APPENDIX-1: TERMS OF REFERENCE (Revised)

Consulting Services for Detailed Engineering Design (DED) preparation for Ainaro-Suai-Maliana Water Supply and Sanitation

MPW,
May25

Abbreviations and Acronyms

ADB	Asian Development Bank
ADN, I.P	Agência de Desenvolvimento Nacional, Instituto Públiku (in Portuguese), National Development Agency, Public Institute (in English)
ANAS, I.P	Autoridade Nacional para a Água e Saneamento, Instituto Públiku (in Portuguese), National Authority for Water and Sanitation, Public Institute (in English)
ANLA, I.P	Autoridade Nacional de Licenciamento Ambiental, Instituto Públiku (in Portuguese), National Authority for Environmental Licensing, Public Institute (in English)
ARAP	Abbreviated Resettlement Action Plan
BPT	Break Pressure Tank
BTL, E.P	Bee Timor-Leste, Empresa Publica (in Portuguese)
CAFI	Administrative Council of the Infrastructure Fund
CAPEX/OPEX	Capital Expenditure / Operational Expenditure
CHMP & IPP	Cultural Heritage Management Plan & Indigenous People Plan
CSTS	Community Sewerage Treatment System
CW	Civil Works
DA	Designated Account
DB	Design-Build
DED	Detailed Engineering Design
DL	Decree-Law
EMP	Environmental Management Plan
ESF	Environmental Social Framework
ESCP	Environmental and Social Commitment Plan
FIDIC	Federation Internationale Des Ingenieurs Conseils (in French)
FM	Financial Management
FSTP	Fecal Sludge Treatment Plant
GBV	Gender-Based Violence
GoTL	Government of Timor-Leste
GRM	Grievance Redress Mechanism
HAZOP	Hazard and Operability
IFI	International Financial Institutions (for example, World Bank, ADB, EIB)
LARAP	Land Acquisition and Resettlement Action Plan

LMP	Labor Management Plan
M&E	Monitoring & Evaluation
MOF	Ministry of Finance
MPW	Ministry of Public Works
NPC	National Procurement Commission
PMC	Project Management Consultant
PMU	Project Management Unit
POM	Project Operation Manual
PSC	Project Supervision Consultant
QPR	Quarterly Progress Report
REOI	Request For Expression of Interest
SEA/SH Action Plan	Sexual Exploitation and Abuse and Sexual Harassment Action Plan
SEIS	Simplified Environmental Impact Statement
SEP	Stakeholders Engagement Plan
SPS	Safeguard Policy Statement
STEP	Systematic Tracking of Exchanges in Procurement
WS&S	Water Supply and Sanitation
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

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1 INTRODUCTION

(1) The Government of Timor-Leste provides financial support to BTL, E.P. to provide a safe, reliable, affordable water supply and sanitation (WSS) in the 3 municipal capitals of Ainaro, Maliana, and Covalima, in 2025. The project will prepare a detailed engineering design (DED) based on the issues identified and improvements proposed in the Master Plan 2022.

(2) The project is aligned with the Timor-Leste Strategic Development Plan (2011–2030). It will contribute to the country's response to environmental health by improving the environmental health and hygiene of the population in project areas.

1.1 Definition

a) The Project: the Water Supply & Sanitation Project for the 3 (three) Municipal Capitals of Ainaro, Bobonaro, and Covalima

b) The Services: Consulting Services for Detailed Engineering Design (DED) preparation for Ainaro-Suai-Maliana Water Supply and Sanitation

c) The Implementing Agency: the Ministry of Public Works (MPW) of the Republic Democratic of Timor-Leste. The counterpart government agency under the MPW is the national water company, Bee Timor-Leste, Empresa Publica (BTL, E.P.).

d) Management of Activities: the overall management of activities is the Project Management Unit (PMU), which will be supported by the Project Management Consultant (PMC).

e) Procurement: the procurement selection of the Consultant will be carried out by the National Procurement Commission (NPC) of Timor-Leste.

1.2 Background

(3) Water supply and sanitation master plan data collection were completed in November 2022. The master plan revealed the poor condition of water supply and sanitation infrastructures at the 3 (three) municipal capitals, Ainaro, Maliana, and Suai, as summarized below:

a) All three water supply systems are largely dysfunctional, have a poor level of service, inadequate flow, poor water quality, intermittent flow, low pressure, low access of services, high non-revenue water (NRW), majority of customers is non-metered, poor billing records, and insufficient operation and maintenance (O&M) inputs;

b) Public toilets lack O&M in the high-demanded areas such as markets, bus terminals, and other public spaces, and;

c) The existing fecal sludge treatment plant in Suai is existing but not functional; there is none in Ainaro and Maliana.

(4) The Government proposes activities to address solutions to the issues mentioned above through:

a) increase raw water production capacity from either surface or groundwater sources;

b) development and upgrading of climate-resilient transmission pipe network from the sources to a new or upgraded water treatment plant (WTP) or from the groundwater pumping stations to reservoirs;

c) Construction of new climate-resilient reservoirs and climate-resilient distribution pipe networks to metered customers within the respective controlled pressure zones.

d) Improvement of existing public toilets and construction of new public toilets. Construction of new FSTP includes developing fecal sludge management (FSM) strategic guidance for small, medium, and communal septage.

e) All other fieldwork, including topographical and drone survey, surface water resource flow measurements, groundwater resource explorations, water quality testing, geotechnical investigations, air quality sampling and testing, and various social and environmental, and climate change risk and impact assessment activities.

f) Determine the water production and the O&M costs (staff, reagents, power, and other supporting facilities). The projection of customers is based on categories, such as domestic, various social subcategories, and commercial connections. Others will require the inputs to prepare sustainable tariff settings for BTL, E.P.

(5) This Terms of Reference (TOR) concerns the provision of climate-resilient DED for water supply and sanitation safely managed access improvements in the municipal capitals of Ainaro, Bobonaro, and Covalima, which are, respectively, Ainaro, Maliana, and Suai. A summary of the projected population (ref. Master Plan) is presented in Table 1.

Table 1: Summary of the three municipal capitals Population Projection

Year	Ainaro	Maliana	Suai	Total
2020	6,456	24,415	26,857	59,748
2030	7,247	28,616	35,900	73,793
2040	8,134	33,539	44,630	88,343

(6) The population projections in the Master Plan were based on the food basket (cesta básica) registered population obtained from the chief of sucos (villages) and the 2015 census (ref. The census 2022 was not available during the preparation of the Master Plan).

(7) The proposed scope activities for water supply and sanitation in the Master Plan are summarized in Appendix A and Appendix B, respectively.

(8) Descriptions of the three municipal water supplies and improvements proposed in the Master Plan are summarized in Appendix A. The description of FSTP is presented in Appendix B.

(9) A consulting firm will be engaged through Quality and Cost-Based Selection (QCBS).

1.3 Objectives

(10) The main objectives of the BTL, E.P., are to increase the service coverage of safely managed water supply and sanitation access, improve the quality of services at an affordable price, and enhance O&M capability in the targeted municipal capitals.

(11) The scope of services is the development of a DED of a climate-resilient Water Supply & Sanitation Project of the 3 (three) municipal capitals of Ainaro, Bobonaro, and Covalima, public consultations, and environmental-social safeguard activities and documentation.

(12) This TOR sets out the principles, criteria, process, inputs, activities, and deliverables to be carried out by the DED consultant for funding eligibility.

1.4 Project Location

(13) The project's location is in the 3 (three) Municipal Capitals of Ainaro, Bobonaro, and Covalima, in Timor-Leste, which are Ainaro, Maliana, and Suai, respectively, as shown in the Figure below.

Figure 1: Project Locations Map of the Targeted Municipal Capitals (Ainaro, Maliana, and Suai)

2 SCOPE OF SERVICES

The Consultant will undertake the following works for the three municipal capitals with the scope of services including but not be limited as below:

(14) The DED time horizon is 20 years with five years or fewer intervals. To anticipate and compensate for the possible delay in implementing the project, the availability of water sources, and the value for money, the consultant is requested to analyze and propose a longer time horizon for sizing the main water system components, such as the transmission and the primary distribution, with the provision for enlargement or expansion of the infrastructure in the same locations.

