that pH in Pago Pago Harbor shall be between 6.5 to 8.6 and be within 0.2 pH units of the pH which would occur naturally. The Applicant conducted receiving water monitoring at three depths for each station at and beyond the ZID (stations A1, B1, C, 16, 18, and 5) from 2013 through 2017, showing a minimum pH of 7.97 and a maximum pH of 8.31 in the receiving water. Therefore, EPA concludes that the discharge complies with the WQS for pH.

2. Impact of Discharge on Public Water Supplies

Under 40 CFR 125.62(b), the discharge must allow for the attainment or maintenance of water quality that assures protection of public water supplies. The Utulei STP discharges to marine waters which are not a public water supply. The Applicant states there are no planned or existing public water supply (desalination facility) intakes in the vicinity of the current or modified discharge. EPA's Drinking Water Management Section confirmed this information. Therefore, EPA concludes that the modified discharge will not affect public water supplies.

3. Impact of the Discharge on Shellfish, Fish, and Wildlife

Under 40 CFR 125.62(c), the Applicant's modified discharge must allow for the attainment or maintenance of water quality that assures protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife. A balanced indigenous population must exist immediately beyond the zone of initial dilution and in all other areas beyond the zone of initial dilution where marine life is actually or potentially affected by the Applicant's modified discharge. Conditions within the zone of initial dilution must not contribute to extreme adverse biological impacts, including, but not limited to, the destruction of distinctive habitats of limited distribution, the presence of disease epicenter, or the stimulation of phytoplankton blooms which have adverse effects beyond the zone of initial dilution. The term "balanced indigenous population", as defined in 40 CFR 125.58(f), means an ecological community that exhibits characteristics similar to those of nearby, healthy communities existing under comparable but unpolluted environmental conditions; or may reasonably be expected to become re-established in the polluted water body segment from adjacent waters if sources of pollution were removed.

According to EPA's ATSD, four characteristics generally indicate a low potential for adverse biological impact:

(1) location of the discharge at a depth of greater than 33 ft.,
(2) hydrographic conditions that result in a low predicted solids accumulation rate,
(3) the absence of distinctive habitats of limited distribution and the absence of fisheries in the vicinity of the outfall, when such absences are not due to anthropogenic stresses, and
(4) the absence of known or suspected sources of toxic pollutants and pesticides or low concentrations of these substances in the effluent.

EPA evaluated these four characteristics and considered coral reef surveys conducted by the Applicant to confirm that extreme adverse biological impacts are not currently occurring.

Based on evaluation of the four characteristics, EPA has determined that there is low potential for adverse impact from the proposed discharge:

(1) The outfall is located at a depth of 150 ft, which is greater than the 33 ft. threshold;

(2) As described above, the sediment accumulation rate is predicted to be low. Sediment accumulation rates predicted to be less than 50 g/m^2 generally have minimal biological effect in open coastal environments and the predicted sediment accumulation rate for

Utulei STP is less than 50 g/m^2;

(3) There is a subsistence fishery in the shallow waters of Pago Pago Harbor, but no fisheries occur in the vicinity of the outfall, which is in the deep waters of Outer Pago Pago Harbor.

In the vicinity of the outfall there are coral reefs, which are distinctive habitats of limited distribution. To evaluate potential for adverse impacts to coral reefs, EPA considered current conditions, since the proposed discharge will be substantially similar to the existing discharge. Coral reefs are sensitive to sediment deposition, so EPA also reviewed sediment data. The Applicant performed coral reef surveys between 1991 and 2005 as part of its benthic community monitoring program and concluded that no adverse impacts to coral reefs have occurred in the vicinity of the discharge. The Applicant conducted sediment monitoring and found no distinct differences between sediment characteristics at the ZID and at other monitoring locations beyond the ZID, indicating that the sediment is not contributing to extreme adverse biological impacts. The Applicant also reported that there have been no warnings, restrictions, closures, mass mortalities, or increased incidence of disease in marine organisms caused by the existing discharge. Based on analysis of the characteristics associated with low potential for adverse biological impacts and available information about current conditions EPA concludes that conditions within the ZID will not contribute to extreme adverse biological impacts.

(4) All toxics that were found to be present in the 2004 and 2005 sampling events were found at concentrations below water quality standards after consideration of dilution, except for 4.4'-DDT; however, this pollutant is a legacy pollutant, and the proposed permit requires the Applicant to collect new monitoring data for this pollutant. In addition, recent toxicity tests have shown no toxicity in the discharge.

The presence of these characteristics indicates a low potential for the proposed discharge to cause extreme adverse biological impacts.

4. Impact of Discharge on Recreational Activities

Pursuant to 40 CFR 125.62(d), the Applicant's proposed discharge must allow for the attainment or maintenance of water quality which allows for recreational activities beyond the ZID, including, without limitation, swimming, diving, boating, fishing, and picnicking and sports activities along shorelines and beaches. In addition, there must be no Federal, Territorial, or local restrictions on recreational activities within the vicinity of the Applicant's modified outfall unless such restrictions are routinely imposed around sewage outfalls.

According to the Applicant, there is no commercial fishing in the harbor. Recreational and subsistence fishing occurs at shallow depths and on the reef flats, but not in the vicinity of the discharge. There is no primary water contact in the area of the outfall, which is well offshore in deeper water. Also, no restrictions by Federal or Territorial authorities exist in the vicinity of the discharge.

As described in Section 24.0205(e)(1) of the ASWQS, the designated uses for Pago Pago Harbor include commercial, subsistence, and recreational fishing and whole and limited body-contact recreation (e.g., swimming, snorkeling, surfing, and scuba diving). In addition, section 24.0206(g) contains toxic pollutant human health criteria for consumption of organisms. Discharges that comply with the ASWQS allow for the attainment or maintenance of water quality which allows for recreational activities.

As discussed above in C.1, the proposed discharge will comply with the WQS for Pago Pago Harbor. Therefore, EPA has concluded that the proposed discharge will allow for the attainment or maintenance of water quality which allows for recreational activities beyond the ZID.

D. Establishment of a Monitoring Program

EPA may issue a modified permit only if the Applicant has established a system for monitoring the impact of the proposed discharge on a representative sample of aquatic biota (CWA § 301(h)(3)). The monitoring program must be designed to provide data to evaluate the impact of the modified discharge on the marine biota, demonstrate compliance with applicable WQS or water quality criteria, as applicable, and measure toxic substances in the effluent. (40 CFR § 125.63(a)(i)). The Applicant must demonstrate that it has the resources necessary to implement the monitoring program upon issuance of the permit and to carry it out for the life of the permit (40 CFR 125.63(a)(1)(iii)). The Applicant must determine the frequency and extent of the monitoring program by taking into consideration the Applicant's rate of discharge, quantities of toxic pollutants discharged, and the potential significant impacts on the receiving water (40 CFR 125.63(a)(1)(iv)). The program must include biological monitoring, water quality monitoring, and effluent monitoring (40 CFR §§ 125.63(b)-(d)).

EPA has determined that the monitoring requirements included in the proposed permit meet the requirements above. Over the years, the Applicant has conducted a successful monitoring program including effluent, receiving water, and sediment monitoring. On September 27, 2006, the Applicant provided a letter to EPA stating it has the resources necessary to conduct a monitoring program and meet all the requirements of a renewed NPDES permit. Therefore, EPA concludes that the Applicant's monitoring program will meet the requirements of 40 CFR § 125.63.

E. Impact of Modified Discharge on Other Point and Non-point Sources

40 CFR 125.64 implements Section 301(h)(4) of the CWA and requires that the Applicant's proposed modified discharge not result in the imposition of additional treatment requirements on any other point or non-point source. The Applicant is required to obtain a determination from the ASEPA indicating whether the Applicant's discharge will result in any additional treatment requirements on any other point or nonpoint sources, (40 CFR § 125.64(b)).

Other point source discharges to Pago Pago Harbor include the shipyard, a petroleum terminal, and the joint outfall from the two canneries, each of which are regulated by separate individual NPDES permits. ASEPA has indicated that a new certification for the proposed modified

discharge is pending EPA's publication of a draft permit renewal for the facility, in keeping with ASEPA policy. EPA will provide ASEPA this decision document and draft permit at the time of public notice for review and concurrence. EPA is proposing to grant the variance of secondary treatment requirements, with concurrence from ASEPA.

F. Toxics Control Program and Urban Area Pretreatment Program

EPA may not issue a Section 301(h)-modified NPDES permit unless the Applicant demonstrates that all applicable pretreatment requirements for sources introducing waste into such treatment works will be enforced (CWA § 301(h)(5)). The Utulei STP does not treat waste from any industrial facilities or other facilities with pretreatment requirements. Therefore, EPA has determined that there are no pretreatment requirements that Utulei STP must enforce.

In addition, POTWs serving a population of 50,000 or more are required to implement a pretreatment program which removes the same amount of toxic pollutants as would be removed if such works were to apply secondary treatment to discharges (CWA § 301(h)(6), 40 CFR 125.65(a)). The Utulei STP serves a population of approximately 13,000 and is therefore not required to implement an urban area pretreatment program.

In accordance with CWA § 301(h)(7), EPA may not issue a Section 301(h)-modified permit unless the Applicant demonstrates that it has established a schedule of activities designed to eliminate the entrance of toxic pollutants from non-industrial sources into the POTW. The Applicant must perform a chemical analysis of its effluent and identify sources of toxic pollutants or pesticides identified (40 CFR §§ 125.66(a)-(b)). For non-industrial sources, the Applicant shall submit a proposed public education program designed to minimize the entrance of non-industrial toxic pollutants and pesticides into its POTW (40 CFR § 125.66(d)).

The Applicant conducted a chemical analysis of its discharge, described above, which showed the presence of some toxic pollutants, but at concentrations below water quality standards. As the Utulei STP does not receive discharges from any industrial facilities, it is reasonable to conclude that these toxic pollutants and pesticides come from non-industrial sources.

To minimize the entrance of toxic pollutants and pesticides to the Utulei STP from non-industrial sources, the Applicant has developed a public education program. The Applicant has proposed to continue its existing Non-Industrial Source Control Education Program, which consists of newspaper articles, radio and television announcements, and informational pamphlets to increase awareness of the need for proper disposal of toxic pollutants. EPA concludes that the applicant's proposed source control program satisfies the requirements of 40 CFR § 125.66(d).

G. Increase in Effluent Volume or Amount of Pollutants Discharged

40 CFR 125.67, which implements Section 301(h)(8) of the CWA, states that no modified discharge may result in any new or substantially increased discharges of the pollutant to which the modification applies above the discharge specified in the 301(h)-modified permit. The Applicant must provide projections of effluent volume and mass loadings for any pollutants to which the modification applies, in five-year increments, for the design life of the facility.

The Utulei STP was constructed with a maximum design flow of 6.0 MGD and permitted for an annual average flow of 2.2 MGD. The Applicant projects an increase in the annual average effluent flow to 3.0 MGD. EPA is proposing to issue a permit authorizing discharge of 3.0 MGD.

The Applicant predicts that pollutant concentrations in the effluent will remain the same, but due to the increased discharge volume, the mass loadings will increase. In accordance with 40 CFR § 125.67, the Applicant projected mass loadings for BOD and TSS in five-year increments, from 2011 to 2021, based on a projected end-of-permit flow of 3.0 MGD. Based on a projected effluent average annual volume of 3.0 MGD for 2011, 2016, and 2021, the Applicant calculated BOD mass loading of 324 metric tons per year and TSS mass loading of 311 metric tons per year. EPA is proposing to issue a permit authorizing the discharge up to 3.0 MGD, with mass limits calculated based on that flow. This increase in mass loading is consistent with antidegradation requirements, as described in the permit fact sheet. The concentration-based limits will be the same as the limits in the previous permit. Based on the Applicant's projections, EPA finds the permit limits to be achievable. The Applicant will be required to comply with the permit limits and will not discharge above the volume specified in the permit.

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H. Compliance with Other Applicable Laws

No § 301(h)-modified permit shall be issued where such issuance would conflict with applicable provisions of Territorial, local, or other Federal laws or Executive Orders (40 CFR § 125.59(b)). This includes compliance with the Coastal Zone Management Act of 1972, as amended, 16 USC 1451 *et seq.*; the Endangered Species Act of 1973, as amended, 16 USC 1531 *et seq.*; Title III of the Marine Protection, Research and Sanctuaries Act, as amended, 16 USC 1431 *et seq.*; and the Magnuson-Stevens Fisheries Conservation and Management Act of 1976, as amended, 16 U.S.C. 1801 *et seq.*

1. Coastal Zone Management Act of 1972

40 CFR 125.59(b)(3) requires issuance of a 301(h) modified NPDES permit comply with the Coastal Zone Management Act, 16 U.S.C. 1451 *et seq.* A 301(h) modified NPDES permit may not be issued unless the proposed discharge is certified by the Territory to comply with the applicable Territory coastal zone management program(s) approved under the Coastal Zone Management Act, or the Territory waives such certification.

The issuance of a 301(h) modified permit for the Utulei discharge is contingent upon the American Samoa Coastal Management Program's certification.

2. Endangered Species Act of 1973

40 CFR 125.59(b)(3) requires issuance of a 301(h) modified NPDES permit comply with the Endangered Species Act, 16 U.S.C. 1531 *et seq.* A 301(h) modified NPDES permit may not

be issued if the proposed discharge is likely to jeopardize threatened or endangered species or critical habitats listed pursuant to Section 7 of the Endangered Species Act, 16 USC § 1536.

EPA requested a species list from the United States Fish and Wildlife Service (USFWS) and the NOAA National Marine Fisheries Service (NMFS) regarding the proposed renewal of the Utulei STP NPDES permit in a letter dated July 17, 2018. USFWS and NMFS provided lists of endangered and threatened species which may occur in the vicinity of the discharge to EPA. EPA's biological evaluation will be provided to USFWS and NMFS for concurrence. The issuance of a 301(h)-modified permit for the Utulei STP discharge is contingent upon concurrence by the Services.

3. Marine Protection, Research and Sanctuaries Act

To comply with the Marine Protection, Research and Sanctuaries Act, a 301(h)-modified permit may not be issued for a discharge located in a marine sanctuary designated pursuant to Title III, if the regulations applicable to the sanctuary prohibit issuance of such a permit. The proposed modified discharge is not located in a marine sanctuary. The closest marine sanctuary, Fagatele Bay, is located more than five miles from the discharge point of the Utulei STP. Due to the prevailing northeast currents, the distance between the outfall and the marine sanctuary, and dilution of pollutants occurring in the ZID, EPA believes the proposed discharge will not affect the marine sanctuary and complies with the Marine Protection, Research, and Sanctuaries Act.

4. Magnuson-Stevens Fishery Conservation and Management Act

A 301(h)-modified permit shall not be issued where such issuance would conflict with the federal Magnuson-Stevens Fishery Conservation and Management Act, as amended (the MSA), 16 U.S.C. 1801 *et seq*.

The issuance of a 301(h)-modified permit for the Utulei STP discharge is contingent upon the National Marine Fisheries Service's concurrence.

5. State Determination and Concurrence

In accordance with 40 CFR 125.59(i)(2), no Section 301(h)-modified permit shall be issued until the appropriate Territorial certification/concurrence is granted or waived, or if the Territory denies certification/concurrence, pursuant to 40 CFR 124.54. ASEPA, the entity which prepares such certifications, concurred with EPA's permit package and certified consistency with the Territory's requirements in a letter dated August 9, 2019.

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Evaluation of Effluent Concentrations of Priority Toxic Pollutants from the Utulei STP

Priority Pollutant	Effluent Conc. (µg/l)		Max. Effluent Conc. (µg/l)	Predicted Receiving Water Conc. (µg/l)[1]	Federal Water Quality Criteria				ASWQS (µg/l)	Exceeds Criteria at ZID?
					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
Antimony	ND[2]	ND	-[3]	-	-	-	5.6	640	-	N
Arsenic	ND	ND	-	-	69	36	0.018	0.14	-	N
Beryllium	ND	ND	-	-	-	-	-	-	-	N
Cadmium	ND	ND	-	-	33	7.9	-	-	-	N
Chromium	ND	ND	-	-	1,100	50	-	-	-	N
Copper	6.1	ND	6.1	0.067	4.8	3.1	1,300	-	-	N
Lead	ND	ND	-	-	210	8.1	-	-	-	N
Mercury	0.24	0.0647	0.24	0.0026	1.8	0.94	-	-	0.05	N
Methylmercury	-	-	-	-	-	-	-	0.3 mg/kg	-	-
Nickel	ND	ND	-	-	74	8.2	610	4,600	-	N
Selenium	ND	ND	-	-	290	71	170	4,200	-	N
Silver	ND	ND	-	-	1.9	-	-	-	-	N
Thallium	ND	ND	-	-	-	-	0.24	0.47	-	N
Zinc	27.7	28.5	28.5	0.31	90	81	7,400	26,000	-	N
Cyanide	3	ND	3	0.03	1	1	4	400	-	N
2,3,7,8-TCDD (Dioxin)[4]	1.3E-7	1.0E-7	1.3E-7	1.4E-10	-	-	5.0E-9	5.1E-9	-	N
Acrolein	ND	ND	-	-	-	-	3	400	-	N

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	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
Acrylonitrile	ND	ND	-	-	-	-	0.061	7.0	-	N
Benzene	ND	ND	-	-	-	-	2.1	58	-	N
Bromoform	ND	ND	-	-	-	-	7.0	120	-	N
Carbon Tetrachloride	ND	ND	-	-	-	-	0.4	5	-	N
Chlorobenzene	0.21	ND	0.21	0.002	-	-	100	800	-	N
Chlorodibromomethane	ND	ND	-	-	-	-	0.80	2.1	-	N
Chloroethane	ND	ND	-	-	-	-	-	-	-	N
2-Chloroethylvinyl Ether	ND[3]	ND	-	-	-	-	-	-	-	N
Chloroform	1.5	ND	1.5	0.016	-	-	60	2,000	-	N
Dichlorobromomethane	ND	ND	-	-	-	-	0.95	27	-	N
1,1-Dichloroethane	ND	ND	-	-	-	-	-	-	-	N
1,2-Dichloroethane	ND	ND	-	-	-	-	9.8	650	-	N
1,1-Dichloroethylene	ND	ND	-	-	-	-	300	20,000	-	N
1,2-Dichloropropane	ND	ND	-	-	-	-	0.90	31	-	N
1,3-Dichloropropene	ND	ND	-	-	-	-	0.27	12	-	N
Ethylbenzene	ND	ND	-	-	-	-	68	130	-	N
Methyl Bromide	ND	ND	-	-	-	-	100	10,000	-	N

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Methyl Chloride	ND	ND	-	-	-	-	-	-	-	N
Methylene Chloride	0.42	ND	0.42	0.005	-	-	20	1,000	-	N
1,1,2,2-Tetrachloroethane	ND	ND	-	-	-	-	0.2	3.0	-	N
Tetrachloroethylene	ND	ND	-	-	-	-	10	29	-	N
Toluene	0.51	2.3	2.3	0.025	-	-	57	520	-	N
1,2,-Trans-Dichloroethylene	ND	ND	-	-	-	-	100	4,000	-	N
1,1,1-Trichloroethane	ND	ND	-	-	-	-	10,000	200,000	-	N
1,1,2-Trichloroethane	ND	ND	-	-	-	-	0.55	8.9	-	N
Trichloroethylene	ND	ND	-	-	-	-	0.6	7	-	N
Vinyl Chloride	ND	ND	-	-	-	-	0.022	1.6	-	N
2-Chlorophenol	ND	ND	-	-	-	-	30	800	-	N
2,4-Dichlorophenol	ND	ND	-	-	-	-	10	60	-	N
2,4-Dimethylphenol	ND	ND	-	-	-	-	100	3,000	-	N

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	September 2004	March 2005			Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
					CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
2-Methyl-4,6-Dinitrophenol	ND	ND	-	-	-	-	2	30	-	N
2,4-Dinitrophenol	ND	ND	-	-	-	-	10	300	-	N
2-Nitrophenol	ND	ND	-	-	-	-	-	-	-	N
4-Nitrophenol	13	ND	13	0.143	-	-	-	-	-	N
3-Methyl-4-Chlorophenol	ND	ND	-	-	-	-	-	-	-	N
Pentachlorophenol	ND	ND	-	-	13	7.9	0.03	0.04	-	N
Phenol	12	32	32	0.35	-	-	4,000	300,000	-	N
2,4,6-Trichlorophenol	ND	ND	-	-	-	-	1.5	2.8	-	N
Acenaphthene	ND	ND	-	-	-	-	70	90	-	N
Acenaphthylene	ND	ND	-	-	-	-	-	-	-	N
Anthracene	ND	ND	-	-	-	-	300	00	-	N
Benzidine	ND	ND	-	-	-	-	0.00014	0.011	-	N
Benzo(a)Anthracene	ND	ND	-	-	-	-	0.0012	0.0013	-	N
Benzo(a)Pyrene	ND	ND	-	-	-	-	0.00012	0.00013	-	N
Benzo(b)Fluoranthene	ND	ND	-	-	-	-	0.0012	0.0013	-	N

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	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
Benzo(ghi)Perylene	ND	ND	-	-	-	-	-	-	-	N
Benzo(k)Fluoranthene	ND	ND	-	-	-	-	0.012	0.013	-	N
Bis(2-Chloroethoxy) - Methane	ND	ND	-	-	-	-	-	-	-	N
Bis(2-Chloroethyl)Ether	ND	ND	-	-	-	-	0.030	2.2	-	N
Bis(2-Chloroisopropyl) - Ether	ND	ND	-	-	-	-	-	-	-	N
Bis(2-Ethylhexyl)Phthalate	8.6	12	12	0.13	-	-	0.32	0.37	-	N
4-Bromophenyl Phenyl Ether	ND	ND	-	-	-	-	-	-	-	N
Butylbenzyl Phthalate	ND	ND	-	-	-	-	0.10	0.10	-	N
2-Chloronaphthalene	ND	ND	-	-	-	-	800	1,000	-	N
4-Chlorophenyl Phenyl Ether	ND	ND	-	-	-	-	-	-	-	N
Chrysene	ND	ND	-	-	-	-	0.12	0.13	-	N
Dibenzo(a,h)Anthracene	ND	ND	-	-	-	-	0.00012	0.00013	-	N
1,2-Dichlorobenzene	ND	ND	-	-	-	-	1,000	3,000	-	N
1,3-Dichlorobenzene	ND	ND	-	-	-	-	7	10	-	N
1,4—Dichlorobenzene[5]	4.1/4.3	3.8/1.8	4.3	0.048	-	-	300	900	-	N
3,3-Dichlorobenzidine	ND	ND	-	-	-	-	0.049	0.15	-	N

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					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Water + Organism (µg/l)	Organism Only (µg/l)		
Diethyl Phthalate	3.5	4.4	4.4	0.48	-	-	600	600	-	N
Dimethyl Phthalate	ND	ND	-	-	-	-	2,000	2,000	-	N
Di-n-Butyl Phthalate	ND	ND	-	-	-	-	20	30	-	N
2,4-Dinitrotoluene	ND	ND	-	-	-	-	0.049	1.7	-	N
2,6-Dinitrotoluene	ND	ND	-	-	-	-	-	-	-	N
Di-n-Octyl Phthalate	ND	ND	-	-	-	-	-	-	-	N
2,4-Diphenylhydrazine	ND	ND	-	-	-	-	0.03	0.2	-	N
Fluoranthene	ND	ND	-	-	-	-	20	20	-	N
Fluorene	ND	0.38	0.38	0.004	-	-	50	70	-	N
Hexachlorobenzene	ND	ND	-	-	-	-	0.000079	0.000079	-	N
Hexachlorobutadiene	ND	ND	-	-	-	-	0.01	0.01	-	N
Hexachlorocyclo-pentadiene	ND	ND	-	-	-	-	4	4	-	N
Hexachloroethane	ND	ND	-	-	-	-	0.1	0.1	-	N
Indeno(1,2,3-cd)Pyrene	ND	ND	-	-	-	-	0.0012	0.0013	-	N

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					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Organism Only (µg/l)	Organism + Water (µg/l)		
Isophorone	ND	ND	-	-	-	-	34	1,800	-	N
Naphthalene	ND	ND	-	-	-	-	-	-	-	N
Nitrobenzene	ND	ND	-	-	-	-	10	600	-	N
N-Nitrosodimethylamine	ND	ND	-	-	-	-	0.00069	3.0	-	N
N-Nitrosodi-n-Propylamine	ND	ND	-	-	-	-	0.0050	0.51	-	N
N-Nitrosodiphenylamine	ND	ND	-	-	-	-	3.3	6.0	-	N
Phenanthrene	ND	0.56	0.56	0.0062	-	-	-	-	-	N
Pyrene	ND	ND	-	-	-	-	20	30	-	N
1,2,4-Trichlorobenzene	ND	ND	-	-	-	-	0.071	0.076	-	N
Aldrin	ND	ND	-	-	1.3	-	0.00000077	0.00000077	-	N
alpha-BHC	0.011	ND	0.011	0.00012	-	-	0.00036	0.00039	-	N
beta-BHC	ND	ND	-	-	-	-	0.0080	0.014	-	N
gamma-BHC (Lindane)	ND	ND	-	-	0.16	-	4.2	4.4	-	N
delta-BHC	0.0052	ND	0.0052	5.7E-5	-	-	-	-	-	N
Chlordane	ND	ND	-	-	0.09	0.004	0.00031	0.00032	-	N
4,4'-DDT	0.018	0.019	0.019	0.00021	0.13	0.001	0.000030	0.000030	-	Y
4,4'-DDE	ND	ND	-	-	-	-	0.000018	0.000018	-	N
4,4'-DDD	ND	ND	-	-	-	-	0.00012	0.00012	-	N

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					Saltwater Aquatic Life Criteria		Human Health Criteria For Consumption of:			
	September 2004	March 2005			CMC (µg/l)	CCC (µg/l)	Organism Only (µg/l)	Organism + Water (µg/l)		
Dieldrin	ND	ND	-	-	0.71	0.0019	0.0000012	0.0000012	-	N
alpha-Endosulfan	ND	ND	-	-	0.034	0.0087	20	30	-	N
beta-Endosulfan	ND	ND	-	-	0.034	0.0087	20	40	-	N
Endosulfan Sulfate	ND	ND	-	-	-	-	20	40	-	N
Endrin	ND	ND	-	-	0.037	0.0023	0.03	0.03	-	N
Endrin Aldehyde	ND	ND	-	-	-	-	1	1	-	N
Heptachlor	ND	ND	-	-	0.053	0.0036	0.0000059	0.0000059	-	N
Heptachlor Epoxide	ND	ND	-	-	0.053	0.0036	0.000032	0.000032	-	N
Polyclorinated Biphenyls (PCBs)[6]	ND	ND	-	-	-	0.03	6.4E-5	6.4E-5	-	N
Toxaphene	ND	ND	-	-	0.21	0.0002	0.00070	0.00071	-	N

[1]Predicted receiving water concentration calculated by dividing the maximum effluent concentration by the critical initial dilution of 91:1
[2]Concentration estimated to be below laboratory detectable levels
[3]Dashes indicate nondetect concentrations assumed to be zero and thus assumed to not be above the water quality criterion; or no water quality criterion available
[4]Efluent concentration based on 2,3,7,8-TCDD Toxic Equivalency Factors to determine Toxic Equivalents
[5]Two samples were analyzed for 1,4-Dichlorobenzene for each sampling event
[6]Efluent concentration based on "non-detect" concentrations reported for Aroclors 1016, 1232, 1242, 1248, 1254 and 1260

APPENDIX D
EPA CORRESPONDENCE

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APPENDIX D-1
AMERICAN SAMOA WATER QUALITY STANDARDS
(2018)

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Presented below are water quality standards that are in effect for Clean Water Act purposes.

EPA is posting these standards as a convenience to users and has made a reasonable effort to assure their accuracy. Additionally, EPA has made a reasonable effort to identify parts of the standards that are not approved, disapproved, or are otherwise not in effect for Clean Water Act purposes.

AMERICAN SAMOA WATER QUALITY STANDARDS
2018 Revision
Administrative Rule No. 001-2019

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§24.0201 Definitions

As used in this chapter and in conformance with the Federal Water Pollution Control Act, as amended:

"acute exposure value" means the threshold value at or below which there should be no unacceptable effects to aquatic organisms and their uses if the one-hour concentration does not exceed the value more than once every three years on the average;

"acute toxicity" means the degree to which a pollutant, discharge, or water sample causes a rapid adverse impact to aquatic organisms;

"ambient conditions" means the water quality condition that would occur in the receiving waters if these waters were not influenced by any proposed new human activity or discharge;

"animal pen" refers to an animal feeding operation (AFO) facility or lot (other than an aquatic animal production facility) which is separate from any waste treatment facilities,

where animals have been, are, or will be stabled or confined and fed or maintained;

"ASAC" means the American Samoa Administrative Code;

"ASCA" means the American Samoa Code Annotated;

"AS-EPA" means the American Samoa Environmental Protection Agency, the agency responsible for implementation and enforcement of Water Quality Standards in American Samoa;

"ASG" means the American Samoa Government;

"chronic exposure value" means the threshold value at or below which there should be no unacceptable effects to aquatic organisms and their uses if the four-day concentration does not exceed that value more than once every three years on the average;

"chronic toxicity" means the degree to which a pollutant, discharge, or water sample causes a long-term adverse impact to aquatic organisms, such as an alteration in growth rate or reproduction;

"class I waters" means fresh surface waters above impoundments or diversions of water which may be used as a potable water supply;

"class II waters" means all fresh surface waters that are not class I;

"Clean Water Act" or ***"CWA"*** means the Federal Water Pollution Control Act;

"*discharge of a pollutant"* means any addition of any pollutant to the waters of American Samoa from any point source;

"embayment" means a body of water subject to tidal action and bounded by headlands which restrict the exchange of water with the open ocean. A bay or lagoon is an embayment if the ratio of the volume of water (cubic feet) to the cross-sectional area (square feet) at the entrance is more than 700, when determined at mean lower low water. Embayments include Pago Pago Harbor, Fagatele Bay, Pala Lagoon, Afono Bay, Fagasa Bay, Masefau Bay, and Vatia Bay.

"EQC" means the Environmental Quality Commission of the American Samoa Government and its authorized agents;

*"**fresh surface waters"*** means all fresh territorial waters including perennial, intermittent, and ephemeral freshwater streams, all natural and artificial impoundments,

springs, seeps and wetlands, including coastal wetlands not surface-connected to the ocean. This includes all surface territorial waters that are not embayments, open coastal waters, or ocean waters;

"geometric mean" is defined as n^{th} root of the products of C_1 to C_n in which n is the number of samples analyzed during the period and C is the concentration of the parameter found in each sample. The geomean is calculated by taking the $\log_{10}$ of sample values, averaging those values and the raising the average to the power of 10;

"ground water" means water in the part of the ground that includes all subsurface waters, basal and parabasal water, perched water, water percolating through the unsaturated zone, and all saline waters below and along the perimeter of the basal fresh water body;

"hazardous materials" means any material that poses a threat to human health and/or the environment when improperly managed, including toxic, corrosive, ignitable, explosive or chemically reactive substances;

"light penetration depth" means the depth reached by one percent of the sunlight incident on the surface of a body of water;

"NPDES" means the National Pollutant Discharge Elimination System;

"natural conditions" describes the quality of surface and marine water reasonably assumed to be not influenced by human-caused pollution or disturbance;

"nonpoint source pollution" is defined as pollution caused by sediments, nutrients and organic and toxic substances originating from land use activities and/or from the atmosphere, which are carried to receiving waters by runoff at a rate that exceeds reference condition levels;

*"**ocean waters"*** means those waters that extend from the 100-fathom (600-foot or 183-meter) depth contour seaward;

"open coastal waters" means those waters that begin at the shoreline and extend seaward to the 100-fathom (600-foot or 183-meter) depth contour from mean lower low water. This category includes small bays with good water movement which do not qualify as embayments;

"*Pago Pago Harbor"* is defined as landward of a line drawn from Niuloa Point to Breaker's Point;

"Pala Lagoon" is defined as that body of water inside a line drawn from the eastern most point of the airport to the nearest part of Coconut Point;

"person" means any individual, partnership, firm, state, federal government, association, municipality, public or private corporation, subdivision or agency of the territory, trust, estate or any other legal entity or interstate body;

"point source" means any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged;

"*pollutant"* means dredged spoil, sediment, solid waste, petroleum product, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical waste, biological material, radioactive material, heat, wrecked or discarded equipment, rock, sand, excavated material, or industrial, municipal, and agricultural waste discharged into water;

"pollution" means the manmade or man induced alteration of the physical, chemical, biological, or radiological condition of territorial waters;

"*process waste water"* means any water which comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by product, or waste product during manufacturing or processing operations;

"***reference conditions"*** describes the characteristics of water body segments least impaired by human activities, where the influence of human activities is reasonably assumed to be present. As such, reference conditions can be used to describe attainable biological or habitat conditions for water body segments with common watershed or catchment characteristics within defined water body classes;

"Statistical Threshold Value" means the approximation of the 90th percentile of the water quality distribution;

*"**Territorial waters"*** means waters of the United States as defined in 40 CFR 122.2, as well as those that are located within the jurisdiction of the territory;

"wetlands" mean those areas that are inundated or saturated by ground or surface water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include, but are not limited to, swamps, marshes, mangroves, streams, springs, cultivated marshes, and similar areas;

"zone of initial dilution" or ***"ZID"*** is that area of a plume where dilution is achieved due to the combined effects of momentum and buoyancy of the effluent discharged from an orifice. Unless otherwise approved by the EQC and US EPA, the zone of initial dilution and initial dilution ratio shall be determined using the latest version of the UDKHDEN model (EPA/600/3-85-073a,b), assuming zero ambient current and representative reference condition concentrations of the pollutant in question;

"*zone of mixing"* or ***"ZOM"*** means a defined portion of a water body receiving water around a point source within which specific modifications of applicable water quality standards are permitted by the EQC.

§24.0202 Policy on Water Quality Antidegradation

(a) It is the policy of the Environmental Quality Commission (EQC) that existing water uses and the level of water quality necessary to protect existing uses shall be maintained. Any water quality degradation which would interfere with or become injurious to these existing uses is prohibited. Existing uses are those uses identified in these standards.

(b) Waters whose existing quality exceeds the level necessary to support existing uses shall not be degraded unless and until the EQC finds, after full satisfaction of the intergovernmental coordinating and public participation provisions contained in the Environmental Quality Act (ASCA Title 24), that allowing lower water quality is necessary to accommodate important economic or social needs of the Territory. In no event, however, may water quality be degraded to an extent that it would interfere with or become injurious to existing uses.

(c) No further degradation shall be allowed in waters which constitute an outstanding public resource or in waters of exceptional recreational or ecological significance. Waters which receive this protection shall be classified as unique waters by the EQC.

(d) Subject to the provisions of sections (a)-(c) above, the EQC may allow limited degradation if it is determined that all the following criteria are met:

(1) The proposed degraded level of water quality will support existing uses;
(2) A compelling economic or social need of the Territory is served by allowing limited degradation;
(3) The highest practicable statutory and regulatory requirements will be met by existing and new point sources of pollutants; and
(4) All cost-effective and reasonable best management practices for non-point sources of pollutants will be achieved.

(e) In those cases where potential water quality impairment is associated with a thermal

discharge, nothing in these regulations or their implementation shall be inconsistent with Section 316 of the Clean Water Act.

(f) In carrying out its responsibilities under these standards, the EQC and AS-EPA will undertake such activities and studies as may be necessary to implement the above policies. These activities and studies may include, but are not limited to: (1) monitoring the quality of water and the impacts of pollutant discharges; (2) requiring appropriate levels of treatment and other pollutant control measures through conditions placed on water quality certifications (ASAC § 24.0209) and other approvals granted by the EQC; and (3) performing inspections and, as necessary, undertaking enforcement actions to assure compliance.

§24.0203 Authority

These standards are adopted under the provisions of the American Samoa Environmental Quality Act. ASCA, Title 24, Chapter 1.

§24.0204 Standards Review

The EQC may revise these standards at any time in accordance with the American Samoa Administrative Procedures Act (APA), as set forth in ASCA, Title 4, Chapter 10, and the US EPA public participation regulation, as set forth in 40 CFR part 25 and 40 CFR part 131. The EQC will submit any such revisions to US EPA in accordance with §303(c) of the CWA., as amended.

§24.0205 Water Classifications - Protected and Prohibited Uses

(a) Prohibited uses and activities applicable to all waters:

(1) Dumping of solid waste, including dead animals, directly into the water or in a manner that could reasonably be expected to adversely affect water quality;
(2) The discharge of oil, sludge, oil refuse, fuel oil, or bilge waters directly into the water or in a manner that could reasonably be expected to adversely affect water quality;
(3) The discharge of toxic, hazardous or radioactive waste directly into the water or in a manner that could reasonably be expected to adversely affect water quality;
(4) The dumping or discharge of industrial, domestic or animal waste except as approved by the EQC and, as applicable, permitted by the US EPA; and
(5) Whole and limited body-contact recreation, e.g., swimming, snorkeling, surfing, and scuba diving within any zone of mixing.

(b) Fresh Surface Waters

(1) Class 1 Fresh Surface Waters

(A) Class 1 waters are to remain in as near their natural state as possible with a minimum of pollution from any human activity. Protected uses of these waters are: potable water supplies, support and propagation of indigenous aquatic and terrestrial life, and compatible recreation and aesthetic enjoyment.

(B) Prohibited uses and activities include, but are not limited to:

(i) Point source discharges of pollutants;
(ii) Dredging and filling activities;
(iii) Bathing, including washing clothes and dishes;
(iv) Animal pens over or within 100 feet of the water body;
(v) Siting of septic tanks including drain fields within 200 feet of the water body;
(vi) Land disturbing (e.g., grading, tillage) activities within 100 feet of the water body; and
(vii) Wood cutting or clearing within 100 feet of the water body.

(2) Class 2 Fresh Surface Waters

(A) Class 2 waters shall be protected for the support and propagation of indigenous aquatic life, recreation in and on the water, and aesthetic enjoyment.

(B) Prohibited uses and activities include, but are not limited to:

(i) Point source discharges of pollutants except as approved by the EQC. No zones of mixing will be granted;
(ii) Dredging or filling activities, except as approved by EQC;
(iii) Bathing, including washing clothes and dishes;
(iv) Animal pens over or within 50 feet of the water body;
(v) Siting of septic tanks:
(a) Hollow block constructed tanks within 50 feet of the water body;
(b) Cast-in-place concrete tanks within 30 feet of the water body;
(c) Molded plastic tanks (e.g., high-density polyethylene (HDPE) within 20 feet of the water body.
(vi) Siting of septic tank drain fields within 50 feet of the water body.
(vii) Land disturbing (e.g., grading, tillage) activities within 50 feet of the

water body; and
(viii) Wood cutting or clearing within 50 feet of the water body.

(c) Ground Waters

(1) Class 1G Ground Waters

(A) Class 1G groundwaters are current or potential supplies of potable water and their associated recharge areas and shall be protected as potable water supplies. Unless otherwise identified, Class 1G groundwaters include all ground water with a naturally occurring salinity of less than10,000 mg/l.

(B) Prohibited uses and activities include, but are not limited to:

(i) Direct discharge of any waste through injection wells;
(ii) The surface or subsurface discharge of industrial waste;
(iii) Dumping or landfilling of solid waste on the surface or subsurface; and
(iv) The surface or subsurface discharge of treated industrial, human or animal waste, except through treatment and disposal devices or systems approved by EQC.

(2) Class 2G Ground Waters

(A) Class 2G groundwaters are waters with naturally occurring salinities of 10,000 mg/l or more, or other groundwaters not designated as class 1G.

(B) Prohibited uses and activities include, but are not limited to:

(i) The surface or subsurface discharge of industrial, human or animal waste, except through treatment and disposal systems approved by the EQC.

(d) Wetlands

(1) All wetlands are to remain in as near their natural state as possible and shall be protected to support the propagation of indigenous aquatic and terrestrial life, recreation and subsistence fishing, food cultivation and gathering, aesthetic enjoyment, recreation in an on water, flood control, and recharge of groundwaters.

(2) Prohibited uses and activities include, but are not limited to:

(A) Point source discharges of pollutants;
(B) Dredging and filling activities, except as approved by the EQC;
(C) Animal pens directly over or within 50 feet of the wetland; and
(D) Siting of septic tanks including drain fields within 50 feet of the wetland.

(e) Embayments

All embayments are to remain in as near their natural state as possible.

(1) Pago Pago Harbor: Pago Pago Harbor has been designated by the American Samoa Government to be developed into a transshipment center for the South Pacific. Recognizing its unique position as an embayment where water quality has been degraded from the natural condition, the EQC has established a separate set of standards for Pago Pago Harbor.

(A) Protected uses for Pago Pago Harbor:

(i) Recreational and subsistence fishing except for exclusions as specified under federal regulations such as no take zones;
(ii) Boat-launching ramps and designated mooring areas;
(iii) Subsistence food gathering; e.g. shellfish harvesting except for exclusions as specified under federal regulations such as no take zones;
(iv) Aesthetic enjoyment;
(v) Whole and limited body-contact recreation, e.g. swimming, snorkeling, and scuba diving;
(vi) Support and propagation of marine life;
(vii) Industrial water supply;
(viii) Mari-culture development except for exclusions as specified under federal regulations such as no take zones;
(ix) Normal harbor activities; e.g. ship movements, docking, loading and unloading, marine railways and floating drydocks; and
(x) Scientific investigations.

(B) Prohibited uses include but are not limited to:

(i) Dumping or discharge of solid waste;
(ii) Animal pens over or within 50 feet of any shoreline:
(iii) Dredging and filling activities; except as approved by the EQC;
(iv) Toxic, hazardous and radioactive waste discharges; and
(v) Discharge of oil sludge, oil refuse, fuel oil, or bilge water, or any other wastewater from any vessel or unpermitted shoreside facility.

(C) Zones of mixing may be granted in Pago Pago Harbor by the EQC, however, no zones of mixing will be allowed within 500 feet of Goat Island Point or beneath this surface area to the bottom of the harbor.

(2) Special Embayments

(A) Fagatele Bay is designated as marine sanctuary by the U.S. Department of Commerce because of pristine water quality, remote location, and rich underwater resources. Therefore, the EQC has assigned specific water quality standards to prohibit any reduction in water quality in the bay.

(B) Nu'uuli Pala Lagoon is a shallow embayment that is important as a breeding ground for the marine life of the Territory. It has been designated by the American Samoa Coastal Management Plan Rules as a special management area. Therefore, the EQC has also classified the Nu'uuli Pala Lagoon as a special embayment.

(C) Protected uses:

(i) Recreational and subsistence fishing except for exclusions as specified under federal regulations such as no take zones;
(ii) Subsistence food gathering, e.g. shellfish harvesting except for exclusions as specified under federal regulations such as no take zones;
(iii) Aesthetic enjoyment;
(iv) Whole and limited body-contact recreation, e.g. swimming, snorkeling, surfing, and scuba diving;
(v) Support and propagation of marine life;
(vi) Mari-culture development except for exclusions as specified under federal regulations such as no take zones; and
(vii) Scientific investigations.

(D) Prohibited uses include but are not limited to:

(i) Dumping or discharge of solid or industrial waste materials;
(ii) Animal pens over or within 50 feet of any shoreline;
(iii) Dredging and filling activities, except when approved by the EQC;
(iv) Toxic, hazardous and radioactive waste discharges; and
(v) Discharge of oil sludge, oil refuse, fuel oil, or bilge water, or any other wastewater from any vessel or unpermitted shoreside facility.

(E) Zones of mixing will not be allowed in Pala Lagoon or Fagatele Bay.

(3) Other Embayments: All embayments of the Territory excluding Pago Pago Harbor, Pala Lagoon, and Fagatele Bay are included in this category.

(A) Protected uses:

(i) Recreational and subsistence fishing except for exclusions as specified under federal regulations such as no take zones;
(ii) Boat-launching ramps and designated mooring area;
(iii) Subsistence food gathering; e.g. shellfish harvesting except for exclusions as specified under federal regulations such as no take zones;
(iv) Aesthetic enjoyment;
(v) Whole and limited body-contact recreation, e.g., bathing, swimming, snorkeling, surfing, and scuba diving;
(vi) Support and propagation of marine life; and
(vii) Mari-culture development except for exclusions as specified under federal regulations such as no take zones.

(B) Prohibited uses include but are not limited to:

(i) Dumping or discharge of solid or industrial waste material;
(ii) Animal pens over or within 50 feet of any shoreline;
(iii) Dredging and filling activities, except when approved by EQC;
(iv) Toxic, hazardous and radioactive waste discharges; and
(v) Discharge of oil sludge, oil refuse, fuel oil, or bilge water from any vessel or shoreside facility.

(C) Zones of mixing may be granted in the embayments included in this paragraph by EQC.

(f) Open Coastal Waters

(1) Protected uses:

(A) Commercial, subsistence, and recreational fishing except for exclusions as specified under federal regulations such as no take zones;
(B) Scientific investigations;
(C) Whole and limited body-contact recreation, e.g., swimming, snorkeling, surfing, and scuba diving;

(D) Harbors and boat-launching ramps;
(E) Commercial and recreational boating;
(F) The support and propagation of marine life; and
(G) Aesthetic enjoyment.

(2) Prohibited uses include but are not limited to:

(A) Offshore oil recovery;
(B) Dumping or discharge of solid or industrial waste material;
(C) Discharge of oil sludge, oil refuse, fuel oil, bilge waters, or any other wastewater from any vessel or unpermitted shore-side facility;
(D) Animal pens over or within 50 feet of any shoreline;
(E) Dredging and filling activities except when approved by the EQC;
(F) Toxic, hazardous and radioactive waste discharges; and
(G) Point source discharges in Manu'a off Ofu Park and between Ofu Park and the Ofu-Olosega Bridge within 1,000 feet of the bridge.

(g) Ocean Waters

(1) Protected uses:

(A) Commercial, subsistence, and recreational fishing except for exclusions as specified under federal regulations such as no take zones;
(B) Scientific investigations;
(C) Commercial and recreational boating;
(D) The support and propagation of marine life;
(E) Aesthetic enjoyment; and
(F) Whole or limited body-contact recreation.

(2) Prohibited uses include but are not limited to:

(A) Discharge of oil sludge, oil refuse, fuel oil, bilge waters, or any other wastewater from any vessel;
(B) Dumping of solid or industrial waste materials without an EPA ocean dumping permit, except as approved by EQC under exclusions in the federal ocean dumping regulations; and
(C) Toxic, hazardous and radioactive waste discharges.

§24.0206 Standards of Water Quality

The following standards apply to all territorial and ground waters including but not limited to fresh surface waters, ground waters, embayments, open coastal waters, and oceanic waters of the territory, except as otherwise provided in §24.0207 (Zones of Mixing):

(a) They shall be substantially free from materials attributable to sewage, industrial wastes, or other activities of man that will produce objectionable color, odor, or taste, either of itself or in combinations, or in the biota;

(b) They shall be substantially free from visible floating materials, grease, oil, scum, foam, and other floating material attributable to sewage, industrial wastes, or other activities of man;

(c) They shall be substantially free from materials attributable to sewage, industrial wastes, or other activities of man that will produce visible turbidity or settle to form objectionable deposits;

(d) They shall be substantially free from substances and conditions or combinations thereof attributable to sewage, industrial wastes, or other activities of man which may be toxic to humans, other animals, plants, and aquatic life or produce undesirable aquatic life;

(e) The temperature shall not deviate more than 1.5 degrees Fahrenheit from conditions which would occur naturally and shall not fluctuate more than 1-degree Fahrenheit on an hourly basis or exceed 85 degrees Fahrenheit due to the influence of other than natural causes;

(f) Radioactivity:

(1) Since human exposure to any ionizing radiation is undesirable, the concentration of radioactivity in any waters will be maintained at the lowest practicable level.

(2) No radioactive materials shall be present in any waters as a consequence of the failure of an installation to exercise appropriate controls to eliminate releases.

(3) The concentration of radioactivity shall not:

(A) result in accumulations or radioactivity in edible plants and animals that present a hazard to consumers or are harmful to aquatic or terrestrial life, as recommended by the Federal Radiation Council in the “Radiation Protection Guides”;

(B) exceed 1/30 of the maximum permissible concentrations (MPC) values

given for continuous occupational exposures in the National Bureau of Standards “Handbook No. 69”, as revised; or

(C) exceed the current National Primary Drinking Water Regulations for waters used for public or domestic water supplies.

(g) Toxic Substances:

(1) Class 1 Surface Waters and Class 1G Groundwater.
The concentration of toxic pollutants shall not exceed the more stringent of the aquatic life criteria for freshwater or the human health concentration criteria for consumption of water and organisms in the priority toxic pollutant table of the National Recommended Water Quality Criteria 2002, EPA-822-R-02-047, November 2002 (EPA 2002) or the most recent version.

(2) Class 2 Surface Water and Wetlands.
The concentration of toxic pollutants shall not exceed the more stringent of the aquatic life criteria for freshwater or the human health concentration criteria for consumption of water and organisms found in EPA 2002 or the most recent version.

(3) All Embayments, Open Coastal Waters and Ocean Waters.
Except as may be allowed by the EQC within a Zone of Mixing (ASAC § 24.0207), the concentration of toxic pollutants shall not exceed the more stringent of the aquatic life criteria for marine waters or the human health concentration criteria for consumption of organisms found in EPA 2002 or the most recent version.

(4) Subject to US EPA approval, the EQC may from time to time adopt site-specific toxic pollutant criteria. Any such adoption shall involve public participation and be based upon site-specific data and studies demonstrating that the alternate criteria will support the propagation of aquatic life and protect the public health.

(h) Toxicity Requirements - Acute and Chronic

(1) All effluents containing materials attributable to the activities of man shall be considered harmful unless acceptable bioassay tests have shown otherwise. In its discretion the EQC may require the person responsible for the discharge of the effluent to perform bioassay tests on the effluent in question.

(2) Compliance with §24.0206(d) of these standards will be determined using indicator organisms, analysis of species diversity, population density, growth anomalies, bioassays, or other appropriate methods as specified by the EQC.

(3) The chronic effect on test organisms outside a zone of mixing, if one exists, in the water body receiving the effluent in question shall not be more than that for waters of the same water body that are unaffected by the discharge of pollutant, or, when necessary for other control water meeting the criteria described in the latest edition of “Standard Methods for the Examination of Water and Wastewater.”

(4) Compliance with the above standards shall be evaluated with a 96-hour bioassay or short-term method for estimating chronic toxicity using methods described in the most recently updated versions of the following documents:

(A) EPA/821/R-02-013 Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition, 2002.

(B) EPA/600/4-90-027F Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Cincinnati, Ohio, EMSL, Fourth Edition, 1993.

(C) EPA/600/R-95-136 Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, Cincinnati, Ohio, EMSL, 1995.

(i) There shall be no changes in basin geometry or freshwater inflow that will alter current patterns in such a way as to adversely affect existing biological populations or sediment distribution. To protect estuarine organisms, no change in channels, basin geometry, or freshwater influx shall be made which would cause permanent changes in existing isohaline patterns of more than 10 percent.

(j) The following additional toxic standards shall apply:

(1) Arsenic: The human health numeric criteria for arsenic in the EPA 2002 publication are excluded from the American Samoa Water Quality Standards and instead, the American Samoa human health criteria for arsenic for freshwaters is 10 µg/l.

(2) Total Mercury: In addition to the methyl mercury criteria for human health from the EPA 2002 publication, the water column concentration of mercury shall not exceed 0.05 µg/l.

(3) Total Residual Chlorine: Total residual chlorine in any ambient water shall not exceed 11 micrograms per liter for fresh water and 7.5 micrograms per liter for marine waters.

(k) **Fresh surface waters.** The following standards apply specifically to all fresh surface waters of the territory:

Parameter	Median[1] not to exceed	Not to exceed more than 10% of the time	Not to exceed more than 2% of the time
Turbidity (NTU)	5	8	12
Total Phosphorus (µg/l as P)	175	390	635
Total Nitrogen (µg/l as N)	300	650	1000
Total Suspended Solids (mg/l)	5	10	15

[1]Refer to most recent version of "AS-EPA Implementation Guidance Manual for ASWQS Numeric Criteria" for median calculation method.

Ammonia: The ammonia toxicity standards for fresh and marine waters are tabulated in Appendix A.

Dissolved Oxygen: Concentration of dissolved oxygen shall not be decreased to less than 75% saturation at any time, as influenced by salinity or naturally occurring temperature variations. Where natural conditions cause lower dissolved oxygen levels, controllable water quality factors shall not cause further reductions.

pH: The pH range shall be 6.5 to 8.6 and be within 0.2 pH units of that which would occur naturally.

Enterococci: 35 per 100 ml (geometric mean indicator density)
130 per 100 ml (statistical threshold value)

E. coli: 126 per 100 ml (geometric mean indicator density)
410 per 100 ml (statistical threshold value)

(l) Embayments.

The following standards apply to all embayments except Pago Pago Harbor, Fagatele Bay and Pala Lagoon:

Parameter	Median[1] not to exceed	Not to exceed more than 10% of the time	Not to exceed more than 2% of the time
Turbidity (NTU)	0.35	0.45	0.60
Total Phosphorus (µg/l as P)	20	40	60
Total Nitrogen (µg/l as N)	150	250	350
Chlorophyll a (µg/l)	0.5	1.5	3.0
Light Penetration[2] (feet)	120	100	75

[1]Refer to most recent version of "AS-EPA Implementation Guidance Manual for ASWQS Numeric Criteria" for median calculation method.
[2]Light Penetration to exceed given values.

Ammonia: The ammonia toxicity standards for fresh and marine waters are tabulated in Appendix A.

Dissolved Oxygen: Concentration of dissolved oxygen shall not be decreased to less than 80% saturation at any time, as influenced by salinity or naturally occurring temperature variations. Where natural conditions cause lower dissolved oxygen levels, controllable water quality factors shall not cause further reductions.

pH: The pH range shall be 6.5 to 8.6 and be within 0.2 pH units of that which would occur naturally.

Enterococci: 35 per 100 ml (geometric mean indicator density)
130 per 100 ml (statistical threshold value)

(m) Pago Pago Harbor

The following standards apply specifically to Pago Pago Harbor:

Parameter	Median[1] not to exceed	Not to exceed more than 10% of the time	Not to exceed more than 2% of the time
Turbidity (NTU)	0.75	1.0	1.5
Total Phosphorus (µg/l as P)	30	60	90
Total Nitrogen (µg/l as N)	200	350	500
Chlorophyll a (µg/l)	1.0	3.0	5.0
Light Penetration[2] (feet)	65	45	35

[1]Refer to most recent version of "AS-EPA Implementation Guidance Manual for ASWQS Numeric Criteria" for median calculation method.
[2]Light Penetration to exceed given values.

Ammonia: The ammonia toxicity standards for fresh and marine waters are tabulated in Appendix A.

Dissolved Oxygen: Concentration of dissolved oxygen shall not be decreased to less than 80% saturation at any time, as influenced by salinity or naturally occurring temperature variations. Where natural conditions cause lower dissolved oxygen levels, controllable water quality factors shall not cause further reductions.

pH: The pH range shall be 6.5 to 8.6 and be within 0.2 pH units of that which would occur naturally.

Enterococci: 35 per 100 ml (geometric mean indicator density)
130 per 100 ml (statistical threshold value)

(n) Embayments - Fagatele Bay and Pala Lagoon

The following standards apply specifically to Fagatele Bay and Pala Lagoon:

Parameter	Median[1] not to exceed	Not to exceed more than 10% of the time	Not to exceed more than 2% of the time
Turbidity (NTU)			
Fagatele Bay	0.25	0.35	0.50
Pala Lagoon	0.75	1.5	2.5
Total Phosphorus (µg/l as P)	15	36	60
Total Nitrogen (µg/l as N)	135	220	300
Chlorophyll a (µg/l)	0.35	0.60	1.0
Light Penetration[2] (feet)	130	110	90

[1]Refer to most recent version of "AS-EPA Implementation Guidance Manual for ASWQS Numeric Criteria" for median calculation method.
[2]Light Penetration to exceed given values.

Ammonia: The ammonia toxicity standards for fresh and marine waters are tabulated in Appendix A.

Dissolved Oxygen: Concentration of dissolved oxygen shall not be decreased to less than 80% saturation at any time, as influenced by salinity or naturally occurring temperature variations. Where natural conditions cause lower dissolved oxygen levels, controllable water quality factors shall not cause further reductions.

pH: The pH range shall be 6.5 to 8.6 and be within 0.2 pH units of that which would occur naturally.

Enterococci: 35 per 100 ml (geometric mean indicator density)
130 per 100 ml (statistical threshold value)

(o) Open Coastal Waters

The following apply specifically to open coastal waters:

Parameter	Median[1] not to exceed	Not to exceed more than 10% of the time	Not to exceed more than 2% of the time
Turbidity (NTU)	0.25	0.35	0.45
Total Phosphorus (µg/l as P)	15	30	50
Total Nitrogen (µg/l as N)	130	210	280
Chlorophyll a (µg/l)	0.25	0.50	0.75
Light Penetration[2] (feet)	130	110	90

[1]Refer to most recent version of "AS-EPA Implementation Guidance Manual for ASWQS Numeric Criteria" for median calculation method.
[2]Light Penetration to exceed given values.

Ammonia: The ammonia toxicity standards for fresh and marine waters are tabulated in Appendix A.

Dissolved Oxygen: Concentration of dissolved oxygen shall not be decreased to less than 80% saturation at any time, as influenced by salinity or naturally occurring temperature variations. Where natural conditions cause lower dissolved oxygen levels, controllable water quality factors shall not cause further reductions.

pH: The pH range shall be 6.5 to 8.6 and be within 0.2 pH units of that which would occur naturally.

Enterococci: 35 per 100 ml (geometric mean indicator density)
130 per 100 ml (statistical threshold value)

(p) Ocean Waters

The following apply specifically to ocean waters:

Parameter	Median[1] not to exceed	Not to exceed more than 10% of the time	Not to exceed more than 2% of the time
Turbidity (NTU)	0.20	0.29	0.36
Total Phosphorus (µg/l as P)	11	23	35
Total Nitrogen (µg/l as N)	115	180	230
Chlorophyll a (µg/l)	0.18	0.40	0.65
Light Penetration[2] (feet)	150	132	120

[1]Refer to most recent version of "AS-EPA Implementation Guidance Manual for ASWQS Numeric Criteria" for median calculation method.
[2]Light Penetration to exceed given values.

Ammonia: The ammonia toxicity standards for fresh and marine waters are tabulated in Appendix A.

Dissolved Oxygen: Concentration of dissolved oxygen shall not be decreased to less than 80% saturation at any time, as influenced by salinity or naturally occurring temperature variations. Where natural conditions cause lower dissolved oxygen levels, controllable water quality factors shall not cause further reductions.

pH: The pH range shall be 6.5 to 8.6 and be within 0.2 pH units of that which would occur naturally.

Enterococci: 35 per 100 ml (geometric mean indicator density)
130 per 100 ml (statistical threshold value)

(q) Implementation Provisions for Numeric Criteria

Compliance with numeric criteria shall be determined in accordance with the most recent version of "AS-EPA Implementation Guidance Manual for ASWQS Numeric Criteria".

Refer to the most recent version of "Territory of American Samoa Integrated Water Quality Monitoring and Assessment Report" for use support evaluation methodology including 303d listing.

(r) Biocriteria

The Territory shall preserve, protect, and restore water resources to as near their natural condition. The condition of these waterbodies shall be determined from measures of physical, chemical, and biological characteristics of each waterbody type, according to its designated use. As a component of these measures, the biological integrity of the benthic communities living within waters shall be assessed by comparison to reference conditions(s) with similar abiotic and biotic environmental settings that represent the optimal or least impacted condition for that system. Such reference conditions shall be those observed to support the greatest community evenness, diversity, and abundance of aquatic life as is expected to be or has been historically found in natural settings essentially undisturbed or minimally disturbed by human impacts, development, or discharges. This condition shall be determined by consistent sampling and reliable measures of selected indicator communities of flora and/or fauna and may be used in conjunction with other measures of water quality. Waters shall be of a sufficient quality to support a resident biological community as defined by metrics derived based upon reference conditions. These narrative biological criteria shall apply to fresh water, wetlands, estuaries, and coral reefs and other marine conditions based upon their respective reference conditions and metrics.

§24.0207 Zones of Mixing

(a) Policy: Zone of mixing

Human activities may result in the practical need to discharge pollutants through point sources into the waters of the territory. And, because of technological, economic and other factors, it may not always be feasible to achieve an effluent quality that equals or exceeds the standards established herein at the point of discharge. Therefore, subject to the prohibitions, criteria and procedures set forth below, alternate water quality standards may be defined by the EQC in the immediate vicinity surrounding the point of discharge. The area within which the alternate standards apply shall be a zone of mixing. All applicable water quality standards shall be met at the boundary of any zone of mixing.
It is the policy of the EQC that zones of mixing shall only be granted upon a finding that no other practicable means of waste treatment and disposal are available. Further, it is the policy of the EQC that zones of mixing shall be limited to the smallest area possible.

(b) Criteria: Zone of Mixing

A zone of mixing can only be granted by the EQC if the application and the supporting

information clearly shows that all of the following conditions and criteria have been met:

(1) It is in the public interest that a zone of mixing be granted to begin or continue the function or operation associated with the discharge;

(2) The proposed discharge does not substantially endanger human health or safety, or the environment;

(3) Compliance with the existing water quality standards at the point of discharge would produce serious economic hardships without equal or greater benefit to the public;

(4) Alterations generated by a proposed discharge do not disrupt the marine ecology of the receiving waters outside the zone of mixing;

(5) A zone of mixing shall not be granted for fresh surface waters, Nu'uuli Pala Lagoon, Fagatele Bay, that portion of Pago Pago Harbor described in §24.0205(e)(1)(C), or in those waters in Manu'a described in §24.0205(f)(2)(G);

(6) The size of any zone of mixing granted for any toxic pollutant shall not exceed the dimensions and volume of the zone of initial dilution and in no event shall the concentration of a toxic pollutant exceed chronic toxic levels at the boundary of the zone of initial dilution (ZID). Except for limited portions of the ZID, acute toxic standards shall be achieved within the ZID;

(7) The standards set forth in §24.0206(a)-(d) shall be met at the boundary of the zone of initial dilution;

(8) Alternate standards may be established within a zone of mixing for those standards set forth at §§24.0206(h),(j),(l),(m),(o), and (p); provided that the standards shall be met at the boundary of the zone of mixing;

(9) A zone of mixing shall not be granted if it would include the surface of the water body, any part of the shoreline, or any part of any barrier or fringing reef; and

(10) Further, the following shall be considered by the EQC in determining whether to grant or deny a zone of mixing:

(A) Protected uses of the body of water;
(B) Existing ambient conditions of the receiving water;
(C) Character of the effluent;
(D) Adequacy of the design of the outfall and diffuser system to achieve the desired dispersion and assimilation in the receiving waters; and

(E) Other pertinent policies, plans or territorial agencies.

(c) Procedures to Apply for Zone of Mixing

(1) The owner and/or operator of a point source of pollutants where the effluent quality of the discharge does not meet the applicable standards defined in §24.0206 at the point of discharge shall be in violation of these standards until such time as the EQC grants a zone of mixing upon receiving and acting upon an application for a zone of mixing from the discharger. At its discretion the EQC may grant extensions to discharges existing on the effective date of these standards, but in no event shall an existing discharge requiring a zone of mixing continue to discharge if a complete application for a zone of mixing has not been submitted to the EQC within 180 days of the effective date of these standards.

(2) Every application for a zone of mixing shall be accompanied by a complete and detailed description of:

(A) the nature of the discharge including, but not limited to, volume, effluent quality, discharge location and configuration, and treatment applied;
(B) existing ambient water quality conditions in the vicinity of the discharge;
(C) how present conditions compare to standards;
(D) proposed alternate water quality standards within the proposed zone of mixing;
(E) proposed dimensions and volume of the zone of mixing;
(F) a calculation of the dimensions and volume of the zone of initial dilution and the dilution ratio achieved at the boundaries of the zone of initial dilution;
(G) the reasons why it is not practicable to achieve water quality standards for any specific parameter at the point of discharge or to eliminate the discharge and why the operation of the discharge is in the best interest of the territory; and
(H) such other information as the EQC prescribes.

(3) Each application for a zone of mixing shall be reviewed in light of descriptions, statements, plans, histories, and other supporting information as may be submitted in the application or upon the request of the EQC and the effect on the water quality standards established in §24.0206.

(4) A zone of mixing, or a renewal, may be granted upon the EQC's determination that the requirements of these standards have been met for the following time periods and conditions:

(A) If a zone of mixing is granted on the grounds that there is no technically and/or financially efficient means known or available for elimination or adequate prevention, control, or abatement of the discharge involved, it shall be only until the necessary means of prevention, control, or abatement becomes practicable and it shall be

subject to the taking of substitute or alternative measures that the EQC may prescribe. No renewal of a zone of mixing granted under this section shall be allowed without a thorough review of known and available means of preventing, controlling of abating the discharge involved;
(B) The EQC may grant a zone of mixing for a period not exceeding 5 years, subject to be reopened if these water quality standards are revised during the 5-year period;
(C) Every zone of mixing granted under this section may include, but not be limited to, applicant requirements to perform effluent and receiving water sampling and testing as specified by the EQC and to report the results to the EQC. A program of research to develop practicable alternatives to the methods of treatment or control in use by the applicant may be required as a condition of the granting of the zone of mixing; and
(D) Upon application any zone of mixing granted pursuant to this section may be renewed periodically for periods not exceeding 5 years, provided, that:

(i) the applicant for renewal has met all of the conditions specified in the previously prescribed zone of mixing;
(ii) no renewal shall be granted except upon application. Any such application shall be made at least 120 days prior to the expiration of the current zone of mixing;
(iii) upon timely application for renewal, the terms and conditions of the original zone of mixing shall remain in effect until such time as the EQC acts upon the application for renewal; and
(iv) if no timely application for renewal is made, the zone of mixing shall automatically expire.

(5) The EQC, on its own motion or upon the application of any person, shall terminate a zone of mixing if, after a hearing, it is determined that:

(A) the water quality outside the zone of mixing does not meet the standards applicable to that water as given in §24.0206;
(B) the zone of mixing granted has interfered with any protected uses of the water area; or
(C) any NPDES permit condition has not been met and the discharger has failed to take prudent action to bring the discharge into compliance.
Such termination shall be made after a hearing held by the EQC in accordance with ASCA, Title 4, Chapter 10. Upon such termination, the standards of water quality applicable shall be those established in §24.0206.

(6) The granting of a mixing zone shall be subject to approval by US EPA.

§24.0208 Pollution Control

(a) General

Any private or public development which would constitute a source of pollution to the waters of American Samoa shall provide the degree of waste treatment and/or operational and management practices necessary to preserve the quality of these waters.

(b) Land Disturbing Activities

Soil particles resulting from erosion on land involved in earth work, such as the construction of public works, highways, subdivisions, private developments, and recreational, commercial, or industrial developments, or the cultivation and management of agricultural lands, shall be prevented from entering any waters of American Samoa by application of management practices and standards in accordance with the most recent version of "American Samoa Erosion and Sediment Control Field Guide" adopted by AS-EPA and implemented by the person(s) responsible. These practices include, but are not limited to:

(1) Best management practices (BMPs) for cultivated agricultural lands. The responsible person(s) shall implement BMPs to assure removal of settleable solids originating from the cultivated area. In so doing, the responsible person(s) shall:

> (A) Utilize guidelines established by AS-EPA and the erosion component of the Conservation Management System as defined in the Field Office Technical Guide of the US Department of Agriculture, the Natural Resources Conservation Service, and/or guidance from AS-EPA. In the alternative, the responsible person(s) may design and install a combination of management and physical practices to remove the settleable solids and associated pollutants in runoff delivered from the contributing area for storms up to and including a ten-year, 24-hour frequency.
> (B) For cultivated areas in excess of one acre and/or within 100 feet of a surface water or such other areas as AS-EPA may specify, prepare and submit an erosion and sediment control plan to the AS-EPA for approval. The AS-EPA shall either approve, conditionally approve or disapprove the plan. Cultivation activities ongoing as of the effective date of these standards may not proceed for more than 90 days in the absence of an approved plan. No new activity may commence until such time as AS-EPA has approved the plan.

(2) BMPs for construction sites. The responsible person(s) implementing BMPs at construction sites shall:

> (A) Assure that the annual total suspended solids loading from a construction site is no greater than the average annual loading prior to construction or after construction is complete and the site is permanently stabilized;

(B) Reduce annual average suspended solids loading by 80 percent based on total suspended solids loading from storms less than or equal to the 2-year/24-hour storm; (C) For construction activities disturbing in excess of one acre or occurring within 100 feet of a surface water, ensure that the standards set forth in subdivisions (A) and (B) are met, or, in the alternative, prepare and submit a construction and post-construction erosion and sediment control plan for approval by AS-EPA. For approval, the BMPs to be included in the plan must be those provided by the "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters" (January 1993, USEPA OW) guidance received from AS-EPA or the Natural Resources Conservation Service, or other references, as approved by AS-EPA. For construction activities disturbing in excess of one acre or within 100 feet of a surface water that are initiated after the effective date of these standards, the plan shall include measures to retain sediment on the site.

(c) On Site Disposal Systems

(1) No person may site, construct, or operate an on site disposal system except in accordance with public health rules, building codes, water quality standards, and sewer use regulations of the Territory. Failure to do so shall constitute a violation of these standards.

(2) Installation of on site disposal systems that reduce total nitrogen loading by 50 percent to ground water that is closely hydrologically connected to surface water will be required if conditions indicate that nitrogen limited surface waters may be adversely affected by excess nitrogen loading.

(d) Animal Waste Control

Improper waste disposal and contaminated runoff from confined animal facilities contribute nutrients, bacteria, viruses, other microorganisms, and sediment to streams, near shore and ground waters that lead to eutrophication, fish kills, and unsafe drinking water. In order to prevent these impacts, owners of confined animal facilities shall:

(1) Utilize animal waste control facilities that provide waste treatment, such as septic tanks and leach fields, waste storage ponds, waste storage structures, application of manure or runoff water to agricultural land, waste utilization, burial, or any other method determined to be environmentally acceptable by the Director of AS-EPA;

(2) Locate such facilities and their waste treatment facilities at least 50 feet from any wetland, marine water body, or Class II fresh surface water except for the allowed siting of septic tanks and drain fields in §24.0205 (b)(1)(B)(v), §24.0205 (b)(2)(B)(v) and (vi), and §24.0205(d)(2)(D); and at least 100 ft. from any well head;

(3) Control all waste such that it will not contaminate near shore waters, streams, or ground waters; and

(4) Continuously operate and maintain animal waste control facilities to ensure effective treatment.

(e) Storm Water Control

To prevent negative impacts to receiving waters and ground waters as a result of disruption in natural drainage patterns caused by development, the following standards shall be required to control storm water for all new development projects and new or modified land uses in accordance with the most recent version of "AS-EPA Guidance Manual for Runoff Control":

(1) A storm water control plan shall be completed for any construction activity or temporary or permanent development determined by AS-EPA to have a potential significant impact on receiving water quality or ground water quantity or quality. Such activities include, but are not limited to, confined animal facilities, construction project staging areas, highways, bridges, parking lots, structures, and facilities utilizing hazardous materials, pesticides, fertilizers or manure. The storm water control plan required by this section shall be submitted to AS-EPA and approved in writing prior to commencement of any construction activity for a new project and by the date specified by AS-EPA for existing land uses. The plan shall include the following:

(A) An estimate of the volume of storm water to be controlled, an assessment of the potential impacts of the storm water to be addressed, the design of BMPs and/or storm water controls, including a location map for the controls at the site, and a full description of the designs for the storm water controls.

(B) For nonstructural BMPs, a description of the management measures or methods to be used at the site to prevent the escape of pollutants to the receiving waters or ground waters. Nonstructural BMPs used in the plan shall be those contained in the "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters" (January 1993, USEPA OW) or guidance from the AS-EPA, the Natural Resources Conservation Service, or other source as approved by AS-EPA.

(2) For the planning, development, and maintenance of new, modified, and existing land uses, avoidance and prevention of water quality impacts is required. The methods to be utilized include, but are not limited to, BMPs such as site planning, proper use, storage, and disposal of hazardous materials, avoidance of sensitive areas, and proper preparation and maintenance of drainage structures, or others as required by AS-EPA.

(f) Hydromodification

In order to prevent water quality degradation and preserve valuable in stream and riparian habitat, the following practices shall be required and/or implemented by AS-EPA:

(1) All projects involving hydromodification shall be evaluated to determine their impacts on the physical and chemical characteristics of surface waters as well as in stream and riparian habitat, using appropriate models and methodologies.

(2) BMPs for use in the design and/or operation of new or existing hydromodification structures shall be identified and implemented by responsible persons. BMPs include, but are not limited to, protection of existing vegetation, minimization of loads on top of stream banks, hydraulic structures, check dam systems, grade control structures, vegetative cover, in stream sediment load control, soil bioengineering, proper stream bank and shoreline erosion control design, and use of setbacks, as provided in the "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters" (January 1993, USEPA OW) or other references approved by AS-EPA.

(3) AS-EPA shall work with other ASG departments and the private sector to ensure the proper operation and maintenance of hydromodification structures; and

(4) Prior to commencing any hydromodification activity, authorization from AS-EPA must be received.

(g) Hazardous Materials and Chemical Control

Notwithstanding any other rules in force pertaining to hazardous materials management, the following BMPs shall be implemented at facilities or construction sites where hazardous materials such as petroleum products, solvents, paints, pesticides, fertilizers, soil additives, and other chemicals in excess are stored or utilized so that contamination of streams, near shore waters, and ground waters is minimized or prevented:

(1) Proper storage of hazardous materials. All hazardous materials and chemicals shall be stored within a covered shelter; an impervious berm with a capacity of 110 % of the largest container in the shelter shall be placed around the perimeter of the storage area; and appropriate construction measures shall be taken to prevent the runoff of pollutants;

(2) Proper labeling of chemicals and placement of warning signs in areas where pesticides are or have recently been applied;

(3) Proper disposal of hazardous chemicals or materials in conformance with AS-EPA guidelines and/or regulations promulgated by the EQC;

(4) Proper maintenance of vehicles, equipment, and machinery in confined areas specially designed to control runoff; and

(5) Proper application of fertilizers and manure using procedures recommended by the "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters" (January 1993, USEPA OW) Natural Resources Conservation Service, or other source as approved by AS-EPA. Soil tests shall also be utilized to determine the specific nutrient needs at the site where such applications are performed in consultation with appropriate subject matter experts (e.g., Natural Resources Conservation Service).

(h) Dredging (Dredge and Dredge Spoil)

Dredging and dredged spoil discharges generally result in short-term disruption and do not represent continuous discharge that will affect beneficial uses over a long-term. Other in-water, construction-related activities, such as discharge from the dewatering of excavations and shoreline stabilization projects, can also cause short-term suspension of sediments similar to that caused by dredge and fill discharges. Effect zones may therefore be granted for dredging activities, other in-water construction-related activities, and the discharge of dredged or fill material provided that: (1) all other requirements of this Part are met; and (2) the proposed activity satisfies the policy of water quality antidegradation found in §24.0202 of this document.

Dredging and discharge of dredged or fill material can adversely affect colonies of reef building organisms by burying them, by releasing contaminants such as hydrocarbons into the water column, by reducing light penetration through the water, and by increasing the level of suspended particulates. Coral organisms are extremely sensitive to even slight reductions in light penetration or increases in suspended particulates (i.e., turbidity). These adverse effects will cause a loss of productive colonies which in turn provide habitat for many species of highly specialized aquatic organisms.

Dredging and discharge of dredged or fill material can also adversely affect sea grass beds by smothering vegetation and benthic organisms, and may also create unsuitable conditions for their continued vigor by: (1) changing water circulation patterns; (2) releasing nutrients that increase undesirable algal populations; (3) releasing chemicals that adversely affect plants and animals; (4) increasing turbidity levels, thereby reducing light penetration and hence photosynthesis; and (5) changing the capacity of a vegetated shallow to stabilize bottom materials and decrease channel shoaling. Dredging and the discharge of dredged or fill materials may reduce the value of vegetated shallows as nesting, spawning, nursery, cover, and forage areas, as well as their value in protecting shorelines from erosion and wave actions. It may encourage the growth of nuisance vegetation.

In granting effect zones for dredging activities, the discharge of dredged or fill material, or other in-water, construction-related activities that cause the suspension of sediments in or near coral reef resources and sea grass beds, the EQC shall assure that any disruption to beneficial uses is kept to an absolute minimum, and that all practicable measures are taken to prevent adverse impacts to resources of concern, taking into consideration the magnitude and duration of the proposed activity, and the proximity to resources of concern. This shall be satisfied by placing conditions within the applicable permit or water quality certification requiring the following:

(1) The use and maintenance of Best Management Practices (BMPs) including such measures as "silt curtains", closed ("environmental") buckets, hydraulic dredges, or other methods as appropriate to control the drift and extent of suspended sediment plumes beyond the location of the dredge or fill activity;

(2) Water quality monitoring requirements for turbidity and other pollutants of concern that may be identified or expected in the dredge spoil or fill material. Periodic aquatic ecosystem monitoring may also be required for the purpose of assessing the effects of the activity on resources of concern and determining the necessity of additional mitigative measures;

(3) For activities which have the potential to adversely affect coral reproduction, a stoppage period of no less than 60 days, starting 5 days after the October full moon, shall be a condition of any permit or water quality certification. In determining whether an activity has the potential to affect coral spawning, the EQC shall consider all of the following: 1) the magnitude of the sediment plume generated by the proposed activity; 2) the most likely extent and direction(s) of drift of the sediment plume; 3) the type of sediment and its composition; and 4) the proximity of broadcast spawning coral species to the proposed activity and expected sediment plume;

(4) A specified distance up-current and down-current from the permitted activity at which applicable water quality criteria must be met (i.e, an effect zone). Effect zones for dredge and fill activities shall be kept as small as practicable, and shall not exceed 300 feet down-current and 150 feet up-current. Down-current distance may be increased to 600 feet where typical currents can be shown to make the use of BMPs ineffective; and

(5) Any additional protective measures, limitations, monitoring, or effect zone requirements that the EQC identifies as being necessary to protect resources of concern; and

(6) Prior to commencing any dredging activity, authorization from AS-EPA must be received.

The EQC may require an applicant for water quality certification or permit for dredging, the discharge of dredged or fill material, or similar in-water, construction-related activities, to provide information necessary to support the development of monitoring plans, mitigation

measures, or effect zone requirements, such as engineering designs, surveys of existing currents, water quality data, and baseline ecosystem and indicator species surveys.

§24.0209 Water Quality Certifications

(a) Water Quality Certification Issuance

Water quality certifications may be issued by the EQC for any proposed activity that is found not to violate applicable water quality standards and Sections 301, 302, 303, 306, and 307 of the Clean Water Act, as amended. A water quality certification is required by Section 401 of the Clean Water Act of any applicant for a federal license or permit to conduct any activity, including, but not limited to, the construction or operation of facilities which may result in a discharge into navigable waters of the United States.

(b) Procedures to Apply for Water Quality Certification - Contents of Application

An applicant for certification shall submit a complete description of the discharge involved in the activity for which certification is sought, with a request for certification signed by the applicant. Such description shall include the following:

(1) The name and address of the applicant;

(2) A description of the facility or activity, and of any discharge into territorial waters which may result from the conduct of any activity including, but not limited to, the construction or operation of the facility, including characteristics of the discharge, and the location or locations at which such discharge may enter territorial waters;

(3) If applicable, a description of the function and operation of equipment or facilities to control discharges, including specification of the methods of control to be used;

(4) The estimated date or dates on which the activity will begin and end, and the date or dates on which the discharge(s) will take place;

(5) If applicable, a description of the methods and means being used or proposed to monitor the quality and characteristics of the discharge and the operation of equipment or facilities employed in the control of the proposed discharges; and

(6) The EQC may require the submission of additional information after a certification application has been filed. If a certification application is incomplete or otherwise deficient, processing of the application shall not be completed until such time as the applicant has supplied the missing information or otherwise corrected the deficiency. The EQC shall notify

the applicant, in writing, within sixty days of the submission of an application if an application is incomplete or otherwise deficient. A description of the type of additional information necessary to complete the application or correct the deficiency shall be included with such a written notice. Failure to provide additional information or to correct a deficiency shall be sufficient grounds for denial of certification. EQC must act on the application after receipt of a completed application;

(c) Water Quality Certification - Notice and Hearing

The EQC will provide the public with the opportunity to comment on the water quality certification and may, upon request or its own initiative, provide the opportunity for public hearing(s) to consider the issuance of water quality certification as specified in the Administrative Procedures Act (ASCA, Title 4, Chapter 10) and Environmental Quality Act (ASCA, Title 24, Chapter 1). The EQC shall inform the applicant, in writing, that such action has been taken. If, after considering the complete application, comments received during the public comment period, the record, and other information the EQC deems relevant, the EQC determines that applicable water quality standards will not be violated and the best practicable methods of control will be applied to a discharge which is the result of any activity, including but not limited to the construction and operation of facilities, then the EQC shall so certify.

(d) Contents of Water Quality Certification

(1) The name and address of the applicant;

(2) A statement that the EQC has examined the application made by the applicant and other information furnished to the licensing or permitting agency and bases its certification upon an evaluation of all such information contained in such application which is relevant to water quality certification;

(3) A statement that there is reasonable assurance that the activity will be conducted in a manner that will not violate water quality standards or the Clean Water Act;

(4) A statement of any condition which the EQC deems necessary or desirable with respect to the discharge or the activity that will affect water quality; and

(5) Such other information as the EQC may determine to be appropriate.

(e) Modification

The EQC may modify the certification prior to the issuance of the federal license or permit, after consideration of any additional information presented by the applicant, licensing or

permitting agency or other government agencies or interested parties. The EQC shall provide the opportunity for public review and comment on any such modification.

(f) Water Quality Certification - Adoption of New or Revised Water Quality Standards

(1) All water quality certifications issued by the EQC will include a clause indicating that the certification is subject to amendment or modification if new or revised water quality standards are adopted by the EQC.

(2) Upon adoption or revision of water quality standards, the EQC will notify the licensing or permitting authority and request the licensing or permitting authority to amend or modify the license or permit to reflect the applicable water quality standards.

§24.0210 Enforcement, Compliance and Water Quality Monitoring

(a) Enforcement Authority

Enforcement of these standards shall be in accordance with the applicable provisions of the Environmental Quality Act, ASCA, Title 24, Chapter 1.

(b) Determination of Compliance with Standards

(1) Compliance with numeric water quality standards (§24.0206) shall be determined in accordance with the most recent version of "AS-EPA Implementation Guidance Manual for ASWQS Numeric Criteria".

(2) In situations where the naturally occurring conditions result in exceedance of a standard, the ambient condition shall constitute the applicable standard.

