SCOPE OF WORK

WASTEWATER ADVANCED PRIMARY TREATMENT UPGRADE STUDY

(Utulei & Tafuna WWTP)

1. **Project Background:**

This study project is the result of the August 6, 2025, letter USEPA sent to American Samoa Power Authority (ASPA) to address our need to meet the Clean Water Act (CWA) requirement. In light of the 2025 Secondary Treatment Feasibility Study, the letter requires ASPA to take certain actions to meet the CWA requirements and improve effluent quality. The project needs to be prioritized for action in the FY 2025 Project Priority List and Construction Grant workplan.

The two wastewater treatment plants, Tafuna and Utulei, both use primary wastewater treatment system. The wastewater enters the treatment plant at the Influent Well and from there influent flows into the headworks using pumps. From the headworks, the influent flows by gravity into the clarigester where the settling process takes place. The solids settle then move into the digester and the effluent passes through the weir to the UV System for disinfection then into the outfall. There is no coagulation or flocculation used to enhance settling in these two systems.

2. **Project Goal and Objectives**

The goal and objective of this project are to improve effluent quality at both Utulei and Tafuna Wastewater Treatment Plant (WWTP) by improving BOD, TSS, and potentially nutrient removal. This, in turn, will improve water quality. An Engineering Consultant will be hired to carry out a feasibility study on upgrading to Advanced Primary Treatment to meet the requirements of the CWA and Water Quality Standard.

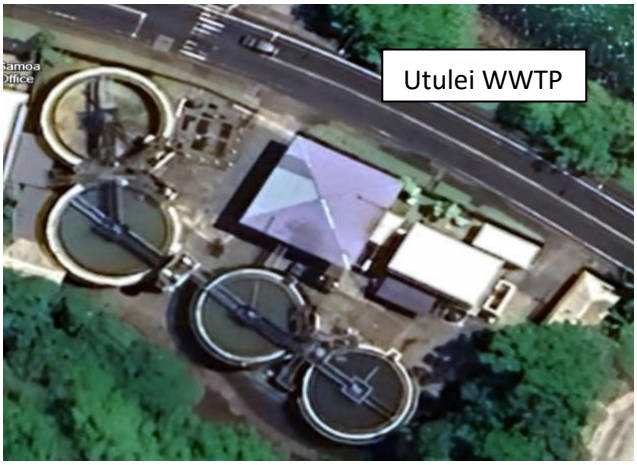
3. **Project Description:**

The project will carry out a feasibility study with a conceptual design to upgrade both WWTPs to Advanced Primary Treatment. The Consultant will consider various primary enhancements and advanced systems and look at which option will work with our treatment facilities at an affordable cost and within their existing footprints. ASPA is looking at the Chemically Enhanced Primary Treatment

option to use, and hopes this will improve the performance of our current UV System. Basically, using this recommended option will help ASPA meet CWA requirements and Water Quality Standards here in American Samoa. The drive is to use our existing infrastructure to enhance influent treatment so that we can improve settling of suspended solids, therefore reducing suspended solids overflowing into the UV Systems. In allowing this to happen, we are maximizing the use of the UV System and improving disinfection. This will help our systems meet regulatory standards.

4. **Project Area:**

This project will focus on Tafuna and Utulei WWTP.



5. SCOPE OF WORK (SOW): TAFUNA AND UTULEI WWTP ADVANCED PRIMARY TREATMENT STUDY

1. PROJECT OBJECTIVE AND GOAL

The objective of this Study is to evaluate, select, and develop a conceptual design for an Advanced Primary Treatment (APT) system at the **Tafuna & Utulei WWTPs**. The upgrade is driven by the critical need to improve effluent quality and meet strict National Pollutant Discharge Elimination System (NPDES) permit requirements, federal effluent guidelines and ASEPA Water Quality Standards.

To maximize capital efficiency and minimize the physical footprint, the study will focus on retrofitting, modifying, or integrating with the plant's existing infrastructure. This includes leveraging the current headworks, influent channel, influent well, and primary clarifiers, prior to downstream Ultra-Violet (UV) disinfection and ocean outfall discharge. The engineering solutions must perform reliably across a current low-flow regime (1.5 MGD to 3.5 MGD) while providing a seamless scaling pathway to the ultimate 6 MGD design capacity.