(15) Detailing the projected population distribution and growth to calculate the domestic and non-domestic water demand (schools, universities, hospitals, clinics, government offices, and commercial areas) for each pressure zone (PZ) and district metered areas (DMAs).

(16) Review the water demand projection based on the latest census data and urban growth to match the limited water resource availability, particularly during the lowest seasons.

(17) Critical review of the overall proposed infrastructure solutions described in the master plan, including the conceptual PZs, the DMAs, the proposed infrastructure sites, hydraulic analysis, treatment methods, and the complexities. Ensure the overall DED solution is realistic, appropriate, affordable, manageable, optimum, resilient, and sustainable. Carry out all necessary surveys, fieldwork verification and supervision, data collection, census data, and analysis needed for validation and updating the information provided in the masterplans to produce the DED documentation.

(18) Conduct the following technical fieldworks and laboratory sampling and testing:

a) topographical survey (terrestrial and remote sensing/drone) as required,

b) surface water flow measurements,

c) groundwater Investigation,

d) water quality sampling and testing,

e) air quality sampling and testing,

f) geotechnical investigation.

Topographical Survey

(19) The scope of the **topographical survey** consists of 2 methods, terrestrial and remote sensing surveys. The activities and the outputs will include the following:

a) Mobilization and demobilization, establishing control point (GNSS, static-tied to National Grid System of Timor-Leste), permanent and visible pegging of benchmarks in conjunction with the geotechnical investigations.

b) Topographic survey for Water Supply specific pipeline sections, such as pipe bridges, river crossings, intake, pumping stations, WTP, reservoir, and sanitation facilities (public toilets, FSTP) for the infrastructure design and land acquisition.

c) Remote sensing survey using Unmanned Arial Vehicle Drone for transmission and distribution pipelines and specific infrastructure sites.

d) Processing Field Data & producing topographic map and profile (Civil3D), showing drainage, pipelines (long section, plan, crossing sections, inspection holes, depth), electric pole, and electric /

telecommunication cable in an underground (if any), road pavement, walkway, gutter, and ditch shall be presented in a topographic map.

e) The topo survey must use various equipment, including a total station set with supporting accessories.

f) The outputs will include a Digital Surface Model (DSM), Digital Terrain Model (DTM), Contour Map (Civil 3D), Orthophoto with an average ground sampling distance of 5 cm, vector Map (Road, House, Etc. in Civil 3D), Long Section Profile (Civil 3D), Cross Section (Civil 3D) and the 3D Point Cloud of the targeted areas.

Table 2: Classical Topography and Drone Survey

No	Description	Unit		Quantity		Total
			Ainaro	Maliana	Suai	
1	**MOBILIZATION**, Internal mobilization, and demobilization for all equipment, pegging of benchmarks, and personnel.	lump sum	1	1	1	3
2	Benchmarks/pegging	Uns	20	25	50	95
3	**CLASSICAL TOPOGRAPHICAL SURVEY**					
4	Topographical Survey Intakes, pumping stations	Ha.	0.9	0.6	0.8	2.3
5	Topographical Survey Water Tanks and Existing WTP	Ha.	1.8	2.0	1.4	5.2
6	**Unmanned Aerial Vehicle LIDAR Survey**					
7	Topographical Survey of Raw Water Pipelines and distribution network (drone)	Ha	50.9	95.3	185.1	331.3
8	FSTP, including access road	Ha	2	2	2	6
9	Report (data acquisition and processing)	Municipal	1	1	1	3

Surface Water Flow Measurement

(20) **Surface Water Flow Measurement:** undertake surface water source flow measurements (spring and the proposed intakes) on at least 4 occasions, covering both rainy and dry seasons (events) for each site.

(21) Dry and wet seasons flow at the intake points, elevation, and distance to WTP, reservoir, and service areas are critical to designing the system. The final report will show more flow measurement fieldwork records, water quality sampling, and testing data combined with the relevant flow monitoring data gathered by ANAS, I.P.

(22) The report will: recommend a minimum reliable flow that can be drawn from each source doe the water supply system they are to supply. Provide an expected range of water quality parameters that will inform the selection and design of water treatment works.

(23) In the suitable flow measurement points, fabricate and install a temporary V-notch.

(24) Conduct a sanitary survey to identify the potential pollution caused by bad sanitation practices and suggest solutions.

Table 3: Surface Water Flow Measurements

DESCRIPTION	Unit	QTY
Ainaro, 3 intakes Teliga-1, Teliga-2, and Sarae river	Occasions	4
Maliana: Maliana, 2 intake points, Il Culba & Bulobu	Occasions	4
Suai: 3 intake points Wemasei (Dato Rua) 43 Lps, Naes (Lactos) 32 Lps, and Wekbotuk (Dato Tolu)	Occasions	4
Installation of V-Notch	Intake points	6

(25) Water quality and treatment: Determine the unit process and unit operation of the proposed WTP based on raw water quality test results, including factors such as climate change impacts, rainy seasons, hardness, and scaling potential. The testing must be conducted at and by the BTL, E.P laboratory or accredited laboratory with the consultant's oversight. DED will cover chemical reagents handling, unloading from trucks, entering into mixing tanks, sizing of dosing pumps, mixing tanks, warehouse storage, sampling points into mini-laboratory, and control system shall be Covered in the DED. The disinfection facilities will allow for calcium and sodium hypochlorite. Anticipate the required space for increasing treatment capacity.

(26) **GIS mapping:** Update the GIS maps (produced during the preparation of the Master Plan) of all water supply system components (raw water unit, transmission unit, production unit, and distribution unit) and georeferenced all existing customer's connections layout (service unit) and the proposed expansion of service area. Update the GIS maps after completing the terrestrial and remote sensing (drone) survey. Collaborate with the BTL, E.P office at central and municipal levels to ensure consistency in registering all WS&S system components.

(27) Water Supply System: Prepare the documentation of the DED and all related water supply system components. Design all infrastructures from water sources (including but not limited to intakes, groundwater pumping stations), transmission, rising mains, Break-Pressure Tanks (BPTs), WTP and the sludge treatment/handling, reservoirs, distribution pipe networks (primary, secondary, and reticulation pipes), pipe bridges, river crossings, pipe supports, warehouse, operation rooms, power supply, moveable back-up generators, solar panel PV, accessories, household connections.

(28) Design robust control systems (SCADA) that are practical, appropriate and compatible with the Dili SCADA system being planned, allowing operators to monitor system performance. However, if the automated system fails, the system will also have a simple manual control backup. The report must include the hazard and Operability (**HAZOP**) analysis may be guided by the IEC 61882 & **Control Philosophy** chapter describing the system operation for normal and abnormal operating conditions along the periods of turbid raw water due to an extended period of continuous rainfall and mitigation measures. The control philosophy shall detail how the SCADA will respond, along with manual control response, for normal and identified abnormal conditions. A commissioning plan for the proposed infrastructure shall be provided.

(29) BTL, E.P Office's DED: Prepare the DED of the BTL, E.P (Ainaro and Suai only) offices and all related documentation. The organization of the room shall include financial, technical and customer service rooms, a command center room, a small kitchen, and M/F toilets. The warehouse shall be separated from the main building. A laboratory may be included in the main WTP to optimize human resources.

The total size is suitable to accommodate the officials to 2050. If space permitted, the consultant shall propose 1 floor only.

(30) Public Toilets (sanitation sector): Provide DED and all related documentation for public toilets based on the public consultations and acceptance/approval for each municipal capital, (3 units in Ainaro, 4 Maliana and 4 Suai). Where practical, solar energy systems shall be highly considered for lighting.

(31) CSTS: prepare a technical viability and cost-sharing options with the selected community, followed by the community sewerage treatment system (CSTS) DED for one pilot community (50 users), consisting of sewerage, communal septic tank, and percolation pipes in a densely populated area. The local authority, ANAS, and the community representative must be fully consulted on the proposed site and the cost-sharing to be developed by the consultant.