(c) Analytical Methods

Unless otherwise approved by the EQC and US -EPA or stipulated in these standards, analysis performed to determine compliance with these standards shall be those approved by US EPA.

d) Sanitary Survey Requirements

If a monitoring station consistently exceeds the geometric mean standard for E. coli or enterococcus, the EQC shall conduct, or require a discharger to conduct, a survey to determine the source of the contamination. When a sanitary survey identifies a controllable source of indicator organisms associated with a discharge of sewage, the EQC shall take

action to control the source. Waste discharge requirements shall require the discharger to conduct sanitary surveys when so directed by the EQC. Such requirements shall contain provisions requiring the discharger to control any controllable discharges identified in a sanitary survey.

e) Compliance Schedules for National Pollution Discharge Elimination System (NPDES) Permits

The use of compliance schedules for water quality-based effluent limitations (WQBELs) in National Pollutant Discharge Elimination System (NPDES) permits issued by the permitting authority is authorized by the EQC in accordance with the requirements under 40 CFR 122.47.

Appendix A

Ammonia Toxicity Standards for Fresh and Marine Waters

Water Quality Criteria for Ammonia in Freshwater (ACUTE)[1,2]

Temperature (C°)

pH	0-14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	51	51	51	51	51	51	51	51	51	48	44	40	37	34	31	29	27
6.6	49	49	49	49	49	49	49	49	49	46	42	39	36	33	30	28	26
6.7	46	46	46	46	46	46	46	46	46	43	40	37	34	31	29	26	24
6.8	44	44	44	44	44	44	44	44	44	41	38	35	32	29	27	25	23
6.9	41	41	41	41	41	41	41	41	41	38	35	32	30	27	25	23	21
7.0	38	38	38	38	38	38	38	38	38	35	32	30	27	25	23	21	20
7.1	34	34	34	34	34	34	34	34	34	32	29	27	25	23	21	19	18
7.2	31	31	31	31	31	31	31	31	31	29	26	24	22	21	19	17	16
7.3	27	27	27	27	27	27	27	27	27	26	23	22	20	18	17	16	14
7.4	24	24	24	24	24	24	24	24	24	22	21	19	17	16	15	14	13
7.5	21	21	21	21	21	21	21	21	21	19	18	16	15	14	13	12	11
7.6	18	18	18	18	18	18	18	18	18	17	15	14	13	12	11	10	9.3
7.7	15	15	15	15	15	15	15	15	15	14	13	12	11	10	9.3	8.6	7.9
7.8	13	13	13	13	13	13	13	13	13	12	11	10	9.2	8.5	7.8	7.2	6.6
7.9	11	11	11	11	11	11	11	11	11	9.9	9.1	8.4	7.7	7.1	6.5	6.0	5.5
8.0	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.2	7.5	6.9	6.4	5.9	5.4	5.0	4.6
8.1	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	6.8	6.2	5.7	5.3	4.9	4.5	4.1	3.8
8.2	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.6	5.1	4.7	4.4	4.0	3.7	3.4	3.1

8.3	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.6	4.2	3.9	3.6	3.3	3.0	2.8	2.6
8.4	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	3.8	3.4	3.2	3.0	2.7	2.5	2.3	2.1
8.5	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.1	2.9	2.6	2.4	2.2	2.1	1.9	1.8
8.6	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.4
8.7	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.0	1.8	1.7	1.5	1.4	1.3	1.2
8.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0
8.9	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.92	0.85
9.0	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.2	1.1	1.0	0.93	0.85	0.78	0.72

1 Source: Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater 2013. EPA-822-R-13-001
2 Units: Total Ammonia Nitrogen (TAN). To convert these units see source document

Water Quality Criteria for Ammonia in Freshwater (CHRONIC)[1,2]

	Temperature (C°)																
pH	0-14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.0	6.6	6.2	5.8	5.4	5.1	4.8	4.5	4.2
6.6	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	6.9	6.5	6.1	5.7	5.4	5.0	4.7	4.4	4.1
6.7	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	6.8	6.4	6.0	5.6	5.3	4.9	4.6	4.3	4.1
6.8	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.6	6.2	5.8	5.5	5.1	4.8	4.5	4.2	4.0
6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.5	6.1	5.7	5.3	5.0	4.7	4.4	4.1	3.9
7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.2	5.8	5.5	5.1	4.8	4.5	4.2	4.0	3.7
7.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.0	5.6	5.3	4.9	4.6	4.3	4.1	3.8	3.6
7.2	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.7	5.3	5.0	4.7	4.4	4.1	3.9	3.6	3.4
7.3	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.4	5.0	4.7	4.4	4.1	3.9	3.6	3.4	3.2
7.4	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.0	4.7	4.4	4.1	3.9	3.6	3.4	3.2	3.0
7.5	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.6	4.3	4.1	3.8	3.6	3.3	3.1	2.9	2.8
7.6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.2	3.9	3.7	3.5	3.2	3.0	2.9	2.7	2.5
7.7	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.3
7.8	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.1	2.0
7.9	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8
8.0	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.4	2.3	2.1	2.0	1.9	1.7	1.6	1.5
8.1	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3
8.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1
8.3	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.96
8.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.2	1.1	1.1	0.99	0.93	0.87	0.81
8.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.0	0.95	0.89	0.83	0.78	0.73	0.69

8.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.97	0.91	0.85	0.80	0.75	0.70	0.66	0.62	0.58
8.7	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.82	0.77	0.72	0.68	0.64	0.60	0.56	0.52	0.49
8.8	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.70	0.65	0.61	0.58	0.54	0.51	0.47	0.44	0.42
8.9	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.60	0.56	0.52	0.49	0.46	0.43	0.41	0.38	0.36
9.0	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.51	0.48	0.45	0.42	0.40	0.37	0.35	0.33	0.31

[1] Source: Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater 2013. EPA-822-R-13-001
[2] Units: Total Ammonia Nitrogen (TAN). To convert these units see source document

Water Quality Criteria for Saltwater Aquatic Life Based on Total Ammonia mg/L

Criteria Maximum Concentrations

	Temperature (°C)							
	0	5	10	15	20	25	30	35
pH	Salinity = 10 g/kg							
7.0	270	191	131	92	62	44	29	21
7.2	175	121	83	58	40	27	19	13
7.4	110	77	52	35	25	17	12	8.3
7.6	69	48	33	23	16	11	7.7	5.6
7.8	44	31	21	15	10	7.1	5.0	3.5
8.0	27	19	13	9.4	6.4	4.6	3.1	2.3
8.2	18	12	8.5	5.8	4.2	2.9	2.1	1.5
8.4	11	7.9	5.4	3.7	2.7	1.9	1.4	1.0
8.6	7.3	5.0	3.5	2.5	1.8	1.3	0.98	0.75
8.8	4.6	3.3	2.3	1.7	1.2	0.92	0.71	0.56
9.0	2.9	2.1	1.5	1.1	0.85	0.67	0.52	0.44

pH	Salinity = 20 g/kg							
7.0	291	200	137	96	64	44	31	21
7.2	183	125	87	60	42	29	20	14
7.4	116	79	54	37	27	18	12	8.7
7.6	73	50	35	23	17	11	7.9	5.6
7.8	46	31	23	15	11	7.5	5.2	3.5
8.0	29	20	14	9.8	6.7	4.8	3.3	2.3
8.2	19	13	8.9	6.2	4.4	3.1	2.1	1.6
8.4	12	8.1	5.6	4.0	2.9	2.0	1.5	1.1
8.6	7.5	5.2	3.7	2.7	1.9	1.4	1.0	0.77
8.8	4.8	3.3	2.5	1.7	1.3	0.94	0.73	0.56
9.0	3.1	2.3	1.6	1.2	0.87	0.69	0.54	0.44

pH	Salinity = 30 g/kg							
7.0	312	208	148	102	71	48	33	23
7.2	196	135	94	64	44	31	21	15
7.4	125	85	58	40	27	19	13	9.4
7.6	79	54	37	25	21	12	8.5	6.0
7.8	50	33	23	16	11	7.9	5.4	3.7

8.0	31	21	15	10	7.3	5.0	3.5	2.5
8.2	20	14	9.6	6.7	4.6	3.3	2.3	1.7
8.4	12.7	8.7	6.0	4.2	2.9	2.1	1.6	1.1
8.6	8.1	5.6	4.0	2.7	2.0	1.4	1.1	0.81
8.8	5.2	3.5	2.5	1.8	1.3	1.0	0.75	0.58
9.0	3.3	2.3	1.7	1.2	0.94	0.71	0.56	0.46

[1] Ambient Water Quality Criteria for Ammonia (Saltwater)-1989, EPA 440/5-88-004, April 1989

Water Quality Criteria for Saltwater Aquatic Life Based on Total Ammonia mg/L

Criteria Continuous Concentrations

	Temperature (°C)							
	0	5	10	15	20	25	30	35
pH	Salinity = 10 g/kg							
7.0	41	29	20	14	9.4	6.6	4.4	3.1
7.2	26	18	12	8.7	5.9	4.1	2.8	2.0
7.4	17	12	7.8	5.3	3.7	2.6	1.8	1.2
7.6	10	7.2	5.0	3.4	2.4	1.7	1.2	0.84
7.8	6.6	4.7	3.1	2.2	1.5	1.1	0.75	0.53
8.0	4.1	2.9	2.0	1.40	0.97	0.69	0.47	0.34
8.2	2.7	1.8	1.3	0.87	0.62	0.44	0.31	0.23
8.4	1.7	1.2	0.81	0.56	0.41	0.29	0.21	0.16
8.6	1.1	0.75	0.53	0.37	0.27	0.20	0.15	0.11
8.8	0.69	0.50	0.34	0.25	0.18	0.14	0.11	0.08
9.0	0.44	0.31	0.23	0.17	0.13	0.10	0.08	0.07

pH	Salinity = 20 g/kg							
7.0	44	30	21	14	9.7	6.6	4.7	3.1
7.2	27	19	13	9.0	6.2	4.4	3.0	2.1
7.4	18	12	8.1	5.6	4.1	2.7	1.9	1.3
7.6	11	7.5	5.3	3.4	2.5	1.7	1.2	0.84
7.8	6.9	4.7	3.4	2.3	1.6	1.1	0.78	0.53
8.0	4.4	3.0	2.1	1.5	1.0	0.72	0.50	0.34

8.2	2.8	1.9	1.3	0.94	0.66	0.47	0.31	0.24
8.4	1.8	1.2	0.84	0.59	0.44	0.30	0.22	0.16
8.6	1.1	0.78	0.56	0.41	0.28	0.20	0.15	0.12
8.8	0.72	0.50	0.37	0.26	0.19	0.14	0.11	0.08
9.0	0.47	0.34	0.24	0.18	0.13	0.10	0.08	0.07

pH	Salinity = 30 g/kg							
7.0	47	31	22	15	11	7.2	5.0	3.4
7.2	29	20	14	9.7	6.6	4.7	3.1	2.2
7.4	19	13	8.7	5.9	4.1	2.9	2.0	1.4
7.6	12	8.1	5.6	3.7	3.1	1.8	1.3	0.90
7.8	7.5	5.0	3.4	2.4	1.7	1.2	0.81	0.56
8.0	4.7	3.1	2.2	1.6	1.1	0.75	0.53	0.37
8.2	3.0	2.1	1.4	1.0	0.69	0.50	0.34	0.25
8.4	1.9	1.3	0.90	0.62	0.44	0.31	0.23	0.17
8.6	1.2	0.84	0.59	0.41	0.30	0.22	0.16	0.12
8.8	0.78	0.53	0.37	0.27	0.20	0.15	0.11	0.09
9.0	0.50	0.34	0.26	0.19	0.14	0.11	0.08	0.07

[1] Ambient Water Quality Criteria for Ammonia (Saltwater)-1989, EPA 440/5-88-004, April 1989

APPENDIX D-2
TAFUNA RECEIVING WATER QUALITY REPORT (2018)

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TAFUNA WWTP RECEIVING WATER QUALITY MONITORING REPORT

2018 Non-tradewind Season
March 2018

Prepared for:

American Samoa Power Authority
Tafuna Wastewater Treatment Plant
NPDES Permit AS0020010

Submitted to:

U.S. Environmental Protection Agency
and
American Samoa Environmental Protection Agency

Prepared by:

gdc

glatzel da costa (**gdc**)
P.O. Box 1238
Trinidad, CA 95570

June 15, 2018

gdc

COASTAL ENVIRONMENTAL ANALYSTS

June 15, 2018

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CED-6
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Christianera Tuitele
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Protection Agency
American Samoa Government
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RE: Tafuna WWTP Receiving Water Quality Monitoring – March 2018 Sampling

Enclosed is the receiving water quality monitoring report for ASPA's Tafuna WWTP. The report is for the 2018 Non-tradewind season sampling done in March 2018. All required stations were occupied and all NPDES permit-required parameters were included. Compliance with NPDES permit limitations for the receiving water were demonstrated as well as compliance with the American Samoa Water Quality Standards.

Please call us if you have any questions or comments on the enclosed report.

Sincerely,

Karen A. Glatzel

Karen A. Glatzel

Enclosure: Tafuna WWTP March 2018 (18.NT) Receiving Water Quality Monitoring Report with Attachments on CD-ROM

Copies with enclosure: Fa'i Mareko/ASPA
Pascal Mues/USEPA

Electronic Copy w/o CD-ROM: William Spitzenberg/ASPA
Jewel Tuiasosopo/ASEPA
Rob Darby/**gdc**
Peter Peshut/NES

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EMAIL: GLATZELDACOSTA@SUDDENLINK.NET

TECHNICAL MEMORANDUM gdc

TAFUNA WWTP OCEAN RECEIVING WATER QUALITY MONITORING MARCH 2018 SAMPLING

Prepared For: American Samoa Power Authority Tafuna WWTP
(NPDES Permit No. AS0020010)

Prepared By: gdc, PO. Box 1238, Trinidad, CA 95570
707-677-0123 – glatzeldacosta@suddenlink.net

Date: June 15, 2018

Distribution: Michael Wolfram
United States Environmental Protection Agency, Region 9
Christianera Tuitele
American Samoa Environmental Protection Agency

SUMMARY

The required semi-annual receiving water quality monitoring for the Tafuna WWTP outfall was conducted in March 2018. The results of the sampling and analyses indicate overall compliance with the National Pollutant Discharge Elimination System (NPDES) permit required conditions and the American Samoa Water Quality Standards.

PURPOSE

This Technical Memorandum (TM) presents the results of the ocean receiving water quality monitoring conducted for the American Samoa Power Authority (ASPA) Tafuna Wastewater Treatment Plant (WWTP) in March 2018. The sampling and analysis was originally required quarterly under the existing National Pollutant Discharge Elimination System (NPDES) Permit No. AS0020010. The sampling frequency was reduced to semi-annually prior to the ongoing permit renewal process. This report documents the first of the two sampling events scheduled for 2018. The sampling and analysis conducted included all permit-required parameters and stations.

STATION LOCATIONS

Part E of the NPDES permit specifies the sampling locations, depths, and parameters for analysis for the receiving water quality monitoring stations. The stations are specified in the permit relative to distance and direction from the outfall diffuser. The diffuser was previously located by finding the discharge plume using a fathometer. The coordinates of this location were recorded using a global positioning system (GPS) unit.[1] The locations of the monitoring stations were determined relative to the diffuser location based on the physical descriptions given in Section E.1.a of the NPDES permit. The latitude and longitude of the monitoring stations were then entered into a GPS unit and used in all subsequent sampling events. The permit required stations occupied, sampled, and reported in this TM are shown in Figure 1.

Table 1 includes a summary of the stations that were occupied for the March 2018 monitoring. The inshore station (Station B) is specified in the permit as being along the outfall pipeline shoreward of the discharge in shallow water (approximately 18 feet deep)[2]. The station location was modified, in consultation with the American Samoa Environmental Protection Agency (ASEPA) and the United States Environmental Protection Agency (USEPA), because sampling in this shallow water location is generally dangerous, and often impossible, under normal wave conditions at the discharge site. The relocated Station B is inshore of the diffuser, along the outfall pipeline, as far towards the shoreline as can be approached safely. The station is closer to the discharge than specified in the permit; therefore, the objectives of the sampling program are achieved.

An additional station (Station FF) was included in this monitoring event to evaluate the benefit of sampling water quality at a farfield location. Station FF is not shown on Figure 1, but is approximately 1000 meters directly offshore of the diffuser. Parameters measured at the Station FF are shown in Table 1.

[1] The location was subsequently verified during a diver inspection of the outfall.
[2] Examination of the permit specified locations and design drawings of the outfall indicate that Station B, 627 feet shoreward of the diffuser, is actually in 40 feet of water. The reference to 18 feet of water in the permit appears to be for an old outfall. This location is indicated in Figure 1 as an open circle.

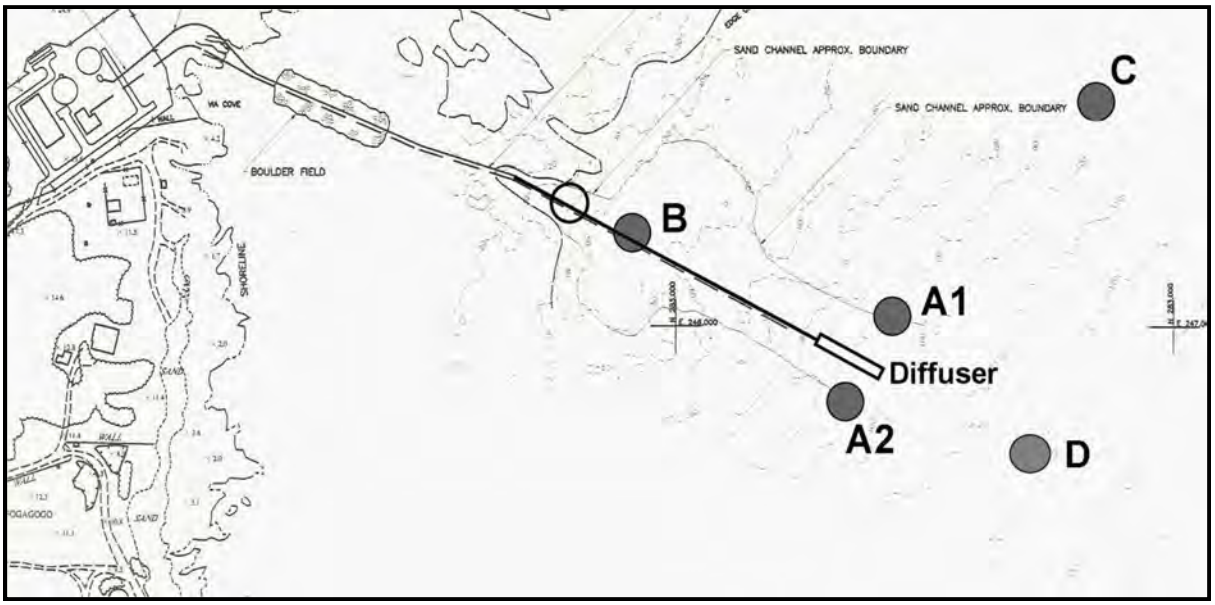


Figure 1
Water Quality Sampling Station Locations
Open circle is approximate location of permit specified sampling Station "B".
Dashed line is the old outfall location; solid line is the existing outfall and diffuser.
Station D, established as an alternate sampling station, was not sampled during the March 2018 sampling event.

Table 1
Tafuna WWTP Station Locations and Parameters – March 2018

Monitoring Stations	Vicinity	Latitude	Longitude	Parameters						
				TN	TP	Ch	E	HP	Narr	Secchi Depth (ft)
C	Reference[1]	S14º20.427'	W170º43.011'	X	X	X	X	X	X	68 (MS)
A1	Zone of Initial Dilution (ZID)[2]	S14º20.483'	W170º43.068'	X	X	X	X	X	X	64 (MS)
A2		S14º20.509'	W170º'43.087'	X	X	X	X	X	X	65 (MS)
B	Zone of Mixing (ZOM)[3]	S14º20.429'	W170º'43.143'	X	X	X	X	X	X	50[5] (MS)
FF	Farfield[4]	S14°20.722'	W170°42.604'	X	X	X		X	X	85 (MS)

[1] Reference Station C is located 212 m (700 ft) NE of the diffuser midpoint at a water depth of 27.4 m (90 ft).

[2] Station A1 is located 27.4 m (90 ft) NE of the diffuser midpoint and Station A2 is located 27.4 m (90 ft) SW of the diffuser mid-point; both are at a water depth of 27.4 m (90 ft).

[3] Station B is located 190 m (627 ft) shoreward of the diffuser midpoint at a water depth of 5.5 m (18 ft) and has been relocated along the outfall alignment in approximately 16.5 m (54 feet) of water (see Figure 1).

[4] Farfield Station (FF) was located 1000 m (3281 ft) offshore of the diffuser. This is not a permit required station and was added to the March 2018 sampling to evaluate the usefulness of measuring water quality parameters outside the immediate near-shore environment where the Tafuna outfall is located.

[5] Water depth was 50 feet – bottom visible from surface.

TN = Total Nitrogen; TP = Total Phosphorus; Ch = Chlorophyll *a*; E = *Enterococcus* bacteria
HP =hydrographic parameters (temperature, salinity, dissolved oxygen, pH, turbidity)
Narr = (narrative parameters) visible floating materials, odor, grease, oil, scum or foam
MS = mostly sunny sky

SAMPLING CONDITIONS AND METHODS

Table 1 includes the latitude and longitude of the stations as recorded and occupied at the time of sampling for water chemistry, hydrographic parameters, and bacterial samples. Table 1 includes the Secchi depth readings, which ranged between 64 and 68 feet in the vicinity of the discharge and 85

feet at Station FF. The Secchi depth readings were taken under mostly sunny conditions. Samples were collected on March 12, 2018. A summary of sampling times, weather conditions during the times of receiving water sampling, and sampling depths is provided in the Supplemental Data Section at the end of this Technical Memorandum (TM) for all stations occupied during the March 2018 campaign. Receiving water quality chemistry and bacteria samples and *in situ* measurements of salinity, temperature, dissolved oxygen (DO), and pH were collected on March 12, 2018.

Table 2 presents the sample analysis and handling procedures used for the collection of water quality and bacteria samples. Water quality samples were collected at three depths at each station: near-surface (3 feet), mid-depth, and near-bottom (~3 feet above the bottom)[3]. Samples were collected using a standard oceanographic sample-collecting bottle (WildCo Beta bottle). Water samples were placed in sterile sample bottles, preserved as required, stored on ice, and shipped to the laboratory by express shipment (DHL). Water samples for bacteria analyses were collected into sterilized sample bottles provided by the ASEPA laboratory. The bacteria samples were put on ice and delivered to the ASEPA laboratory for analysis within 3 hours of collection. Chain-of-Custody forms are included in the laboratory reports discussed below.

WATER QUALITY SAMPLING AND ANALYSIS RESULTS

Results of the water quality analysis are provided in Tables 3, 4, and 5. The samples were collected and analyzed for hydrographic parameters, nutrients, and chlorophyll *a*. Note that on the detailed laboratory data, provided in Attachments to this TM, all stations are referenced with a "T" before the station designator to avoid potential confusion with monitoring in other locations during the same time period.[4] Light penetration was inferred from Secchi depths observed during the sampling, which are listed in Table 1.

[3] In some cases the sample is more than 3 feet from the bottom because of irregular bottom conditions and the potential for equipment fouling and loss. An assessment is made concerning the sampling depth based on fathometer readings taken from the vessel at the time of sample collection. Note that the deep water quality samples at the farfield station (Station FF) were collected at 90 feet to match the outfall discharge depth.

[4] Stations A1, A2, B, C and FF may be indicated as TA1, TA2, TB, TC, and TFF on the chain-of-custody and in the laboratory data sheets.

Table 2
Sample Analysis and Handling Procedures for Water Quality Samples
Tafuna WWTP Ocean Receiving Water Quality
March 2018 Sampling

Parameter	Analytical Method	Detection Limit or Instrument Resolution	Sample Holding Time	Sample Container	Sample Preservation
Temperature	Field Probe	0.1°C	--	--	--
Salinity	Field Probe	0.1 PSU			
Dissolved O_2	Field Probe	0.1 mg/l			
pH	Field Probe	0.1 SU			
Turbidity	HACH 2100Q	0.1 NTU [1]			
Total Kjeldahl Nitrogen (as N)	EPA 351.2	0.2 mg/l	28 days	250 ml plastic	4°C - H_2SO_4
Nitrate + Nitrite (as N)	EPA 353.2	0.020 mg/l	28 days	500 ml plastic	4°C - H_2SO_4
Total Phosphorus	EPA 365.3	0.004 mg/l			
Chlorophyll *a*	SM 10200 H	0.2 mg/m^3	3 months	Whatman (0.7 micron) GF/F filter	magnesium carbonate, and frozen
Enterococcus	ASEPA [2]	10 MPN [3]	8 hours	Sterile sample bottles	Kept on ice until delivery to lab (within 3 hours)

[1] Estimated based on calibration with ultra-low level standards.
[2] Seawater bacterial contamination test methods similar to the chromogenic ONPG-MUG test to detect coliform in freshwater using Enterolert, a commercially available fluorogenic substrate (Enterolert Quantitray).
[3] Reported as 0 MPN if no bacteria are detected.

Light Penetration

The American Samoa Water Quality Standards[5] (ASWQS) criteria for water clarity is in terms of light penetration, which cannot be directly converted from Secchi depth or turbidity readings. However, an estimate can be made with light penetration related to Secchi depth using the following approximation:

$$\chi = \kappa \cdot D^{-1}$$

where,

χ = extinction coefficient for visible light
κ = a constant

and

D = Secchi depth in meters for a 30 cm diameter Secchi disk.

[5] The ASWQS, 2013 revision (approved by USEPA 22 August 2014) criteria for open coastal waters are referenced in this Technical Memorandum.

The constant κ is not easily determined but is often taken as approximately 1.7. Using the above approximation, light penetration of 1 percent at 130 feet corresponds to a Secchi depth of approximately 48 feet. The Secchi depth data (Table 1) indicates that the receiving water Secchi depths exceeded 48 feet. The calculation described above is approximate although no definitive assessment is possible without direct measurements of light penetration. Secchi depth readings indicate compliance with the ASWQS criteria.[6] Based on past data the criterion is consistently achieved.

Hydrographic Parameters

Table 3 provides a summary of the hydrographic parameters that were measured at approximately the same depths and times at each station as the grab samples for nutrient analysis. Parameters were measured using an YSI EXO2 sonde with temperature, conductivity, pH, and DO sensors. Sensor calibration records for this data collection event are provided in the Supplemental Data Section at the end of this TM. Turbidity was measured using a bench-top meter. Grab samples for turbidity analysis were collected concurrently with the water quality samples.

The results of the measurements of the hydrographic parameters *for the nearfield stations only* (Stations A1, A2, B, and C) are summarized as follows:

- Water temperatures ranged from 29.11 °C to 29.46 °C with an average of 29.39 °C and a median of 29.41 °C. Temperatures at all of the monitoring stations were measured below or within 0.02 °C (0.04 F) of the American Samoa Water Quality Standards (ASWQS) numerical criterion of 85°F (29.44 °C)[7] for the nearfield stations in the vicinity of the diffuser. The water column temperatures indicate a well-mixed water column and compliance with the ASWQS.

- Salinity ranged from 35.06 PSU to 36.05 PSU with an average of 35.93 PSU. The reported values are typical of open coastal water for this region and are consistent with previous salinity measurements. The water column salinity indicates a well-mixed water column. There is no specific ASWQS for salinity, but there was no indication of significantly reduced salinity caused by the discharge plume.

- The DO minimum value was 5.32 mg/l measured at the near-bottom at Station B. The average and median DO concentrations were 5.91 mg/l and 6.02 mg/l, respectively. These concentrations meet the ASWQS minimum criteria, based on the median value of not less than 5.5 mg/l and not

[6] The light penetration depth to exceed 130 feet (as median value), 110 feet 10% of the time, and 90 feet 2% of the time. Light penetration depth means the depth reached by one percent of the sunlight incident on the surface of a body of water.

[7] The ASWQS criterion for temperature is that: "The temperature shall not deviate more than 1.5 degrees Fahrenheit from conditions which would occur naturally and shall not fluctuate more than 1 degree Fahrenheit on an hourly basis or exceed 85 degree Fahrenheit due to the influence of other than natural causes"

less than 80 percent saturation[8] except when the natural level is less than 5.5 mg/l, in which case the natural level shall become the standard.

- The pH minimum, maximum, average, and median values were measured as 8.24, 8.30, 8.28, and 8.29 SU, respectively. The ASWQS requires pH to be between 6.5 and 8.6 SU and to be within 0.2 SU units of what it would be naturally. In coastal marine waters pH is typically between 7.8 and 8.2 SU. The pH at the nearfield stations is essentially the same as at the farfield station. Therefore, the ASWQS for pH is met based on all of the values observed.[9]

- The turbidity ranged from 0.10 to 0.35 NTU. The average and median turbidity values for all stations were 0.19 NTU and 0.17 NTU. The ASWQS criterion is a median value of 0.25 NTU[10]. Therefore, the ASWQS for turbidity was met based on all of the values observed. Turbidity was measured with a portable bench top turbidity meter calibrated with ultralow turbidity standards. The data and calibration are provided in the Supplemental Data Section at the end of this Technical Memorandum. The accuracy of the meter is likely > ±0.1 NTU. The highest turbidity was measured at 0.35 NTU at the bottom at Station B.

Bacteria

Samples for *Enterococcus* analysis were collected as scheduled and analyzed by the ASEPA laboratory. Enterococcus was not present (that is the reported values were 0 MPN/100 ml at all depths at all stations. The laboratory data are provided in the Supplemental Data Section.

[8] Saturation is approximately 6.3 mg/l, for the observed temperature and salinity; 80 percent saturation is approximately 5.0 mg/l.

[9] Note that the calibration data indicate the pH sensor may have been reading about 0.02 SU too high.

[10] The turbidity is not to exceed 0.25 NTU (as median value), 0.35 NTU 10% of the time, and 0.45 NTU 2% of the time.

Table 3
Hydrographic Parameters
Tafuna WWTP Receiving Water Quality
March 2018 Sampling

Station	Depth	DO	pH	Salinity	Temp.	Turbidity[1]
	(feet)	(mg/l)	(SU)	(PSU)	(ºC)	(NTU)
A1 (ZID)	3	6.08	8.29	35.98	29.40	0.21
	45	6.05	8.30	36.02	29.41	0.14
	90	5.87	8.29	36.05	29.43	0.17
	Average	6.00	8.29	36.02	29.41	0.17
A2 (ZID)	3	6.06	8.29	35.94	29.39	0.30
	45	5.99	8.29	36.02	29.41	0.14
	80	5.82	8.29	36.02	29.41	0.20
	Average	8.29	8.29	35.99	29.40	0.21
B (ZOM)	3	6.04	8.25	35.06	29.11	0.17
	25	5.48	8.25	36.01	29.46	0.17
	50	5.32	8.26	36.00	29.41	0.35
	Average	5.61	8.25	35.69	29.33	0.23
C	3	6.25	8.24	36.01	29.40	0.16
	45	6.09	8.29	36.02	29.41	0.10
	90	5.90	8.29	36.02	29.41	0.13
	Average	6.08	8.27	36.02	29.41	0.13
Summary of All Stations in the Discharge Area (A1, A2, B, C)						
All Stations in Discharge Area	Minimum	5.32	8.24	35.06	29.11	0.10
	Maximum	6.25	8.30	36.05	29.46	0.35
	Average	5.91	8.28	35.93	29.39	0.19
	Median	6.02	8.29	36.02	29.41	0.17
	90th Percentile	6.09	8.29	36.02	29.43	0.29
	98th Percentile	6.21	8.30	36.04	29.45	0.34
	Std. Dev.	0.27	0.02	0.28	0.09	0.07
Farfield Station Measurements						
FF	3	6.27	8.29	36.06	29.47	0.14
	45	6.16	8.31	36.06	29.47	0.13
	90	6.08	8.30	36.06	29.47	0.15
	Average	6.17	8.30	36.06	29.47	0.14

[1] Turbidity was measured using a bench top meter from samples taken at the same time as the grab samples for nutrient analysis.

Nutrients and Biological Parameters

Table 4 presents the results for the nutrients and chlorophyll *a* measured in the water quality grab samples. These parameters included total Kjeldahl nitrogen (TKN), nitrate+nitrite, total phosphorus (TP), and chlorophyll *a*. The ASWQS regulates total nitrogen (TN), which is calculated by adding the concentrations of TKN and nitrate+nitrite. Laboratory data are provided in Attachment 1.

The analysis of TKN at low levels in seawater requires careful sample preparation and Method 351.2 has been found to be most appropriate for such analyses. The analytical laboratory that normally runs these samples ceased do chemical analysis very shortly before the samples arrived. An alternative laboratory was found, but the samples were subsequently beyond holding time and the selected laboratory was only able to run the samples to a detection limit of 0.2 mg/l. The samples were also

run using method 351.4, but the results may not be reliable and are not reported here, although the lab reports in Attachment 1 include those data.

The results of the measurements of the nutrient and biological parameters *for the nearfield stations only* (Stations A1, A2, B, and C) are summarized as follows::

- Total nitrogen. All TKN concentrations were reported as not-detected ("U") in Table 4. If ½ of the detection limit is used to assess compliance, compliance at the Tafuna discharge location is demonstrated[11]. There is no effect of the discharge indicated in the overall results.

- Total phosphorus. The ASWQS criterion is expressed as a median (0.015 mg/l)[12]. Single sample concentrations of total phosphorous were reported lower than 0.015 mg/l for all samples except at the ZID Stations A1 and A2 (both near-surface) where it was reported at 0.017 mg/l and 0.018 mg/l, respectively. The median value was 0.010 mg/l. The data indicate compliance with ASWQS for total phosphorus with no significant effects of the effluent plume observed, although slightly higher values were reported at the ZID stations.

- Chlorophyll. Chlorophyll *a* concentrations were reported as below the ASWQS median criteria[13] in all but three samples at the reference station and the farfield stations. The median value was 0.2 mg/m^3 (0.2 µg/l). The data indicate ASWQS was achieved for chlorophyll *a*.

[11] TN not to exceed 0.130 mg/l (as median value), 0. 210 mg/l more than 10% of the time, and 0.280 mg/l more than 2% of the time.
[12] TP not to exceed 0.015 mg/l (as median value), 0.030 mg/l more than 10% of the time, and 0.050 mg/l more than 2% of the time.
[13] Chlorophyll *a* not to exceed 0.25 µg/l (as a median value), 0.050 µg/l more than 10% of the time, and 0.75 µg/l more than 2% of the time.

Table 5
Nutrient and Biological Parameters
Tafuna WWTP Ocean Receiving Water Quality
March 2018 Sampling

Station	Depth	TKN	Nitrate + Nitrite	Total Nitrogen	Total Phosphorous	Chlorophyll a
	Method	E 351.2	E 353.2	Calculated *	E 365.3	SM10200 H
	Units	mg/l	mg/l	mg/l	mg/l	mg/m^3
	Method Detection Limit	0.200	0.020	--	0.004	0.16
	ASWQS Criterion	--	--	0.130	0.015	0.25
A1 (ZID)	3	0.2U	0.020U	0.220	0.017=	0.2U
	40	0.2U	0.020U	0.220	0.013=	0.2U
	90	0.2U	0.020U	0.220	0.011=	0.2J
	Average	**0.2**	**0.020**	**0.220**	**0.014**	**0.2**
A2 (ZID)	3	0.2U	0.020U	0.220	0.018=	0.2U
	45	0.2U	0.020U	0.220	0.010J	0.2J
	80	0.2U	0.020U	0.220	0.010=	0.2U
	Average	**0.2**	**0.020**	**0.220**	**0.011**	**0.2**
B (ZOM)	3	0.2U	0.053=	0.253	0.011=	0.2J
	25	0.2U	0.020U	0.220	0.007J	0.2J
	45	0.2U	0.020U	0.220	0.006J	0.2U
	Average	**0.2**	**0.031**	**0.231**	**0.009**	**0.2**
C (Reference)	3	0.2U	0.020U	0.220	0.004U	0.2J
	45	0.2U	0.020U	0.220	0.004J	0.3J
	90	0.2U	0.020U	0.220	0.004U	0.3J
	Average	**0.2**	**0.020**	**0.220**	**0.004**	**0.3**
Summary of All Stations in the Discharge Area (A1, A2, B, C)						
All Stations in Discharge Area	Minimum	0.2	0.020	0.220	0.004	0.2
	Average	0.2	0.023	0.223	0.010	0.2
	Median	0.2	0.020	0.220	0.010	0.2
	Maximum	0.2	0.053	0.253	0.018	0.3
	Standard Deviation	0.0	0.010	0.010	0.005	0.0
	90th Percentile	0.2	0.020	0.220	0.017	0.3
	98th Percentile	0.2	0.046	0.246	0.018	0.3
Farfield Station Measurements						
FF (Farfield)	3	0.2U	0.020U	0.220	0.007J	0.2J
	45	0.2U	0.020U	0.220	0.005J	0.2J
	90	0.2U	0.020U	0.220	0.007J	0.3J
	Average	**0.2**	**0.020**	**0.220**	**0.006**	**0.2**

* The parameter was calculated [Total Nitrogen] = [TKN] + [nitrate+nitrite]. Because of the not detected and/or estimated values used, the values are considered a maximum potential concentration.
"=" indicates that the parameter was detected at the concentration shown
"J" indicates that the result is an estimated concentration that is less than the reporting limit (RL) but greater than or equal to the method detection limit (MDL).
"U" indicates that the parameter was not detected at the method detection limit; the method detection limit is shown.

CONCLUSIONS AND RECOMMENDATIONS

Based on the ongoing monitoring reports over the past few years, with the exception of the exceedances for TN, the Tafuna WWTP receiving water appears to be in overall compliance with the ASWQS. Previous exceedances of the ASWQS criterion for total nitrogen in recent years remain unexplained. Overall, compliance with NPDES permit conditions is demonstrated. A summary of compliance assessments with the NPDES permit limitations is provided in Table 5.

Based on the sampling conducted during March 2018, and considering previous sampling events, the following recommendations are presented:

- The permit requires turbidity measurements using a nephelometer. The commercially available field instruments used to make *in situ* measurements of turbidity are limited by resolution and accuracy and are not suitable for evaluations of turbidity at the low levels required. Laboratory analysis is therefore preferable, but holding times cannot be met because of shipping constraints. Based on recommendations made following the February 2007 sampling episode and trials in September 2007, a bench top meter (refer to Table 2 for specifications) has been used for subsequent sampling episodes including this March 2018 sampling. It has been found to provide marginally acceptable results at the low levels required, using protocols and procedures specifically developed for these measurements. <u>It is recommended that USEPA and ASEPA replace turbidity measurements with light intensity measurements, accept analytical laboratory results outside of the normal holding time, or continue to consider the results using the bench top meter (HACH 2600Q) with a correction curve generated using ultra-low turbidity standards.</u>

- The ASWQS criteria for TN is often near and below the typical limit of laboratory analyses. Furthermore, recent results have indicated that the values reported at these low levels are sensitive to the analytical methods employed. Based on the analytical results from samples collected during many previous sampling events it is recommended that ASPA, ASEPA, and USEPA discuss and develop an approach that would provide more definitive assessments of compliance and appropriate environmental protection levels for these parameters. The recently adopted and approved revisions to the ASWQS appear to address this in part. <u>However, additional review of the ASWQS for nutrients, considering the limited data on which they were developed, is suggested.</u>

Prior reports included the following recommendation: To better assess the possible impacts of the discharge, samples from an additional farfield station, located in the range of 1,000 meters offshore

of the Tafuna outfall stations, might be considered. This would allow ASPA to provide more information to USEPA and ASEPA to consider changing the location of the existing reference station in the next permit cycle to a location farther offshore to better represent background conditions.

To evaluate the value of monitoring the water quality at a farfield station, Station FF, located 1000 meters offshore the diffuser was included in the sampling and analysis for the March 2018 sampling. The sampling at the Station FF included sampling and analysis for TN, TP, and chlorophyll *a*. The farfield station results compared well with the other stations located in the immediate near-shore area closest to the outfall

Table 5.
Evaluation of NPDES Permit Compliance
Tafuna WWTP Receiving Water Quality
March 2018 Sampling

Parameter	Permit Condition *The discharge shall not cause:*	Compliance Evaluation
Part A.2. The discharge shall be substantially free from:		
Narrative	a. Objectionable color, odor, or taste.	Compliance with permit requirements observed during sampling of receiving water.
	b. Visible floating material, grease, oil, scum, foam.	
	c. Materials that will produce visible turbidity or form objectionable deposits.	
	d. Materials toxic to humans or aquatic life or produce undesirable aquatic life.	
Part A.3 The discharge shall not cause		
Temperature	a. The temperature in the receiving water to deviate more than 1.5º Fahrenheit from conditions which would occur naturally, to fluctuate more than 1º Fahrenheit on an hourly basis, or to exceed 85º Fahrenheit due to the influence of other than natural causes.	Compliance demonstrated.
Hydrography	b. Changes in basin geometry or freshwater inflow that will alter current patterns in such a way as to adversely affect existing biological populations or sediment distribution in the receiving water.	Compliance demonstrated. Based on salinity, no effects of the discharge are observed or expected.
Turbidity	c. The average turbidity in the receiving water at and beyond the Zone of Initial Dilution to exceed 0.25 NTU.	Compliance demonstrated. Significant influence of the plume was not observed.
Phosphorus	d. The average total phosphorous in the receiving water at and beyond the Zone of Initial Dilution to exceed 15 μg/L.	Compliance demonstrated.
Nitrogen	e. The average total nitrogen in the receiving water at and beyond the Zone of Initial Dilution to exceed 130 μg/L.	Compliance demonstrated.
Chlorophyll *a*	f. The average chlorophyll a in the receiving water at and beyond the Zone of Initial Dilution not to exceed 0.25 μg/L.	Compliance demonstrated.
Light Penetration	g. The light penetration depth in the receiving water at and beyond the Zone of Initial Dilution to not exceed 130 ft. 50 percent of the time.	Compliance demonstrated (see text for discussion).
Dissolved Oxygen	h. A dissolved oxygen content in the receiving water at and beyond the Zone of Initial Dilution less than 80% saturation, or less than 5.5 mg/L.	Compliance demonstrated.
pH	i. The pH in the receiving water at and beyond the Zone of Initial Dilution to be neither less than 6.5 nor greater than 8.6 and to not to deviate more than 0.2 pH units from that which occurs naturally.	Compliance demonstrated.
Bacteria	j. Enterococci density (concentration) in the receiving water at and beyond the Zone of Mixing to exceed a geometric mean of 35 CFU/l00 ml steady state geometric mean, nor any single sample to exceed 124 CFU/100 ml.	Compliance demonstrated.

SUPPLEMENTAL DATA

Sampling Station Occupation: Times, Depths, and Weather Observations

Water Quality Station Occupation Descriptions
JCO and Utulei Pago Pago Harbor and Tafuna Ocean Receiving Water Quality Monitoring
2018 Non-tradewind Season Sampling: March and May 2018

Time[1]	Station	Water Depth (feet)	Sample Depth[2] (feet)	Weather Conditions					Notes
				Sky	Rain	Wind Speed and Direction (knots)[3]	Wind Waves (feet) and Direction[4]	Swell (feet) and Direction[4]	
Water Quality Sampling (Grab Samples) – March 11, 2018									
08:33 – 08:35	13	24	3, 20	Sunny	--	7 E	<0.5 E	0	a
09:05 – 09:06	15	165	3, 60, 120	Partly Cloudy	--	9 SE	0.5 – 1.0 SE	1 – 2 S	a
09:28 – 09:29	C	154	3, 60, 120	Partly Cloudy	--	5 SE	0.5 – 1.0 SE	0	a
09:50 – 10:14	A1	152	3, 60, 120	Partly Cloudy	--	13 SE	0.5 – 1.0 SE	1 – 2 S	a
10:21 – 10:23	U	148	3, 60, 120	Partly Cloudy	--	13 SE	1 SSE	1 – 2 S	b
10:39 – 10:39	B1	180	3, 60, 120	Partly Cloudy	--	15 ESE	1 SE	1 SE	a
11:06 – 11:10	XFF	209	3, 60, 120	Partly Cloudy	--	14 ESE	2 – 3 SE	2 – 4 SE	a
11:30 – 11:32	FF	281	3, 60, 120	Partly Cloudy	--	12 ESE	1 – 2 SE	2 – 4 SE	a
11:50 – 11:52	18	191	3, 60, 120	Partly Cloudy	--	7 ESE	1 SE	1 SE	a
14:45 – 14:47	S8	190	3, 60, 120	Mostly Cloudy	--	6 SE	0.5 – 1 SE	1 – 2 S	a
15:03 – 15:04	S8A	170	3, 60, 120	Mostly Sunny	--	6 SE	0.5 – 1 SE	1 – 2 S	a
Water Quality Sampling (Grab Samples) – March 12, 2018									
07:25 – 07:26	TC	98	3, 45, 90	Mostly Sunny	--	15 ESE	1 SE	4 – 6 SE	a
07:44 – 07:45	TA1	95	3, 45, 90	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:02 – 08:03	TA2	93	3, 45, 80	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:18 – 08:19	TB	50	3, 25, 50	Mostly Sunny	--	9 ESE	1 SE	3 – 4 SE	a
08:38 – 08:40	TFF	1410	3, 45, 90	Mostly Sunny	--	12 E	1 SE	4 – 6 SE	a
12:35 – 12:37	5	130	3, 60, 120	Partly Cloudy	--	12 SE	1 SE	2 – 4 SE	a
13:21 – 13:23	16	193	3, 60, 120	Partly Cloudy	--	11 SE	0.5 SE	<1 SE	a
13:41 – 13:42	8	190	3, 60, 120	Partly Cloudy	--	9 SE	<0.5 SE	1 SE	a
14:01 – 14:03	14	175	3, 60, 120	Partly Sunny	--	12 SE	<0.5 SE	< 0.5 SE	a
14:18 – 14:20	8A	171	3, 60, 120	Mostly Sunny	--	9 SE	<0.5 SE	< 0.5 SE	a
Water Quality Sampling (Grab Samples) – May 8, 2018									
14:27 – 14:32	16-1	192	3, 60, 120	Mostly Cloudy	Drizzle	0 – 5 SE	<0.5 SE	1 – 3 S	a, c
14:09 – 14:12	5-1	126	3, 60, 120	Mostly Cloudy	--	8 E	1 SE	1 – 3 SSE	a, c
Water Quality Sampling (Grab Samples) – May 9, 2018									
08:06 – 08:06	13-2	26	3, 20	Mostly Cloudy	--	0	0	0	a, c
08:34 – 08:36	15-2	168	3, 60, 120	Overcast	--	0	0	1 – 2 S	a, c
08:55 – 08:58	16-2A	193	3, 60, 120	Overcast	Lt - Med	7 SE	<0.5 SE	1 – 3 S	a, c
09:14 - 0916	18-2	190	3, 60, 120	Overcast	Lt	4 SSE	<0.5 SE	1 – 2 S	a, c
09:40 – 09:43	FF-2	282	3, 60, 120	Overcast	Drizzle	4 S	1 S	2 – 3 SSE	a, c
10:02 – 10:05	5-2A	128	3, 60, 120	Overcast	Lt - Med	0	<0.5 SE	1 – 3 S	a, c
14:39 – 14:31	16-2P	193	3, 60, 120	Overcast	--	0	0	1 – 3 S	a, c
15:01 – 15:14	5-2P	129	3, 60, 120	Overcast	--	0	0	1 – 3 SSE	a, c
Water Quality Sampling (Grab Samples) – May 10, 2018									
07:10 – 07:13	16-3	192	3, 60, 120	Overcast	--	17 SSE	1 SSE	1 – 4 S	a, c
07:32 – 07:38	5-3	135	3, 60, 120	Partly Sunny	--	17 SSE	1 -2 SSE	3 -7 SSE	a, c

Water Quality Station Occupation Descriptions
JCO and Utulei Pago Pago Harbor and Tafuna Ocean Receiving Water Quality Monitoring
2018 Non-tradewind Season Sampling: March and May 2018

Time[1]	Station	Water Depth (feet)	Sample Depth[2] (feet)	Weather Conditions					Notes
				Sky	Rain	Wind Speed and Direction (knots)[3]	Wind Waves (feet) and Direction[4]	Swell (feet) and Direction[4]	
Secchi Depth – March 11, 2018									
08:37	13	24	17	Sunny	--	7 E	<0.5 E	0	
09:11	15	165	41	Partly Cloudy	--	9 SE	0.5 – 1.0 SE	1 – 2 S	
09:31	C	154	59	Partly Cloudy	--	5 SE	0.5 – 1.0 SE	0	
09:52	A1	152	53	Partly Cloudy	--	13 SE	0.5 – 1.0 SE	1 – 2 S	
10:23	U	148	42	Partly Cloudy	--	13 SE	1 SSE	1 – 2 S	
10:41	B1	180	41	Partly Cloudy	--	15 ESE	1 SE	1 SE	
11:09	XFF	209	68	Partly Cloudy	--	14 ESE	2 – 3 SE	2 – 4 SE	
11:34	FF	281	54	Partly Cloudy	--	12 ESE	1 – 2 SE	2 – 4 SE	
11:52	18	191	37	Partly Cloudy	--	7 ESE	1 SE	1 SE	
14:45	S8	190	42	Mostly Cloudy	--	6 SE	0.5 – 1 SE	1 – 2 S	d
15:03	S8A	170	44	Mostly Sunny	--	6 SE	0.5 – 1 SE	1 – 2 S	d
Secchi Depth – March 12, 2018									
07:27	TC	98	68	Mostly Sunny	--	15 ESE	1 SE	4 – 6 SE	
07:49	TA1	95	64	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	
08:03	TA2	93	65	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	
08:20	TB	50	50	Mostly Sunny	--	9 ESE	1 SE	3 – 4 SE	
08:41	TFF	1410	85	Mostly Sunny	--	12 E	1 SE	4 – 6 SE	
12:38	5	130	52	Partly Cloudy	--	12 SE	1 SE	2 – 4 SE	
13:06	5	129	48	Partly Cloudy	--	12 SE	1 SE	2 – 4 SE	e
13:20	16	191	44	Partly Cloudy	--	11 SE	0.5 SE	<1 SE	e
13:23	16	193	47	Partly Cloudy	--	11 SE	0.5 SE	<1 SE	
13:43	8	190	47	Mostly Sunny	--	9 SE	<0.5 SE	<0.5 SE	
14:05	14	175	29	Partly Sunny	--	12 SE	<0.5 SE	< 0.5 SE	
14:22	8A	171	44	Mostly Sunny	--	9 SE	<0.5 SE	< 0.5 SE	
14:49	8A	172	42	Partly Sunny	--	9 SE	<0.5 SE	< 0.5 SE	e
15:00	14	176	19	Mostly Cloudy	Lt - Med	12 SE	<0.5 SE	< 0.5 SE	e
15:13	8	190	47	Partly Sunny	--	Calm	0	<0.5 SE	e
15:25	14	176	35	Mostly Sunny	--	4 SE	<0.5 SE	<0.5 SE	f
Light Penetration – March 12, 2017									
13:00 – 13:05	5	129	65 feet for 5 minutes	Partly Cloudy	--	12 SE	1 SE	2 – 4 SE	
13:14 – 13:19	16	191		Partly Cloudy	--	11 SE	0.5 SE	< 1 SE	
14:42 – 14:48	8A	172		Partly Cloudy	--	9 SE	<0.5 SE	<0.5 SE	
14:54 – 14:59	14	176		Mostly Cloudy	Lt - Med	12 SE	<0.5 SE	<0.5 SE	
15:06 – 15:12	8	190		Mostly Cloudy	--	Calm	0	<0.5 SE	
15:19 – 15:24	14	176		Mostly Sunny	--	4 SE	<0.5 SE	<0.5 SE	g

Water Quality Station Occupation Descriptions
JCO and Utulei Pago Pago Harbor and Tafuna Ocean Receiving Water Quality Monitoring
2018 Non-tradewind Season Sampling: March and May 2018

Time[1]	Station	Water Depth (feet)	Sample Depth[2] (feet)	Weather Conditions					Notes
				Sky	Rain	Wind Speed and Direction (knots)[3]	Wind Waves (feet) and Direction[4]	Swell (feet) and Direction[4]	
Vertical Profiles – March 11, 2018									
08:45	13	24	--	Sunny	--	7 E	<0.5 E	0	h
09:16	15	162	160	Partly Cloudy	--	9 SE	0.5 – 1.0 SE	1 – 2 S	a
09:42	C	154	142	Partly Cloudy	--	5 SE	0.5 – 1.0 SE	0	a
10:05	A1	151	120	Partly Cloudy	--	13 SE	0.5 – 1.0 SE	1 – 2 S	a
10:36	U	170	120	Partly Cloudy	--	13 SE	1 SSE	1 – 2 S	b
10:50	B1	190	120	Partly Cloudy	--	15 ESE	1 SE	1 SE	a
11:18	XFF	233	180	Partly Cloudy	--	14 ESE	2 – 3 SE	2 – 4 SE	a
11:38	FF	279	180	Partly Cloudy	--	12 ESE	1 – 2 SE	2 – 4 SE	a
11:57	18	191	180	Partly Cloudy	--	7 ESE	1 SE	1 SE	a
14:53	S8	192	180	Mostly Cloudy	--	6 SE	0.5 – 1 SE	1 – 2 S	a, d
15:12	S8A	174	170	Mostly Sunny	--	6 SE	0.5 – 1 SE	1 – 2 S	a, d, i
Vertical Profiles – March 12, 2018									
07:39	TC	102	90	Mostly Sunny	--	15 ESE	1 SE	4 – 6 SE	a
07:58	TA1	92	90	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:15	TA2	97	90	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:31	TB	53	50	Mostly Sunny	--	9 ESE	1 SE	3 – 4 SE	a
08:48	TFF	1470	90	Mostly Sunny	--	12 E	1 SE	4 – 6 SE	a
12:51	5	130	120	Partly Cloudy	--	12 SE	1 SE	2 – 4 SE	a
13:33	16	193	180	Partly Cloudy	--	11 SE	0.5 SE	<1 SE	a
13:50	8	190	180	Mostly Sunny	--	9 SE	<0.5 SE	1 SE	a
14:13	14	178	175	Partly Sunny	--	12 SE	<0.5 SE	< 0.5 SE	a
14:29	8A	173	170	Mostly Sunny	--	9 SE	<0.5 SE	< 0.5 SE	a
Vertical Profiles – May 8, 2018									
14:19	5-1	126	120	Mostly Cloudy	--	8 E	1 SE	1 – 3 SSE	a, c
14:40	16-1	192	180	Mostly Cloudy	Drizzle	0 – 5 SE	<0.5 SE	1 – 3 S	a, c
Vertical Profiles – May 9, 2018									
08:18	13-2	25	20	Mostly Cloudy	--	0	0	0	a, c
08:42	15-2	168	160	Overcast	--	0	0	1 – 2 S	a, c
09:00	16-2A	192	180	Overcast	Lt - Med	7 SE	<0.5 SE	1 – 3 S	a, c
09:23	18-2	190	180	Overcast	Lt	4 SSE	<0.5 SE	1 – 2 S	a, c
09:48	FF-2	282	180	Overcast	Drizzle	4 S	1 S	2 – 3 SSE	a, c
10:10	5-2A	128	120	Overcast	Lt - Med	0	<0.5 SE	1 – 3 S	a, c
14:45	16-2P	193	180	Overcast	--	0	0	1 – 3 S	a, c
15:16	5-2P	129	120	Overcast	--	0	0	1 – 3 SSE	a, c
Vertical Profiles – May 10, 2018									
07:15	16-3	192	180	Overcast	--	17 SSE	1 SSE	1 – 4 S	a, c
07:47	5-3	135	120	Partly Sunny	--	17 SSE	1 -2 SSE	3 -7 SSE	a, c

Water Quality Station Occupation Descriptions
JCO and Utulei Pago Pago Harbor and Tafuna Ocean Receiving Water Quality Monitoring
2018 Non-tradewind Season Sampling: March and May 2018

Time[1]	Station	Water Depth (feet)	Sample Depth[2] (feet)	Weather Conditions					Notes
				Sky	Rain	Wind Speed and Direction (knots)[3]	Wind Waves (feet) and Direction[4]	Swell (feet) and Direction[4]	
Enterococcus Sampling[5] – March 12, 2018									
07:25 – 07:26	TC	98	3, 45, 90	Mostly Sunny	--	15 ESE	1 SE	4 – 6 SE	a
07:44 – 07:45	TA1	95	3, 45, 90	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:02 – 08:03	TA2	93	3, 45, 80	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:18 – 08:19	TB	50	3, 25, 50	Mostly Sunny	--	9 ESE	1 SE	3 – 4 SE	a
09:18 – 09:20	18	191	3, 60, 120	Partly Cloudy	--	7 E	0	1 S	a
09:26 – 09:26	16	193	3, 60, 120	Partly Cloudy	--	7 E	0	1 S	a
09:31 – 09:32	B1	184	3, 60, 120	Partly Cloudy	--	11 E	<0.5 SE	1 S	a
09:40 – 09:40	A1	146	3, 60, 120	Partly Cloudy	--	12 SE	0	<0.5 S	a
09:46 – 09:46	C	154	3, 60, 120	Partly Cloudy	--	10 E	<0.5 SE	<1 SE	a
Utulei Sediment Sampling – March 11, 2018									
14:02	C	151	151	Mostly Sunny	--	11 SE	<0.5 SE	1 – 2 S	
14:20	B	184	184	Mostly Sunny	--	10 SE	0.5 - 1 SE	1 – 2 S	
14:30	OH-4	205	205	Partly Cloudy	--	9 SE	0.5 - 1SE	1 – 2 S	

[1] Water quality times are start and end of grab sample collection. Profile times are start times of profiler. Light penetration times are time that instruments were at required depth.

[2] Water samples were collected at 3, 60, and 120 feet below the surface unless otherwise indicated. Depth listed under vertical profiles is the depth of the cast. Depth under Secchi depth is the measured Secchi depth.

[3] Measured with hand held gage on deck. Wind gusts were often higher.

[4] Based on visual observation and estimates.

[5] Equipment blanks were sampled at the boat dock prior to departure.

NOTES:

a. No observed effluent derived odor, taste, floatables, grease, oil, scum, or foam.

b. Apparent surface expression of plume: no color, no odor, clear water.

c. Station designators -1, -2, -3, indicate different days for supplementary May 2018 sampling. Station designators -2A and -2P indicate morning and afternoon samples at the same station for the May 2018 Supplementary sampling.

d. Same as Stations 8 and 8A. Only sampled for supplemental parameters on March 11, 2018.

e. Second Secchi depth obtained during light penetration measurements.

f. Third Secchi depth done during repeat of light penetration measurements.

g. Repeated light penetration measurement.

h. No vertical profile, in situ measurements made at grab sample depths.

i. Upcast only logged at Station S8A.

Bacteria Data

American Samoa EPA Water Quality L ratory, Analytical Results for REQUESTS

Enterococci by Fluorogenic Substrate (Enterolert) Method

Sample Date:	Record of Sample Receipt											
	Relinquished by:_____ / _____ Date/Time:_____ / _____ Received by:_____ / _____ Date/Time:_____ / _____											
		Sample Collection	Incubation (41 +/- 0.5 °C)				*Enterococci* Results:					
Sample Site	Description		Start		End (24 +/- 28 hrs)		No. of Fluorescent		Quanti-Tray 2000 Results			
		Time	Date	Time	Date	Time	Large Wells	Small Wells	Table MPN	x 10	Actual MPN	
EB-1			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
EB-2			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
EB-3			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
IW-M			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
IW-B			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
IW-S			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
IB-B			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
IB-M			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
IB-S			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
BI-B			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
BI-S			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
TAI-B			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
TAI-M			03·12·18	1438	03·12·18	1438	0	0	0	x 10	0	
TAI-S			03·12·18	1438	03·12·19	1438	0	0	0	x 10	0	
TB-M			03·12·18	1438	03·12·19	1438	0	0	0	x 10	0	
TB-B			03·12·18	1438	03·12·19	1438	0	0	0	x 10	0	
TB-S			03·12·18	1438	03·12·19	1438	0	0	0	x 10	0	
		DI	~~03·12·18~~ 03·12·18	1438						x 10		

*Criteria: Enterolert® must be completely dissolved prior to incubation.
For sample results to be acceptable, QC results must be as follows: Positive Control Results = (+/+) and Negative Control Results = (-/-).

Lab Analysts: Dayster / Kino Expected Read Out Date/Time: 06·18·18 / 1438 Read Out Analyst: Dayster/Kino /JM

Enterolert® Media: Lot #: HN820 Expiration Date: 23 SEP 2018 Date Approved by Lab Manager: _____ Initials: _____

Last updated: 12/2/2016 (by: JT) THIS RECORD TO BE RETAINED FOR 5 YEARS

American Samoa EPA Water Quality L[illegible]ratory, Analytical Results for REQUESTS
Enterococci by Fluorogenic Substrate (Enterolert) Method

Sample Date:	Record of Sample Receipt Relinquished by:_____/____ Date/Time:_____/____ Received by:_____/____ Date/Time:_____/____											
Sample Site	Description	Sample Collection Time	Incubation (41 +/- 0.5 °C) Start Date	Start Time	End (24 - 28 hrs) Date	End Time	*Enterococci* Results: No. of Fluorescent Large Wells	Small Wells	Quanti-Tray 2000 Results: Table MPN	x 10	Actual MPN
TA2-B			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
TA2-S			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
TA2-M			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
C-S			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
C-M			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
C-B			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
A1-S			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
A1-M			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
A1-B			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
TC-M			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
TC-S			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
TC-B			03·12·18	1438	03·13·18	1438	0	0	0	x 10	0
										x 10	
										x 10	
										x 10	
										x 10	
										x 10	
										x 10	
										x 10	

*Criteria: Enterolert® must be completely dissolved prior to incubation.
For sample results to be acceptable, QC results must be as follows: Positive Control Results = (+/+) and Negative Control Results = (-/-).

Lab Analysts: Daystar / Kimo Expected Read Out Date/Time: 03·13·18 / 1438 Read Out Analyst: Daystar/Kimo / IM

Enterolert® Media: Lot #: HN820 Expiration Date: 27SEP2018 Date Approved by Lab Manager: _____ Initials: ____

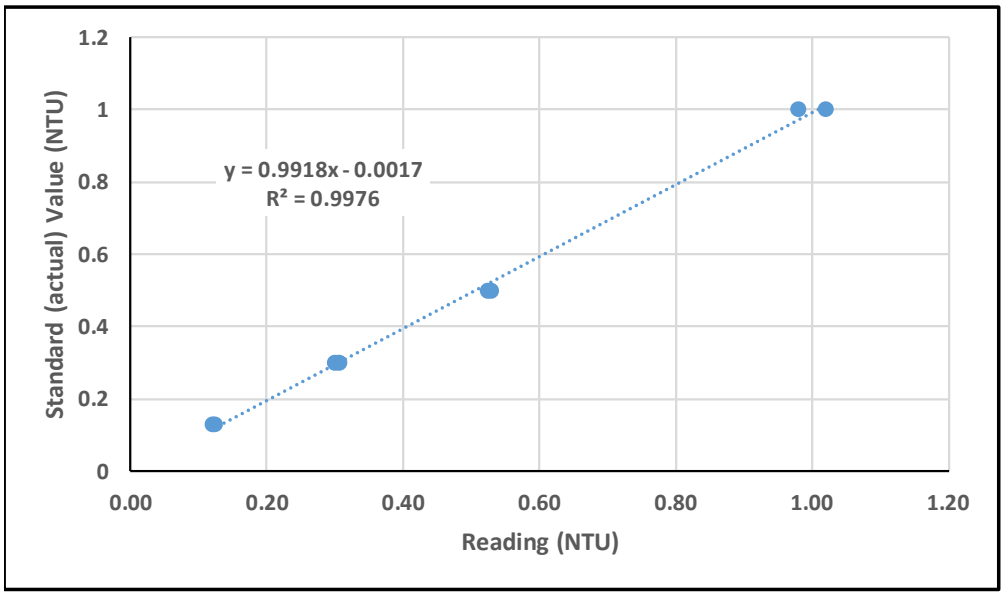
Last updated: 12/2/2016 (by: JT) THIS RECORD TO BE RETAINED FOR 5 YEARS

Sonde Sensor Calibration

YSI EXO Sonde Sensor Calibration Summary March 2018						
Parameter	**Date**	**Time**	**Standard**	**Pre-Calibration Reading**	**Post-calibration Reading**	**QC**
Depth (m)	3/11/18	08:33	0.0	0.06	0.00	OK
DO (% Sat)	3/10/18	16:01	Sat. Air	96.2	98.9	OK
	3/11/18	08:32	Sat. Air	102.2	99.8	OK
	3/11/18	16:23	Sat. Air	98.0	98.8	OK
	3/12/18	07:01	Sat. Air	100.4	99.8	OK
	3/12/18	12:44	Sat. Air	100.4	99.8	OK
	3/12/18	16:10	Sat. Air	94.4	98.8	OK
	3/12/18	16:27	Sat. Air	98.6	98.9	OK
pH (SU)	3/10/18	16:14	7.00	6.90	6.97	OK
			10.00	9.97	10.00	
	3/11/18	16:31	7.00	7.07	6.98	OK
			10.00	10.09	10.00	
	3/12/18	16:24	7.00	7.03	7.04	OK
			10.00	10.02	10.00	
Specific Conductivity (µS/cm)	3/10/18	16:04	53000	52977	53005	OK
	3/11/18	16:25	53000	52658	53022	OK
	3/12/18	16:16	53000	53586	52999	OK

Turbidity Data and Calibration

Turbidity Calibration (NTU)						
Standard	**Date**	**Time**	**Rep1**	**Rep2**	**Rep3**	**Average**
Pre-measurement Calibration						
0.129±0.006	3/13/2018	8:15	0.12	0.12	0.12	0.12
0.3		8:18	0.31	0.3	0.31	0.31
0.5		8:21	0.53	0.52	0.52	0.52
1		8:26	0.98	0.98	0.98	0.98
Post-measurement Calibration						
0.129±0.006	3/13/2018	12:14	0.12	0.12	0.13	0.12
0.3		12:17	0.30	0.30	0.30	0.30
0.5		12:21	0.53	0.53	0.53	0.53
1		12:25	1.02	1.02	1.02	1.02



Turbidity Measurements - March 2018							
Station	**Analysis Date and Time**		**Rep 1**	**Rep 2**	**Rep 3**	**Average**	**Corrected***
Utulei Stations							
C-S	3/13/2018	8:37	0.26	0.26	0.26	0.26	0.26
C-M	3/13/2018	8:40	0.35	0.35	0.35	0.35	0.35
C-B	3/13/2018	8:43	0.38	0.38	0.37	0.37	0.37
A1-S	3/13/2018	8:45	0.29	0.29	0.29	0.29	0.29
A1-M	3/13/2018	8:48	0.35	0.36	0.36	0.36	0.36
A1-B	3/13/2018	8:54	0.23	0.23	0.23	0.23	0.23
U-S	3/13/2018	8:58	0.28	0.28	0.28	0.28	0.28
U-M	3/13/2018	9:00	0.28	0.27	0.27	0.27	0.27
U-B	3/13/2018	9:05	0.34	0.34	0.33	0.33	0.33
B1-S	3/13/2018	9:11	0.28	0.27	0.27	0.27	0.27
B1-M	3/13/2018	9:15	0.33	0.33	0.32	0.32	0.32
B1-B	3/13/2018	9:17	0.31	0.32	0.32	0.32	0.32
XFF-S	3/13/2018	9:23	0.18	0.18	0.17	0.17	0.17
XFF-M	3/13/2018	9:29	0.13	0.13	0.12	0.12	0.12
XFF-B	3/13/2018	9:35	0.21	0.20	0.21	0.21	0.21
FF-S	3/13/2018	9:38	0.16	0.15	0.16	0.16	0.16
FF-M	3/13/2018	9:41	0.13	0.13	0.13	0.13	0.13
FF-B	3/13/2018	9:43	0.16	0.17	0.16	0.16	0.16
5-S	3/13/2018	11:42	0.21	0.21	0.21	0.21	0.21
5-M	3/13/2018	11:45	0.33	0.33	0.33	0.33	0.33
5-B	3/13/2018	11:47	0.23	0.23	0.23	0.23	0.23
16-S	3/13/2018	11:49	0.28	0.28	0.28	0.28	0.28
16-M	3/13/2018	11:51	0.23	0.23	0.23	0.23	0.23
16-B	3/13/2018	11:54	0.30	0.30	0.30	0.30	0.30
18-S	3/13/2018	9:45	0.21	0.21	0.21	0.21	0.21
18-M	3/13/2018	9:48	0.23	0.23	0.23	0.23	0.23
18-B	3/13/2018	9:50	0.22	0.23	0.22	0.22	0.22
Tafuna Stations							
TC-S	3/13/2018	10:58	0.16	0.15	0.16	0.16	0.16
TC-M	3/13/2018	11:02	0.10	0.10	0.10	0.10	0.10
TC-B	3/13/2018	11:04	0.13	0.13	0.13	0.13	0.13
TA1-S	3/13/2018	11:06	0.21	0.21	0.21	0.21	0.21
TA1-M	3/13/2018	11:09	0.13	0.13	0.14	0.14	0.14
TA1-B	3/13/2018	11:11	0.17	0.17	0.17	0.17	0.17
TA2-S	3/13/2018	11:15	0.30	0.30	0.30	0.30	0.30
TA2-M	3/13/2018	11:18	0.14	0.14	0.14	0.14	0.14
TA2-B	3/13/2018	11:20	0.20	0.20	0.20	0.20	0.20
TB-S	3/13/2018	11:22	0.17	0.17	0.17	0.17	0.17
TB-M	3/13/2018	11:25	0.17	0.17	0.17	0.17	0.17
TB-B	3/13/2018	11:32	0.35	0.32	0.35	0.35	0.35
TFF-S	3/13/2018	11:35	0.14	0.14	0.14	0.14	0.14
TFF-M	3/13/2018	11:37	0.13	0.13	0.13	0.13	0.13
TFF-B	3/13/2018	11:40	0.15	0.15	0.15	0.15	0.15
S = near-surface sample							
M= mid-depth sample							
B = near-bottom sample							
* Corrected using secondary calibration curve							

Attachments Provided on CD-ROM

ATTACHMENT 1: Laboratory Results – Chemistry Analyses

Attacment 1.A ALS Environmental Laboratory Report

Attachment 1.B Enthalpy Analytical Laboratory Report (TKN)

APPENDIX D-3
UTULEI RECEIVING WATER REPORT (2018)

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UTULEI WWTP RECEIVING WATER QUALITY MONITORING REPORT

2018 Non-tradewind Season
March 2018

Prepared for:

American Samoa Power Authority
Utulei Wastewater Treatment Plant
NPDES Permit AS0020001

Submitted to:

U.S. Environmental Protection Agency
and
American Samoa Environmental Protection Agency

Prepared by:

gdc

glatzel da costa (**gdc**)
P.O. Box 1238
Trinidad, CA 95570

July 3, 2018

gdc

COASTAL ENVIRONMENTAL ANALYSTS

July 3, 2018

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Christianera Tuitele
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Protection Agency
American Samoa Government
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RE: Utulei WWTP Receiving Water Quality Monitoring – March 2018 Sampling

Enclosed is the receiving water quality monitoring report for ASPA's Utulei WWTP. The report is for the 2018 Non-tradewind Season sampling done in March 2018. The sampling and analysis were carried out without problems for all required stations and parameters.

Please contact us if you have any questions or comments on the enclosed report.

Sincerely,

Karen A. Glatzel

Karen A. Glatzel

Enclosure: Utulei WWTP March 2018 (18.NT) Receiving Water Quality Monitoring Report with Attachments on CD-ROM

Copies with enclosure: Fa'i Mareko/ASPA
Pascal Mues/USEPA

Electronic Copy w/o CD ROM: Willian Spitzenberg/ASPA
Jewel Potoae/ASEPA
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TECHNICAL MEMORANDUM gdc

UTULEI WWTP RECEIVING WATER QUALITY MONITORING MARCH 2018 SAMPLING

Prepared For: American Samoa Power Authority Utulei WWTP
(NPDES Permit No. AS0020001)

Prepared By: gdc, PO. Box 1238, Trinidad, CA 95570
707-677-0123 – glatzeldacosta@suddenlink.net

Date: July 3, 2018

Distribution: Michael Wolfram
United States Environmental Protection Agency, Region 9
Christianera Tuitele
American Samoa Environmental Protection Agency

SUMMARY

The required semi-annual receiving water monitoring for the Utulei wastewater treatment plant outfall was conducted in March 2018. All stations and parameters were sampled as required. The results of the sampling and analyses indicate compliance with all the National Pollutant Discharge Elimination System (NPDES) permit required conditions, which are based on the American Samoa Water Quality Standards (ASWQS) criteria for specific parameters. No influence of the discharge was detected at or beyond the zone of mixing.

PURPOSE

This Technical Memorandum (TM) presents the results of the Pago Pago Harbor receiving water quality monitoring conducted for the American Samoa Power Authority (ASPA) Utulei Wastewater Treatment plant (WWTP) in March 2018. The sampling and analysis is required semi-annually under the National Pollutant Discharge Elimination System (NPDES) Permit No. AS0020001. This report documents the first of two sampling events to be conducted in 2018. The sampling and analysis conducted included all permit required stations and parameters.

STATION LOCATIONS

Part E of the NPDES permit specifies the sampling locations, depths, and parameters for analysis for the receiving water quality monitoring stations. In 2002, subsequent to issuing the NPDES Permit, the U.S. Environmental Protection Agency (USEPA) and the American Samoa Environmental Protection Agency (ASEPA) reconsidered the specified monitoring requirements and changed the number and location of stations, as well as the sampling seasons. These changes were designed to allow coordination between ASPA and the tuna canneries (StarKist Samoa and COS Samoa Packing[1]) in conducting their respective receiving water monitoring, and to provide a more comprehensive approach to water quality monitoring in Pago Pago Harbor. Some of the ASPA stations were relocated[2] to facilitate use of common farfield and reference stations in the two sampling programs. Stations occupied, sampled, and reported in this TM are shown in Figure 1, with the exceptions noted below.

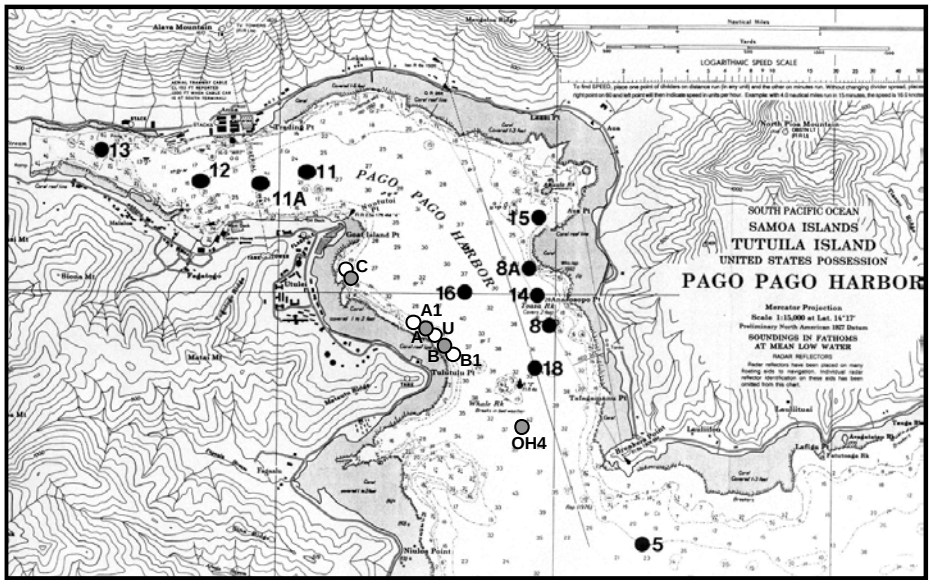


Figure 1. Water Quality Sampling Station Locations

(Stations A1, B1, U, C, 16, 18, and 5 were sampled for water quality)
(Stations A, C, and OH4 were sampled for sediment quality)

[1] The COS Samoa Packing facility and the associated NPDES permit have been transferred to Samoa Tuna Processors, Inc.

[2] The rationale for changes in station locations was described in previous monitoring reports.

The original and revised sampling stations are shown in Table 1. The diffuser (Station U) was previously located by finding the discharge plume using a fathometer and subsequently verified during diver inspection of the outfall. The coordinates of this location were recorded using a GPS unit. The locations of Stations A1, B1 and C were determined by calculating the latitude and longitude relative to Station U based on the physical descriptions given in Section E.1.a of the NPDES Permit. Stations 16, and 5[3] are established stations shared with the tuna canneries' monitoring program.

Additional stations offshore of the Pago Pago Harbor mouth (Stations FF[4], and XFF) was established during the February 2016 and November 2017 sampling episodes, respectively. These stations were sampled to provide additional information concerning the water quality of the adjacent coastal waters. These stations are *not* shown in Figure 1, and are approximately 2500 meters and 3500 meters offshore of the Harbor entrance, respectively.

Table 1
Utulei WWTP Station Locations and Parameters as Specified in NPDES Permit

Monitoring Stations	Vicinity	Latitude	Longitude	Parameters Sampled April 22017						
				TN	TP	CLa	E	HP	Narr	SD (ft)
FF[1]	Offshore	S14º18.862'	W170º39.963'	X	X	X		X		54 (PC)
XFF[2]	Offshore	S14º19.253'	W170º39.354'	X	X	X		X		68 (PC)
5	Reference	S14º17.701'	W170º'39.778'	X	X	X		X	X	52 (PC)
U	Diffuser	S14º16.945'	W170º40.532'	X	X	X		X	X	42 (PC)
A1	Zone of Mixing	S14º16.999'	W170º40.470'	X	X	X	X	X	X	53 (PC)
B1		S14º17.088'	W170º40.416'	X	X	X	X	X	X	41 (PC)
C	Farfield	S14º16.766'	W170º40.820'	X	X	X	X	X	X	59 (PC)
16		S14º16.884'	W170º40.358'	X	X	X	X	X	X	47 (PC)
18		S14º17.118'	W170º40.140'	X	X	X	X	X	X	37 (PC)

TN = Total Nitrogen, TP = Total Phosphorus. CLa = Chlorophyll *a*, E = *Enterococcus*
HP = Hydrographic Parameters (temperature, salinity, dissolved oxygen, and pH)
Narr = Narrative Parameters (visible floating materials, grease, oil, scum or foam)
SD = Secchi Depth (feet) measured on 11 and 12 March 2018; PC=partly cloudy; MS= mostly sunny
[1] Station FF is not a permit required station and is an offshore station approximately 2.5 km from the Harbor entrance.
[2] Station XFF is not a permit required station and is an offshore station approximately 3.5 km from the Harbor entrance.

Original and Revised Permit Required Utulei WWTP Receiving Water Monitoring Stations

Original Stations	Revised Stations
Water Sampling Stations	
A1 (Zone of Mixing) *	A1 (Zone of Mixing) *
B1 (Zone of Mixing) *	B1 (Zone of Mixing) *
A (Zone of Initial Dilution)**	U (Diffuser Mid-point)
B (Zone of Initial Dilution)**	U (Diffuser Mid-point)
C (Farfield) *	C (Farfield) *
D (Farfield) *	16 & 18 (Farfield-Canneries Permit) *
OH-4 (Reference) *	5 (Reference-Canneries Permit)

* Designates bacteria sampling stations
** Alternating for each annual non-tradewind sediment-sampling period.

[3] Station 5 is referred to as Station JCO5 in some data reports to avoid confusion because certain parameters are collected for other projects.
[4] Station FF is referred to as Station JCOFF in some data reports to avoid confusion because certain parameters are collected for other projects and at other locations with the same designator.

SAMPLING CONDITIONS AND METHODS

Table 1 indicates the latitude and longitude of the stations as recorded and occupied at the time of sampling. Secchi depths were taken at each water quality station and are included in Table 1. Secchi depths ranged from 37 to 59 feet for the Harbor stations and 52 to 68 feet offshore of the Harbor. A summary of sampling times and weather conditions during the times of receiving water quality sampling is provided in the Supplementary Data Section at the end of this Technical Memorandum.

Receiving water quality sampling and measurements were conducted on 11 and 12 March 2018. Bacteria samples were collected during the morning of 12 March 2018 and the samples were delivered to the ASEPA laboratory before 11:00 AM. Table 2 presents the sample analysis and handling procedures used for the collection of water quality and bacteria samples.

Table 2
Sample Analysis and Handling Procedures for Water Quality Samples
Utulei WWTP Ocean Receiving Water Quality
March 2018 Sampling

Parameter	Analytical Method	Detection Limit or Instrument Resolution	Sample Holding Time	Sample Container	Sample Preservation
Temperature	Field Probe	0.1°C	--	--	--
Salinity	Field Probe	0.1 PSU			
Dissolved O_2	Field Probe	0.1 mg/l			
pH	Field Probe	0.1 SU			
Turbidity	Hach 2100P	0.1 NTU [1]			
Total Kjeldahl Nitrogen	EPA 351.2	0.2 mg/l	28 days	250 ml plastic	4°C - H_2SO_4
Nitrate + Nitrite	EPA 353.2	0.020 mg/l	28 days	500 ml plastic	4°C - H_2SO_4
Total Phosphorus	EPA 365.3	0.005 mg/l			
Chlorophyll *a*	SM 10200 H	0.2 mg/m^3	3 months	Whatman (0.7 micron) GF/F filter	magnesium carbonate, and frozen
Enterococcus	ASEPA [2]	10 MPN	8 hours	Sterile sample bottles supplied by ASEPA	Kept on ice until delivery to lab (within 3 hrs)
Sediment Total Solids	EPA 160.3M	0.1 %	14 days	8 oz glass	4°C
Sediment Total Organic Carbon	ASTM D4129 – 05M	0.020%	14 days		4°C
Sediment Grain Size	ASTM D 422	0.01 %	6 months		none

[1] Estimated based on calibration with ultra-low level standards.
[2] Seawater bacterial contamination test methods similar to the chromogenic ONPG-MUG test to detect coliform in freshwater using Enterolert, a commercially available fluorogenic substrate (Enterolert Quantitray).

Water quality samples were collected at three depths at each station: near-surface (3 feet), mid-depth (60 feet), and deep-water (120 feet) or near-bottom[5]. Water samples were collected using standard oceanographic sample-collecting bottles (WildCo Beta bottles). Water samples for bacteria analyses were placed into sterilized 100 ml sample bottles. These samples were put on ice immediately following collection and delivered to the ASEPA laboratory for analysis within 3 hours of collection. Water samples for other parameters were placed in laboratory-supplied bottles, preserved as required, stored on ice, and shipped to the laboratory by express shipment (DHL). Hydrographic parameters were measured *in situ* at the same locations the water quality samples were collected. Chain-of-Custody forms for the sample shipping and delivery to the laboratory are included in the laboratory reports described below.

WATER QUALITY SAMPLING AND ANALYSIS RESULTS

Results of the water quality sampling are provided in Tables 3, 4, and 5. The samples were collected and analyzed, or measured in situ, for light penetration (Secchi Depth), hydrographic parameters (salinity, temperature, DO, pH), *Enterococcus* bacteria, nutrients (TN and TP), and chlorophyll *a*. The results for each parameter are discussed below.

Light Penetration

The American Samoa Water Quality Standards[6] (ASWQS) criterion for water clarity is in terms of light penetration, which cannot be directly converted from Secchi depth or turbidity readings. However, an estimate can be made based on Secchi depth using the following approximation:

$$\chi = \kappa \cdot D^{-1}$$

where,

χ = extinction coefficient for visible light

κ = a constant

and

D = Secchi depth in meters for a 30 cm diameter Secchi disk.