2. SCOPE OF SERVICES

Task 1: Existing Infrastructure Condition & Hydraulic Assessment

- **Blueprint and Data Review:** Review original structural blueprints, hydraulic profiles, and as-built drawings provided by ASPA for the headworks, influent channel, and influent well, and primary clarifiers to establish baseline physical constraints.
- **Low-Flow Hydraulic Modeling:** Analyze current low-flow ranges (1.5–3.5 MGD) within the existing structures to identify risks of over-detention, solids deposition in channels, septicity, and odors.
- **Permit Baseline Deficit Analysis:** Compare the historical performance of the existing clarifier configuration against target numeric thresholds for Total Suspended Solids (TSS) and Biochemical Oxygen Demand (BOD) mandated by the U.S. EPA Region 9 and ASEPA
- **UV Interface Baseline:** Evaluate how current clarifier effluent quality affects downstream UV transmittance (UVT) and quartz sleeve fouling.

Task 2: Retrofit and Integration Technology Screening

- **In-Structure Retrofit Options:** Screen advanced treatment options that can be direct-fit retrofits into existing footprints. This includes converting current clarifiers to Chemically Enhanced Primary Treatment (CEPT) or high-rate ballasted settling.
- **Adjacent/In-Line Option:** At least one alternative should consider dosing and mixing before the clarifiers. This may include direct injection into the influent channel or existing pipeline or looking at a specialized mixing tanks built right next to the existing primary clarifier.
- **Technologies:** Technologies to be used for CEPT shall fit into the current footprint available within the treatment plants.
- **Turndown and Modular Scaling:** Evaluate how each option scales from current low-flows up to the 6 MGD design flow using existing structures without causing backups or short-circuiting.
- **UV System Protection:** Rank shortlisted technologies based on their ability to consistently reduce fine particulates and enhance downstream UV disinfection.

Task 3: Bench-Scale / Pilot Treatability Studies

- **Chemical Application Optimization:** Execute jar testing protocols to determine optimal chemical coagulant and polymer dosing needed to lower TSS using the existing clarifier hydraulics.
- **Mixing and Flocculation Assessment:** Determine where and how chemicals should be introduced (e.g., flash mixing within the existing influent channel or influent well) to ensure proper flocculation.
- **Sludge Production Analysis:** Quantify the volume and characteristics of the advanced primary sludge to ensure downstream processes can accommodate the increased solids load.

- **UVT Enhancement Validation:** Measure the change in UV transmittance during testing to confirm the downstream operational benefits.

Task 4: Solids Handling & Sludge Infrastructure Evaluation

- **Existing Pump Evaluation:** Inspect and test the performance capabilities of the existing primary sludge pumps and associated piping to determine if they can handle the higher-density, higher-viscosity and larger volume sludge generated by the proposed APT system.
- **Capacity & Wear Assessment:** Evaluate the existing sludge infrastructure for capacity limitations, potential for plugging, and expected wear and tear under increased solids loading.
- **Upgrade Recommendations:** Determine whether the existing pumps can be reused, retrofitted with variable frequency drives (VFDs), or if complete replacement with new, heavy-duty solids pumps is required.

Task 5: Automated Dosing Controls & Process Automation

- **Flow-Paced Controls Evaluation:** Evaluate and design an automated chemical dosing control system (e.g., flow-paced and/or water quality-paced dosing pumps) capable of dynamically adjusting chemical feed rates to match the rapid daily flow shifts between 1.5 MGD and 3.5 MGD.
- **Over-dosing and Under-dosing Mitigation:** Develop control strategies to prevent chemical over-dosing during low-flow periods (which causes chemical waste and downstream fouling) and under-dosing during peak diurnal flows (which risks permit non-compliance).
- **SCADA Integration:** Outline the instrumentation, flow meters, and control logic required to integrate the new automated dosing system into the plant's existing or future SCADA network.

Task 6: Spatial Engineering & Conceptual Retrofit Layouts

- **Repurposing & Integration Layouts:** Draft preliminary engineering drawings showing how the shortlisted APT technologies will integrate into the existing headworks, channels, influent well, and clarifiers.
- **Hydraulic Profile & Mass Balance:** Generate a hydraulic profile proving that gravity-driven flow is maintained from the headworks through modified structures to the UV channels without intermediate pumping.
- **Phased Implementation Plan:** Develop a sequencing plan that details how to construct or install retrofits within existing tanks while keeping the plant operational and compliant.