(32) FTSP (sanitation sector): Prepare the DED and all documentation for the selected and approved site that is the most technically viable, efficient, climate resilient, and environmentally friendly FSTP for the municipal capitals in Ainaro, Maliana, and Suai. The DED should include the control philosophy for the FSTP, including the operation of the receiving structure, facultative and aerobic lagoons, treated effluent irrigation area, access roads, and solar energy where practical. Each FSTP shall include one desludging truck, and if the location of the FSTPs changes, the consultant must review the suitability of the new sites both at the technical and safeguards level.

(33) The DED consultant will propose other FSTP process options, which have proven to be more appropriate, has low O&M costs, is more practical, and has higher efficiency. Describes the unit process and unit operation of the FSTP reactors and the expected removal efficiency based on the fecal sludge characteristics.

(34) Gender and special needs: toilets for offices, public toilets, and other relevant buildings must be segregated by gender and accessible to individuals with special needs.

(35) DED Technical Documentations: Prepare all the associated technical specifications for the materials, equipment, civil works/buildings, pipework, mechanical, electrical, instrumentation, and automatization; DED technical drawings, fieldwork/investigation reports, calculations (structural, geotechnical, classical topographical survey, lidar contour). The design for the seismic loads and safety factors used in the calculations should be referenced in the Geotechnical Investigation Report. Climate change and disaster resilience considerations shall be clearly described, and all necessary measures to mitigate climate change and disaster risk incorporated into the DED.

(36) The BOQs must be substantiated by calculating the volume/quantity of work items, unit price analysis, and current material prices of three reputable sources of different regions, in accordance with and approved by the Timor-Leste National Development Agency (ADN).

(37) The consultant must prepare the bid document for each municipal capital acceptable to the domestic and comply with the IFI requirements. The consultant must use the blank BOQ as verified or approved by ADN.

(38) Prepare only outlined TOR for Construction Supervision and Project Management Support, without cost estimates.

(39) **Preparation of environmental and social assessments (ESAs)** that satisfy the Government of Timor-Leste on Environmental Licensing (ANLA, Decree Law #5,2011 and #39, 2022) requirements, and the peer review based on the risk categorization of the project. PMU assumes that different IFIs require minor variations.

(40) The Project Document for each municipal capital's water supply and sanitation (public toilets and FSTP) sectors shall be separated; hence, two licenses will be granted for each. The consultant shall assume that all the municipal capital water systems will likely fall under **category A**. The project document shall

be submitted to ANLA early to allow for licensing within the contract period. The preparation of the environmental and social documents will be considered complete after ANLA has granted licenses.

(41) The works involve a review of the project brief and area, drafting Project Documents, screening or rapid environmental assessment checklist for **ANLA review**, and scoping. Prepare **TOR** for public consultations which will incorporate the IFI's social safeguard, to target community members and organizations from the affected areas and various field works. Conduct various baseline studies and Impact Analyses (geology and geomorphology, air quality measurement, climate change, hydrology and water resources, water and soil quality, noise, biodiversity, wastewater, land use, socioeconomic, heritage (archaeology and architecture) and Culture, georeferenced map of the proposed infrastructures.

(42) Preparation of Environmental Impact Assessment and Statement (**EIS**) and Environmental Management Plan (**EMP**) for Public Consultation Purposes as endorsed by ANLA for clearance and obtaining the Environmental License from ANLA.

(43) For ANLA Category A Project with a substantial risk rating according to (for example, the World Bank and ADB risk classification), the ESA will incorporate the outline of an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) under ANLA requirements and also the requirements for Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP) under the World Bank ESF and the equivalent ADB SPS.

(44) For ANLA Category B Project with a moderate risk rating according to the available International Financial Institutions (IFIs) guidelines on risk classification. The following description refers to the World Bank and ADB risk classification. The ESA or IEE will incorporate the outline of the Simplified Environmental Impact Statement (SEIS) and EMP under the ANLA and ESMP requirements of the World Bank and ADB SPS. Specific ESAs or IEEs will be prepared for each of the three municipal capitals according to the risk categorization of each location. The consultant will schedule an initial risk categorization for each site according to the GoTL regulation standards and the World Bank and ADB SPS risk classification criteria before preparing the specific ESAs for each location. To the extent possible, the ESAs or IEEs will combine water supply and sanitation development assessments for each municipal capital. The preparation of the specific ESAs or IEEs will include public consultations with project stakeholders at each municipal capital as guided by the WB ESF ESS 10 and ADB SPS.

(45) The contents of the ESAs or IEEs for each of the municipal capitals should refer to the requirements of the Government of Timor-Leste on Environmental Licensing (ANLA requirement) and the indicative outlines for ESIA and ESMP according to the World Bank ESF or IEEs on Environmental and Social Standards 1 (ESS1) provided in Annex C.

(46) The ESAs or IEEs will incorporate both requirements of the Government of Timor-Leste and the World Bank ESF or ADB SPS, which will include, but not be limited to, the following:

g) Assessment of the project alternatives and selected design option;

h) Screening and scoping of potential environmental and social risks and impacts;

i) Determination of the project's area of influence, including the likely risks of associated facilities[1] and the requirement for assessment of cumulative impacts on the extraction of water;

j) Methodology to collect and analysis of the environmental and social baseline data;

k) Assessment of the environmental and social impacts using suitable methods and accepted best practices, mitigation, and monitoring of impacts, including estimation of the costs, requirements for capacity building, and institutional arrangements.

[1] *Associated Facilities* means facilities or activities that are not funded as part of the project and are: (a) directly and significantly related to the project; (b) carried out, or planned to be carried out, contemporaneously with the project; and (c) necessary for the project to be viable and would not have been constructed, expanded or conducted if the project did not exist. For facilities or activities to be Associated Facilities, they must meet all three criteria.

(47) Preparation of Labor Management Procedures (LMPs) for each municipal capital. The LMPs will incorporate the requirements of the World Bank ESF and ADB SPS that describe the number of project workers, characteristics of project workers, the timing of labor requirements, type of project workers (local, contracted, community, or migrant workers, etc.), assessment of key potential labor risks (including Gender-Based Violence and Sexual Exploitation and Abuse risks), an overview of in-country labor regulations and occupational health and safety regulations, responsible staff for labor management, policies and procedures on labor management, age of employment, terms and conditions on labor, labor grievance mechanism and contractor management. The preparation should refer to the LMP template provided in the WB ESF or ADB SPS.

(48) Preparation of Stakeholder Engagement Plan (SEP), guided by the WB ESF, particularly ESS10 and ADB SPS.

(49) Preparation of Sexual Abuse and Exploitation/ Sexual Harassment (SEA/SH) Action Plan concerning Good Practice Note on Addressing Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) in Investment Project Financing involving Major Civil Works (Second Edition) or the equivalent ADB framework.

(50) Preparation of Land Acquisition and Resettlement Action Plans (LARAP) guided by the WB ESF ESS5 and ADB SPS.

(51) Preparation of Cultural Heritage Management Plan (CHMP) and Indigenous People Plan (IPP), if relevant, guided by the WB ESF ESS7 and ESS8 and ADB SPS.

(52) Assessing potential social impacts, including activities below:

(53) Carry out meaningful stakeholder consultation, including Focus Group Discussion; carry out and document Inventory of Losses, Loss of Income, Social Economic Survey of affected families, Replacement Cost Study based on at least three material costs surveys around the area, and Entitlement Matrix.

(54) Reviewing all the options and their likely involuntary resettlement/land acquisition impacts and likely involuntary resettlement category.

(55) Undertaking risk assessment associated with land acquisition and involuntary resettlement in consultation with affected persons and other key stakeholders to determine if there are ongoing land disputes on sites to be acquired, existing sacred sites, any outstanding land issues, and feedback from all relevant stakeholders including directly and indirectly affected persons and civil society organizations/non-government organizations (CSOs/NGOs).

(56) Estimating the resources and developing actions required to implement the requirements of environmental and social mitigation measures given issues/risks. The affected assets and people will be summarized to include conceptual replacement costs of land, structures, plants, trees, and horticultural allowances for vulnerable households, total compensation and allowances, contingencies, inflation estimate, other assistance such as transportation, training, any other additional assistance, and total entitlement matrix.