The constant κ is not easily determined but is often taken as approximately 1.7. Using the above approximation, light penetration of 1 percent at 65 feet[7] corresponds to a Secchi depth of 24 feet. Such a calculation corresponds to Secchi readings taken at high sun angles and in full sunlight. The Secchi depths (Table 1) indicate that the receiving water meets the ASWQS criterion and NPDES permit limitations for light penetration depth. Based on this and previous reports of

[5] In some cases the sample may be more than 3 feet from the bottom because of irregular bottom conditions and the potential for equipment fouling and loss. An assessment is generally made based on fathometer readings from the vessel. When water depths are more than 120 feet, the deepest sample is taken at 120 feet for consistency with the canneries monitoring program.

[6] The ASWQS, 2013 revision (approved by USEPA 22 August 2014) criteria for Pago Pago Harbor are referenced in this Technical Memorandum.

[7] The light penetration depth to exceed 65 feet (as median value), 45 feet 10% of the time, and 35 feet 2% of the time. Light penetration depth means the depth reached by one percent of the sunlight incident on the surface of a body of water.

Secchi depth, the ASWQS criterion is met more than 50 percent of the time, so continuing compliance with the ASWQS is achieved.

Hydrographic Parameters

Table 3 provides a summary of the hydrographic parameters that were measured at approximately the same depths and times at each station as the grab samples for nutrient analysis. Parameters were measured using an YSI EXO2 sonde with temperature, conductivity, pH, and DO sensors. Sensor calibration records for this data collection event are provided in the Supplemental Data Section at the end of this TM.

Turbidity was measured in grab samples collected concurrently with the water quality samples using a portable bench-top meter. Sensor calibration records for this data collection event are provided in the Supplementary Data Section. The results of the measurements of the hydrographic parameters are summarized as follows:

- Water temperatures at the monitoring stations in the Harbor ranged from 29.36 °C to 29.84 °C (average of 29.44 °C for all stations). Most single samples were below the ASWQS numerical criterion of 85°F (29.44 °C). Higher temperatures appear to be a natural seasonal occurrence with no indication off the effects from the discharge plume. Compliance with the ASWQS criterion and NPDES permit limitation for temperature was demonstrated.[8]

- Salinity in the Harbor ranged from 35.43 PSU to 36.11 PSU with an average of 35.78 PSU. These values are typical of Harbor water and are consistent with previous salinity measurements. There is no ASWQS for salinity, but there was no indication of reduced salinity caused by the discharge plume.

- The DO minimum value in the Harbor was 5.10 mg/l (Station 18 mid-depth) and the average and median were 5.82 mg/l and 5.96 mg/l, respectively. The DO concentrations meet the ASWQS minimum criteria for Pago Pago Harbor. Compliance with the ASWQS criterion and NPDES permit limitation for DO was demonstrated.[9]

- The pH minimum, maximum, median, and average were measured as 8.26, 8.32, 8.31 and 8.30, respectively. Compliance with the ASWQS criterion and NPDES permit limitation for pH was demonstrated[10].

- Turbidity was measured well below the ASWQS criterion and NPDES permit limitation for all samples[11]. The maximum turbidity measured was 0.37 NTU at Station C.

[8] The ASWQS for temperature states, "The temperature shall not deviate more than 1.5 degrees Fahrenheit from conditions that would occur naturally and shall not fluctuate more than 1 degree Fahrenheit on an hourly basis or exceed 85 degrees Fahrenheit due to the influence of other than natural causes."

[9] The ASWQS for DO is not less than 70% saturation (approximately 4.4 mg/l) or less than 5.0 mg/l for Pago Pago Harbor and 5.5 mg/l and not less than 80% saturation for open coastal waters. If the natural level of dissolved oxygen is less than 5.0 mg/l, the natural level shall become the standard. Compliance is based on the median value.

[10] The pH range shall be 6.5 to 8.6 and be within 0.2 units of that which would occur naturally. Compliance is based on the median value.

[11] The turbidity is not to exceed 0.75 NTU (as median value), 1.0 NTU 10% of the time, and 1.5 NTU 2% of the time for Pago Pago Harbor. Turbidity is not to exceed 0.25 NTU (as a median value, 0.35 NTU 10% of the time, and 0.45 NTU 2% of the time for open coastal waters.

Table 3
Hydrographic Parameters
Utulei WWTP Pago Pago Harbor Receiving Water Quality Monitoring
March 2018

Station	Depth (feet)	DO (mg/l)	pH[1] (SU)	Salinity (PSU)	Temp. (ºC)	Turbidity[2] (NTU)
Diffuser						
U	3	5.95	8.30	35.51	29.40	0.28
	60	6.08	8.32	35.82	29.40	0.27
	120	5.43	8.31	35.86	29.39	0.33
	Average	5.82	8.31	35.73	29.40	0.29
ZOM						
A1	3	6.18	8.30	35.43	29.39	0.29
	60	5.98	8.32	35.82	29.39	0.36
	120	5.40	8.31	35.86	29.39	0.23
	Average	5.85	8.31	35.70	29.39	0.29
B1	3	6.16	8.31	35.55	29.58	0.27
	60	5.96	8.32	35.82	29.39	0.32
	120	5.77	8.32	35.85	29.37	0.32
	Average	5.96	8.32	35.74	29.45	0.30
Farfield						
C	3	5.94	8.29	35.44	29.46	0.26
	60	6.16	8.32	35.81	29.38	0.35
	120	5.31	8.30	35.88	29.38	0.37
	Average	5.80	8.30	35.71	29.41	0.33
16	3	6.14	8.26	35.90	29.84	0.28
	60	6.10	8.28	36.10	29.46	0.23
	120	5.69	8.27	36.11	29.37	0.30
	Average	5.98	8.27	36.04	29.56	0.27
18	3	5.99	8.32	35.62	29.60	0.21
	60	5.10	8.30	35.83	29.39	0.23
	120	5.38	8.31	35.87	29.36	0.22
	Average	5.49	8.31	35.77	29.45	0.22
Summary of All Harbor Stations (U, A1, B1, C, 16, 18)						
All Harbor Stations	Minimum	5.10	8.26	35.43	29.36	0.21
	Maximum	6.18	8.32	36.11	29.84	0.37
	Average	5.82	8.30	35.78	29.44	0.28
	90th percentile	6.16	8.32	35.96	29.59	0.35
	98th percentile	6.17	8.32	36.11	29.76	0.37
	Median	5.96	8.31	35.83	29.39	0.28
	Std. Dev.	0.35	0.02	0.20	0.12	0.05
Reference and Offshore						
5	3	6.73	8.32	36.09	29.75	0.21
	60	5.79	8.28	36.10	29.35	0.33
	120	5.74	8.27	36.10	29.32	0.23
	Average	6.09	8.29	36.10	29.47	0.26
FF	3	6.33	8.34	35.79	29.48	0.16
	60	6.02	8.33	35.83	29.39	0.13
	120	5.98	8.33	35.85	29.37	0.16
	Average	6.11	8.33	35.82	29.41	0.15
XFF	3	6.23	8.35	35.84	29.46	0.17
	60	6.10	8.34	35.84	29.42	0.12
	120	5.92	8.34	35.84	29.40	0.21
	Average	6.08	8.34	35.84	29.43	0.17

[1] pH values are not corrected for sensor drift which was approximately ≤0.08 SU high, except for stations 5 and 16, which are approximately ≤0.02 Su high.
[1] Turbidity was measured from individual samples using a portable bench top meter.

Bacteria

Table 4 shows the results of the *Enterococcus* bacteria analysis. The ASEPA laboratory conducted the analysis of these samples. Laboratory data for these analyses are provided in the Supplementary Data Section, which includes results for the equipment blanks. The equipment blanks indicated no bacteria. The ASWQS[12] requires that the geometric mean be no more than 35 CFU per 100ml. There was no reported detections at any station sampled. The ASWQS criteria for *Enterococcus* bacteria was achieved for this sampling event.

Table 4
Enterococci Results
Utulei WWTP Pago Pago Harbor Receiving Water Quality Monitoring
March 2018

Station and Location	Station Depth (feet)	Enterococci (CFU/100 ml)
A1 ZOM	3	0
	60	0
	120	0
	Geometric mean	--
B1 ZOM	3	0
	60	0
	120	0
	Geometric mean	--
C Farfield	3	0
	60	0
	120	0
	Geometric mean	--
16 Farfield	3	0
	60	0
	120	0
	Geometric mean	--
18 Farfield	3	0
	60	0
	120	0
	Geometric mean	--
Geometric mean of all samples combined		**< 1**

[1] The detection limit (lowest value if bacteria are detected) for Enterococci is 10 CFU/100 ml. A value of "0" indicates no bacteria were detected.
[2] Geometric means are calculated with "0" values replaced by "1".

Nutrients and Biological Parameters

Table 5 presents the results for the nutrients and chlorophyll *a* measured in the samples. These parameters included total Kjeldahl nitrogen (TKN), nitrate+nitrite, total phosphorus (TP), and chlorophyll *a*. The ASWQS regulates total nitrogen (TN), which is calculated by adding the concentrations of TKN and nitrate+nitrite.

[12] The bacteria standard for Pago Pago Harbor requires a geometric mean of 35 CFU per 100 ml (geometric mean density) and 130 CFU per 100 ml (statistical threshold value as the approximation of the 90th percentile).

The analysis of TKN at low levels in seawater requires careful sample preparation and Method 351.2 has been found to be most appropriate for such analyses. The analytical laboratory that normally runs these samples ceased do chemical analysis very shortly before the samples arrived. An alternative laboratory was found, but the samples were subsequently beyond holding time and the selected laboratory was only able to run the samples to a detection limit of 0.2 mg/l. The samples were also run using method 351.4, but the results may not be reliable and are not reported here, although the lab reports in Attachment 1 include those data.

Laboratory data are provided in Attachment 1. The results of the sampling and analyses for the nutrient and biological parameters are summarized as follows:

- Total nitrogen. All TKN concentrations were reported as not-detected ("U") in Table 5. If ½ of the detection limit is used for not-detected results to assess compliance, compliance with the ASWQS and NPDES permit limitation at the Utulei discharge location is demonstrated[13]. There is no effect of the discharge indicated in the overall results.

- Total phosphorus. The ASWQS criterion is expressed as a median (0.030 mg/l)[14]. The data indicate compliance with ASWQS and NPDES permit limitations based on a median value of 0.011 mg/l (range 0.008 to 0.018 mg/l) for total phosphorus with no significant effects of the effluent plume observed.

- Chlorophyll. Chlorophyll *a* concentrations were reported as below the ASWQS median criteria[15] in all samples. The median value was 0.3 mg/m^3 (0.3 µg/l) and single values ranged from 0.2 to 0.5 mg/m^3. The data indicate ASWQS and the NPDES permit limitation were achieved for chlorophyll *a*.

[13] TN not to exceed 0.200 mg/l (as median value), 0. 350 mg/l more than 10% of the time, and 0.500 mg/l more than 2% of the time.

[14] TP not to exceed 0.030 mg/l (as median value), 0.060 mg/l more than 10% of the time, and 0.090 mg/l more than 2% of the time.

[15] Chlorophyll *a* not to exceed 1.0 µg/l (as a median value), 3.0 µg/l more than 10% of the time, and 5.0 µg/l more than 2% of the time.

Table 5
Nutrient and Biological Parameters
Utulei WWTP Pago Pago Harbor Receiving Water Quality Monitoring
March 2018

Station	Depth	TKN		Nitrate + Nitrite		Total Nitrogen	Total Nitrogen	Total Phosphorus		Chlorophyll *a*	
	Method	351.2		353.2		Calculated *	Calculated **	365.3		SM 10200H	
	Units	mg/l		mg/l		mg/l	mg/l	mg/l		mg/m3	
	Detection Limits	0.2		0.020		--	--	0.005		0.2	
	ASWQS Criterion	--		--		0.200	0.200	0.030		1.0	
Diffuser											
U	3	0.2	U	0.020	U	0.220	0.110	0.011	=	0.5	J
	60	0.2	U	0.020	U	0.220	0.110	0.010	J	0.2	J
	120	0.2	U	0.020	J	0.220	0.120	0.012	=	0.2	U
	Average	**0.200**		**0.020**		**0.220**	0.113	**0.011**		**0.3**	
ZOM											
A1	3	0.2	U	0.020	U	0.220	0.110	0.011	=	0.2	J
	60	0.2	U	0.020	U	0.220	0.110	0.009	J	0.2	J
	120	0.2	U	0.020	U	0.220	0.110	0.011	=	0.4	J
	Average	**0.200**		**0.020**		**0.220**	0.110	**0.010**		**0.3**	
B1	3	0.2	U	0.020	U	0.220	0.110	0.010	=	0.2	U
	60	0.2	U	0.020	U	0.220	0.110	0.009	J	0.4	J
	120	0.2	U	0.023	J	0.223	0.123	0.014	=	0.2	J
	Average	**0.200**		**0.021**		**0.221**	0.114	**0.011**		**0.3**	
Farfield											
C	3	0.2	U	0.020	U	0.220	0.110	0.008	J	0.2	J
	60	0.2	U	0.020	U	0.220	0.110	0.010	J	0.3	J
	120	0.2	U	0.021	J	0.221	0.121	0.015	=	0.3	J
	Average	**0.200**		**0.020**		**0.220**	0.114	**0.011**		**0.3**	
16	3	0.2	U	0.020	U	0.220	0.110	0.013	=	0.4	J
	60	0.2	U	0.020	U	0.220	0.110	0.010	J	0.4	J
	120	0.2	U	0.020	U	0.220	0.110	0.013	=	0.5	J
	Average	**0.200**		**0.020**		**0.220**	0.110	**0.012**		**0.4**	
18	3	0.2	U	0.020	U	0.220	0.110	0.010	J	0.3	J
	60	0.2	U	0.020	U	0.220	0.110	0.013	=	0.2	J
	120	0.2	U	0.029	J	0.229	0.129	0.018	=	0.4	J
	Average	**0.200**		**0.023**		**0.223**	0.116	**0.014**		**0.3**	
Summary of All Harbor Stations (Excluding Stations 5, FF, and XFF)											
All Harbor Stations	Minimum	0.2		0.020		0.220	0.110	0.008		0.2	
	Maximum	0.2		0.029		0.229	0.129	0.018		0.5	
	Average	0.2		0.021		0.221	0.113	0.012		0.3	
	Median	0.2		0.020		0.220	0.110	0.011		0.3	
	St Dev	0.0		0.002		0.002	0.006	0.002		0.1	
Reference											
5	3	0.2	U	0.020	U	0.220	0.110	0.016	=	0.3	J
	60	0.2	U	0.020	U	0.220	0.110	0.013	=	0.3	J
	120	0.2	U	0.020	U	0.220	0.110	0.013	=	0.2	J
	Average	**0.200**		**0.020**		**0.220**	0.110	**0.014**		**0.3**	
Offshore											
FF	3	0.2	U	0.020	U	0.220	0.110	0.007	J	0.4	J
	60	0.2	U	0.020	U	0.220	0.110	0.008	J	0.3	J
	120	0.2	U	0.020	U	0.220	0.110	0.007	J	0.6	J
	Average	**0.200**		**0.020**		**0.220**	0.110	**0.007**		**0.4**	
XFF	3	0.2	U	0.020	U	0.220	0.110	0.007	J	0.2	U
	60	0.2	U	0.020	U	0.220	0.110	0.007	J	0.2	U
	120	0.2	U	0.020	U	0.220	0.110	0.007	J	0.2	U
	Average	**0.200**		**0.020**		**0.220**	0.111	**0.007**		**0.2**	

"=" indicates the parameter was detected at the concentration shown
"J" indicates estimated concentration less than the reporting limit but greater than or equal to the method detection limit
"U" indicates measurement below the method detection limit (method detection limit reported)
* indicates the concentration was calculated: (Total Nitrogen) = [TKN] + [nitrate-nitrite]
** indicates the concentration was calculated using 1/2 the value if not detected: (Total Nitrogen) = [TKN] + [nitrate-nitrite]

SEDIMENT MONITORING RESULTS

Results of the sediment sampling at Stations B, C, and OH-4 are provided in Table 6 (analytical results and field observations) and in Figure 2 and Table 7 (detailed grain size distributions). The sediment laboratory results are provided in Attachment 2. Photographs of the sediment samples were taken at the time of collection and are provided in Photographs 1, 2, and 3. Sampling locations are indicated on Figure 1.

Table 6 provides a description of the sediment samples. The sediment at all stations is predominantly a mixture of fine sand and silt, brown colored throughout the samples, and generally with no odor. Total solids and total organic carbon (TOC) are similar for all samples. No effects of the discharge are evident in the sediment characteristics.

Table 7 and Figure 2 present a more detailed grain size distribution of the sediment samples. Overall, the sediment samples were typical of sediments in the Harbor and did not indicate any degradation attributable to the Utulei WWTP outfall discharge.

Table 6
Sediment Sample Results
Utulei WWTP Receiving Water Quality and Sediment Monitoring
Pago Pago Harbor – March 2018

Station	Water Depth (feet)	Sample Type (Sampler Penetration)	Sediment Type from Field Observations	Particle Size Distribution (%)				Total Solids (%)	Total Organic Carbon (% dry weight)
				Gravel	Sand	Silt	Clay		
B	184	Grab (4 cm)	Silty-sand, Light brown/gray, no odor	0.16	41.89	57.95	0	65.9	0.569
C	151	Grab (4-5 cm)	Silty-sand, Light brown, no odor	7.59	49.13	43.28	0	62.2	0.613
OH-4	205	Grab (7 cm)	Silt; brown, no odor	0	15.78	84.22	0	64.2	0.471
OH-4 Dup				0	16.43	83.57	0		

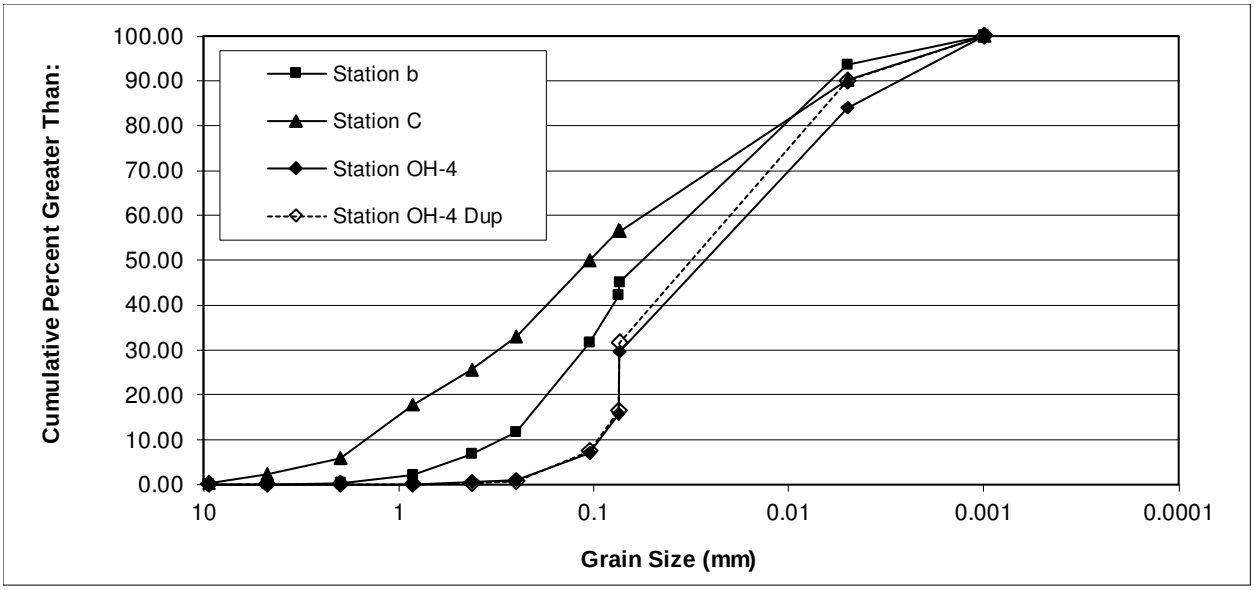


Figure 2. Sediment Grain Size Distributions

Utulei WWTP Sediment Monitoring, Pago Pago Harbor, March 2018

Table 7
Sediment Grain Size
Utulei WWTP Receiving Water Quality and Sediment Monitoring
Pago Pago Harbor – March 2018

Description	Size (mm)	Station B		Station C		Station OH-4		Station OH-4 Dup	
		Percent Passing	Cumulative Percent Greater Than	Percent Passing	Cumulative Percent Greater Than	Percent Passing	Cumulative Percent Greater Than	Percent Passing	Cumulative Percent Greater Than
Sieve Analysis									
Gravel	19.0	100.00	0.00	99.72	0.28	100.00	0.00	100.00	0.00
Gravel	9.50	100.00	0.00	99.72	0.28	100.00	0.00	100.00	0.00
Medium Gravel	4.75	99.85	0.15	97.77	2.23	100.00	0.00	100.00	0.00
Fine Gravel	2.00	99.84	0.16	92.41	7.59	100.00	0.00	100.00	0.00
Very Coarse Sand	0.850	97.88	2.12	82.39	17.61	99.90	0.10	99.96	0.04
Coarse Sand	0.425	93.25	6.75	74.45	25.55	99.56	0.44	99.65	0.35
Medium Sand	0.250	88.41	11.59	67.02	32.98	99.12	0.88	99.20	0.80
Fine Sand	0.106	68.47	31.53	50.16	49.84	92.93	7.07	92.50	7.50
Very Fine Sand	0.075	57.95	42.05	43.28	56.72	84.22	15.78	83.57	16.43
Hydrometer Analysis									
Coarse Silt	0.074	55.01	44.99	43.68	56.32	70.42	29.58	68.14	31.86
Fine Silt	0.005	6.40	93.60	9.80	90.20	16.03	83.97	9.98	90.02
Clay/Colloid	0.001	0.00	100	0.00	100	0.00	100	0.00	100

Sediment Photographs – M<arch 2018



Photograph 1
Sediment Sample from Station B
Pago Pago Harbor March 11, 2018



Photograph 2
Sediment Sample from Station C
Pago Pago Harbor March 11, 2018



Photograph 3
Sediment Sample from Station OH-4
Pago Pago Harbor March 11, 2018

CONCLUSIONS

The Utulei WWTP receiving water appears to be in compliance with the ASWQS for all parameters. A summary of NPDES permit compliance evaluations concerning effects on the receiving water is provided in Table 8.

Table 8
Evaluation of NPDES Permit Compliance
Utulei WWTP Receiving Water Quality
March 2018 Sampling

Parameter	Permit Condition *The discharge shall not cause:*	Compliance Evaluation
Part A.2. The discharge shall be substantially free from:		
Narrative	a. Objectionable color, odor, or taste	Compliance with permit requirements observed during receiving water sampling.
	b. Visible floating material, grease, oil, scum, foam	
	c. Materials that will produce visible turbidity or form objectionable deposits	
	d. Materials toxic to humans or aquatic life or produce undesirable aquatic life	
Part A.3 The discharge shall not cause		
Temperature	a. The temperature in the receiving water to deviate more than 1.5º Fahrenheit from conditions which would occur naturally, to fluctuate more than 1º Fahrenheit on an hourly basis, or to exceed 85º Fahrenheit due to the influence of other than natural causes.	Compliance demonstrated.
Hydrography	b. Changes in basin geometry or freshwater inflow that will alter current patterns in such a way as to adversely affect existing biological populations or sediment distribution in the receiving water.	Compliance demonstrated. Based on salinity, no effects of the discharge are observed or expected.
Turbidity	c. The average turbidity in the receiving water at and beyond the Zone of Initial Dilution to exceed 0.75 NTU.	Compliance demonstrated.
Phosphorus	d. The average total phosphorous in the receiving water at and beyond the Zone of Initial Dilution to exceed 30 µg/L.	Compliance demonstrated.
Nitrogen	e. The average total nitrogen in the receiving water at and beyond the Zone of Initial Dilution to exceed 200 µg/L	Compliance demonstrated
Chlorophyll *a*	f. The average chlorophyll *a* in the receiving water at and beyond the Zone of Initial Dilution to exceed 1.0 µg/L.	Compliance demonstrated
Light Penetration	g. The light penetration depth in the receiving water at and beyond the Zone of Initial Dilution to not exceed 65 feet 50 percent of the time.	Compliance demonstrated based on approximations derived from Secchi depth measurements.
Dissolved Oxygen	h. A dissolved oxygen content in the receiving water at and beyond the Zone of Initial Dilution less than 70% saturation, or less than 5.0 mg/L.	Compliance demonstrated
pH	i. The pH in the receiving water at and beyond the Zone of Initial Dilution to range less than 6.5 nor greater than 8.6, and to deviate more than 0.2 pH units from that which occurs naturally.	Compliance demonstrated.
Bacteria	j. Enterococci density (concentration) in the receiving water at and beyond the Zone of Mixing to exceed a geometric mean of 35 CFU/I00 ml steady state geometric mean, nor any single sample to exceed 104 CFU/100 ml.	Compliance demonstrated.

SUPPLEMENTAL DATA

Sampling Station Occupation: Times, Depths, and Weather Observations

Water Quality Station Occupation Descriptions
JCO and Utulei Pago Pago Harbor and Tafuna Ocean Receiving Water Quality Monitoring
2018 Non-tradewind Season Sampling: March and May 2018

Time[1]	Station	Water Depth (feet)	Sample Depth[2] (feet)	Weather Conditions					Notes
				Sky	Rain	Wind Speed and Direction (knots)[3]	Wind Waves (feet) and Direction[4]	Swell (feet) and Direction[4]	
Water Quality Sampling (Grab Samples) – March 11, 2018									
08:33 – 08:35	13	24	3, 20	Sunny	--	7 E	<0.5 E	0	a
09:05 – 09:06	15	165	3, 60, 120	Partly Cloudy	--	9 SE	0.5 – 1.0 SE	1 – 2 S	a
09:28 – 09:29	C	154	3, 60, 120	Partly Cloudy	--	5 SE	0.5 – 1.0 SE	0	a
09:50 – 10:14	A1	152	3, 60, 120	Partly Cloudy	--	13 SE	0.5 – 1.0 SE	1 – 2 S	a
10:21 – 10:23	U	148	3, 60, 120	Partly Cloudy	--	13 SE	1 SSE	1 – 2 S	b
10:39 – 10:39	B1	180	3, 60, 120	Partly Cloudy	--	15 ESE	1 SE	1 SE	a
11:06 – 11:10	XFF	209	3, 60, 120	Partly Cloudy	--	14 ESE	2 – 3 SE	2 – 4 SE	a
11:30 – 11:32	FF	281	3, 60, 120	Partly Cloudy	--	12 ESE	1 – 2 SE	2 – 4 SE	a
11:50 – 11:52	18	191	3, 60, 120	Partly Cloudy	--	7 ESE	1 SE	1 SE	a
14:45 – 14:47	S8	190	3, 60, 120	Mostly Cloudy	--	6 SE	0.5 – 1 SE	1 – 2 S	a
15:03 – 15:04	S8A	170	3, 60, 120	Mostly Sunny	--	6 SE	0.5 – 1 SE	1 – 2 S	a
Water Quality Sampling (Grab Samples) – March 12, 2018									
07:25 – 07:26	TC	98	3, 45, 90	Mostly Sunny	--	15 ESE	1 SE	4 – 6 SE	a
07:44 – 07:45	TA1	95	3, 45, 90	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:02 – 08:03	TA2	93	3, 45, 80	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:18 – 08:19	TB	50	3, 25, 50	Mostly Sunny	--	9 ESE	1 SE	3 – 4 SE	a
08:38 – 08:40	TFF	1410	3, 45, 90	Mostly Sunny	--	12 E	1 SE	4 – 6 SE	a
12:35 – 12:37	5	130	3, 60, 120	Partly Cloudy	--	12 SE	1 SE	2 – 4 SE	a
13:21 – 13:23	16	193	3, 60, 120	Partly Cloudy	--	11 SE	0.5 SE	<1 SE	a
13:41 – 13:42	8	190	3, 60, 120	Partly Cloudy	--	9 SE	<0.5 SE	1 SE	a
14:01 – 14:03	14	175	3, 60, 120	Partly Sunny	--	12 SE	<0.5 SE	< 0.5 SE	a
14:18 – 14:20	8A	171	3, 60, 120	Mostly Sunny	--	9 SE	<0.5 SE	< 0.5 SE	a
Water Quality Sampling (Grab Samples) – May 8, 2018									
14:27 – 14:32	16-1	192	3, 60, 120	Mostly Cloudy	Drizzle	0 – 5 SE	<0.5 SE	1 – 3 S	a, c
14:09 – 14:12	5-1	126	3, 60, 120	Mostly Cloudy	--	8 E	1 SE	1 – 3 SSE	a, c
Water Quality Sampling (Grab Samples) – May 9, 2018									
08:06 – 08:06	13-2	26	3, 20	Mostly Cloudy	--	0	0	0	a, c
08:34 – 08:36	15-2	168	3, 60, 120	Overcast	--	0	0	1 – 2 S	a, c
08:55 – 08:58	16-2A	193	3, 60, 120	Overcast	Lt - Med	7 SE	<0.5 SE	1 – 3 S	a, c
09:14 - 0916	18-2	190	3, 60, 120	Overcast	Lt	4 SSE	<0.5 SE	1 – 2 S	a, c
09:40 – 09:43	FF-2	282	3, 60, 120	Overcast	Drizzle	4 S	1 S	2 – 3 SSE	a, c
10:02 – 10:05	5-2A	128	3, 60, 120	Overcast	Lt - Med	0	<0.5 SE	1 – 3 S	a, c
14:39 – 14:31	16-2P	193	3, 60, 120	Overcast	--	0	0	1 – 3 S	a, c
15:01 – 15:14	5-2P	129	3, 60, 120	Overcast	--	0	0	1 – 3 SSE	a, c
Water Quality Sampling (Grab Samples) – May 10, 2018									
07:10 – 07:13	16-3	192	3, 60, 120	Overcast	--	17 SSE	1 SSE	1 – 4 S	a, c
07:32 – 07:38	5-3	135	3, 60, 120	Partly Sunny	--	17 SSE	1 -2 SSE	3 -7 SSE	a, c

Water Quality Station Occupation Descriptions
JCO and Utulei Pago Pago Harbor and Tafuna Ocean Receiving Water Quality Monitoring
2018 Non-tradewind Season Sampling: March and May 2018

Time[1]	Station	Water Depth (feet)	Sample Depth[2] (feet)	Weather Conditions					Notes
				Sky	Rain	Wind Speed and Direction (knots)[3]	Wind Waves (feet) and Direction[4]	Swell (feet) and Direction[4]	
Secchi Depth – March 11, 2018									
08:37	13	24	17	Sunny	--	7 E	<0.5 E	0	
09:11	15	165	41	Partly Cloudy	--	9 SE	0.5 – 1.0 SE	1 – 2 S	
09:31	C	154	59	Partly Cloudy	--	5 SE	0.5 – 1.0 SE	0	
09:52	A1	152	53	Partly Cloudy	--	13 SE	0.5 – 1.0 SE	1 – 2 S	
10:23	U	148	42	Partly Cloudy	--	13 SE	1 SSE	1 – 2 S	
10:41	B1	180	41	Partly Cloudy	--	15 ESE	1 SE	1 SE	
11:09	XFF	209	68	Partly Cloudy	--	14 ESE	2 – 3 SE	2 – 4 SE	
11:34	FF	281	54	Partly Cloudy	--	12 ESE	1 – 2 SE	2 – 4 SE	
11:52	18	191	37	Partly Cloudy	--	7 ESE	1 SE	1 SE	
14:45	S8	190	42	Mostly Cloudy	--	6 SE	0.5 – 1 SE	1 – 2 S	d
15:03	S8A	170	44	Mostly Sunny	--	6 SE	0.5 – 1 SE	1 – 2 S	d
Secchi Depth – March 12, 2018									
07:27	TC	98	68	Mostly Sunny	--	15 ESE	1 SE	4 – 6 SE	
07:49	TA1	95	64	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	
08:03	TA2	93	65	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	
08:20	TB	50	50	Mostly Sunny	--	9 ESE	1 SE	3 – 4 SE	
08:41	TFF	1410	85	Mostly Sunny	--	12 E	1 SE	4 – 6 SE	
12:38	5	130	52	Partly Cloudy	--	12 SE	1 SE	2 – 4 SE	
13:06	5	129	48	Partly Cloudy	--	12 SE	1 SE	2 – 4 SE	e
13:20	16	191	44	Partly Cloudy	--	11 SE	0.5 SE	<1 SE	e
13:23	16	193	47	Partly Cloudy	--	11 SE	0.5 SE	<1 SE	
13:43	8	190	47	Mostly Sunny	--	9 SE	<0.5 SE	<0.5 SE	
14:05	14	175	29	Partly Sunny	--	12 SE	<0.5 SE	< 0.5 SE	
14:22	8A	171	44	Mostly Sunny	--	9 SE	<0.5 SE	< 0.5 SE	
14:49	8A	172	42	Partly Sunny	--	9 SE	<0.5 SE	< 0.5 SE	e
15:00	14	176	19	Mostly Cloudy	Lt - Med	12 SE	<0.5 SE	< 0.5 SE	e
15:13	8	190	47	Partly Sunny	--	Calm	0	<0.5 SE	e
15:25	14	176	35	Mostly Sunny	--	4 SE	<0.5 SE	<0.5 SE	f
Light Penetration – March 12, 2017									
13:00 – 13:05	5	129	65 feet for 5 minutes	Partly Cloudy	--	12 SE	1 SE	2 – 4 SE	
13:14 – 13:19	16	191		Partly Cloudy	--	11 SE	0.5 SE	< 1 SE	
14:42 – 14:48	8A	172		Partly Cloudy	--	9 SE	<0.5 SE	<0.5 SE	
14:54 – 14:59	14	176		Mostly Cloudy	Lt - Med	12 SE	<0.5 SE	<0.5 SE	
15:06 – 15:12	8	190		Mostly Cloudy	--	Calm	0	<0.5 SE	
15:19 – 15:24	14	176		Mostly Sunny	--	4 SE	<0.5 SE	<0.5 SE	g

Water Quality Station Occupation Descriptions
JCO and Utulei Pago Pago Harbor and Tafuna Ocean Receiving Water Quality Monitoring
2018 Non-tradewind Season Sampling: March and May 2018

Time[1]	Station	Water Depth (feet)	Sample Depth[2] (feet)	Weather Conditions					Notes
				Sky	Rain	Wind Speed and Direction (knots)[3]	Wind Waves (feet) and Direction[4]	Swell (feet) and Direction[4]	
Vertical Profiles – March 11, 2018									
08:45	13	24	--	Sunny	--	7 E	<0.5 E	0	h
09:16	15	162	160	Partly Cloudy	--	9 SE	0.5 – 1.0 SE	1 – 2 S	a
09:42	C	154	142	Partly Cloudy	--	5 SE	0.5 – 1.0 SE	0	a
10:05	A1	151	120	Partly Cloudy	--	13 SE	0.5 – 1.0 SE	1 – 2 S	a
10:36	U	170	120	Partly Cloudy	--	13 SE	1 SSE	1 – 2 S	b
10:50	B1	190	120	Partly Cloudy	--	15 ESE	1 SE	1 SE	a
11:18	XFF	233	180	Partly Cloudy	--	14 ESE	2 – 3 SE	2 – 4 SE	a
11:38	FF	279	180	Partly Cloudy	--	12 ESE	1 – 2 SE	2 – 4 SE	a
11:57	18	191	180	Partly Cloudy	--	7 ESE	1 SE	1 SE	a
14:53	S8	192	180	Mostly Cloudy	--	6 SE	0.5 – 1 SE	1 – 2 S	a, d
15:12	S8A	174	170	Mostly Sunny	--	6 SE	0.5 – 1 SE	1 – 2 S	a, d, i
Vertical Profiles – March 12, 2018									
07:39	TC	102	90	Mostly Sunny	--	15 ESE	1 SE	4 – 6 SE	a
07:58	TA1	92	90	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:15	TA2	97	90	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:31	TB	53	50	Mostly Sunny	--	9 ESE	1 SE	3 – 4 SE	a
08:48	TFF	1470	90	Mostly Sunny	--	12 E	1 SE	4 – 6 SE	a
12:51	5	130	120	Partly Cloudy	--	12 SE	1 SE	2 – 4 SE	a
13:33	16	193	180	Partly Cloudy	--	11 SE	0.5 SE	<1 SE	a
13:50	8	190	180	Mostly Sunny	--	9 SE	<0.5 SE	1 SE	a
14:13	14	178	175	Partly Sunny	--	12 SE	<0.5 SE	< 0.5 SE	a
14:29	8A	173	170	Mostly Sunny	--	9 SE	<0.5 SE	< 0.5 SE	a
Vertical Profiles – May 8, 2018									
14:19	5-1	126	120	Mostly Cloudy	--	8 E	1 SE	1 – 3 SSE	a, c
14:40	16-1	192	180	Mostly Cloudy	Drizzle	0 – 5 SE	<0.5 SE	1 – 3 S	a, c
Vertical Profiles – May 9, 2018									
08:18	13-2	25	20	Mostly Cloudy	--	0	0	0	a, c
08:42	15-2	168	160	Overcast	--	0	0	1 – 2 S	a, c
09:00	16-2A	192	180	Overcast	Lt - Med	7 SE	<0.5 SE	1 – 3 S	a, c
09:23	18-2	190	180	Overcast	Lt	4 SSE	<0.5 SE	1 – 2 S	a, c
09:48	FF-2	282	180	Overcast	Drizzle	4 S	1 S	2 – 3 SSE	a, c
10:10	5-2A	128	120	Overcast	Lt - Med	0	<0.5 SE	1 – 3 S	a, c
14:45	16-2P	193	180	Overcast	--	0	0	1 – 3 S	a, c
15:16	5-2P	129	120	Overcast	--	0	0	1 – 3 SSE	a, c
Vertical Profiles – May 10, 2018									
07:15	16-3	192	180	Overcast	--	17 SSE	1 SSE	1 – 4 S	a, c
07:47	5-3	135	120	Partly Sunny	--	17 SSE	1 -2 SSE	3 -7 SSE	a, c

Water Quality Station Occupation Descriptions
JCO and Utulei Pago Pago Harbor and Tafuna Ocean Receiving Water Quality Monitoring
2018 Non-tradewind Season Sampling: March and May 2018

Time[1]	Station	Water Depth (feet)	Sample Depth[2] (feet)	Weather Conditions					Notes
				Sky	Rain	Wind Speed and Direction (knots)[3]	Wind Waves (feet) and Direction[4]	Swell (feet) and Direction[4]	
Enterococcus Sampling[5] – March 12, 2018									
07:25 – 07:26	TC	98	3, 45, 90	Mostly Sunny	--	15 ESE	1 SE	4 – 6 SE	a
07:44 – 07:45	TA1	95	3, 45, 90	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:02 – 08:03	TA2	93	3, 45, 80	Mostly Sunny	--	13 ESE	1 – 2 SE	2 – 4 SE	a
08:18 – 08:19	TB	50	3, 25, 50	Mostly Sunny	--	9 ESE	1 SE	3 – 4 SE	a
09:18 – 09:20	18	191	3, 60, 120	Partly Cloudy	--	7 E	0	1 S	a
09:26 – 09:26	16	193	3, 60, 120	Partly Cloudy	--	7 E	0	1 S	a
09:31 – 09:32	B1	184	3, 60, 120	Partly Cloudy	--	11 E	<0.5 SE	1 S	a
09:40 – 09:40	A1	146	3, 60, 120	Partly Cloudy	--	12 SE	0	<0.5 S	a
09:46 – 09:46	C	154	3, 60, 120	Partly Cloudy	--	10 E	<0.5 SE	<1 SE	a
Utulei Sediment Sampling – March 11, 2018									
14:02	C	151	151	Mostly Sunny	--	11 SE	<0.5 SE	1 – 2 S	
14:20	B	184	184	Mostly Sunny	--	10 SE	0.5 - 1 SE	1 – 2 S	
14:30	OH-4	205	205	Partly Cloudy	--	9 SE	0.5 - 1SE	1 – 2 S	

[1] Water quality times are start and end of grab sample collection. Profile times are start times of profiler. Light penetration times are time that instruments were at required depth.

[2] Water samples were collected at 3, 60, and 120 feet below the surface unless otherwise indicated. Depth listed under vertical profiles is the depth of the cast. Depth under Secchi depth is the measured Secchi depth.

[3] Measured with hand held gage on deck. Wind gusts were often higher.

[4] Based on visual observation and estimates.

[5] Equipment blanks were sampled at the boat dock prior to departure.

NOTES:

a. No observed effluent derived odor, taste, floatables, grease, oil, scum, or foam.

b. Apparent surface expression of plume: no color, no odor, clear water.

c. Station designators -1, -2, -3, indicate different days for supplementary May 2018 sampling. Station designators -2A and -2P indicate morning and afternoon samples at the same station for the May 2018 Supplementary sampling.

d. Same as Stations 8 and 8A. Only sampled for supplemental parameters on March 11, 2018.

e. Second Secchi depth obtained during light penetration measurements.

f. Third Secchi depth done during repeat of light penetration measurements.

g. Repeated light penetration measurement.

h. No vertical profile, in situ measurements made at grab sample depths.

i. Upcast only logged at Station S8A.

Bacteria Data

American Samoa EPA Water Quality L))ratory, Analytical Results for REQUESTS

Enterococci by Fluorogenic Substrate (Enterolert) Method

Sample Date:	Record of Sample Receipt Relinquished by:____ / ____ Date/Time: ____ / ____ Received by: ____ / ____ Date/Time: ____ / ____												
Sample Site / Description	Sample Collection Time	Incubation (41+/-0.5 °C) Start Date	Incubation (41+/-0.5 °C) Start Time	Incubation (41+/-0.5 °C) End (24+28 hrs) Date	Incubation (41+/-0.5 °C) End (24+28 hrs) Time	*Enterococci* Results: No. of Fluorescent Large Wells	*Enterococci* Results: No. of Fluorescent Small Wells	*Enterococci* Results: Quanti-Tray 2000 Results Table MPN	x 10	Actual MPN
EB-1		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
EB - 2		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
EB - 3		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
1B - M		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
1B - B		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
1B - S		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
1B - B		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
1B - M		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
B1 - M		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
B1 - B		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
B1 - S		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
TA1 - B		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
TA1 - M		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
TA1 - S		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
TB - M		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
TB - B		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
TB - S		03.12.18	1438	03.12.18	1438	0	0	0	x 10	0
	DI	~~03.12.18~~	~~1438~~ 05.12.18						x 10	

*Criteria: Enterolert® must be completely dissolved prior to incubation.
For sample results to be acceptable, QC results must be as follows: Positive Control Results = (+/+) and Negative Control Results = (-/-).

Lab Analysts: Dayster / Kimo Expected Read Out Date/Time: 06.12.18 / 1438 Read Out Analyst: Dayster/Kimo /TM

Enterolert® Media: Lot #: HN820 Expiration Date: 23 SEP 2018 Date Approved by Lab Manager: ____ Initials: ____

Last updated: 12/2/2016 (by: JT) THIS RECORD TO BE RETAINED FOR 5 YEARS

American Samoa EPA Water Quality L[illegible]ratory, Analytical Results for REQUESTS
Enterococci by Fluorogenic Substrate (Enterolert) Method

Sample Date:	Record of Sample Receipt												
	Relinquished by: ____/____ Date/Time: ____/____ Received by: ____/____ Date/Time: ____/____												
Sample Site	Description	Sample Collection Time	Incubation (41+/- 0.5 °C)				*Enterococci* Results						
			Start		End (24+/-28 hrs)		No. of Fluorescent			Quanti-Tray 2000 Results			
			Date	Time	Date	Time	Large Wells	Small Wells	Table MPN	x 10	Actual MPN		
TA2-B			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
TA2-S			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
TA2-M			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
C-S			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
C-M			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
C-B			05.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
A1-S			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
A1-M			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
A1-B			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
TC-M			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
TC-S			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
TC-B			03.12.18	1438	05.13.18	1438	0	0	0	x 10	0		
										x 10			
										x 10			
										x 10			
										x 10			
										x 10			
										x 10			
										x 10			

*Criteria: Enterolert® must be completely dissolved prior to incubation.
For sample results to be acceptable, QC results must be as follows: Positive Control Results = (+/+) and Negative Control Results = (-/-).

Lab Analysts: Dayster / Kimo Expected Read Out Date/Time: 03 / 13 - 18 / 1438 Read Out Analyst: Dayster/Kimo / TM

Enterolert® Media: Lot #: HN820 Expiration Date: 27 SEP 2018 Date Approved by Lab Manager: _____ Initials: _____

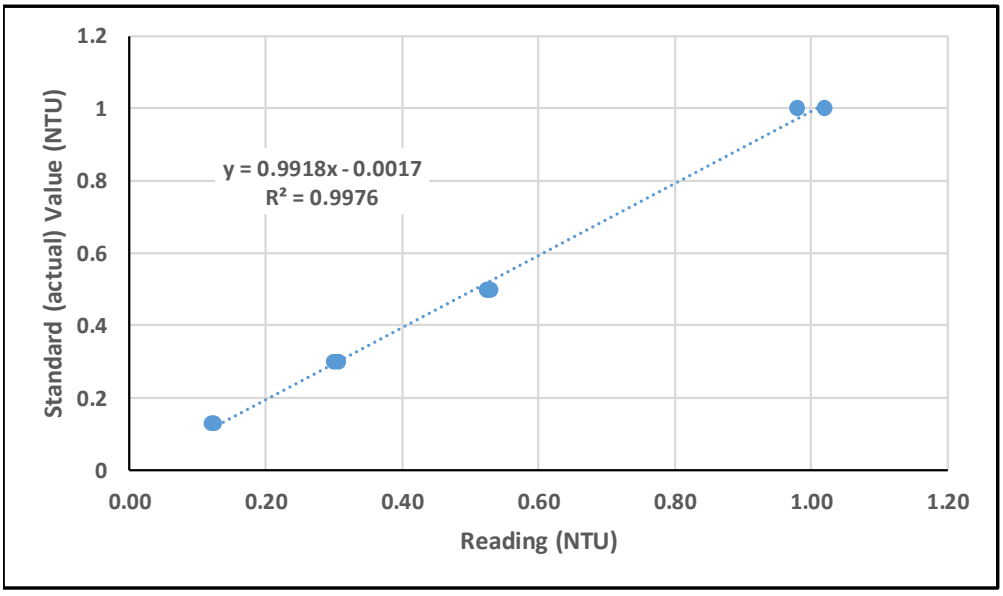
Last updated: 12/2/2016 (by: JT) THIS RECORD TO BE RETAINED FOR 5 YEARS

Sonde Sensor Calibration

YSI EXO Sonde Sensor Calibration Summary March 2018						
Parameter	**Date**	**Time**	**Standard**	**Pre-Calibration Reading**	**Post-calibration Reading**	**QC**
Depth (m)	3/11/18	08:33	0.0	0.06	0.00	OK
DO (% Sat)	3/10/18	16:01	Sat. Air	96.2	98.9	OK
	3/11/18	08:32	Sat. Air	102.2	99.8	OK
	3/11/18	16:23	Sat. Air	98.0	98.8	OK
	3/12/18	07:01	Sat. Air	100.4	99.8	OK
	3/12/18	12:44	Sat. Air	100.4	99.8	OK
	3/12/18	16:10	Sat. Air	94.4	98.8	OK
	3/12/18	16:27	Sat. Air	98.6	98.9	OK
pH (SU)	3/10/18	16:14	7.00	6.90	6.97	OK
			10.00	9.97	10.00	
	3/11/18	16:31	7.00	7.07	6.98	OK
			10.00	10.09	10.00	
	3/12/18	16:24	7.00	7.03	7.04	OK
			10.00	10.02	10.00	
Specific Conductivity (µS/cm)	3/10/18	16:04	53000	52977	53005	OK
	3/11/18	16:25	53000	52658	53022	OK
	3/12/18	16:16	53000	53586	52999	OK

Turbidity Data and Calibration

Turbidity Calibration (NTU)						
Standard	**Date**	**Time**	**Rep1**	**Rep2**	**Rep3**	**Average**
Pre-measurement Calibration						
0.129±0.006	3/13/2018	8:15	0.12	0.12	0.12	0.12
0.3		8:18	0.31	0.3	0.31	0.31
0.5		8:21	0.53	0.52	0.52	0.52
1		8:26	0.98	0.98	0.98	0.98
Post-measurement Calibration						
0.129±0.006	3/13/2018	12:14	0.12	0.12	0.13	0.12
0.3		12:17	0.30	0.30	0.30	0.30
0.5		12:21	0.53	0.53	0.53	0.53
1		12:25	1.02	1.02	1.02	1.02



Turbidity Measurements - March 2018							
Station	**Analysis Date and Time**		**Rep 1**	**Rep 2**	**Rep 3**	**Average**	**Corrected***
Utulei Stations							
C-S	3/13/2018	8:37	0.26	0.26	0.26	0.26	0.26
C-M	3/13/2018	8:40	0.35	0.35	0.35	0.35	0.35
C-B	3/13/2018	8:43	0.38	0.38	0.37	0.37	0.37
A1-S	3/13/2018	8:45	0.29	0.29	0.29	0.29	0.29
A1-M	3/13/2018	8:48	0.35	0.36	0.36	0.36	0.36
A1-B	3/13/2018	8:54	0.23	0.23	0.23	0.23	0.23
U-S	3/13/2018	8:58	0.28	0.28	0.28	0.28	0.28
U-M	3/13/2018	9:00	0.28	0.27	0.27	0.27	0.27
U-B	3/13/2018	9:05	0.34	0.34	0.33	0.33	0.33
B1-S	3/13/2018	9:11	0.28	0.27	0.27	0.27	0.27
B1-M	3/13/2018	9:15	0.33	0.33	0.32	0.32	0.32
B1-B	3/13/2018	9:17	0.31	0.32	0.32	0.32	0.32
XFF-S	3/13/2018	9:23	0.18	0.18	0.17	0.17	0.17
XFF-M	3/13/2018	9:29	0.13	0.13	0.12	0.12	0.12
XFF-B	3/13/2018	9:35	0.21	0.20	0.21	0.21	0.21
FF-S	3/13/2018	9:38	0.16	0.15	0.16	0.16	0.16
FF-M	3/13/2018	9:41	0.13	0.13	0.13	0.13	0.13
FF-B	3/13/2018	9:43	0.16	0.17	0.16	0.16	0.16
5-S	3/13/2018	11:42	0.21	0.21	0.21	0.21	0.21
5-M	3/13/2018	11:45	0.33	0.33	0.33	0.33	0.33
5-B	3/13/2018	11:47	0.23	0.23	0.23	0.23	0.23
16-S	3/13/2018	11:49	0.28	0.28	0.28	0.28	0.28
16-M	3/13/2018	11:51	0.23	0.23	0.23	0.23	0.23
16-B	3/13/2018	11:54	0.30	0.30	0.30	0.30	0.30
18-S	3/13/2018	9:45	0.21	0.21	0.21	0.21	0.21
18-M	3/13/2018	9:48	0.23	0.23	0.23	0.23	0.23
18-B	3/13/2018	9:50	0.22	0.23	0.22	0.22	0.22
Tafuna Stations							
TC-S	3/13/2018	10:58	0.16	0.15	0.16	0.16	0.16
TC-M	3/13/2018	11:02	0.10	0.10	0.10	0.10	0.10
TC-B	3/13/2018	11:04	0.13	0.13	0.13	0.13	0.13
TA1-S	3/13/2018	11:06	0.21	0.21	0.21	0.21	0.21
TA1-M	3/13/2018	11:09	0.13	0.13	0.14	0.14	0.14
TA1-B	3/13/2018	11:11	0.17	0.17	0.17	0.17	0.17
TA2-S	3/13/2018	11:15	0.30	0.30	0.30	0.30	0.30
TA2-M	3/13/2018	11:18	0.14	0.14	0.14	0.14	0.14
TA2-B	3/13/2018	11:20	0.20	0.20	0.20	0.20	0.20
TB-S	3/13/2018	11:22	0.17	0.17	0.17	0.17	0.17
TB-M	3/13/2018	11:25	0.17	0.17	0.17	0.17	0.17
TB-B	3/13/2018	11:32	0.35	0.32	0.35	0.35	0.35
TFF-S	3/13/2018	11:35	0.14	0.14	0.14	0.14	0.14
TFF-M	3/13/2018	11:37	0.13	0.13	0.13	0.13	0.13
TFF-B	3/13/2018	11:40	0.15	0.15	0.15	0.15	0.15
S = near-surface sample							
M= mid-depth sample							
B = near-bottom sample							
* Corrected using secondary calibration curve							

Attachments Provided on CD-ROM

ATTACHMENT 1: Laboratory Results

1.1 Chemistry Data (Utulei Stations)-ALS Environmental
1.2 Chemistry Data (Utulei/JCO Stations)-ALS Environmental
1.3 Chemistry Data (Utulei Stations)-Enthalpy Analytical
1.2 Chemistry Data (Utulei/JCO Stations)-Enthalpy Analytical

ATTACHMENT 2: Sediment Analysis – ALS Environmental

APPENDIX D-4
EPA NOTICE TO RESOLVE CWA VIOLATIONS (2021)

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9
75 Hawthorne Street
San Francisco, CA 94105

Via Electronic Mail

Fa'i Mareko, Manager
Wastewater Division
American Samoa Power Authority
P.O. Box PPB
Pago Pago, AS 96799
faim@aspower.com

RE: Notice of Opportunity to Resolve Clean Water Act Violations

Dear Fa'i Mareko:

This letter is to inform you of an ongoing investigation by the United States Environmental Protection Agency, Region 9, (EPA or Agency) of potential violations of Section 301(a) and requirements of your permits issued pursuant to Section 402 of the Clean Water Act (CWA), 33. U.S.C. § 1311(a) and 1342, resulting from the American Samoa Power Authority's (Respondent) operation of the Utulei Sewage Treatment Plant and the Tafuna Sewage Treatment Plant (Facilities).

Section 301(a) of the Clean Water Act provides that "the discharge of any pollutant by any person shall be unlawful" unless the discharge is in compliance with certain other sections of the Act. 33 U.S.C. § 1131(a), including Section 402. Under Section 402(a), the EPA may "issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding Section 1311(a)," upon certain conditions required by the CWA. The permitting program established by Section 402 is known as the National Pollutant Discharge Elimination System (NPDES).

ASPA is currently operating the Facilities under two NPDES permits issued by EPA. The Tafuna NPDES permit, NPDES Permit No. AS0020010, was last issued by EPA on September 30, 1999, effective November 2, 1999. This permit expired at midnight on November 1, 2004, but was administratively continued by EPA, pursuant to 40 C.F.R. 122.6, and remains in effect until EPA reissues this permit. The Utulei NPDES permit, NPDES Permit No. AS0020001, was issued by EPA on October 5, 2001, effective October 9, 2001, and expired at midnight on October 9, 2006, but was also administratively continued. On November 18, 2019, the Utulei permit was issued by EPA and most conditions went into effect on February 15, 2020. The permit was modified with regard to four provisions and that modification became effective on August 1, 2021.

On November 30, 2020, via a conference call on Microsoft Teams with representatives from ASPA, EPA inspectors conducted a virtual inspection of the Facilities to evaluate the Respondent's compliance with its NPDES permits. EPA sent reports of these virtual inspections to the Respondent on January 21, 2021 which identified several areas of concerns and asked for ASPA's response. ASPA provided responses to these areas of concern on March 9 and March 12, 2021. On May 5, 2021, EPA requested additional information regarding recordkeeping and reporting of effluent samples, sanitary sewer overflows,

bypasses of UV disinfection systems, and plans for sewage sludge handling and management. Respondent provided a response to the information request on June 30, 2021. EPA provided a list of questions regarding the June Response and ASPA submitted additional information on September 10 and September 29, 2021.

To date, EPA's investigation at the Facilities has identified potential noncompliance with Respondent's NPDES permits and the CWA. Specifically, evidence gathered by the EPA indicates that Respondent may have failed to:

1. Collect numerous effluent monitoring samples and analyze for oil and grease and whole effluent toxicity at both Facilities;
2. Collect numerous effluent samples and analyze for phosphorus and nitrogen at the Utulei Sewage Treatment Plant;
3. Develop a Quality Assurance Manual for the field collection and laboratory analysis of samples at the Utulei Sewage Treatment Plant;
4. Accurately report effluent monitoring sample results for multiple parameters in discharge monitoring reports for both Facilities;
5. Report the date and time of sanitary sewer overflows, including time that the Respondent first became aware of each of the sanitary sewer overflow incidents at the Utulei Sewage Treatment Plant and collection system;
6. Notify EPA of anticipated bypasses and sanitary sewer overflows within 24 hours and provide written submissions within 5 days of noncompliance at both Facilities;
7. Meet effluent limitations for oil and grease and enterococcus and percent removal requirements for BOD and TSS at the Utulei Sewage Treatment Plant;
8. Meet percent removal requirements for BOD and TSS at the Tafuna Sewage Treatment Plant;
9. Prevent bypass of UV disinfection system at the Tafuna Sewage Treatment Plant;
10. Test sewage sludge disposed of in a municipal solid waste landfill to demonstrate compliance with 40 CFR §§ 503.4 and 40 CFR 258.28, which prohibit disposal of materials with free liquids in a municipal solid waste landfill;
11. Ensure that sewage sludge disposed of in a municipal solid waste landfill met the requirements of 40 CFR §§ 503.4 and 40 CFR 258.28, which prohibit disposal of materials with free liquids in a municipal solid waste landfill; and
12. Properly operate and maintain the Utulei Sewage Treatment Plant and collection system to prevent sanitary sewer overflows.

The EPA seeks to discuss resolution of the currently identified CWA violations through an administrative settlement without litigation. Pursuant to Section 309 of the CWA, the United States can unilaterally seek compliance with the CWA and penalties for noncompliance with the NPDES permits by initiating either: a) a civil action in federal district court or b) an administrative action, either of which may include a complaint, demand for civil penalties and/or an order for compliance. Although such enforcement authorities are available to EPA, this letter provides you an opportunity to meet with EPA and submit additional information you believe relevant for the EPA to consider regarding the apparent violations.

If you would like to discuss settlement, please contact Daniel Kostek at (415) 972-3080 or by email at kostek.daniel@epa.gov, or have your legal counsel contact Desean Garnett in our Office of Regional Counsel at (415) 972-3046 or by email at garnett.desean@epa.gov no later than **December 10, 2021**. Please note that to the extent there is ongoing CWA noncompliance, the EPA specifically reserves the

right to use any and all enforcement tools at its disposal to address ongoing violations regardless of any future discussions in response to this letter.

The EPA has not determined whether you, either acting alone or in concert with another entity, constitute a "small business" under the Small Business Regulatory Enforcement and Fairness Act (SBREFA). Information on compliance assistance or contacting the SBREFA Ombudsman to comment on federal enforcement and compliance activities may be found at https://www.epa.gov/sites/production/files/2017-06/documents/smallbusinessinfo.pdf. Any decision to communicate with the SBREFA Ombudsman or to otherwise seek compliance assistance through this program does not relieve you of your obligation to respond in a timely manner to this letter or an EPA information request or an enforcement action, and does not create any new rights or defenses under law.

Please carefully consider the settlement negotiation opportunities being made available through this letter. We appreciate your cooperation and prompt response.

Sincerely,

Amy C. Miller-Bowen
Director
Enforcement and Compliance Assurance Division

cc (via email): Fa'amao Asalele, American Samoa Environmental Protection Agency
William Sili, American Samoa Environmental Protection Agency

APPENDIX D-5
TAFUNA STP WET ASSESSMENT AND MARCH 2023 PPS RESULTS

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TECHNICAL MEMORANDUM gdc

ASPA Tafuna STP Effluent WET Testing and Priority Pollutant Analysis: March 2023 Sampling

Prepared For:	ASPA
Prepared By:	gdc, 1024 10th Street, Fortuna, CA 95540, 707-407-5468
Date:	May 19, 2023
Distribution:	ASPA: Fa'i Mareko EPA Region 9: CDR Elena Vaouli, Daniel Kostek ASEPA: Fa'amao Asalele Jr., Director ; William S. Sili, Acting Director; Christianera A. Tuitele, Water Division

Executive Summary

A whole effluent toxicity (WET) test and priority pollutant scan (PPS) were performed on the effluent from the Tafuna sewage treatment plant (STP) in March 2023. The PPS included all 126 listed priority pollutants as well as hydrographic parameters (DO, pH, conductivity, temperature, and turbidity) measured at the time of sampling. Laboratory results for the Echinoderm Fertilization Bioassay indicated the NOEC at 0.3 percent sample, resulting in a TUc of 333. The Plant has a dilution credit requiring an NOEC of 0.6 percent effluent. The PPS results indicated 102 parameters were not detected and 24 were detected. Six detected parameters [Bis(2-ethylhexyl) Phthalate, Aldrin, Heptachlor, alpha-BHC, Endrin, and Copper] were above the applicable water quality standard (WQS). Only copper and Endrin were detected above the chronic criterion for aquatic life in salt water. Both parameters would easily achieve the WQS with a dilution factor of less than 2:1. The remaining four detected priority pollutants were above the Human Health criterion for the consumption of organism. All four parameters were flagged by the laboratory as estimated concentrations, above the method detection limit (MDL) but below the method reporting limit (MRL), and may not be accurate or precise. None of the 126 priority pollutants assessed are likely to be a cause of toxicity given the Plant's dilution credit of 173:1

Review of WET testing results from 2019 to present indicates the Tafuna STP met WET requirements in 2019 up until testing was suspended due to COVID 19 travel restrictions preventing shipping to the testing laboratory from American Samoa. WET testing resumed in late 2021 and periotic WET exceedances were observed. Investigations into likely causes of toxicity are believed to be associated with elevated total suspended solids (TSS) resulting from to one of the plant's three clarifiers being offline.

Introduction

The American Samoa Power Authority (ASPA) owns and operates the Tafuna STP and discharges treated domestic wastewater under a National Pollutant Discharge Elimination System (NPDES) Permit (No. AS0020010) into the Pacific Ocean. The permit became effective in 1999 and has been administratively extended since 2004. Part A.4 of the permit describes the whole effluent toxicity (WET) testing and includes the following requirements:

- *For this discharge, toxicity is defined by an exceedance of a chronic toxicity target value. These chronic toxicity target values are a Maximum Daily Value of 347 TUc, and an Average Monthly Value of 173 TUc.*
- *A series of five dilutions and a control shall be tested. The series shall include the two instream waste concentrations (IWCs) of 0.3% effluent and 0.6% effluent, one dilution below the IWC of 0.3% effluent, and two dilutions above the IWC of 0.6% effluent. The IWC is the percentage of effluent at the edge of the mixing zone over a specified averaging period.*

Review of WET testing results from 2019 to present indicates the Tafuna STP met WET requirements in 2019 up until testing was suspended because of COVID 19 travel restrictions that prevented shipping to the testing laboratory from American Samoa. WET testing resumed in late 2021 and periotic WET exceedances were observed. Table 1 provides a summary of the WET testing results in terms of chronic toxicity units (TUc) and percent effluent for the no observable effects concentration (NOEC). Figure 1 provides graphical representation of the TUc results in relation to the average monthly TUc value of 173.

During 2021, one of the Plant's three clarifiers was taken offline. Tafuna Tank #1 is offline for wet sludge storage. The cycle of sludge accumulation in the clarifiers followed by sludge removal and transport to the drying beds has been interrupted. The sludge drying beds are failing to drain properly due to age and cannot dry the sludge in a timely manner to keep up with sludge production at both Tafuna and Utulei treatment plants. New sludge drying beds are being constructed to hold the sludge which will be followed by refurbishing the existing drying beds to remedy the problem and increase future sludge drying capacity. As soon as the new drying beds are complete, estimated for June 2023, Tafuna Tank #1 will be drained of sludge and brought back online.

Testing of the WET sample for probable causes of the reduced WET survival testing results was initiated and is discussed in this Technical Memorandum. Testing included nitrogenous products in the effluent (that is, ammonia and nitrite), a PPS, and TSS investigations.

Table 1. Chronic Whole Effluent Toxicity Test Results for the Tafuna Seage Treatment Plant

Date	**Fertilization Test Species**	Toxicity Units (TU_c)	NOEC Percent Effluent
1st Quarter 2019 (3/4/2019)	*Strongylocentrotus purpuratus*	167	0.60
2nd Quarter 2019 (6/24/2019)	*Strongylocentrotus purpuratus*	167	0.60
3rd Quarter 2019 (7/1/2019)	*Strongylocentrotus purpuratus*	128.2	0.78
4th Quarter 2019 (12/16/2019)	*Strongylocentrotus purpuratus*	167	0.60
1st Quarter 2020 (3/2/2020)	*Strongylocentrotus purpuratus*	41.7	2.40
4th Quarter 2021 (12/6/2021)	*Strongylocentrotus purpuratus*	333	0.30
1st Quarter 2022 (2/17/2022)	*Strongylocentrotus purpuratus*	167	0.60
2nd Quarter 2022 (5/26/2022)	*Strongylocentrotus purpuratus*	83	1.20
3rd Quarter 2022 (8/29/2022)	*Strongylocentrotus purpuratus*	333	0.30
4th Quarter 2022 (10/17/2022)	*Strongylocentrotus purpuratus*	>667	>0.15
4th Quarter 2022 (11/30/2022)	*Strongylocentrotus purpuratus*	333	0.30
4th Quarter 2022 (12/08/2022)	*Strongylocentrotus purpuratus*	677	0.15
4th Quarter 2022 (12/21/2022)	*Strongylocentrotus purpuratus*	83	1.20
1st Quarter 2023 (1/23/2023)	*Strongylocentrotus purpuratus*	83	1.20
1st Quarter 2023 (1/30/2023)	*Strongylocentrotus purpuratus*	333	0.30
1st Quarter 2023 (3/23/2023)	*Strongylocentrotus purpuratus*	333	0.30

NOEC = no observable effects concentration. The highest concentration that causes no observable adverse effects on the test organism (that is, no statistically significant reduction from the control) using statistical hypothesis testing.

TU_c = chronic toxicity units ($100\%/LC_{50}$)

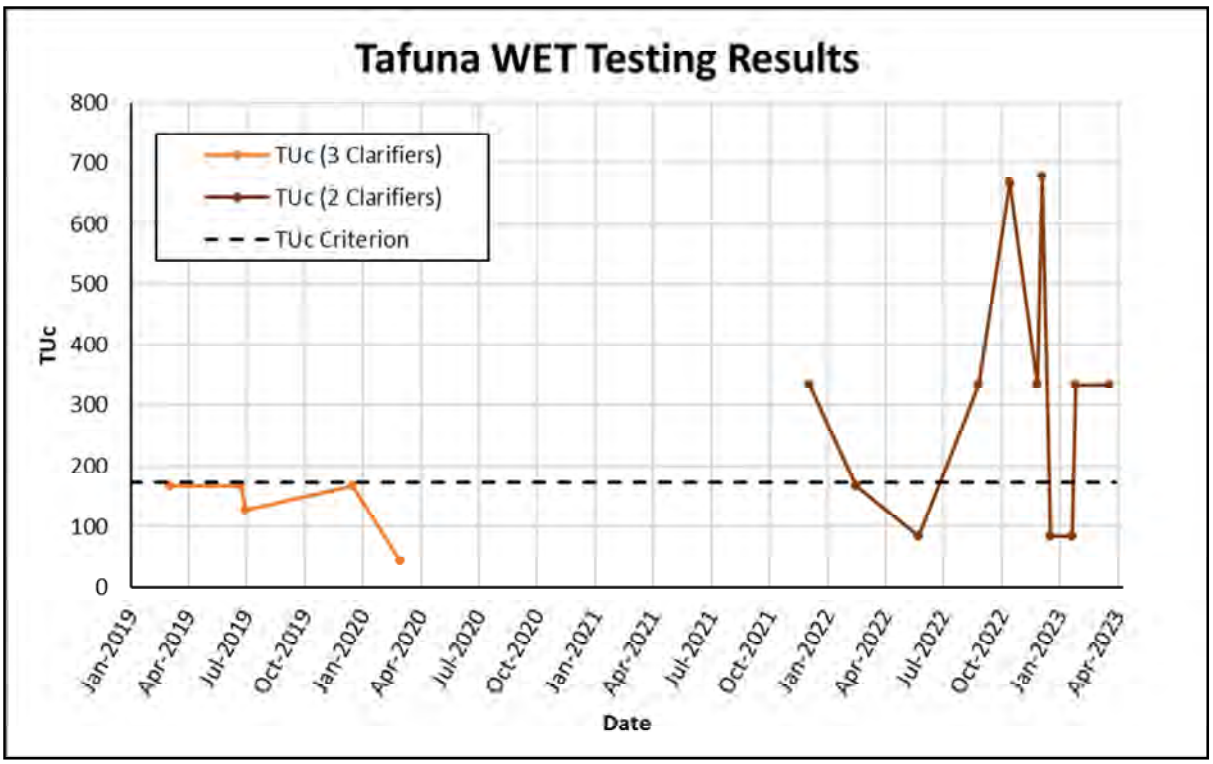


Figure 1. Plot of Chronic Whole Effluent Toxicity Test Results for the Tafuna Seage Treatment Plant

Sampling Location

The effluent sampling location is the NPDES permit established sampling point and is the same location used for sampling effluent for routine discharge monitoring reports (DMR). It is located downstream from the last treatment process and any in-plant return flows where a representative effluent sample can be obtained.

Effluent Sampling Methods: Initial Sampling

Plant staff used a plastic dipper on pole to collect grab samples directly from the effluent stream. Grab samples were collected over a 24-hour period and composited to generate the WET test sample. The composite sample was sent to Enthalpy Analytical (formerly Nautilus Environmental) in San Diego, California for WET testing using the required urchin fertilization test.

For the PPS testing, a grab sample of final effluent was collected from the Tafuna STP effluent stream at 0900 on March 23, 2023. With the exception of samples for volatile organic compounds (VOCs), a non-contact pump (peristaltic pump) and clean, parameter-free, Teflon tubing was used to draw sample water from the effluent stream. A dipper on a pole was lowered into the effluent stream to collect samples for VOCs. The effluent was pumped, or poured in the case of VOCs, into pre-preserved sample bottles supplied by the analytical laboratory doing the analyses. The sample bottles were stored on ice until being packed for shipping. The sample containers were packed on frozen gel packs, in an ice chest, for shipment to the laboratory. A chain-of-custody form for the samples was

completed and placed inside the chest. The samples were shipped to the analytical testing laboratory, ALS Global in Kelso Washington, USA, on the same day as collected. The chain-of-custody form is provided in laboratory report which is provided as Attachment 1. A YSI EXO2 sonde with parameter specific sensors was used to measure hydrographic parameters directly in the effluent at the time of grab sample collection.

Toxicity Source Investigation Results

Nitrogenous Parameters

Levels of ammonia in the Tafuna STP effluent used for the WET testing were elevated in Late 2022 and early 2023 as shown in Table 2. Ammonia was initially considered the most likely candidate for WET exceedances. Ammonia testing was performed by the bioassay laboratory on the WET sample (Table 2). When concentrations of ammonia were lower (i.e., 25.7 mg/L, see 12/21/2022 in Table 2) the TUc dropped to an acceptable level. However, discussion with the testing laboratory indicated that with a dilution credit greater than 100:1, the levels of ammonia observed should be reduced to concentrations that should not cause the toxicity results observed.

Table 2. Ammonia Levels in Chronic Whole Effluent Toxicity Test Results

Collection Date	TUc	EC25 (%)	NH_3 (mg/L)*	NO_2- (mg/L)
10/17/2022	>667	0.268	44	NA
11/30/2022	333	0.728	33.8	NA
12/08/2022	667	0.385	34.8	NA
12/21/2022	83	1.99	25.7	NA
1/23/2022	83	0.73	31.6	39
1/30/2022	333	0.73	29	29
3/23/2022	333	1.4	NA	11

* Based on 100 percent effluent used for WET testing

Nitrite was also examined as a potential cause of toxicity. Nitrite (NO_2-) was tested in the WET test samples from January 15, January 30, and March 23, 2023. Tests results are shown in Table 2. Base on toxicity observed and the concentration of nitrite measured prior to implementing the standard Tafuna dilution series, nitrite concentration was also considered to be insufficient to be the major source of the toxicity.

PPS sampling

On March 23, 2023, effluent was collected from the Tafuna STP to examine the possibility that WET TUc exceedances were associated with excessive total solids associated with the Tank #1 clarifier being offline and not a new parameter of concern entering the plant. Sampling for the PPS was performed during the 24-hour composite period used for the WET sample. The WET test results are summarized in Tables 1 and 2 for the March 23,

2023, sampling event. The complete laboratory WET report will be submitted to EPA and uploaded to NETDMR by ASPA as a separate document.

The PPS included all 126 listed priority pollutants as well as hydrographic parameters (DO, pH, conductivity, temperature, and turbidity) measured at the time of sampling. Field measured parameters collected immediately before and after grab sample collection are shown in Table 3. Temperature and pH meet the American Samoa Water Quality Standards (ASWQS) at end-of-pipe. Turbidity and dissolved oxygen should easily meet the ASWQS after dilution based on the existing mixing zone and associated initial dilution. It is noted that DO and pH were not an issue during toxicity testing, as described in the WET reports.

Table 3. Parameters Measured from the Tafuna Effluent Stream During the Priority Pollutant Scan on March 23, 2023.

Parameter	Units	Pre-event	Post-event
Time	hh:mm	09:00	09:15
Dissolved Oxygen	mg/L (% saturation)	0.12 (1.5)	0.06 (0.8)
pH	SU	7.00	7.01
Conductivity	mS/cm	1.824	1.833
Specific Conductance	mS/cm	1.701	1.707
Temperature	°C	28.17	28.88
Turbidity	NTU	105	101

A summary table of the results of the effluent sample analyses for priority pollutants is provided in Attachment 1. Detailed laboratory analytical results are provided in Attachment 2. Results of the PPS are compared to the most restrictive[1] USEPA National Recommended Water Quality Criteria (NRWQC)[2] and the American Samoa Environmental Protection Agency (ASEPA) water quality standards criteria[3]. Laboratory results indicated 102 parmaters were non-detect and 24 were detected. Detected parameters, along with water quality criterion are provided in Table 4.

Six detected parameters [Bis(2-ethylhexyl) Phthalate, Aldrin, Heptachlor, alpha-BHC, Endrin, and Copper] were above the applicable water quality standard (WQS). However, only copper and Endrin were detected above the WQS criteria for aquatic life in salt water.

[1] The discharge is to salt water; therefore, the most restrictive criteria were taken as the saltwater chronic criterion for the protection of aquatic life (criterion continuous concentration: CCC) or the human health criterion (HH) for ingestion of organisms only (seawater is not routinely consumed by humans). Note that the human health criterion is based on a long-term average exposure.

[2] The most recent version (as of the date of this report) of the USEPA National Recommended Water Quality Criteria (NRWQC) was used as required by the American Samoa Water Quality Standards (ASWQS) for those parameters not specifically listed with numerical criteria in the ASWQS.

[3] The current (as of the date of this report) ASWQS criteria were used if specific numerical criteria are listed.

- Eldrin was reported at an estimated concentration of 0.0025 µg/L which is below the acute aquatic life criterion (0.037 µg/L) but slightly above the chronic aquatic life criterion of 0.0023 µg/L. Eldrin was used as a pesticide to control insects, rodents, and birds but has not been produced or sold for general use in the United States since 1986. Therefore, Endrin is not likely to be a commonly occurring parameter in the Tafuna STP effluent and the detected levels are unlikely to affect WET after appropriate sample dilution.
- Copper (as total copper) was detected at a concentration of 7.96 µg/L which is above the acute and chronic aquatic life criteria (5.78 µg/L and 3.73 µg/L respectively. Copper is a common component in domestic wastewater. The detected levels are unlikely to affect WET after appropriate sample dilution.

Both parameters would easily achieve the WQS with a dilution factor of less than 2:1 and are therefore not considered like candidates for the source of toxicity considering the Tafuna STP dilution credit of 173:1.

The remaining four detected priority pollutants were above the Human Health criterion for the consumption of organism. All four parameters were flagged by the laboratory as estimated concentrations, above the method detection limit (MDL) but below the method reporting limit (MRL), and may not be accurate or precise.

- Bis(2-ethylhexyl) Phthalate is a manufactured chemical that is a commonly added to plastics to make them flexible. It is found in PVC used to make pipes. It is present in other plastic products such as wall paper, tablecloths, floor tiles, furniture and automobile upholstery, shower curtains, garden hoses, swimming pool liners, rainwear, baby pants, dolls, footwear, sheathing for wire and cable, medical tubing, and blood storage bags. It was detected at an estimated concentration of 6.6 µg/L.
- Aldrin is an organochlorine insecticide that was widely used until the 1990s, when it was banned in most countries. Aldrin quickly breaks down into Dieldrin. Dieldrin was not detected in the effluent. In 1987, EPA banned all uses of Aldrin and Dieldrin. Aldrin was reported at an estimated concentration of 0.0043 µg/L.
- Heptachlor was used extensively for killing insects in homes, buildings, and on food crops but these uses stopped in 1988. Bacteria and animals break down heptachlor to form heptachlor epoxide which is more likely to be found in the environment than heptachlor. heptachlor epoxide was not detected in the effluent. Hepachlor was reported at an estimated concentration of 0.0015 µg/L.
- alpha-BHC is one of eight isomers of Hexachlorocyclohexane (HCH). Technical-grade HCH was used as an insecticide in the United States, however, has not been produced or used in the United States in over 20 years.

None of the 126 priority pollutants assessed are likely to be a cause of toxicity given the Plant's dilution credit 173:1

Table 4 Priority Pollutants Detected from the Tafuna Effluent Stream, March 23, 2023.

Priority Pollutant Number	Parameter	Result	Qualifier	Human Health for the consumption of Organism Only (µg/L)	Aquatic Life Saltwater CMC (acute, µg/L)	Aquatic Life Saltwater CCC (chronic, µg/L)
4	Benzene	0.09	J	16	--	--
23	Chloroform	0.3	J	2,000	--	--
27	1,4-Dichlorobenzene	0.14	J	900	--	--
65	Phenol	13		300,000	--	--
66	Bis(2-ethylhexyl) Phthalate	6.6	J	0.037	--	--
70	Diethyl Phthalate	0.68	J	600	--	--
86	Toluene	1.5	J	520	--	--
89	Aldrin	0.0043	J	0.00000077	1.3	--
98	Endrin	0.0025	JP	0.03	0.037	0.0023
100	Heptachlor	0.0015	J	0.0000059	0.053	0.0036
102	alpha-BHC	0.0021	J	0.00039	--	--
114	Antimony, Total	0.154		640	--	--
115	Arsenic, Total	10 (ASWQS)		0.014	69	36
117	Beryllium, Total	0.005	J	--	--	--
118	Cadmium, Total	0.039		--	33	7.9
119	Chromium, Total	1.29		--	--	--
120	Copper, Total	7.96		--	4.8	3.1
122	Lead, Total	0.283		--	210	8.1
123	Mercury, Total	0.05 (ASWQS)		--	1.8	0.94
124	Nickel, Total	1.3		4600	74	8.2
125	Selenium, Total	0.4	J	4200	290	71
126	Silver, Total	0.026		--	1.9	--
127	Thallium, Total	0.01	J	0.47	--	--
128	Zinc, Total	48.9		26000	90	81

J = parameter was detected above the method detection limit (MDL) but below the method reporting limit (MRL)

TSS Investigation

Discussion with contractors performing WET testing on the effluent from 301(h) waiver wastewater treatment plants with marine discharges in Puerto Rico revealed that exceedances of WET criteria were infrequent but when they were observed, it was generally associated with periods of plant upset (that is, plant infrastructure being offline, such as clarifiers). Increased BOD and TSS were thought to be the primary causes of WET test failures at those facilities.

Dissolved oxygen levels during the WET test were typical and not considered to be associated with the observed low fertilization success. Following the WET testing of the May 1, 2023, Tafuna sample, the lab conducted a pilot study using some of the remaining WET test sample. A paired WET test was run at 0.92 percent effluent using filtered and unfiltered effluent. Unfiltered fertilization success was only 53% while the sample filtered with a 0.45-um filter resulted in 98 percent fertilization success. A formal paired filtration test was run on the May 17, 2023, Tafuna effluent sample. Results are shown in Table 5. Toxicity appears to be associated with filterable suspended solids.

Figure 2 provides the same toxicity results in TUc shown in Figure 1 along with the DMR reported daily maximum TSS for each month. A trend in elevated levels of TSS is clearly observed corresponding to the timing of when the Tafuna Tank 1 clarifier was taken offline.

While removal of TSS with filtration does not exclusively identify TSS, or a component of TSS, as the sole contributing parameter responsible for elevated TUc, it does support that that other parameters which would occur in a dissolved state in the effluent do not appear to be the cause of the elevated TUc. Further, APSA believes that when the third clarifier is brought back online, estimated for June 2023, TSS will be reduced to typical historic levels (left half of Figure 2) and TUc will decrease to levels observed pre-COVID 19 when compliance was routinely achieved.

Table 5. WET Test Results for Filtered and Unfiltered Tafuna STP Effluent, May 17, 2023.