Task 7: Business Case & Life Cycle Cost Analysis (LCCA)

- **Capital Cost (CAPEX):** Develop an AACE Class 4 cost estimate (+50%/-30%) factoring in cost savings from reusing existing concrete structures and evaluating whether existing sludge pumps are retained or replaced. Costs must be tailored for the isolated island logistics of American Samoa.

- **Operational Cost (OPEX):** Quantify long-term chemical procurement, power consumption, and maintenance costs across low-flow and full-capacity periods, factoring in efficiency gains from automated dosing.
- **Net Present Value (NPV):** Complete a 20-year NPV calculation comparing the financial sustainability of an in-tank chemical retrofit versus an in-line mechanical upgrade.
- **Cost to Customer:** Evaluate how much additional cost our customer will pay if we introduce this advance primary treatment (APT)

Task 8: ASPA Leadership Technical Workshop & Alignment

- **Workshop Preparation:** Develop a comprehensive presentation detailing the study's findings, shortlisted alternatives, layout options, lifecycle costs, and operational impacts.
- **Formal Presentation:** Host an interactive technical workshop with **ASPA Executive Leadership and Operations Teams** to review findings, gather feedback, and select the preferred treatment alternative.
- **Feedback Integration:** After the workshop, document all decisions and reasoning and resolve all comments and questions in the final engineering report.

Task 9: Environmental & Permitting Review

- **Permit Modification Roadmap:** Detail the necessary administrative documentation required by the U.S. EPA and the American Samoa Environmental Protection Agency (ASEPA) to update the facility's active NPDES operating permit.
- **Environmental Impact:** Provide and assess how the chemical used can exhibit or contribute to any environmental challenges and ways to mitigate this impact.

Task 10: Design Criteria to Support Design RFP

The consultant, as part of this study shall put together a design package for the recommended alternative:

- Deign Standard and criteria that shall provide and govern the WW Advance Primary Design as per study recommendation
- A standard bid document for the design proposal for the RFP
- Put together additional working documents that shall govern the design scope of work
- The design scope of work shall be used for the design of the WW Advance Primary Treatment recommended in the study.

3. DELIVERABLES & TIMELINE

This project shall be delivered within a timeline of 180 calendar days from the day of NTP issuance.

1. **The report shall be submitted in logical increments similar to the following:**

i. Milestone schedule and timeline

ii. Outline of report submittal

iii. 30% submittal

iv. 60% submittal

v. 90% submittal

vi. Final draft submittal. Final report is complete once ASPA and USEPA approves of and signs Final submittal.

vii. Each submittal will be succeeded by an ASPA and USEPA review with comments within 20 calendar days. These comments shall be addressed and incorporated into the next submittal. Also, a comment and response list shall be maintained and shared with ASPA.

viii. It shall be mandatory that monthly meetings between ASPA and the consultant shall be scheduled by the consultant to discuss progress, challenges, updates and review submittals.

2. The Consultant shall provide two Post Study presentations/workshops of the final ASPA approved report.

i. One presentation/workshop is for the ASPA Board, the Executive Director and upper management including lunch refreshments for up to 10 staff as outlined in Task #8 above

ii. The second presentation/workshop shall be for the ASPA WW Department Operations staff, including lunch refreshments for up to 20 staff as outlined in Task #8 above.

iii. Each presentation/workshop shall last up to 3 hours, first half to provide a clear explanation of the report and its highlights and the second half to include a question and answer period. Presentation/workshop can be “in person” or by video conference including an agenda and hands on use of the report.

iv. Presentations/workshops shall be conducted by the Firm’s main contributors to the study as well as the professional licensed staff who approved the report. The goal is for the audience to thoroughly understand the report, upgrades to the WWTPs, and associated implementation impacts and related topics.

3. Minimum Deliverables:

i. The complete and ASPA approved Study.

ii. A 2 to 3 page “easy on the eyes” Executive Summary with schematics.

iii. Planning, pre-design, engineered and EOR stamped documents related to the study such as value-engineering analysis, calculations, technical specifications and standards.

iv. Milestone schedule and timeline to completion with summary descriptions.

v. Post report presentation/workshop slides, summary and agenda.

vi. Three (3) hard bound copies and electronic copies (i.e. AutoCAD, pdf, Excel spreadsheet, ArcGIS) of report, summary, maps, tables, figures and all deliverables.

vii. Other items as necessary.