(57) Undertaking risk assessment associated with cultural heritage and indigenous peoples in consultation with the stakeholders and relevant experts. Should the Project's impacts on cultural heritage and Indigenous Peoples be confirmed, the consultant will prepare a Cultural Heritage Management Plan and an Indigenous Peoples' Plan following the WB ESF ESS7 and ESS8 and ADB SPS provisions.

(58) Water Supply Production Cost: prepare the basic cost calculation per m3, consisting of labor, treatment, chemical, and power costs.

Ground Water Investigation

(59) **Groundwater redevelopment** of four existing boreholes (1 in Maliana and 3 in Suai). The work involves engaging a drilling company, dismantling the wellhead and pump, and cleaning the water in the bore with a cleaning agent equivalent to Boresaver, de-mudding, surging, jetting, air-lifting, and downhole camera recording. **The pumping Test** will include a step drawdown test at 50%, 75%, 100%, and 120% of the initial Q and recovery. Constant-rate test 1440 minutes (120% Q) followed by recovery. **Sampling and testing** by BTL, E.P laboratory 15 minutes before the completion of the test. **Reinstallation** of the pump set and site reinstatement.

(60) **Exploration drilling** of 2 new boreholes in Maliana will involve a drilling service company. The work involves the following: the unit cost of one drilling site shall include the initial geo-electric resistivity survey (2D) and interpretation (4 trajectory lines of 600 m per line to obtain approximately 130m penetration depth, drilling rig mobilization, drilling of 6" pilot holes up to 80m, bore logging SP & R, if potential, reaming to 14", bore construction, allow for 60m PVC DN8", PN9 bore casing, 18m of machine slotted PVC screen and piezometer 32mm. Gravel pack, sealing off the uppermost section of the annulus with bentonite pellets. The **bore cleaning** will include de-mudding, surging, jetting, airlifting, and disinfection. Final confirmation of casing and screen positions using a downhole camera. Pumping tests: initial test for 1 hour, step drawdown test 50%, 75%, 100%, and 120% of initial Q (4 hours), and recovery. Constant-rate test 1440 minutes (120%Q) followed by recovery. Sampling and testing by the BTL, E.P laboratory, 5 minutes before the completion of the test. The successful bore shall include a 0.8mx0.8mx0.4m raised slab around the bore, blind flange, and site reinstatement.

(61) The Groundwater Report shall include bore redevelopment results, bore construction report, pumping test and safe yield estimate, handover of cutting samples, geoelectric resistivity, bore logging (Resistivity, R & Spontaneous Potential, SP), daily drilling log, and water testing report.

Table 4: Groundwater Investigation

No	Description	Unit	QTY		
			Maliana	Suai	Total
A	**REDEVELOPMENT WORK**				
1	**MOBILIZATION**, Internal mobilization, and demobilization for all equipment and personnel.	lump sum	1	1	2
2	Bore cleaning	LS	1	3	4
3	Pumping test (step, constant rate, recovery, full parameters water quality testing)	Sum	1	3	4
4	Reinstallation, reinstatement	Sum	1	3	4
5	**EXPLORATION DRILLING**				
6	Geo-electric resistivity survey and Report	600m Lines	8		
7	Pilot hole drilling 6" - 90m, to include 6m surface casing	Un.	2		2
8	Downhole geophysical logging: R & SP logging, Report, discuss, and if potential, continue with:	Bores	2		2
9	Bore reaming to 14"-90m each	M	180		180
10	PVC PN9 DN200 Bore Casing, incl. bottom plug, centralizer 72m each	M	144		144

No	Description	Unit	QTY		
			Maliana	Suai	Total
11	PVC PN9 DN200 machine slotted pipe screen supply & installation 18m each	M	36		36
12	Gravel packing bore cleaning, surging, airlifting, downhole camera record	Un.	2		2
13	Pumping test (step, constant rate, recovery, full parameters water quality testing)	Un.	2		2
14	Site reinstatement raised slab around the bore, blind flange cover.	Un.	1		2
15	Report: Redevelopment & Exploration drilling	Un.	1		1

Water Quality Sampling and Testing

(62) **Water Quality Sampling & Testing:** Consultant to work with the national laboratory to conduct sampling and full parameters water quality testing in accordance with Decree Law 31,2021 (ref. as DL31). Conduct three (3) sampling times covering both rainy and dry seasons for each of the proposed surface water sources and only once (1) for the groundwater, as tabulated below:

Table 5: Water Quality Testing

DESCRIPTION	Unit	QTY
Ainaro: 3 water intake points	Samples	9
Maliana: 2 water intake points and one existing bore	Samples	7
Suai: 3 water intake points and 3 existing bores	Samples	12
Report	Set	1

(63) **Reports:** summary and conclusion of the test sheets will be annexed and be used as the basis for the water treatment design. Individual working report for water quality sampling and testing must be prepared for invoicing.

Ambient Air Quality Sampling and Testing

(64) The ambient air quality testing to establish the baseline covering 10 key parameters; (1) Sulfur Dioxide (SO2) - 1 hour; (2) CO-1 hour; (3) NO2-1 hour; (4) Ox as O3-1-8hr; (5) Hydrocarbon Non-Methane (NMHC) – 3 hours; (6) Air Particulate – 24 hours; (7) PM10-24 hours; (8) PM2.5 – 24 hours; (9) Pb-24 hours ; (10) Noise level 8 hours in dB. The unit for the first nine parameters is µg/m3.

Table 6: Ambient Air Quality Sampling and Testing

No.	Description	Unit		Quantity		
			Ainaro	Maliana	Suai	Total
1	**MOBILIZATION**, Internal mobilization, delivery of all equipment, samples, operators, demobilization, and field assistance.	Sum				3

No.	Description	Unit		Quantity		
			Ainaro	Maliana	Suai	Total
2	**Field and laboratory testing for 10 parameters** (at least 1 for FSTP)	Sites	4	4	4	12
3	**Report**	Set				1

Scope of Geotechnical Investigation

(65) The geotechnical Investigation is required to obtain the properties of the soil, rock, and materials (index, mechanical, and chemical) for the DED calculations. Site investigation shall be carried out for the selected WS&S system components, including the pipelines, transmission/distribution), WTP, reservoir, FSTP, and public toilets in each municipal capital.

(66) **Mobilization:** Preparatory work includes finalizing the proposed sites, the TOR submission to PMU showing all the sites, the work plan, and benchmarking for approval. The arrangement, mobilization of equipment and personnel, pegging, fieldwork, internal mobilization, and demobilization.

(67) Fieldworks**: Trial Pits (1):** To expose the soil stratigraphy, a maximum of 3 m depth for (1) visual inspection, collect disturbed samples for laboratory tests, and laboratory tests for index properties. The investigation will focus on critical/essential sites, like soft ground pipeline crossings, high water table areas, WTP, reservoir, FSTP, public toilets, quarry/borrow pits for soils/earth filling, etc. Works shall include reinstatement. **(2) Borehole exploration drilling** to perform (**3) Standard Penetration Test (SPT)**. Provision of 18m for each borehole, with SPT generally every 1.5m to a depth reaching an "NSPT" value equal to or greater than 60. Collect disturbed and undisturbed samples and conduct **(4)** Hydraulic **Piezometer** Tests shall measure the groundwater levels. They shall consist of a porous filter attached to the bottom of the PVC tubing, and **(5) Lefranc** permeability tests shall be conducted inside some boreholes to determine the conductivity of the soil inside the boreholes at selected sites (FSTP & Public toilets). **Light Dynamic Penetration Test (DPL) (6)**: The light tests shall reach depths of about 8 to 10m to determine the dynamic resistance and correlate deformability of soft ground to allow for special foundation measures for pipe and shaft design.

(68) The trial pits for Suai shall include a total of 6 points in the Tafara and Haemanu rivers to assess the viability of an infiltration gallery.