Percent Effluent Tested	TUc Level	Percent Fertilization Unfiltered	Percent Fertilization Filtered (0.45-um)
0.15	667	87	95
0.30	333	96	93
0.60	167	80	92
1.20	83	59	98
2.40	41.7	0	94

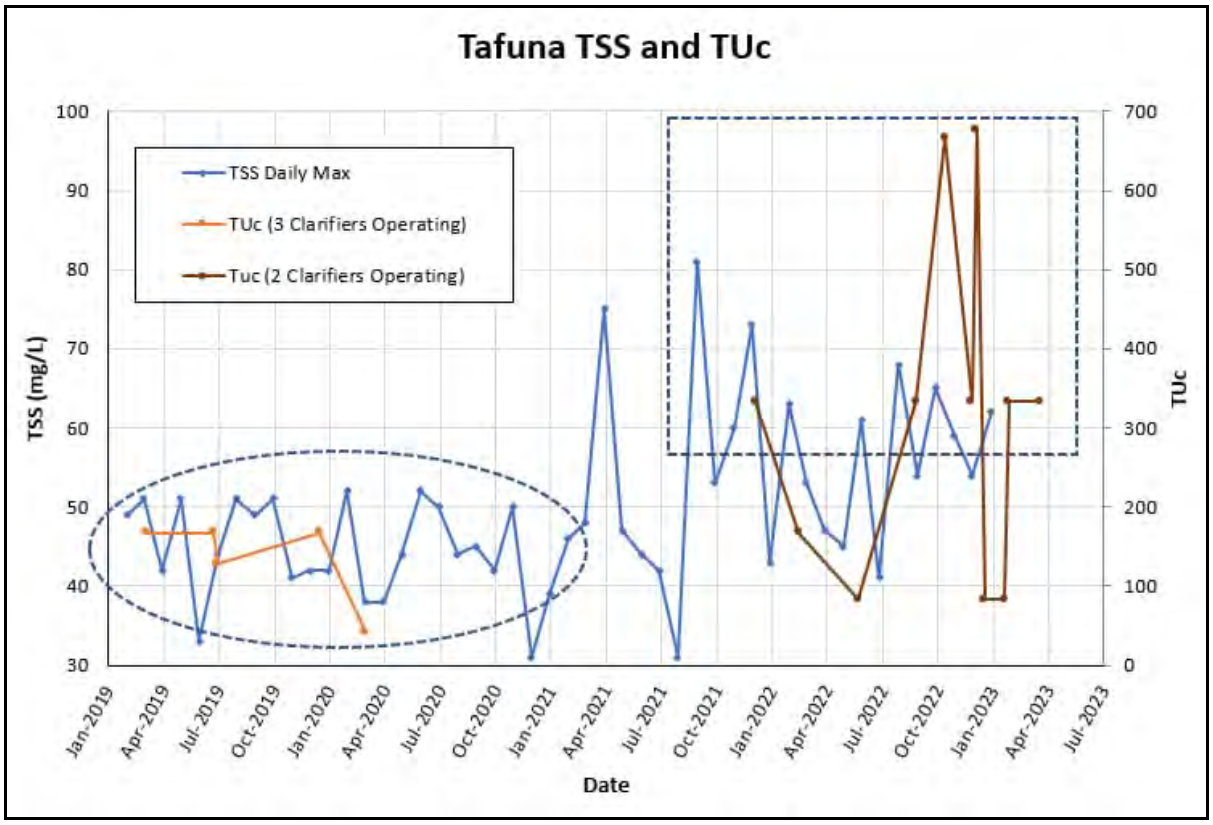


Figure 2. Plot of TSS and Chronic WET Test Results for the Tafuna Seage Treatment Plant

Conclusions and Recommendations

ASPA believes recent elevated WET testing results for TUc at the Tafuna STP are attributed to elevated TSS in the effluent stream resulting from one of the plant's three clarifiers being offline. A PPS was performed and considering the plant's 173:1 dilution credit, none of the 126 parameters tested were considered probable candidates for elevated toxicity. Paired WET testing using filtered and unfiltered sample indicated significantly lower toxicity in the filtered sample. ASPA should bring the third clarifier back online as soon as possible. TSS should be measured in future WET samples prior to shipping the sample to the bioassay laboratory. TSS testing of the WET sample should continue until TUc values drop to levels that are routinely in compliance.

ATTACHMENT 1

PPS Summary of Results

Attachment 1. ASPA Tafuna STP Priority Pollutant Scan Results, March 2023					
Number	Parameter	Method	Units	Reporting Limit	Result
1	Acenaphthene	625.1	µg/L	0.81	ND
2	Acrolein	624.1	µg/L	50	ND
3	Acrylonitrile	624.1	µg/L	100	ND
4	Benzene	624.1	µg/L	5	0.09 J
5	Benzidine	625.1	µg/L	2	ND
6	Carbon Tetrachloride	624.1	µg/L	5	ND
7	Chlorobenzene	624.1	µg/L	5	ND
8	1,2,4-Trichlorobenzene	625.1	µg/L	0.81	ND
9	Hexachlorobenzene	625.1	µg/L	0.81	ND
10	1,2-Dichloroethane (EDC)	624.1	µg/L	5	ND
11	1,1,1-Trichloroethane (TCA)	624.1	µg/L	5	ND
12	Hexachloroethane	625.1	µg/L	0.81	ND
13	1,1-Dichloroethane	624.1	µg/L	5	ND
14	1,1,2-Trichloroethane	624.1	µg/L	5	ND
15	1,1,2,2-Tetrachloroethane	624.1	µg/L	5	ND
16	Chloroethane	624.1	µg/L	5	ND
17	(Removed)				
18	Bis(2-chloroethyl) Ether	625.1	µg/L	0.81	ND
19	2-Chloroethyl Vinyl Ether	624.1	µg/L	10	ND
20	2-Chloronaphthalene	625.1	µg/L	0.81	ND
21	2,4,6-Trichlorophenol	625.1	µg/L	0.81	ND
22	Parachlorometa cresol [4-Chloro-3-methylphenol]	625.1	µg/L	0.81	ND
23	Chloroform	624.1	µg/L	5	0.3 J
24	2-Chlorophenol	625.1	µg/L	0.81	ND
25	1,2-Dichlorobenzene	624.1	µg/L	5	ND
26	1,3-Dichlorobenzene	624.1	µg/L	5	ND
27	1,4-Dichlorobenzene	624.1	µg/L	5	0.14 J
28	3,3'-Dichlorobenzidine	625.1	µg/L	0.81	ND
29	1,1-Dichloroethene	624.1	µg/L	5	ND
30	1,2-trans-dichloroethylene [trans-1,2-Dichloroethene]	624.1	µg/L	5	ND
31	2,4-Dichlorophenol	625.1	µg/L	0.81	ND
32	1,2-Dichloropropane	624.1	µg/L	5	ND
33	cis-1,3-Dichloropropene	624.1	µg/L	5	ND
	trans-1,3-Dichloropropene	624.1	µg/L	5	ND
34	2,4-Dimethylphenol	625.1	µg/L	0.81	ND
35	2,4-Dinitrotoluene	625.1	µg/L	0.81	ND
36	2,6-Dinitrotoluene	625.1	µg/L	0.81	ND

Attachment 1. ASPA Tafuna STP Priority Pollutant Scan Results, March 2023					
37	1,2-Diphenylhydrazine	625.1	µg/L	0.81	ND
38	Ethylbenzene	624.1	µg/L	5	ND
39	Fluoranthene	625.1	µg/L	0.81	ND
40	4-Chlorophenyl Phenyl Ether	625.1	µg/L	0.81	ND
41	4-Bromophenyl Phenyl Ether	625.1	µg/L	0.81	ND
42	Bis(2-chloroisopropyl) ether	625.1	µg/L	0.81	ND
43	Bis(2-chloroethoxy)methane	625.1	µg/L	0.81	ND
44	Methylene Chloride (Dichloromethane)	624.1	µg/L	5	ND
45	Methyl chloride (Chloromethane)	624.1	µg/L	5	ND
46	Methyl bromide (Bromomethane)	624.1	µg/L	5	ND
47	Bromoform	624.1	µg/L	5	ND
48	Dichlorobromomethane (Bromodichloromethane)	624.1	µg/L	5	ND
49	(Removed)		µg/L		
50	(Removed)		µg/L		
51	Dibromochloromethane (Chlorodibromomethane)	624.1	µg/L	5	ND
52	Hexachlorobutadiene	625.1	µg/L	0.81	ND
53	Hexachlorocyclopentadiene	625.1	µg/L	4.1	ND
54	Isophorone	625.1	µg/L	0.81	ND
55	Naphthalene	625.1	µg/L	0.81	ND
56	Nitrobenzene	625.1	µg/L	0.81	ND
57	2-Nitrophenol	625.1	µg/L	0.81	ND
58	4-Nitrophenol	625.1	µg/L	2	ND
59	2,4-Dinitrophenol	625.1	µg/L	4.1	ND
60	4,6-dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	625.1	µg/L	4.1	ND
61	N-Nitrosodimethylamine	625.1	µg/L	0.81	ND
62	N-Nitrosodiphenylamine	625.1	µg/L	0.81	ND
63	N-Nitrosodi-n-propylamine	625.1	µg/L	0.81	ND
64	Pentachlorophenol (PCP)	625.1	µg/L	2	ND
65	Phenol	625.1	µg/L	0.81	13
66	Bis(2-ethylhexyl) Phthalate	625.1	µg/L	0.81	6.6 J
67	Butyl Benzyl Phthalate	625.1	µg/L	0.81	ND
68	Di-n-butyl Phthalate	625.1	µg/L	0.81	ND
69	Di-n-octyl Phthalate	625.1	µg/L	0.81	ND
70	Diethyl Phthalate	625.1	µg/L	0.81	0.68 J
71	Dimethyl Phthalate	625.1	µg/L	0.81	ND
72	Benz(a)anthracene	625.1	µg/L	0.81	ND

Attachment 1. ASPA Tafuna STP Priority Pollutant Scan Results, March 2023					
73	Benzo(a)pyrene	625.1	µg/L	0.81	ND
74	Benzo(b)fluoranthene	625.1	µg/L	0.81	ND
75	Benzo(k)fluoranthene	625.1	µg/L	0.81	ND
76	Chrysene	625.1	µg/L	0.81	ND
77	Acenaphthylene	625.1	µg/L	0.81	ND
78	Anthracene	625.1	µg/L	0.81	ND
79	Benzo(g,h,i)perylene	625.1	µg/L	0.81	ND
80	Fluorene	625.1	µg/L	0.81	ND
81	Phenanthrene	625.1	µg/L	0.81	ND
82	Dibenz(a,h)anthracene	625.1	µg/L	0.81	ND
83	Indeno(1,2,3-cd)pyrene	625.1	µg/L	0.81	ND
84	Pyrene	625.1	µg/L	0.81	ND
85	Tetrachloroethene (PCE)	624.1	µg/L	5	ND
86	Toluene	624.1	µg/L	5	1.5 J
87	Trichloroethene (TCE)	624.1	µg/L	5	ND
88	Vinyl Chloride	624.1	µg/L	5	ND
89	Aldrin	608.3	µg/L	0.01	0.0043 J
90	Dieldrin	608.3	µg/L	0.01	ND
91	Chlordane	608.3	µg/L	0.21	ND
92	4,4'-DDT	608.3	µg/L	0.01	ND
93	4,4'-DDE	608.3	µg/L	0.01	ND
94	4,4'-DDD	608.3	µg/L	0.01	ND
95	Endosulfan I	608.3	µg/L	0.01	ND
96	Endosulfan II	608.3	µg/L	0.01	ND
97	Endosulfan Sulfate	608.3	µg/L	0.01	ND
98	Endrin	608.3	µg/L	0.01	0.0025 J
99	Endrin Aldehyde	608.3	µg/L	0.01	ND
100	Heptachlor	608.3	µg/L	0.01	0.0015 J
101	Heptachlor Epoxide	608.3	µg/L	0.01	ND
102	alpha-BHC	608.3	µg/L	0.01	0.0021 J
103	beta-BHC	608.3	µg/L	0.044	ND
104	gamma-BHC (Lindane)	608.3	µg/L	0.01	ND
105	delta-BHC	608.3	µg/L	0.01	ND
106	PCB-1242 (Arochlor 1242)	608.3	µg/L	0.1	ND
107	PCB-1254 (Arochlor 1254)	608.3	µg/L	0.1	ND
108	PCB-1221 (Arochlor 1221)	608.3	µg/L	0.1	ND
109	PCB-1232 (Arochlor 1232)	608.3	µg/L	0.1	ND
110	PCB-1248 (Arochlor 1248)	608.3	µg/L	0.1	ND
111	PCB-1260 (Arochlor 1260)	608.3	µg/L	0.1	ND
112	PCB-1016 (Arochlor 1016)	608.3	µg/L	0.1	ND
113	Toxaphene	608.3	µg/L	0.52	ND
114	Antimony, Total	200.8	µg/L	0.05	0.154

Attachment 1. ASPA Tafuna STP Priority Pollutant Scan Results, March 2023					
115	Arsenic, Total	200.8	µg/L	0.5	0.75
116	Asbestos	ENV 005	MFL	<7MFL	ND
117	Beryllium, Total	200.8	µg/L	0.02	0.005 J
118	Cadmium, Total	200.8	µg/L	0.02	0.039
119	Chromium, Total	200.8	µg/L	0.2	1.29
120	Copper, Total	200.8	µg/L	0.1	7.96
121	Cyanide, Total	335.4	mg/L	0.005	ND
122	Lead, Total	200.8	µg/L	0.02	0.283
123	Mercury, Total	1631E	µg/L	0.0005	0.024
124	Nickel, Total	200.8	µg/L	0.2	1.3
125	Selenium, Total	200.8	µg/L	1	0.4 J
126	Silver, Total	200.8	µg/L	0.02	0.026
127	Thallium, Total	200.8	µg/L	0.02	0.01 J
128	Zinc, Total	200.8	µg/L	2	48.9
129	2,3,7,8-TCDD (2,3,7,8-Tetrachlorodibenzo-p-dioxin)	USEPA 1613B	pg/L	10	ND

ND = not detected
J = parameter was detected above the method detection limit (MDL) but below the method reporting limit (MRL)

ATTACHMENT 2

Laboratory Results

(Provided as pdf files)

APPENDIX E
FAA SETBACKS

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DEVIATIONS FROM FAA STANDARDS

	DESCRIPTION	REQUIRED	EXISTING	FUTURE	ACTION
A	RUNWAY SAFETY AREA AND RUNWAY OBJECT FREE AREA BEYOND RUNWAY 23 END	1,000'	200'	200'	APPLY DECLARED DISTANCES
A	RUNWAY OBJECT FREE AREA HALF WIDTH	400'	250'	250'	PERIMETER FENCE TO REMAIN
A	PRECISION OBSTACLE FREE ZONE HALF WIDTH	400'	306'	306'	SEWER PLANT TO REMAIN PERIMETER FENCE TO REMAIN

PAVEMENT DATA

PAVEMENT AREA	PCN*	STRENGTH (000 lbs)
RUNWAY 5-23	60/F/A/W/T	75/170/250/600
RUNWAY 8-26	45/F/A/W/T	75/150/230/550 (See Note 6)
TAXIWAY A	57/F/A/W/T	75/200/400/887
TAXIWAY B	52/F/A/W/T	75/200/400/782
TAXIWAY C	60/F/A/W/T	75/200/400/877
APRON AREA 1	60/F/A/W/T	UNKNOWN
APRON AREA 2	23/F/A/W/T	UNKNOWN

* Source: Pavement PCN Plan (2010)

DECLARED DISTANCES

	RUNWAY 5		RUNWAY 23	
	EXISTING	FUTURE	EXISTING	FUTURE
TAKEOFF RUN AVAILABLE (TORA)	9,200'	SAME	10,000'	SAME
TAKEOFF DISTANCE AVAILABLE (TODA)	10,200'	SAME	10,000'	SAME
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	9,200'	SAME	10,000'	SAME
LANDING DISTANCE AVAILABLE (LDA)	8,200'	SAME	9,200'	SAME

MONUMENT DATA

	NAME	HEIGHT	NORTHING	EASTING
1	TAFUNA 2 RESET ET	16.34'	288117.04	246482.44
2	TAFUNA 1A RESET ET	5.91'	288135.93	261479.78
3	ARP	8.2'	287280.20	248857.51
4	TAFUNA AIRPORT B	0.0'	287090.40	249091.29
5	TAFUNA USWB GMD	0.0'	286709.04	247999.19
6	SAT TR STA	12.6'	286417.51	247656.54
7	BM 1 RNG	26.51'	283975.84	244484.78
8	RUNWAY ET	29.88'	283735.24	244626.92

See note 11.

BUILDING TABLE

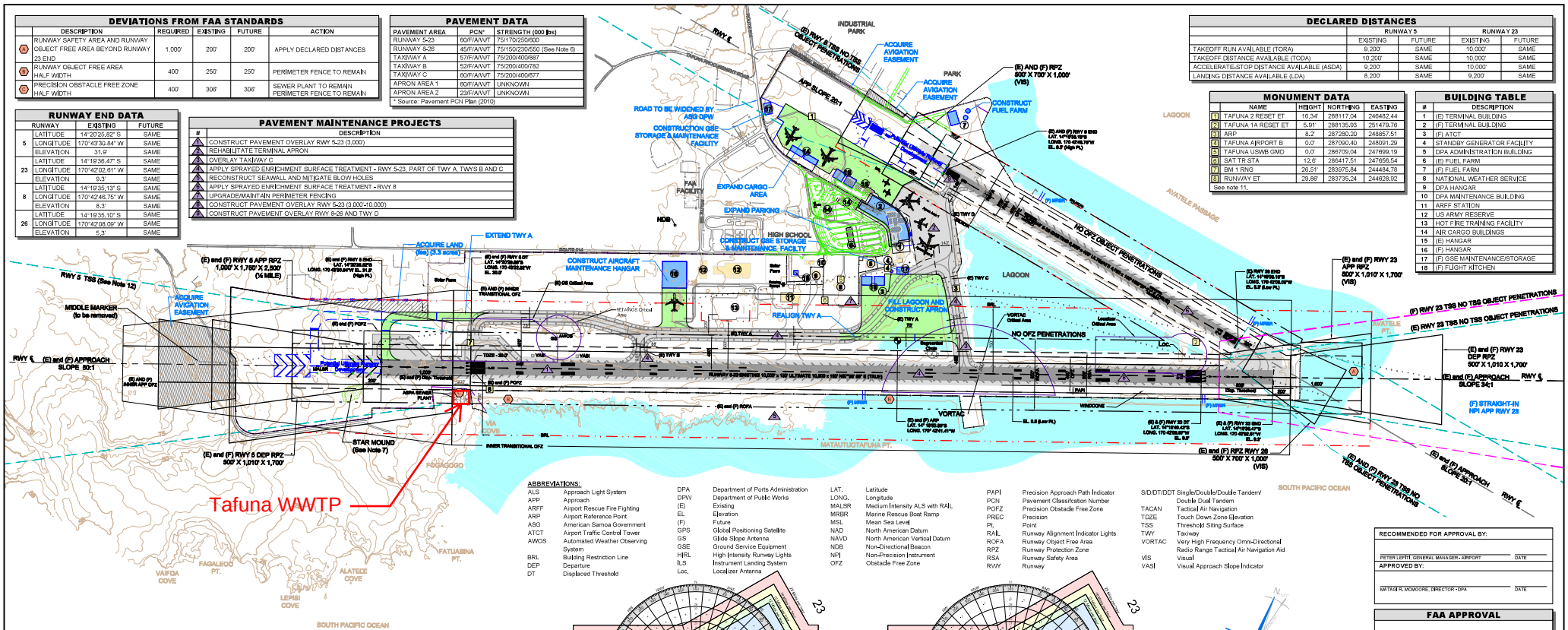
#	DESCRIPTION
1	(E) TERMINAL BUILDING
2	(F) TERMINAL BUILDING
3	(F) ATCT
4	STANDBY GENERATOR FACILITY
5	DPA ADMINISTRATION BUILDING
6	(E) FUEL FARM
7	(F) FUEL FARM
8	NATIONAL WEATHER SERVICE
9	DPA HANGAR
10	DPA MAINTENANCE BUILDING
11	ARFF STATION
12	US ARMY RESERVE
13	HOT FIRE TRAINING FACILITY
14	AIR CARGO BUILDINGS
15	(E) HANGAR
16	(F) HANGAR
17	(F) GSE MAINTENANCE/STORAGE
18	(F) FLIGHT KITCHEN

RUNWAY END DATA

RUNWAY		EXISTING	FUTURE
5	LATITUDE	14°20'25.82" S	SAME
	LONGITUDE	170°43'30.84" W	SAME
	ELEVATION	31.9'	SAME
23	LATITUDE	14°19'36.47" S	SAME
	LONGITUDE	170°42'02.61" W	SAME
	ELEVATION	9.3'	SAME
8	LATITUDE	14°19'35.13" S	SAME
	LONGITUDE	170°42'46.75" W	SAME
	ELEVATION	8.3'	SAME
26	LATITUDE	14°19'35.10" S	SAME
	LONGITUDE	170°42'08.09" W	SAME
	ELEVATION	5.3'	SAME

PAVEMENT MAINTENANCE PROJECTS

#	DESCRIPTION
1	CONSTRUCT PAVEMENT OVERLAY RWY 5-23 (3,000')
2	REHABILITATE TERMINAL APRON
3	OVERLAY TAXIWAY C
4	APPLY SPRAYED ENRICHMENT SURFACE TREATMENT - RWY 5-23, PART OF TWY A, TWYS B AND C
5	RECONSTRUCT SEAWALL AND MITIGATE BLOW HOLES
6	APPLY SPRAYED ENRICHMENT SURFACE TREATMENT - RWY 8
7	UPGRADE/MAINTAIN PERIMETER FENCING
8	CONSTRUCT PAVEMENT OVERLAY RWY 5-23 (3,000'-10,000')
9	CONSTRUCT PAVEMENT OVERLAY RWY 8-26 AND TWY D



ABBREVIATIONS:

ALS	Approach Light System	DPA	Department of Ports Administration	LAT.	Latitude	PAPI	Precision Approach Path Indicator
APP	Approach	DPW	Department of Public Works	LONG.	Longitude	PCN	Pavement Classification Number
ARFF	Airport Rescue Fire Fighting	(E)	Existing	MALSR	Medium Intensity ALS with RAIL	POFZ	Precision Obstacle Free Zone
ARP	Airport Reference Point	EL	Elevation	MRBR	Marine Rescue Boat Ramp	PREC	Precision
ASG	American Samoa Government	(F)	Future	MSL	Mean Sea Level	Pt.	Point
ATCT	Airport Traffic Control Tower	GPS	Global Positioning Satellite	NAD	North American Datum	RAIL	Runway Alignment Indicator Lights
AWOS	Automated Weather Observing System	GS	Glide Slope Antenna	NAVD	North American Vertical Datum	ROFA	Runway Object Free Area
BRL	Building Restriction Line	GSE	Ground Service Equipment	NDB	Non-Directional Beacon	RPZ	Runway Protection Zone
DEP	Departure	HIRL	High Intensity Runway Lights	NPI	Non-Precision Instrument	RSA	Runway Safety Area
DT	Displaced Threshold	ILS	Instrument Landing System	OFZ	Obstacle Free Zone	RWY	Runway
		Loc.	Localizer Antenna				

S/D/DT/DDT	Single/Double/Double Tandem/ Double Dual Tandem
TACAN	Tactical Air Navigation
TDZE	Touch Down Zone Elevation
TSS	Threshold Siting Surface
TWY	Taxiway
VORTAC	Very High Frequency Omni-Directional Radio Range Tactical Air Navigation Aid
VIS	Visual
VASI	Visual Approach Slope Indicator

RECOMMENDED FOR APPROVAL BY:

PETER LEPPT, GENERAL MANAGER - AIRPORT — DATE

APPROVED BY:

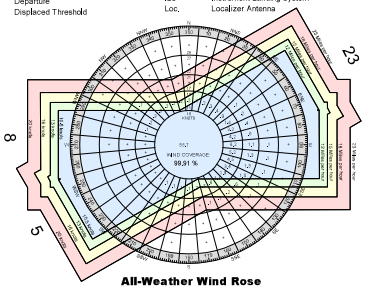
MATAGI R. MCMOORE, DIRECTOR - DPA — DATE

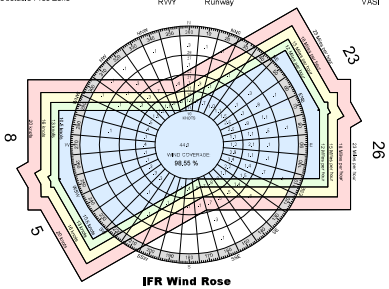
FAA APPROVAL

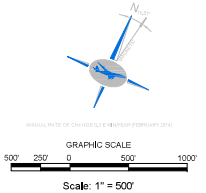
RUNWAY DATA

DESCRIPTION		RUNWAY 5-23 EXISTING	RUNWAY 5-23 FUTURE	RUNWAY 8-26 EXISTING	RUNWAY 8-26 FUTURE
AIRPORT REFERENCE CODE		D-V	SAME	B-III	SAME
EFFECTIVE GRADIENT (IN %)		0.23	SAME	0.11	SAME
MAXIMUM GRADIENT (IN %)		0.76	SAME	0.33	SAME
WIND COVERAGE % (20 KNOTS)		99.55	SAME	99.89	SAME
APPROACH VISIBILITY MINIMUMS		1/2 mi (5), VIS (23)	SAME	VIS / VIS	SAME
DESIGN AIRCRAFT	MAKE AND MODEL	B747-400	SAME	DHC-8/Dx328	SAME
	WINGSPAN (FEET)	213	SAME	85	SAME
	UNDERCARRIAGE WIDTH (FEET)	36.1	SAME	25.8	SAME
	APPROACH SPEED (KNOTS)	154	SAME	90	SAME
	MAX. TAKEOFF WEIGHT (LBS)	870,000	SAME	36,300	SAME
RUNWAY MARKING		PRECISION	SAME	NON-PRECISION	SAME
APPROACH CATEGORY (FAR PART 77)		PREC / VIS	PREC / NPI	VIS / VIS	SAME
RUNWAY CENTERLINE TO HOLD LINE		250'	SAME	250'	SAME
RUNWAY CENTERLINE TO TWY CENTERLINE		400'-570' (VARIES)	SAME	500'	SAME
TAXIWAY ¶ TO FIXED OR MOVABLE OBJECT		160'	SAME	160'	SAME
TAXIWAY OBJECT FREE AREA WIDTH		320'	SAME	320'	SAME
TAXIWAY SAFETY AREA WIDTH		214'	SAME	214'	SAME
TAXIWAY WINGTIP CLEARANCE		53'	SAME	53'	SAME
RUNWAY ELEVATIONS (NAVD 88)	TOUCHDOWN ZONE (TDZ)	30 (5), N/A (23)	SAME	N/A	SAME
	HIGH POINT	31.9'	SAME	8.3'	SAME
	LOW POINT	8.5'	SAME	5.3'	SAME
LINE OF SIGHT REQUIREMENT MET		YES	SAME	YES	SAME
RUNWAY LENGTH		10,000'	SAME	3,800'	SAME
RUNWAY WIDTH		150'	SAME	100'	SAME
RUNWAY/TAXIWAY SURFACE TYPE		ASPH-CONC	SAME	ASPH-CONC	SAME
APPROACH SLOPE		50:1 / 20:1	SAME	20:1 / 20:1	SAME
RUNWAY LIGHTING		HIRL	SAME	HIRL	SAME
NAVIGATIONAL AIDS		ILS (5)	SAME	NONE	SAME
VISUAL AIDS		VASI (5), PAPI (23)	SAME	NONE	SAME
RUNWAY SAFETY AREA	LENGTH*	1,000'	SAME	600'	SAME
	WIDTH	500'	SAME	300'	SAME
RUNWAY OBJECT FREE AREA	LENGTH*	1,000'	SAME	600'	SAME
	WIDTH	800'	SAME	800'	SAME
OBSTACLE FREE ZONE	LENGTH*	200'	SAME	200'	SAME
	WIDTH	400'	SAME	400'	SAME
RUNWAY CENTERLINE TO HOLD BARS		292' - 452'	SAME	146'	SAME

* Length beyond runway end.
* See Note 6.







LEGEND

DESCRIPTION	EXISTING	FUTURE
AIRPORT BOUNDARY		
AIRFIELD PAVEMENT		
BUILDING RESTRICTION LINE (BRL)		SAME
RUNWAY OBJECT FREE AREA (ROFA)		SAME
RUNWAY SAFETY AREA (RSA)		SAME
OBSTACLE FREE ZONE (OFZ)		SAME
RUNWAY PROTECTION ZONE		SAME
BUILDINGS		
BUILDINGS TO BE REMOVED	NONE	
GROUND CONTOURS	410'	SAME
AIRPORT REFERENCE POINT (ARP)		SAME
HOLD POSITION MARKINGS		
THRESHOLD SITING SURFACE		
AIRPORT PERIMETER FENCE		
ROAD		
ROTATING BEACON		SAME
ATCT LINE OF SIGHT	NONE	
RUNWAY LIGHTS		SAME
WIND CONE	FC	SAME
NAVAID CRITICAL AREAS		SAME
MONUMENT (SEE NOTE 11)		SAME
ENVIRONMENTALLY SENSITIVE AREA		SAME

WIND DATA

RUNWAY	ALL-WEATHER CROSSWIND COVERAGE 10.5 Kts	13 Kts	16 Kts	20 Kts	INSTRUMENT CROSSWIND COVERAGE 10.5 Kts	13 Kts	16 Kts	20 Kts
05	66.47%	73.73%	78.58%	80.35%	49.21%	56.40%	62.12%	66.58%
23	21.34%	22.15%	23.07%	23.42%	22.76%	25.60%	28.74%	30.59%
08	74.84%	77.35%	78.61%	78.99%	53.57%	59.10%	63.27%	65.37%
26	23.82%	24.48%	25.00%	25.12%	27.08%	29.66%	32.00%	33.54%
05-23	83.54%	91.62%	97.40%	99.52%	71.03%	81.04%	89.91%	96.20%
08-26	94.41%	97.59%	99.36%	99.88%	79.67%	87.80%	94.32%	97.94%
COMBINED	95.56%	98.16%	99.50%	99.91%	84.25%	90.72%	95.63%	98.54%

Based on 76,288 observations (1989 - 2008) taken at Pago Pago International Airport.
Source: National Climatic Data Center Asheville, NC.

AIRPORT DATA

DESCRIPTION		EXISTING	FUTURE
AIRPORT ELEVATION (MSL)		32'	SAME
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83)	LATITUDE	14°19'53.98" S	SAME
	LONGITUDE	170°42'41.41" W	SAME
NAVAIDS (ILS, BEACON, ALS)		BEACON, ILS, NDB VORTAC, TACAN	SAME, ATCT
MEAN MAX. TEMP. OF HOTTEST MONTH		88°	SAME
AIRPORT REFERENCE CODE		D-V	SAME
GPS AT AIRPORT		YES	SAME

NOTES:

1. All elevations are in feet above mean sea level (MSL) and are NAVD 88.
2. Latitude and longitude coordinates are NAD 83.
3. All runways and taxiways have 35-foot paved shoulders.
4. Existing declared distances shown per Airport/Facility Directory, PAC, 3 June 2010 to 29 July 2010. Ultimate declared distances to be confirmed once the runway extension is complete.
5. American Samoa has not been sectioned.
6. Runway 8-26 is used as a taxiway by ADG IV aircraft.
7. The Star Mound near the end of Runway 5 is a historically sensitive area.
8. Taxiways to be renamed when runways are extended.
9. Airport property line follows shoreline.
10. Monument protection is unknown.
11. The displaced threshold and instrument approach procedures for Runway 5 take the existing terrain penetrations into consideration.
12. The existing and future airport boundary lines are graphic representations.
13. The ALP reflects the extent of potential runway development that is possible within the present airport boundary. Avigation easement will be required for the ultimate build-out of the runway as shown.

The preparation of this plan was financed in part through a planning grant from the Federal Aviation Administration as provided under Section 505 of the Airport and Airway Improvement Act of 1982, as amended. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this plan by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws.

PAGO PAGO INTERNATIONAL AIRPORT

DEPARTMENT OF PORT ADMINISTRATION
AMERICAN SAMOA GOVERNMENT

AIRPORT LAYOUT PLAN

AECOM
PO Box 4241 Shortland Street Auckland 1140 New Zealand
Tel +64 9 379 1200 Fax +64 9 336 0120

NO.	DATE	REVISION	BY	CK	APPROVALS
1	06/1996	AIRPORT LAYOUT PLAN REVISED	DLH	RPW	AMSAM 06/04/1996
2	04/03/09	UPDATED PER ALP CHECKLIST	RP	AS	
3	02/08	MASTER PLAN UPDATE	RP	DS	
4	02/14	AIRPORT LAYOUT PLAN UPDATE	LF	AS	

Date: February 2014 — Sheet 2 of 9

Ref: 3260/2632/80

APPENDIX F
OPINIONS OF PROBABLE COSTS

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APPENDIX F-1
SUMMARY OF TREATMENT ALTERNATIVES

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 2/19/2025

PROJECT DESCRIPTION: Probable Costs for Treatment Alternatives

CLIENT: American Samoa Power Authority

P/N: 93-23-002

No.	Description	Oxidation Ditch	SBR	MBR
A	Utulei - Retain Existing Components and Pump to Tafuna	$136,887,000	$136,887,000	$136,887,000
B	Utulei - Abandon Existing Components and Pump to Tafuna	–	–	–
1	Headworks - 6 mm screening and grit removal	$33,917,000	$33,917,000	$33,917,000
2	Headworks - 2 mm fine screening	–	–	$18,620,000
3	Oxidation Ditch - biological basins	$93,306,000	–	–
4	Secondary Clarification and RAS Pumping	$41,917,000	–	–
5	SBR - biological basins and post-SBR EQ	–	$75,322,000	–
6	MBR - biological basins and membranes	–	–	$141,781,000
7	UV Disinfection	$18,114,000	–	$18,114,000
8	UV Disinfection - SBR	–	$28,191,000	–
9	Outfall	$16,011,000	$16,011,000	$16,011,000
10	Chemical Phosphorus Feed / Mixing	$3,024,000	$3,024,000	$3,024,000
11	Biosolids Dewatering	$30,891,000	$30,891,000	$30,891,000
12	Administration, Laboratory, and Maintenance Buildings	$7,010,000	$7,010,000	$7,010,000
	TOTAL (2025 DOLLARS)	**$381,077,000**	**$331,253,000**	**$406,255,000**

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APPENDIX F-2
FORCE MAIN ALTERNATIVES

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 2/19/2025

PROJECT DESCRIPTION: Utulei Alternative 1- Retain Existing Components and Pump to Tafuna (FM Route 3)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Force Main (FM)				-
2	Excavation and Backfill	30,037	CY	$60	$1,802,222
3	Pipe Bedding	10,825	CY	$100	$1,082,456
4	16" HDPE Pipe #1	40,550	LF	$300	$12,165,000
5	16" HDPE Pipe #2	40,550	LF	$300	$12,165,000
6	Fittings and Valves - included in pipe cost				-
7	Asphalt Repair - 16ft lane width, 5" thick asphalt	10,012	CY	$900	$9,011,111
8	Asphalt Subbase - 6" Layer	12,015	CY	$300	$3,604,444
9	Existing Utility Conflicts (estimated)	40,550	LF	$30	$1,216,500
10	Traffic Control - 2 people at 60 ft/day construction	676	DAY	$3,000	$2,027,500
11	Traffic Control - 2 people at 180 ft/day asphalt	225	DAY	$3,000	$675,833
12	Pipe Boring Beneath Airport Approach	1,100	LF	$6,000	$6,600,000
13					-
14	Force Main Lift Station (LS)	1	LS	$3,000,000	$3,000,000
15					-
16	Flow Distribution Box	1	LS	$500,000	$500,000
17					-
18	Bypass Pumping at switch over	1	LS	$300,000	$300,000
19					-
20	Onsite Demo (shed)	1	LS	$100,000	$100,000
21					-
22	Improvements to existing facilities (see Utility Plan)	1	LS	$0	$0
23					-
24					-
25					-
26	Additional Elements (estimated % of above)				-
27	Contractor mobilization and administration			20.0%	$10,850,000
28	Yard Piping			1.0%	$543,000
29	Site Civil	1.0%		$543,000	
30	Electrical and instrumentation			5.0%	$2,713,000
31	Bonding	4.0%		$2,170,000	
32	Contractor overhead and profit			10.0%	$5,425,000

SUBTOTAL	$	**76,494,000**
Construction Contingency: 30%	$	22,948,000
Subsurface Conditions / Groundwater: 5%	$	4,972,000
Prevailing Wages / AIS Compliance: 10%	$	10,441,000
State Sales Tax: %	$	-
Design / CMS: 20%	$	20,883,000
Legal and Administrative:1%	$	1,149,000
Escalation Allowance:%	$	-
TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$**	**136,887,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study **DATE:** 2/19/2025

PROJECT DESCRIPTION: Utulei Alternative 2- Abandon Existing Components and Pump to Tafuna (FM Route 3)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Force Main (FM)				-
2	Excavation and Backfill	30,037	CY	$60	$1,802,222
3	Pipe Bedding	10,825	CY	$100	$1,082,456
4	16" HDPE Pipe #1	40,550	LF	$300	$12,165,000
5	16" HDPE Pipe #2	40,550	LF	$300	$12,165,000
6	Fittings and Valves - included in pipe cost				-
7	Asphalt Repair - 16ft lane width, 5" thick asphalt	10,012	CY	$900	$9,011,111
8	Asphalt Subbase - 6" Layer	12,015	CY	$300	$3,604,444
9	Existing Utility Conflicts (estimated)	40,550	LF	$30	$1,216,500
10	Traffic Control - 2 people at 60 ft/day construction	676	DAY	$3,000	$2,027,500
11	Traffic Control - 2 people at 180 ft/day asphalt	225	DAY	$3,000	$675,833
12	Pipe Boring Beneath Airport Approach	1,100	LF	$6,000	$6,600,000
13					-
14	Force Main Lift Station (LS)	1	LS	$3,000,000	$3,000,000
15	Flow Distribution Box	1	LS	$500,000	$500,000
16	Bypass Pumping at switch over	1	LS	$300,000	$300,000
17					-
18	Onsite Demo - all treatment faciliites	1	LS	$500,000	$500,000
19					-
20					-
21					-
22					-
23					-
24	Additional Elements (estimated % of above)				
25	Contractor mobilization and administration			20.0%	$10,930,000
26	Yard Piping			1.0%	$547,000
27	Site Civil			1.0%	$547,000
28	Electrical and instrumentation			5.0%	$2,733,000
29	Bonding			4.0%	$2,186,000
30	Contractor overhead and profit			10.0%	$5,465,000

SUBTOTAL	**$**	**77,058,000**
Construction Contingency: 30%	$	23,117,000
Subsurface Conditions / Groundwater: 5%	$	5,009,000
Prevailing Wages / AIS Compliance: 10%	$	10,518,000
State Sales Tax: %	$	-
Design / CMS: 20%	$	21,037,000
Legal and Administrative:1%	$	1,157,000
Escalation Allowance:%	$	-
TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$**	**137,896,000**

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APPENDIX F-3
SECONDARY TREATMENT ALTERNATIVES

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 1/7/2025

PROJECT DESCRIPTION: Headworks - 6 mm screening and grit removal (All Regional WWTP Alternatives)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Influent Pump Station				-
2	Excavation	2,244	CY	$100	$224,400
3	Concrete - slab	53	CY	$2,000	$105,274
4	Concrete - walls	88	CY	$3,000	$264,000
5	Concrete - top slab	58	CY	$5,000	$289,504
6	Backfill	1,813	CY	$150	$272,000
7	Spoils Removal	431	CY	$200	$86,133
8	Pumps	3	EA	$200,000	$600,000
9	Valves & Coatings	3	EA	$200,000	$600,000
10	Odor Control	1	LS	$700,000	$700,000
11					-
12	Septage Receiving Station	1	LS	$444,000	$444,000
13					-
14	Headworks Building (HW)				-
15	Excavation and Backfill	1,185	CY	$100	$118,519
16	Structure - open walls, roof	4,000	SF	$200	$800,000
17	MCC Room (enclosed)	400	SF	$700	$280,000
18	Channel Walls	100	CY	$3,000	$300,000
19	Channel Slab	30	CY	$2,000	$60,000
20	Grating (FRP)	1	LS	$200,000	$200,000
21	Slide gates	6	EA	$20,000	$120,000
22	Screening equipment				-
23	(2) fine screens and (2) washer / compactor	2	EA	$700,000	$1,400,000
24	Add bagger	2	EA	$10,000	$20,000
25	Compactor Extension	2	EA	$10,000	$20,000
26	Compactor Metal Fab/Supports	2	EA	$10,000	$20,000
22	Bypass Bar Rack (fabricated SS)	1	LS	$15,000	$15,000
23	Grit System				-
24	Concrete Channel Walls	100	CY	$3,000	$300,000
25	Concrete Basin Walls	100	CY	$3,000	$300,000
26	Concrete Slabs	30	CY	$2,000	$60,000
27	Slide Gates	6	EA	$20,000	$120,000
28	Vortex, Pump and Enclosure Equipment	2	EA	$540,000	$1,080,000
29	Classifier Eqpt (Stainless Steel)	2	EA	$246,000	$492,000
30					-
31					-
32					-
33	Additional Elements (estimated % of above)				
34	Contractor mobilization and administration			20.0%	$1,858,200
35	Yard Piping			25.0%	$2,322,700
36	Site Civil			10.0%	$929,100
37	Electrical and instrumentation			35.0%	$3,251,800
38	Bonding			4.0%	$371,600
39	Contractor overhead and profit			10.0%	$929,100

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 1/7/2025

PROJECT DESCRIPTION: Headworks - 6 mm screening and grit removal (All Regional WWTP Alternatives)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
				SUBTOTAL	**$ 18,953,000**
				Construction Contingency: 30%	$ 5,686,000
				Subsurface Conditions / Groundwater: 5%	$ 1,232,000
				Prevailing Wages / AIS Compliance: 10%	$ 2,587,000
				State Sales Tax: %	$ -
				Design / CMS: 20%	$ 5,174,000
				Legal and Administrative:1%	$ 285,000
				Escalation Allowance:%	$ -
				TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$ 33,917,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study **DATE:** 1/7/2025

PROJECT DESCRIPTION: Headworks - 2 mm fine screening (MBR Alternative)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Structure - open walls, roof	4,000	SF	$300	$1,200,000
2	MCC Room (enclosed)	400	SF	$700	$280,000
3					-
4	Intermediate Pump Station (into Fine Screens)				-
5	Excavation	2,244	CY	$100	$224,400
6	Concrete - slab	53	CY	$2,000	$105,274
7	Concrete - walls	88	CY	$3,000	$264,000
8	Concrete - top slab	58	CY	$5,000	$289,504
9	Backfill	1,813	CY	$150	$272,000
10	Spoils Removal	431	CY	$200	$86,133
11	Pumps	3	EA	$200,000	$600,000
12	Valves & Coatings	3	EA	$200,000	$600,000
13					-
14	Fine Screening				-
15	2mm Fine Screen (Three 6 MGD Units)	3	EA	$790,000	$2,370,000
16	Washer Compactor (Three Units)	3	EA	$200,000	$600,000
17	Walkways / access platforms	3	EA	$50,000	$150,000
18	Piping / Valving	3	LS	$198,000	$594,000
19					-
20					-
21					-
22	Additional Elements (estimated % of above)				
23	Contractor mobilization and administration			20.0%	$1,527,000
24	Yard Piping			25.0%	$370,000
25	Site Civil			10.0%	$148,000
26	Electrical and instrumentation			35.0%	$518,000
27	Bonding			4.0%	$59,000
28	Contractor overhead and profit			10.0%	$148,000

SUBTOTAL	**$**	**10,405,000**
Construction Contingency: 30%	$	3,122,000
Subsurface Conditions / Groundwater: 5%	$	676,000
Prevailing Wages / AIS Compliance: 10%	$	1,420,000
State Sales Tax: %	$	-
Design / CMS: 20%	$	2,841,000
Legal and Administrative:1%	$	156,000
Escalation Allowance:%	$	-
TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$**	**18,620,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 1/7/2025

PROJECT DESCRIPTION: Influent Equalization

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Not included				-
2					-
3					-
4					-
5					-
6					-
7					-
8					-
9	Additional Elements (estimated % of above)				
10	Contractor mobilization and administration			20.0%	$0
11	Yard Piping			25.0%	$0
12	Site Civil			10.0%	$0
13	Electrical and instrumentation			35.0%	$0
14	Bonding			4.0%	$0
15	Contractor overhead and profit			10.0%	$0

SUBTOTAL	$	-
Construction Contingency: 30%	$	-
Subsurface Conditions / Groundwater: 5%	$	-
Prevailing Wages / AIS Compliance: 10%	$	-
State Sales Tax: %	$	-
Design / CMS: 20%	$	-
Legal and Administrative:1%	$	-
Escalation Allowance:%	$	-
TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)		**?**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study **DATE:** 2/14/2025

PROJECT DESCRIPTION: Oxidation Ditch - biological basins (Ditch Alternative)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Oxidation Ditch with Anoxic Basin				-
2	Distribution Box	1	LS	$700,000	$700,000
3	Excavation	18,200	CY	$60	$1,092,000
4	Concrete - slab	3,070	CY	$2,000	$6,140,000
5	Concrete - walls	1,600	CY	$3,000	$4,800,000
6	Concrete - top slab	290	CY	$5,000	$1,450,000
7	Concrete - walkways	150	CY	$5,000	$750,000
8	Grout - 3 in avg	370	CY	$1,000	$370,000
9	Backfill	2,100	CY	$60	$126,000
10	Spoils Disposal	16,100	CY	$60	$966,000
11	Stairs	5	EA	$30,000	$150,000
12	Handrailing	2,280	LF	$400	$912,000
13					-
14	Oxidation Ditch Mechanical, including the following:	1	LS	$3,750,000	$3,750,000
15	Surface Aerators & Motors				-
16	Submersible Anoxic Mixers				-
17	Weir Gate				-
18	Biological Process Instrumentation				-
19	Electrical (Master Panel and MCC)				-
20	Installation and Markup	1	LS	$750,000	$750,000
21					-
22	MCC Room (enclosed)	600	SF	$700	$420,000
23					-
24					-
25					-
26	Additional Elements (estimated % of above)				
27	Contractor mobilization and administration			20.0%	$4,475,000
28	Yard Piping			25.0%	$5,632,000
29	Site Civil			10.0%	$2,238,000
30	Electrical and instrumentation			35.0%	$7,832,000
31	Bonding			4.0%	$895,000
32	Contractor overhead and profit			10.0%	$2,238,000
				SUBTOTAL	**$ 45,686,000**
				Construction Contingency: 30%	$ 13,706,000
				Subsurface Conditions / Groundwater: 5%	$ 2,970,000
				Prevailing Wages / AIS Compliance: 10%	$ 6,236,000
				State Sales Tax: %	$ -
				Design / CMS: 20%	$ 12,472,000
				Legal and Administrative:1%	$ 686,000
	Land Purchase	15	AC	$700,000	$ 10,500,000
	Land Purchase - Contingency			10%	$ 1,050,000
				Escalation Allowance:%	$ -
				TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$ 93,306,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 1/7/2025

PROJECT DESCRIPTION: Secondary Clarification and RAS Pumping (Ditch Alternative)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Secondary Clarifier #1 - 90' diameter				-
2	Excavation	5,900	CY	$60	$354,000
3	Concrete - slab	570	CY	$2,000	$1,140,000
4	Concrete - walls	280	SF	$3,000	$840,000
5	Concrete - launder	110	SF	$5,000	$550,000
5	Grout - 2 in	39	CY	$1,000	$39,270
6	Backfill	1,400	CY	$60	$84,000
7	Spoils Disposal	4,500	CY	$60	$270,000
8					-
9	Clarifier #1 Mechanical, including	1	LS	$1,500,000	$1,500,000
10	Walkway Bridge				-
11	Drive Platform				-
12	Motor				-
13	Feedwell				-
14	Rake Arms				-
15	Sludge Skimmer				-
16	Scum Box				-
17	Installation and Markup	1	LS	$300,000	$300,000
18					-
19	Clarifier #2 - 90' diameter	1	LS	$5,077,270	$5,077,270
20					-
21	Clarifier #3 - 90' diameter	1	LS	$5,077,270	$5,077,270
22					-
23	MLSS Distribution Box	1	LS	$700,000	$700,000
24					-
25	RAS/WAS Pump Building (below grade)				-
26	Structure (assuming 250 SF per pump)	2,000	SF	$1,000	$2,000,000
27	RAS Pumps (3+1)	4	EA	$100,000	$400,000
28	Piping / coating (per pump)	4	EA	$100,000	$400,000
29	WAS Pumps (3+1)	4	EA	$70,000	$280,000
30	Piping / coating (per pump)	4	EA	$70,000	$280,000
31			-		
32			-		
33			-		
34	Additional Elements (estimated % of above)				
35	Contractor mobilization and administration			20.0%	$3,858,000
36	Yard Piping			25.0%	$4,823,000
37	Site Civil			10.0%	$1,929,000
38	Electrical and instrumentation			35.0%	$6,752,000
39	Bonding			4.0%	$772,000
40	Contractor overhead and profit			10.0%	$1,929,000

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 1/7/2025

PROJECT DESCRIPTION: Secondary Clarification and RAS Pumping (Ditch Alternative)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
				SUBTOTAL	**$ 23,423,000**
				Construction Contingency: 30%	$ 7,027,000
				Subsurface Conditions / Groundwater: 5%	$ 1,523,000
				Prevailing Wages / AIS Compliance: 10%	$ 3,197,000
				State Sales Tax: %	$ -
				Design / CMS: 20%	$ 6,395,000
				Legal and Administrative:1%	$ 352,000
				Escalation Allowance:%	$ -
				TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$ 41,917,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study **DATE:** 2/14/2025

PROJECT DESCRIPTION: SBR - biological basins and post-SBR EQ (SBR Alternative)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	SBR Influent Lift Station				-
2	Excavation	2,244	CY	$100	$224,400
3	Concrete - slab	53	CY	$2,000	$105,274
4	Concrete - walls	88	CY	$3,000	$264,000
5	Concrete - top slab	58	CY	$5,000	$289,504
6	Backfill	1,813	CY	$150	$272,000
7	Spoils Removal	431	CY	$200	$86,133
8	Pumps	3	EA	$200,000	$600,000
9	Valves & Coatings	3	EA	$200,000	$600,000
10					-
11	SBR Basins				-
12	Excavation	25,275	CY	$60	$1,516,508
13	Concrete - slab	3,040	CY	$2,000	$6,080,000
14	Concrete - walls	1,670	CY	$3,000	$5,010,000
15	Concrete - walkways	170	CY	$5,000	$850,000
16	Handrailing	2,120	LF	$400	$848,000
17	Grout - 3 in avg	325	CY	$1,000	$325,000
18	Backfill	4,573	CY	$60	$274,375
19	Spoils Disposal	20,702	CY	$60	$1,242,133
20	Stairs	4	EA	$50,000	$200,000
21	SBR Mechanical (Total), including the following:	1	LS	$5,224,000	$5,224,000
22	Anoxic Mixers (3)				-
23	Decanters (6)				-
24	Transfer Pumps/Valves (3)				-
25	Fine Bubble Diffusers (3)				-
26	PD Blowers (4 + 1)				-
27	Water Level Sensors (3 Pressure + 3 Float)				-
28	DO Sensors and Controllers (3)				-
29	Installation and Markup	1	LS	$1,044,000	$1,044,000
30	Mechanical piping	1	LS	$1,306,000	$1,306,000
31					-
32	SBR Support Building (below grade)				-
33	Structure (assuming 250 SF per pump)	1,000	SF	$1,000	$1,000,000
34	WAS Pumps (3+1)	4	EA	$70,000	$280,000
35	Piping / coating (per pump)	4	EA	$70,000	$280,000
36	MCC Room (enclosed)	600	SF	$700	$420,000
37			-		
38	SBR Effluent EQ Basin				-
39	Excavation	4,277	CY	$60	$256,616
40	Concrete - slab	460	CY	$2,000	$920,000
41	Concrete - walls	300	CY	$3,000	$900,000
42	Backfill	839	CY	$60	$50,366
43	Spoils Disposal	3,438	CY	$60	$206,250
44	Stairs	2	EA	$50,000	$100,000
45	Elevated walkways	1	EA	$50,000	$50,000
46	Mechanical piping	1	LS	$200,000	$200,000

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study **DATE:** 2/14/2025

PROJECT DESCRIPTION: SBR - biological basins and post-SBR EQ (SBR Alternative)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
47					-
48	Additional Elements (estimated % of above)				
49	Contractor mobilization and administration			20.0%	$6,205,000
50	Yard Piping			25.0%	$7,756,000
51	Site Civil			10.0%	$3,102,000
52	Electrical and instrumentation			35.0%	$10,859,000
53	Bonding			4.0%	$1,241,000
54	Contractor overhead and profit			10.0%	$3,102,000
				SUBTOTAL	**$ 36,928,000**
				Construction Contingency: 30%	$ 11,078,000
				Subsurface Conditions / Groundwater: 5%	$ 2,400,000
				Prevailing Wages / AIS Compliance: 10%	$ 5,041,000
				State Sales Tax: %	$ -
				Design / CMS: 20%	$ 10,081,000
				Legal and Administrative:1%	$ 554,000
	Land Purchase	12	AC	$700,000	$ 8,400,000
	Land Purchase - Contingency			10%	$ 840,000
				Escalation Allowance:%	$ -
				TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$ 75,322,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study **DATE:** 2/14/2025

PROJECT DESCRIPTION: MBR - biological basins and membranes (MBR Alternative)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Biological and MBR Basins (Total)				-
2	Distribution Box	1	LS	$700,000	$700,000
3	Excavation	13,457	CY	$60	$807,433
4	Concrete - slab	1,330	CY	$2,000	$2,660,000
5	Concrete - walls	1,410	CY	$3,000	$4,230,000
6	Concrete - walkways	200	CY	$5,000	$1,000,000
7	Handrailing	2,480	LF	$400	$992,000
8	Grout - 3 in avg	4	CY	$1,600	$5,600
9	Backfill	2,592	CY	$60	$155,500
10	Spoils Disposal	10,866	CY	$60	$651,933
11	Stairs	4	EA	$50,000	$200,000
12	Bridge crane and support structure	1	LS	$500,000	$500,000
13					-
14	MBR Membrane System, including the following:	1	EA	$10,616,000	$10,616,000
15	Anoxic Mixers (4)				-
16	Preaeration Blowers (4)				-
17	Preaeration Fine Bubble Diffusers				-
18	MBR Blowers (4 + 1)				-
19	Membrane Units (48)				-
20	MBR Diffusers				-
21	Feed Forward / RAS Pumps (4)				-
22	WAS Pumps (2)				-
23	Process Instrumentation				-
24	Process Valving				-
25	Membrane Clean In Place (CIP) Equipment				-
26	Installation and Markup	1	LS	$2,124,000	$2,124,000
27					-
28	Mechanical piping	1	LS	$2,654,000	$2,654,000
29					-
30	RAS Pump Station				-
31	Covered structure (assuming 250 SF per pump)	500	SF	$700	$350,000
32	RAS Pumps (+1)	1	EA	$100,000	$100,000
33	Piping / coating (per pump)	1	EA	$100,000	$100,000
34	WAS Pumps (+1)	1	EA	$70,000	$70,000
35	Piping / coating (per pump)	1	EA	$70,000	$70,000
36			-		
37	MBR Support Building (enclosed)	12,030	SF	$700	$8,421,000
38			-		
39	Chemical storage vessels	2	EA	$30,000	$60,000
40	Chemical safety equipment	1	LS	$50,000	$50,000
41					-

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 2/14/2025

PROJECT DESCRIPTION: MBR - biological basins and membranes (MBR Alternative)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
42					-
43	Additional Elements (estimated % of above)				
44	Contractor mobilization and administration			20.0%	$7,303,000
45	Yard Piping			25.0%	$9,129,000
46	Site Civil			10.0%	$3,652,000
47	Electrical and instrumentation			35.0%	$12,781,000
48	Bonding			4.0%	$1,461,000
49	Contractor overhead and profit			10.0%	$3,652,000
				SUBTOTAL	**$ 74,495,000**
				Construction Contingency: 30%	$ 22,349,000
				Subsurface Conditions / Groundwater: 5%	$ 4,842,000
				Prevailing Wages / AIS Compliance: 10%	$ 10,169,000
				State Sales Tax: %	$ -
				Design / CMS: 20%	$ 20,337,000
				Legal and Administrative:1%	$ 1,119,000
	Land Purchase	11	AC	$700,000	$ 7,700,000
	Land Purchase - Contingency			10%	$ 770,000
				Escalation Allowance:%	$ -
				TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$ 141,781,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study **DATE:** 1/7/2025

PROJECT DESCRIPTION: UV Disinfection (All Regional WWTP Alternatives)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	UV Disinfection Covered Structure	4,200	SF	$300	$1,260,000
2					
3	Distribution box	1	LS	$300,000	$300,000
4					
5	Channels				-
6	Weir Gates	2	EA	$30,000	$60,000
7	UV Channel Concrete Walls (inside)	50	CY	$3,000	$150,000
8	UV Channel Concrete Slab (inside)	20	CY	$2,000	$40,000
9	UV Channel Concrete Walls (outside)	50	CY	$3,000	$150,000
10	UV Channel Concrete Slab (outside)	50	CY	$2,000	$100,000
11	Channel covers	1	LS	$200,000	$200,000
12					
13	UV Equipment	1	LS	$2,252,000	$2,252,000
14	Installation and Markup	1	LS	$450,000	$450,000
15					-
16					-
17					-
18	Additional Elements (estimated % of above)				
19	Contractor mobilization and administration			20.0%	$992,000
20	Yard Piping			25.0%	$1,241,000
21	Site Civil			10.0%	$496,000
22	Electrical and instrumentation			35.0%	$1,737,000
23	Bonding			4.0%	$198,000
24	Contractor overhead and profit			10.0%	$496,000

SUBTOTAL	**$**	**10,122,000**
Construction Contingency: 30%	$	3,037,000
Subsurface Conditions / Groundwater: 5%	$	658,000
Prevailing Wages / AIS Compliance: 10%	$	1,382,000
State Sales Tax: %	$	-
Design / CMS: 20%	$	2,763,000
Legal and Administrative:1%	$	152,000
Escalation Allowance:%	$	-
TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$**	**18,114,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study **DATE:** 1/7/2025

PROJECT DESCRIPTION: UV Disinfection - SBR (SBR Alternative)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	UV Disinfection Covered Structure	4,200	SF	$300	$1,260,000
2					
3	Distribution box	1	LS	$300,000	$300,000
4					
5	Channels				-
6	Weir Gates	4	EA	$30,000	$120,000
7	UV Channel Concrete Walls (inside)	50	CY	$3,000	$150,000
8	UV Channel Concrete Slab (inside)	20	CY	$2,000	$40,000
9	UV Channel Concrete Walls (outside)	50	CY	$3,000	$150,000
10	UV Channel Concrete Slab (outside)	50	CY	$2,000	$100,000
11	Channel covers	1	LS	$200,000	$200,000
12					
13	UV Equipment (sized for higher peak flows)	1	LS	$4,502,000	$4,502,000
14	Installation and Markup	1	LS	$900,000	$900,000
15					-
16					-
17					-
18	Additional Elements (estimated % of above)				
19	Contractor mobilization and administration			20.0%	$1,544,000
20	Yard Piping			25.0%	$1,931,000
21	Site Civil			10.0%	$772,000
22	Electrical and instrumentation			35.0%	$2,703,000
23	Bonding			4.0%	$309,000
24	Contractor overhead and profit			10.0%	$772,000

SUBTOTAL	**$**	**15,753,000**
Construction Contingency: 30%	$	4,726,000
Subsurface Conditions / Groundwater: 5%	$	1,024,000
Prevailing Wages / AIS Compliance: 10%	$	2,150,000
State Sales Tax: %	$	-
Design / CMS: 20%	$	4,301,000
Legal and Administrative:1%	$	237,000
Escalation Allowance:%	$	-
TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$**	**28,191,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 1/7/2025

PROJECT DESCRIPTION: Outfall (All Regional WWTP Alternatives)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Effluent Pump Station				-
2	Excavation	2,244	CY	$100	$224,400
3	Concrete - slab	53	CY	$2,000	$105,274
4	Concrete - walls	88	CY	$3,000	$264,000
5	Concrete - top slab	58	CY	$5,000	$289,504
6	Backfill	1,813	CY	$150	$272,000
7	Spoils Removal	431	CY	$200	$86,133
8	Pumps	3	EA	$200,000	$600,000
9	Valves & Coatings	3	EA	$200,000	$600,000
10					-
11	New Outfall	1	LS	$3,772,000	$3,772,000
12					-
13					-
14					-
15	Additional Elements (estimated % of above)				
16	Contractor mobilization and administration			20.0%	$1,243,000
17	Yard Piping			0.0%	$0
18	Site Civil			10.0%	$621,000
19	Electrical and instrumentation			0.0%	$0
20	Bonding			4.0%	$249,000
21	Contractor overhead and profit			10.0%	$621,000
				SUBTOTAL	**$ 8,947,000**
				Construction Contingency: 30%	$ 2,684,000
				Subsurface Conditions / Groundwater: 5%	$ 582,000
				Prevailing Wages / AIS Compliance: 10%	$ 1,221,000
				State Sales Tax: %	$ -
				Design / CMS: 20%	$ 2,443,000
				Legal and Administrative:1%	$ 134,000
				Escalation Allowance:%	$ -
				TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$ 16,011,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 1/7/2025

PROJECT DESCRIPTION: Chemical Phosphorus Feed / Mixing (All Regional WWTP Alternatives)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Chemical Feed				-
2	Duplex chemical skid - coagulant	1	LS	$70,000	$70,000
3	Duplex chemical skid - pH control	1	LS	$70,000	$70,000
4	Installation and Markup	1	LS	$28,000	$28,000
5	Chemical piping	1	LS	$50,000	$50,000
6	Safety equipment	1	LS	$50,000	$50,000
7			-		
8	Exterior Storage Area - 20 x 30				-
9	Concrete	1	LS	$150,000	$150,000
10	Storage Tanks	2	EA	$50,000	$100,000
11	Installation and mark-up	1	LS	$10,000	$10,000
12			-		
13	Rapid mix basin and mixer	1	LS	$300,000	$300,000
14					-
15					-
16					-
17	Additional Elements (estimated % of above)				
18	Contractor mobilization and administration			20.0%	$166,000
19	Yard Piping			25.0%	$207,000
20	Site Civil			10.0%	$83,000
21	Electrical and instrumentation			35.0%	$290,000
22	Bonding			4.0%	$33,000
23	Contractor overhead and profit			10.0%	$83,000

SUBTOTAL	**$**	**1,690,000**
Construction Contingency: 30%	$	507,000
Subsurface Conditions / Groundwater: 5%	$	110,000
Prevailing Wages / AIS Compliance: 10%	$	231,000
State Sales Tax: %	$	-
Design / CMS: 20%	$	461,000
Legal and Administrative:1%	$	25,000
Escalation Allowance:%	$	-
TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$**	**3,024,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 1/7/2025

PROJECT DESCRIPTION: Biosolids Dewatering (All Regional WWTP Alternatives)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Solids Holding Tank (WAS) - 90 ft dia x 18 ft deep				-
2	Excavation	9,500	CY	$60	$570,000
3	Concrete - slab	420	CY	$2,000	$840,000
4	Concrete - walls	310	CY	$3,000	$930,000
5	Backfill	3,100	CY	$60	$186,000
6	Spoils Removal	6,400	CY	$60	$384,000
7					-
8	Aeration Equipment				-
9	Blowers	2	EA	$200,000	$400,000
10	Diffused aeration	1	LS	$400,000	$400,000
11	Installation and Markup	1	LS	$120,000	$120,000
12	Mechanical piping	1	LS	$400,000	$400,000
13	Covered building	600	SF	$300	$180,000
14					-
15	Dewatering				-
16	Covered structure	1,600	SF	$300	$480,000
17	Equipment				-
18	Solids feed pumps	2	EA	$100,000	$200,000
19	Feed piping	2	EA	$100,000	$200,000
20	Screw Press or Belt filter press	2	EA	$1,324,000	$2,648,000
21	Sludge conveyor	1	LS	$200,000	$200,000
22	Installation and mark-up	1	LS	$324,000	$324,000
#REF!					-
#REF!	Additional Elements (estimated % of above)				
#REF!	Contractor mobilization and administration			20.0%	$1,692,000
#REF!	Yard Piping			25.0%	$2,116,000
#REF!	Site Civil			10.0%	$846,000
#REF!	Electrical and instrumentation			35.0%	$2,962,000
#REF!	Bonding			4.0%	$338,000
#REF!	Contractor overhead and profit			10.0%	$846,000

SUBTOTAL	$	**17,262,000**
Construction Contingency: 30%	$	5,179,000
Subsurface Conditions / Groundwater: 5%	$	1,122,000
Prevailing Wages / AIS Compliance: 10%	$	2,356,000
State Sales Tax: %	$	-
Design / CMS: 20%	$	4,713,000
Legal and Administrative:1%	$	259,000
Escalation Allowance:%	$	-
TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	$	**30,891,000**

ENGINEER'S OPINION OF PROBABLE COST - CAPITAL COSTS

PLANNING

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 1/7/2025

PROJECT DESCRIPTION: Administration, Laboratory, and Maintenance Buildings (All Regional WWTP Alternatives)

CLIENT: American Samoa Power Authority

P/N: 93-23-002

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QNTY	UNIT	UNIT PRICE	TOTAL COST
1	Administration and Lab Building	1,600	SF	$700	$1,120,000
2					-
3	Maintenance Building	1,600	SF	$500	$800,000
4					-
5					-
6					-
7					-
8					-
9					-
10					-
11					-
12					-
13					-
14					-
15	Additional Elements (estimated % of above)				
16	Contractor mobilization and administration			20.0%	$384,000
17	Yard Piping			25.0%	$480,000
18	Site Civil			10.0%	$192,000
19	Electrical and instrumentation			35.0%	$672,000
20	Bonding			4.0%	$77,000
21	Contractor overhead and profit			10.0%	$192,000
				SUBTOTAL	**$ 3,917,000**
				Construction Contingency: 30%	$ 1,175,000
				Subsurface Conditions / Groundwater: 5%	$ 255,000
				Prevailing Wages / AIS Compliance: 10%	$ 535,000
				State Sales Tax: %	$ -
				Design / CMS: 20%	$ 1,069,000
				Legal and Administrative:1%	$ 59,000
				Escalation Allowance:%	$ -
				TOTAL PROBABLE CAPITAL COST (2025 DOLLARS)	**$ 7,010,000**

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APPENDIX F-4
FORCE MAIN O&M

ENGINEER'S OPINION OF PROBABLE COST - OPERATION AND MAINTENANCE

PROJECT: ASPA Secondary Treatment Feasibility Study

DATE: 1/7/2025

PROJECT DESCRIPTION: Utulei Force Main

CLIENT: American Samoa Power Authority

P/N: 93-23-002

	Equipment Maintenance		Labor - 2 employees		Pumping (Electrical)		Present Worth
	Capital Cost	$300,000	Hours per day	16	HP	42	
	Maintenance / yr	10.0%	Days / month	22	Cost per kW-hr	$0.50	
	Inflation / yr	5.0%	Months / year	12	Flow (gpm) (AD)	1,500	
					Head (ft) (AD)	82	Discount Rate
			Cost per hour	$30	Specific gravity	1.01	2.5%
			Salary adjustment /	4.0%	# of pumps online	1	
					pump efficiency	75%	

Year	Cost in Year *i*	Cost in Year *i*	Cost in Year *i*	Total by Year	Present Worth
1	$30,000	$125,143	$134,658	$289,801	$289,801
2	$31,500	$130,149	$141,391	$303,039	$295,648
3	$33,075	$135,355	$148,460	$316,890	$301,620
4	$34,729	$140,769	$155,883	$331,381	$307,720
5	$36,465	$146,399	$163,677	$346,542	$313,950
6	$38,288	$152,255	$171,861	$362,405	$320,313
7	$40,203	$158,346	$180,454	$379,003	$326,813
8	$42,213	$164,679	$189,477	$396,370	$333,452
9	$44,324	$171,267	$198,951	$414,541	$340,233
10	$46,540	$178,117	$208,898	$433,556	$347,160
11	$48,867	$185,242	$219,343	$453,452	$354,236
12	$51,310	$192,652	$230,311	$474,272	$361,464
13	$53,876	$200,358	$241,826	$496,059	$368,848
14	$56,569	$208,372	$253,917	$518,859	$376,391
15	$59,398	$216,707	$266,613	$542,718	$384,096
16	$62,368	$225,375	$279,944	$567,687	$391,968
17	$65,486	$234,390	$293,941	$593,818	$400,010
18	$68,761	$243,766	$308,638	$621,165	$408,226
19	$72,199	$253,516	$324,070	$649,785	$416,620
20	$75,809	$263,657	$340,274	$679,739	$425,196

NET PRESENT WORTH - PROBABLE O&M COSTS (2025 DOLLARS) $ 7,064,000

equivalent yearly cost = $442,000

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APPENDIX F-5
SECONDARY TREATMENT ALTERNATIVES O&M

ENGINEER'S OPINION OF PROBABLE COST - OPERATION AND MAINTENANCE

PROJECT:
ASPA Secondary Treatment Feasibility Study

PROJECT DESCRIPTION: Regional WWTP (Ditch Option)

CLIENT:
American Samoa Power Authority

P/N: 93-23-002

	Equipment Maintenance		**Labor - 11 Employees**		**Laboratory Analyses**		**Chemical Costs (ChemP-Alum)**		**Electrical Use - Aeration**	
	Capital Cost	$19,786,000	Hours per day	88	NPDES & Process		Cost / yr / each	$ 248,565	Operating hp (Avg)	140
	Maintenance / yr	10.0%	Days / month	22	$/year	$150,000	# of chemicals	1	Cost per kW-hr	$0.50
	Inflation / yr	5.0%	Months / year	12	Inflation / yr	5.0%	gal alum/day	227	Days / year	365
							$/48.5% gal	$3.00	hours / day	24
			Cost per hour	$30			Increased use / yr	1.50%	Increased use / yr	1.5%
			Salary adjustment /	4.0%			Inflation / yr	5.0%	Inflation / yr	5.0%
Year		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***
1		$1,978,600		$688,286		$150,000		$248,565		$457,263
2		$2,077,530		$715,817		$157,500		$264,908		$487,328
3		$2,181,407		$744,450		$165,375		$282,326		$519,370
4		$2,290,477		$774,228		$173,644		$300,889		$553,519
5		$2,405,001		$805,197		$182,326		$320,672		$589,913
6		$2,525,251		$837,405		$191,442		$341,756		$628,699
7		$2,651,513		$870,901		$201,014		$364,227		$670,036
8		$2,784,089		$905,737		$211,065		$388,175		$714,091
9		$2,923,293		$941,967		$221,618		$413,697		$761,043
10		$3,069,458		$979,645		$232,699		$440,898		$811,081
11		$3,222,931		$1,018,831		$244,334		$469,887		$864,410
12		$3,384,077		$1,059,584		$256,551		$500,782		$921,245
13		$3,553,281		$1,101,968		$269,378		$533,708		$981,817
14		$3,730,945		$1,146,046		$282,847		$568,800		$1,046,371
15		$3,917,493		$1,191,888		$296,990		$606,198		$1,115,170
16		$4,113,367		$1,239,564		$311,839		$646,056		$1,188,492
17		$4,319,036		$1,289,146		$327,431		$688,534		$1,266,636
18		$4,534,987		$1,340,712		$343,803		$733,805		$1,349,917
19		$4,761,737		$1,394,341		$360,993		$782,053		$1,438,674
20		$4,999,824		$1,450,114		$379,043		$833,473		$1,533,267

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16	**Electrical Use - Other (1/3 total)**		**Solids Disposal (trucking)**		**Present Worth**	
17	Operating hp	70	tipping fee ($/20 CY)	$0		
18	Cost per kW-hr	$0.50	dry lbs/day	6,600		
19	Days / year	365	CY/week (15% TS)	181		
20	hours / day	24	20 CY trips/week	9.1		Discount Rate
21	Increased use / yr	1.5%	miles/trip	6		2.5%
22	Inflation / yr	5.0%	$/mile	$2.0		
23						
24		**Cost in Year *i***		**Cost in Year *i***	**Total by Year**	**Present Worth**
25		$228,632		$5,653	$3,756,998	$3,756,998
26		$243,664		$5,935	$3,952,683	$3,856,276
27		$259,685		$6,232	$4,158,844	$3,958,448
28		$276,759		$6,544	$4,376,059	$4,063,606
29		$294,956		$6,871	$4,604,936	$4,171,844
30		$314,350		$7,214	$4,846,118	$4,283,262
31		$335,018		$7,575	$5,100,285	$4,397,960
32		$357,046		$7,954	$5,368,157	$4,516,043
33		$380,521		$8,352	$5,650,491	$4,637,621
34		$405,541		$8,769	$5,948,091	$4,762,805
35		$432,205		$9,208	$6,261,805	$4,891,712
36		$460,622		$9,668	$6,592,530	$5,024,462
37		$490,908		$10,151	$6,941,212	$5,161,179
38		$523,186		$10,659	$7,308,854	$5,301,992
39		$557,585		$11,192	$7,696,516	$5,447,034
40		$594,246		$11,752	$8,105,316	$5,596,442
41		$633,318		$12,339	$8,536,440	$5,750,359
42		$674,959		$12,956	$8,991,139	$5,908,932
43		$719,337		$13,604	$9,470,738	$6,072,315
44		$766,633		$14,284	$9,976,638	$6,240,663
45						
46	**NET PRESENT WORTH - PROBABLE O&M COSTS (2025 DOLLARS)**					**$ 97,800,000**
47					equivalent yearly cost =	$6,121,000
48						

ENGINEER'S OPINION OF PROBABLE COST - OPERATION AND MAINTENANCE

PROJECT:
ASPA Secondary Treatment Feasibility Study

PROJECT DESCRIPTION: Regional WWTP (SBR Option)

CLIENT:
American Samoa Power Authority

P/N: 93-23-002

	Equipment Maintenance		Labor - 11 Employees		Laboratory Analyses		Chemical Costs (ChemP-Alum)		Electrical Use - Aeration	
	Capital Cost	$19,212,000	Hours per day	88	NPDES & Process		Cost / yr / each	$ 248,565	Operating hp (AD)	140
	Maintenance / yr	10.0%	Days / month	22	$/year	$150,000	# of chemicals	1	Cost per kW-hr	$0.50
	Inflation / yr	5.0%	Months / year	12	Inflation / yr	5.0%	gal alum/day	227	Days / year	365
							$/48.5% gal	$3	hours / day	24
			Cost per hour	$30			Increased use / yr	1.50%	Increased use / yr	1.5%
			Salary adjustment	4.0%			Inflation / yr	5.0%	Inflation / yr	5.0%
Year		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***
1		$1,921,200		$688,286		$150,000		$248,565		$457,263
2		$2,017,260		$715,817		$157,500		$264,908		$487,328
3		$2,118,123		$744,450		$165,375		$282,326		$519,370
4		$2,224,029		$774,228		$173,644		$300,889		$553,519
5		$2,335,231		$805,197		$182,326		$320,672		$589,913
6		$2,451,992		$837,405		$191,442		$341,756		$628,699
7		$2,574,592		$870,901		$201,014		$364,227		$670,036
8		$2,703,321		$905,737		$211,065		$388,175		$714,091
9		$2,838,487		$941,967		$221,618		$413,697		$761,043
10		$2,980,412		$979,645		$232,699		$440,898		$811,081
11		$3,129,432		$1,018,831		$244,334		$469,887		$864,410
12		$3,285,904		$1,059,584		$256,551		$500,782		$921,245
13		$3,450,199		$1,101,968		$269,378		$533,708		$981,817
14		$3,622,709		$1,146,046		$282,847		$568,800		$1,046,371
15		$3,803,845		$1,191,888		$296,990		$606,198		$1,115,170
16		$3,994,037		$1,239,564		$311,839		$646,056		$1,188,492
17		$4,193,739		$1,289,146		$327,431		$688,534		$1,266,636
18		$4,403,426		$1,340,712		$343,803		$733,805		$1,349,917
19		$4,623,597		$1,394,341		$360,993		$782,053		$1,438,674
20		$4,854,777		$1,450,114		$379,043		$833,473		$1,533,267

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16	**Electrical Use - Other (1/3 total)**		**Solids Disposal (trucking)**		**Present Worth**	
17	Operating hp	70	tipping fee ($/20 CY)	$0		
18	Cost per kW-hr	$0.50	dry lbs/day	6,600		
19	Days / year	365	CY/week (15% TS)	181		
20	hours / day	24	20 CY trips/week	9.1		Discount Rate
21	Increased use / yr	1.5%	miles/trip	6		2.5%
22	Inflation / yr	5.0%	$/mile	$2.0		
23						
24		**Cost in Year *i***		**Cost in Year *i***	**Total by Year**	**Present Worth**
25		$228,632		$5,653	$3,699,598	$3,699,598
26		$243,664		$5,935	$3,892,413	$3,797,476
27		$259,685		$6,232	$4,095,561	$3,898,214
28		$276,759		$6,544	$4,309,611	$4,001,903
29		$294,956		$6,871	$4,535,165	$4,108,636
30		$314,350		$7,214	$4,772,859	$4,218,512
31		$335,018		$7,575	$5,023,364	$4,331,631
32		$357,046		$7,954	$5,287,389	$4,448,097
33		$380,521		$8,352	$5,565,685	$4,568,017
34		$405,541		$8,769	$5,859,045	$4,691,504
35		$432,205		$9,208	$6,168,307	$4,818,672
36		$460,622		$9,668	$6,494,356	$4,949,640
37		$490,908		$10,151	$6,838,130	$5,084,532
38		$523,186		$10,659	$7,200,618	$5,223,475
39		$557,585		$11,192	$7,582,868	$5,366,602
40		$594,246		$11,752	$7,985,986	$5,514,048
41		$633,318		$12,339	$8,411,143	$5,665,956
42		$674,959		$12,956	$8,859,577	$5,822,470
43		$719,337		$13,604	$9,332,598	$5,983,744
44		$766,633		$14,284	$9,831,591	$6,149,933
45						
46	**NET PRESENT WORTH - PROBABLE O&M COSTS (2025 DOLLARS)**					**$ 96,343,000**
47					equivalent yearly cost =	$6,029,000
48						

ENGINEER'S OPINION OF PROBABLE COST - OPERATION AND MAINTENANCE

PROJECT:
ASPA Secondary Treatment Feasibility Study

PROJECT DESCRIPTION: Regional WWTP (MBR Option)

CLIENT:
American Samoa Power Authority

P/N: 93-23-002

	Equipment Maintenance		**Labor - 12 Employees**		**Laboratory Analyses**		**Membrane Replacement**		**Chemical Costs (ChemP-Alum)**	
	Capital Cost	$23,020,000	Hours per day	96	NPDES & Process		Membrane Cost	$ 5,308,000	Cost / yr / each	$ 248,565
	Maintenance / yr	10.0%	Days / month	22	$/year	$150,000	Life (years)	10	# of chemicals	1
	Inflation / yr	5.0%	Months / year	12	Inflation / yr	5.0%	Inflation / yr	5%	gal alum/day	227
									$/48.5% gal	$3
			Cost per hour	$30					Increased use / yr	1.50%
			Salary adjustment	4.0%					Inflation / yr	5.0%
Year		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***
1		$2,302,000		$750,857		$150,000		$0		$248,565
2		$2,417,100		$780,891		$157,500		$0		$264,908
3		$2,537,955		$812,127		$165,375		$0		$282,326
4		$2,664,853		$844,612		$173,644		$0		$300,889
5		$2,798,095		$878,397		$182,326		$0		$320,672
6		$2,938,000		$913,533		$191,442		$0		$341,756
7		$3,084,900		$950,074		$201,014		$0		$364,227
8		$3,239,145		$988,077		$211,065		$0		$388,175
9		$3,401,102		$1,027,600		$221,618		$0		$413,697
10		$3,571,158		$1,068,704		$232,699	replace	$8,234,450		$440,898
11		$3,749,715		$1,111,452		$244,334		$0		$469,887
12		$3,937,201		$1,155,910		$256,551		$0		$500,782
13		$4,134,061		$1,202,146		$269,378		$0		$533,708
14		$4,340,764		$1,250,232		$282,847		$0		$568,800
15		$4,557,803		$1,300,242		$296,990		$0		$606,198
16		$4,785,693		$1,352,251		$311,839		$0		$646,056
17		$5,024,977		$1,406,341		$327,431		$0		$688,534
18		$5,276,226		$1,462,595		$343,803		$0		$733,805
19		$5,540,037		$1,521,099		$360,993		$0		$782,053
20		$5,817,039		$1,581,943		$379,043	replace	$13,413,052		$833,473

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14										
15										
16	**Chemical Costs (MBR**		**Electrical Use - Aeration**		**Electrical Use - Other (1/3 total)**		**Solids Disposal (trucking)**		**Present Worth**	
17	Cost / yr / each	$ 54,750	Operating hp (AD)	210	Operating hp	105	tipping fee ($/20 CY)	$0		
18	# of chemicals	2	Cost per kW-hr	$0.50	Cost per kW-hr	$0.50	dry lbs/day	6,600		
19	gal/day	50	Days / year	365	Days / year	365	CY/week (15% TS)	181		
20	$/gal	$3	hours / day	24	hours / day	24	20 CY trips/week	9.1		Discount Rate
21	Increased use / yr	1.50%	Increased use / yr	1.5%	Increased use / yr	1.5%	miles/trip	6		2.5%
22	Inflation / yr	5.0%	Inflation / yr	5.0%	Inflation / yr	5.0%	$/mile	$2.0		
23										
24		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***		**Cost in Year *i***	**Total by Year**	**Present Worth**
25		$109,500		$685,895		$342,947		$5,653	$4,595,417	$4,595,417
26		$116,700		$730,992		$365,496		$5,935	$4,839,523	$4,721,486
27		$124,373		$779,055		$389,528		$6,232	$5,096,970	$4,851,370
28		$132,550		$830,278		$415,139		$6,544	$5,368,508	$4,985,194
29		$141,265		$884,869		$442,434		$6,871	$5,654,930	$5,123,087
30		$150,553		$943,049		$471,524		$7,214	$5,957,073	$5,265,184
31		$160,452		$1,005,054		$502,527		$7,575	$6,275,824	$5,411,624
32		$171,002		$1,071,137		$535,568		$7,954	$6,612,123	$5,562,549
33		$182,246		$1,141,564		$570,782		$8,352	$6,966,961	$5,718,109
34		$194,228		$1,216,622		$608,311		$8,769	$15,575,839	$12,472,016
35		$206,999		$1,296,615		$648,307		$9,208	$7,736,517	$6,043,755
36		$220,609		$1,381,867		$690,934		$9,668	$8,153,522	$6,214,164
37		$235,114		$1,472,725		$736,362		$10,151	$8,593,647	$6,389,857
38		$250,573		$1,569,557		$784,778		$10,659	$9,058,210	$6,571,010
39		$267,048		$1,672,755		$836,377		$11,192	$9,548,604	$6,757,807
40		$284,606		$1,782,739		$891,369		$11,752	$10,066,305	$6,950,437
41		$303,319		$1,899,954		$949,977		$12,339	$10,612,873	$7,149,096
42		$323,262		$2,024,876		$1,012,438		$12,956	$11,189,961	$7,353,987
43		$344,517		$2,158,011		$1,079,006		$13,604	$11,799,319	$7,565,321
44		$367,169		$2,299,900		$1,149,950		$14,284	$25,855,853	$16,173,552
45										
46	**NET PRESENT WORTH - PROBABLE O&M COSTS (2025 DOLLARS)**								**$**	**135,875,000**
47									equivalent yearly cost =	$8,503,000
48										

APPENDIX G
EQUIPMENT VENDORS

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APPENDIX G-1
WESTECH OXYSTREAM DITCH PRELIMINARY PROPOSAL (VERTICAL MIXER AERATOR)

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Tafuna WWTP

American Samoa

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J-U-B Engineers

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WesTech®

Proposal Number: 2460361
Friday, August 16, 2024

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Technical Proposal

Item A / B – OxyStream™ Biological Nutrient Removal System, Model AES2C3

Design Overview		
Parameter	Unit	Value / Description
Proposed WesTech System	-	Two (2) OxyStream Biological Nutrient Removal Systems, Model AES2B3
Application	-	Municipal Wastewater Treatment
Stages	-	Two Stage
Configuration	-	Straight Loop Reactor
Approximate Footprint	Item A Item B	256' L x 61' W x 15' SWD 301' L x 61' W x 15' SWD

WesTech has been promoting oxidation ditch technology for over 25 years with over 500 mechanical surface aerator installations. WesTech's Landy-7 impeller maintains an industry leading oxygen transfer rate; and, unlike diffused aeration plants, its efficiency does not erode over time. There are no below deck maintenance items. The unique design of the impeller requires no supplemental mixing and prevents rag accumulation, helping to save municipalities capital and operating costs.