(69) Laboratory **tests:** by an approved laboratory, proper apparatus, in accordance with the relevant and various ASTM standards, and shall include the following: **(7) Index Properties Laboratory Tests (IPLT)** to include (a) sieve analysis and hydrometer test. (b) Atterberg limits: Liquid limit, plastic limit, and plasticity index of soils, (c) moisture content of soils, (d) specific gravity. **(8) Mechanical properties Laboratory Tests** (MPLT) to include (a) Consolidated undrained direct, simple shear testing of fine-grain soils, (b) One-dimensional consolidation properties of soils using incremental loading, oedometer. (c). Unconsolidated Undrained Triaxial (d). Consolidated Undrained Triaxial (e). Consolidated Drain Direct Shear **(9) Proctor** Compaction Tests to obtain optimum moisture content and maximum dry density. Chemical properties **(10) soil**: pH, Sulphate, and Chloride, **(11) water**: pH, Sulphate, and Chloride.

(70) **Geotechnical Site Investigation Reports**: these shall contain typical in situ ground investigation data, georeferenced sites, maps, technical equipment data, and all field and laboratory test results.

Table 7: Geotechnical Investigation

No	Description	Unit		Quantity		
			Ainaro	Maliana	Suai	Total
1	**MOBILIZATION**, Internal mobilization, delivery of samples and demobilization for all equipment, pegging of benchmarks and personnel.	lump sum	1	1	1	3
2	**SITE INVESTIGATION WORKS AND IN SITU TESTS**					
3	Trial Pits, maximum 3m deep, including all provisions for disturbed sampling and logging.	Un.	28	53	70	151
4	**BOREHOLES**					
5	Borehole positioning in each drilling point.	Un.	18	33	28	79
6	Borehole drilling	M	324	594	504	1422
7	**IN SITU TESTS**					
8	Standard Penetration Tests (SPT) test every 1.5 meters or whenever there's a lithology change.	Un.	216	396	336	948
9	Dynamic Light Penetration tests (DPL) with a minimum of 8 to 10m.	Un.	9	13	15	37
10	Hydraulic Piezometer inside boreholes, including all provisions and materials.	Un.	16	30	26	72
11	Lefranc water tests inside boreholes, including all provisions for performing static and variable level tests.	Un.	4	4	4	12
12	**LABORATORY TESTS AND FINAL REPORT**					
13	Index Property Lab tests (ref. Scope)	Un.	26	53	54	133
14	Mechanical Properties Lab Tests (ref Scope).	Un.	8	14	14	36
15	Proctor Normal (light energy) soil compaction tests.	Un.	8	8	8	24
16	Soil Chemical analysis (pH, Sulphide, and Chloride tests).	Un.	16	19	16	51
17	Water Chemical analysis (pH, Sulphate, and Chloride tests).	Un.	16	19	16	51
18	Final Report	Un.	1	1	1	3
19	Gratitude for local rituals and site access	Ls	1	1	1	3

3 RESPONSIBILITIES OF THE CONSULTANT

(71) The Consultant is responsible professionally for the design services to conform to the regulations and standards of Timor-Leste, international best practices, and in accordance with ethical code and professionalism.

(72) Supply and manage the consultant, sub-consultant, and other service providers and maintain inputs within the contract requirements.

(73) All field works, and public consultations must be carried out in close consultation with the relevant stakeholder's focal points, including the following: Ministry of Public Works, BTL, E.P, ANAS, I.P, Local Authorities; Agriculture (trees, crops), DG Lands and Properties - Cadaster (landowner and acquisition); MOP-DNE National Building Directorate (buildings and assets affected) and ANLA (environmental issues and protected areas). Written approval for the proposed sites for water supply and sanitation system components must be officially obtained.

(74) All fieldwork, water sources, intended flow intake, and water quality, FSTP must be closely consulted with ANAS, I.P., and the Department of Water Quality Control and Environment (DCQA, BTL, E.P).

(75) All cost estimates and supporting data must be consulted. The BOQ of items must be traceable and harmonized with the government agency, i.e., ADN.

(76) The Consultant is responsible for validating the accuracy, correctness, and updating of the data/information/inputs/measurements produced by the master plan. Any incorrect, unsuitable, and inappropriate design solutions offered in the master plan shall be consulted with the PMU with proposed solutions for approval.

(77) The result of design services should accommodate the limitations expressed by the Employer, including through this TOR, such as in the aspect of payment, work schedule, and the quality of water supply and sanitation infrastructures to be constructed;

(78) Highly consider the flood level as the result of climate change in infrastructure design.

4 DESIGN COST

(79) The consulting services shall be a fixed cost lump sum consisting of (a) **Part A, B, C, D** Competitive Cost Components and (b) **Part E** Non-Competitive Cost Components as indicated below.

PART A Competitive Cost Components

Part A International Personnel Remunerations.

Part B National Consultants Remunerations.

Part C Reimbursable Expenses will cover the following:

- C3.1 International Travel, Airfares, Misc., and Visas
- C3.2 Office Rental and Operation
- C3.3 Office Equipment and Furniture
- C3.4 Report Production
- C3.5 Rental and Operation of Vehicles
- C3.6 Office Support Staff (Accounting Officers, Administrative Staff, Driver)
- C3.7 Perdiems for International and National Consultants' Visits
- Communication and Internet

Part D Reimbursable Expenses for the Specific Technical Field Work and Laboratory Testing, below:

- D3.1 Topographical Survey Report
- D3.2 Surface Water Flow Measurements Report
- D3.3 Groundwater Investigation Report
- D3.4 Water Quality Sampling and Testing Report
- D3.5 Ambient Air Quality Sampling and Testing Report
- D3.6 Geotechnical Investigation Report

PART E Non-Competitive Costs Component

PROVISIONAL SUMS

Provisional Sums for funding fieldwork to include a series of public consultations for environmental licensing purposes. Payment of Perdiems for the government agencies' staff participating in validating the information obtained from the field may be funded through this component: Baseline survey, including socioeconomics surveys, willingness to pay, affordability, and customer satisfaction survey.

Note: Ensure that the cost for mobilization/internal mobilization, demobilization of equipment, and skilled operators engaged in the fieldwork will be included in each Part D activity.

5 DELIVERABLES

5.1 Deliverables

(80) The consultant must deliver four draft versions and four copies of the final deliverables. Each deliverable must include an executive summary, concise, systematic, formal English, proofed read, reviewed, and signed by the Team Leader as part of quality assurance. The executive summary reflects the summary of the essential findings and recommendations. The table of contents must be consulted with the assigned focal point.

(81) The consultant is required to conduct a presentation of each draft version to stakeholders' representatives for input and comments. The Employer will approve the final version, subject to adequately addressing all requested improvements and responses to the draft version within the scope of services. The list of deliverables is presented in the table below:

Table 8: List of Deliverables

Code	Deliverables (D-Draft, P-Presentation, F-Final)	Subject to payment certificate approval
D1	Inception Report	1D, P, 1.5F
D2	**Interim Reports, consisting of:**	5D, P, 6F
	D2.1 Preliminary Design Report	
	D2.2 Topographical & Drone Survey	
	D2.3 Hydraulic Modelling Report (D)	
D3	**Interim Reports, consisting of:**	
	D3.1 Topographical & Drone Survey	6D, P, 8F
	D3.2 Surface Water Resource Report (F)	6D, P, 12F
	D3.3 Groundwater Resource Report	5D, P, 8F
	D3.4 Water Quality Test Report	6D, P, 10F
	D3.5 Ambient Air Quality Index Report	6D, P, 10F
	D3.6 Geotechnical Investigation Report	6D, P, 10F
D4	**Environmental and Social Safeguard Reports**	
	D4.1 Project Documents (for categorization – ANLA,IP)	4D, 5F
	D4.2 Environmental-related Reports, (D,P,F), various reports	6D, P, 12F
	D4.3 Social-related Reports, (D,P,F), various reports	6D, P, 12F
D5	DED Reports	10D,P, 15F
D6	ANLA Environmental License	15F

Note: *3D & 6F shall be read as; the Draft report is due within 3 months & Final Report is due within 6 months of the contract's start. To be reviewed in the inception stage.

(82) Each deliverable will be prepared in official English, consisting of 4 sets of draft version & final versions in hard copies and 1 USB containing electronic documents in pdf and editable files.

(83) None of the deliverables shall be submitted to PMU without prior review, proofreading, and the team leader's signature.

5.2 Deliverables Features

D1.1 Inception Report

The DED Inception Report will summarize the plan to execute the contract and services as described below:

a) The objectives, scope of services, and consultants' initial and follow-up activities commencing the kick-off meeting.

b) Summary of planned activities, optimizing the resources, fieldwork, data collection, and submission of the deliverables to comply with the set schedule.

c) The presentation of preliminary findings, analysis of available data, and stakeholders' inputs.

d) Methodology to develop activities to meet the deliverables,

e) Updated Workplan, mobilization of resources (showing home/field), activities under the provisional sums, deliverables schedules, and stakeholders' engagement.

f) Stakeholders' engagement and preparation of public consultations, detailed measurements survey of the affected persons' properties, buildings, plants, and the associated socio-economic conditions. Collaboration with the relevant institutions/agencies/authorities.

g) Preparation for environmental and social fieldwork and documentation, including environmental risk categorization and license from ANLA. Various air quality measurements/testing (availability of resources and equipment) in consultation and collaboration with relevant authorities and agencies. The specifications of testing equipment shall be consulted.

h) Strategy to execute critical path activities to avoid delays for each deliverable and transfer know-how to the national consultants and BTL resources.

i) Document any issues identified by the DED consulting team and how they intend to deal with them.

j) Invoicing schedules submission.

D2 Interim Reports

D2.1 Preliminary DED Report

a) Preliminary Design Report, a comprehensive water supply system, public toilets, the viability of the pilot CSTS, and FSTP infrastructure design for the three municipal capitals before the DED development stage.

b) Indicative ownership of the sites, based on consultation with stakeholders, including Land and Property.

c) Structure of DED Drawings, formats, legends, updated BTL,E.P Standard Drawings to include typical infrastructure drawings, service pipes presented in 3D CAD, with proper scale and readable font size.

d) Indicative water production per m3 and the FSTP O&M costs per m3 desludging and treatment for each municipal capital.

D2.2 Hydraulic Modelling Report

a) The hydraulic analysis software must be compatible with the latest version of EPANET.

b) Detailed Hydraulic Analysis based on demand projection, transmission main, reservoir distribution main, demand points, and an approved consumption pattern. The demand allocation for each node shall be proportional and logical, including domestic and non-domestic (social and commercial) demands.

c) Test for 72 hours, 24/7 supply, one (1) hourly pattern, fire flow hydrant functioning independently at five key locations to be proposed, and optimum pipe sizing to the time horizon demand. Demonstrate isolating individual pressure zone during an interruption.

d) Residual Chlorine analysis, particularly in critical points, still meets the specified standard.

D2.3 BOQ Report

a) Prepare the draft BOQ report for each municipal capital based on the ADN guidance. The BOQ shall be structured, best practice, and practical. Based on 3 suppliers' quotations from different regions, the unit cost must be substantiated with catalogs (brochures). The draft shall be consulted with ADN to ensure speedy verification of the draft and final version.

b) The BOQ may be categorized into preparation work, civil works, pipe works, mechanical, electrical/instrumentation, landscaping, house connections, control system (SCADA), Sanitation (Public toilets, pilot CSTS, FSTP, desludging truck), Environmental and Social mitigations and Construction Supervision. The cost will be detailed in the subsequent draft and final DED documentation.

D3. Specific Technical Fieldwork & Laboratory Testing

D3.1 Topographical Survey Reports

a) The topographical survey of the WS&S system components (infrastructure and pipelines) consists of 2 methods, terrestrial and remote sensing/drone. The specifications of survey equipment, survey method, scale, resolutions, reports (long sections, cross sections) and formats, and time frame shall be well-defined prior to the approval of the service provider contract.

b) The outputs will include Digital Terrain Model (DTM), Contour Map (Civil 3D), Vector Map (Road, House, Etc.) (Civil 3D), Long Section Profile (Civil 3D), Cross Section (Civil 3D), and the 3D Point Cloud.

c) The WS&S system components should cover surface water intakes, transmission, rising mains, primary and secondary distribution pipes, pipe bridges, river crossings, FSTP contour, site photographs, and datum (benchmarks).

D3.2 Surface Water Resource Report

a) The surface water resource report must include an overview of the rainfall data, catchment area boundaries, estimated recharge, water balance, and full water quality parameters based on Timor-

Leste Decree Law 31, 2020. The consultant will conduct a sanitary survey to identify the potential source of pollutants.

b) Dry and wet seasons flow at the intake points, elevation, and distance to WTP, reservoir, and service areas are critical factors in designing the system. The final report will show more flow measurement records and water quality testing data as the basis for recommending flow intake.

c) The report will recommend a minimum reliable flow that can be drawn from each source for the water supply system they are to supply. Provide an expected range of water quality parameters that will inform the selection and design of water treatment works.

D3.3 Groundwater Resource Report

d) Redevelopment of four existing boreholes, confirmation of bore screen position using a downhole camera, pumping test, and water quality sampling and testing. The proposed sites are one in Maliana and three in Suai.

e) Report on exploration drilling of 2 new boreholes in Maliana will include geo-electrical resistivity survey, bore logging, bore construction, step and constant rate pumping test, recoveries, daily log, cutting samples, reinstatement, photos, water quality test result.

f) An overview of the rainfall data and catchment area boundaries; general geology of the project sites; geologic conditions that influence groundwater movement and recharge; surface features resulting from groundwater movements, such as seeps, springs, and landslides. Streams and valleys' general character includes flow volumes, streambanks, beds, steepness of valley grades, and side slopes. The groundwater development, yields, static and dynamic water level, drawdown, and water quality.

D3.4 Water Quality Test Report

a) The report summarizes that the baseline water quality of all parameters complies with Decree-Law No.31 of 2020, Timor-Leste.

b) Bacteriology parameters: Coliforms Total N/100 mL; Escherichia coli N/100 mL.

c) Chemical and physical parameters are Aluminum in mg/L Al, Arsenic in mg/L As, Ammonium in mg/L NH3-N, Calcium mg/L Ca, Odor and Taste (detectable or not), Chloride in mg/L Cl, Residual free chlorine in mg/L Cl2, Conductivity in µS/cm (20 °C), Color mg/L(Pt-Co scale), Dureza total mg/L CaCO3 110-500, Ferro mg/L Fe, Fluoride in mg/L F, Langelier Index (min. & max.), Magnesium in mg/L Mg, Manganese in mg/L Mn, Nitrate in mg/L NO3-N, Nitrite mg/L NO2-N, pH, Salinity in %, TDS in mg/L, Sulphate mg/L SO4, and Turbidity in NTU.

d) The report will be required for submission to the Environmental licensing and WTP design factors.

e) The sites are all surface water intakes and all the groundwater used for the new proposed municipal capital water system.

D3.5 Ambient Air Quality Index Report

a) The ambient air quality index report sets out the baseline value of 10 parameters of pollutants (ref. scope of services) at a specific point in a particular time. There will be 12 points for each municipal capital, including one at the FSTP.

D3.6 Geotechnical Investigation Report

The Geotechnical Investigation Report covers an overview of all the preparation (installation of benchmarks), implementation schedule, site details, equipment details, fieldwork, laboratory tests,

and results, including index properties, mechanical properties, chemical properties of soil and water, maps, and site photographs.

D4 Environmental and Social Safeguard Reports

a) The environmental and Social Safeguard reports consist of various documents as specified by the Timor-Leste environmental licensing agency (ANLA, I.P.) and comply with the donor requirements (handbook).

D4.1 Project Documents

a) Prepare and submit 6 Project Documents (PD) to ANLA, I.P. for screening and determining the risk categorizations of the proposed activities. The PD comprises 1 document for each municipal capital's water project and 1 document for each municipal capital's sanitation project (FSSTP and Public Toilets). The submission of the PD shall be considered a critical path deliverable.