Basis of Design Information

Water Quality

The WesTech OxyStream™ Biological Nutrient Removal system is designed based on the following feed water quality information.

Influent Water Quality*

Parameter	Value / Description			
	Item A – Peak Daily Flow		Item B – Peak Daily Flow	
Flow*	5.3 MGD		10.7 MGD	
Biological Oxygen Demand	348 mg/L	15,390 lbs/day	217 mg/L	19,350 lbs/day
Total Suspended Solids	310 mg/L	13,710 lbs/day	182 mg/L	16,230 lbs/day
Total Kjeldahl Nitrogen	53.6 mg/L	2,368 lbs/day	35.1 mg/L	3,134 lbs/day
Temperature	15 – 25 °C			

*Information not provided is assumed.

Treated Water Quality

Parameter	Unit	Value / Description
Biological Oxygen Demand	mg/L	10
Total Suspended Solids	mg/L	10
Ammonia	mg/L	1
Total Nitrogen	mg/L	10

Process / Design Description

Each MGD train will have one anoxic zone for total nitrogen reduction and one aeration zone equipped with two vertical slow-speed surface aerators for the treatment of biological oxygen demand, total suspended solids, and ammonia.

The aerators have been sized for largest unit out of service (3 duty + 1 redundant) at peak daily flow. They will be operated on a variable frequency drive with full turn down capabilities from 60 to 30 Hz, the equivalent of a minimum 80% turndown per aerator, up to 90% turndown for the system.

The horizontal channel velocity recycles nitrate-rich mixed liquor between the aerobic and anoxic zones through bypass channels. An internal recycle gate controls the flow leaving the aerobic zone and entering the anoxic zone. The gate is equipped with a handwheel for manual operation as well as an actuator for automatic operation. The flow is set to optimize the transfer of nitrates while maintaining anoxic conditions.

The Advanced OxyStream Control System™ includes a programmable logic controller, all necessary instrumentation, and an integrated motor control center. The status of all mechanical process equipment is monitored at one location with an easy touch screen interface for the system adjustments. The variable frequency drives automatically adjust aerator speed to match the oxygen demand using control parameter probes in the reactor. The Advanced OxyStream Control System has been designed to increase or restrict aeration in specific zones of the process train, optimizing performance and minimizing operation costs.

Process Design Summary

Detailed Design Summary – Item A

Parameter	AES	SI
Number of Trains in System		2
Number of Aerators per Train		2
WesTech System Model		OxyStream™ System, AES2B3
Flow Rates		
Design Flow Rate	2.6 MGD	9,840 m^3/day
Peak Flow Rate	5.3 MGD	20,100 m^3/day
Volumes (Per Train)		
Anoxic	0.36 Mgal	1,360 m^3
Aerobic	1.25 Mgal	4,732 m^3
Yield*		0.83 lb/lb BOD
Aerobic Solids Retention Time		9.4 days
Design Mixed Liquor Suspended Solids Concentration		3,500 mg/L
Standard Oxygen Requirement		
Design		23,531 lbs O_2/day
Peak		37,376 lbs O_2/day
Standard Oxygen Transfer Rate		3.8 lbs O_2/HP-hr
Approximate Footprint		256’ L x 61’ W x 15’ SWD

Detailed Design Summary – Item B

Parameter	AES	SI
Number of Trains in System		2
Number of Aerators per Train		2
WesTech System Model		OxyStream™ System, AES2B3
Item A		
Flow Rates (Per Train – based on Phase 3 flows)		
Design Flow Rate	5.5 MGD	20,800 m^3/day
Peak Flow Rate	10.7 MGD	40,500 m^3/day
Volumes (Per Train)		
Anoxic	0.41 Mgal	1,550 m^3
Aerobic	1.50 Mgal	5,680 m^3
Yield*		0.80 lb/lb BOD
Aerobic Solids Retention Time		9.4 days
Design Mixed Liquor Suspended Solids Concentration		3,500 mg/L
Standard Oxygen Requirement		
Design		29,854 lbs O_2/day
Peak		47,291 lbs O_2/day
Standard Oxygen Transfer Rate		3.8 lbs O_2/HP-hr
Approximate Footprint		301’ L x 61’ W x 15’ SWD

Scope of Supply

Scope of Supply – OxyStream System

Item	Quantity	Description	Material/Brand
Surface Aerator	2/train		
Landy-7 Impeller	4/total	2800 mm diameter 150 HP	A36 Steel
Motor		460 V/3 PH/60 Hz 120 V space heater 120 V immersion heater	ABB
Reducer		Oil pressure switch -	Nord
Mounting Bars/Plate			A36 Steel
Jackstuds			A307 ZP
Submersible Mixers			
Anoxic	1/train	TR Series	Wilo
Internal Recycle Gate	1/train 2/total	2.5' width Automated, with actuator	A36 Steel
Weir Gate	1/train	10' width Automated, with actuator	304SS
Instrumentation			
Anoxic ORP probe	1/train	Differential Electrode and Controller	Hach
Dissolved Oxygen probe	1/aerator	LDOsc Model 2 and Controller	Hach
Nitrate/Nitrite probe	1/train	NT3200sc and Controller	Hach
Mounting Poles	1/probe	For ORP, DO, and Nitrate probes	Hach
Level Sensor	1/train	Hydraulic level detection	Vega
Electrical Controls			
Master Panel	1/total	NEMA 4X, PLC, HMI; 480 V/ 3 ph / 60 Hz	Allen-Bradley
Motor Control Center	1/total	With aerator VFDs	Schneider
Hardware	1 Lot	Bolts and Fasteners	304SS

Surface Preparation and Painting

Surface Preparation and Coating*

Coating Area	Surface Preparation	Coating
Submerged	SSPC-SP10 / NACE 2 Near White Blast	One (1) coat Tnemec Epoxy N140, 4-6 mils One (1) coat Tnemec Epoxy N140, 4-6 mils Finish color B5712 "WesTech Blue"
Non-Submerged	SSPC-SP6 / NACE 2 Commercial Blast	One (1) coat Tnemec Epoxy N140, 4-6 mils One (1) coat Tnemec Endura-Shield Series 73, 3-5 mils Finish color B5712 "WesTech Blue"
Motors/Reducers	-	Standard factory coatings
Stainless Steel	-	Stainless steel components will not be coated

*All field surface preparation, field paint, touch-up, and repair to shop painted surfaces are not by WesTech.

Included Spare Parts and Supplemental Items

WesTech has included spare parts in the proposal pricing. These components are shelf spares that can be readily installed as needed.

- Low oil flow switch
- High speed coupling

Additional Services

On-Site Technical Assistance and Training

WesTech has included on-site technical assistance during construction, pre-commissioning and start-up to ensure the equipment is installed and commissioned per WesTech and sub-supplier requirements. All service visits will be completed by certified field technicians that are qualified and have experience working with WesTech equipment.

Any additional trips that the customer may request can be purchased at the standard WesTech daily rates plus travel and living expenses.

On-Site Technical Service

Service	Number of Trips	Number of Days (Including Travel Time)
Installation and Start-Up Commissioning Assistance, Operator Training	4	12
Total Included Service	4	12

To supplement the above noted technical assistance, WesTech will provide the additional services.

- Technical support during WesTech office hours with a direct phone number to reach a qualified and involved project representative during the equipment warranty period.
- Access to a 24-hour on-call emergency support line.

Clarifications and Exceptions

General Clarifications

Terms & Conditions: This proposal, including all terms and conditions contained herein, shall become part of any resulting contract or purchase order. Changes to any terms and conditions, including but not limited to submittal and shipment days, payment terms, and escalation clause shall be negotiated at order placement, otherwise the proposal terms and conditions contained herein shall apply.

Paint: If your equipment has paint included in the price, please take note to the following. Primer paints are designed to provide only a minimal protection from the time of application (usually for a period not to exceed 30 days). Therefore, it is imperative that the finish coat be applied within 30 days of shipment on all shop primed surfaces. Without the protection of the final coatings, primer degradation may occur after this period, which in turn may require renewed surface preparation and coating. If it is impractical or impossible to coat primed surfaces within the suggested time frame, WesTech strongly recommends the supply of bare metal, with surface preparation and coating performed in the field. All field surface preparation, field paint, touch-up, and repair to shop painted surfaces are not by WesTech.

Carbon and Stainless Escalation: Any material price increase from proposal date to material procurement greater than 2.5% from stated prices set forth herein are subject to escalation. The escalation shall be based upon increases at cost, without additional profit, overhead or margin and shall include labor, material, and other costs to WesTech that occur in the specified time period. Any revisions or changes requested by the customer will be priced on a case by case basis. Carbon material escalation will be based on a third-party carbon steel material index of flats and longs, such as the SBB indexes located at https://www.steelbb.com. Any carbon steel escalation will be based on carbon current flats and longs indexes which are in effect at the time of bid. Stainless material escalation will be based on a third-party material nickel index, such as the SBB index located at https://www.steelbb.com. Any escalation will be based on current nickel price indexes which are in effect at the time of bid.

USA Tariffs and Current Trade Laws: All prices are based on current USA and North America tariffs and trade laws/agreements at time of bid. Any changes in costs due to USA Tariffs and trade laws/ agreements will be passed through to the purchaser at cost.

Exceptions

Not applicable

Commercial Proposal

Proposal Name: Tafuna WWTP American Samoa
Proposal Number: 2460361
Friday, August 16, 2024

1. Bidder's Contact Information

Company Name	WesTech Engineering, LLC
Primary Contact Name	Adian Williams
Phone	(801) 265-1000
Email	awilliams@westech-inc.com
Address: Number/Street	3665 S West Temple
Address: City, State, Zip	Salt Lake City, UT 84115

2. Budget Pricing

Currency: USD

Scope of Supply

A	OxyStream™ BNR System, Model AES2B3	$1,786,000
B	OxyStream™ BNR System, Model AES2B3	$1,786,000
	Taxes (sales, use, VAT, IVA, IGV, duties, import fees, etc.)	Not Included

Prices are valid for a period not to exceed 30 days from date of proposal.

Additional Field Service

Daily Rate (Applicable Only to Field Service Not Included in Scope)	$1,750

Pricing does not include field service unless noted in scope of supply, but is available at the daily rate plus expenses. The greater of a two week notice or visa procurement time is required prior to departure date. Our field service policy is subject to change and can be provided upon request for details.

3. Payment Terms

Purchase Order Acceptance and Contract Execution	10%
Submittals Provided by WesTech	15%
Release for Fabrication	35%
Notification of Ready to Ship	40%

All payments are net 30 days. Partial shipments are allowed. An approved Letter of Credit is required if Incoterms CIF, CFR, DAP, CIP, or CPT are applicable. Payment is required in full for all other Incoterms prior to international shipment. Other terms per WesTech proforma invoice. Please note that the advising bank must be named as: Wells Fargo Bank, International Department, 9000 Flair Drive, 3rd Floor, El Monte, California 91731, USA.

4. Schedule

Submittals, after Purchase Order Acceptance and Contract Execution	8 to 10 weeks
Ready to Ship, after Receipt of Final Submittal Approval	22 to 26 weeks
Estimated Weeks to Ready to Ship	30 to 36 weeks*

*Customer submittal approval is typically required to proceed with equipment fabrication and is not accounted for in the schedule above. Project schedule will be extended to account for time associated with receipt of customer submittal approval. Due to supply chain disruptions and volatility, delivery schedule is a best estimate only and may be improved or hampered based on date of contract execution, scope selection, and materials availability.

5. Freight

Domestic	FOB Shipping Point - Full Freight Allowed to Jobsite (FSP-FFA)	
From	Final Destination	Number of Trucks or Containers
WesTech Shops	Long Beach, California*	Approximately 3

*Ocean freight is not by WesTech.

One-Year Warranty

Equipment manufactured or sold by WesTech Engineering, LLC, once paid for in full, is backed by the following warranty:

Subject to the terms below, WesTech warrants all new equipment manufactured or sold by WesTech Engineering, LLC to be unencumbered and free from defects in material and workmanship, and WesTech will replace or repair, F.O.B. its factories or other location it chooses, any part or parts returned to WesTech which WesTech's examination and analysis determine have failed within the warranty period because of defects in material and workmanship. The warranty period is either, one calendar year immediately following start-up, or eighteen (18) months from when WesTech sent its ready-to-ship notification to the purchaser, whichever expires sooner. All repair or replacement parts qualifying under this warranty shall be free of charge. Purchaser will provide timely written notice to WesTech of any defects it believes should be repaired or replaced under this warranty. WesTech will reject as untimely any warranty defect claim that purchaser submits more than thirty (30) days after the possible warranty defect first occurred. Unless specifically stated otherwise, this warranty does not cover normal wear or consumables. This warranty is not transferable.

This warranty shall be void and shall not apply where the equipment or any part thereof

a) has been dismantled, modified, repaired or connected to other equipment, outside of a WesTech factory, or without WesTech's written approval, or
b) has not been installed in complete adherence to all WesTech's or parts manufacturer's requirements, recommendations, and procedures, or
c) has been subject to misuse, abuse, neglect, or accident, or has not at all times been operated and maintained in strict compliance with all of WesTech's requirements and recommendations therefor, including, but not limited to, the relevant WesTech Operations & Maintenance Manual and any other of WesTech's specified guidelines & procedures, or
d) has been subject to force majeure events; use of chemicals not approved in writing by WesTech; electrical surges; overloading; significant power, water or feed supply fluctuations; or non-compliance with agreed feedwater or chemical volumes, specifications or procedures.

In any case where a part or component of equipment under this warranty is or may be faulty and the component or part is also covered under the warranty of a third party then the purchaser shall provide reasonable assistance to first pursue a claim under the third party warranty before making a claim under this warranty from WesTech. WesTech Engineering, LLC gives no warranty with respect to parts, accessories, or components purchased other than through WesTech. The warranties which apply to such items are those offered by the respective manufacturers.

This warranty is expressly given by WesTech and accepted by purchaser in lieu of all other warranties whether written, oral, express, implied, statutory or otherwise, including without limitation, warranties of merchantability and fitness for particular purpose. WesTech neither accepts nor authorizes any other person to assume for it any other liability with respect to its equipment. WesTech shall not be liable for normal wear and tear, corrosion, or any contingent, incidental, or consequential damage or expense due to partial or complete inoperability of its equipment for any reason whatsoever. The purchaser's exclusive and only remedy for breach of this warranty shall be the repair and or replacement of the defective part or parts within a reasonable time of WesTech's accepting the validity of a warranty claim made by the purchaser.

Terms & Conditions

Terms and Conditions appearing in any order based on this proposal which are inconsistent herewith shall not be binding on WesTech Engineering, LLC The sale and purchase of equipment described herein shall be governed exclusively by the foregoing proposal and the following provisions:

1. SPECIFICATIONS: WesTech Engineering, LLC is furnishing its standard equipment as outlined in the proposal and as will be covered by final approved drawings. The equipment may not be in strict compliance with the Engineer's/Owner's plans, specifications, or addenda as there may be deviations. The equipment will, however, meet the general intention of the mechanical specifications of these documents.

2. ITEMS INCLUDED: This proposal includes only the equipment specified herein and does not include erection, installation, accessories, nor associated materials such as controls, piping, etc., unless specifically listed.

3. PARTIES TO CONTRACT: WesTech Engineering, LLC is not a party to or bound by the terms of any contract between WesTech Engineering, LLC's customer and any other party. WesTech Engineering, LLC's undertakings are limited to those defined in the contract between WesTech Engineering, LLC and its direct customers.

4. PRICE AND DELIVERY: All selling prices quoted are subject to change without notice after 30 days from the date of this proposal unless specified otherwise. Unless otherwise stated, all prices are F.O.B. WesTech Engineering, LLC or its supplier's shipping points. All claims for damage, delay or shortage arising from such equipment shall be made by Purchaser directly against the carrier. When shipments are quoted F.O.B. job site or other designation, Purchaser shall inspect the equipment shipped, notifying WesTech Engineering, LLC of any damage or shortage within forty-eight hours of receipt, and failure to so notify WesTech Engineering, LLC shall constitute acceptance by Purchaser, relieving WesTech Engineering, LLC of any liability for shipping damages or shortages.

5. PAYMENTS: All invoices are net 30 days. Delinquencies are subject to a 1.5 percent service charge per month or the maximum permitted by law, whichever is less on all past due accounts. Pro rata payments are due as shipments are made. If shipments are delayed by the Purchaser, invoices shall be sent on the date when WesTech Engineering, LLC is prepared to make shipment and payment shall become due under standard invoicing terms. If the work to be performed hereunder is delayed by the Purchaser, payments shall be based on the purchase price and percentage of completion. Products held for the Purchaser shall be at the risk and expense of the Purchaser. Unless specifically stated otherwise, prices quoted are for equipment only. These terms are independent of and not contingent upon the time and manner in which the Purchaser receives payment from the owner.

6. PAYMENT TERMS: Credit is subject to acceptance by WesTech Engineering, LLC's Credit Department. If the financial condition of the Purchaser at any time is such as to give WesTech Engineering, LLC, in its judgment, doubt concerning the Purchaser's ability to pay, WesTech Engineering, LLC may require full or partial payment in advance or may suspend any further deliveries or continuance of the work to be performed by the WesTech Engineering, LLC until such payment has been received.

7. ESCALATION: If between the proposal date and actual procurement and through no fault of the Seller, the relevant cost of labor, material, freight, tariffs, and other Seller costs combined relating to the contract, increase by greater than 2.5% of the overall contract price, then the contract price shall be subject to escalation and increased. Such increase shall be verified by documentation and the amount of contract price escalation shall be calculated as either the actual increased cost to the Seller or, if agreed by the Parties, the equivalent increase of a relevant industry recognized third-party index, and in both cases without any additional profit or margin being added.

8. APPROVAL: If approval of equipment submittals by Purchaser or others is required, a condition precedent to WesTech Engineering, LLC supplying any equipment shall be such complete approval.

9. INSTALLATION SUPERVISION: Prices quoted for equipment do not include installation supervision. WesTech Engineering, LLC recommends and will, upon request, make available, at WesTech Engineering, LLC's then current rate, an experienced installation supervisor to act as the Purchaser's employee and agent to supervise installation of the equipment. Purchaser shall at its sole expense furnish all necessary labor equipment, and materials needed for installation.

Responsibility for proper operation of equipment, if not installed by WesTech Engineering, LLC or installed in accordance with WesTech Engineering, LLC's instructions, and inspected and accepted in writing by WesTech Engineering, LLC, rests entirely with Purchaser; and any work performed by WesTech Engineering, LLC personnel in making adjustment or changes must be paid for at WesTech Engineering, LLC's then current per diem rates plus living and traveling expenses.

WesTech Engineering, LLC will supply the safety devices described in this proposal or shown in WesTech Engineering, LLC's drawings furnished as part of this order but excepting these, WesTech Engineering, LLC shall not be required to supply or install any safety devices whether required by law or otherwise. The Purchaser hereby agrees to indemnify and hold harmless WesTech Engineering, LLC from any claims or losses arising due to alleged or actual insufficiency or inadequacy of the safety devices offered or supplied hereunder, whether specified by WesTech Engineering, LLC or Purchaser, and from any damage resulting from the use of the equipment supplied hereunder.

10. ACCEPTANCE OF PRODUCTS: Products will be deemed accepted without any claim by Purchaser unless written notice of non-acceptance is received by WesTech Engineering, LLC within 30 days of delivery if shipped F.O.B. point of shipment, or 48 hours of delivery if shipped F.O.B. point of destination. Such written notice shall not be considered received by WesTech Engineering, LLC unless it is accompanied by all freight bills for said shipment, with Purchaser's notations as to damages, shortages and conditions of equipment, containers, and seals. Non-accepted products are subject to the return policy stated below.

11. TAXES: Any federal, state, or local sales, use or other taxes applicable to this transaction, unless specifically included in the price, shall be for Purchaser's account.

12. TITLE: The equipment specified herein, and any replacements or substitutes therefore shall, regardless of the manner in which affixed to or used in connection with realty, remain the sole and personal property of WesTech Engineering, LLC until the full purchase price has been paid. Purchaser agrees to do all things necessary to protect and maintain WesTech Engineering, LLC's title and interest in and to such equipment; and upon Purchaser's default, WesTech Engineering, LLC may retain as liquidated damages any and all partial payments made and shall be free to enter the premises where such equipment is located and remove the same as its property without prejudice to any further claims on account of damages or loss which WesTech Engineering, LLC may suffer from any cause.

13. INSURANCE: From date of shipment until the invoice is paid in full, Purchaser agrees to provide and maintain at its expense, but for WesTech Engineering, LLC's benefit, adequate insurance including, but not limited

to, builders risk insurance on the equipment against any loss of any nature whatsoever.

14. SHIPMENTS: Any shipment of delivery dates recited represent WesTech Engineering, LLC's best estimate but no liability, direct or indirect, is assumed by WesTech Engineering, LLC for failure to ship or deliver on such dates.

WesTech Engineering, LLC shall have the right to make partial shipments; and invoices covering the same shall be due and payable by Purchaser in accordance with the payment terms thereof. If Purchaser defaults in any payment when due hereunder, WesTech Engineering, LLC may, without incurring any liability therefore to Purchaser or Purchaser's customers, declare all payments immediately due and payable with maximum legal interest thereon from due date of said payment, and at its option, stop all further work and shipments until all past due payments have been made, and/or require that any further deliveries be paid for prior to shipment.

If Purchaser requests postponements of shipments, the purchase price shall be due and payable upon notice from WesTech Engineering, LLC that the equipment is ready for shipment; and thereafter any storage or other charge WesTech Engineering, LLC incurs on account of the equipment shall be for the Purchaser's account.

If delivery is specified at a point other than WesTech Engineering, LLC or its supplier's shipping points, and delivery is postponed or prevented by strike, accident, embargo, or other cause beyond WesTech Engineering, LLC's reasonable control and occurring at a location other than WesTech Engineering, LLC or its supplier's shipping points, WesTech Engineering, LLC assumes no liability in delivery delay. If Purchaser refuses such delivery, WesTech Engineering, LLC may store the equipment at Purchaser's expense. For all purposes of this agreement such tender of delivery or storage shall constitute delivery.

15. WARRANTY: WesTech Engineering, LLC warrants equipment it supplies only in accordance with the attached WesTech Warranty. This warranty is expressly given by WesTech and accepted by purchaser in lieu of all other warranties whether written, oral, express, implied, statutory or otherwise, including without limitation, warranties of merchantability and fitness for particular purpose. WesTech neither accepts nor authorizes any other person to assume for it any other liability with respect to its equipment. WesTech shall not be liable for normal wear and tear, corrosion, or any contingent, incidental, or consequential damage or expense due to partial or complete inoperability of its equipment for any reason whatsoever. The purchaser's exclusive and only remedy for breach of this warranty shall be the repair and or replacement of the defective part or parts within a reasonable time of WesTech's accepting the validity of a warranty claim made by the purchaser.

16. PATENTS: WesTech Engineering, LLC agrees that it will, at its own expense, defend all suits or proceedings instituted against Purchaser and pay any award of damages assessed against it in such suits or proceedings, so far as the same are based on any claim that the said equipment or any part thereof constitutes an infringement of any apparatus patent of the United States issued at the date of this Agreement, provided WesTech Engineering, LLC is given prompt notice in writing of the institution or threatened institution of any suit or proceeding and is given full control of the defense, settlement, or compromise of any such action; and Purchaser agrees to give WesTech Engineering, LLC needed information, assistance, and authority to enable WesTech Engineering, LLC so to do. In the event said equipment is held or conceded to infringe such a patent, WesTech Engineering, LLC shall have the right at its sole option and expense to a) modify the equipment to be non-infringing, b) obtain for Purchaser the license to continue using said equipment, or c) accept return of the equipment and refund to the Purchaser the purchase price thereof less a reasonable charge for the use thereof. WesTech Engineering, LLC will reimburse Purchaser for actual out-of-pocket expenses, exclusive of legal fees, incurred in preparing such information and rendering such assistance at WesTech Engineering, LLC's request. The foregoing states the entire liability of WesTech Engineering, LLC, with respect to patent infringement; and except as otherwise agreed to in writing, WesTech Engineering, LLC assumes no responsibility for process patent infringement.

17. SURFACE PREPARATION AND PAINTING: If furnished, shop primer paint is intended to serve only as minimal protective finish. WesTech Engineering, LLC will not be responsible for the condition of primed or finish painted surfaces after equipment leaves its shops. Purchasers are invited to inspect paint in shops for proper preparation and application prior to shipment. WesTech Engineering, LLC assumes no responsibility for field surface preparation or touch-up of shipping damage to paint. Painting of fasteners and other touch-up to painted surfaces will be by Purchaser's painting contractor after mechanism installation.

Motors, gear motors, and other components not manufactured by WesTech Engineering, LLC will be painted with that manufacturer's standard paint system. It is WesTech Engineering, LLC's intention to ship major steel components as soon as fabricated, often before drive, motors, and other manufactured components. Unless Purchaser can ensure that shop primed steel shall be field painted within thirty (30) days after arrival at the job site, WesTech Engineering, LLC encourages the Purchaser to order these components without primer.

WesTech Engineering, LLC's prices are based on paints and surface preparations as outlined in the main body of this proposal. In the event that an alternate paint system is selected, WesTech Engineering, LLC requests that Purchaser's order advise of the paint selection. WesTech Engineering, LLC will then either adjust the price as may be necessary to comply or ship the material unpainted if compliance is not possible due to application problems or environmental controls.

18. CANCELLATION, SUSPENSION, OR DELAY: After acceptance by WesTech Engineering, LLC, this proposal, or Purchaser's order based on this proposal, shall be a firm agreement and is not subject to cancellation, suspension, or delay except upon payment by Purchaser of appropriate charges which shall include all costs incurred by WesTech Engineering, LLC to date of cancellation, suspension, or delay plus a reasonable profit. Additionally, all charges related to storage and/or resumption of work, at WesTech Engineering, LLC's plant or elsewhere, shall be for Purchaser's sole account; and all risks incidental to storage shall be assumed by Purchaser.

19. FORCE MAJEURE: Neither party hereto shall be liable to the other for default or delay in delivery caused by extreme weather or other act of God, strike or other labor shortage or disturbance, fire, accident, war or civil disturbance, act of government, pandemic, delay of carriers, failure of normal sources of supply, complete or partial shutdown of plant by reason of inability to attain sufficient raw materials or power, and/or other similar contingency beyond the reasonable control of the respective parties. The time for delivery specified herein shall be extended during the continuance of such conditions, or any other cause beyond such party's reasonable control. Escalation resulting from a Force Majeure event shall be equitably adjusted per the escalation policy stated above.

20. RETURN OF PRODUCTS: No products may be returned to WesTech Engineering, LLC without WesTech Engineering, LLC's prior written permission. Said permission may be withheld by WesTech Engineering, LLC at its sole discretion.

21. BACKCHARGES: WesTech Engineering, LLC will not approve or accept backcharges for labor, materials, or other costs incurred by Purchaser or others in modification, adjustment, service, or repair of WesTech Engineering, LLC furnished materials unless such back charge has been authorized in advance in writing by a WesTech Engineering, LLC purchase order, or work requisition signed by WesTech Engineering, LLC.

22. INDEMNIFICATION: Purchaser agrees to indemnify WesTech Engineering, LLC from all costs incurred, including but not limited to court costs and reasonable attorney fees, from enforcing any provisions of this contract, including but not limited to breach of contract or costs incurred in collecting monies owed on this contract.

23. ENTIRE AGREEMENT: This proposal expresses the entire agreement between the parties hereto superseding any prior understandings and is not subject to modification except by a writing signed by an authorized officer of each party.

24. MOTORS AND MOTOR DRIVES: In order to avoid shipment delays of WesTech Engineering, LLC equipment, the motor drives may be sent directly to the job site for installation by the equipment installer. Minor fit-up may be required.

25. EXTENDED STORAGE: Extended storage instructions will be part of information provided to shipment. If equipment installation and start-up is delayed more than 30 days, the provisions of the storage instructions must be followed to keep WARRANTY in force.

26. LIABILITY: Professional liability insurance, including but not limited to, errors and omissions insurance, is not included. In any event, liability for errors and omissions shall be limited to the lesser of $100,000 USD or the value of the particular piece of equipment (not the value of the entire order) supplied by WesTech Engineering, LLC against which a claim is sought.

27. ARBITRATION NEGOTIATION: Any controversy or claim arising out of or relating to the performance of any contract resulting from this proposal or contract issued, or the breach thereof, shall be settled by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) may be entered to any court having jurisdiction.

ACCEPTED BY PURCHASER

Customer Name: _____

Customer Address: _____

_____

_____

Contact Name: _____

Contact Phone: _____

Contact Email: _____

Signature: _____

Printed Name: _____

Title: _____

Date: _____

Supplemental Information

OxyStream Layout and Concrete Estimate – Tafuna
OxyStream Layout and Concrete Estimate – Regional

OxyStream Layout and Concrete Estimate

Project Information

Project Name:	Tafuna	Project Number:	2460361
Engineer:	JUB	Completed by:	MGAMM
Date:	8/14/2024	Checked by:	BBURT

Design Parameters

Ditch Parameters

# of Ditches	2	
Aerators/Ditch	2	
Depth	15	ft
Channel Width	30	ft
Straight Length	138.9	ft
Channel Freeboard	1.5	ft
Aeration Freeboard	6	ft

Assumptions

Exterior Walls	15	in	thick
Interior Walls	12	in	thick
Deck	12	in	thick
Floor	10	in	thick
Footings	18	in	thick
Footings	60	in	tall

Volume

Aerobic	1.25	Mgal
Anoxic	0.36	Mgal
TOTAL	1.61	Mgal (ea)

Footprint

	Width	Length	
Aerobic	61.0	198.9	ft
Anoxic	61.0	52.3	ft
TOTAL (2 ditches)	125.5	255.7	ft

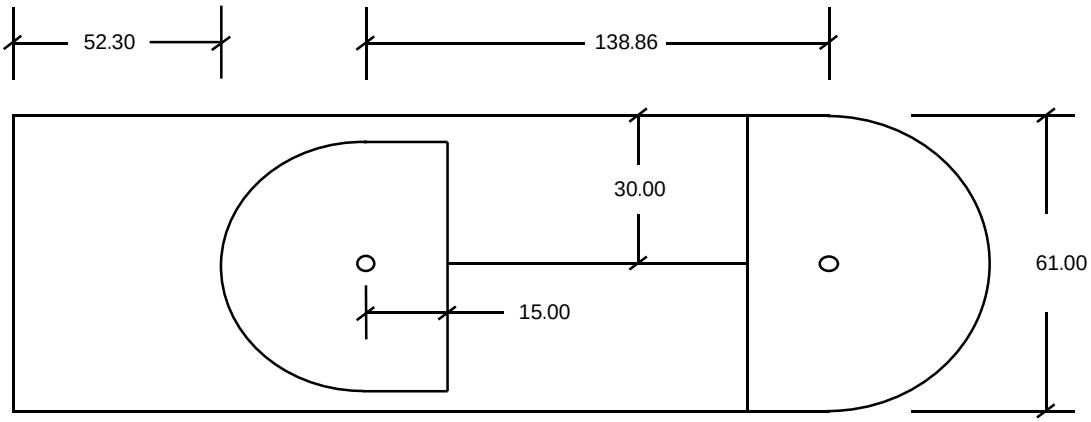
Concrete Estimate

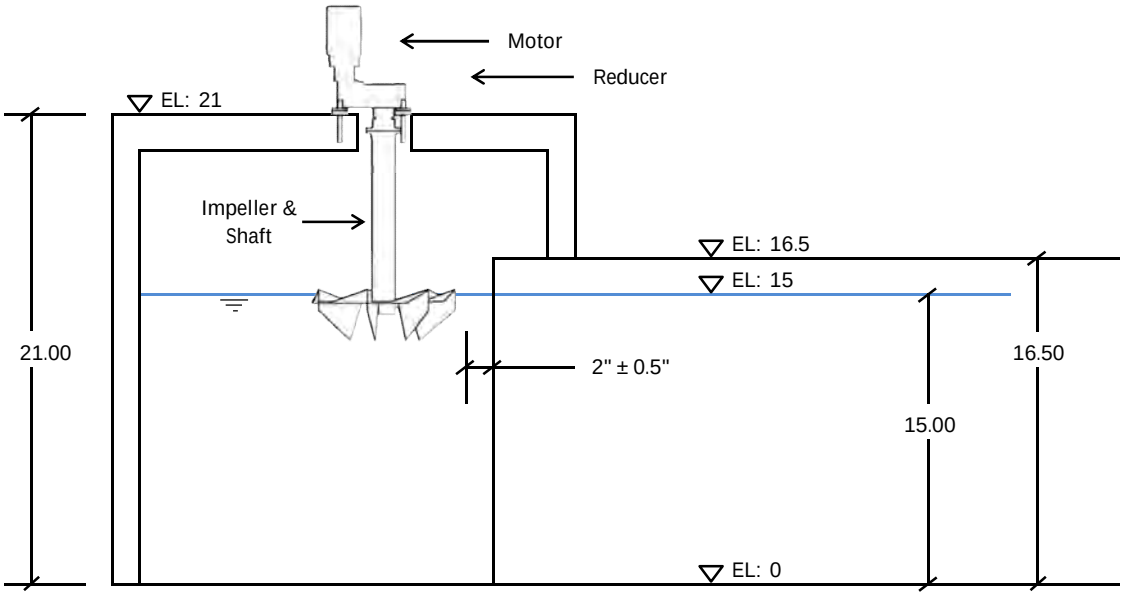
OxyStream BASIN OUTER WALLS	500	cu-yd
OxyStream BASIN INNER WALLS	528	cu-yd
OxyStream BASIN FLOOR	914	cu-yd
OxyStream BASIN FOOTINGS	384	cu-yd
Aerator Deck(s)	329	cu-yd
Total Estimated Concrete	2655	cu-yd

Ditch Layout

Drawing Not To Scale
Dimensions Given in Feet
Dimensions listed are interior dimensions

Shown: 1 of 2





OxyStream Layout and Concrete Estimate

Project Information

Project Name:	Regional	Project Number:	2460361
Engineer:	JUB	Completed by:	MGAMM
Date:	8/14/2024	Checked by:	EHOTZ

Design Parameters

Ditch Parameters

# of Ditches	2	
Aerators/Ditch	2	
Depth	15	ft
Channel Width	30	ft
Straight Length	176.2	ft
Channel Freeboard	1.5	ft
Aeration Freeboard	6	ft

Assumptions

Exterior Walls	15	in	thick
Interior Walls	12	in	thick
Deck	12	in	thick
Floor	10	in	thick
Footings	18	in	thick
Footings	60	in	tall

Volume

Aerobic	1.50	Mgal
Anoxic	0.41	Mgal
TOTAL	1.91	Mgal (ea)

Footprint

	Width	Length	
Aerobic	61.0	236.2	ft
Anoxic	61.0	60.0	ft
TOTAL (2 ditches)	125.5	300.7	ft

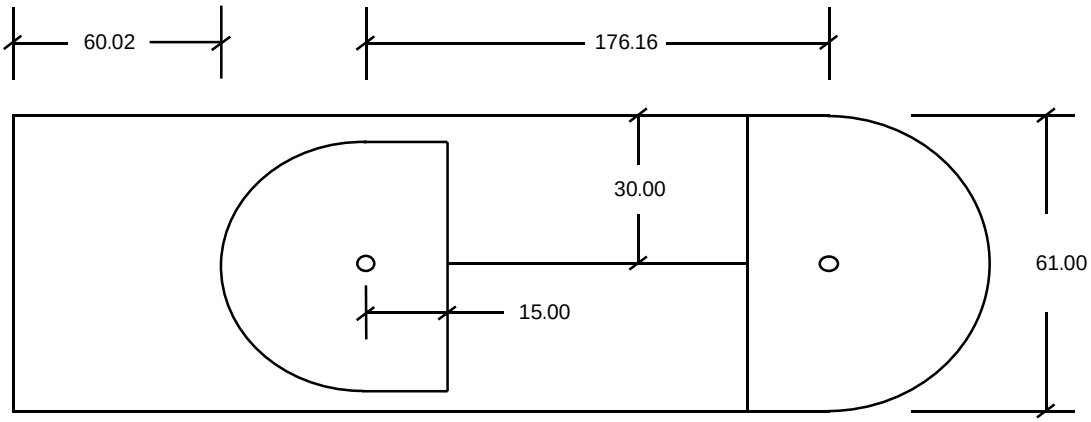
Concrete Estimate

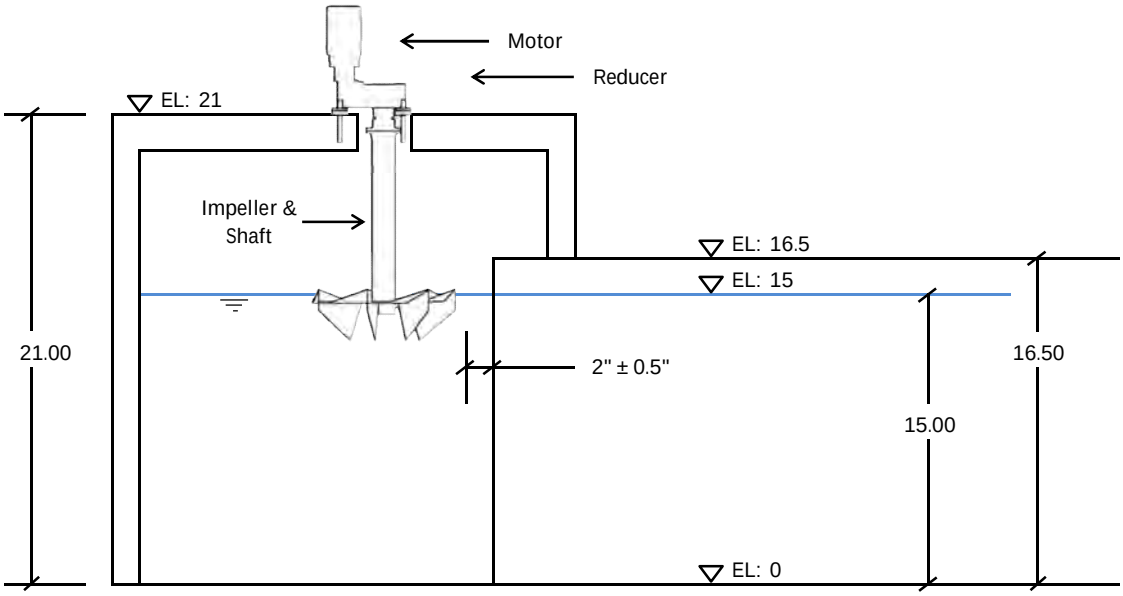
OxyStream BASIN OUTER WALLS	569	cu-yd
OxyStream BASIN INNER WALLS	601	cu-yd
OxyStream BASIN FLOOR	1083	cu-yd
OxyStream BASIN FOOTINGS	443	cu-yd
Aerator Deck(s)	329	cu-yd
Total Estimated Concrete	3025	cu-yd

Ditch Layout

Drawing Not To Scale
Dimensions Given in Feet
Dimensions listed are interior dimensions

Shown: 1 of 2





APPENDIX G-2
WORLD WATERWORKS MBBR

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World water works

Clean Water and Energy from Wastewater

DATE
7/17/2024

PROPOSAL
JUB Engineering - Tafuna-AmericanSamoa - MBBR

CLIENT
JUB Engineering

END USER
Tafuna WWTP

REPRESENTATIVE
Nate Miller, Misco Water - Idaho, Utah

World water works
Clean Water and Energy from Wastewater

DATE: July 17, 2024
TO: JUB Engineering
FROM: Jason Boyd, World Water Works, Inc. (WWW)
CC: Graham Hoppe, WWW
RE: MBBR BUDGETARY PROPOSAL

Thank you for your interest in World Water Works and our MBBR IFAS technology. We have prepared this preliminary proposal for you based on the design criteria provided. Please review and we look forward to hearing back from you. We encourage you to reach out to our references to understand how others have enjoyed the experience of working with World Water Works.

The document has been organized to provide:

1) OVERVIEW
2) DESIGN BASIS
3) SCOPE OF SUPPLY
4) PRICING & DELIVERY
5) CONTRACTUAL

WWW has the technology, team and record of customer satisfaction to provide you the assurance of success and long-term value. WWW delivers:

- A passionate and technical team
- A track record of customer satisfaction
- Lasting technology that is capitally and operationally cost effective
- The ability to achieve the desired goals consistently
- An industry leading warranty and performance guarantee

We look forward to partnering with you for lasting success! Let's schedule a time in the near future to review this proposal in detail and to move on to the next steps of refining project details and developing a formal sales agreement.

Best Regards,

Jason Boyd

Jason Boyd
World Water Works, Inc.

This document contains World Water Works' proprietary and confidential information has been disclosed for the purpose of consideration of purchase of the goods and services identified herein. This document and said confidential information shall NOT be distributed to any other company or entity except those listed on this cover page. By accepting and reviewing this proposal, you agree to these confidential terms.

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DESIGN BASIS

1. TECHNOLOGY OVERVIEW

Ideal MBBR™ – Moving Bed Biofilm Reactor

The Ideal MBBR™ - Moving Bed Biofilm Reactor system removes soluble materials (BOD, COD, NH_3-N, NO_3-N) from the waste stream through highly efficient aerobic and/or anoxic biological degradation. The Ideal MBBR process achieves high removal rates in the smallest footprint possible, which requires only a few control points. This process provides the most reliable and cost effective biological system, which is tolerant of both load swings and temporary load deprivation.

The MBBR is a tank partially filled with our specialized biomedia. The media provides a highly advantageous site for the bacteria to grow and thrive. A stainless steel aeration manifold installed in the bottom of the tank provides both dissolved oxygen and mixing by means of a blower. A stainless steel media retention sieve is located near the top of the tank allows the water and solids generated from the process to exit the reactor while retaining the media in the tank. If sufficient nutrients are not available in the feedwater to the MBBR, to support a ratio of 100:4-5:1 BOD:N:P respectively, then the wastewater will be supplemented. The bacteria will digest the organics in the waste stream converting the soluble material to biomass, which can be removed downstream of this process through an Ideal DAF™. A dissolved oxygen meter will provide the ability to control the amount of dissolved oxygen injected into the waste stream.

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2. DESIGN BASIS

It is critical that the basis of design is accurate and meets the facility's current and future demands. The following information relates to the design basis used for this proposal. Any changes will likely impact design and costs.

Type of Facility:

Type of Industry	Municipal: Secondary Treatment

Facility Information:

Hours Of Operation (hours/day):	24
Days Of Operation (days/week):	7
Weeks Of Operation (weeks/year):	52
Project Type:	New Wastewater Treatment System
Elevation At Site (ft):	100

Plant Flow Information:

Avg. Month Flowrate (GPD):	2,000,000
Max. Month Flowrate (GPD):	2,440,000
Instant Peak Flow (GPM):	4,000
Maximum Temperature (°F):	84
Average Temperature (°F):	83
Minimum Temperature (°F):	82

Influent Loadings:

Influent TSS (mg/L):	352
Influent BOD (mg/L):	352
Influent NH3 (mg/L):	45
Influent TKN (mg/L):	60
Influent Phosphorous (mg/L):	8.8

Effluent Loadings:

Effluent TSS (mg/L):	30
Effluent BOD (mg/L):	30
Effluent NH3 (mg/L):	5
Effluent Phosphorous (mg/L):	1

*****See attached design calculations for more details*****

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3. SCOPE DOCUMENT

The below model numbers and equipment selection is based upon the information and data provided. In order to provide this proposal, certain assumptions were made. For example, items as transfer pump designs, blower designs and VFDs (where applicable) may be adjusted based upon final layouts, head pressures and other elements that could impact the selections.

Project Mgt, Eng & Design				
Quantity	**Model**	**Equipment Description**	**Description**	**Provided By**
1	DRAW-MBBR	Process Engineering, Design & Project Management	Drawing Package - MBBR Only	WWW

Biological Process				
Quantity	**Model**	**Equipment Description**	**Description**	**Provided By**
1205	MBBR-MEDIA-WWW-01V	MBBR - Media	Moving Bed Biofilm Reactor Media - 650 m2/m3 - Virgin	WWW
4	MANI-LT10	MBBR Manifolds	Aeration Manifold - SS304	WWW
2	MANI-LT10	MBBR Manifolds	Aeration Manifold - SS304	WWW
2	MANI-LT06	MBBR Manifolds	Aeration Manifold - SS304	WWW
42	MBBR-SIEV-750K	MBBR Sieve	MBBR Sieve – Cylindrical	WWW
36	MBBR-SIEV-750K	MBBR Sieve	MBBR Sieve – Flat Screen	WWW
8	MBBR-SIEV-Other12	MBBR Overflow Sieve	MBBR Sieve – Cylindrical	WWW
8	MBBR-SIEV-Other6	MBBR Drain Sieve	MBBR Sieve – Cylindrical	WWW
4	Blow-2000-L	Blower	Blower 2000 SCFM - 150 HP - 9.5 psi - 0 ft Elevation - 85%Humidity	WWW
4	VFD-1500	Variable Frequency Drive	VFD - 150 HP Allen Bradley	WWW
8	PM-ProbeOnly-DO	DO Probe(s)	DO Probe with Airblast	WWW
2	PM-ProbeControl-1000	DO Controller	Process Meter Controller	WWW

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Controls & Electrical				
Quantity	**Model**	**Equipment Description**	**Description**	**Provided By**
1	CTRLS-AB-CL-DAF	Low Voltage Electrical Cabinet	MBBR Control Panel	WWW

QC & Shipping				
Quantity	**Model**	**Equipment Description**	**Description**	**Provided By**
1	QCSH-QC	Quality Control	Factory QA/QC by WWW	WWW
2	QCSH-	FOB Destination (Off-Loading BY OTHERS)		WWW

Startup and Training				
Quantity	**Model**	**Equipment Description**	**Description**	**Provided By**
1	SERV-FSO-12	Startup and Training Services	Field Service - 12 Days On Site, 10 Travel Days, 5 Trips	WWW

Warranty				
Quantity	**Model**	**Equipment Description**	**Description**	**Provided By**
1	WTY-1	Warranty	1-Year Mechanical	WWW

4. UTILITIES (To Be Provided by Others; Subject to Final Design)

POWER	
High Voltage Power	460 VAC, 3 Phase, TBD Amps
Control Power	24 VDC
Low Voltage Power	
Ancillary	110 V, 1 Phase 20 Amp
Chemical Feed(s)	110 V, 1 Phase 20 Amp
INTERNET ACCESS	Dedicated, Into the WWW Control Panel

5. DRAFTING ENGINEERING SERVICES

World Water Works offers a variety of drafting and engineering package options from basic packages to full design/build engineering packages. Based upon the scope of supply and client discussions the following package has been selected. Please let us know if a different level of drawings and engineering services are required.

Basic Integrated Solution Engineering Package (limited to WWW's Scope of supply)

The Basic Integrated Solution Engineering Package includes:

- Piping & Instrument Diagrams (P&ID) for all unit processes of equipment provided
- General Equipment Layouts for all equipment provided within scope of supply
- Electrical Panel Layouts and PLC panels (if applicable)
- Equipment Cut Sheets

6. FACTORY TESTING – QUALITY CONTROL

World Water Works conducts numerous tests over the course of the manufacturing process to meet the highest of quality standards. WWW documents and keeps on record these tests, which are available to our clients. WWW invites the engineer and/or the client to witness this testing in Oklahoma City, OK.

7. FIELD SUPPORT, STARTUP & TRAINING SERVICES

The success of any system relies not only in the excellence of the technology and the proper design; it also relies upon proper operational ownership. With years of experience, WWW has developed highly effective training methods to assure success. World Water Works offers a variety of field service package options that can be tailored to best meet the project needs and treatment goals. The scope of supply lists out the services provided.

Important Notice: All onsite service is based on Travel on Monday and Fridays with days on site Tuesday, Wednesday, and Thursday. If weekend travel and/or onsite service is required, additional costs will be applied. Travel is based on notification two weeks in advance to be on site for meetings, service, etc.

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PRICING and DELIVERY

8. TIMELINE

Submittal Preparation	6 – 8 weeks
Equipment Construction	22 – 28 weeks
Inspection & Shipment	1 – 2 weeks

Note: Project delivery timing will be subject to timing of the order and timely approvals and payments by the customer. WWW manufactures its technology fully in-house, which gives us greater flexibility in meeting scheduling demands. **Please inquire about special timing requirements that may be available and potentially subject to additional fees.**

9. SHIPPING

Incoterm	FOB Destination
Shipping & Handling Terms	Freight Allowed
Desired Delivery Date	TBD

10. PAYMENT TERMS

10% Down Payment - Due Upon Receipt

15% Upon Submittal Approval - Due Net 30 Days

65% Upon Delivery of System - Due Net 30 Days

10% Payment Upon Performance - Due Net 30 Days (Not to Exceed 90 Days from Shipping)

11. BUDGETARY PRICE

The following pricing is budgetary and will be finalized based upon final design and refinement of terms and options selected.

Budget Price…….$ 3,500,000 to $ 3,750,000 USD
(Startup and Training/Shipping Included)

This includes the specified equipment and services in the scope section labeled “WWW”, but are not inclusive of any of the items labeled “BY OTHERS”, “OPTIONAL”, “EXISTING”, or the responsibilities of the Customer itemized in the section below titled “CUSTOMER TO SUPPLY” and “CUSTOMER RESPONSIBILITIES”. This pricing also does not include any applicable local, state, and federal sales and use taxes, tariffs, duties, import taxes, brokerage fees, bonding, system installation costs and equipment shipping costs beyond what is stated.

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CONTRACTUAL INFORMATION

12. MECHANICAL WARRANTY & PERFORMANCE GUARANTEE

Equipment will be warranted from defects in materials, workmanship and design for a period of 12 months from the date upon which the goods are used or put into operation or 18 months from shipment, whichever occurs first. Warranty is contingent upon the system being stored, installed, operated and maintained in accordance with World Water Works' instructions. Extended warranties are available for an additional cost. World Water Works will provide a Performance Guarantee based upon final design and scope mutually agreed upon.

13. CUSTOMER TO SUPPLY (Unless Otherwise Specified in This Document)

- All Costs of Installation to include, but not be limited to: System Unloading, Piping and Electrical Installation, any/all Building/Foundation work, Permitting Costs, etc.
- Sufficient room for the equipment, sufficient water, sufficient heating and/or cooling, and sufficient compressed air to meet the requirements of the project.
- All utilities, sewer and solid waste disposal systems, chemicals, and laboratory testing required to operate the system to include, but not be limited to: phone/internet, electrical power supply, potable water at proper pressures and compressed air.
- Customer shall inform Company of any third-party inspection requirements. Customer shall pay any and all charges, which may be incurred for third party approval. Licenses and permits as required.
- Personnel trainable in operation and control of system and that follows WWW's recommendations.
- The above listed materials are based on the Company's interpretation of the plans and specifications. Any changes to this proposal are subject to price revision.
- Additional Customer requirements may be defined based upon final design and scope mutually agreed upon.

14. TERMS AND CONDITIONS

WWW Standard Terms and Conditions of sale are available upon request.

Project Location: American Samoa
Proposal Type: PRELIMINARY MBBR
Plant Name: American Samoa WWTP

Influent Flows	Value	Units	Value	Units
Flow				
Average Day Flow (ADF)	2.00	MGD	7570	m3/day
Maximum Month Flow (MMF)	2.44	MGD	9235	m3/day
Peak Hour Flow (PHF)	5.00	MGD	18925	m3/day

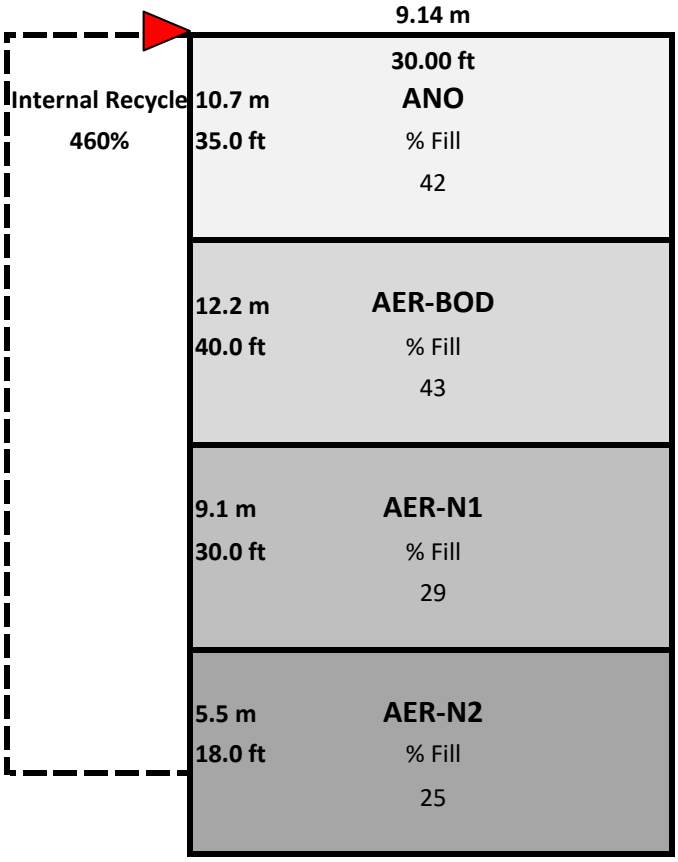
Influent Loading	Value	Units	Value	Units
BOD				
Loading @ MMF	7,168	lb/day	3,251	kg/day
Concentration	352	mg/L	352	mg/L
TSS				
Loading @ MMF	7,168	lb/day	3,251	kg/day
Concentration @ MMF	352	mg/L	352	mg/L
TKN				
Loading @ MMF	1,222	lb/day	554	kg/day
Concentration	60	mg/L	60	mg/L
Ammonia				
Loading @ MMF	916.34	lb/day	416	kg/day
Concentration	45	mg/L	45	mg/L
Temperature				
Minimum			27	Celcius
Maximum			29	Celcius

Ratios - Assumed If Not Provided		
COD/BOD	2.2	kg/kg
OP/TP	0.65	kg/kg
VSS/TSS	0.85	kg/kg
Ammonia/TKN	0.75	kg/kg

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Tank Sizing (Per Train) 1 of	**2**			
Selected Volume	Value	Units	Value	Units
Pre-Anoxic	ANO			
Width	30.00	ft	9.14	m
Length	35.00	ft	10.67	m
Side Water Depth	16.00	ft	4.88	m
Volume	*0.126*	*MG*	*475.72*	m3
Aerobic - BOD	AER-BOD			
Width	30.00	ft	9.14	m
Length	40.00	ft	12.19	m
Side Water Depth	16.00	ft	4.88	m
Volume	*0.144*	*MG*	*543.68*	m3
Aerobic - Ammonia 1	AER-N1			
Width	30.00	ft	9.14	m
Length	30.00	ft	9.14	m
Side Water Depth	16.00	ft	4.88	m
Volume	*0.108*	*MG*	*407.76*	m3
Aerobic - Ammonia 2	AER-N2			
Width	30.00	ft	9.14	m
Length	18.00	ft	5.49	m
Side Water Depth	16.00	ft	4.88	m
Volume	*0.065*	*MG*	*244.66*	m3

CONFIDENTIAL



CONFIDENTIAL

General Operational Parameters				Value	Units
HRT @ MMF (Total)					
ANO				2.4	hr
AER-BOD				2.8	hr
AER-N1				2.1	hr
AER-N2				1.2	hr
Total HRT				8.5	hr
Average DO					
AER-BOD				4.0	mgO2/L
AER-N1				4.0	mgO2/L
AER-N2				2.0	mgO2/L
SALR					
ANO	27 C			1.45	g/m2/day
AER-BOD	27 C			8.62	g/m2/day
AER-N1	27 C			1.96	g/m2/day
AER-N2	27 C			1.15	g/m2/day
Sludge Production					
Sludge Yeild		0.88	lb/lb	0.88	kg/kg
Sludge Production		6,294	lb/day	2,855	kg/day
Sludge Concentration		309		309	mg/L
Media Volumes					
Anoxic Media	WWW-01	13,842	ft3	392	m3
Anoxic Media	Surface Area	198	ft2/ft3	650	m2/m3
Aerobic Media	WWW-01	28,707	ft3	813	m3
Aerobic Media	Surface Area	198	ft2/ft3	650	m2/m3
Media Sieves					
# Flat Panel Sieves	Anoxic	36			
Sieve Length		4	ft	1.22	m
Sieve Width		4	ft	1.22	m
# Flat Cylindrical Sieves	Aerobic	42			
Sieve Length		10	ft	3.05	m
Sieve Diameter		16	in	40.64	cm

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Air Requirements	Value	Units	Value	Units
Actual Oxygen Transfer Rate	9,172	lbO2/hr	4,160	kgO2/hr
SWD	16	ft	4.88	m
Diffuser Submergence	15	ft	4.57	m
Elevation	500	ft	152	m
Estimated Total Air Flow	3,751	SCFM	6,040	Nm3/hr
Alpha	0.8		0.8	
% Transfer	1.1	%/ft	3.6	%/m
Discharge Pressure	8.49	psig	58.56	kPa

IFAS Effluent Quality Values are not guaranteed		Value	Units
* Soluble BOD	≤	20	mg/L
** Ammonia	≤	1.00	mg/L
*** Nitrate + Nitrite	≤	8	mg/L
**** Ortho Phosphate	≤	NA	mg/L

NOTE:
** Additional Influent Characterization required for effluent < 5 mg/L*
*** Additional Influent Characterization required for effluent < 1 mg/L*
**** Additional Influent Characterization required for effluent < 10 mg/L*
***** Additional Influent Characterization required for effluent < 1 mg/L*

Target Effluent Limits		Value	Units
BOD	≤	30	mg/L
TSS	≤	30	mg/L
Ammonia	≤	1.0	mg/L
Total Nitrogen	≤	10	mg/L
Total Phosphorus	≤	1.0	mg/L

NOTE: *The limits listed above are post secondary and/or tertiary treatment and are not guaranteed*
The Effluent TP is assuming the use of chemicals for the complete removal

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APPENDIX G-3
WESTECH SECONDARY CLARIFIER PRELIMINARY PROPOSAL

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Tafuna WWTP

American Samoa

Engineer
J-U-B Engineers

Representative
John Simon
Goble Sampson & Associates
Issaquah, Washington
jsimon@goblesampson.com
(425) 392-0491

Contact
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WesTech®

Proposal Number: 2460361
Monday, August 26, 2024

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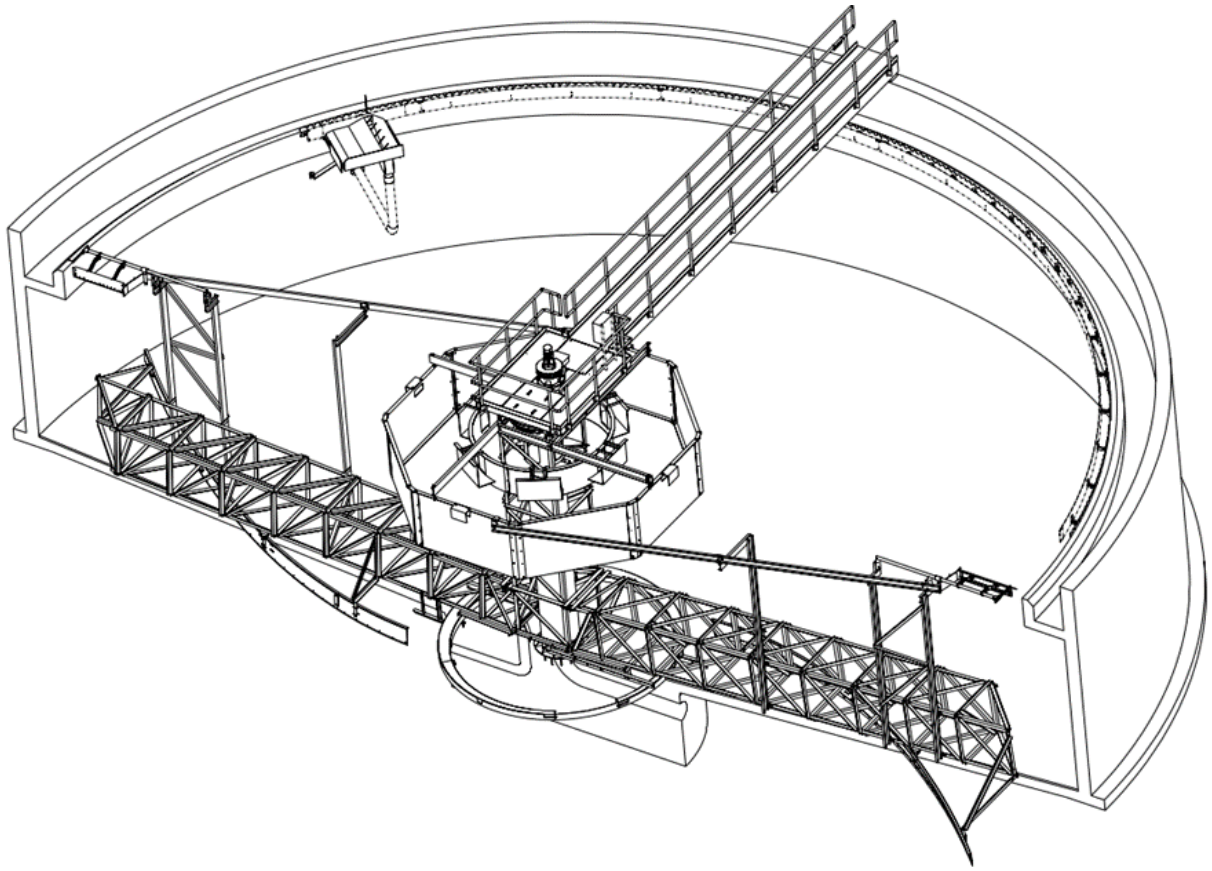
Technical Proposal

Item A – Clarifier Mechanism Model COPC1G

General Scope of Supply		
Item	**Unit**	**Value/Description**
Number of Mechanisms	Each	1
Application	-	Activated Sludge Secondary
Tank Diameter	ft	85
Tank Side Wall Depth	ft	16
Tank Side Water Depth	ft	14
Tank Bottom Slope	-	1.5:12
Average Flow Rate	MGD	2.2
Design Flow Rate	MGD	2.6
Max Flow Rate	MGD	4.8667**
Peak Flow Rate	MGD	8.4
Influent MLSS Concentration	mg/L	2700-3000
SVI	mL/g	130**

**Assumed Values

The WesTech COPC1 clarifier mechanism is designed specifically to treat secondary wastewater. It combines multiple proven components in an optimized combination that produces the highest quality effluent possible for secondary wastewater. WesTech's knowledgeable process engineers can assist in appropriate application and sizing, while our extensive installation list and ISO 9001 certified quality system ensure you of a consistently high-quality product.



The WesTech COPC1G Clarifier mechanism includes a Sludge Ring and Dual Gate EDI

Detailed Scope of Supply - Each Mechanism Includes the Following

Item	Qty	Size/Description	Material
Walkway Bridge	1	36" wide Beam Bridge	Steel
Walkway Handrail	-	2 Rail Component Handrail, Pop Rivet	Aluminum
Walkway Flooring	-	1.25" Grating	Aluminum
Drive Platform	1	24" Minimum Drive Clearance	Steel
Platform Handrail	-	2 Rail Component Handrail, Pop Rivet	Aluminum
Platform Flooring	-	0.25" Checker Plate	Aluminum
Center Column	1	30" dia. x 0.25" thick	Steel
Center Cage	1	4' Square	Steel
Dual Gate EDI	1	9' dia. x 2.5' deep x 0.1875" plate	Steel
Feedwell	1	19' dia. x 5' deep x 0.1875" plate	Steel
Full Radius Rake Arms	2	Box Truss w/ Spiral Scrapers	Steel
Sludge Withdrawal Ring	1	20% Tank Diameter w/ Evenly Spaced Ports	Steel
Skimmer Blade & Supports	2	Extends from feedwell to hinged skimmer	Steel
Hinged Skimmer Assembly	2	With neoprene wipers	HDG/304 SS/Alum
Scum Box & Supports	1	4' Scum Box	Steel
Scum Flushing Valve	1	Skimmer Actuated	Polymer/SS
Drive Unit	1	See Drive Unit Table for description	
Anchor Bolts & Fasteners	-	-	304 SS

Drive Unit

Description	Unit	Value/Description
Drive Type	C42	Cage Drive w/ Precision Bearing
Housing Material	-	Fabricated Steel
Continuous Rated Torque	ft·lbs	25,000
Momentary Peak Torque	ft·lbs	50,000
Rake Tip Speed	ft/min	10.9
Motor Size	HP	1
Motor Voltage/Frequency/Phase	V / Hz / Phase	460 / 60 / 3
Torque Control Settings	Alarm: ft·lbs Motor Cutout: ft·lbs	100%: 25,000 120%: 30,000
Main Gear and Pinion Lubrication	-	Oil
Main Bearing and Reducer Lubrication	-	Grease

Surface Preparation and Coating

Application Surfaces	Surface Preparation	Finish
Submerged	SSPC-SP10	One (1) Coat Tnemec N140-1255, 4-6 mils DFT, and One (1) Coat Tnemec N140-B5712, 4-6 mils DFT
Non-Submerged	SSPC-SP10	One (1) Coat Tnemec N140-1255, 4-6 mils DFT, and One (1) Coat Tnemec 1074U-B5712, 3-5 mils DFT
Drive Unit	SSPC-SP6	One (1) coat Tnemec N140F-1255 Epoxy, 4-6 mils DFT, and one (1) coat Tnemec 1074U-B5712 Polyurethane, 3-5 mils DFT

Approximate Weights

Item	Weight	Unit
Center Column	2250	lbs
Center Cage, Rake Arms, Spiral Rake Blades, Sludge Withdrawal Ring	8350	lbs
Dual Gate EDI, Feedwell, Feedwell Supports	5700	lbs
Standard Skimmer, Scum Box & Supports	2650	lbs
Bridge & Platform	2800	lbs
Drive Unit	4000	lbs
Heaviest Single Item (Drive Unit)	4000	lbs

Additional Services and Equipment

WesTech has included on-site technical assistance for inspection, observation of torque testing, startup, and instruction of plant personnel. Additional on-site services may be purchased at standard WesTech daily rates plus travel and living expenses.

On-Site Technical Service

Item	Quantity
Total Number of Trips	1
Total Number of Days	2

Items Not Included in WesTech's Base Scope of Supply (unless specifically noted)

- Access Stairs and Landings
- Concrete/Grout
- Concrete and Anchor Reinforcement
- Conduits and Wiring
- Electrical Controls
- Erection or Assembly
- Lubricants
- Piping, Valves, or Fittings
- Scum Baffle & Supports
- Unloading or Storage
- Weir

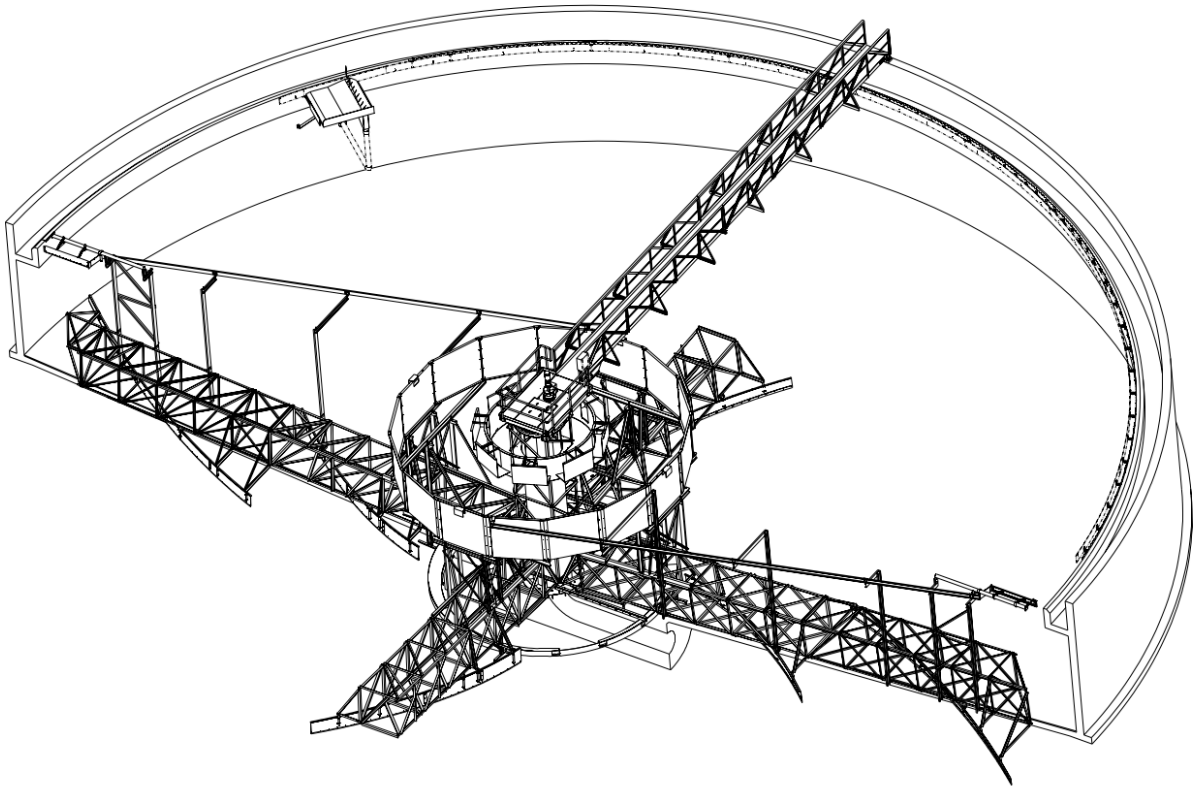
Technical Proposal

Item B – Clarifier Mechanism Model COPC1G

General Scope of Supply		
Item	**Unit**	**Value/Description**
Number of Mechanisms	Each	1
Application	-	Activated Sludge Secondary
Tank Diameter	ft	125
Tank Side Wall Depth	ft	15
Tank Side Water Depth	ft	13
Tank Bottom Slope	-	1:12
Average Flow Rate	MGD	4.3
Design Flow Rate	MGD	5.5
Max Flow Rate	MGD	9.0917**
Peak Flow Rate	MGD	13.9
Influent MLSS Concentration	mg/L	2700-3000
SVI	mL/g	130**

**Assumed Values

The WesTech COPC1 clarifier mechanism is designed specifically to treat secondary wastewater. It combines multiple proven components in an optimized combination that produces the highest quality effluent possible for secondary wastewater. WesTech's knowledgeable process engineers can assist in appropriate application and sizing, while our extensive installation list and ISO 9001 certified quality system ensure you of a consistently high-quality product.



The WesTech COPC1G Clarifier mechanism includes a Sludge Ring and Dual Gate EDI

Detailed Scope of Supply - Each Mechanism Includes the Following

Item	Qty	Size/Description	Material
Walkway Bridge	1	36" wide Truss Bridge	Steel
Walkway Handrail	-	Truss Serves as Handrail Component	Steel
Walkway Flooring	-	1.25" Grating	Aluminum
Drive Platform	1	24" Minimum Drive Clearance	Steel
Platform Handrail	-	2 Rail Component Handrail, Pop Rivet	Aluminum
Platform Flooring	-	0.25" Checker Plate	Aluminum
Center Column	1	40" dia. x 0.25" thick	Steel
Center Cage	1	5' Square	Steel
Dual Gate EDI	1	11' dia. x 3' deep x 0.1875" plate	Steel
Feedwell	1	26' dia. x 6' deep x 0.1875" plate	Steel
Full Radius Rake Arms	2	Box Truss w/ Spiral Scrapers	Steel
Half Radius Rake Arms	2	Box Truss w/ Spiral Scrapers	Steel
Sludge Withdrawal Ring	1	20% Tank Diameter w/ Evenly Spaced Ports	Steel
Skimmer Blade & Supports	2	Extends from feedwell to hinged skimmer	Steel
Hinged Skimmer Assembly	2	With neoprene wipers	HDG/304 SS/Alum
Scum Box & Supports	1	5' Scum Box	Steel
Scum Flushing Valve	1	Skimmer Actuated	Polymer/SS
Drive Unit	1	See Drive Unit Table for description	
Anchor Bolts & Fasteners	-	-	304 SS

Drive Unit		
Description	**Unit**	**Value/Description**
Drive Type	C60	Cage Drive w/ Precision Bearing
Housing Material	-	Fabricated Steel
Continuous Rated Torque	ft·lbs	60,000
Momentary Peak Torque	ft·lbs	120,000
Rake Tip Speed	ft/min	11.9
Motor Size	HP	1
Motor Voltage/Frequency/Phase	V / Hz / Phase	460 / 60 / 3
Torque Control Settings	Alarm: ft·lbs	100%: 60,000
	Motor Cutout: ft·lbs	120%: 72,000
Main Gear and Pinion Lubrication	-	Oil
Main Bearing and Reducer Lubrication	-	Grease

Surface Preparation and Coating		
Application Surfaces	**Surface Preparation**	**Finish**
Submerged	SSPC-SP10	One (1) Coat Tnemec N140-1255, 4-6 mils DFT, and One (1) Coat Tnemec N140-B5712, 4-6 mils DFT
Non-Submerged	SSPC-SP10	One (1) Coat Tnemec N140-1255, 4-6 mils DFT, and One (1) Coat Tnemec 1074U-B5712, 3-5 mils DFT
Drive Unit	SSPC-SP6	One (1) coat Tnemec N140F-1255 Epoxy, 4-6 mils DFT, and one (1) coat Tnemec 1074U-B5712 Polyurethane, 3-5 mils DFT

Approximate Weights		
Item	**Weight**	**Unit**
Center Column	2900	lbs
Center Cage, Rake Arms, Spiral Rake Blades, Sludge Withdrawal Ring, Addnl HR Rake Arms	17550	lbs
Dual Gate EDI, Feedwell, Feedwell Supports	9000	lbs
Standard Skimmer, Scum Box & Supports	3750	lbs
Bridge & Platform	4950	lbs
Drive Unit	4500	lbs
Heaviest Single Item (Drive Unit)	4500	lbs

Additional Services and Equipment

WesTech has included on-site technical assistance for inspection, observation of torque testing, startup, and instruction of plant personnel. Additional on-site services may be purchased at standard WesTech daily rates plus travel and living expenses.

On-Site Technical Service	
Item	**Quantity**
Total Number of Trips	1
Total Number of Days	2

Items Not Included in WesTech's Base Scope of Supply (unless specifically noted)

- Access Stairs and Landings
- Concrete/Grout
- Concrete and Anchor Reinforcement
- Conduits and Wiring
- Electrical Controls
- Erection or Assembly
- Lubricants
- Piping, Valves, or Fittings
- Scum Baffle & Supports
- Unloading or Storage
- Weir

Clarifications and Exceptions

General Clarifications

Terms & Conditions: This proposal, including all terms and conditions contained herein, shall become part of any resulting contract or purchase order. Changes to any terms and conditions, including but not limited to submittal and shipment days, payment terms, and escalation clause shall be negotiated at order placement, otherwise the proposal terms and conditions contained herein shall apply.

Paint: If your equipment has paint included in the price, please take note to the following. Primer paints are designed to provide only a minimal protection from the time of application (usually for a period not to exceed 30 days). Therefore, it is imperative that the finish coat be applied within 30 days of shipment on all shop primed surfaces. Without the protection of the final coatings, primer degradation may occur after this period, which in turn may require renewed surface preparation and coating. If it is impractical or impossible to coat primed surfaces within the suggested time frame, WesTech strongly recommends the supply of bare metal, with surface preparation and coating performed in the field. All field surface preparation, field paint, touch-up, and repair to shop painted surfaces are not by WesTech.

Escalation: If between the proposal date and actual procurement and through no fault of the Seller, the relevant cost of labor, material, freight, tariffs, and other Seller costs combined relating to the contract, increase by greater than 2.5% of the overall contract price, then the contract price shall be subject to escalation and increased. Such increase shall be verified by documentation and the amount of contract price escalation shall be calculated as either the actual increased cost to the Seller or, if agreed by the Parties, the equivalent increase of a relevant industry recognized third-party index, and in both cases without any additional profit or margin being added.

USA Tariffs and Current Trade Laws: All prices are based on current USA and North America tariffs and trade laws/agreements at time of bid. Any changes in costs due to USA Tariffs and trade laws/ agreements will be passed through to the purchaser at cost.

Build America, Buy America Act (BABAA) and Other Domestic Content Requirements: WesTech is U.S. based and proudly manufacturers many products available to meet various domestic procurement requirements. Due to variability in legislation, products, and project-based specifications, WesTech is unable to guarantee compliance with domestic content requirements unless stated otherwise in our official project proposal. For products where domestic sourcing is not currently available, WesTech can provide documentation to support application for relevant waivers (Non-Availability, De Minimis, or others).

Equipment Exceptions/Clarifications

Only items noted in this scope are by WesTech. Installation, removal, field painting, general rehabilitation, field dimensions, and other items not shown or mentioned are specifically not included. Hardware is not included for rehabilitation of items which are not specifically supplied by the Manufacturer. Some field fit-up; including cutting, drilling holes, and possible welding will be required. Field fit-up is by others. It is the responsibility of the contractor to verify that any existing structural components that are being reused are of adequate strength to support and operate any new equipment supplied by WesTech prior to installing and operating the equipment.

Commercial Proposal

Proposal Name: Tafuna WWTP
Proposal Number: 2460361
Monday, August 26, 2024

1. Bidder's Contact Information

Company Name	WesTech Engineering, LLC
Primary Contact Name	Adrian Williams
Phone	(801) 265-1000
Email	awilliams@westech-inc.com
Address: Number/Street	3665 S West Temple
Address: City, State, Zip	Salt Lake City, UT 84115

2. Budget Pricing

Currency: USD

Scope of Supply

A	One (1) 85' Diameter Clarifier Mechanism Model COPC1G	$700,000
B	One (1) 125' Diameter Clarifier Mechanism Model COPC1G	$1,124,000
	Taxes (sales, use, VAT, IVA, IGV, duties, import fees, etc.)	Not Included

Prices are valid for a period not to exceed 30 days from date of proposal.

Additional Field Service

Daily Rate (Applicable Only to Field Service Not Included in Scope)	$1,350

Pricing does not include field service unless noted in scope of supply, but is available at the daily rate plus expenses. The greater of a two week notice or visa procurement time is required prior to departure date. Our field service policy is subject to change and can be provided upon request for details.

3. Payment Terms

Purchase Order Acceptance and Contract Execution	10%
Submittals Provided by WesTech	15%
Release for Fabrication	35%
Notification of Ready to Ship	40%

All payments are net 30 days. Partial shipments are allowed. An approved Letter of Credit is required if Incoterms CIF, CFR, DAP, CIP, or CPT are applicable. Payment is required in full for all other Incoterms prior to international shipment. Other terms per WesTech proforma invoice. Please note that the advising bank must be named as: Wells Fargo Bank, International Department, 9000 Flair Drive, 3rd Floor, El Monte, California 91731, USA.

4. Schedule

Submittals, after Purchase Order Acceptance and Contract Execution	10 to 12 weeks
Ready to Ship, after Receipt of Final Submittal Approval	26 to 28 weeks
Estimated Weeks to Ready to Ship	**36 to 40 weeks***

*Customer submittal approval is typically required to proceed with equipment fabrication and is not accounted for in the schedule above. Project schedule will be extended to account for time associated with receipt of customer submittal approval. Due to supply chain disruptions and volatility, delivery schedule is a best estimate only and may be improved or hampered based on date of contract execution, scope selection, and materials availability.

5. Freight

Incoterms 2020	FOB Shipping Point - Full Freight Allowed to Jobsite (FSP-FFA)	
From	**Final Destination**	**Number of Trucks or Containers**
WesTech Shops	Tafuna, American Samoa	TBD

One-Year Warranty

Equipment manufactured or sold by WesTech Engineering, LLC, once paid for in full, is backed by the following warranty:

Subject to the terms below, WesTech warrants all new equipment manufactured or sold by WesTech Engineering, LLC to be unencumbered and free from defects in material and workmanship, and WesTech will replace or repair, F.O.B. its factories or other location it chooses, any part or parts returned to WesTech which WesTech's examination and analysis determine have failed within the warranty period because of defects in material and workmanship. The warranty period is either, one calendar year immediately following start-up, or eighteen (18) months from when WesTech sent its ready-to-ship notification to the purchaser, whichever expires sooner. All repair or replacement parts qualifying under this warranty shall be free of charge. Purchaser will provide timely written notice to WesTech of any defects it believes should be repaired or replaced under this warranty. WesTech will reject as untimely any warranty defect claim that purchaser submits more than thirty (30) days after the possible warranty defect first occurred. Unless specifically stated otherwise, this warranty does not cover normal wear or consumables. This warranty is not transferable.

This warranty shall be void and shall not apply where the equipment or any part thereof

a) has been dismantled, modified, repaired or connected to other equipment, outside of a WesTech factory, or without WesTech's written approval, or
b) has not been installed in complete adherence to all WesTech's or parts manufacturer's requirements, recommendations, and procedures, or
c) has been subject to misuse, abuse, neglect, or accident, or has not at all times been operated and maintained in strict compliance with all of WesTech's requirements and recommendations therefor, including, but not limited to, the relevant WesTech Operations & Maintenance Manual and any other of WesTech's specified guidelines & procedures, or
d) has been subject to force majeure events; use of chemicals not approved in writing by WesTech; electrical surges; overloading; significant power, water or feed supply fluctuations; or non-compliance with agreed feedwater or chemical volumes, specifications or procedures.

In any case where a part or component of equipment under this warranty is or may be faulty and the component or part is also covered under the warranty of a third party then the purchaser shall provide reasonable assistance to first pursue a claim under the third party warranty before making a claim under this warranty from WesTech. WesTech Engineering, LLC gives no warranty with respect to parts, accessories, or components purchased other than through WesTech. The warranties which apply to such items are those offered by the respective manufacturers.

This warranty is expressly given by WesTech and accepted by purchaser in lieu of all other warranties whether written, oral, express, implied, statutory or otherwise, including without limitation, warranties of merchantability and fitness for particular purpose. WesTech neither accepts nor authorizes any other person to assume for it any other liability with respect to its equipment. WesTech shall not be liable for normal wear and tear, corrosion, or any contingent, incidental, or consequential damage or expense due to partial or complete inoperability of its equipment for any reason whatsoever. The purchaser's exclusive and only remedy for breach of this warranty shall be the repair and or replacement of the defective part or parts within a reasonable time of WesTech's accepting the validity of a warranty claim made by the purchaser.

Terms & Conditions

Terms and Conditions appearing in any order based on this proposal which are inconsistent herewith shall not be binding on WesTech Engineering, LLC The sale and purchase of equipment described herein shall be governed exclusively by the foregoing proposal and the following provisions:

1. SPECIFICATIONS: WesTech Engineering, LLC is furnishing its standard equipment as outlined in the proposal and as will be covered by final approved drawings. The equipment may not be in strict compliance with the Engineer's/Owner's plans, specifications, or addenda as there may be deviations. The equipment will, however, meet the general intention of the mechanical specifications of these documents.

2. ITEMS INCLUDED: This proposal includes only the equipment specified herein and does not include erection, installation, accessories, nor associated materials such as controls, piping, etc., unless specifically listed.