D4.2 Environmental-related Reports

a) Following the PD's classification (screening) by ANLA, each document will be classified into either Category A, B, or C. For the category "A" PD, the consultant will prepare and submit the subsequent documents, a scoping document (TOR) for approval. Consultants will normally be required to conduct various baseline surveys and public consultations and prepare the Environmental Impact Statement (EISs/EIAs) and Environmental Management Plan (EMP)..

b) For category "B" PD, the consultant will prepare SEISs and EMPs/ESMPs. The Employer assumes that Ainaro, Maliana, and Suai municipal capitals WS systems fall under the category." A".

c) Category A requires the DED consultant to conduct various activities, including an air quality index baseline survey and in-depth public consultations.

d) The consultant must fully assess extensive public consultation and focus group discussions for Category A projects. All mitigation measures must be consulted with the stakeholders early in the design process.

e) The consultant shall adequately plan the environmental report/document preparation given the time required for public consultations and review needed by ANLA.

D4.3 Social-related Reports

a) The social-related reports (subject to the World Bank/ADB's review and approval) will consist of various reports described in the scope of the service. It will include the LMP, SEP, SEA/SH Action Plan, LARAP, CHMP & IPP or the equivalent ADB framework.

b) Each municipal capital must have a detailed measurement of affected assets and people, particularly buildings, with clear and permanent boundaries, benchmarked, georeferenced, and precise cut-off dates in collaboration with government agencies.

c) The consultant will prepare estimated compensation costs based on the most recent and relevant data.

D5 DED Reports

a) The DED Reports (draft and final) for each municipal capital will consist of the following

b) DED Report summarizes the DED of WS&S system components to be constructed, from the water sources down to the metered connections.

c) The BOQ, technical specifications, and calculation/design notes are in soft copy only.

d) The draft DED drawings and standard Drawings (CAD 3D, A2 size) for all WS&S system components for each municipal capital shall be printed in A2 size.

e) Three Bidding Documents based on FIDIC Red Book (3 municipal capitals) to include the approved BOQ by ADN. All the documentation should be based on the FIDIC Red Book.

f) The Hazard and Operability (HAZOP) analysis and Control Philosophy describe the operation of the WS&S systems in various conditions, under abnormal conditions, possible causes, consequences, and scenarios for each PZs, and in relation to the SCADA.

g) The water production cost per m3, the annual maintenance cost for the pilot CSTS, and the FSTP treatment cost per m3.

h) Quantum Geographic Information System (QGIS) final data for all components, geographical locations, boundaries, asphalt and non-asphalt roads, cultural heritage, water system components (pressure zones, production units, rising/transmission mains, WTP, pumps, main valves, main meters, disinfection units, / reservoir down to customers connections, FSTP, protected areas, public toilets, public utilities if any depicted by contours lines.

i) The implementation schedule, commencing the bidding, evaluation, construction and two years operation and maintenance.

D6 ANLA Environmental Licenses

a) As a result of the approved environmental-related reports, ANLA, I.P. will grant 6 environmental licenses (1 for water and 1 for sanitation component for each municipal capital).

5.3 Reports Review

(84) The PMU, and the relevant representatives of the stakeholders will jointly review the progress of the Deliverables and provide a comment matrix, feedback, and inputs as part of the approval processes. PMU will involve IFI's nominated peer reviewers to ensure the DED outputs are immediately eligible for packaging for an investment loan. The payment will be secured once the consultant has incorporated the relevant inputs and responses approved by the reviewers and the employer.

6 PRINCIPLES

(85) The Consultant, in the implementation of its tasks, should comply with the following principles below:

a) The water supply (including demand calculation) and sanitation network should be appropriate, functional, sustainable, reliable, effective, climate resilient, and meet the Urban Drinking Water Guidelines 2022 of Timor Leste.

b) The water supply and sanitation infrastructure components, especially pipelines, must be prioritized to be located on government/public land. The consultant should provide technical justifications for the proposed infrastructures to be built or installed on non-public-owned land.

c) The design should be climate resilient, and engineered for minimum energy input, and solar panels, if practical, must be prioritized as a preferred option.

d) Without compromising the quality of the constructions, the investment cost and the operation and maintenance cost along the lifetime of infrastructures should be as low as possible and value for money.

e) The input for designing the components of the water supply and sanitation system is primarily based on primary data collection and analysis.

f) The design should be developed so that the construction work can meet the budget and timeframe and be utilized soon after completion.

g) Unit Price Analysis provided in accordance with the Timor-Leste National Development Agency guidelines and comparisons/average of 3 material price surveys. The imported items' price must incorporate all the importation costs and provides a technical rationale on why they must be imported. Drawings details, BOQ, technical specifications, and scope of works are adequately provided to enable the contractor to execute without multiple interpretations.

h) Information provided under the environmental and social documents is clear, verifiable by Timor-Leste Environmental Agency, well presented during public consultation, and meets the World Bank ESF, ADB SPS and other IFI's safeguard policies.

i) The design of the infrastructures shall adopt gender awareness, climate resilience, disaster risk management (DRM), and inclusivity and be well-presented to be implemented during construction.

j) The technical specifications for materials, equipment, and goods should refer to a detailed description with plausible technical justifications and does not point to or prioritize specific trademarks.

(86) Any design prepared by the Consultant for the Employer under the Contract shall belong to and remain the Employer's property. The Consultant may retain a copy of such document and software, but it shall not be used for other purposes without the express written consent of the Employer.

7 DESIGN CRITERIA

7.1 General Criteria

(87) For the implementation of the works, the Consultant should take notice of the general criteria of the water supply distribution network to conform to its functionality, sustainability, and reliability along with its complexity, as follows:

a) The quantity of water should be available adequately and fulfill the required quality.

b) The water continuity should be available at any time with sufficient pressure, even at critical service points.

c) The system's design should provide the lowest cost for CAPEX and OPEX and gradually ensure the fulfillment of the full cost recovery tariff.

d) The water supply and sanitation system should be provided with an operation & maintenance manual and operated with optimum human resources, gradually integrating the SCADA system into daily operations.

7.2 Specific Criteria

(88) The specific criteria cover as follows:

(89) The DED period is 20 years commencing the DED contract. Adjustment is required to suit the requirement.

(90) The water supply design criteria must comply with Urban Drinking Water Guidelines, 2022, Timor-Leste.

(91) The target area of services in the beginning phase should be prioritized to supply the very poor service area, commercial areas, density areas, and strategic areas before expanding to new areas.

(92) The water supply distribution network could use a loop distribution system, a dead-end distribution system, or combining both systems (grade system), respecting the pressure zones and district metered area (DMA).

(93) The distribution network will be determined by topography, elevation, lowest energy consumption, if possible, location of water sources, WTP and reservoirs, the extent of the service area, the total amount of customers, and the road network where the pipes will be installed.

(94) Whenever the topographical condition is unsuitable for the whole area, the distribution network could combine gravity and pumping systems. A minimum of 10 meters of water pressure must be considered whenever the area is relatively flat.

(95) Whenever significant elevations exist among service areas, more than 40 meters, these areas could be divided into several zones to fulfill the minimum pressure requirement. It could use break-pressure tanks or pressure-reducing valves for excessive pressure. To overcome low pressure, one could use a booster pump. However, using a pump shall be the last option, given the energy cost. If practical, propose solar panels as the preferred solution.

(96) Pumping for the distribution system shall be the last option, nevertheless;

a) Discharge of the distribution pump is determined based on the daily water fluctuation and the water consumption pattern. An optimum pump with well design duty point will supply water in peak hours, while a small pump for a minimum supply.

b) Booster pumps to increase pressure for the most extended piping network.

c) The elevation of the booster pump should be located above the flood surface elevation of the 50-year flood period.

(97) The layout of the piping distribution network will be determined based on the followings:

a) Condition of road network in the service area, customers density

b) Topographical condition and boundaries of the service area

c) Spatial planning of service area

d) Assurance of sufficient water pressure at the critical point

(98) The components of the distribution network comprise as follows:

a) Pressure zones represented by the reservoir and isolated distribution network;

b) Primary, secondary, and tertiary piping;

c) Customers service pipes;

d) Master meters, various isolating valves, fire hydrants, and metered customer connections.

(99) Specific criteria for water component materials should be selected based on suitability for the areas, topography, and O&M practicality.