3. PARTIES TO CONTRACT: WesTech Engineering, LLC is not a party to or bound by the terms of any contract between WesTech Engineering, LLC's customer and any other party. WesTech Engineering, LLC's undertakings are limited to those defined in the contract between WesTech Engineering, LLC and its direct customers.

4. PRICE AND DELIVERY: All selling prices quoted are subject to change without notice after 30 days from the date of this proposal unless specified otherwise. Unless otherwise stated, all prices are F.O.B. WesTech Engineering, LLC or its supplier's shipping points. All claims for damage, delay or shortage arising from such equipment shall be made by Purchaser directly against the carrier. When shipments are quoted F.O.B. job site or other designation, Purchaser shall inspect the equipment shipped, notifying WesTech Engineering, LLC of any damage or shortage within forty-eight hours of receipt, and failure to so notify WesTech Engineering, LLC shall constitute acceptance by Purchaser, relieving WesTech Engineering, LLC of any liability for shipping damages or shortages.

5. PAYMENTS: All invoices are net 30 days. Delinquencies are subject to a 1.5 percent service charge per month or the maximum permitted by law, whichever is less on all past due accounts. Pro rata payments are due as shipments are made. If shipments are delayed by the Purchaser, invoices shall be sent on the date when WesTech Engineering, LLC is prepared to make shipment and payment shall become due under standard invoicing terms. If the work to be performed hereunder is delayed by the Purchaser, payments shall be based on the purchase price and percentage of completion. Products held for the Purchaser shall be at the risk and expense of the Purchaser. Unless specifically stated otherwise, prices quoted are for equipment only. These terms are independent of and not contingent upon the time and manner in which the Purchaser receives payment from the owner.

6. PAYMENT TERMS: Credit is subject to acceptance by WesTech Engineering, LLC's Credit Department. If the financial condition of the Purchaser at any time is such as to give WesTech Engineering, LLC, in its judgment, doubt concerning the Purchaser's ability to pay, WesTech Engineering, LLC may require full or partial payment in advance or may suspend any further deliveries or continuance of the work to be performed by the WesTech Engineering, LLC until such payment has been received.

7. ESCALATION: If between the proposal date and actual procurement and through no fault of the Seller, the relevant cost of labor, material, freight, tariffs, and other Seller costs combined relating to the contract, increase by greater than 2.5% of the overall contract price, then the contract price shall be subject to escalation and increased. Such increase shall be verified by documentation and the amount of contract price escalation shall be calculated as either the actual increased cost to the Seller or, if agreed by the Parties, the equivalent increase of a relevant industry recognized third-party index, and in both cases without any additional profit or margin being added.

8. APPROVAL: If approval of equipment submittals by Purchaser or others is required, a condition precedent to WesTech Engineering, LLC supplying any equipment shall be such complete approval.

9. INSTALLATION SUPERVISION: Prices quoted for equipment do not include installation supervision. WesTech Engineering, LLC recommends and will, upon request, make available, at WesTech Engineering, LLC's then current rate, an experienced installation supervisor to act as the Purchaser's employee and agent to supervise installation of the equipment. Purchaser shall at its sole expense furnish all necessary labor equipment, and materials needed for installation.

Responsibility for proper operation of equipment, if not installed by WesTech Engineering, LLC or installed in accordance with WesTech Engineering, LLC's instructions, and inspected and accepted in writing by WesTech Engineering, LLC, rests entirely with Purchaser; and any work performed by WesTech Engineering, LLC personnel in making adjustment or changes must be paid for at WesTech Engineering, LLC's then current per diem rates plus living and traveling expenses.

WesTech Engineering, LLC will supply the safety devices described in this proposal or shown in WesTech Engineering, LLC's drawings furnished as part of this order but excepting these, WesTech Engineering, LLC shall not be required to supply or install any safety devices whether required by law or otherwise. The Purchaser hereby agrees to indemnify and hold harmless WesTech Engineering, LLC from any claims or losses arising due to alleged or actual insufficiency or inadequacy of the safety devices offered or supplied hereunder, whether specified by WesTech Engineering, LLC or Purchaser, and from any damage resulting from the use of the equipment supplied hereunder.

10. ACCEPTANCE OF PRODUCTS: Products will be deemed accepted without any claim by Purchaser unless written notice of non-acceptance is received by WesTech Engineering, LLC within 30 days of delivery if shipped F.O.B. point of shipment, or 48 hours of delivery if shipped F.O.B. point of destination. Such written notice shall not be considered received by WesTech Engineering, LLC unless it is accompanied by all freight bills for said shipment, with Purchaser's notations as to damages, shortages and conditions of equipment, containers, and seals. Non-accepted products are subject to the return policy stated below.

11. TAXES: Any federal, state, or local sales, use or other taxes applicable to this transaction, unless specifically included in the price, shall be for Purchaser's account.

12. TITLE: The equipment specified herein, and any replacements or substitutes therefore shall, regardless of the manner in which affixed to or used in connection with realty, remain the sole and personal property of WesTech Engineering, LLC until the full purchase price has been paid. Purchaser agrees to do all things necessary to protect and maintain WesTech Engineering, LLC's title and interest in and to such equipment; and upon Purchaser's default, WesTech Engineering, LLC may retain as liquidated damages any and all partial payments made and shall be free to enter the premises where such equipment is located and remove the same as its property without prejudice to any further claims on account of damages or loss which WesTech Engineering, LLC may suffer from any cause.

13. INSURANCE: From date of shipment until the invoice is paid in full, Purchaser agrees to provide and maintain at its expense, but for WesTech Engineering, LLC's benefit, adequate insurance including, but not limited

to, builders risk insurance on the equipment against any loss of any nature whatsoever.

14. SHIPMENTS: Any shipment of delivery dates recited represent WesTech Engineering, LLC's best estimate but no liability, direct or indirect, is assumed by WesTech Engineering, LLC for failure to ship or deliver on such dates.

WesTech Engineering, LLC shall have the right to make partial shipments; and invoices covering the same shall be due and payable by Purchaser in accordance with the payment terms thereof. If Purchaser defaults in any payment when due hereunder, WesTech Engineering, LLC may, without incurring any liability therefore to Purchaser or Purchaser's customers, declare all payments immediately due and payable with maximum legal interest thereon from due date of said payment, and at its option, stop all further work and shipments until all past due payments have been made, and/or require that any further deliveries be paid for prior to shipment.

If Purchaser requests postponements of shipments, the purchase price shall be due and payable upon notice from WesTech Engineering, LLC that the equipment is ready for shipment; and thereafter any storage or other charge WesTech Engineering, LLC incurs on account of the equipment shall be for the Purchaser's account.

If delivery is specified at a point other than WesTech Engineering, LLC or its supplier's shipping points, and delivery is postponed or prevented by strike, accident, embargo, or other cause beyond WesTech Engineering, LLC's reasonable control and occurring at a location other than WesTech Engineering, LLC or its supplier's shipping points, WesTech Engineering, LLC assumes no liability in delivery delay. If Purchaser refuses such delivery, WesTech Engineering, LLC may store the equipment at Purchaser's expense. For all purposes of this agreement such tender of delivery or storage shall constitute delivery.

15. WARRANTY: WesTech Engineering, LLC warrants equipment it supplies only in accordance with the attached WesTech Warranty. This warranty is expressly given by WesTech and accepted by purchaser in lieu of all other warranties whether written, oral, express, implied, statutory or otherwise, including without limitation, warranties of merchantability and fitness for particular purpose. WesTech neither accepts nor authorizes any other person to assume for it any other liability with respect to its equipment. WesTech shall not be liable for normal wear and tear, corrosion, or any contingent, incidental, or consequential damage or expense due to partial or complete inoperability of its equipment for any reason whatsoever. The purchaser's exclusive and only remedy for breach of this warranty shall be the repair and or replacement of the defective part or parts within a reasonable time of WesTech's accepting the validity of a warranty claim made by the purchaser.

16. PATENTS: WesTech Engineering, LLC agrees that it will, at its own expense, defend all suits or proceedings instituted against Purchaser and pay any award of damages assessed against it in such suits or proceedings, so far as the same are based on any claim that the said equipment or any part thereof constitutes an infringement of any apparatus patent of the United States issued at the date of this Agreement, provided WesTech Engineering, LLC is given prompt notice in writing of the institution or threatened institution of any suit or proceeding and is given full control of the defense, settlement, or compromise of any such action; and Purchaser agrees to give WesTech Engineering, LLC needed information, assistance, and authority to enable WesTech Engineering, LLC so to do. In the event said equipment is held or conceded to infringe such a patent, WesTech Engineering, LLC shall have the right at its sole option and expense to a) modify the equipment to be non-infringing, b) obtain for Purchaser the license to continue using said equipment, or c) accept return of the equipment and refund to the Purchaser the purchase price thereof less a reasonable charge for the use thereof. WesTech Engineering, LLC will reimburse Purchaser for actual out-of-pocket expenses, exclusive of legal fees, incurred in preparing such information and rendering such assistance at WesTech Engineering, LLC's request. The foregoing states the entire liability of WesTech Engineering, LLC, with respect to patent infringement; and except as otherwise agreed to in writing, WesTech Engineering, LLC assumes no responsibility for process patent infringement.

17. SURFACE PREPARATION AND PAINTING: If furnished, shop primer paint is intended to serve only as minimal protective finish. WesTech Engineering, LLC will not be responsible for the condition of primed or finish painted surfaces after equipment leaves its shops. Purchasers are invited to inspect paint in shops for proper preparation and application prior to shipment. WesTech Engineering, LLC assumes no responsibility for field surface preparation or touch-up of shipping damage to paint. Painting of fasteners and other touch-up to painted surfaces will be by Purchaser's painting contractor after mechanism installation.

Motors, gear motors, and other components not manufactured by WesTech Engineering, LLC will be painted with that manufacturer's standard paint system. It is WesTech Engineering, LLC's intention to ship major steel components as soon as fabricated, often before drive, motors, and other manufactured components. Unless Purchaser can ensure that shop primed steel shall be field painted within thirty (30) days after arrival at the job site, WesTech Engineering, LLC encourages the Purchaser to order these components without primer.

WesTech Engineering, LLC's prices are based on paints and surface preparations as outlined in the main body of this proposal. In the event that an alternate paint system is selected, WesTech Engineering, LLC requests that Purchaser's order advise of the paint selection. WesTech Engineering, LLC will then either adjust the price as may be necessary to comply or ship the material unpainted if compliance is not possible due to application problems or environmental controls.

18. CANCELLATION, SUSPENSION, OR DELAY: After acceptance by WesTech Engineering, LLC, this proposal, or Purchaser's order based on this proposal, shall be a firm agreement and is not subject to cancellation, suspension, or delay except upon payment by Purchaser of appropriate charges which shall include all costs incurred by WesTech Engineering, LLC to date of cancellation, suspension, or delay plus a reasonable profit. Additionally, all charges related to storage and/or resumption of work, at WesTech Engineering, LLC's plant or elsewhere, shall be for Purchaser's sole account; and all risks incidental to storage shall be assumed by Purchaser.

19. FORCE MAJEURE: Neither party hereto shall be liable to the other for default or delay in delivery caused by extreme weather or other act of God, strike or other labor shortage or disturbance, fire, accident, war or civil disturbance, act of government, pandemic, delay of carriers, failure of normal sources of supply, complete or partial shutdown of plant by reason of inability to attain sufficient raw materials or power, and/or other similar contingency beyond the reasonable control of the respective parties. The time for delivery specified herein shall be extended during the continuance of such conditions, or any other cause beyond such party's reasonable control. Escalation resulting from a Force Majeure event shall be equitably adjusted per the escalation policy stated above.

20. RETURN OF PRODUCTS: No products may be returned to WesTech Engineering, LLC without WesTech Engineering, LLC's prior written permission. Said permission may be withheld by WesTech Engineering, LLC at its sole discretion.

21. BACKCHARGES: WesTech Engineering, LLC will not approve or accept backcharges for labor, materials, or other costs incurred by Purchaser or others in modification, adjustment, service, or repair of WesTech Engineering, LLC furnished materials unless such back charge has been authorized in advance in writing by a WesTech Engineering, LLC purchase order, or work requisition signed by WesTech Engineering, LLC.

22. INDEMNIFICATION: Purchaser agrees to indemnify WesTech Engineering, LLC from all costs incurred, including but not limited to court costs and reasonable attorney fees, from enforcing any provisions of this contract, including but not limited to breach of contract or costs incurred in collecting monies owed on this contract.

23. ENTIRE AGREEMENT: This proposal expresses the entire agreement between the parties hereto superseding any prior understandings and is not subject to modification except by a writing signed by an authorized officer of each party.

24. MOTORS AND MOTOR DRIVES: In order to avoid shipment delays of WesTech Engineering, LLC equipment, the motor drives may be sent directly to the job site for installation by the equipment installer. Minor fit-up may be required.

25. EXTENDED STORAGE: Extended storage instructions will be part of information provided to shipment. If equipment installation and start-up is delayed more than 30 days, the provisions of the storage instructions must be followed to keep WARRANTY in force.

26. LIABILITY: Professional liability insurance, including but not limited to, errors and omissions insurance, is not included. In any event, liability for errors and omissions shall be limited to the lesser of $100,000 USD or the value of the particular piece of equipment (not the value of the entire order) supplied by WesTech Engineering, LLC against which a claim is sought.

27. ARBITRATION NEGOTIATION: Any controversy or claim arising out of or relating to the performance of any contract resulting from this proposal or contract issued, or the breach thereof, shall be settled by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) may be entered to any court having jurisdiction.

ACCEPTED BY PURCHASER

Customer Name: _____

Customer Address: _____

_____

_____

Contact Name: _____

Contact Phone: _____

Contact Email: _____

Signature: _____

Printed Name: _____

Title: _____

Date: _____

APPENDIX G-4
AQUAAEROBICS SBR PRELIMINARY PROPOSAL

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AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Process Design Report

REGIONAL WWTP AMERICAN SAMOA

Design# 176510
Option: Preliminary SBR Design



AquaSBR®

Sequencing Batch Reactor

August 22, 2024
Designed By: Xu Ye

6306 N. Alpine Rd Loves Park, IL 61111
(815) 654-2501 www.aqua-aerobic.com

© 2024 Aqua-Aerobic Systems, Inc

Upstream Recommendations

- Neutralization is required ahead of the biological system if the pH is expected to fall outside of 6.5-8.5 for significant durations.

- Coarse screening and grit removal is recommended (by others) ahead of the biological system.

- Elevated concentration of hydrogen sulfide can be detrimental to both civil and mechanical structures. If anaerobic conditions exist in the collection system, steps should be taken to eliminate hydrogen sulfide prior to the treatment system.

- Fats, oils, and grease (FOG) removal may be necessary (by others) if the wastewater contains significant amounts of FOG. Historical data suggests levels less than 60 mg/l on a daily average basis (based on a 24 hour composite sample), along with a maximum of 90 mg/l is appropriate for biological treatment. If FOG levels above this are anticipated, please discuss with Aqua-Aerobic Systems to understand the impacts of elevated FOG on the system performance.

Flow Considerations

- The maximum flow, as shown on the design, has been assumed as an organic maximum that represents an increased organic load. An oxygen peaking factor of 1.07 has been included to accommodate this additional load while maintaining a residual DO concentration of 2 mg/l.

- When flows are in excess of the maximum daily flow of 10.7 MGD, the biological system has been designed to modify cycles in order to process a peak hydraulic flow of 13.9 MGD.

- Depending upon the magnitude and duration of the peak flow, effluent quality may be degraded.

Biological Process

- The three basin SBR has been designed to receive flow such that each basin's fill period comprises the first 33% of the cycle.

- The decanter performance is based upon a free-air discharge following the valve and immediately adjacent to the basin. Actual decanter performance depends upon the complete installation including specific liquid and piping elevations and any associated field piping losses to the final point of discharge. Modification of the high water level, low water level, centerline of discharge, and / or cycle structure may be required to achieve discharge of full batch volume based on actual site installation specifics.

Aeration

- The aeration system has been designed to provide 1.25 lbs. O2/lb. BOD5 applied and 4.6 lbs. O2/lb. TKN applied at the design average loading conditions, while maintaining a residual DO concentration of 2 mg/l.

- A common standby blower will be shared among the biological reactors.

- Depending on the actual yard piping from the blowers to the diffuser system and the heat losses associated with the yard piping, additional provisions for cooling of the air (i.e. incorporating heat exchangers) and/or modification of in-basin piping and/or diffuser sleeve material may be required. Aqua-Aerobic Systems, Inc. may need to modify the following equipment offering to ensure compatibility of all in-basin components with actual air temperatures.

Process/Site

- The following parameters have been assumed, as displayed on the design (engineer to verify): Elevation, influent Total P, in basin temperatures, ambient temperatures.

- The anticipated effluent nitrogen requirement is predicated upon an influent waste temperature of 15 °C or greater. While lower temperatures may be acceptable for a short-term duration, nitrification and (if required) denitrification below 10 °C can be unpredictable, requiring special operator attention.

- Sufficient alkalinity is required for nitrification, as approximately 7.1 mg alkalinity (as CaCO3) is required for every mg of NH3-N nitrified. If the raw water alkalinity cannot support this consumption, while maintaining a residual concentration of 50 mg/l, supplemental alkalinity shall be provided (by others).

- The average, maximum and peak design flow and loading conditions, shown within the report, are based on maximum month average, maximum day and peak hour conditions, respectively.

Equipment

- Changes in basin geometry may require alterations in the equipment recommendation.

- The basins are not included and shall be provided by others.

- Influent is assumed to enter the reactor above the water level, away from the decanter, and to avoid splashing or direct discharge in the immediate vicinity of other equipment. If the influent enters the basin below the water level, adequate hydraulic capacity shall be made in the headworks to prevent backflow from one reactor to the other during transition of influent.

- Based on the process requirements and selected equipment, the reactor wall height should be at least 25 ft for biological reactors.

- Scope of supply includes freight, installation supervision and start-up services.

- Equipment selection is based upon the use of Aqua-Aerobic Systems' standard materials of construction and electrical components, suitable for non-classified electrical environments.

- The basin dimensions reported on the design have been assumed based upon the required volumes and assumed basin geometry. Actual basin geometry may be circular, square or rectangular with construction materials including concrete or steel.

- The control panel does not include motor starters or VFDs, which should be provided in a separate MCC (by others).

- Provisions should be made, by others, for overflows in each of the recommended basins.

AquaSBR® - Sequencing Batch Reactor - Design Summary

Design#: 176510

Project: REGIONAL WWTP AMERICAN SAMOA

Option: Preliminary SBR Design

Designed by Xu Ye on Thursday, August 22, 2024

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

DESIGN INFLUENT CONDITIONS

Avg. Design Flow (ADF)	= 5.5 MGD	= 20,820 m³/day
Max Design Flow (MDF)	= 10.7 MGD	= 40,504 m³/day
Peak Hyd. Flow (PHF)	= 13.9 MGD	= 52,617 m³/day (modifying cycles)

DESIGN PARAMETERS

	Influent	mg/l	Effluent Required	<= mg/l	Effluent Anticipated	<= mg/l
Bio/Chem Oxygen Demand:	BOD5	265	BOD5	10	BOD5	10
Total Suspended Solids:	TSS	250	TSS	10	TSS	10
Total Kjeldahl Nitrogen:	TKN	43	TKN	--	TKN	--
Ammonia Nitrogen:	--	--	NH3-N	1	NH3-N	1
Total Nitrogen:	--	--	TN	10	TN	10
Total Phosphorus:	TP	6	--	--	--	--

SITE CONDITIONS

	Maximum		Minimum		Elevation (MSL)
Ambient Air Temperatures:	86 F	30.0 C	79 F	26.0 C	200 ft
Influent Waste Temperatures:	77 F	25.0 C	77 F	25.0 C	61.0 m

SBR BASIN DESIGN VALUES

			Water Depth			Basin Vol./Basin		
No./Basin Geometry:	= 3 Rectangular Basin(s)		**Min (LWL)**	= 15.0 ft	= (4.6 m)	**Min (Vlwl)**	= 1.346 MG	= (5,095.5 m³)
Freeboard:	= 2.0 ft	= (0.6 m)	**Avg (AWL)**	= 19.1 ft	= (5.8 m)	**Avg (Vawl)**	= 1.713 MG	= (6,483.6 m³)
Length of Basin:	= 133.0 ft	= (40.5 m)	**Max (HWL)**	= 23.0 ft	= (7.0 m)	**Max (Vhwl)**	= 2.059 MG	= (7,796.0 m³)
Width of Basin:	= 90.0 ft	= (27.4 m)						

Number of Cycles:

Cycle Duration:

Food/Mass (F/M) ratio:

MLSS Concentration:

Hydraulic Retention Time:

Solids Retention Time:

Est. Net Sludge Yield:

Est. Dry Solids Produced:

Est. Solids Flow Rate:

Design Redacted
Intellectual Property

Decant Flow Rate @ MDF:

LWL to CenterLine Discharge:

Lbs. O2/lb. BOD5

Lbs. O2/lb. TKN

Peak O2 Factor:

Actual Oxygen Required:

Air Flowrate/Basin:

Max. Discharge Pressure:

Daily Max. Month Avg. Estimated Power*:

* Power consumption calculations in this document are based on maximum month conditions. Detailed power vs. loadin calculations can be provided if requested.

AquaSBR

Mixers

3 AquaDDM Direct Drive Mixer(s)

Mixer Mooring

3 Mixer Cable Mooring System(s)

Decanters

6 Decanter Assembly(ies)

Transfer Pumps/Valves

3 Submersible Pump Assembly(ies)

Fixed Fine Bubble Diffusers

3 Fixed Fine Bubble Diffuser Assembly(ies)

Positive Displacement Blowers

Air Valves

4 Air Control Valve(s)

Level Sensor Assemblies

3 Pressure Transducer Assembly(ies)

3 Level Sensor Assembly(ies)

Instrumentation

3 Dissolved Oxygen Assembly(ies)

3 Process Controller(s)

Controls

Controls wo/Starters

1 Controls Package(s)

APPENDIX G-5
KUBOTA MBR PRELIMINARY PROPOSAL

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For Earth, For Life

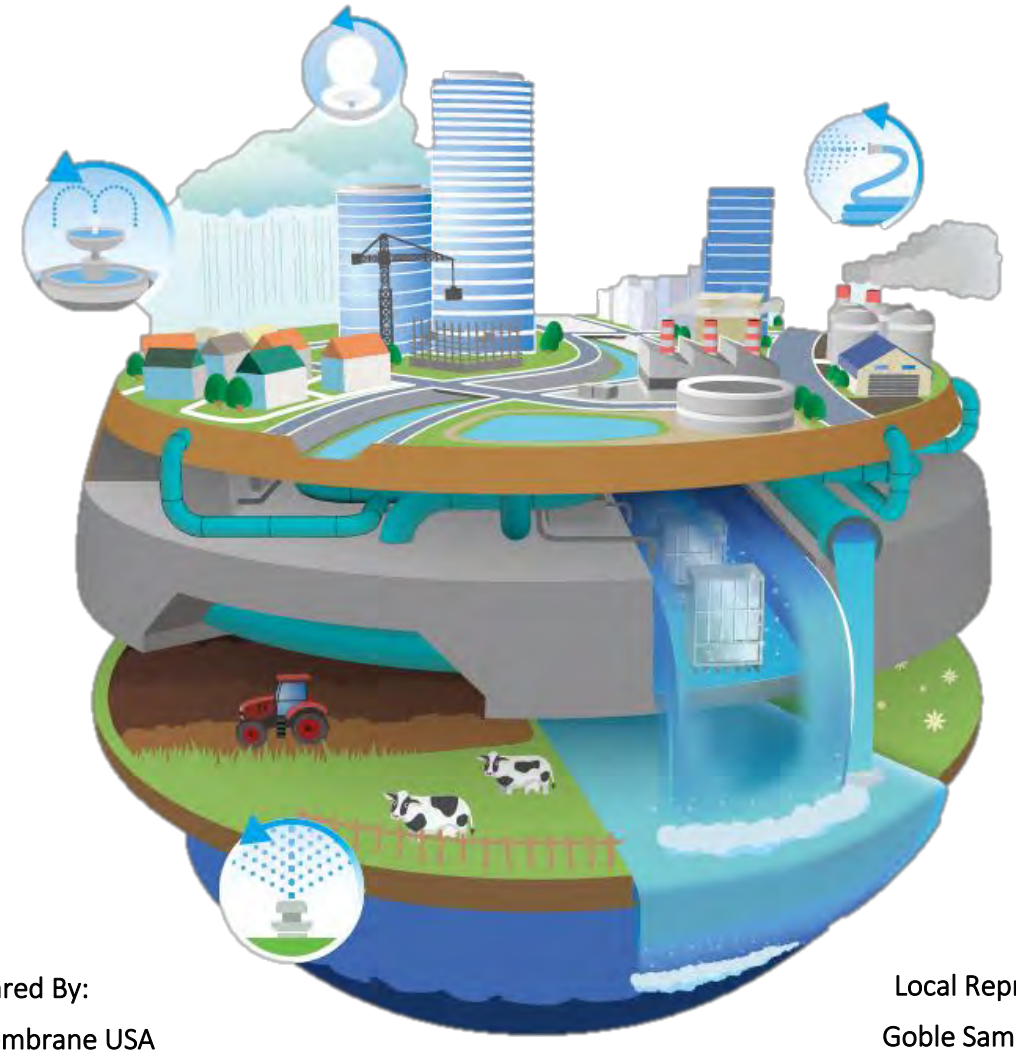
Budgetary Proposal for Kubota

Tafuna and Regional Wastewater Treatment Facilities

Kubota

Membrane Bioreactor System

September 16, 2024



Prepared By:

Kubota Membrane USA
19910 N Creek Pkwy, Suite 100
Bothell, WA 98011
425-898-2858

Local Representation By:

Goble Sampson Associates
John Simon
jsimon@goblesampson.com
(801) 268-8790

September 13, 2024

Project Name Representatives,

Kubota Membrane USA (KMU) is pleased to present our budgetary proposal for the Tafuna Wastewater Treatment Facility Membrane Bioreactor System. Kubota Membrane USA (KMU) is a company with a strong history in the U.S., backed by Kubota Corporation's extensive wastewater experience worldwide. The Kubota MBR system has unique features that will save your client time through simple and reliable operation. In this proposal, we've provided two different plant options, one to take the place of the Tafuna Plant, and another to treat the conditions described for a potential regional plant. These budgetary proposals assume new basins will be constructed to accommodate the proposed operations. Of course, these are our ideas, and we are happy to adjust to take into account any desired changes to the potential design as well as Kubota's potential scope of supply.

A compelling feature of the Kubota MBR system is the simplicity of daily operations and periodic maintenance. Both the membrane unit and the MBR system are designed for the operator's convenience. Cleaning is performed in place, with no routine membrane unit removal required. Cleaning events are performed two to four times per year, and each event can be completed in a matter of hours. Also, because the Kubota MBR System uses a flat sheet membrane, it offers straightforward troubleshooting and easy replacement in the unlikely event that problems arise.

Kubota Membrane USA offers first class service. Our technicians have operational experience and are well trained in wastewater analysis and membrane inspection. This sets us apart from other membrane manufacturers who do not design, build, or operate treatment plants, and system integrators who do not manufacture parts or operate plants. We are responsive to operator concerns and knowledgeable about the Kubota MBR System from top to bottom.

With the Kubota name comes a long history of excellence in MBR wastewater treatment. We are happy to put you in touch with operators and engineers who can share their experience with our product. If you have any questions regarding our proposal, please feel free to contact us or our local representative, John Simon at jsimon@goblesampson.com.

Best regards,

Hiro Kuge

Regional Manager | KUBOTA Membrane USA Corporation

Cell: +1-425-919-3308

Email: hiroo.kuge@kubota.com

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1 Introduction

Kubota Membrane USA would like to thank you for the opportunity to present the enclosed proposal to supply a Membrane Bioreactor System (MBR) system and associated components for the Project Name project. Included in this proposal is some background information about Kubota and Kubota MBR systems, followed by an overview of the proposed design, Kubota's scope of supply, and budgetary price.

2 Company Background

2.1 History

Kubota Corporation has been designing and building wastewater treatment plants since the early 1960s. Long before building wastewater treatment plants, the company became involved with water engineering projects in 1893 as a manufacturer of iron piping, which was used for clean water distribution. As the largest engineering contractor for wastewater treatment plants in Japan, Kubota has the capability to design, build and operate municipal and industrial wastewater treatment plants.

In the 1980s, Kubota developed its own MBR technology using an external tubular type of ultrafiltration membrane. After the initial installation of these membranes in a soil treatment plant in Japan, Kubota realized these membranes lacked energy efficiency, had short life spans, and required frequent maintenance. This prompted Kubota to find an alternative to the external tubular membranes. In 1989, Kubota pioneered the energy-efficient, long-lasting, and easy-to-use flat sheet membrane with its Submerged Membrane Unit. Kubota's Submerged Membrane Unit was designed specifically for wastewater treatment applications and is currently installed in wastewater treatment plants around the world, making Kubota a leader in the flat sheet MBR technology market.

The first installation of the Kubota flat sheet Submerged Membrane Unit was for a mechanical tool equipment manufacturer in Hiroshima in 1990. Kubota has refined and improved the membrane product for over 25 years (Figure 1). Kubota membranes were first introduced to the U.S. in 2002. Today, MBR systems using the Kubota membrane have been installed all over the world for numerous applications in addition to sewage treatment, such as brewery, dairy, food processing, pharmaceutical and chemical, laundry, leachate, and electrical industry wastes, as well as for sludge liquor treatment and water reuse.

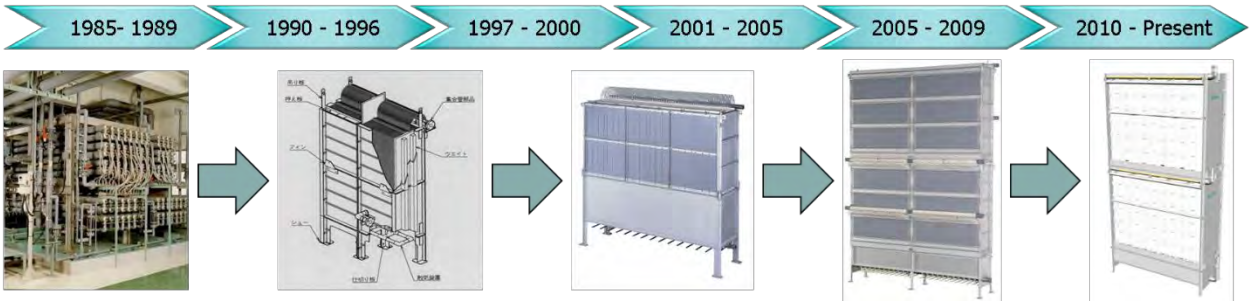
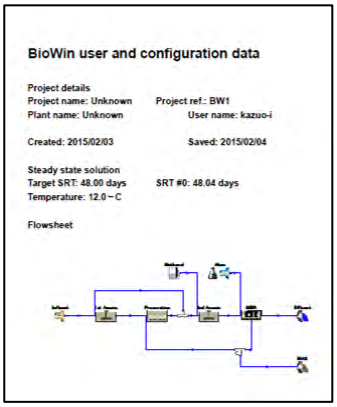


Figure 1: Progression of the Kubota membrane, from the tubular type to the most recent SP600

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2.2 Design Support and After-Sales Service

Kubota Membrane USA has technical staff in Washington State and Ohio who can help the customer with any design or operational needs of this project. Kubota staff members are available to provide technical support to consultants, WWTP operators, and WWTP owners.



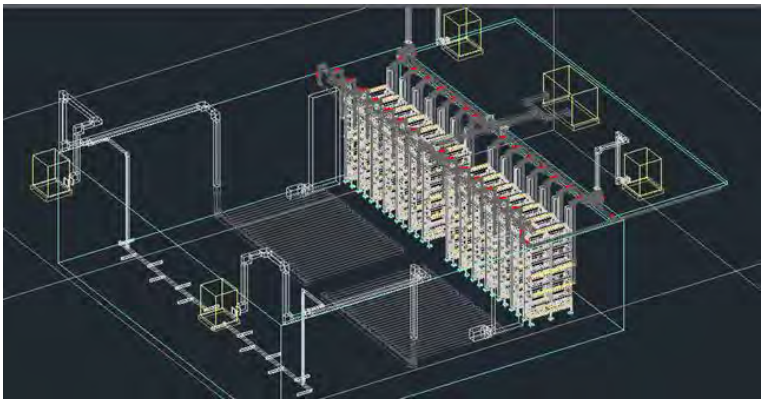


Figure 2: Examples of Kubota's Design Support Capabilities

Kubota provides a staff on a regular basis for service and support of construction activities and throughout the warranty period. The service provided includes delivery inspection, installation certification, training, commissioning and ongoing technical support. Kubota will also provide operation and maintenance manuals and 24/7 customer support.

Kubota Industrial Equipment in the state of Georgia has five certified operators who operate the industrial MBR system for the factory's wastewater. Additionally, Kubota has a Research and Development Center in Canton, OH, which focuses on optimizing the design and performance of Kubota membrane systems for the North American market.

2.3 Kubota's Experience

Kubota has extensive experience in all parts of an MBR system project including designing, building, and operating MBR systems. Kubota has over 300 Design-Build projects, operates over 30 plants, and has over 300 maintenance contracts. Kubota also designed, operates, and maintains the 80,000 GPD MBR treatment facility for the Kubota Tractor Factory in Georgia, USA.

As of 2022, Kubota MBR systems have been installed at over 7,300 facilities worldwide, making Kubota the top supplier in the world. Even prior to the first U.S. MBR installations, Kubota had already been designing, building, and operating MBR systems around the world for many years.

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Table 1: Kubota Submerged Membrane Unit Installations Worldwide as of December 2022

Region	Number of Installations
North America	525
Europe & Africa	756
Middle East	148
Asia (Except Japan) & Oceania	836
Japan	5,062
Total MBR Plants	**7,327**

3 Membrane Product Information

For this project, we have prepared a preliminary design based around the SP900 Submerged Membrane Unit (SMU). Kubota's SP series of SMUs offer state-of-the-art technology. The SP series was developed in 2011 to create a Submerged Membrane Unit which is more energy efficient and faster to assemble on-site then the preceding RM/RW series, while still maintaining the reliable and simple operation that is characteristic of Kubota's MBR systems. Kubota's philosophy of learning from our extensive experience is one of our greatest advantages, setting us apart from more newly developed membrane manufacturers. An overview of the structure of the SP series is provided below.

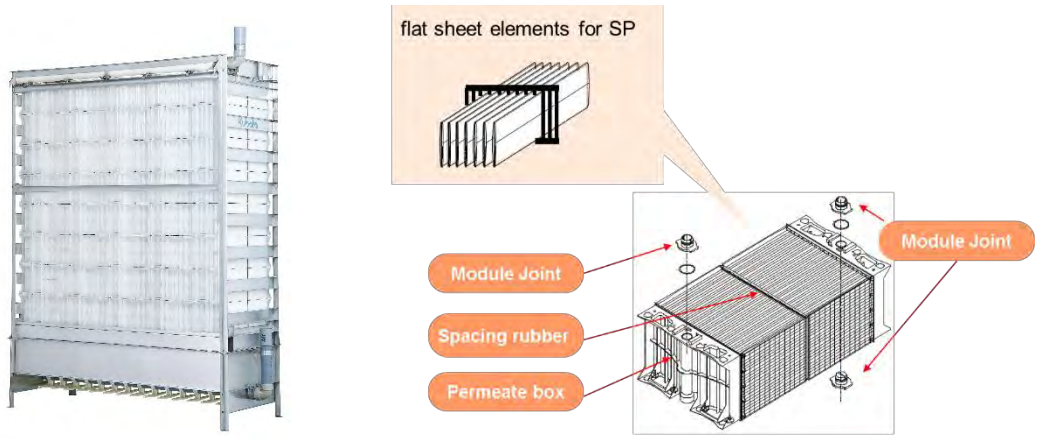


Figure 3: SP Series Unit Structure (left) and Module Structure (right)

The cartridge structure of the SP series units differs from previous Kubota products. Forty individual membrane sheets are permanently fixed to each membrane module. Each module has a permeate box and module joint on both ends. These modules are connected in a tubeless configuration by the integrated module joints to form a single cassette. Built-in retainers connect the assembled cassette to a permeate manifold which is connected to the permeate header. The SP series is ideally suited for medium to large installations, offering fast assembly, easy maintenance, and up to 15% lower energy use for air scour in the MBR than other Kubota systems.

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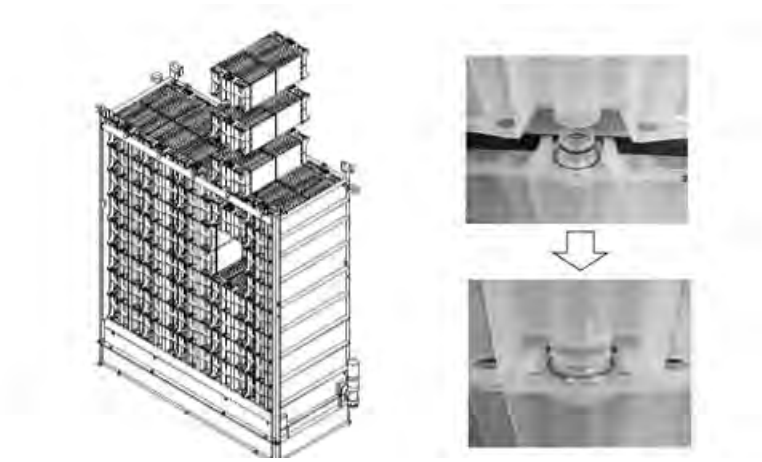


Figure 4: SP Series Module Assembly (left) and Module Connection Detail (right)

Kubota's membrane sheet is made from chlorinated polyethylene, has an average pore size of 0.2 micron (maximum 0.4 micron). This membrane is much thicker than other membranes to provide long-lasting durability and features high porosity to enable high flows. This pore size has been designed as the optimum balance between water quality and quantity. The SP series utilizes the same membrane material used by Kubota worldwide for over 25 years.

3.1 MBR Process Description

The MBR treatment process is capable of meeting strict nutrient removal requirements while still maintaining a small footprint. MBR is the combined process of activated sludge (secondary treatment) and membrane filtration (tertiary treatment). Membrane units are installed in the activated sludge reactor, where sludge and treated water are separated by means of physical filtration. Other treatment processes, such as conventional activated sludge, require gravity sedimentation through the use of final clarifiers. MBRs eliminate the need for gravity sedimentation, thereby eliminating the need for final clarifiers.

Additionally, the Kubota MBR tank using SP900 can operate at a mixed liquor concentration up to 13,000 mg/L, which is much higher than that of a conventional activated sludge basin. This reduces the required aeration volume and the volume of waste sludge produced, and also gives the system increased ability to withstand influent load fluctuations.

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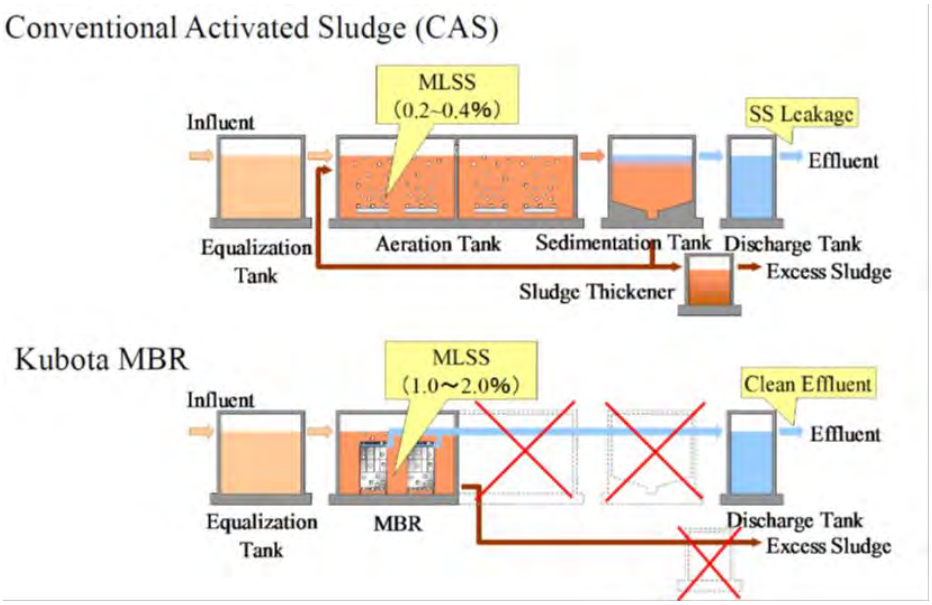


Figure 5: Typical CAS Process (top) vs. Kubota MBR Process (bottom)

3.2 Operation and Maintenance

The primary method of membrane cleaning for the Kubota MBR system is the air scour provided by the diffusers at the base of the membrane units. The chemical cleaning system, utilized much less often, is based on a venturi mixing valve that feeds the cleaning solution through the permeate piping into the membrane units and allowing that solution to soak in the membrane units for 2 to 4 hours. If the residual chemical cannot be discharged from the system, it can be sent back to the raw water inlet or to the bioreactor in order to neutralize the chemical. The venturi system is compact and can be wall mounted. No neutralization or back pulse is required with Kubota membranes.

Organic fouling can be cleaned with a 0.5% sodium hypochlorite (NaClO) solution, which is typically needed two to four times per year. Inorganic fouling such as iron or aluminum can be cleaned by a 0.5% to 1% oxalic or citric acid solution which is typically needed once a year or less.

The annual maintenance cleaning chemical usage cost estimation is based on the following assumptions:

- Sodium hypochlorite used for organic fouling removal and is done two-four times every year. Below is calculated based on three CIP cleaning events per year.
- Citric acid is used to address inorganic fouling and would typically be needed once per year or less. In organic fouling does not occur at every facility so some facilities never require this. However, due to the water treatment residuals in this system, we have calculated the acid usage below based on one CIP cleaning event per year.
- Sodium Hydroxide is used if silica is present in the wastewater.

The Kubota MBR system was developed in 1990 to be low-maintenance and easy to operate. Since then, Kubota MBR package plants have been installed in many remote communities to treat small flows. Many of these plants run without constant operator attention and are visited only once every two weeks. This illustrates the ease of operation and reliability of the Kubota MBR system.

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Kubota takes pride in the simplicity of our MBR systems, and we strive to build long-term relationships with our customers. We are committed to the U.S. market, and will provide excellent support through all phases of our projects.

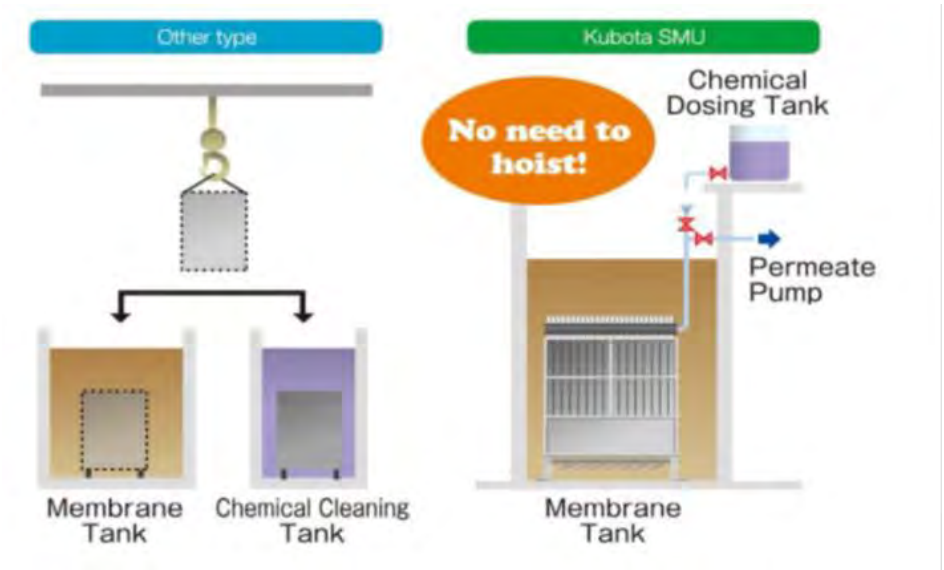


Figure 6: Chemical Cleaning for Other Manufacturers (left) vs. Kubota Membrane Units (right)

4 Design Overview

The MBR system was designed based on the following influent data.

4.1 Influent Design Flow Per System

The following flow conditions were used to design the capacity of the proposed MBR system.

Table 2: Design Flow Conditions

Condition	Tafuna Design Flow	Regional Design Flow
Average Daily Flow	2.20 MGD	4.30 MGD
Maximum Monthly Flow	2.60 MGD	5.50 MGD
Peak Daily Flow	5.30 MGD	10.70 MGD
Peak Hourly Flow	8.40 MGD	13.90 MGD

The wastewater characteristics used for preliminary design are listed in the table below. These concentrations were derived from the provided data, using the loading at max monthly flow.

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Table 3: Influent and Effluent Characteristics

Constituent	Tafuna: Influent Concentrations at MMF	Regional: Influent Concentrations at MMF	Required Effluent Concentration
BOD	443.17 mg/L	263.51 mg/L	10.00 mg/L
TSS	450.69 mg/L	249.35 mg/L	10.00 mg/L
TN	66.37 mg/L	42.64 mg/L	10.00 mg/L
TP	- mg/L	- mg/L	- mg/L

4.2 MBR Specifications Per System

Specifications for the proposed membrane equipment are provided in the tables below.

Table 4: Membrane Equipment Specifications.

Component	Tafuna Membrane Specifications	Regional Membrane Specifications
Membrane Model	SP900	SP900
Membrane Surface Area per Unit	9687.52 sq ft	9687.52 sq ft
Total Number of Submerged Membrane Units	24 Units	48 Units
Design MLSS at MBR	12,000 mg/L	12,000 mg/L
Total Number of Treatment Trains	4	4
Total Number of MBR Tanks	4	4
Job Site Elevation	42.65 ft	42.65 ft
Assumed Minimum Water Temperature	27.6 °C	27.6 °C

Both this and the tank sizing proposed later in the document are driven by the influent/effluent characteristics, and the listed assumed minimum water temperature. The sizing of the tanks may be changed should these targets be adjusted.

4.3 Process Flow Diagram and Tank Sizing

Pre-screened raw influent will first be directed into the Anoxic zone (AX). Feed forward pumps will then carry the mixed liquor to the pre-aeration zone to continue the biological process. Gravity will then carry liquor into the MBR tank. In the MBR tanks, permeate will be extracted through the membranes via gravity flow. This system can be modified to incorporate permeate pumps, or pump assisted gravity, should that be desired. Sludge also flows by gravity back to the pre-anoxic zone. Wasting occurs in this this tank as needed via external centrifugal pumps.

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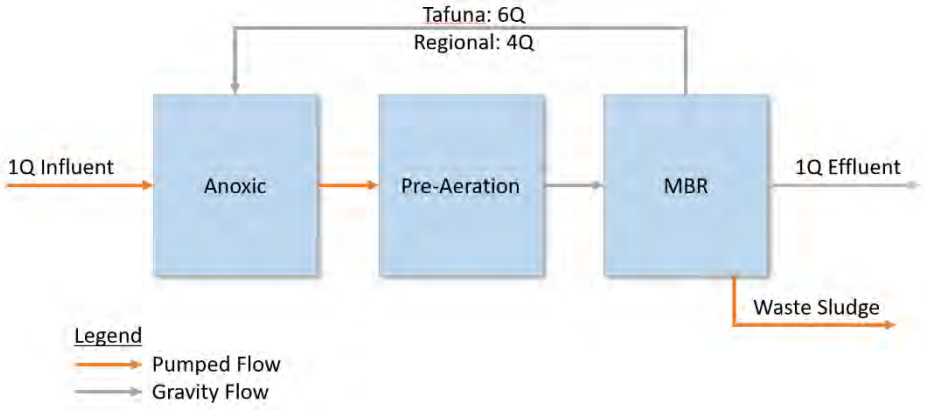


Figure 7: Process Flow Diagram

The following table shows the sizing of the required tanks for operation. These numbers are designed so that the previously listed effluent targets can be properly met.

Table 5: Tank Sizing for Tafuna Plant

Tank Name	Dimensions (L' x W' x SWD')	Volume per Tank (gallons)	Number of Tanks	Total Volume (gallons)
Anoxic	9.69 ft x 21 ft x 17.7 ft	26,940 gal	4	**107,770 gal**
Pre-Aeration	22.26 ft x 21 ft x 18.2 ft	63,640 gal	4	**254,540 gal**
MBR	15.09 ft x 21 ft x 18.7 ft	44,330 gal	4	**177,320 gal**
Total				**539,640 gal**

Table 6: Tank Sizing for Regional Plant

Tank Name	Dimensions (L' x W' x SWD')	Volume per Tank (gallons)	Number of Tanks	Total Volume (gallons)
Anoxic	10.13 ft x 28.08 ft x 17.7 ft	37,680 gal	4	150,720 gal
Pre-Aeration	11.45 ft x 28.08 ft x 18.2 ft	43,770 gal	4	175,080 gal
MBR	29.86 ft x 24 ft x 18.7 ft	100,250 gal	4	400,990 gal
Total				**726,790 gal**

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The greater volume in the pre-aeration tank is driven by the higher loading per flow unit in the Tafuna regional plant influent conditions. We're open to feedback on the designs of these tanks, though, and happy to provide additional options based on suggestions.

5 Scope of Supply

The following proposed items will be supplied by Kubota Membrane. We are flexible in terms of scope of supply though, and are happy to adjust our scope to fit the project's needs.

5.1 Major Equipment and Instrumentation for Tafuna Plant

Table 7: Tafuna Plant Scope of Supply

Equipment Location	Name	Type	Required Size/Capacity	Unit	Material	Motor HP	Notes	QTY
Anoxic (AX) Equipment								
AX1	AX1 Mixer	Submersible	41339	gal/tank	304SS	2.5	Submersible Mixer for agitation and mixing of contents of anoxic tank to provide uniform treatment and distribution of in-process wastewater	4
AX1	AX1 Level Switch	Float			PU			4
AX1	AX1 Level Transmitter	Hydrostatic		ft	SS			2
Pre-Aeration (PA) Equipment								
PA	PA Diffuser	Fine Bubble	677	scfm	EPDM		Diffuser to ensure that proper nitrification occurs throughout the basin	4
MBR Equipment								
MBR	MBR SMU	Flat Plate	SP900		304SS		Submerged Membrane Unit, includes diffuser case, membrane cassette and all flat plate	24

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							membranes needed for each SMU. Constructed of 304SS	
MBR	MBR SMU Lifting Tool	Lifting Tool	TGSP508		CS, SS		Lifting tool and chain to support removal of membrane unit as necessary for repairs	1
MBR	MBR SMU Module Lifting Tool	Lifting Tool	TGSPM008		CS, SS			1
MBR	MBR Air Isolation Valve	Manual Butterfly	3	inch	Duct Iron		Manual 3-inch ball valves for air isolation to and from the membrane unit	24
MBR	MBR PRMT Isolation Valve	Manual Ball	3	inch	PVC		Manual 3-inch ball valve for permeate isolation from the membrane unit	48
MBR	MBR Level Switch	Float			PU			4
MBR	MBR Level Sensor	Hydrostatic		ft	SS			2
MBR	MBR SMU Guide & Stabilizer						Fabrication of guide and stabilizer pipes for the existing SMU units, cassette replacements.	24
MBR	MBR SMU Fasteners				304SS			240
MBR	MBR In-Basin Pipe&Supports (Permeate Drop Pipe)				PVC		Fabrication of in-basin permeate piping to	48

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							membrane unit	
MBR	MBR In-Basin Pipe&Supports (Air Drop Pipe)				304SS		Fabrication of in-basin air piping to membrane unit	24
Permeate (PRMT) Control Equipment								
PRMT	PRMT Vent Valve	ON/OFF Ball	1	inch	SS		Vent valve for relief on permeate system, assist during CIP process	4
PRMT	PRMT Flow Control Valve	Modulating Butterfly	12	inch	SS		Flow control valve to allow for gravity system to allow permeate rate to be controlled to plant specifications	4
PRMT	PRMT Flow Meter	Electromagnetic	12	inch	PU			2
PRMT	PRMT Turbidity Meter	Laser		NTU				1
PRMT	PRMT Turbidity Transmitter							1
PRMT	Turbidity Meter Maintenance Kit							1
PRMT	Pole							1
Feed Forward (FF) Control Equipment								
FF	FF Pump w/ VFD	Submersible	4965	gpm		60	Feed forward pumps for system going from the Pre-Aeration zone to the MBR zone	3
FF	FF Flow Meter	Electromagnetic	16	inch	PU			3
Waste Activated Sludge (WAS) Control Equipment								

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WAS	WAS Pump w/ VFD	Self-Priming Centrifugal	240	gpm		7.5		2
WAS	WAS Flow Meter	Electromagnetic	4	inch	PU			2
MBR Blower								
MBR BLW	MBR Blower	Positive Displacement	662	scfm	CI	50	MBR Blowers designed to meet aeration targets in the MBR tanks	5
MBR BLW	MBR Blower Flow Meter	Thermal Mass	8	inch	PU			2
PA Blower								
PA BLW	PA Blower	Positive Displacement	678	scfm	CI	50	Process air blowers designed to meet aeration targets in the pre-aeration zones	4
PA BLW	PA Blower Flow Meter	Thermal Mass	8	inch	PU			2
Clean-In-Place Equipment								
SMU CIP	SMU CIP System		3	inch			MBR Cleaning system for make down and use of cleaning chemicals designed to easily maintain Membrane Units over the course of their lifespan	1
System Control Equipment								
CONTROL	Control Panel	PLC, HMI					Service to install Control System to Operate SMU	1

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5.2 Major Equipment and Instrumentation for Regional Plant

Table 8: Regional Plant Scope of Supply

Equipment Location	Name	Type	Required Size/Capacity	Unit	Material	Motor HP	Notes	QTY
Anoxic (AX) Equipment								
AX1	AX1 Mixer	Submersible	37680	gal/tank	304SS	2.5	Submersible Mixer for agitation and mixing of contents of anoxic tank to provide uniform treatment and distribution of in-process wastewater	4
AX1	AX1 Level Switch	Float			PU			8
AX1	AX1 Level Transmitter	Hydrostatic		ft	SS			4
Pre-Aeration (PA) Equipment								
PA	PA Diffuser	Fine Bubble	627	scfm	EPDM		Diffuser to ensure that proper nitrification occurs throughout the basin	4
MBR Equipment								
MBR	MBR SMU	Flat Plate	SP900		304SS		Submerged Membrane Unit, includes diffuser case, membrane cassette and all flat plate membranes needed for each SMU. Constructed of 304SS	48
MBR	MBR SMU Lifting Tool	Lifting Tool	TGSP508		CS, SS		Lifting tool and chain to	1

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							support removal of membrane unit as necessary for repairs	
MBR	MBR SMU Module Lifting Tool	Lifting Tool	TGSPM008		CS, SS			1
MBR	MBR Air Isolation Valve	Manual Butterfly	3	inch	Duct Iron		Manual 3-inch ball valves for air isolation to and from the membrane unit	48
MBR	MBR PRMT Isolation Valve	Manual Ball	3	inch	PVC		Manual 3-inch ball valve for permeate isolation from the membrane unit	96
MBR	MBR Level Switch	Float			PU			4
MBR	MBR Level Sensor	Hydrostatic		ft	SS			2
MBR	MBR SMU Guide & Stabilizer						Fabrication of guide and stabilizer pipes for the existing SMU units, cassette replacements.	48
MBR	MBR SMU Fasteners				304SS			480
MBR	MBR In-Basin Pipe&Supports (Permeate Drop Pipe)				PVC		Fabrication of in-basin permeate piping to membrane unit	96
MBR	MBR In-Basin Pipe&Supports (Air Drop Pipe)				304SS		Fabrication of in-basin air piping to	48

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							membrane unit	
Permeate (PRMT) Control Equipment								
PRMT	PRMT Vent Valve	ON/OFF Ball	1	inch	SS		Vent valve for relief on permeate system, assist during CIP process	4
PRMT	PRMT Flow Control Valve	Modulating Butterfly	12	inch	SS		Flow control valve to allow for gravity system to allow permeate rate to be controlled to plant specifications	4
PRMT	PRMT Flow Meter	Electromagnetic	12	inch	PU			4
PRMT	PRMT Turbidity Meter	Laser		NTU				1
PRMT	PRMT Turbidity Transmitter							1
PRMT	Turbidity Meter Maintenance Kit							1
PRMT	Pole							1
Feed Forward (FF) Control Equipment								
FF	FF Pump w/ VFD	Submersible	7639	gpm		90	Feed forward pumps for system going from the Pre-Aeration zone to the MBR zone	4
FF	FF Flow Meter	Electromagnetic	18	inch	PU			4
Waste Activated Sludge (WAS) Control Equipment								
WAS	WAS Pump w/ VFD	Self-Priming Centrifugal	302	gpm		10		2
WAS	WAS Flow Meter	Electromagnetic	4	inch	PU			2

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MBR Blower								
MBR BLW	MBR Blower	Positive Displacement	1323	scfm	CI	100	MBR Blowers designed to meet aeration targets in the MBR tanks	4
MBR BLW	MBR Blower Flow Meter	Thermal Mass	10	inch	PU			4
PA Blower								
PA BLW	PA Blower	Positive Displacement	627	scfm	CI	50	Process air blowers designed to meet aeration targets in the pre-aeration zones	4
PA BLW	PA Blower Flow Meter	Thermal Mass	8	inch	PU			4
Clean-In-Place Equipment								
SMU CIP	SMU CIP System		3	inch			MBR Cleaning system for make down and use of cleaning chemicals designed to easily maintain Membrane Units over the course of their lifespan	1
System Control Equipment								
CONTROL	Control Panel	PLC, HMI					Service to install Control System to Operate SMU	1

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5.3 Other Notable Inclusions to Scope of Supply

The following table shows other items that Kubota routinely includes in its scope of supply for various projects across the globe. KMU is dedicated toward ensuring the success of each project it takes on.

Table 9: Other Inclusions to Kubota Scope

Other Inclusions	
Design Support Submittal	Preliminary Design
	Design Calculation
	Selection of Equipment
	Review of 30/60/90/100% Design
	Design Meeting
	Submittal
	Construction Guidelines & Installation Specification
O&M Manual	O&M Manual for the MBR Systems including HMI
Delivery and Construction SV	Delivery Inspection
	Construction Supervisor
Startup	Dry Check, Wet Check, Control Program check
Membrane Warranty	Performance and Defect
Equipment Warranty (Excluding Membrane)	Defect
Control Warranty	Performance and Defect

5.4 Direct Services

The following services are included in Kubota's scope of supply:

5.4.1 Design Support

- Support during preliminary and final design.
- One (1) day on-site design meeting.
- Construction submittals including shop drawings.
- Preparation and submittal of a system O&M manual for Kubota supplied systems and equipment.
- Equipment delivery coordination with the contractor.
- On-site delivery inspection of Submerged Membrane Units.

5.4.2 Commissioning

- On-site installation inspection, start-up, and commissioning including dry and wet equipment checks, clean water testing, and support during seeding and start-up.
- On-site performance testing.
- Additional days are available as needed.

5.4.3 Training

- Two (2) days of on-site, hands-on operator training using a mix of classroom and field time. See Table 10 below for list of training topics.

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Table 10: Training and Workshops Included in Kubota's Scope of Supply

Training/Workshop	Brief Summary
PLC and HMI	1. Navigation of all HMI screens and menus. 2. Review of automatic operations and controls. 3. Changing process set points. 4. Overriding controls from the HMI. 5. Manual operation of the system in the event of a power failure.
CIP training	1. Navigation of CIP (Clean-In-Place), in-situ maintenance chemical cleaning. 2. Control from HMI and operation of manual valve. 3. Adjust set points of chemical flow.
Troubleshooting	1. Case study of troubleshooting 2. Recovery from trouble 3. "Fish bone" approach
Daily testing	1. Filterability test 2. Viscosity measurement

5.4.4 Workshop/Additional Training Available (No Charge)

- In addition to our standard training at commissioning, Kubota Membrane USA will host an annual operator workshop in which operators meet to exchange ideas and learn about the latest developments in MBR technology.
- Customized individual training, such as membrane disassembling training, is also available upon request.

5.5 Exclusions to Kubota Scope of Supply

The following items are not currently included in the Kubota scope of supply:

- Sales Tax.
- Bid bond and payment bond.
- Equipment unloading, handling, storage, and installation.
- Any equipment or services not expressly listed above.
- Civil works including installation of equipment, piping, and wiring.
- Fine screening equipment.
- Pretreatment/Headworks (grit removal, DAF, etc.).
- Flow equalization system.
- Electrical system (main electrical, generators, etc.).
- Solids handling equipment and digesters.
- Disinfection System.
  - KMU can supply this equipment at an additional cost.
- Tanks, building construction.
- All piping that is outside of the MBR tanks, including permeate, air scour and diffuser cleaning headers.
- Wall pipe, link seal, sleeve, and any kind of penetration seal.
- Chemical epoxy or glue for anchor bolts.
- Chemical storage tanks.
- Flow conditioners for flow meters.
- MCC, VFDs, motor starters.

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- Equipment lifts or hoists except for Kubota SMU Lifting Tool.
- Seismic bracing for equipment, if needed.
- Any systems for operation in a classified area. All supplied systems will be "unclassified" in accordance NFPA Standard 820.
- BABA or AIS requirements are not currently included in pricing.
- Freight from site equipment manufacture to American Samoa is not included in the budgetary pricing. Should this proposal move towards a bid proposal in the future, would like to collaborate on a freight strategy in order to minimize this additive cost to the proposed design.

6 Budgetary Price

The estimated budgetary price for the equipment and instrumentation described herein is shown below. The pricing herein is for budgetary purposes only and does not constitute an offer of sale. Freight, taxes or duties are not included.

Table 11: Kubota MBR and Associated Equipment Pricing

Kubota Price	
Equipment and Services per plant as detailed in this document for Tafuna Plant	$3,246,000 *excluding freight, taxes or duties*
Equipment and Services per plant as detailed in this document for Regional Plant	$5,055,000 *excluding freight, taxes or duties*

7 Price and Payment Terms

The price shown in Table 11 is proposed by KMU subject to the following conditions.

7.1 Price Escalation

In preparing this proposal, KMU has endeavored to provide a competitive, fair, and accurate price. Current market conditions, however, reflect uncertainty and high levels of inflation. We are offering this pricing with a validity of 6 months. It is then subject to escalation based on the increase in the Producer Price Index (PPI) for Final Demand published by the Bureau of Labor Statistics (BLS Series ID WPSFD4). Escalation will be according the following formula, assuming the scope of supply remains unchanged from this proposal.

Price at Purchase Order = Bid Price x (PPI at time of PO / PPI at the time of bid)

Escalation terms will only serve to increase the bid price. In the event the PPI at the time of PO is lower then the PPI at the time of bid, the bid price shall remain unchanged.

7.2 Payment Terms

This offer is made according to KMU's standard payment terms shown below.

10% down with purchase order
10% upon delivery of submittal
50% upon delivery of equipment (except for SMUs)
25% upon delivery of SMUs
5% upon MBR start up completion

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- All payments are net 30 days.
  - A 1-1/2% per month service charge will be added for all payments beyond the due date.
  - In the event of any specification changes after the receipt of an order, KMU reserves the right to adjust the selling price to cover such changes. The changes must be in writing and paid for before debugging of the system will be done.
  - In the event of delay in payments, KMU reserves the right to withhold delivery and start-up.

8 24/7 Technical Support

24/7 phone support is available in addition to support during regular business hours. 24-hour technical support calls are shared within the Kubota staff so that you can rest assured knowing that knowledgeable engineers and technicians are just a phone call away.

9 Warranty

KMU's membrane warranty is governed by the Kubota Products Warranty Terms and Conditions, which are incorporated herein by reference as part of this proposal.

10 Additional Services (Optional)

The following service plans are optional and may be added to Kubota's scope of supply if desired for an additional cost.

10.1 Kubota Custom Membrane Support Plan

Kubota can customize your support/service package to meet your needs. The following table shows a variety of our available services:

Table 12: Kubota's Available Services

Service	Note
Periodical technical support	Monthly, Quarterly, Annually
24/7 phone support	Always Available
MBR control system monitoring	Weekly, Monthly, Quarterly
Periodical site visit	Quarterly, Semi-annually, Annually
Membrane inspection	Annual, Semi-annual, 3x per year
Membrane protection (10-year contract)	Select annual or semi-annual inspections
Program (MBR control system, etc.) update	Based on hydraulic changes, such as increases in flow or changes in operation

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10.2 Terms and Conditions

KUBOTA Membrane USA Corporation

GENERAL TERMS & CONDITIONS

1. **Precedence of Terms.** These general terms and conditions shall apply to this Contract, except that provisions set forth on the face hereof shall take precedence over any inconsistent or contrary provisions set forth in these General Terms and Conditions. No conditions contrary to or in addition to those set forth in this General Terms and Conditions shall be binding upon the Seller unless expressly approved in writing by Seller. Performance by Seller shall not be construed as accepting any different or additional terms.

2. **Quality and Quantity.** Seller shall not be responsible for any damage to or deterioration in the quality or loss in weight or units of the Goods during transit or due to natural causes.

3. **Shipment.** Shipment within the time stipulated on the face hereto shall be subject to the availability of vessel's space. In case FCA or FOB INCOTERMS apply to this Contract and Buyer fails to obtain space in time to fulfill the stipulated shipment date, Buyer shall be responsible for all costs, expenses and damages resulting directly or indirectly therefrom, including, without limitation, all increases in freight and insurance charges, losses, and other damages incurred by Seller prior to or after such failure by Buyer. The date of the Bill of Lading or the Waybill shall be conclusive evidence of the shipment date.

4. **Risk of Loss and Transfer of Title.** Risk of loss or damage to the Goods shall pass from Seller to Buyer in accordance with the INCOTERMS set forth on face hereof. Title to and the right to possess the Goods shall pass from the Seller to the Buyer at the same time when the risk of loss or damage to the Goods is passed to the Buyer as stipulated above, however, that the title to and the right to repossess the Goods are to be retained by Seller until Seller has received the full contract amount due to Seller pursuant to this Contract.

5. **Payment.** Payment by Buyer to Seller under this Contract shall be made by means of telegraphic transfer in immediately available funds to such bank account as designated by Seller or a confirmed, irrevocable, without recourse documentary letter of credit, in favor of Seller and with terms any satisfactory to Seller. If Buyer desires to pay Seller by means of a letter of credit, the letter of credit shall (i) cover the full contract amount (ii) be established through a prime-bank immediately after the date of this Contract, (iii) be negotiable on sight draft, and (iv) be valid for negotiation against the relative draft for at least fifteen (15) days after the end of the last month in which the Goods are shipped.

The letter of credit shall authorize reimbursement to Seller for any expenses incurred by Seller on account of Buyer pursuant hereto, and shall authorize partial payment against partial delivery. Any bank charges arising in connection with payment hereunder shall be borne by Buyer. If Buyer fails to satisfy any payment terms of this Contract, Seller at its sole discretion and at Buyer's expense and risk may resell all or any part of the Goods on account of Buyer, hold all or any part of the Goods on account of Buyer, cancel all or any part of this Contract and/or claim any damages resulting from such breach.

In the event of late payment of any amount due hereunder, Seller shall, in addition to any other remedy it may have hereunder or pursuant to applicable law, be entitled to receive interest at the maximum rate allowed by law in the country/state of Buyer or eighteen percent (18%) per annum, whichever is greater, on such late payment until payment is received in full.

6. **Increased Costs.** Any new, additional or increased freight rates, surcharges (bunker, currency, congestion or other surcharges), taxes, customs duties, export or import surcharges or other governmental charges, or insurance premiums, which may be incurred by Seller with respect to the Goods after the date of this Contract, shall be for the account of Buyer and shall be reimbursed to Seller by Buyer within a reasonable time on demand.

7. **Force Majeure.** Seller shall not be liable for failure or delay to perform its obligations hereunder due to any reason including, but not limited to, acts of God, earthquake, fire, flood, prohibition of exportation, refusal to issue export license, war, blockade, revolution, insurrection, sub vendor manufacturing delays, civil commotion, riots, mobilization, strikes, lockout, plague, other epidemics, pandemics, or any other causes beyond the control of Seller, and may, at its option, extend the time of shipment or delivery of the Goods or terminate unconditionally and without liability of this Contract to the extent so affected or prevented.

8. **Cancellation.** If Buyer fails to carry out any of the terms of this and/or any other contract with Seller, or in the event of the death, bankruptcy or insolvency of Buyer, liquidation, modification or reorganization of the corporate structure of Buyer, or nonpayment for any shipment, Seller shall have the right to cancel this and/or any other contract with Buyer or to postpone the shipment, or to stop the Goods in transit, and Buyer shall indemnify, defend and hold Seller harmless from all losses, costs, and expenses resulting from Seller taking any such actions.

9. **Intellectual Property Rights.** Buyer shall defend, indemnify and hold Seller harmless from any and all liability, loss or expense (including reasonable attorney's fees) arising from or in connection with any actual or alleged infringement of any patent, trademark, copyright, industrial design, registered pattern, trade secret or other similar intellectual property rights used or owned by Seller.

10. **Liability of Agent.** If this Contract is signed by an agent or on behalf of a principal as Buyer hereunder, whether the principal is disclosed or otherwise, the agent shall be liable not only as agent but also as principal for the performance of the obligations of Buyer under this Contract. This provision shall not affect Buyer's obligation as principal under this Contract.

11. **Construction.** The meanings of the terms UCPDC or INCOTERMS, when used in this Contract shall be determined in accordance with the Uniform Customs and Practice for Documentary Credit ("UCPDC") and Incoterms® ("INCOTERMS") adopted by the International Chamber of Commerce in effect on the date of this Contract. This Contract shall be governed by the laws of the state of Washington, USA without giving effect to any conflicts of laws principles. This Contract shall not be governed by the United Nations Contracts for the International Sales of Goods, the application of which is expressly excluded.

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1. **Inspection.** Unless otherwise stated on the face of this Contract, any export inspections by Japanese authorities, Seller's suppliers or Seller shall be considered as final. When Buyer requires special inspection by an independently appointed inspector, Buyer shall inform Seller in writing the details of such special inspection including without limitation the name of such inspector at the time of this Contract. Such especial inspection shall be made promptly upon delivery of the Goods but in any event within two (2) weeks after delivery of the Goods, and all inspection fees and costs therefor shall be borne by Buyer.

2. **Warranty.** Seller warrants that any Goods delivered hereunder are free from defects in material and workmanship and, if Seller's specifications are set forth or incorporated by reference on the face hereof, or separately provided to Buyer, will meet such Seller's specifications.

Unless otherwise specified in Seller's warranty statement set forth or incorporated by reference on the face hereof, or separately provided to Buyer, Seller's liability under this warranty is limited to repair or replacement of any Goods delivered hereunder that do not conform to this warranty.

Buyer shall not be entitled to any remedy for lack of conformity of the Goods, including latent defects, under this warranty if he fails to notify Seller thereof within a six months period commencing on the shipment date of the Goods (and if there are more than one shipment dates, the first shipment date). Such notification shall contain full particulars of such lack of conformity of the Goods to the Seller's reasonable satisfaction.

Notwithstanding anything herein contained to the contrary, Seller shall have no liability under this warranty i) for minor deviations from Seller's specifications (if applicable) that do not affect the performance of the Goods, or ii) for any lack of conformity of the Goods caused by misuse, neglect, improper installation, handling, operation, or maintenance, repair, alteration, fair wear and tear, erosion or corrosion, or accident, including any damage or loss of the whole or a part of the Goods that occurs after the shipment date.

3. **Limitation of Liability.** EXCEPT AS EXPRESSLY STATED IN SECTION 13, SELLER HEREBY DISCLAIMS ALL REPRESENTATIONS AND WARRANTIES WITH RESPECT TO THE GOODS, WHETHER EXPRESS, IMPLIED OR STATUTORY (EXCEPT AS TO TITLE) INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT AND OTHER IMPLIED WARRANTIES UNDER ANY APPLICABLE LAWS, RULES OR REGULATIONS. SECTION 13 SETS FORTH THE FULL EXTENT OF SELLER'S LIABILITY TO BUYER OR ANY OTHER PARTY FOR ANY BREACH OF WARRANTY WITH RESPECT TO THE GOODS.

NOTHWITHSTANDING ANY OTHER PROVISION OF THIS CONTRACT, SELLER'S AGGREGATE AND CUMULATIVE LIABILITY ARISING OUT OF OR RELATING TO THIS CONTRACT, INCLUDING WITHOUT LIMITATION ON ACCOUNT OF PERFORMANCE OR NON-PERFORMANCE OF OBLIGATIONS, REGARDLESS OF THE FORM OF THE CAUSE OF ACTION, WHETHER IN CONTRACT, TORT (INCLUDING WITHOUT LIMITATION NEGLIGENCE), STATUTORY OR OTHERWISE WILL BE LIMITED TO DIRECT DAMAGES AND SHALL NOT EXCEED THE FULL CONTRACT AMOUNT OF GOODS STATED ON THE FACE HEREOF.

SELLER SHALL HAVE NO LIABILITY FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL OR SIMILAR DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE SALE, DELIVERY,NONDELIVERY,STORAGE,USE,MAINTENANCE, CONDITION OR POSSESSION OF THE GOODS.

15. **Arbitration.** All disputes or controversies which may arise between the parties hereto, out of or in relation to or in connection with this Contract, shall be negotiated in good faith and settled by agreement between both parties as promptly as possible. If not amicably settled within 14 days after the first negotiation day, such disputes or controversies shall be settled by arbitration in Seattle, Washington by arbitration administered by the American Arbitration Association in accordance with its Commercial Arbitration Rules including the Optional Rules for Emergency Measures of Protection, and judgment on the award rendered by the arbitrators shall be final and binding and may be entered in any court having jurisdiction thereof. All arbitration proceedings shall be held in the English language.

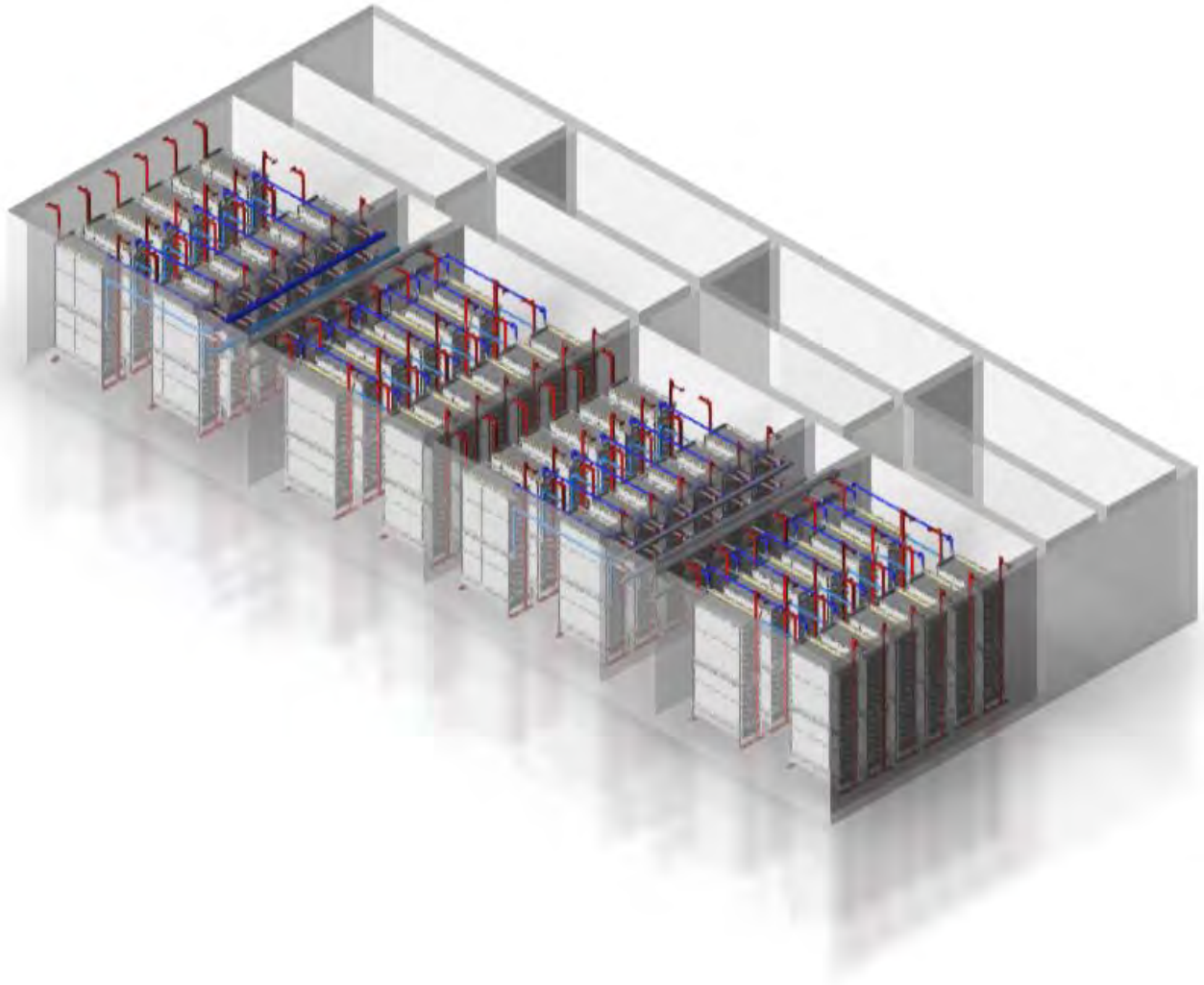
16. **Governing Law.** These Terms and Conditions shall be governed by and construed in accordance with the laws of the State of Washington, USA, for both domestic and international sales contract. All buyers agree that jurisdiction and venue shall be Seattle, Washington State.

17. **Liability for Delays and Return Trips.** Buyer agrees that if Seller or any of its representative's must make an additional service trip due to the site conditions not being ready for installation check, start up, or training to compensate them for their cost for additional travel expenses and pay for additional labor at their published labor rates. Additionally, should Buyer (or any of its representative's) cancel an installation check, start up, or training trip with less than 72 hours' notice, that Buyer will be liable for any additional travel costs and that the cancelling party will be liable for unused labor at their published labor rates.

18. **Change Orders.** If it is determined that the Seller needs to supply any other equipment or services not specified in the Sellers Project Proposal, shall warrant a change order.

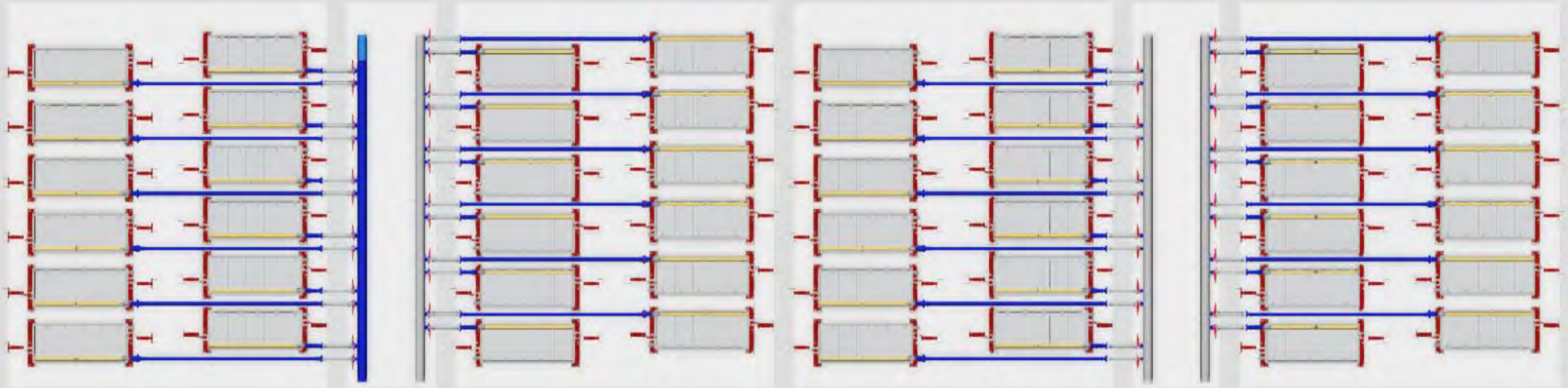
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Regional Design Potential Layout



Regional Design Potential Layout

AX1	AX2	AX3	AX4
PA1	PA2	PA3	PA4



MBR1 MBR2 MBR3 MBR4

AUTODESK Viewer

AUTODESK

APPENDIX H
STAFFING REQUIREMENTS

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APPENDIX H-1
HAWAII DOH, WWTP CLASSIFICATION

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TABLE I

CRITERIA FOR CLASSIFICATION
OF WASTEWATER TREATMENT PLANTS
JULY 1, 2001

ASPA Regional WWTP = 95.3 points

PLANT CLASS	I.	II.	III.	IV.
RANGE OF POINTS	30 or less	31-55	56-75	76 or greater

Assign points for every item that applies:

	ITEM		
	Size		
3.8 points	Maximum population equivalent (P.E.) served, peak day.....	1 pt. per 10,000 P.E. or part	-- Max. 10 Points
5.5 points	Design flow (avg. day) or peak month's flow (avg. day), whichever is larger.....	1 pt. per MGD or part	-- Max. 10 Points
	Effluent Discharge		
	Receiving stream (sensitivity)...(2-6 pts. range)		
	"Effluent limited segment" in Environmental Protection Agency (EPA) terminology; secondary treatment is adequate.....		1
2 points	More than secondary treatment is required.....		2
	"Water quality limited segment" EPA terminology; stream conditions are very critical (dry reach, for example) and a very high degree of treatment is required.....		3
	Effluent used in a direct		

	recycle and reuse system.....	6
	Land disposal.....	2
	Subsurface disposal.....	5
	Variation in Raw Wastes	
	(slight to extreme)..... (0-6 pts. range)	
	Variations do not exceed those normally or typically expected.....	0
	Recurring deviations or excessive variations of 100 to 200 percent in strength and/or flow.....	2
4 points	Recurring deviations or excessive variations of more than 200 percent in strength and/ or flow.....	4
	Raw wastes subject to toxic waste discharges.....	6
	Pretreatment	
3 points	Screening, comminution.....	3
3 points	Grit removal.....	3
3 points	Plant pumping of main flow.....	3
2 points	Standby power supply.....	2
	Flow Equalization.....	2
	Primary Treatment	
	Primary clarifiers.....	5
	Combined sedimentation/ digestion.....	5
	Chemical addition (except chlorine, enzymes).....	4
	Secondary Treatment	
	Trickling filter w/sec.	

	clarifiers	10
15 points	Activated sludge w/sec. clarifiers (including ext. aeration and oxidation ditches	15
	Stabilization ponds without aeration	5
	Aerated lagoon	8
	Chemical Stabilization	5
	Advanced Waste Treatment	
	Polishing pond	2
	Chemical/physical - without secondary	15
	Chemical/physical - following secondary	10
12 points	Biological or chemical/ biological	12
	Ion exchange	10
	Reverse osmosis, electrodialysis	15
	Chemical recovery, carbon regeneration	4
	Additional Treatment Processes	
	Dissolved air flotation units	5
4 points	Chemical/physical odor control	4
3 points	Influent/effluent pump stations	3
	Wastewater pump stations	3
	Solids Handling	
5 points	Thickening	5
	Anaerobic digestion	10
	Aerobic digestion	6
	Evaporative sludge drying	2
8 points	Mechanical dewatering	8
	Solids reduction (incineration,	

wet oxidation)..... 12

Disinfection
Chlorination or comparable..... 5
On-site generation of disinfectant..... 5
10 points Ultraviolet disinfection..... 10
Ozonation..... 10

Laboratory Control by Plant Personnel
Bacteriological (complexity)..(0-10 pts. range)
Lab work done outside the plant..... 0
Membrane filter procedures..... 3
5 points Use of fermentation tubes or any dilution methods, fecal coliform determination..... 5
Biological identification..... 7
Virus studies or similarly complex work conducted on-site..... 10

Chemical/physical (complexity)..(0-10 pts. range)
Lab work done outside the plant..... 0
Pushbutton or visual methods for simple tests such as pH, settleable solids -- up to..... 3
Additional procedures such as DO, COD, BOD, gas analysis, titrations, solids volatile content - up to..... 5
7 points More advanced determinations such as specific constituents: nutrients, total oils, phenols, etc. - up to..... 7
Highly sophisticated instrumentation such as atomic absorption and gas chromatography..... 10

[Eff. 11/5/81; am and comp 1/22/2002] (Auth: HRS §§340B-2, 340B-7) (Imp: HRS §§340B-2,340B-7)

APPENDIX H-2
NEIWPCC, WWTP STAFFING ESTIMATE

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Chapter 6
Charts: One Shift Plant

The charts on the following pages apply to publicly and privately owned wastewater treatment facilities where operators are present for only one shift a day, five days a week. To arrive at the numbers on the charts, the daily hour estimates for a task were multiplied by 260 to determine annual hours.

CHART 1 (One Shift)
BASIC AND ADVANCED OPERATIONS AND PROCESSES

	Flow						
Process	**0.25-0.5 mgd**	**0.5-1.0 mgd**	**1.0-5.0 mgd**	**5.0-10.0 mgd**	**10.0-20.0 mgd**	**>20 mgd**	**Total Hours for Plant**
Preliminary Treatment	130	130	260	520	780	1040	520
Primary Clarification (mult. by # of units)	130	130	130	260	260	260	
Activated Sludge	520	1040	1560	1560-2080	2080-2600	6240	
Activated Sludge w/BNR	780	1560	2080	2340-3120	3120-6240	7280	
Rotating Biological Contactor	260	390-780	780-1560	1560	X	X	
Sequencing Batch Reactor (per tank)	260	260	260	260	260	260	
Extended Aeration (w/o primary)	650	1300	2080	X	X	X	
Extended Aeration w/BNR	910	1820	2600	X	X	X	
Pure Oxygen Facility	X	X	X	2080-2600	2600	4680	
Pure Oxygen Facility w/BNR	X	X	X	2600-3900	3900	6240	
Trickling Filter	260	260	520	780	1040	2080	
Oxidation Ditch (w/o primary)	650	1300	2080	X	X	X	
Oxidation Ditch w/BNR	910	1820	2600	X	X	X	3900
Aeration Lagoon	390	390	390	X	X	X	
Stabilization Pond	260	260	260	X	X	X	
Innovative Alternative Technologies	520	780	X	X	X	X	
Nitrification	65	65	130	130	260	520	130
Denitrification	65	65	130	130	260	520	130
Phosphorus Removal (Biological)	65	65	130	130	260	520	
Phosphorus Removal (Chemical/Physical)	65	130	260	520	780	1040	520
Membrane Processes	65	65	130	130	260	260	

continued on page 24

CHART 1 (One Shift) *continued*
BASIC AND ADVANCED OPERATIONS AND PROCESSES

	Flow						
Process	**0.25-0.5 mgd**	**0.5-1.0 mgd**	**1.0-5.0 mgd**	**5.0-10.0 mgd**	**10.0-20.0 mgd**	**>20 mgd**	**Total Hours for Plant**
Cloth Filtration	65	65	130	130	130	130	
Granular Media Filters (Carbon, sand, anthracite, garnet)	130	260	260	390	390	780	
Water Reuse	65	65	130	130	130	130	
Plant Reuse Water	26	26	26	39	65	65	39
Chlorination	130	130	260	260	260	260	
Dechlorination	130	130	260	260	260	260	
Ultraviolet Disinfection	130	130	260	260	260	260	260
Wet Odor Control (mult. by # of systems)	130	130	260	260	260	260	260
Dry Odor Control (mult. by # of systems)	65	65	130	130	130	130	
Septage Handling	130	130	260	260	260	260	260
TOTAL							

- Activated Sludge process includes RAS and WAS pumping.
- Secondary Clarification has been built into basic operations processes.

CHART 2 (One Shift)
MAINTENANCE

	Flow							
Activity	0.25-0.5 mgd	0.5-1.0 mgd	1.0-5.0 mgd	5.0-10.0 mgd	10.0-20.0 mgd	>20 mgd	Multiply by	Total Hours for Plant
Manually Cleaned Screens	65	65	65	65	130	260	# of screens	65
Mechanically Cleaned Screens	65	65	65	260	780	1040	# of screens	
Mechanically Cleaned Screens with grinders/ washer/compactors	65	130	260	520	1040	1300	# of screens	1040
Comminutors/ Macerators	65	65	65	130	195	260	# of units	
Aerated Grit Chambers	26	26	65	130	195	260	# of chambers	
Vortex Grit Removal	26	26	65	130	195	260	# of units	260
Gravity Grit Removal	26	26	39	52	104	130	# of units	
Additional Process Tanks	26	26	26	26	26	26	# of tanks	
Chemical Addition (varying dependent upon degree of treatment)	26	26	26	26-78	78-156	208	# of chemicals added for processes	104
Circular Clarifiers	65	65	130	130	195	260	# of clarifiers	390
Chain and Flight Clarifiers	65	65	130	130	195	260	# of clarifiers	
Traveling Bridge Clarifiers	X	X	X	X	195	260	# of clarifiers	
Squircle Clarifiers	65	65	130	130	195	260	# of clarifiers	
Pumps	100	100	250	500	750	1500	X	500
Rotating Biological Contactor	39	39	65	65	X	X	# of trains	
Trickling Filters	39	39	39	65	104	130	# of TFs	
Sequencing Batch Reactor	39	39	39	65	104	130	# of tanks	
Mechanical Mixers	26	26	26	26	39	52	# of mixers	52
Aeration Blowers	52	52	52	52	78	104	# of blowers	52
Membrane Bioreactor	26	26	26	52	78	104	# of cartridges	

Continued on page 26

CHART 2 (One Shift) *continued*
MAINTENANCE

	Flow							
Activity	**0.25-0.5 mgd**	**0.5-1.0 mgd**	**1.0-5.0 mgd**	**5.0-10.0 mgd**	**10.0-20.0 mgd**	**>20 mgd**	**Multiply by**	**Total Hours for Plant**
Subsurface Disposal System	26	26	26	26	78	104	# of systems	
Groundwater Discharge	26	26	26	26	39	52	X	
Aerobic Digestion	26	26	26	26	39	52	# of digesters	
Anaerobic Digestion	X	52	52	78	156	260	# of digesters	
Gravity Thickening	26	26	26	26	78	104	# of basins	26
Gravity Belt Thickening	39	39	39	65	104	130	# of belts	
Belt Filter Press	39	39	39	65	104	130	# of presses	30
Mechanical Dewatering (Plate Frame and Centrifuges)	39	39	39	65	104	130	# of units	
Dissolved Air Floatation	X	26	26	26	78	104	# of units	
Chlorination (gas)	26	26	26	52	78	104	X	
Chlorination (liq.)	52	52	52	78	117	156	X	
Dechlorination (gas)	26	26	26	52	78	104	X	
Dechlorination (liq.)	52	52	52	78	117	156	X	
Ultraviolet	26	26	26	39	65	78	# of racks	117
Biofilter	130	130	130	130	130	130	# of units	
Activated Carbon	130	130	130	195	195	260	# of units	
Wet Scrubbers	X	X	X	39	65	78	# of units	
Microscreens	26	26	26	39	65	78	# of screens	
Pure Oxygen	X	X	X	52	78	104	# of units	
Final Sand Filters	52	52	52	52	78	156	# of units	
Probes/ Instrumentation/ Calibration	26	26	26	26	26	26	# of probes in-line	156
TOTAL								

CHART 3 (One Shift)
LABORATORY OPERATIONS

	How often are tests run?				
Test Required by Permit	**Testing Time (hrs.)**	**Tested Weekly X 52**	**Tested Monthly X 12**	**Tested Quarterly X 4**	**Annual Hours**
Acidity	0.75				
Alkalinity, total	0.75				
Biochemical Oxygen Demand (BOD)	2.5	2			260
Chemical Oxygen Demand (COD)	2.5				
Chloride	0.5				
Chlorine, Total Residual	0.25				
Coliform, Total, Fecal, E.Coli	1.0				
Dissolved Oxygen (DO)	0.25				
Hydrogen Ion (pH)	0.25	2			26
Metals	3.0				
Toxicity	2.0			2	208
Ammonia	2.0		2		208
Total Nitrogen	2.0		2		208
Oil and Grease	3.0		2		312
Total and Dissolved Phosphorus	2.0		2		208
Solids, Total, Dissolved, and Suspended	3.0	2			312
Specific Conductance	0.25				
Sulfate	1.0				
Surfactants	1.0				
Temperature	0.25	2			26
Total Organic Carbon (TOC)	0.25				
Turbidity	0.25				
Bacteriological Enterococci	1.0				
Lab QA/QC Program	1.0	10			520
Process Control Testing	3.0	1			156
Sampling for Contracted Lab Services	0.25				
Sampling for Monitoring Groundwater Wells	0.5				
TOTAL					

• Sampling time is built into testing time estimates.

CHART 4 (One Shift)
BIOSOLIDS/SLUDGE HANDLING

	Flow					
Process	**0.25-0.5 mgd**	**0.5-1.0 mgd**	**1.0-5.0 mgd**	**5.0-10.0 mgd**	**10.0-20.0 mgd**	**>20 mgd**
Belt Filter Press	260	780	1560	2080	2080	2080/shift
Plate & Frame Press	260	390	780	2080	2080	2080
Gravity Thickening	65	65	130	130	260	260
Gravity Belt Thickening	65	65	130	130	260	520
Rotary Press	65	65	130	130	260	520
Dissolved Air Floatation	X	130	130	260	260	260
Alkaline Stabilization	65	65	65	65	65	65
Aerobic Digestion	130	130	130	260	390	520
Anaerobic Digestion	65	65	130	390	650	1040
Centrifuges	260	260	780	2080	2080	2080
Composting	260	520-780	1040	2080	2080	2080/shift
Incineration	X	X	X	X	6240	6240
Air Drying – Sand Beds	130	130	X	X	X	X
Land Application	65	130	130	X	X	X
Transported Off-site for Disposal	65	260	1040	2080	2080	2080
Static Dewatering	260	260	X	X	X	X
TOTAL						

CHART 5 (One Shift)
YARDWORK

	Size of Plant			
Work Done	**Small**	**Average**	**Large**	**Total Hours for Plant**
Janitorial/Custodial Staff	100	200	400	
Snow Removal	60	120	400	
Mowing	100	120	400	
Vehicle Maintenance (per vehicle)	25	25	25	
Facility Painting	60	80	160	
Rust Removal	60	80	160	
TOTAL				

CHART 6 (One Shift)
AUTOMATION/SCADA

Type of Automation	Yes	No
Automated attendant or interactive voice recognition (IVR) equipment		No
Automated meter reading (AMR), touchpad meters or other automated metering technology		No
Automatic call director (ACD)		No
Billing system		No
Computerized facilities management (FM) system		No
Computerized preventative maintenance	Yes	
Computerized recordkeeping	Yes	
E-mail	Yes	
Geographical information system (GIS)		No
Integrated purchasing and inventory		No
Internet website		No
Laboratory information management system (LIMS)	Yes	
Local area network (LAN)		No
Supervisory control and data acquisition (SCADA)	Yes	
Telemetry		No
Utility customer information system (CIS) package		No

CHART 7 (One Shift)
CONSIDERATIONS FOR ADDITIONAL PLANT STAFFING

• Management responsibilities (i.e., human resources, budgeting, outreach, training, town/ city meetings, scheduling, etc.) and responsibility for clerical duties (i.e., billing, reports, correspondence, phones, time sheets, mailings, etc.)	Yes
• Plant staff responsible for collection system operation and maintenance, pump station inspections, and/or combined sewer overflows	No
• Plant operators responsible for snow plowing, road/sidewalk repair, or other municipal project	No
• Plant staff involved in generating additional energy	No
• Plant receives an extra high septage and/or grease load (higher than designed organic and grease loadings) or plant takes in sludge from other treatment plants	Yes
• Plant is producing a Class A Biosolid product	No
• Plant operators responsible for operating generators and emergency power	Yes
• Plant responsible for industrial pre-treatment program	No
• Plant staff responsible for plant upgrades and large projects done both on-site and off-site (i.e., collection systems, manholes, etc.)	No
• Plant operators responsible for machining parts on-site	Yes
• Age of plant and equipment (over 15 years of age)	No

NEIWPCC

THE NORTHEAST GUIDE FOR ESTIMATING STAFFING AT PUBLICLY AND PRIVATELY OWNED WASTEWATER TREATMENT PLANTS (One Shift)

Plant Name: ASPA Regional Secondary WWTP

Design Flow: 5.5 MGD (MMF) **Actual Flow:**

FINAL ESTIMATES	
Chart #	**Annual Hours**
1 – Basic and Advanced Operations and Processes	6,019
2 – Maintenance	2,892
3 – Laboratory Operations	2,444
4 – Biosolids/Sludge Handling	4,290
5 – Yardwork	505
Estimated Operation and Maintenance Hours	16,150
Estimated Operation and Maintenance Staff	11 full time staff
Estimated Additional Staff from Chart 7	See sheet, WWTP only (Administration and collection system not included)
Total Staffing Estimate	11 full time staff

• Divide the total of Annual Hours by 1500 hours per year to get the Estimated Operation and Maintenance Staff needed to operate the plant. This assumes 5-day work week; 29 days of vacation, sick leave, holidays; and 6.5 hours per day of productive work.

Note: The estimate from Charts 1-5 will not be the final amount of staff necessary to run the facility. Please review Chart 7 for additional staffing needs.

Chart 6 – Automation/SCADA (List all "yes" answers from Chart 6.)

Computerized preventative maintenance
Computerized record keeping
E-mail
Laboratory information management system (LIMS)
Supervisory control and data acquisition (SCADA)

Chart 7 – Considerations for Additional Plant Staffing (List all "yes" answers from Chart 7.)
Attach supporting information to justify additional staffing needs from Chart 7.

WWTP management responsibilities
Plant receives high septage or sludge from other treatment plants (Utulei FM Alt. 1)
Operators responsible for operating emergency power
Operators responsible for machining parts

APPENDIX A
AUTOMATION AND SCADA OPTIONS

Automation and SCADA have had a major impact on the wastewater industry, increasing efficiency and providing for a higher level of safety. They also have had an impact on staffing. A plant with a large amount of automation will need a highly skilled staff and most likely a person directly responsible for maintaining the system. A higher amount of automation may allow a plant to reduce staffing during evening and overnight shifts, with approval from the appropriate regulatory group.

There are many options available to wastewater treatment plants for automation, and a number of them are included in Chart 6 of this guide. An explanation of each item in the chart—and the benefits provided—appears below.

Automated attendant or interactive voice recognition (IVR) equipment – A phone technology that allows a computer to detect voice and touch tones during a normal phone call. An IVR system can respond with pre-recorded or dynamically generated audio to further direct callers on how to proceed. IVR systems can be used to control almost any function where the interface can be broken down into a series of simple menu choices. Once constructed, IVR systems generally scale well to handle large call volumes.

Automated meter reading (AMR), touchpad meters, or other automated metering technology – The technology of automatically collecting data from water or energy metering devices and transferring that data to a central database for analyzing and billing. This virtually eliminates the need for meter readers to visit premises, and allows for billing to be based on actual consumption rather than on estimates based on previous consumption. AMR technologies include handheld, mobile and network technologies based on telephony platforms (wired and wireless), radio frequency (RF), or power-line transmission.

Automatic call director (ACD) – A device or system that distributes incoming calls to a specific group of terminals that agents use. It is often part of a computer telephony integration (CTI) system.

Billing system – A computer program set up to handle bill printing, payment processing, accounting reports, and delinquent payments. The system can provide demand letters, shut-off notices, and mailing label printing.

Computerized facilities management (FM) system – A software package that maintains a computer database of information about a wastewater plant's maintenance operations. This information is intended to help maintenance workers do their jobs more effectively and to help management make informed decisions. For example, it can help workers determine which storerooms contain the spare parts they need, and help managers calculate the cost of maintenance for each piece of equipment used by a plant, possibly leading to better allocation of resources. These packages may be used by any organization that must perform maintenance on equipment and property.

Computerized maintenance management system (CMMS) – A computerized process that incorporates a work order system which allows operators to write work orders without the familiar paper trail. This system eliminates the problem of duplicate work orders, and facilitates accurate cost accounting by allowing for efficient recordkeeping of labor hours, parts, and other inventory items. Preventative maintenance management, such as deciding what equipment needs maintenance and how much the work will cost, is improved by using the computerized work order system.

Computerized preventative maintenance – A computerized process for keeping track of preventative maintenance inspections and jobs, including step-by-step instructions or check lists, lists of materials required, and other pertinent details. Typically, an FM program (see above) schedules preventative maintenance jobs automatically based on schedules or meter readings. Different software packages use different techniques for reporting when a job should be performed.

Computerized recordkeeping – The use of computer software to keep track of all plant records. Plants utilizing computerized recordkeeping must have someone available to do data-entry on a regularly scheduled basis.

E-mail – A method of composing, sending, receiving, and storing messages over electronic communication systems.

Geographical information system (GIS) – A computer program that combines mapping with detailed information about the physical locations of structures such as pipes, valves, and manholes. A GIS helps operators and maintenance personnel locate utility system features or structures, and assists with the scheduling and performance of maintenance activities.

Integrated purchasing and inventory – A software product that offers a complete inventory control and warehouse management system, and is considered very beneficial to asset management. It allows users to view inventory items and assets, and provides the ability to browse purchase orders, list outstanding purchase orders, and generate reports based on purchase orders.

Internet website – A collection of pages on the World Wide Web, accessible through the Internet, that represent the work of an individual, business, or organization. A wastewater treatment plant may have its own website as a convenient means of disseminating information to the public and providing answers to frequently asked questions. A site may be set up by the municipality or by the plant itself, and will require occasional maintenance and updating by a person knowledgeable of web design and programming.

Laboratory information management system (LIMS) – A computer software program used in the laboratory for the management of samples, laboratory users, instruments, standards, and other laboratory functions such as invoicing, plate management, and work flow automation.

Local area network (LAN) – A computer network covering a small geographic area, such as a home, office, or group of buildings. When compared to larger computer networks, the defining characteristics of LANs are their much higher data-transfer rates, smaller geographic range, and lack of a need for leased telecommunication lines.

Supervisory control and data acquisition (SCADA) – A computer-monitored alarm, response, control and data acquisition system used by operators to monitor and adjust wastewater treatment processes and facilities. A SCADA system also provides for remote monitoring of lift stations and other facilities, thereby reducing personnel needs while cost-effectively checking equipment, operations, and site security. Use of remote monitoring allows a plant to deploy personnel where they are most needed and to detect problems before they escalate into major costs.

Telemetry – The process of transmitting measured data by radio to a distant station.

Utility customer information system (CIS) package – A package developed by a municipality or plant to give to citizens that contains information on the plant's treatment processes, contact phone numbers, hours of operation, etc.

APPENDIX B
CONSIDERATIONS FOR ADDITIONAL PLANT STAFFING

Chart 7 of this guide contains a list of considerations not included in Charts 1-6. Detailed descriptions of the entries requiring explanation are given here. While it is difficult to provide numerical estimates of staff hours for the work associated with the entries in the Chart 7 list, the impact on operator workload must be taken into consideration when coming up with the final staffing estimate.

- **Management responsibilities (i.e., human resources, budgeting, outreach, training, town/city meetings, scheduling, etc.) and responsibility for clerical duties (i.e., billing, reports, correspondence, phones, time sheets, mailings, etc.)**

  At many plants, the chief operator also performs a wide range of functions encompassing managerial, operational, and administrative tasks. Budgeting, recordkeeping, general clerical work, and public relations often fall under the chief operator's responsibilities. The amount of time a chief operator spends on this non-hands-on work must be taken into consideration when making staffing decisions, and these additional responsibilities should be reflected in a managerial and clerical diagram, which all plants should develop in conjunction with their major stockholders. Bear in mind there are situations where plant superintendents and chief operators are almost exclusively involved in managerial tasks, and therefore they should not be included in staffing estimates developed by the charts in this guide. There are also situations where plants have the opportunity to add staff specifically to handle clerical duties. In some cases, this can be accomplished by sharing clerical staff with other town departments.

- **Plant staff responsible for collection system operation and maintenance, pump station inspections, and/or combined sewer overflows**

  Operators at many plants visited in the pilot study conducted for this guide are also responsible for maintaining the associated collection system. This is an increase in workload, and depending upon the level of automation the increase can be significant. Many operators are also responsible for the inspection and maintenance of pump stations as well as home and business sewer connections. As with collection system O&M, these additional responsibilities increase an operator's workload, often substantially. The increase is even greater if a city or town has combined sewers and plant operators are responsible for addressing combined sewer overflows (CSOs); during storm events, it may even be necessary to add additional staff to cope with the challenges posed by CSOs.

- **Plant operators responsible for snow plowing, road/sidewalk repair, or other municipal projects**

  During the pilot study, it was observed that at some plants, staff are responsible for municipal tasks entirely unrelated to wastewater treatment. These include operating their community's drinking water plant; plowing snow; assisting with composting and recycling; working at landfills and cemeteries; repairing roads and sidewalks; and doing mark-outs for Dig Safe. All these additional responsibilities put extra demands on operators, and therefore should be factored into staffing decisions.

- **Plant staff involved in generating additional energy**

  For plants using complex methods for co-generation of energy, additional staff are generally needed due to the intricate processes.

- **Plant receives an extra high septage and/or grease load (higher than designed organic and grease loadings) or plant takes in sludge from other treatment plants**

  An evaluation of available plant operator staff and the staffing necessary to meet these needs must be conducted. Plant staff should be present when septage is received and unloaded. The added laboratory work associated with receiving septage for treatment should be included in the staffing and laboratory facilities evaluation.

- **Plant is producing a Class A Biosolid product**

  Biosolids are residual solids resulting from wastewater treatment, which have been carefully treated and tested. They contain organic matter as well as plant nutrients, such as nitrogen and phosphorus, and make a good soil amendment. The quality of biosolids must be carefully managed to minimize the presence of trace toxic materials and disease-causing organisms. Producing a Class A Biosolid product is a complex process, and a plant doing so can expect to see a large increase in operations and maintenance time.

- **Plant operators responsible for operating generators and emergency power**

  These tasks can be outsourced but at plants that operate and test their generators, the impact on staff time needs to be considered.

- **Plant responsible for industrial pre-treatment program**

  In areas that have a large amount of industry discharges, a person at the receiving plant must be responsible for the industrial pre-treatment program. The amount of time this will take is directly related to the amount of industry discharges to the plant.

- **Plant staff responsible for plant upgrades and large projects done both on-site and off-site (i.e., collection systems, manholes, etc.)**

  Many plants have staffs that are responsible for major projects that are done at the facility. Some are also responsible for assisting in town/city projects. Whether these responsibilities will be given to the plant will depend on the municipality's set-up and the knowledge of the wastewater plant staff.

- **Plant operators responsible for machining parts on-site**

  For many larger plants it is more economical to have machinists on-site to machine parts than to purchase parts each time something is needed.

- **Age of plant and equipment**

  When a plant and its equipment are 15 years old or more, maintenance issues will become more prominent and will need to be addressed more often. Consequently, there will be an increase in maintenance labor hours.

Appendix C
Tools to Assist Staff

Having the appropriate number of staff at a wastewater treatment plant is critical, but it is only one factor in ensuring that a plant is run efficiently, effectively, and safely. The staff must also be well managed and well trained, and they should have access to tools that can assist them in their jobs. Two such tools are described below.

Operations and Maintenance (O&M) Manuals

Operation and maintenance manuals provide information and guidance for day-to-day operation of a wastewater treatment plant. It is important to check state regulations for specific O&M manual requirements and approval procedures. However, the New Hampshire Department of Environmental Services' publication, *Code of Administrative Rules* (1999) states that an O&M manual should include, at a minimum, the following:

- Information on process design assumptions
- Unit process information that includes control measures and monitoring procedures for the various processes
- Start-up procedures for each unit operation and piece of equipment
- Maintenance management systems
- Laboratory test procedures
- Safety procedures
- Organizational structure and administrative procedures
- Troubleshooting procedures
- Emergency response and operation plan
- Staffing requirements
- Process and instrumentation diagrams
- Checklists for systems and components for the operator's use in developing a maintenance program for pump stations and wastewater treatment plants

It is important that O&M manuals remain up-to-date and accessible to employees. Changes to an O&M manual should only be done by one authorized person on a set schedule. This prevents the problem of a plant possessing multiple versions of the same document, each with different information and practices.

Many treatment plants are now going to interactive computerized O&M manuals for ease of use and the ability to quickly search through multiple manuals at one time. During the conversion of manuals from their original printed form to digital, computerized versions, plants typically also convert all plant drawings, records, and specifications, thereby making them also accessible in one searchable area.

Standard Operating Procedures (SOPs)

A standard operating procedure is a set of written instructions that document a routine or repetitive activity that is done at a wastewater treatment plant. SOPs are not photocopies of test methods or equipment manuals. Instead they provide very specific directions on how personnel should perform certain tasks. An SOP is a "how-we-do-it" document, which incorporates laboratory set-up, plant layout, equipment and chemicals, and any special conditions that need to be noted.

The development and use of SOPs is an integral part of a successful quality system since they provide staff with the information to perform a job properly and facilitate consistency in the quality and integrity of a product or end-result. They may describe, for example, fundamental programmatic actions and technical actions such as analytical processes, and processes for maintaining, calibrating, and using equipment. SOPs are intended to be specific to each individual wastewater treatment plant, and if properly done, will allow the plant to maintain its quality control and quality assurance processes, and ensure compliance with governmental regulations and permits.

SOPs should be written in a concise, step-by-step, easy-to-read format. If not written correctly, they are of limited value. Of course, even the best written SOPs will fail if they are not followed. Therefore, the use of SOPs needs to be reviewed and reinforced by management. Copies of SOPs need to be readily accessible for reference in the work areas of staff actually performing the activity, either in hard copy or electronic format. And they need to remain current to be useful. Whenever procedures are changed, SOPs should be updated and re-approved. Also SOPs should be systematically reviewed on a periodic basis, e.g., every 1-2 years, to ensure that the policies and procedures remain current and appropriate.

Valid SOPs help minimize variation and promote quality through consistent implementation of a process or procedure within a plant, even when there are personnel changes. SOPs can indicate compliance with organizational and governmental requirements and can be used as a part of a personnel training program, since they provide detailed work instructions. They minimize opportunities for miscommunication and can address safety concerns. When historical data are being evaluated for current use, SOPs can also be valuable for reconstructing project activities when no other references are available. In addition, SOPs are frequently used as checklists by inspectors when auditing procedures. Ultimately, the benefits of a valid SOP are reduced work effort, along with improved comparability, credibility, and legal defensibility.

It should be noted that the term "SOP" may not always be appropriate for any one specific document, and other terms, such as protocols, instructions, worksheets, and laboratory operating procedures, may also be used. Also, please note that the recommendations here for SOPs are very general. Always check state and local regulations for additional SOP requirements that must be met. Also, be aware that a national laboratory accreditation program is being adopted by many states, which may impact the contents of an SOP.

For more specific directions on how to write an SOP, consult the various resources on the subject, such as U.S. EPA's *Guidance for Preparing Standard Operating Procedures (SOPs)* (March, 2001).

APPENDIX D
GLOSSARY OF TERMS

A

Acidity – The capacity of water or wastewater to neutralize bases. Acidity is expressed in milligrams per liter of equivalent calcium carbonate. Acidity is not the same as pH because water does not have to be strongly acidic (low pH) to have a high acidity. Acidity is a measure of how much base must be added to a liquid to raise the pH to 8.2.

Activated carbon – A highly adsorbent form of carbon used to remove dissolved organic matter from water and wastewater or to remove odors and toxic substances from gaseous emissions.

Activated sludge – A biological wastewater treatment process that speeds up the decomposition of wastes in the wastewater being treated. Activated sludge is added to the wastewater and the mixture (mixed liquor) is aerated and agitated. After some time in the aeration tank, the activated sludge is allowed to settle out by sedimentation and is disposed of (wasted) or reused (returned to the aeration tank) as needed. The remaining wastewater then undergoes more treatment.

Activated sludge w/BNR – Biological nutrient removal is the removal of nitrogen and phosphorus by biological reactions instead of chemical processes. Biological nitrogen removal is done in two steps. In the first step ammonia is oxidized to nitrate (nitrification) and various process configurations are then employed to provide the nitrate as an electron acceptor for biological respiration so that it can be reduced to molecular nitrogen (denitrification). The removal of phosphorus by BNR requires the organisms to pass through an anaerobic stage in the absence of both nitrates and dissolved oxygen.

Additional process tanks – Storage tanks for wastewater or septage. An alarm on a tank signals when the tank is full and the contents need to be pumped and properly disposed. Examples of such tanks include equalization tanks, storage tanks, hauling tanks and sludge holding tanks.

Aerated grit chamber – A chamber that offers a mechanical way to remove grit from a wastewater stream by introducing air near the bottom of the chamber creating a toroidal flow pattern. This flow pattern causes the grit to settle to the bottom of the chamber while keeping lighter organic material in suspension to be processed further downstream.

Aeration blower – The process of adding air to wastewater to keep it fresh and to keep solids in suspension is done by blowers, typically rotary positive displacement blowers and multi-stage centrifugal blowers. When dealing with mixtures of wastewater and activated sludge, adding air provides mixing and oxygen for the microorganisms treating the wastewater.

Aeration lagoon – A holding or treatment pond provided with artificial aeration to promote the biological oxidation of wastewater.

Aerobic digestion – The breakdown of wastes by microorganisms in the presence of dissolved oxygen. This digestion process may be used to treat only waste activated sludge, trickling filter sludge and primary (raw) sludge, or waste sludge from activated sludge treatment plants designed without primary settling. The treated sludge is placed in a large aerated tank where aerobic microorganisms decompose the organic matter. This is an extension of the activated sludge process.

Air drying (sand beds) – A partitioned area consisting of sand or other porous material on which sludge is dewatered by drainage and evaporation.

Alkaline stabilization – Adding an alkaline material to waste to create beneficial by-products. The alkaline stabilization process is used to treat biosolids prior to beneficial re-use.

Alkalinity – The capacity of wastewater to neutralize acids. Alkalinity is expressed in milligrams per liter of equivalent calcium carbonate. Alkalinity is not the same as pH because water

does not have to strongly basic (high pH) to have a high alkalinity. Alkalinity is a measure of how much acid must be added to a liquid to lower the pH to 4.5.

Ammonia – A compound of hydrogen and nitrogen that occurs extensively in nature.

Anaerobic digestion – The solids and water in wastewater (about 5 percent solids, 95 percent water) are placed in a large tank where bacteria decompose the solids in the absence of dissolved oxygen. At least two general groups of bacteria act in balance: (1) saprophytic bacteria break down complex solids to volatile acids, the most common of which are acetic and propionic acids; and (2) methane fermenters break down the acids to methane, carbon dioxide, and water.

Automated attendant or interactive voice recognition (IVR) equipment – A phone technology that allows a computer to detect voice and touch tones during a normal phone call. Once constructed, IVR systems generally scale well to handle large call volumes.

Automated meter reading (AMR), touchpad meters, or other automated metering technology – The technology of automatically collecting data from water or energy metering devices and transferring that data to a central database for analyzing and billing.

Automatic call director (ACD) – A device or system that distributes incoming calls to a specific group of terminals that agents use. It is often part of a computer telephony integration (CTI) system.

B

Bacteriological enterococci – Indicator bacteria used to determine the presence of fecal contamination.

Belt filter press – A dewatering device that uses two fabric belts revolving over a series of rollers to squeeze water from the sludge.

Billing system – A computer program set up to handle bill printing, payment processing, accounting reports, and delinquent payments. The system can provide demand letters, shut-off notices, and mailing label printing.

Biochemical oxygen demand (BOD) – The rate at which organisms use the oxygen in water or wastewater while stabilizing decomposable organic matter under aerobic conditions. In decomposition, organic matter serves as food for the bacteria and energy results from its oxidation. BOD measurements are used as a measure of organic strength of wastes in water.

Biofilter – Odorous air is blown through organic media, e.g., wood chips, or inorganic media, e.g., plastics. Odors are eliminated through a natural biological oxidation process.

C

Centrifuge – A mechanical device that uses centrifugal or rotational forces to separate solids from liquids.

Chain and flight clarifier – A sludge collection mechanism used in rectangular sedimentation basins or clarifiers.

Chemical addition – Any water or wastewater treatment process involving the addition of chemicals to obtain a desired result, such as precipitation, coagulation, flocculation, sludge conditioning, or disinfection.

Chemical oxygen demand (COD) – A measure of the oxygen-consuming capacity of organic matter present in wastewater. COD is expressed as the amount of oxygen consumed from a chemical oxidant in mg/l during a specific test. Results are not necessarily related to the biochemical oxygen demand (BOD) because the chemical oxidant may react with substances that bacteria do not stabilize.

Chloride – The chloride ion is formed when the element chlorine picks up one electron to form an anion (negatively-charged ion). It can also refer to a chemical compound in which one or more chlorine atoms are covalently bonded in the molecule.

Chlorination – The application of chlorine to water or wastewater, generally for the purpose of disinfection, but frequently for accomplishing other biological or chemical results.

Chlorination (gas) – Chlorination done by using a gaseous form of chlorine.

Chlorination (liq.) – Chlorination done by adding liquid chlorine.

Chlorine, total residual – The concentration of chlorine present in water after the chlorine demand has been satisfied. The concentration is expressed in terms of the total chlorine residual, which includes both the free and combined or chemically bound chlorine residuals.

Circular clarifier – A circular tank used as a settling tank or sedimentation basin in which wastewater is held for a period of time during which the heavier solids settle to the bottom and the lighter materials float to the water surface.

Clarifier – A quiescent tank used to remove suspended solids by gravity settling.

Cloth filtration – An alternative to conventional granular media filtration technologies. Wastewater enters the tank or basin, completely submerging the cloth media. By gravity, liquid passes through the cloth media. Heavier solids are allowed to settle to the bottom portion of the filter tank. These solids are then pumped on an intermittent basis back to the headworks, digester, or other solids collection area of the treatment plant.

Coliform, total, fecal, E.Coli – One type of bacteria. The presence of coliform-group bacteria is an indication of possible pathogenic bacterial contamination. The human intestinal tract is one of the main habitats of coliform bacteria. They may also be found in the intestinal tracts of warm-blooded animals, and in plants, soil, air, and the aquatic environment. Fecal coliforms are those coliforms found in feces of various warm-blooded animals, whereas the term "coliform" also includes other environmental sources.

Comminutor – A device used to reduce the size of the solid chunks in wastewater by shredding (comminuting). The shredding action can be likened to many pairs of scissors cutting or chopping to shreds all the large solids materials in wastewater.

Composting – Stabilization process relying on the aerobic decomposition of organic matter in sludge by bacteria and fungi.

Computerized facilities management (FM) system – A software package that maintains a computer database of information about a wastewater plant's maintenance operations.

Computerized preventative maintenance – A computerized process for keeping track of preventative maintenance inspections and jobs, including step-by-step instructions or check lists, lists of materials required, and other pertinent details.

Computerized recordkeeping – The use of computer software to keep track of all plant records. Plants utilizing computerized recordkeeping must have someone available to do data-entry on a regularly scheduled basis.

D

Dechlorination – The removal of chlorine from the effluent of a treatment plant. Chlorine needs to be removed because it is toxic to fish and other aquatic life.

Dechlorination (gas) – Dechlorination done by gas.

Dechlorination (liq.) – Dechlorination done by liquid.

Denitrification – (1) The anoxic biological reduction of nitrate nitrogen to nitrogen gas. (2) The removal of some nitrogen from a system. (3) An anoxic process that occurs when nitrite or nitrate ions are reduced to nitrogen gas and nitrogen bubbles are formed as a result of this process. The bubbles attach to the biological floc in the activated sludge process and float the floc to the surface of the secondary clarifiers. This condition is often the cause of rising sludge observed in secondary clarifiers and gravity thickeners.

Dissolved air floatation – The clarification of flocculated material by contact with minute bubbles causing the air/floc mass to be buoyed to the surface, leaving behind a clarified water.

Dissolved oxygen (DO) – Molecular atmospheric oxygen dissolved in water or wastewater.

E

E-mail – A method of composing, sending, receiving, and storing messages over electronic communication systems.

Extended aeration (w/o primary) – A variation of the activated sludge process with an increased detention time to allow endogenous respiration to occur.

Extended aeration w/BNR – Biological nutrient removal is the removal of nitrogen and phosphorus by biological reactions instead of chemical processes. Biological nitrogen removal is done in two steps. In the first step, ammonia is oxidized to nitrate (nitrification) and various process configurations are then employed to provide the nitrate as an electron acceptor for biological respiration so that it can be reduced to molecular nitrogen (denitrification). The removal of phosphorus by BNR requires the organisms to pass through an anaerobic stage in the absence of both nitrates and dissolved oxygen.

F

Facility painting – The physical act of painting a wastewater treatment plant. This can be done for walls, railings, floors, etc. Painting gives the plant a more hygienic feel.

Final sand filter – Rectangular or cylindrical in cross section, typically 1 to 2 meters deep of sand, and used in treating wastewater to produce a potable product. Sand filters use biological processes to clean the water, and are nonpressurized systems. In the base of each bed is a series of herringbone drains that are covered with a layer of pebbles which in turn is covered with coarse gravel. Further layers of sand are placed on top followed by a thick layer of fine sand. The whole depth of filter material may be more than 1 meter in depth, the majority of which will be fine sand material. On top of the sand bed sits a supernatant layer of raw, unfiltered water.

G

Geographical information system (GIS) – A computer program that combines mapping with detailed information about the physical locations of structures such as pipes, valves, and manholes.

Granular media filter (carbon, sand, anthracite, garnet) – A tank or vessel filled with sand or other granular media to remove suspended solids and colloids from water or wastewater that flows through it.

Gravity belt thickening – A sludge dewatering device that uses a porous filter belt to promote gravity drainage of water.

Gravity grit removal – A preliminary wastewater treatment process to remove sand, gravel, cinders, and other heavy solid matter that have settling velocities substantially higher than those of organic putrescible solids in wastewater by sedimentation.

Gravity thickening – A process that uses a sedimentation basin designed to operate at high solids rates, usually with vertical pickets mounted to the revolving sludge scrapers to assist in releasing entrained water.

Groundwater discharge – The discharge of wastewater into the ground, as opposed to a surface waterway. It usually requires a state permit depending on flow and state.

H

Hydrogen ion (pH) – The weight of hydrogen ions in moles per liter of solution.

I

Incineration – The conversion of dewatered wastewater solids by combustion (burning) to ash, carbon dioxide, and water vapor.

Innovative alternative technologies – Onsite treatment systems that are not based on a conventional septic tank and leach field design. Alternative systems are used to accommodate a variety of site conditions (e.g., high ground water, soil with low permeability) or to provide additional treatment.

Integrated purchasing and inventory – A software product that offers a complete inventory control and warehouse management system, and is considered very beneficial to asset management.

Internet website – A collection of pages on the World Wide Web, accessible through the Internet, that represent the work of an individual, business, or organization. A wastewater treatment plant

may have its own website as a convenient means of disseminating information to the public and providing answers to frequently asked questions. A site may be set up by the municipality or by the plant itself, and will require occasional maintenance and updating by a person knowledgeable of web design and programming.

J

Janitorial/custodial staff – Individuals responsible for maintaining the building, removing trash, sweeping, mopping, and general upkeep of the building.

L

Lab Quality Assurance/Quality Control (QA/QC) – Refers to the protocol that ensures all lab measurements are accurate and reproducible, and that all tests have been run according to proper procedures. Every lab should have a detailed, documented QA/QC program in place. Without one, there is no documentation to prove that the data gathered are usable.

Laboratory information management system (LIMS) – A computer software program used in the laboratory for the management of samples, laboratory users, instruments, standards, and other laboratory functions such as invoicing, plate management, and work flow automation.

Land application – The disposal of wastewater or municipal solids onto land under controlled conditions.

Local area network (LAN) – A computer network covering a small geographic area, such as a home, office, or group of buildings. When compared to larger computer networks, the defining characteristics of LANs are their much higher data-transfer rates, smaller geographic range, and lack of a need for leased telecommunication lines.

M

Macerators – A device used to reduce the size of solid chunks in wastewater by chopping or tearing. The tearing action can be likened to many pairs of scissors cutting or chopping to shreds all the large solids materials in wastewater.

Manually cleaned screens – A treatment process using a device with uniform openings to retain coarse solids. Maintenance is done by hand and rake.

Mechanical dewatering – see definitions at "Plate and frame press" and "Centrifuges."

Mechanical mixers – The use of machinery to mix air and water so oxygen can be absorbed into the water.

Mechanically cleaned screens – A treatment process using a device with uniform openings to retain coarse solids combined with a device that cleans the rack and distributes waste in a specified area.

Mechanically cleaned screens with grinders/washer/compactor – A treatment process using a device with uniform openings to retain coarse solids combined with a device that grinds and compacts solids and then cleans the bars by washing them down.

Membrane bioreactor – A surface filtration process that has the ability to produce product water with virtually no suspended solids and can remove microorganisms including viruses. The two main types of MBRs are hollow fiber and flat plate.

Membrane processes – Systems that utilize membranes to remove pollutants from wastewater.

Metals – In general, those elements that easily lose electrons to form positive ions.

Microscreen – A device with a fabric-straining media with openings between 20 and 60 microns. The fabric is wrapped around the outside of a rotating drum. Wastewater enters the open end of the drum and flows out through the rotating screen cloth. At the highest point of the drum, the collected solids are backwashed by high-pressure water jets into a trough located within the drum.

Mowing – Encompasses the cutting of grass and routine yardwork at a wastewater treatment plant, which is typically performed by plant staff.

N

Nitrification – An aerobic process in which bacteria change the ammonia and organic nitrogen

in wastewater into oxidized nitrogen (usually nitrate).

O

Odor control – Systems or chemicals used to reduce the odor dispersed to the areas surrounding a wastewater treatment plant.

Oil and grease – Common term used to include fats, oils, waxes, and related constituents found in wastewater.

Oxidation ditch (w/o primary) – An extended aeration waste treatment process that occurs in an oval-shaped channel or ditch (also called a "race-track"), with aeration provided by a mechanical brush aerator.

Oxidation ditch w/BNR – Biological nutrient removal is the removal of nitrogen and phosphorus by biological reactions instead of chemical processes. Biological nitrogen removal is done in two steps. In the first step, ammonia is oxidized to nitrate (nitrification) and various process configurations are then employed to provide the nitrate as an electron acceptor for biological respiration so that it can be reduced to molecular nitrogen (denitrification). The removal of phosphorus by BNR requires the organisms to pass through an anaerobic stage in the absence of both nitrates and dissolved oxygen.

P

Phosphorus removal (Chemical/Physical) – The removal of phosphorus using treatment processes that are nonbiological in nature.

Phosphorus removal (Biological) – The removal of phosphorus by BNR requires the organisms to pass through an anaerobic stage in the absence of both nitrates and dissolved oxygen.

Plant reuse water – Using treated effluent for toilet flushing, cooling tanks, irrigation, and nonpotable purposes at a treatment plant.

Plate and frame press – A batch process dewatering device in which sludge is pumped through a series of parallel plates fitted with filter cloth.

Preliminary treatment – The removal of metal, rocks, rags, sand, egg shells, and similar materials that may hinder the operation of a treatment plant. Preliminary treatment is accomplished by using equipment such as racks, bar screens, comminutors, and grit removal systems.

Primary clarification – A sedimentation basin that precedes secondary wastewater treatment.

Primary treatment unit – A wastewater treatment process that takes place in a rectangular or circular tank and allows those substances in wastewater that readily settle or float to be separated from the water being treated.

Probes, instrumentation, calibration – The process of establishing the relationship between a measuring device and the units of measure. This is done by comparing a device or the output of an instrument to a standard with known measurement characteristics.

Process control testing – Wastewater treatment plants are unstable systems that require monitoring and adjustments. By sampling wastewater at various points during treatment and running basic lab tests, it can be verified quickly that the correct treatment steps are being made.

Pump estimates – Estimated time required to maintain all pumps at a plant for a year.

Pure oxygen facility – Variation of the activated sludge process using pure molecular oxygen for microbial respiration rather than atmospheric oxygen.

Pure oxygen facility w/BNR – Biological nutrient removal is the removal of nitrogen and phosphorus by biological reactions instead of chemical processes. Biological nitrogen removal is done in two steps. In the first step ammonia is oxidized to nitrate (nitrification) and various process configurations are then employed to provide the nitrate as an electron acceptor for biological respiration so that it can be reduced to molecular nitrogen (denitrification). The removal of phosphorus by BNR requires the organisms to pass through an anaerobic stage in the absence of both nitrates and dissolved oxygen.

R

Rotary press – Sludge is fed into a rectangular channel, and rotated between two parallel

revolving stainless steel chrome plated screens. The filtrate passes through the screens as the flocculated sludge advances within the channel. The sludge continues to dewater as it travels around the channel, eventually forming a cake near the outlet side of the press. The frictional force of the slow-moving screens, coupled with the controlled outlet restriction, results in the extrusion of a very dry cake.

Rotating biological contactor (RBC) – A secondary biological treatment process for domestic and biodegradable industrial wastes. Biological contactors have a rotating "shaft" surrounded by plastic discs called the "media." The shaft and media are called the "drum." A biological slime grows on the media when conditions are suitable and the microorganisms that make up the slime (biomass) stabilize the waste products by using the organic material for growth and reproduction.

Rust removal – The removal of rust from tanks, walls, etc. (typically a responsibility of plant staff).

S

Sampling for contracted lab services – At plants where lab work is done by a contracted agency, operators are required to collect samples for testing.

Septage handling – The process whereby a wastewater treatment plants takes in septage from outside sources, i.e., septic tanks, campgrounds, other wastewater plants, etc.

Sequencing batch reactor – A variation of the activated sludge process where all the treatment steps and processes are combined into a single basin or tank. The operation of an SBR is based on a fill-and-draw principle, which consists of five steps —fill, react, settle, decant, and idle. These steps can be altered for different operational applications.

Snow removal – The removal of snow at a wastewater treatment plant (typically a responsibility of plant staff).

Solids: total, dissolved, and suspended – Total solids are the sum of dissolved solids and suspended solids in a water or wastewater (matter remaining as residue on evaporation at 103 to 105 degrees Celsius) sample. Total suspended solids are the measure of the amount of suspended solids found in a sample of wastewater effluent. After filtering a sample of a known volume, the filter is dried and weighed to determine the residue retained. Total dissolved solids are the sum of all volatile and nonvolatile solids dissolved in a water or wastewater.

Specific conductance – Rapid method of estimating the dissolved solid content of a water supply by testing its capacity to carry an electrical current.

Squircle clarifiers – Square clarifiers with a circular tank inside.

Stabilization pond – A lagoon that is sufficiently deep (i.e., 5 to 6 feet) where organic solids settle to the bottom as sludge and decay anaerobically; a liquid layer forms above the sludge where facultative and aerobic bacteria oxidize the incoming organics and products of anaerobic sludge decomposition.

Static dewatering – Simple process where a polymer is added to the sludge and pumped into a container (typically made of steel). The polymer helps to separate the liquid from the solids. The solids are held in the container by a filter screen while the free water drains out of the container by gravity. Once the container is full, a truck can haul the sludge cake away.

Subsurface disposal system – A subsurface land area with relatively permeable soil designed to receive pretreated wastewater from a septic tank or intermediate treatment unit, e.g., sand filter. The soil further treats the wastewater by filtration, sorption, and microbiological degradation before the water is discharged to groundwater. A typical soil absorption system consists of perforated piping and gravel in a field or trench, although gravel-less systems can also be used. Soil absorption systems are normally placed at relatively shallow depths, i.e., less than two feet. Excellent TSS, BOD, phosphorus, and pathogen removal is provided in the unsaturated soil that surrounds the infiltrative surfaces. Subsurface disposal systems are also known as soil absorption systems (SAS).

Sulfate – The sulfate ion is a polyatomic anion that consists of a central sulfur atom surrounded by four equivalent oxygen atoms in a tetrahedral arrangement.

Supervisory control and data acquisition (SCADA) – A computer-monitored alarm, response, control and data acquisition system used by operators to monitor and adjust a wastewater treatment plant's processes and facilities.

Surfactant – The active agent in detergents that possesses a high cleaning ability.

T

Telemetry – The process of transmitting measured data by radio to a distant station.

Temperature – A measure of the kinetic energy of a sample of matter. In this case, the matter is wastewater, and the temperature is measured in degrees Fahrenheit and degrees Celsius.

Total and dissolved phosphorus – The total phosphorous content of all material that will pass through a filter, which is determined as orthophosphate without prior digestion or hydrolysis.

Total nitrogen – The combination of organically bound nitrogen and ammonia in wastewater.

Total organic carbon (TOC) – The amount of carbon bound in an organic compound and often used as a non-specific indicator of water quality.

Toxicity – The relative degree of being toxic or poisonous. When present in wastes, toxicity will inhibit or destroy the growth or function of certain organisms.

Transported off-site for disposal – At wastewater treatment plants that do not handle sludge onsite, plant staff are responsible for transporting it to a disposal area.

Traveling bridge clarifier – A traveling bridge sludge collector is a machine mobilized by a high-torque, slow-speed drive system that is used mainly in rectangular basins.

Trickling filter – A treatment process in which wastewater trickles over media (rocks or other durable material) that provide the opportunity for the formation of slimes or biomass which contain organisms that feed upon and remove wastes from the water being treated.

Turbidity – A measure of the cloudiness of water.

U

Ultraviolet disinfection – In this process, high intensity lamps that emit ultraviolet light are submerged in wastewater or the lamps may surround tubes that carry wastewater. Disinfection occurs when the ultraviolet light damages the genetic material of the bacterial or viral cell walls so that replication can no longer occur. Care must be taken to keep the surface of the lamps clean because surface deposits can shield the bacteria from the radiation, thus reducing the performance of the system.

Utility customer information system (CIS) package – A package developed by a municipality or plant to give to citizens that contains information on the plant's treatment processes, contact phone numbers, hours of operation, etc.

V

Vehicle maintenance – The maintenance of vehicles at a wastewater treatment plant, i.e., washing, tire rotation, oil and grease, minor repairs, etc.

Vortex grit removal – A grit removal system that relies on a mechanically induced vortex to capture grit solids in the center hopper of a circular tank.

W

Water reuse – The restoration of wastewater to a state that will allow its beneficial reuse for some agricultural, industrial or municipal applications. This reuse occurs outside of the treatment plant.

Wet scrubbers – An air pollution control device used to remove particulates and fumes from air by entraining the pollutants in a water spray.

REFERENCES

A literature review was conducted to obtain information on wastewater treatment plant staffing and operation and maintenance of wastewater treatment plants. Wherever practical, information was taken directly from the literature compiled under the review. Reference information is provided to allow users of this guidance document to obtain the source documentation in order to find additional and more detailed information.

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APPENDIX I
FINANCIAL MODEL

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American Samoa Power Authority

Ground Water Protection Rate Analysis - Secondary Treatment
Scenario 1: Master Plan; Oxidization Ditch; 100% Grant

1.50% $ 35.67
County AMHI $ 28,539

								$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ (83,211)	$ 25,329	$ 142,895	$ 270,046	$ 407,372	$ 555,496
	Actuals			Actuals (est)	Historic	Future	Budget	Projected									
	2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Number of Connections	Estimated					**0.0%**											
Total Accounts	10,288	10,288	10,315	10,396		-	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315
Rate Per Account Type								**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**
Average Charge per Account per Month	$ 35.50	$ 35.86	$ 35.95	$ 35.03			$ 37.69	$ 39.52	$ 41.43	$ 43.45	$ 45.56	$ 47.78	$ 50.11	$ 52.56	$ 55.13	$ 57.83	$ 60.66
Operating Revenue																	
Rate Revenue	$ 4,325,754	$ 4,376,651	$ 4,307,345	$ 4,314,680	115.8%	-	$ 4,520,422	$ 4,746,443	$ 4,983,765	$ 5,232,954	$ 5,494,601	$ 5,769,331	$ 6,057,798	$ 6,360,688	$ 6,678,722	$ 7,012,658	$ 7,363,291
Miscellaneous Revenue	57,269	51,000	143,103	55,000		0.00%	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000
Total Operating Revenue	$ 4,383,023	$ 4,427,651	$ 4,450,448	$ 4,369,680			$ 4,665,422	$ 4,891,443	$ 5,128,765	$ 5,377,954	$ 5,639,601	$ 5,914,331	$ 6,202,798	$ 6,505,688	$ 6,823,722	$ 7,157,658	$ 7,508,291
Operating Costs		Budget		Budget													
Personnel Services (5100)	$ 1,092,057	$ 1,995,500	$ 2,037,795	$ 2,129,000	24.9%	3.00%	$ 2,204,000	$ 2,270,120	$ 2,338,224	$ 2,408,370	$ 2,480,621	$ 2,555,040	$ 2,631,691	$ 2,710,642	$ 2,791,961	$ 2,875,720	$ 2,961,992
Material & Supplies (5200)	783,993	511,500	250,576	541,000	-11.6%	3.00%	1,551,000	541,000	557,230	573,947	591,165	608,900	627,167	645,982	665,362	685,323	705,882
Contractual Services (5300) *minus Capital*	123,680	123,680	123,680	123,680	0.0%	3.00%	221,290	227,929	234,767	241,810	249,064	256,536	264,232	272,159	280,324	288,733	297,395
Travel (5400)	4,048	46,000	7,836	15,500	56.4%	3.00%	19,000	19,570	20,157	20,762	21,385	22,026	22,687	23,368	24,069	24,791	25,534
All Others (5500)	1,139,242	829,500	1,379,177	1,382,500	6.7%	3.00%	1,513,500	1,558,905	1,605,672	1,653,842	1,703,458	1,754,561	1,807,198	1,861,414	1,917,257	1,974,774	2,034,017
Equipment (5600)	132,966	379,500	285,337	609,500	66.1%	3.00%	690,500	711,215	732,551	754,528	777,164	800,479	824,493	849,228	874,705	900,946	927,974
New O&M for Oxidization Ditch					3,756,998	3.00%	-	-	-	-	-	-	4,486,052	4,620,634	4,759,253	4,902,030	5,049,091
						3.00%	-	-	-	-	-	-	-	-	-	-	-
						3.00%	-	-	-	-	-	-	-	-	-	-	-
						3.00%	-	-	-	-	-	-	-	-	-	-	-
						3.00%	-	-	-	-	-	-	-	-	-	-	-
Depreciation		2,381,679	2,690,636	2,690,636		3.00%	2,690,636	2,771,355	2,854,496	2,940,131	3,028,335	3,119,185	3,212,760	3,309,143	3,408,417	3,510,670	3,615,990
						3.00%											
Remove Depreciation Expense	-	(2,381,679)	(2,690,636)	(2,690,636)		3.00%	(2,690,636)	(2,771,355)	(2,854,496)	(2,940,131)	(3,028,335)	(3,119,185)	(3,212,760)	(3,309,143)	(3,408,417)	(3,510,670)	(3,615,990)
Total Operating Costs	$ 3,275,986	$ 3,885,680	$ 4,084,401	$ 4,801,180			$ 6,199,290	$ 5,328,739	$ 5,488,601	$ 5,653,259	$ 5,822,857	$ 5,997,542	$ 10,663,521	$ 10,983,426	$ 11,312,929	$ 11,652,317	$ 12,001,887
Net Operating Income	$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ (83,211)	$ (4,460,723)	$ (4,477,739)	$ (4,489,207)	$ (4,494,659)	$ (4,493,595)
Non-Operating																	
Grant for O&M for New Oxidization Ditch								-	-	-	-	-	$ 4,486,052	$ 4,620,634	$ 4,759,253	$ 4,902,030	$ 5,049,091
Total Non-Operating Revenuse (Expenses)	$ -	$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ 4,486,052	$ 4,620,634	$ 4,759,253	$ 4,902,030	$ 5,049,091
Net Revenue Before Debt Service	$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ (83,211)	$ 25,329	$ 142,895	$ 270,046	$ 407,372	$ 555,496
Debt Service Coverage Ratio																	
Debt Service																	
Total Debt Service	$ -	$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net After Debt Service	$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ (83,211)	$ 25,329	$ 142,895	$ 270,046	$ 407,372	$ 555,496
Other Sources																	
Bonds Proceeds																	
Grant Revenue - Master Plan	3,021,793	6,927,412	3,763,313	8,822,356			8,224,905	6,866,600	6,866,600	6,866,600	6,866,600	6,866,600	2,883,128	2,883,128	2,883,128	2,883,128	2,883,128
Grant Revenue - Secondary Treatment								68,226,800	68,226,800	68,226,800	68,226,800	68,226,800	-	-	-	-	-
									-	-	-	-	-	-	-	-	-
									-	-	-	-	-	-	-	-	-
										-	-	-	-	-	-	-	-
Total Other Sources	$ 3,021,793	$ 6,927,412	$ 3,763,313	$ 8,822,356	$ -	$ -	$ 8,224,905	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128

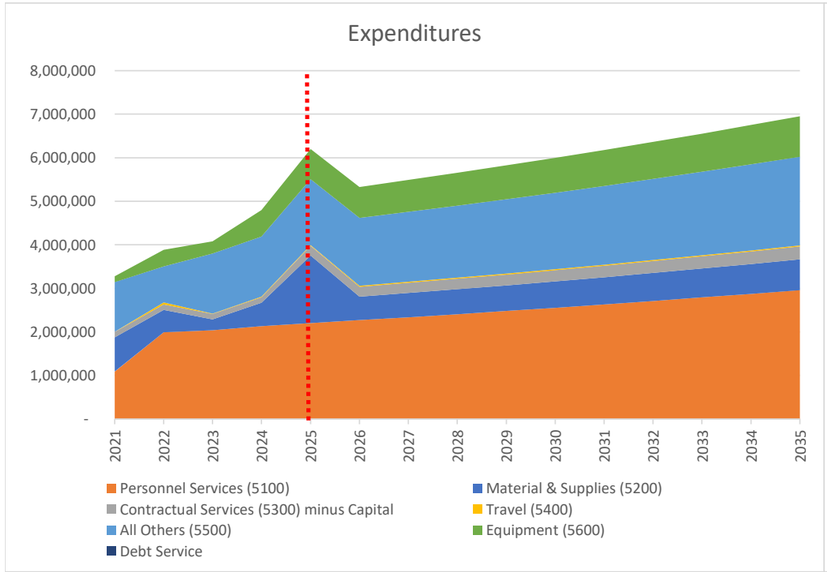
		Actuals			Actuals (est)	Historic	Future	Budget	Projected									
		2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Capital Projects									5	5	5	5	5	10	10	10	10	10
Grant Funded Projects		$ 3,021,793	$ 6,927,412	$ 3,928,820	$ 8,822,356	2025	$ 6,283,710	$ 6,283,710	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
I/I Study	G.1					5	805,000	-	161,000	161,000	161,000	161,000	161,000	-	-	-	-	-
GIS & Asset Management	G.2					5	21,000	-	4,200	4,200	4,200	4,200	4,200	-	-	-	-	-
CCTV Inspections	G.3					5	1,332,000	-	266,400	266,400	266,400	266,400	266,400	-	-	-	-	-
Wastewater Construction Standards Update	G.4					5	121,000	-	24,200	24,200	24,200	24,200	24,200	-	-	-	-	-
Install Influent WWTP Flow Meter	TWT.1					10	182,000	-	-	-	-	-	-	36,400	36,400	36,400	36,400	36,400
Corrosion Protection for Headworks	TWT.2					10	56,140	-	-	-	-	-	-	11,228	11,228	11,228	11,228	11,228
Miscellaneous Electrical Improvements of Screens	TWT.3					5	610,000	-	122,000	122,000	122,000	122,000	122,000	-	-	-	-	-
Install FRP grating Over the Grit Channels	TWT.4					15	43,360		-	-	-	-	-	-	-	-	-	-
Provide Spare Pump and Parts for Influent Pump Sta	TWT.5					15	103,000		-	-	-	-	-	-	-	-	-	-
Upsize Influent Pumps	TWT.6					15	345,000		-	-	-	-	-	-	-	-	-	-
Install a Parallel Headworks Train	TWT.7					15	2,062,000		-	-	-	-	-	-	-	-	-	-
Install a New Bypass Pipe	TWT.8					10	132,000		-	-	-	-	-	26,400	26,400	26,400	26,400	26,400
Replace Piping in Scum Pits	TWT.9					10	84,000		-	-	-	-	-	16,800	16,800	16,800	16,800	16,800
Replace Drive for Clarigester #2 and #3	TWT.10					5	1,433,000		286,600	286,600	286,600	286,600	286,600	-	-	-	-	-
Replace Grating of the Walkway and Railing of the Cl	TWT.11					5	693,000		138,600	138,600	138,600	138,600	138,600	-	-	-	-	-
Record Hourly Flow	TWT.12					5	-		-	-	-	-	-	-	-	-	-	-
Recoat Exposed Piping	TWT.13					10	106,000		-	-	-	-	-	21,200	21,200	21,200	21,200	21,200
Recalibrate UVT meter	TWT.14					10	40,000		-	-	-	-	-	8,000	8,000	8,000	8,000	8,000
New UV Shed for Corrosion Protection	TWT.15					5	654,000		130,800	130,800	130,800	130,800	130,800	-	-	-	-	-
Miscellaneous Channel Improvements	TWT.16					10	70,000		-	-	-	-	-	14,000	14,000	14,000	14,000	14,000
Provide Backup Power to the AC unit in the UV Contr	TWT.17					5	225,000		45,000	45,000	45,000	45,000	45,000	-	-	-	-	-
Backup Disinfection Design Study	TWT.18					5	212,000		42,400	42,400	42,400	42,400	42,400	-	-	-	-	-
Outfall Modification Study	TWT.19					10	202,000		-	-	-	-	-	40,400	40,400	40,400	40,400	40,400
Dewatering Infrastructure Improvements	TWT.20					10	289,000		-	-	-	-	-	57,800	57,800	57,800	57,800	57,800
Install New SCADA System	TWT.21					5	700,000		140,000	140,000	140,000	140,000	140,000	-	-	-	-	-
Install Refrigerated Composite Samplers	TWT.22					15	101,000		-	-	-	-	-	-	-	-	-	-
Coordinate Permit Conditions with EPA	TWT.23					5	101,000		20,200	20,200	20,200	20,200	20,200	-	-	-	-	-
Install Filter for Incoming Power	TWT.24					20	397,000		-	-	-	-	-	-	-	-	-	-
Investigate Sampling and Testing Practices	TWT.25					10	101,000		-	-	-	-	-	20,200	20,200	20,200	20,200	20,200
Raise the Grade of the Plant Drain Lift Station	TWT.26					10	9,100		-	-	-	-	-	1,820	1,820	1,820	1,820	1,820
Wastewater Operations Building Upgrades and Remo	TWT.27					10	101,000		-	-	-	-	-	20,200	20,200	20,200	20,200	20,200
Generator Upgrades	TWT.28					5	591,000		118,200	118,200	118,200	118,200	118,200	-	-	-	-	-
Install Redundant Utility Water Pump	TWT.29					20	109,000	-	-	-	-	-	-	-	-	-	-	-
New Headworks Building with Screen and Grit Remo	UWT.1					20	15,498,000	-	-	-	-	-	-	-	-	-	-	-
Install Automatic Wet Basket Screen	UWT.2					20	166,000	-	-	-	-	-	-	-	-	-	-	-
Install Influent Flow Meter	UWT.3					10	152,000	-	-	-	-	-	-	30,400	30,400	30,400	30,400	30,400
Corrosion Protection for Headworks	UWT.4					10	46,400	-	-	-	-	-	-	9,280	9,280	9,280	9,280	9,280
Provide Spare Pump and Parts for Influent Pump Sta	UWT.5					15	103,000	-	-	-	-	-	-	-	-	-	-	-
Replace Piping in Scum Pits	UWT.6					10	132,000	-	-	-	-	-	-	26,400	26,400	26,400	26,400	26,400
Replace Drive for Clarigester #2 and #3	UWT.7					5	1,433,000	-	286,600	286,600	286,600	286,600	286,600	-	-	-	-	-
Replace Walkway and Railing of the Clarigester	UWT.8					5	703,000	-	140,600	140,600	140,600	140,600	140,600	-	-	-	-	-
Fix Cracks in the Clarigester	UWT.9					5	51,000	-	10,200	10,200	10,200	10,200	10,200	-	-	-	-	-
Record Hourly Flow	UWT.10					5	-	-	-	-	-	-	-	-	-	-	-	-
Recoat Exposed Piping	UWT.11					10	64,000	-	-	-	-	-	-	12,800	12,800	12,800	12,800	12,800
Recalibrate UVT meter	UWT.12					10	18,000	-	-	-	-	-	-	3,600	3,600	3,600	3,600	3,600
New UV Shed for Corrosion Protection	UWT.13					10	486,000	-	-	-	-	-	-	97,200	97,200	97,200	97,200	97,200
Miscellaneous Channel Improvements	UWT.14					10	81,000	-	-	-	-	-	-	16,200	16,200	16,200	16,200	16,200
Backup Disinfection Design Study	UWT.15					5	212,000	-	42,400	42,400	42,400	42,400	42,400	-	-	-	-	-
Provide Backup Power to the AC unit in the UV Contr	UWT.16					5	225,000	-	45,000	45,000	45,000	45,000	45,000	-	-	-	-	-
Outfall Modification Study	UWT.17					5	202,000	-	40,400	40,400	40,400	40,400	40,400	-	-	-	-	-
Install New SCADA System	UWT.18					5	700,000	-	140,000	140,000	140,000	140,000	140,000	-	-	-	-	-
Install Refrigerated Composite Samplers	UWT.19					20	101,000	-	-	-	-	-	-	-	-	-	-	-
Coordinate Permit Conditions with EPA	UWT.20					5	101,000	-	20,200	20,200	20,200	20,200	20,200	-	-	-	-	-
Install Filter for Incoming Power	UWT.21					20	397,000	-	-	-	-	-	-	-	-	-	-	-
Investigate Sampling and Testing Practices	UWT.22					10	81,000	-	-	-	-	-	-	16,200	16,200	16,200	16,200	16,200
Replace Pumps in Utility Water System	UWT.23					10	234,000	-	-	-	-	-	-	46,800	46,800	46,800	46,800	46,800
Wastewater Operations Building Upgrades and Remo	UWT.24					20	101,000	-	-	-	-	-	-	-	-	-	-	-
Generator Upgrades	UWT.25					5	754,000	-	150,800	150,800	150,800	150,800	150,800	-	-	-	-	-
Aunu'u Wastewater System Treatment and Design S	OWT.1					5	500,000	-	100,000	100,000	100,000	100,000	100,000	-	-	-	-	-
Manua Islands Septic Tank Installation	OWT.2					5	1,250,000	-	250,000	250,000	250,000	250,000	250,000	-	-	-	-	-
Tutuila On-Site Septic System Upgrade	OWT.3					10	2,500,000	-	-	-	-	-	-	500,000	500,000	500,000	500,000	500,000
Coconut Point Condition Assessment & Rehabilitatio	TCS.1					5	392,000	-	78,400	78,400	78,400	78,400	78,400	-	-	-	-	-
Papa Stream LS Condition Assessment & Rehabilitati	TCS.2					5	190,000	-	38,000	38,000	38,000	38,000	38,000	-	-	-	-	-

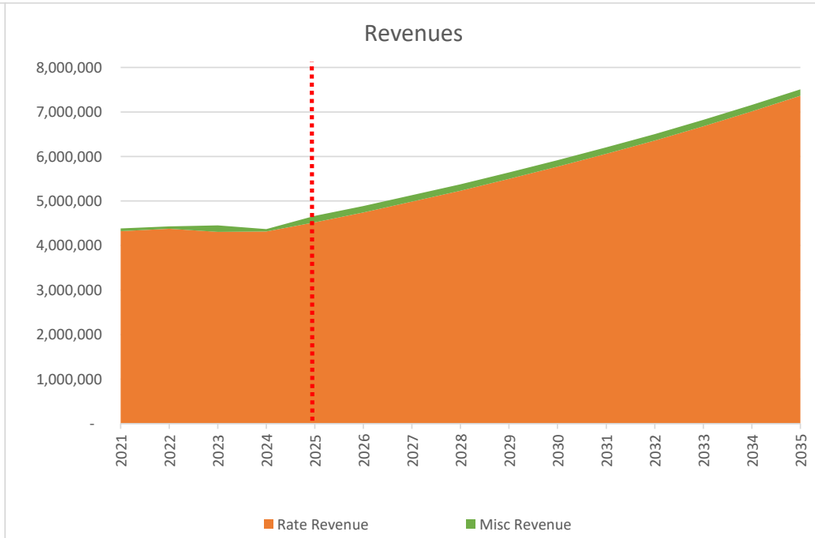
		Actuals			Actuals (est)	Historic	Future	Budget	Projected									
		2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Vaitele LS Condition Assessment & Rehabilitation	TCS.3					5	104,000	-	20,800	20,800	20,800	20,800	20,800	-	-	-	-	-
Skill Center LS Condition Assessment & Rehabilitatio	TCS.4					20	1,015,000	-	-	-	-	-	-	-	-	-	-	-
Airport LS Condition Assessment & Rehabilitation	TCS.5					20	213,000	-	-	-	-	-	-	-	-	-	-	-
Overall Tafuna Inflow and Infiltration Inspection/Ma	TCS.6						N/A	-	-	-	-	-	-	-	-	-	-	-
Tafuna Gravity Main Upsize	TCS.7					15	8,464,000	-	-	-	-	-	-	-	-	-	-	-
Vaitele Gravity Main Upszie	TCS.8					15	3,473,000	-	-	-	-	-	-	-	-	-	-	-
Papa Stream Gravity Main Upsize	TCS.9					15	3,315,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point Gravity Main Upsize	TCS.10					15	1,315,000	-	-	-	-	-	-	-	-	-	-	-
Vaitogi Collection System Expansion	TCS.11					10	5,765,000	-	-	-	-	-	-	1,153,000	1,153,000	1,153,000	1,153,000	1,153,000
Leone Collection System Expansion	TCS.12*					25	269,400,000	-	-	-	-	-	-	-	-	-	-	-
Malaeimi Sewer Extension Expansion	TCS.13					5	4,500,000	-	900,000	900,000	900,000	900,000	900,000	-	-	-	-	-
Upper Pavaiai Collection System Expansion	TCS.14					5	5,000,000	-	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	-	-	-	-	-
Aoloau Collection System Expansion	TCS.15					25	3,500,000	-	-	-	-	-	-	-	-	-	-	-
Overall Tafuna Lift Station Electrical/Control Upgrad	TCS.16						N/A	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #3 Lift Station Upgrades	TCS.17					15	370,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #2 Lift Station Upgrades	TCS.18					15	387,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #1 Lift Station Upgrades	TCS.19					15	1,251,000	-	-	-	-	-	-	-	-	-	-	-
Andy's Lift Station Upgrades	TCS.20					25	28,000	-	-	-	-	-	-	-	-	-	-	-
Sagamea Lift Station Upgrades	TCS.21					25	62,000	-	-	-	-	-	-	-	-	-	-	-
Papa Stream Lift Station Upgrades	TCS.22					15	1,521,000	-	-	-	-	-	-	-	-	-	-	-
Vaitele Lift Station Upgrades	TCS.23					5	3,152,000	-	630,400	630,400	630,400	630,400	630,400	-	-	-	-	-
Lavatai Lift Station Upgrades	TCS.24					15	194,000	-	-	-	-	-	-	-	-	-	-	-
Skill Center Lift Station Upgrades	TCS.25					25	162,000	-	-	-	-	-	-	-	-	-	-	-
Freddie's Beach Lift Station Upgrades	TCS.26					25	104,000	-	-	-	-	-	-	-	-	-	-	-
Leloaloa LS Condition Assessment & Rehabilitation	UCS.1					20	393,000	-	-	-	-	-	-	-	-	-	-	-
Atu'u LS Condition Assessment & Rehabilitation	UCS.2					5	135,000	-	27,000	27,000	27,000	27,000	27,000	-	-	-	-	-
Satala LS Condition Assessment & Rehabilitation	UCS.3					15	921,000	-	-	-	-	-	-	-	-	-	-	-
Korean LS Condition Assessment & Rehabilitation	UCS.4					15	528,000	-	-	-	-	-	-	-	-	-	-	-
Malaloa LS Condition Assessment & Rehabilitation	UCS.5					5	889,000	-	177,800	177,800	177,800	177,800	177,800	-	-	-	-	-
Utulei WWTP Condition Assessment & Rehabilitation	UCS.6					10	2,507,000	-	-	-	-	-	-	501,400	501,400	501,400	501,400	501,400
Faga'alu LS Condition Assessment & Rehabilitation	UCS.7					5	876,000	-	175,200	175,200	175,200	175,200	175,200	-	-	-	-	-
Overall Utulei Inflow and Infiltration Inspection/Mair	UCS.8						N/A	-	-	-	-	-	-	-	-	-	-	-
Malaloa Gravity Main Upsize	UCS.9					15	4,771,000	-	-	-	-	-	-	-	-	-	-	-
Matu'u to Faganeanea Collection System Extension	UCS.10					15	600,000	-	-	-	-	-	-	-	-	-	-	-
Upper Pago Pago Bay Area Extension	UCS.11					5	3,500,000	-	700,000	700,000	700,000	700,000	700,000	-	-	-	-	-
Overall Utulei Lift Station Electrical/Control Upgrade	UCS.12						N/A	-	-	-	-	-	-	-	-	-	-	-
Atu'u Lift Station Upgrades	UCS.13					15	194,000	-	-	-	-	-	-	-	-	-	-	-
Satala Lift Station Upgrades	UCS.14					10	685,000	-	-	-	-	-	-	137,000	137,000	137,000	137,000	137,000
Korean Lift Station Upgrades	UCS.15					15	179,000	-	-	-	-	-	-	-	-	-	-	-
Malaloa Lift Station Upgrades	UCS.16					15	1,416,000	-	-	-	-	-	-	-	-	-	-	-
Faga'alu Lift Station Upgrades	UCS.17					5	1,966,000	-	393,200	393,200	393,200	393,200	393,200	-	-	-	-	-
Matafao Lift Station Upgrades	UCS.18					25	388,000	-	-	-	-	-	-	-	-	-	-	-
Aunu'u Lift Station Improvements	ACS.1					10	292,000	-	-	-	-	-	-	58,400	58,400	58,400	58,400	58,400
Oxidization Ditch - Secondary Treatment						5	341,134,000	-	68,226,800	68,226,800	68,226,800	68,226,800	68,226,800	-	-	-	-	-
Depreciation or Asset Replacement		-	-	-	-			-										
Total Capital Projects		$ 3,021,793	$ 6,927,412	$ 3,928,820	$ 8,822,356		$ 719,856,710	$ 6,283,710	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128
Change in Cash		$ 1,107,036	$ 541,971	$ 200,540	$ (431,500)			$ 407,327	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ (83,211)	$ 25,329	$ 142,895	$ 270,046	$ 407,372	$ 555,496
Beginning Cash		-	-	-	-			(431,500)	(24,173)	(461,469)	(821,304)	(1,096,609)	(1,279,865)	(1,363,076)	(1,337,746)	(1,194,851)	(924,806)	(517,434)
Ending Cash		$ 1,107,036	$ 541,971	$ 200,540	$ (431,500)			$ (24,173)	$ (461,469)	$ (821,304)	$ (1,096,609)	$ (1,279,865)	$ (1,363,076)	$ (1,337,746)	$ (1,194,851)	$ (924,806)	$ (517,434)	$ 38,062
Reserve Fund Target		3,275,986	3,885,680	4,084,401	4,801,180			6,199,290	5,328,739	5,488,601	5,653,259	5,822,857	5,997,542	10,663,521	10,983,426	11,312,929	11,652,317	12,001,887
Above/(Below) Target		(2,168,950)	(3,343,709)	(3,883,861)	(5,232,680)			(6,223,463)	(5,790,207)	(6,309,905)	(6,749,868)	(7,102,721)	(7,360,618)	(12,001,267)	(12,178,278)	(12,237,735)	(12,169,751)	(11,963,825)

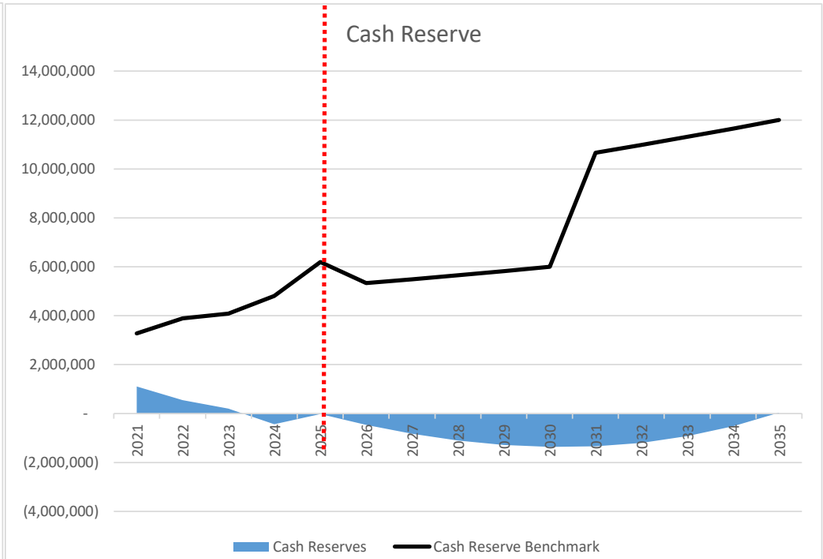
American Samoa Power Authority

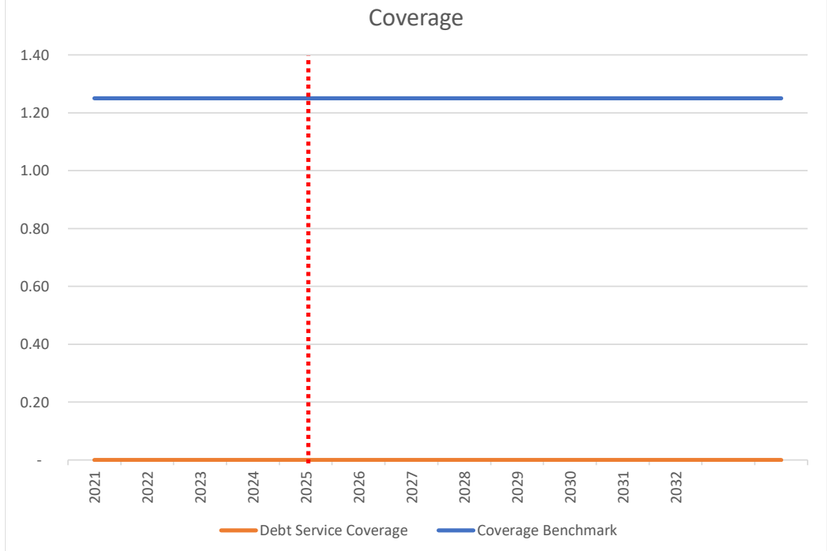
Ground Water Protection Rate Analysis - Secondary Treatment

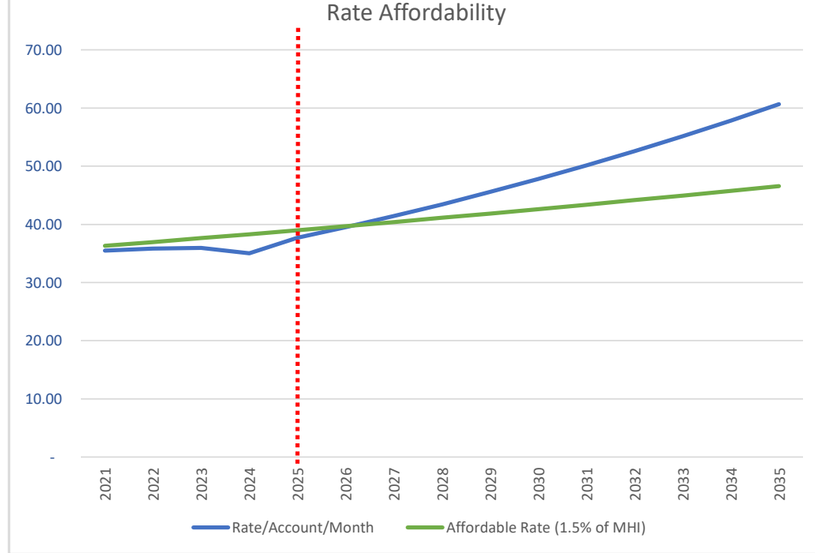
Scenario 1: Master Plan; Oxidization Ditch; 100% Grant

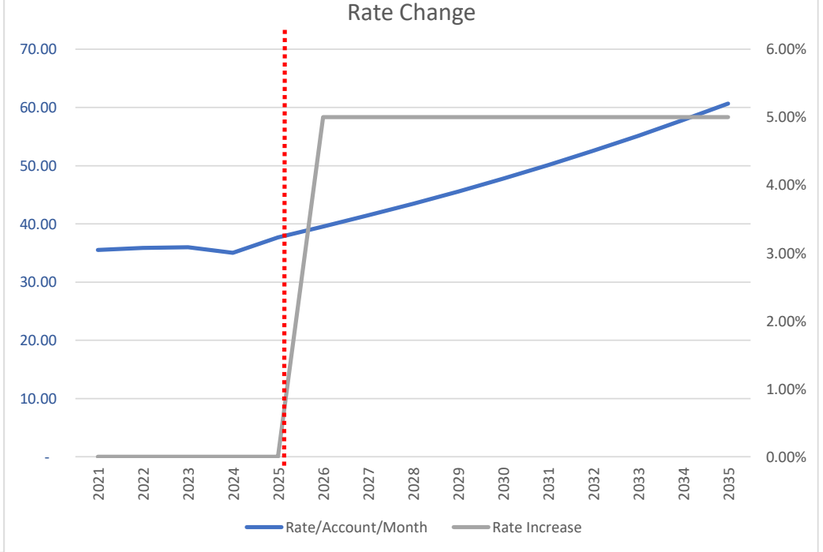












American Samoa Power Authority

Ground Water Protection Rate Analysis - Secondary Treatment

Scenario 2: Master Plan; Oxidization Ditch; 100% Grant; Rate Increas

1.50% $ 35.67

County AMHI $ 28,539

								$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ (83,211)	$ 10,509	$ 132,376	$ 263,182	$ 403,416	$ 553,592
	Actuals			Actuals (est)	Historic	Future	Budget	Projected									
	2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Number of Connections	Estimated					**0.0%**											
Total Accounts	10,288	10,288	10,315	10,396		-	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315
Rate Per Account Type								**5.0%**	**5.0%**	**5.0%**	**5.0%**	**5.0%**	**82.5%**	**4.2%**	**4.2%**	**4.2%**	**4.2%**
Average Charge per Account per Month	$ 35.50	$ 35.86	$ 35.95	$ 35.03			$ 37.69	$ 39.52	$ 41.43	$ 43.45	$ 45.56	$ 47.78	$ 86.23	$ 89.80	$ 93.52	$ 97.40	$ 101.43
Operating Revenue																	
Rate Revenue	$ 4,325,754	$ 4,376,651	$ 4,307,345	$ 4,314,680	115.8%	-	$ 4,520,422	$ 4,746,443	$ 4,983,765	$ 5,232,954	$ 5,494,601	$ 5,769,331	$ 10,529,030	$ 10,970,803	$ 11,431,111	$ 11,910,733	$ 12,410,479
Miscellaneous Revenue	57,269	51,000	143,103	55,000		0.00%	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000
Total Operating Revenue	$ 4,383,023	$ 4,427,651	$ 4,450,448	$ 4,369,680			$ 4,665,422	$ 4,891,443	$ 5,128,765	$ 5,377,954	$ 5,639,601	$ 5,914,331	$ 10,674,030	$ 11,115,803	$ 11,576,111	$ 12,055,733	$ 12,555,479
Operating Costs		Budget		Budget													
Personnel Services (5100)	$ 1,092,057	$ 1,995,500	$ 2,037,795	$ 2,129,000	24.9%	3.00%	$ 2,204,000	$ 2,270,120	$ 2,338,224	$ 2,408,370	$ 2,480,621	$ 2,555,040	$ 2,631,691	$ 2,710,642	$ 2,791,961	$ 2,875,720	$ 2,961,992
Material & Supplies (5200)	783,993	511,500	250,576	541,000	-11.6%	3.00%	1,551,000	541,000	557,230	573,947	591,165	608,900	627,167	645,982	665,362	685,323	705,882
Contractual Services (5300) *minus Capital*	123,680	123,680	123,680	123,680	0.0%	3.00%	221,290	227,929	234,767	241,810	249,064	256,536	264,232	272,159	280,324	288,733	297,395
Travel (5400)	4,048	46,000	7,836	15,500	56.4%	3.00%	19,000	19,570	20,157	20,762	21,385	22,026	22,687	23,368	24,069	24,791	25,534
All Others (5500)	1,139,242	829,500	1,379,177	1,382,500	6.7%	3.00%	1,513,500	1,558,905	1,605,672	1,653,842	1,703,458	1,754,561	1,807,198	1,861,414	1,917,257	1,974,774	2,034,017
Equipment (5600)	132,966	379,500	285,337	609,500	66.1%	3.00%	690,500	711,215	732,551	754,528	777,164	800,479	824,493	849,228	874,705	900,946	927,974
New O&M for Oxidization Ditch					3,756,998	3.00%	-	-	-	-	-	-	4,486,052	4,620,634	4,759,253	4,902,030	5,049,091
						3.00%	-	-	-	-	-	-	-	-	-	-	-
						3.00%	-	-	-	-	-	-	-	-	-	-	-
						3.00%	-	-	-	-	-	-	-	-	-	-	-
						3.00%	-	-	-	-	-	-	-	-	-	-	-
Depreciation		2,381,679	2,690,636	2,690,636		3.00%	2,690,636	2,771,355	2,854,496	2,940,131	3,028,335	3,119,185	3,212,760	3,309,143	3,408,417	3,510,670	3,615,990
						3.00%											
Remove Depreciation Expense	-	(2,381,679)	(2,690,636)	(2,690,636)		3.00%	(2,690,636)	(2,771,355)	(2,854,496)	(2,940,131)	(3,028,335)	(3,119,185)	(3,212,760)	(3,309,143)	(3,408,417)	(3,510,670)	(3,615,990)
Total Operating Costs	$ 3,275,986	$ 3,885,680	$ 4,084,401	$ 4,801,180			$ 6,199,290	$ 5,328,739	$ 5,488,601	$ 5,653,259	$ 5,822,857	$ 5,997,542	$ 10,663,521	$ 10,983,426	$ 11,312,929	$ 11,652,317	$ 12,001,887
Net Operating Income	$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ (83,211)	$ 10,509	$ 132,376	$ 263,182	$ 403,416	$ 553,592
Non-Operating																	
								-	-	-	-	-	-	-	-	-	-
Total Non-Operating Revenuse (Expenses)	$ -	$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net Revenue Before Debt Service	$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ (83,211)	$ 10,509	$ 132,376	$ 263,182	$ 403,416	$ 553,592
Debt Service Coverage Ratio																	
Debt Service																	
Total Debt Service	$ -	$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net After Debt Service	$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ (83,211)	$ 10,509	$ 132,376	$ 263,182	$ 403,416	$ 553,592
Other Sources																	
Bonds Proceeds																	
Grant Revenue - Master Plan	3,021,793	6,927,412	3,763,313	8,822,356			8,224,905	6,866,600	6,866,600	6,866,600	6,866,600	6,866,600	2,883,128	2,883,128	2,883,128	2,883,128	2,883,128
Grant Revenue - Secondary Treatment								68,226,800	68,226,800	68,226,800	68,226,800	68,226,800	-	-	-	-	-
									-	-	-	-	-	-	-	-	-
									-	-	-	-	-	-	-	-	-
										-	-	-	-	-	-	-	-
Total Other Sources	$ 3,021,793	$ 6,927,412	$ 3,763,313	$ 8,822,356	$ -	$ -	$ 8,224,905	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128

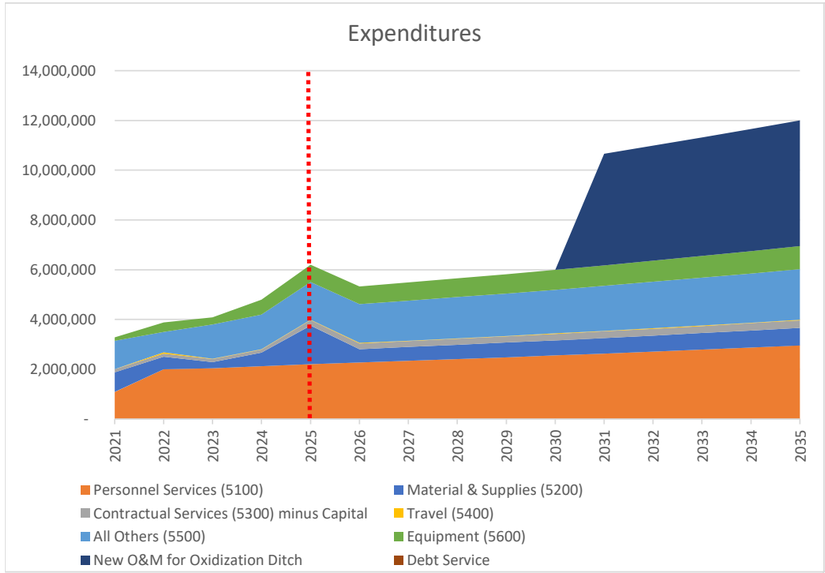
		Actuals			Actuals (est)	Historic	Future	Budget	Projected									
		2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Capital Projects									5	5	5	5	5	10	10	10	10	10
Grant Funded Projects		$ 3,021,793	$ 6,927,412	$ 3,928,820	$ 8,822,356	2025	$ 6,283,710	$ 6,283,710	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
I/I Study	G.1					5	805,000	-	161,000	161,000	161,000	161,000	161,000	-	-	-	-	-
GIS & Asset Management	G.2					5	21,000	-	4,200	4,200	4,200	4,200	4,200	-	-	-	-	-
CCTV Inspections	G.3					5	1,332,000	-	266,400	266,400	266,400	266,400	266,400	-	-	-	-	-
Wastewater Construction Standards Update	G.4					5	121,000	-	24,200	24,200	24,200	24,200	24,200	-	-	-	-	-
Install Influent WWTP Flow Meter	TWT.1					10	182,000	-	-	-	-	-	-	36,400	36,400	36,400	36,400	36,400
Corrosion Protection for Headworks	TWT.2					10	56,140	-	-	-	-	-	-	11,228	11,228	11,228	11,228	11,228
Miscellaneous Electrical Improvements of Screens	TWT.3					5	610,000	-	122,000	122,000	122,000	122,000	122,000	-	-	-	-	-
Install FRP grating Over the Grit Channels	TWT.4					15	43,360		-	-	-	-	-	-	-	-	-	-
Provide Spare Pump and Parts for Influent Pump Sta	TWT.5					15	103,000		-	-	-	-	-	-	-	-	-	-
Upsize Influent Pumps	TWT.6					15	345,000		-	-	-	-	-	-	-	-	-	-
Install a Parallel Headworks Train	TWT.7					15	2,062,000		-	-	-	-	-	-	-	-	-	-
Install a New Bypass Pipe	TWT.8					10	132,000		-	-	-	-	-	26,400	26,400	26,400	26,400	26,400
Replace Piping in Scum Pits	TWT.9					10	84,000		-	-	-	-	-	16,800	16,800	16,800	16,800	16,800
Replace Drive for Clarigester #2 and #3	TWT.10					5	1,433,000		286,600	286,600	286,600	286,600	286,600	-	-	-	-	-
Replace Grating of the Walkway and Railing of the Cl	TWT.11					5	693,000		138,600	138,600	138,600	138,600	138,600	-	-	-	-	-
Record Hourly Flow	TWT.12					5	-		-	-	-	-	-	-	-	-	-	-
Recoat Exposed Piping	TWT.13					10	106,000		-	-	-	-	-	21,200	21,200	21,200	21,200	21,200
Recalibrate UVT meter	TWT.14					10	40,000		-	-	-	-	-	8,000	8,000	8,000	8,000	8,000
New UV Shed for Corrosion Protection	TWT.15					5	654,000		130,800	130,800	130,800	130,800	130,800	-	-	-	-	-
Miscellaneous Channel Improvements	TWT.16					10	70,000		-	-	-	-	-	14,000	14,000	14,000	14,000	14,000
Provide Backup Power to the AC unit in the UV Contr	TWT.17					5	225,000		45,000	45,000	45,000	45,000	45,000	-	-	-	-	-
Backup Disinfection Design Study	TWT.18					5	212,000		42,400	42,400	42,400	42,400	42,400	-	-	-	-	-
Outfall Modification Study	TWT.19					10	202,000		-	-	-	-	-	40,400	40,400	40,400	40,400	40,400
Dewatering Infrastructure Improvements	TWT.20					10	289,000		-	-	-	-	-	57,800	57,800	57,800	57,800	57,800
Install New SCADA System	TWT.21					5	700,000		140,000	140,000	140,000	140,000	140,000	-	-	-	-	-
Install Refrigerated Composite Samplers	TWT.22					15	101,000		-	-	-	-	-	-	-	-	-	-
Coordinate Permit Conditions with EPA	TWT.23					5	101,000		20,200	20,200	20,200	20,200	20,200	-	-	-	-	-
Install Filter for Incoming Power	TWT.24					20	397,000		-	-	-	-	-	-	-	-	-	-
Investigate Sampling and Testing Practices	TWT.25					10	101,000		-	-	-	-	-	20,200	20,200	20,200	20,200	20,200
Raise the Grade of the Plant Drain Lift Station	TWT.26					10	9,100		-	-	-	-	-	1,820	1,820	1,820	1,820	1,820
Wastewater Operations Building Upgrades and Remo	TWT.27					10	101,000		-	-	-	-	-	20,200	20,200	20,200	20,200	20,200
Generator Upgrades	TWT.28					5	591,000		118,200	118,200	118,200	118,200	118,200	-	-	-	-	-
Install Redundant Utility Water Pump	TWT.29					20	109,000	-	-	-	-	-	-	-	-	-	-	-
New Headworks Building with Screen and Grit Remo	UWT.1					20	15,498,000	-	-	-	-	-	-	-	-	-	-	-
Install Automatic Wet Basket Screen	UWT.2					20	166,000	-	-	-	-	-	-	-	-	-	-	-
Install Influent Flow Meter	UWT.3					10	152,000	-	-	-	-	-	-	30,400	30,400	30,400	30,400	30,400
Corrosion Protection for Headworks	UWT.4					10	46,400	-	-	-	-	-	-	9,280	9,280	9,280	9,280	9,280
Provide Spare Pump and Parts for Influent Pump Sta	UWT.5					15	103,000	-	-	-	-	-	-	-	-	-	-	-
Replace Piping in Scum Pits	UWT.6					10	132,000	-	-	-	-	-	-	26,400	26,400	26,400	26,400	26,400
Replace Drive for Clarigester #2 and #3	UWT.7					5	1,433,000	-	286,600	286,600	286,600	286,600	286,600	-	-	-	-	-
Replace Walkway and Railing of the Clarigester	UWT.8					5	703,000	-	140,600	140,600	140,600	140,600	140,600	-	-	-	-	-
Fix Cracks in the Clarigester	UWT.9					5	51,000	-	10,200	10,200	10,200	10,200	10,200	-	-	-	-	-
Record Hourly Flow	UWT.10					5	-	-	-	-	-	-	-	-	-	-	-	-
Recoat Exposed Piping	UWT.11					10	64,000	-	-	-	-	-	-	12,800	12,800	12,800	12,800	12,800
Recalibrate UVT meter	UWT.12					10	18,000	-	-	-	-	-	-	3,600	3,600	3,600	3,600	3,600
New UV Shed for Corrosion Protection	UWT.13					10	486,000	-	-	-	-	-	-	97,200	97,200	97,200	97,200	97,200
Miscellaneous Channel Improvements	UWT.14					10	81,000	-	-	-	-	-	-	16,200	16,200	16,200	16,200	16,200
Backup Disinfection Design Study	UWT.15					5	212,000	-	42,400	42,400	42,400	42,400	42,400	-	-	-	-	-
Provide Backup Power to the AC unit in the UV Contr	UWT.16					5	225,000	-	45,000	45,000	45,000	45,000	45,000	-	-	-	-	-
Outfall Modification Study	UWT.17					5	202,000	-	40,400	40,400	40,400	40,400	40,400	-	-	-	-	-
Install New SCADA System	UWT.18					5	700,000	-	140,000	140,000	140,000	140,000	140,000	-	-	-	-	-
Install Refrigerated Composite Samplers	UWT.19					20	101,000	-	-	-	-	-	-	-	-	-	-	-
Coordinate Permit Conditions with EPA	UWT.20					5	101,000	-	20,200	20,200	20,200	20,200	20,200	-	-	-	-	-
Install Filter for Incoming Power	UWT.21					20	397,000	-	-	-	-	-	-	-	-	-	-	-
Investigate Sampling and Testing Practices	UWT.22					10	81,000	-	-	-	-	-	-	16,200	16,200	16,200	16,200	16,200
Replace Pumps in Utility Water System	UWT.23					10	234,000	-	-	-	-	-	-	46,800	46,800	46,800	46,800	46,800
Wastewater Operations Building Upgrades and Remo	UWT.24					20	101,000	-	-	-	-	-	-	-	-	-	-	-
Generator Upgrades	UWT.25					5	754,000	-	150,800	150,800	150,800	150,800	150,800	-	-	-	-	-
Aunu'u Wastewater System Treatment and Design S	OWT.1					5	500,000	-	100,000	100,000	100,000	100,000	100,000	-	-	-	-	-
Manua Islands Septic Tank Installation	OWT.2					5	1,250,000	-	250,000	250,000	250,000	250,000	250,000	-	-	-	-	-
Tutuila On-Site Septic System Upgrade	OWT.3					10	2,500,000	-	-	-	-	-	-	500,000	500,000	500,000	500,000	500,000
Coconut Point Condition Assessment & Rehabilitatio	TCS.1					5	392,000	-	78,400	78,400	78,400	78,400	78,400	-	-	-	-	-
Papa Stream LS Condition Assessment & Rehabilitati	TCS.2					5	190,000	-	38,000	38,000	38,000	38,000	38,000	-	-	-	-	-

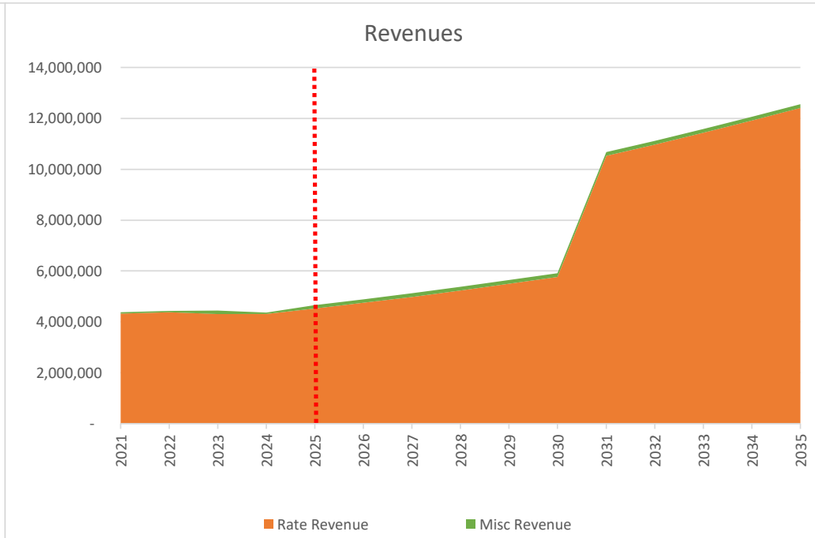
		Actuals			Actuals (est)	Historic	Future	Budget	Projected									
		2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Vaitele LS Condition Assessment & Rehabilitation	TCS.3					5	104,000	-	20,800	20,800	20,800	20,800	20,800	-	-	-	-	-
Skill Center LS Condition Assessment & Rehabilitatio	TCS.4					20	1,015,000	-	-	-	-	-	-	-	-	-	-	-
Airport LS Condition Assessment & Rehabilitation	TCS.5					20	213,000	-	-	-	-	-	-	-	-	-	-	-
Overall Tafuna Inflow and Infiltration Inspection/Ma	TCS.6						N/A	-	-	-	-	-	-	-	-	-	-	-
Tafuna Gravity Main Upsize	TCS.7					15	8,464,000	-	-	-	-	-	-	-	-	-	-	-
Vaitele Gravity Main Upszie	TCS.8					15	3,473,000	-	-	-	-	-	-	-	-	-	-	-
Papa Stream Gravity Main Upsize	TCS.9					15	3,315,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point Gravity Main Upsize	TCS.10					15	1,315,000	-	-	-	-	-	-	-	-	-	-	-
Vaitogi Collection System Expansion	TCS.11					10	5,765,000	-	-	-	-	-	-	1,153,000	1,153,000	1,153,000	1,153,000	1,153,000
Leone Collection System Expansion	TCS.12*					25	269,400,000	-	-	-	-	-	-	-	-	-	-	-
Malaeimi Sewer Extension Expansion	TCS.13					5	4,500,000	-	900,000	900,000	900,000	900,000	900,000	-	-	-	-	-
Upper Pavaiai Collection System Expansion	TCS.14					5	5,000,000	-	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	-	-	-	-	-
Aoloau Collection System Expansion	TCS.15					25	3,500,000	-	-	-	-	-	-	-	-	-	-	-
Overall Tafuna Lift Station Electrical/Control Upgrad	TCS.16						N/A	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #3 Lift Station Upgrades	TCS.17					15	370,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #2 Lift Station Upgrades	TCS.18					15	387,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #1 Lift Station Upgrades	TCS.19					15	1,251,000	-	-	-	-	-	-	-	-	-	-	-
Andy's Lift Station Upgrades	TCS.20					25	28,000	-	-	-	-	-	-	-	-	-	-	-
Sagamea Lift Station Upgrades	TCS.21					25	62,000	-	-	-	-	-	-	-	-	-	-	-
Papa Stream Lift Station Upgrades	TCS.22					15	1,521,000	-	-	-	-	-	-	-	-	-	-	-
Vaitele Lift Station Upgrades	TCS.23					5	3,152,000	-	630,400	630,400	630,400	630,400	630,400	-	-	-	-	-
Lavatai Lift Station Upgrades	TCS.24					15	194,000	-	-	-	-	-	-	-	-	-	-	-
Skill Center Lift Station Upgrades	TCS.25					25	162,000	-	-	-	-	-	-	-	-	-	-	-
Freddie's Beach Lift Station Upgrades	TCS.26					25	104,000	-	-	-	-	-	-	-	-	-	-	-
Leloaloa LS Condition Assessment & Rehabilitation	UCS.1					20	393,000	-	-	-	-	-	-	-	-	-	-	-
Atu'u LS Condition Assessment & Rehabilitation	UCS.2					5	135,000	-	27,000	27,000	27,000	27,000	27,000	-	-	-	-	-
Satala LS Condition Assessment & Rehabilitation	UCS.3					15	921,000	-	-	-	-	-	-	-	-	-	-	-
Korean LS Condition Assessment & Rehabilitation	UCS.4					15	528,000	-	-	-	-	-	-	-	-	-	-	-
Malaloa LS Condition Assessment & Rehabilitation	UCS.5					5	889,000	-	177,800	177,800	177,800	177,800	177,800	-	-	-	-	-
Utulei WWTP Condition Assessment & Rehabilitation	UCS.6					10	2,507,000	-	-	-	-	-	-	501,400	501,400	501,400	501,400	501,400
Faga'alu LS Condition Assessment & Rehabilitation	UCS.7					5	876,000	-	175,200	175,200	175,200	175,200	175,200	-	-	-	-	-
Overall Utulei Inflow and Infiltration Inspection/Mair	UCS.8						N/A	-	-	-	-	-	-	-	-	-	-	-
Malaloa Gravity Main Upsize	UCS.9					15	4,771,000	-	-	-	-	-	-	-	-	-	-	-
Matu'u to Faganeanea Collection System Extension	UCS.10					15	600,000	-	-	-	-	-	-	-	-	-	-	-
Upper Pago Pago Bay Area Extension	UCS.11					5	3,500,000	-	700,000	700,000	700,000	700,000	700,000	-	-	-	-	-
Overall Utulei Lift Station Electrical/Control Upgrade	UCS.12						N/A	-	-	-	-	-	-	-	-	-	-	-
Atu'u Lift Station Upgrades	UCS.13					15	194,000	-	-	-	-	-	-	-	-	-	-	-
Satala Lift Station Upgrades	UCS.14					10	685,000	-	-	-	-	-	-	137,000	137,000	137,000	137,000	137,000
Korean Lift Station Upgrades	UCS.15					15	179,000	-	-	-	-	-	-	-	-	-	-	-
Malaloa Lift Station Upgrades	UCS.16					15	1,416,000	-	-	-	-	-	-	-	-	-	-	-
Faga'alu Lift Station Upgrades	UCS.17					5	1,966,000	-	393,200	393,200	393,200	393,200	393,200	-	-	-	-	-
Matafao Lift Station Upgrades	UCS.18					25	388,000	-	-	-	-	-	-	-	-	-	-	-
Aunu'u Lift Station Improvements	ACS.1					10	292,000	-	-	-	-	-	-	58,400	58,400	58,400	58,400	58,400
Oxidization Ditch - Secondary Treatment						5	341,134,000	-	68,226,800	68,226,800	68,226,800	68,226,800	68,226,800	-	-	-	-	-
Depreciation or Asset Replacement		-	-	-	-			-										
Total Capital Projects		$ 3,021,793	$ 6,927,412	$ 3,928,820	$ 8,822,356		$ 719,856,710	$ 6,283,710	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128
Change in Cash		$ 1,107,036	$ 541,971	$ 200,540	$ (431,500)			$ 407,327	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ (83,211)	$ 10,509	$ 132,376	$ 263,182	$ 403,416	$ 553,592
Beginning Cash		-	-	-	-			(431,500)	(24,173)	(461,469)	(821,304)	(1,096,609)	(1,279,865)	(1,363,076)	(1,352,567)	(1,220,191)	(957,009)	(553,592)
Ending Cash		$ 1,107,036	$ 541,971	$ 200,540	$ (431,500)			$ (24,173)	$ (461,469)	$ (821,304)	$ (1,096,609)	$ (1,279,865)	$ (1,363,076)	$ (1,352,567)	$ (1,220,191)	$ (957,009)	$ (553,592)	$ (0)
Reserve Fund Target		3,275,986	3,885,680	4,084,401	4,801,180			6,199,290	5,328,739	5,488,601	5,653,259	5,822,857	5,997,542	10,663,521	10,983,426	11,312,929	11,652,317	12,001,887
Above/(Below) Target		(2,168,950)	(3,343,709)	(3,883,861)	(5,232,680)			(6,223,463)	(5,790,207)	(6,309,905)	(6,749,868)	(7,102,721)	(7,360,618)	(12,016,087)	(12,203,617)	(12,269,938)	(12,205,909)	(12,001,887)

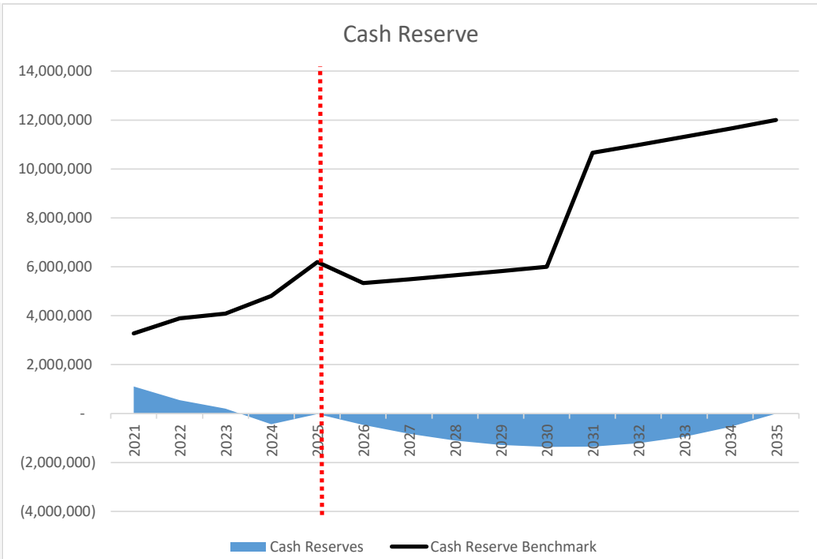
American Samoa Power Authority

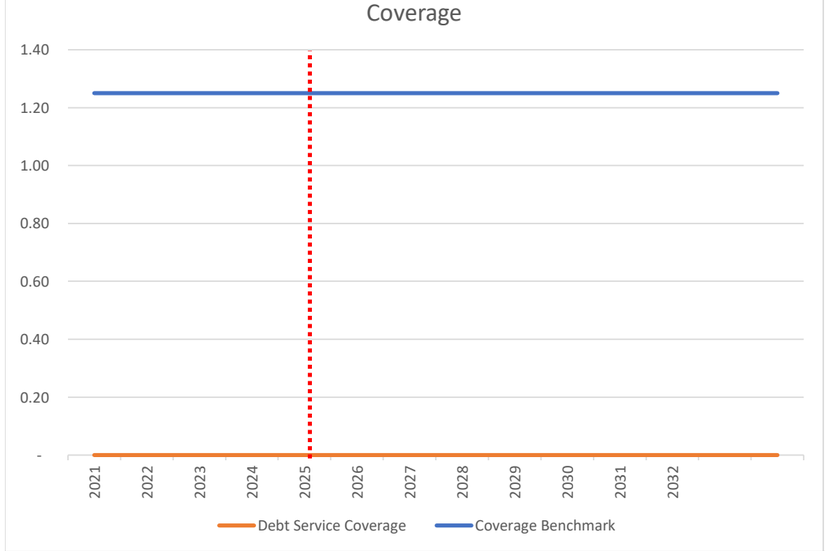
Ground Water Protection Rate Analysis - Secondary Treatment

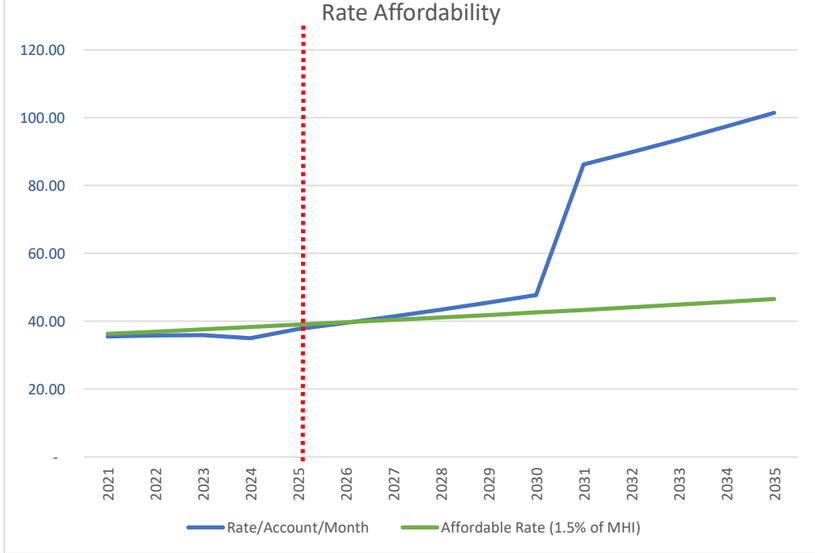
Scenario 2: Master Plan; Oxidization Ditch; 100% Grant; Rate Increase for O&M

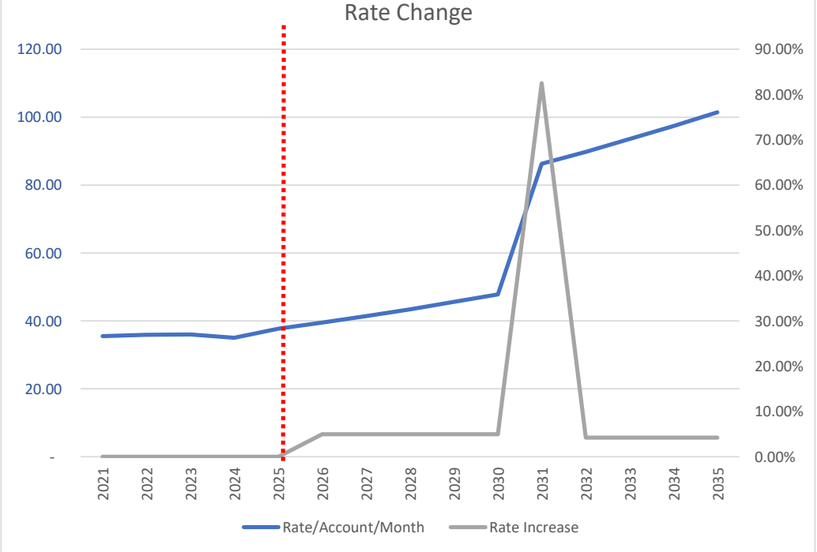












American Samoa Power Authority

Ground Water Protection Rate Analysis - Secondary Treatment

Scenario 3: Master Plan; Oxidization Ditch; 50% Grant; 50% Bonds; F

1.50% $ 35.67

County AMHI $ 28,539

		Actuals			Actuals (est)	Historic	Future	Budget	Projected									
		2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Number of Connections		Estimated					**0.0%**											
Total Accounts		10,288	10,288	10,315	10,396		-	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315
Rate Per Account Type									**10.0%**	**10.0%**	**10.0%**	**10.0%**	**101.0%**	**45.0%**	**2.0%**	**1.5%**	**1.5%**	**2.0%**
Average Charge per Account per Month		$ 35.50	$ 35.86	$ 35.95	$ 35.03			$ 37.69	$ 41.34	$ 45.36	$ 49.78	$ 54.64	$ 108.64	$ 157.01	$ 160.12	$ 162.51	$ 164.93	$ 168.20
Operating Revenue																		
Rate Revenue		$ 4,325,754	$ 4,376,651	$ 4,307,345	$ 4,314,680	115.8%	-	$ 4,520,422	$ 4,972,464	$ 5,469,711	$ 6,016,682	$ 6,618,350	$ 13,302,883	$ 19,289,181	$ 19,674,965	$ 19,970,089	$ 20,269,640	$ 20,675,033
Miscellaneous Revenue		57,269	51,000	143,103	55,000		0.00%	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000
Total Operating Revenue		$ 4,383,023	$ 4,427,651	$ 4,450,448	$ 4,369,680			$ 4,665,422	$ 5,117,464	$ 5,614,711	$ 6,161,682	$ 6,763,350	$ 13,447,883	$ 19,434,181	$ 19,819,965	$ 20,115,089	$ 20,414,640	$ 20,820,033
Operating Costs		Budget			Budget													
Personnel Services (5100)		$ 1,092,057	$ 1,995,500	$ 2,037,795	$ 2,129,000	24.9%	3.00%	$ 2,204,000	$ 2,270,120	$ 2,338,224	$ 2,408,370	$ 2,480,621	$ 2,555,040	$ 2,631,691	$ 2,710,642	$ 2,791,961	$ 2,875,720	$ 2,961,992
Material & Supplies (5200)		783,993	511,500	250,576	541,000	-11.6%	3.00%	1,551,000	541,000	557,230	573,947	591,165	608,900	627,167	645,982	665,362	685,323	705,882
Contractual Services (5300) *minus Capital*		123,680	123,680	123,680	123,680	0.0%	3.00%	221,290	227,929	234,767	241,810	249,064	256,536	264,232	272,159	280,324	288,733	297,395
Travel (5400)		4,048	46,000	7,836	15,500	56.4%	3.00%	19,000	19,570	20,157	20,762	21,385	22,026	22,687	23,368	24,069	24,791	25,534
All Others (5500)		1,139,242	829,500	1,379,177	1,382,500	6.7%	3.00%	1,513,500	1,558,905	1,605,672	1,653,842	1,703,458	1,754,561	1,807,198	1,861,414	1,917,257	1,974,774	2,034,017
Equipment (5600)		132,966	379,500	285,337	609,500	66.1%	3.00%	690,500	711,215	732,551	754,528	777,164	800,479	824,493	849,228	874,705	900,946	927,974
New O&M for Oxidization Ditch						3,756,998	3.00%	-	-	-	-	-	-	4,486,052	4,620,634	4,759,253	4,902,030	5,049,091
							3.00%	-	-	-	-	-	-	-	-	-	-	-
							3.00%	-	-	-	-	-	-	-	-	-	-	-
							3.00%	-	-	-	-	-	-	-	-	-	-	-
							3.00%	-	-	-	-	-	-	-	-	-	-	-
Depreciation			2,381,679	2,690,636	2,690,636		3.00%	2,690,636	2,771,355	2,854,496	2,940,131	3,028,335	3,119,185	3,212,760	3,309,143	3,408,417	3,510,670	3,615,990
							3.00%											
Remove Depreciation Expense		-	(2,381,679)	(2,690,636)	(2,690,636)		3.00%	(2,690,636)	(2,771,355)	(2,854,496)	(2,940,131)	(3,028,335)	(3,119,185)	(3,212,760)	(3,309,143)	(3,408,417)	(3,510,670)	(3,615,990)
Total Operating Costs		$ 3,275,986	$ 3,885,680	$ 4,084,401	$ 4,801,180			$ 6,199,290	$ 5,328,739	$ 5,488,601	$ 5,653,259	$ 5,822,857	$ 5,997,542	$ 10,663,521	$ 10,983,426	$ 11,312,929	$ 11,652,317	$ 12,001,887
Net Operating Income		$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (211,274)	$ 126,110	$ 508,423	$ 940,493	$ 7,450,341	$ 8,770,660	$ 8,836,538	$ 8,802,160	$ 8,762,323	$ 8,818,147
Non-Operating																		
									-	-	-	-	-	-	-	-	-	-
Total Non-Operating Revenuse (Expenses)		$ -	$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net Revenue Before Debt Service		$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (211,274)	$ 126,110	$ 508,423	$ 940,493	$ 7,450,341	$ 8,770,660	$ 8,836,538	$ 8,802,160	$ 8,762,323	$ 8,818,147
Debt Service Coverage Ratio													0.85	1.00	1.01	1.00	1.00	1.00
Debt Service																		
USDA - Loan												$ 8,789,993	$ 8,789,993	$ 8,789,993	$ 8,789,993	$ 8,789,993	$ 8,789,993	$ 8,789,993
Total Debt Service		$ -	$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -	$ 8,789,993	$ 8,789,993	$ 8,789,993	$ 8,789,993	$ 8,789,993	$ 8,789,993
Net After Debt Service		$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (211,274)	$ 126,110	$ 508,423	$ 940,493	$ (1,339,652)	$ (19,333)	$ 46,545	$ 12,167	$ (27,669)	$ 28,154
Other Sources																		
Bonds Proceeds	50%								$ 34,113,400	$ 34,113,400	$ 34,113,400	$ 34,113,400	$ 34,113,400	$ -	$ -	$ -	$ -	$ -
Grant Revenue - Master Plan		3,021,793	6,927,412	3,763,313	8,822,356			8,224,905	6,866,600	6,866,600	6,866,600	6,866,600	6,866,600	2,883,128	2,883,128	2,883,128	2,883,128	2,883,128
Grant Revenue - Secondary Treatment	50%								$ 34,113,400	$ 34,113,400	$ 34,113,400	$ 34,113,400	$ 34,113,400	$ -	$ -	$ -	$ -	$ -
										-	-	-	-	-	-	-	-	-
										-	-	-	-	-	-	-	-	-
											-	-	-	-	-	-	-	-
Total Other Sources		$ 3,021,793	$ 6,927,412	$ 3,763,313	$ 8,822,356	$ -	$ -	$ 8,224,905	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128

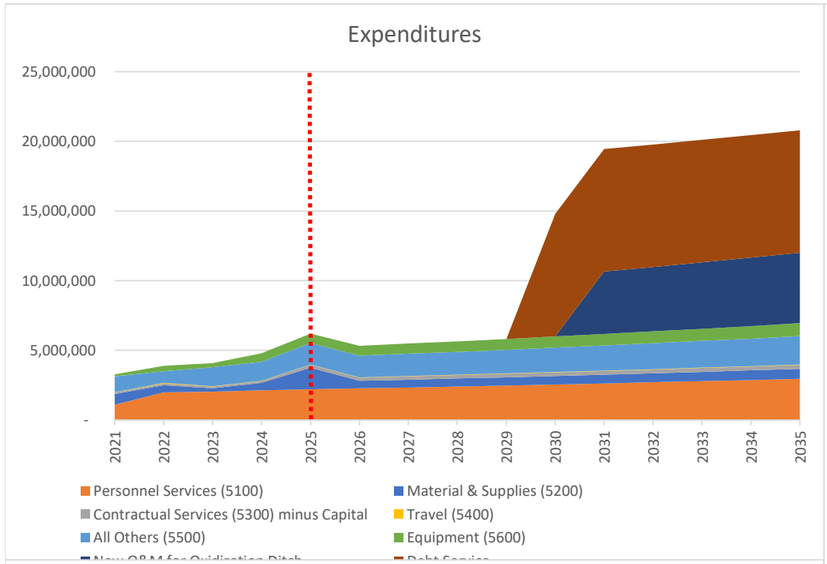
		Actuals			Actuals (est)	Historic	Future	Budget	Projected									
		2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Capital Projects									5	5	5	5	5	10	10	10	10	10
Grant Funded Projects		$ 3,021,793	$ 6,927,412	$ 3,928,820	$ 8,822,356	2025	$ 6,283,710	$ 6,283,710	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
I/I Study	G.1					5	805,000	-	161,000	161,000	161,000	161,000	161,000	-	-	-	-	-
GIS & Asset Management	G.2					5	21,000	-	4,200	4,200	4,200	4,200	4,200	-	-	-	-	-
CCTV Inspections	G.3					5	1,332,000	-	266,400	266,400	266,400	266,400	266,400	-	-	-	-	-
Wastewater Construction Standards Update	G.4					5	121,000	-	24,200	24,200	24,200	24,200	24,200	-	-	-	-	-
Install Influent WWTP Flow Meter	TWT.1					10	182,000	-	-	-	-	-	-	36,400	36,400	36,400	36,400	36,400
Corrosion Protection for Headworks	TWT.2					10	56,140	-	-	-	-	-	-	11,228	11,228	11,228	11,228	11,228
Miscellaneous Electrical Improvements of Screens	TWT.3					5	610,000	-	122,000	122,000	122,000	122,000	122,000	-	-	-	-	-
Install FRP grating Over the Grit Channels	TWT.4					15	43,360		-	-	-	-	-	-	-	-	-	-
Provide Spare Pump and Parts for Influent Pump Sta	TWT.5					15	103,000		-	-	-	-	-	-	-	-	-	-
Upsize Influent Pumps	TWT.6					15	345,000		-	-	-	-	-	-	-	-	-	-
Install a Parallel Headworks Train	TWT.7					15	2,062,000		-	-	-	-	-	-	-	-	-	-
Install a New Bypass Pipe	TWT.8					10	132,000		-	-	-	-	-	26,400	26,400	26,400	26,400	26,400
Replace Piping in Scum Pits	TWT.9					10	84,000		-	-	-	-	-	16,800	16,800	16,800	16,800	16,800
Replace Drive for Clarigester #2 and #3	TWT.10					5	1,433,000		286,600	286,600	286,600	286,600	286,600	-	-	-	-	-
Replace Grating of the Walkway and Railing of the Cl	TWT.11					5	693,000		138,600	138,600	138,600	138,600	138,600	-	-	-	-	-
Record Hourly Flow	TWT.12					5	-		-	-	-	-	-	-	-	-	-	-
Recoat Exposed Piping	TWT.13					10	106,000		-	-	-	-	-	21,200	21,200	21,200	21,200	21,200
Recalibrate UVT meter	TWT.14					10	40,000		-	-	-	-	-	8,000	8,000	8,000	8,000	8,000
New UV Shed for Corrosion Protection	TWT.15					5	654,000		130,800	130,800	130,800	130,800	130,800	-	-	-	-	-
Miscellaneous Channel Improvements	TWT.16					10	70,000		-	-	-	-	-	14,000	14,000	14,000	14,000	14,000
Provide Backup Power to the AC unit in the UV Contr	TWT.17					5	225,000		45,000	45,000	45,000	45,000	45,000	-	-	-	-	-
Backup Disinfection Design Study	TWT.18					5	212,000		42,400	42,400	42,400	42,400	42,400	-	-	-	-	-
Outfall Modification Study	TWT.19					10	202,000		-	-	-	-	-	40,400	40,400	40,400	40,400	40,400
Dewatering Infrastructure Improvements	TWT.20					10	289,000		-	-	-	-	-	57,800	57,800	57,800	57,800	57,800
Install New SCADA System	TWT.21					5	700,000		140,000	140,000	140,000	140,000	140,000	-	-	-	-	-
Install Refrigerated Composite Samplers	TWT.22					15	101,000		-	-	-	-	-	-	-	-	-	-
Coordinate Permit Conditions with EPA	TWT.23					5	101,000		20,200	20,200	20,200	20,200	20,200	-	-	-	-	-
Install Filter for Incoming Power	TWT.24					20	397,000		-	-	-	-	-	-	-	-	-	-
Investigate Sampling and Testing Practices	TWT.25					10	101,000		-	-	-	-	-	20,200	20,200	20,200	20,200	20,200
Raise the Grade of the Plant Drain Lift Station	TWT.26					10	9,100		-	-	-	-	-	1,820	1,820	1,820	1,820	1,820
Wastewater Operations Building Upgrades and Remo	TWT.27					10	101,000		-	-	-	-	-	20,200	20,200	20,200	20,200	20,200
Generator Upgrades	TWT.28					5	591,000		118,200	118,200	118,200	118,200	118,200	-	-	-	-	-
Install Redundant Utility Water Pump	TWT.29					20	109,000	-	-	-	-	-	-	-	-	-	-	-
New Headworks Building with Screen and Grit Remo	UWT.1					20	15,498,000	-	-	-	-	-	-	-	-	-	-	-
Install Automatic Wet Basket Screen	UWT.2					20	166,000	-	-	-	-	-	-	-	-	-	-	-
Install Influent Flow Meter	UWT.3					10	152,000	-	-	-	-	-	-	30,400	30,400	30,400	30,400	30,400
Corrosion Protection for Headworks	UWT.4					10	46,400	-	-	-	-	-	-	9,280	9,280	9,280	9,280	9,280
Provide Spare Pump and Parts for Influent Pump Sta	UWT.5					15	103,000	-	-	-	-	-	-	-	-	-	-	-
Replace Piping in Scum Pits	UWT.6					10	132,000	-	-	-	-	-	-	26,400	26,400	26,400	26,400	26,400
Replace Drive for Clarigester #2 and #3	UWT.7					5	1,433,000	-	286,600	286,600	286,600	286,600	286,600	-	-	-	-	-
Replace Walkway and Railing of the Clarigester	UWT.8					5	703,000	-	140,600	140,600	140,600	140,600	140,600	-	-	-	-	-
Fix Cracks in the Clarigester	UWT.9					5	51,000	-	10,200	10,200	10,200	10,200	10,200	-	-	-	-	-
Record Hourly Flow	UWT.10					5	-	-	-	-	-	-	-	-	-	-	-	-
Recoat Exposed Piping	UWT.11					10	64,000	-	-	-	-	-	-	12,800	12,800	12,800	12,800	12,800
Recalibrate UVT meter	UWT.12					10	18,000	-	-	-	-	-	-	3,600	3,600	3,600	3,600	3,600
New UV Shed for Corrosion Protection	UWT.13					10	486,000	-	-	-	-	-	-	97,200	97,200	97,200	97,200	97,200
Miscellaneous Channel Improvements	UWT.14					10	81,000	-	-	-	-	-	-	16,200	16,200	16,200	16,200	16,200
Backup Disinfection Design Study	UWT.15					5	212,000	-	42,400	42,400	42,400	42,400	42,400	-	-	-	-	-
Provide Backup Power to the AC unit in the UV Contr	UWT.16					5	225,000	-	45,000	45,000	45,000	45,000	45,000	-	-	-	-	-
Outfall Modification Study	UWT.17					5	202,000	-	40,400	40,400	40,400	40,400	40,400	-	-	-	-	-
Install New SCADA System	UWT.18					5	700,000	-	140,000	140,000	140,000	140,000	140,000	-	-	-	-	-
Install Refrigerated Composite Samplers	UWT.19					20	101,000	-	-	-	-	-	-	-	-	-	-	-
Coordinate Permit Conditions with EPA	UWT.20					5	101,000	-	20,200	20,200	20,200	20,200	20,200	-	-	-	-	-
Install Filter for Incoming Power	UWT.21					20	397,000	-	-	-	-	-	-	-	-	-	-	-
Investigate Sampling and Testing Practices	UWT.22					10	81,000	-	-	-	-	-	-	16,200	16,200	16,200	16,200	16,200
Replace Pumps in Utility Water System	UWT.23					10	234,000	-	-	-	-	-	-	46,800	46,800	46,800	46,800	46,800
Wastewater Operations Building Upgrades and Remo	UWT.24					20	101,000	-	-	-	-	-	-	-	-	-	-	-
Generator Upgrades	UWT.25					5	754,000	-	150,800	150,800	150,800	150,800	150,800	-	-	-	-	-
Aunu'u Wastewater System Treatment and Design S	OWT.1					5	500,000	-	100,000	100,000	100,000	100,000	100,000	-	-	-	-	-
Manua Islands Septic Tank Installation	OWT.2					5	1,250,000	-	250,000	250,000	250,000	250,000	250,000	-	-	-	-	-
Tutuila On-Site Septic System Upgrade	OWT.3					10	2,500,000	-	-	-	-	-	-	500,000	500,000	500,000	500,000	500,000
Coconut Point Condition Assessment & Rehabilitatio	TCS.1					5	392,000	-	78,400	78,400	78,400	78,400	78,400	-	-	-	-	-
Papa Stream LS Condition Assessment & Rehabilitati	TCS.2					5	190,000	-	38,000	38,000	38,000	38,000	38,000	-	-	-	-	-

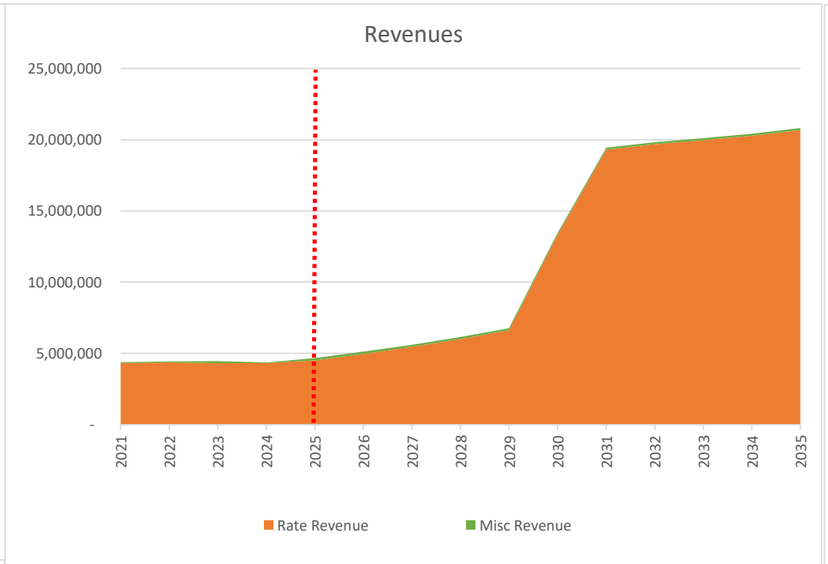
		Actuals			Actuals (est)	Historic	Future	Budget	Projected									
		2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Vaitele LS Condition Assessment & Rehabilitation	TCS.3					5	104,000	-	20,800	20,800	20,800	20,800	20,800	-	-	-	-	-
Skill Center LS Condition Assessment & Rehabilitatio	TCS.4					20	1,015,000	-	-	-	-	-	-	-	-	-	-	-
Airport LS Condition Assessment & Rehabilitation	TCS.5					20	213,000	-	-	-	-	-	-	-	-	-	-	-
Overall Tafuna Inflow and Infiltration Inspection/Ma	TCS.6						N/A	-	-	-	-	-	-	-	-	-	-	-
Tafuna Gravity Main Upsize	TCS.7					15	8,464,000	-	-	-	-	-	-	-	-	-	-	-
Vaitele Gravity Main Upszie	TCS.8					15	3,473,000	-	-	-	-	-	-	-	-	-	-	-
Papa Stream Gravity Main Upsize	TCS.9					15	3,315,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point Gravity Main Upsize	TCS.10					15	1,315,000	-	-	-	-	-	-	-	-	-	-	-
Vaitogi Collection System Expansion	TCS.11					10	5,765,000	-	-	-	-	-	-	1,153,000	1,153,000	1,153,000	1,153,000	1,153,000
Leone Collection System Expansion	TCS.12*					25	269,400,000	-	-	-	-	-	-	-	-	-	-	-
Malaeimi Sewer Extension Expansion	TCS.13					5	4,500,000	-	900,000	900,000	900,000	900,000	900,000	-	-	-	-	-
Upper Pavaiai Collection System Expansion	TCS.14					5	5,000,000	-	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	-	-	-	-	-
Aoloau Collection System Expansion	TCS.15					25	3,500,000	-	-	-	-	-	-	-	-	-	-	-
Overall Tafuna Lift Station Electrical/Control Upgrad	TCS.16						N/A	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #3 Lift Station Upgrades	TCS.17					15	370,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #2 Lift Station Upgrades	TCS.18					15	387,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #1 Lift Station Upgrades	TCS.19					15	1,251,000	-	-	-	-	-	-	-	-	-	-	-
Andy's Lift Station Upgrades	TCS.20					25	28,000	-	-	-	-	-	-	-	-	-	-	-
Sagamea Lift Station Upgrades	TCS.21					25	62,000	-	-	-	-	-	-	-	-	-	-	-
Papa Stream Lift Station Upgrades	TCS.22					15	1,521,000	-	-	-	-	-	-	-	-	-	-	-
Vaitele Lift Station Upgrades	TCS.23					5	3,152,000	-	630,400	630,400	630,400	630,400	630,400	-	-	-	-	-
Lavatai Lift Station Upgrades	TCS.24					15	194,000	-	-	-	-	-	-	-	-	-	-	-
Skill Center Lift Station Upgrades	TCS.25					25	162,000	-	-	-	-	-	-	-	-	-	-	-
Freddie's Beach Lift Station Upgrades	TCS.26					25	104,000	-	-	-	-	-	-	-	-	-	-	-
Leloaloa LS Condition Assessment & Rehabilitation	UCS.1					20	393,000	-	-	-	-	-	-	-	-	-	-	-
Atu'u LS Condition Assessment & Rehabilitation	UCS.2					5	135,000	-	27,000	27,000	27,000	27,000	27,000	-	-	-	-	-
Satala LS Condition Assessment & Rehabilitation	UCS.3					15	921,000	-	-	-	-	-	-	-	-	-	-	-
Korean LS Condition Assessment & Rehabilitation	UCS.4					15	528,000	-	-	-	-	-	-	-	-	-	-	-
Malaloa LS Condition Assessment & Rehabilitation	UCS.5					5	889,000	-	177,800	177,800	177,800	177,800	177,800	-	-	-	-	-
Utulei WWTP Condition Assessment & Rehabilitation	UCS.6					10	2,507,000	-	-	-	-	-	-	501,400	501,400	501,400	501,400	501,400
Faga'alu LS Condition Assessment & Rehabilitation	UCS.7					5	876,000	-	175,200	175,200	175,200	175,200	175,200	-	-	-	-	-
Overall Utulei Inflow and Infiltration Inspection/Mair	UCS.8						N/A	-	-	-	-	-	-	-	-	-	-	-
Malaloa Gravity Main Upsize	UCS.9					15	4,771,000	-	-	-	-	-	-	-	-	-	-	-
Matu'u to Faganeanea Collection System Extension	UCS.10					15	600,000	-	-	-	-	-	-	-	-	-	-	-
Upper Pago Pago Bay Area Extension	UCS.11					5	3,500,000	-	700,000	700,000	700,000	700,000	700,000	-	-	-	-	-
Overall Utulei Lift Station Electrical/Control Upgrade	UCS.12						N/A	-	-	-	-	-	-	-	-	-	-	-
Atu'u Lift Station Upgrades	UCS.13					15	194,000	-	-	-	-	-	-	-	-	-	-	-
Satala Lift Station Upgrades	UCS.14					10	685,000	-	-	-	-	-	-	137,000	137,000	137,000	137,000	137,000
Korean Lift Station Upgrades	UCS.15					15	179,000	-	-	-	-	-	-	-	-	-	-	-
Malaloa Lift Station Upgrades	UCS.16					15	1,416,000	-	-	-	-	-	-	-	-	-	-	-
Faga'alu Lift Station Upgrades	UCS.17					5	1,966,000	-	393,200	393,200	393,200	393,200	393,200	-	-	-	-	-
Matafao Lift Station Upgrades	UCS.18					25	388,000	-	-	-	-	-	-	-	-	-	-	-
Aunu'u Lift Station Improvements	ACS.1					10	292,000	-	-	-	-	-	-	58,400	58,400	58,400	58,400	58,400
Oxidization Ditch - Secondary Treatment						5	341,134,000	-	68,226,800	68,226,800	68,226,800	68,226,800	68,226,800	-	-	-	-	-
Depreciation or Asset Replacement		-	-	-	-			-										
Total Capital Projects		$ 3,021,793	$ 6,927,412	$ 3,928,820	$ 8,822,356		$ 719,856,710	$ 6,283,710	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128
Change in Cash		$ 1,107,036	$ 541,971	$ 200,540	$ (431,500)			$ 407,327	$ (211,274)	$ 126,110	$ 508,423	$ 940,493	$ (1,339,652)	$ (19,333)	$ 46,545	$ 12,167	$ (27,669)	$ 28,154
Beginning Cash		-	-	-	-			(431,500)	(24,173)	(235,448)	(109,338)	399,085	1,339,579	(73)	(19,406)	27,140	39,307	11,637
Ending Cash		$ 1,107,036	$ 541,971	$ 200,540	$ (431,500)			$ (24,173)	$ (235,448)	$ (109,338)	$ 399,085	$ 1,339,579	$ (73)	$ (19,406)	$ 27,140	$ 39,307	$ 11,637	$ 39,791
Reserve Fund Target		3,275,986	3,885,680	4,084,401	4,801,180			6,199,290	5,328,739	5,488,601	5,653,259	5,822,857	5,997,542	10,663,521	10,983,426	11,312,929	11,652,317	12,001,887
Above/(Below) Target		(2,168,950)	(3,343,709)	(3,883,861)	(5,232,680)			(6,223,463)	(5,564,186)	(5,597,939)	(5,254,174)	(4,483,278)	(5,997,616)	(10,682,926)	(10,956,287)	(11,273,622)	(11,640,680)	(11,962,095)

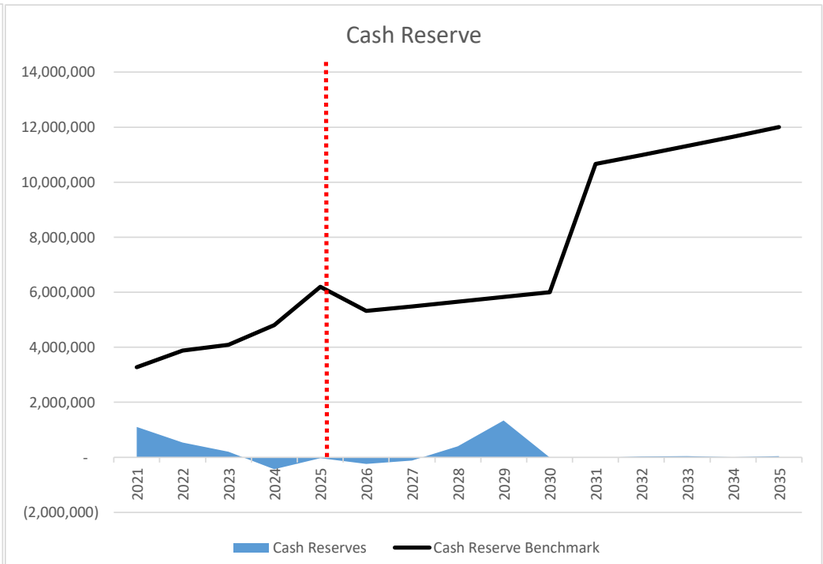
American Samoa Power Authority

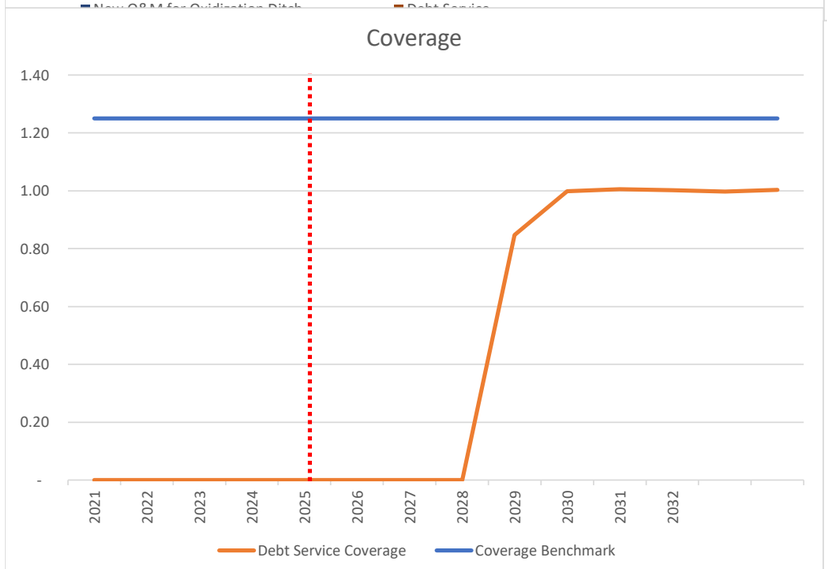
Ground Water Protection Rate Analysis - Secondary Treatment

Scenario 3: Master Plan; Oxidization Ditch; 50% Grant; 50% Bonds; Rate Increase for O&M









American Samoa Power Authority

Ground Water Protection Rate Analysis - Secondary Treatment

Scenario 4: Master Plan; Oxidization Ditch; 0% Grant; 100% Bonds; F

1.50% $ 35.67

County AMHI $ 28,539

								$ (461,469)	$ (821,304)	$ (1,096,609)	$ (1,279,865)	$ 13,313	$ 3,209	$ 10,259	$ 487	$ 24,923	$ 20,019				
	Actuals			Actuals (est)	Historic	Future	Budget	Projected													
	2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035				
Number of Connections	Estimated					**0.0%**															
Total Accounts	10,288	10,288	10,315	10,396		-	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315	10,315				
Rate Per Account Type								**5.0%**	**5.0%**	**5.0%**	**5.0%**	**350.0%**	**13.6%**	**1.2%**	**1.1%**	**1.3%**	**1.1%**				
Average Charge per Account per Month	$ 35.50	$ 35.86	$ 35.95	$ 35.03			$ 37.69	$ 39.52	$ 41.43	$ 43.45	$ 45.56	$ 200.93	$ 228.09	$ 230.82	$ 233.34	$ 236.36	$ 238.95				
Operating Revenue																					
Rate Revenue	$ 4,325,754	$ 4,376,651	$ 4,307,345	$ 4,314,680	115.8%	-	$ 4,520,422	$ 4,746,443	$ 4,983,765	$ 5,232,954	$ 5,494,601	$ 24,725,706	$ 28,088,402	$ 28,425,463	$ 28,738,143	$ 29,111,739	$ 29,431,968				
Miscellaneous Revenue	57,269	51,000	143,103	55,000		0.00%	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000	145,000				
Total Operating Revenue	$ 4,383,023	$ 4,427,651	$ 4,450,448	$ 4,369,680			$ 4,665,422	$ 4,891,443	$ 5,128,765	$ 5,377,954	$ 5,639,601	$ 24,870,706	$ 28,233,402	$ 28,570,463	$ 28,883,143	$ 29,256,739	$ 29,576,968				
Operating Costs		Budget		Budget																	
Personnel Services (5100)	$ 1,092,057	$ 1,995,500	$ 2,037,795	$ 2,129,000	24.9%	3.00%	$ 2,204,000	$ 2,270,120	$ 2,338,224	$ 2,408,370	$ 2,480,621	$ 2,555,040	$ 2,631,691	$ 2,710,642	$ 2,791,961	$ 2,875,720	$ 2,961,992				
Material & Supplies (5200)	783,993	511,500	250,576	541,000	-11.6%	3.00%	1,551,000	541,000	557,230	573,947	591,165	608,900	627,167	645,982	665,362	685,323	705,882				
Contractual Services (5300) *minus Capital*	123,680	123,680	123,680	123,680	0.0%	3.00%	221,290	227,929	234,767	241,810	249,064	256,536	264,232	272,159	280,324	288,733	297,395				
Travel (5400)	4,048	46,000	7,836	15,500	56.4%	3.00%	19,000	19,570	20,157	20,762	21,385	22,026	22,687	23,368	24,069	24,791	25,534				
All Others (5500)	1,139,242	829,500	1,379,177	1,382,500	6.7%	3.00%	1,513,500	1,558,905	1,605,672	1,653,842	1,703,458	1,754,561	1,807,198	1,861,414	1,917,257	1,974,774	2,034,017				
Equipment (5600)	132,966	379,500	285,337	609,500	66.1%	3.00%	690,500	711,215	732,551	754,528	777,164	800,479	824,493	849,228	874,705	900,946	927,974				
New O&M for Oxidization Ditch					3,756,998	3.00%	-	-	-	-	-	-	4,486,052	4,620,634	4,759,253	4,902,030	5,049,091				
						3.00%	-	-	-	-	-	-	-	-	-	-	-				
						3.00%	-	-	-	-	-	-	-	-	-	-	-				
						3.00%	-	-	-	-	-	-	-	-	-	-	-				
						3.00%	-	-	-	-	-	-	-	-	-	-	-				
Depreciation		2,381,679	2,690,636	2,690,636		3.00%	2,690,636	2,771,355	2,854,496	2,940,131	3,028,335	3,119,185	3,212,760	3,309,143	3,408,417	3,510,670	3,615,990				
						3.00%															
Remove Depreciation Expense	-	(2,381,679)	(2,690,636)	(2,690,636)		3.00%	(2,690,636)	(2,771,355)	(2,854,496)	(2,940,131)	(3,028,335)	(3,119,185)	(3,212,760)	(3,309,143)	(3,408,417)	(3,510,670)	(3,615,990)				
Total Operating Costs	$ 3,275,986	$ 3,885,680	$ 4,084,401	$ 4,801,180			$ 6,199,290	$ 5,328,739	$ 5,488,601	$ 5,653,259	$ 5,822,857	$ 5,997,542	$ 10,663,521	$ 10,983,426	$ 11,312,929	$ 11,652,317	$ 12,001,887				
Net Operating Income	$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ 18,873,163	$ 17,569,881	$ 17,587,036	$ 17,570,214	$ 17,604,422	$ 17,575,081				
Non-Operating																					
								-	-	-	-	-	-	-	-	-	-				
Total Non-Operating Revenuse (Expenses)	$ -	$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				
Net Revenue Before Debt Service	$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ 18,873,163	$ 17,569,881	$ 17,587,036	$ 17,570,214	$ 17,604,422	$ 17,575,081				
Debt Service Coverage Ratio												1.07	1.00	1.00	1.00	1.00	1.00				
Debt Service																					
USDA - Loan											$	17,579,986	$ 17,579,986	$ 17,579,986	$ 17,579,986	$ 17,579,986	$ 17,579,986				
Total Debt Service	$ -	$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -	$ 17,579,986	$ 17,579,986	$ 17,579,986	$ 17,579,986	$ 17,579,986	$ 17,579,986				
Net After Debt Service	$ 1,107,036	$ 541,971	$ 366,047	$ (431,500)			$ (1,533,868)	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ 1,293,178	$ (10,105)	$ 7,051	$ (9,772)	$ 24,436	$ (4,904)				
Other Sources																					
Bonds Proceeds 100%								$ 68,226,800	$ 68,226,800	$ 68,226,800	$ 68,226,800	$ 68,226,800	$ -	$ -	$ -	$ -	$ -				
Grant Revenue - Master Plan	3,021,793	6,927,412	3,763,313	8,822,356			8,224,905	6,866,600	6,866,600	6,866,600	6,866,600	6,866,600	2,883,128	2,883,128	2,883,128	2,883,128	2,883,128				
Grant Revenue - Secondary Treatment 0%								$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				
									-	-	-	-	-	-	-	-	-				
									-	-	-	-	-	-	-	-	-				
										-	-	-	-	-	-	-	-				
Total Other Sources	$ 3,021,793	$ 6,927,412	$ 3,763,313	$ 8,822,356	$ -	$ -	$ 8,224,905	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128				

		Actuals			Actuals (est)	Historic	Future	Budget	Projected									
		2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Capital Projects									5	5	5	5	5	10	10	10	10	10
Grant Funded Projects		$ 3,021,793	$ 6,927,412	$ 3,928,820	$ 8,822,356	2025	$ 6,283,710	$ 6,283,710	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
I/I Study	G.1					5	805,000	-	161,000	161,000	161,000	161,000	161,000	-	-	-	-	-
GIS & Asset Management	G.2					5	21,000	-	4,200	4,200	4,200	4,200	4,200	-	-	-	-	-
CCTV Inspections	G.3					5	1,332,000	-	266,400	266,400	266,400	266,400	266,400	-	-	-	-	-
Wastewater Construction Standards Update	G.4					5	121,000	-	24,200	24,200	24,200	24,200	24,200	-	-	-	-	-
Install Influent WWTP Flow Meter	TWT.1					10	182,000	-	-	-	-	-	-	36,400	36,400	36,400	36,400	36,400
Corrosion Protection for Headworks	TWT.2					10	56,140	-	-	-	-	-	-	11,228	11,228	11,228	11,228	11,228
Miscellaneous Electrical Improvements of Screens	TWT.3					5	610,000	-	122,000	122,000	122,000	122,000	122,000	-	-	-	-	-
Install FRP grating Over the Grit Channels	TWT.4					15	43,360		-	-	-	-	-	-	-	-	-	-
Provide Spare Pump and Parts for Influent Pump Sta	TWT.5					15	103,000		-	-	-	-	-	-	-	-	-	-
Upsize Influent Pumps	TWT.6					15	345,000		-	-	-	-	-	-	-	-	-	-
Install a Parallel Headworks Train	TWT.7					15	2,062,000		-	-	-	-	-	-	-	-	-	-
Install a New Bypass Pipe	TWT.8					10	132,000		-	-	-	-	-	26,400	26,400	26,400	26,400	26,400
Replace Piping in Scum Pits	TWT.9					10	84,000		-	-	-	-	-	16,800	16,800	16,800	16,800	16,800
Replace Drive for Clarigester #2 and #3	TWT.10					5	1,433,000		286,600	286,600	286,600	286,600	286,600	-	-	-	-	-
Replace Grating of the Walkway and Railing of the Cl	TWT.11					5	693,000		138,600	138,600	138,600	138,600	138,600	-	-	-	-	-
Record Hourly Flow	TWT.12					5	-		-	-	-	-	-	-	-	-	-	-
Recoat Exposed Piping	TWT.13					10	106,000		-	-	-	-	-	21,200	21,200	21,200	21,200	21,200
Recalibrate UVT meter	TWT.14					10	40,000		-	-	-	-	-	8,000	8,000	8,000	8,000	8,000
New UV Shed for Corrosion Protection	TWT.15					5	654,000		130,800	130,800	130,800	130,800	130,800	-	-	-	-	-
Miscellaneous Channel Improvements	TWT.16					10	70,000		-	-	-	-	-	14,000	14,000	14,000	14,000	14,000
Provide Backup Power to the AC unit in the UV Contr	TWT.17					5	225,000		45,000	45,000	45,000	45,000	45,000	-	-	-	-	-
Backup Disinfection Design Study	TWT.18					5	212,000		42,400	42,400	42,400	42,400	42,400	-	-	-	-	-
Outfall Modification Study	TWT.19					10	202,000		-	-	-	-	-	40,400	40,400	40,400	40,400	40,400
Dewatering Infrastructure Improvements	TWT.20					10	289,000		-	-	-	-	-	57,800	57,800	57,800	57,800	57,800
Install New SCADA System	TWT.21					5	700,000		140,000	140,000	140,000	140,000	140,000	-	-	-	-	-
Install Refrigerated Composite Samplers	TWT.22					15	101,000		-	-	-	-	-	-	-	-	-	-
Coordinate Permit Conditions with EPA	TWT.23					5	101,000		20,200	20,200	20,200	20,200	20,200	-	-	-	-	-
Install Filter for Incoming Power	TWT.24					20	397,000		-	-	-	-	-	-	-	-	-	-
Investigate Sampling and Testing Practices	TWT.25					10	101,000		-	-	-	-	-	20,200	20,200	20,200	20,200	20,200
Raise the Grade of the Plant Drain Lift Station	TWT.26					10	9,100		-	-	-	-	-	1,820	1,820	1,820	1,820	1,820
Wastewater Operations Building Upgrades and Remo	TWT.27					10	101,000		-	-	-	-	-	20,200	20,200	20,200	20,200	20,200
Generator Upgrades	TWT.28					5	591,000		118,200	118,200	118,200	118,200	118,200	-	-	-	-	-
Install Redundant Utility Water Pump	TWT.29					20	109,000	-	-	-	-	-	-	-	-	-	-	-
New Headworks Building with Screen and Grit Remo	UWT.1					20	15,498,000	-	-	-	-	-	-	-	-	-	-	-
Install Automatic Wet Basket Screen	UWT.2					20	166,000	-	-	-	-	-	-	-	-	-	-	-
Install Influent Flow Meter	UWT.3					10	152,000	-	-	-	-	-	-	30,400	30,400	30,400	30,400	30,400
Corrosion Protection for Headworks	UWT.4					10	46,400	-	-	-	-	-	-	9,280	9,280	9,280	9,280	9,280
Provide Spare Pump and Parts for Influent Pump Sta	UWT.5					15	103,000	-	-	-	-	-	-	-	-	-	-	-
Replace Piping in Scum Pits	UWT.6					10	132,000	-	-	-	-	-	-	26,400	26,400	26,400	26,400	26,400
Replace Drive for Clarigester #2 and #3	UWT.7					5	1,433,000	-	286,600	286,600	286,600	286,600	286,600	-	-	-	-	-
Replace Walkway and Railing of the Clarigester	UWT.8					5	703,000	-	140,600	140,600	140,600	140,600	140,600	-	-	-	-	-
Fix Cracks in the Clarigester	UWT.9					5	51,000	-	10,200	10,200	10,200	10,200	10,200	-	-	-	-	-
Record Hourly Flow	UWT.10					5	-	-	-	-	-	-	-	-	-	-	-	-
Recoat Exposed Piping	UWT.11					10	64,000	-	-	-	-	-	-	12,800	12,800	12,800	12,800	12,800
Recalibrate UVT meter	UWT.12					10	18,000	-	-	-	-	-	-	3,600	3,600	3,600	3,600	3,600
New UV Shed for Corrosion Protection	UWT.13					10	486,000	-	-	-	-	-	-	97,200	97,200	97,200	97,200	97,200
Miscellaneous Channel Improvements	UWT.14					10	81,000	-	-	-	-	-	-	16,200	16,200	16,200	16,200	16,200
Backup Disinfection Design Study	UWT.15					5	212,000	-	42,400	42,400	42,400	42,400	42,400	-	-	-	-	-
Provide Backup Power to the AC unit in the UV Contr	UWT.16					5	225,000	-	45,000	45,000	45,000	45,000	45,000	-	-	-	-	-
Outfall Modification Study	UWT.17					5	202,000	-	40,400	40,400	40,400	40,400	40,400	-	-	-	-	-
Install New SCADA System	UWT.18					5	700,000	-	140,000	140,000	140,000	140,000	140,000	-	-	-	-	-
Install Refrigerated Composite Samplers	UWT.19					20	101,000	-	-	-	-	-	-	-	-	-	-	-
Coordinate Permit Conditions with EPA	UWT.20					5	101,000	-	20,200	20,200	20,200	20,200	20,200	-	-	-	-	-
Install Filter for Incoming Power	UWT.21					20	397,000	-	-	-	-	-	-	-	-	-	-	-
Investigate Sampling and Testing Practices	UWT.22					10	81,000	-	-	-	-	-	-	16,200	16,200	16,200	16,200	16,200
Replace Pumps in Utility Water System	UWT.23					10	234,000	-	-	-	-	-	-	46,800	46,800	46,800	46,800	46,800
Wastewater Operations Building Upgrades and Remo	UWT.24					20	101,000	-	-	-	-	-	-	-	-	-	-	-
Generator Upgrades	UWT.25					5	754,000	-	150,800	150,800	150,800	150,800	150,800	-	-	-	-	-
Aunu'u Wastewater System Treatment and Design S	OWT.1					5	500,000	-	100,000	100,000	100,000	100,000	100,000	-	-	-	-	-
Manua Islands Septic Tank Installation	OWT.2					5	1,250,000	-	250,000	250,000	250,000	250,000	250,000	-	-	-	-	-
Tutuila On-Site Septic System Upgrade	OWT.3					10	2,500,000	-	-	-	-	-	-	500,000	500,000	500,000	500,000	500,000
Coconut Point Condition Assessment & Rehabilitatio	TCS.1					5	392,000	-	78,400	78,400	78,400	78,400	78,400	-	-	-	-	-
Papa Stream LS Condition Assessment & Rehabilitati	TCS.2					5	190,000	-	38,000	38,000	38,000	38,000	38,000	-	-	-	-	-

		Actuals			Actuals (est)	Historic	Future	Budget	Projected									
		2021	2022	2023	2024	Growth Rate	Growth Rate	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Vaitele LS Condition Assessment & Rehabilitation	TCS.3					5	104,000	-	20,800	20,800	20,800	20,800	20,800	-	-	-	-	-
Skill Center LS Condition Assessment & Rehabilitatio	TCS.4					20	1,015,000	-	-	-	-	-	-	-	-	-	-	-
Airport LS Condition Assessment & Rehabilitation	TCS.5					20	213,000	-	-	-	-	-	-	-	-	-	-	-
Overall Tafuna Inflow and Infiltration Inspection/Ma	TCS.6						N/A	-	-	-	-	-	-	-	-	-	-	-
Tafuna Gravity Main Upsize	TCS.7					15	8,464,000	-	-	-	-	-	-	-	-	-	-	-
Vaitele Gravity Main Upszie	TCS.8					15	3,473,000	-	-	-	-	-	-	-	-	-	-	-
Papa Stream Gravity Main Upsize	TCS.9					15	3,315,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point Gravity Main Upsize	TCS.10					15	1,315,000	-	-	-	-	-	-	-	-	-	-	-
Vaitogi Collection System Expansion	TCS.11					10	5,765,000	-	-	-	-	-	-	1,153,000	1,153,000	1,153,000	1,153,000	1,153,000
Leone Collection System Expansion	TCS.12*					25	269,400,000	-	-	-	-	-	-	-	-	-	-	-
Malaeimi Sewer Extension Expansion	TCS.13					5	4,500,000	-	900,000	900,000	900,000	900,000	900,000	-	-	-	-	-
Upper Pavaiai Collection System Expansion	TCS.14					5	5,000,000	-	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	-	-	-	-	-
Aoloau Collection System Expansion	TCS.15					25	3,500,000	-	-	-	-	-	-	-	-	-	-	-
Overall Tafuna Lift Station Electrical/Control Upgrad	TCS.16						N/A	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #3 Lift Station Upgrades	TCS.17					15	370,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #2 Lift Station Upgrades	TCS.18					15	387,000	-	-	-	-	-	-	-	-	-	-	-
Coconut Point #1 Lift Station Upgrades	TCS.19					15	1,251,000	-	-	-	-	-	-	-	-	-	-	-
Andy's Lift Station Upgrades	TCS.20					25	28,000	-	-	-	-	-	-	-	-	-	-	-
Sagamea Lift Station Upgrades	TCS.21					25	62,000	-	-	-	-	-	-	-	-	-	-	-
Papa Stream Lift Station Upgrades	TCS.22					15	1,521,000	-	-	-	-	-	-	-	-	-	-	-
Vaitele Lift Station Upgrades	TCS.23					5	3,152,000	-	630,400	630,400	630,400	630,400	630,400	-	-	-	-	-
Lavatai Lift Station Upgrades	TCS.24					15	194,000	-	-	-	-	-	-	-	-	-	-	-
Skill Center Lift Station Upgrades	TCS.25					25	162,000	-	-	-	-	-	-	-	-	-	-	-
Freddie's Beach Lift Station Upgrades	TCS.26					25	104,000	-	-	-	-	-	-	-	-	-	-	-
Leloaloa LS Condition Assessment & Rehabilitation	UCS.1					20	393,000	-	-	-	-	-	-	-	-	-	-	-
Atu'u LS Condition Assessment & Rehabilitation	UCS.2					5	135,000	-	27,000	27,000	27,000	27,000	27,000	-	-	-	-	-
Satala LS Condition Assessment & Rehabilitation	UCS.3					15	921,000	-	-	-	-	-	-	-	-	-	-	-
Korean LS Condition Assessment & Rehabilitation	UCS.4					15	528,000	-	-	-	-	-	-	-	-	-	-	-
Malaloa LS Condition Assessment & Rehabilitation	UCS.5					5	889,000	-	177,800	177,800	177,800	177,800	177,800	-	-	-	-	-
Utulei WWTP Condition Assessment & Rehabilitation	UCS.6					10	2,507,000	-	-	-	-	-	-	501,400	501,400	501,400	501,400	501,400
Faga'alu LS Condition Assessment & Rehabilitation	UCS.7					5	876,000	-	175,200	175,200	175,200	175,200	175,200	-	-	-	-	-
Overall Utulei Inflow and Infiltration Inspection/Mair	UCS.8						N/A	-	-	-	-	-	-	-	-	-	-	-
Malaloa Gravity Main Upsize	UCS.9					15	4,771,000	-	-	-	-	-	-	-	-	-	-	-
Matu'u to Faganeanea Collection System Extension	UCS.10					15	600,000	-	-	-	-	-	-	-	-	-	-	-
Upper Pago Pago Bay Area Extension	UCS.11					5	3,500,000	-	700,000	700,000	700,000	700,000	700,000	-	-	-	-	-
Overall Utulei Lift Station Electrical/Control Upgrade	UCS.12						N/A	-	-	-	-	-	-	-	-	-	-	-
Atu'u Lift Station Upgrades	UCS.13					15	194,000	-	-	-	-	-	-	-	-	-	-	-
Satala Lift Station Upgrades	UCS.14					10	685,000	-	-	-	-	-	-	137,000	137,000	137,000	137,000	137,000
Korean Lift Station Upgrades	UCS.15					15	179,000	-	-	-	-	-	-	-	-	-	-	-
Malaloa Lift Station Upgrades	UCS.16					15	1,416,000	-	-	-	-	-	-	-	-	-	-	-
Faga'alu Lift Station Upgrades	UCS.17					5	1,966,000	-	393,200	393,200	393,200	393,200	393,200	-	-	-	-	-
Matafao Lift Station Upgrades	UCS.18					25	388,000	-	-	-	-	-	-	-	-	-	-	-
Aunu'u Lift Station Improvements	ACS.1					10	292,000	-	-	-	-	-	-	58,400	58,400	58,400	58,400	58,400
Oxidization Ditch - Secondary Treatment						5	341,134,000	-	68,226,800	68,226,800	68,226,800	68,226,800	68,226,800	-	-	-	-	-
Depreciation or Asset Replacement		-	-	-	-			-										
Total Capital Projects		$ 3,021,793	$ 6,927,412	$ 3,928,820	$ 8,822,356		$ 719,856,710	$ 6,283,710	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 75,093,400	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128	$ 2,883,128
Change in Cash		$ 1,107,036	$ 541,971	$ 200,540	$ (431,500)			$ 407,327	$ (437,296)	$ (359,836)	$ (275,305)	$ (183,255)	$ 1,293,178	$ (10,105)	$ 7,051	$ (9,772)	$ 24,436	$ (4,904)
Beginning Cash		-	-	-	-			(431,500)	(24,173)	(461,469)	(821,304)	(1,096,609)	(1,279,865)	13,313	3,209	10,259	487	24,923
Ending Cash		$ 1,107,036	$ 541,971	$ 200,540	$ (431,500)			$ (24,173)	$ (461,469)	$ (821,304)	$ (1,096,609)	$ (1,279,865)	$ 13,313	$ 3,209	$ 10,259	$ 487	$ 24,923	$ 20,019
Reserve Fund Target		3,275,986	3,885,680	4,084,401	4,801,180			6,199,290	5,328,739	5,488,601	5,653,259	5,822,857	5,997,542	10,663,521	10,983,426	11,312,929	11,652,317	12,001,887
Above/(Below) Target		(2,168,950)	(3,343,709)	(3,883,861)	(5,232,680)			(6,223,463)	(5,790,207)	(6,309,905)	(6,749,868)	(7,102,721)	(5,984,229)	(10,660,312)	(10,973,167)	(11,312,442)	(11,627,394)	(11,981,868)

American Samoa Power Authority

Ground Water Protection Rate Analysis - Secondary Treatment

Scenario 4: Master Plan; Oxidization Ditch; 0% Grant; 100% Bonds; Rate Increase for O&M