(100) Transmission primary pipe diameter selection is based on maximum-day demand. In contrast, distribution main network diameters should be determined based on the projected water demand's peak flow (water consumption pattern) at the end of the design period, including a plus safety factor of 20% of the daily average water demand.

(101) Water demand should be determined based on the followings:

- Projection of population and demand that should be calculated for the intervals of the design period, in this case, 2023, 2025,2030 onwards;
- Census data 2022 shall be applied;
- Availability of water (water sources production capacity) to be closely consulted with ANLA and the .
- The consultant shall analyze and propose (for the value for money) to optimize the sizing of the main transmission and main distribution main only using a suitable factor to reflect a longer time horizon to anticipate and compensate for further delays in the implementation of the project.
- The daily demand unit shall adopt the Urban Drinking Water Guidelines 2022.

(102) The main component of the water supply, reservoir capacity, and distribution network should be reliable for delivering maximum water demand and conforming to the peak hour demand as indicated in the master plan.

(103) Water Treatment Plant design based on the water quality measurements, Timor-Leste Decree Law # 31, 2020, and maximum day demand and design criteria best practices.

8 DESIGN PROCESS

(104) In preparation for the DED, the consultant is encouraged to schedule regular meetings with the Employer, the focal points, and other relevant stakeholders nominated by the PMU.

(105) The primary beneficiary of the DED is BTL, E.P., who will nominate a focal point to facilitate and guide the consultant throughout the contract's validity. The focal point will be supported by the technical team appointed by the BTL, E.P.

(106) In the regular meetings, it should determine the inception products, intermediate products, and primary products that will be provided by the Consultant to conform to the output plan specified in the TOR.

(107) During the inception period, the consultant to actively review, verify the available data, information, relevant reports, the expected deliverables, the critical path, overall workplan, the location of the consultant's office, the office establishment to ensure the project will be executed and completed on schedule.

(108) The Consultant should maintain the schedule in implementing the tasks and responsibilities. The outputs of the contracts will be delivered in 12 months;

(109) During the preparation of the inception report, the critical path and the associated activities (including site investigations) will be identified and become the focus of the consultant's early activities.

(110) The Consultant shall give full attention to the plan and supervise the field works, site investigations, and environmental and social-related preparation.

(111) All designed solutions shall be fully consulted with relevant stakeholders, including local authorities, and non-objection letters should be signed mainly related to the sites (affected persons) not owned by the State or currently occupied.

(112) All water resource investigation and abstraction must be fully consulted with the local authority and ANAS.IP.

(113) The conceptual design and development of the DED for water and sanitation shall be submitted and consulted with the relevant stakeholders.

9 DESIGN INPUTS

9.1 Information

(114) To implement the tasks, the Consultant should collect information required to collect primary data directly from the sites besides secondary data or the information provided by the Employer. For the benefit of all parties, the consultant is encouraged to be based in one of the municipal capitals.

(115) The Consultant should check the validity of information used to implement its tasks, either the information provided by the Employer or by self–collected.

(116) The faults of design work resulting from inaccurate information will be the responsibility of the Consultant.

(117) The information required for DED inputs will include but not be limited to the following:

a) Relevant master plan reports and associated reports, including newly established BTL, E.P Business plans.

b) Photos of water sources, route of transmission and distribution pipes, treatment plants, reservoirs, service areas, and FSTP (fecal sludge treatment plants) and public toilets.

c) Technical data regarding the climate, geography, hydrology, spatial planning, the technical report regarding the existing water supply distribution network, and socio-economic data.

d) Review the number of population, projection, and current customers of various categories.

e) Map of the project area, map of a service area, map of existing water supply distribution network, length of pipes, and topographical conditions.

f) Components of service area shall cover housing, commercial, public, schools, social, industry, tourism, and ports where applicable.

g) Customer's connections survey, map location, type, diameter, material, and conservation status.

h) Field investigation, measurements, testing, identification of existing systems, proposed solutions, and quality of raw water sources.

i) Total number of customer connections, locations, and the condition of legal or illegal connections. Consultation with the BTL, E.P Customer Service Department regarding details and field survey.

j) Performance and condition of current WTP and its efficiency;

k) Size of pipes, material, physical leakage record, and layout. Consult with BTL, E.P operational team and with field survey and excavation.

l) Storage capacity of the reservoir. Consultation with BTL, E.P Production Department as to details coupled with field survey.

m) Redevelopment and pumping test of existing boreholes in consultation with BTL, E.P.

n) Various and current guidelines, standards, and decree-laws of the GoTL.

(118) Customer's connections survey, map location, type, diameter, material, and conservation status.

a) Other data for water supply distribution network simulation method.

b) Confirmation of the presence or absence of other projects, such as land readjustment.

(119) Items to be analyzed by each zone are as follows:

a) Population distribution, population growth, and water demand projection.

b) Hydraulic model simulation and residual chlorine.

c) The size and layout of pipes, capacity, and layout of the reservoir.

d) The need for temporary interconnection during an interrupted supply or an emergency situation.

e) Non-technical issues.

9.2 Team Composition

(120) The team composition shall consist of international experts (IK), national consultants (NC), and locally engaged support staff (LES). Consultants should provide the team composition to fulfill the requirements to implement the services based on the scope of services and the level of complexity. The international experts should provide technical support to gather information, manage and oversee fieldwork, and other services for this detailed engineering design in Timor-Leste. The total minimum time input required to undertake the DED services consists of **81** pm of international experts (Table 9) and a total of **192** pm of national consultants (Table 10), as indicated below:

Table 9: International Experts Team Composition (Pm=person months)

Code	Positions	Number of Position	Minimum Time Input (Pm)
	International - Key Experts (IKE)		
IKE1	Team Leader / Water Supply & Sanitation Specialist	Pm	15
IKE2	Water Supply Design Specialist	Pm	15
IKE3	Environmental/Climate Change Specialist	Pm	8
IKE4	Social Development Specialist	Pm	8
IKE5	Water Resources Specialist	Pm	4
IKE6	Water Treatment Plant Design Specialist	Pm	3
	International - Non-Key Experts (INK)		
INK1	Structural Specialist	Pm	4
INK2	Geotechnical Engineer	Pm	4
INK3	Electrical and Systems Engineer	Pm	3
INK4	Mechanical Engineer	Pm	3
INK5	Quantity Surveyor/Cost Engineer	Pm	4
INK6	GIS Mapping Engineer	Pm	3
INK7	Wastewater Treatment Plant Design Specialist	Pm	4
INK8	Water Quality Specialist	Pm	3
	Total International Personnel		**81**

Table 10: National Consultant Team Composition (Pm=Person-months)

Code	Positions	The total duration of inputs	Minimum Time Input (Pm)
NC1	Water Supply Design Engineer (Deputy Team Leader)	Pm	15
NC2	Water Supply Design Engineer (2 persons)	Pm	12
NC3	Water Resources Engineer (3 persons)	Pm	30
NC4	Water Quality Technician	Pm	6
NC5	Structural and Geotechnical Engineer	Pm	9
NC6	Mechanical and Electrical Engineer	Pm	6
NC7	Quantity Surveyor (2 persons)	Pm	18
NC8	GIS Mapping Engineer	Pm	12
NC9	Environmental Engineer (3 persons)	Pm	30
NC10	Social Development Assistant (3 persons)	Pm	30
NC11	CAD Operator (2 persons)	Pm	24
	Total National Consultant		**192**

9.3 International Key Experts Requirements:

(121) **All** international key experts must hold a minimum master's degree of relevant educational background and 10-year relevant work experience for the nominated position. The team leader shall have 15 years of relevant work experience. The international personnel who has worked on the IFI funded projects, such as World Bank, ADB and EIB, is an advantage. The experts have completed at least 5 (five) similar (relevant) urban water & sanitation assignments in the similar position. A minimum of five years of work experience in the Asia Pacific Region and 5 years in another region other than its country of origin is an advantage.

(122) Work experience in Timor-Leste and knowledge of the administrative systems and government organizations is an advantage. Each team member must hold a valid professional institution membership written on the curriculum vitae (CV). All key experts (KE) and specialists communicate and write in English, acquire working fluency in Tetum, Portuguese or Indonesian language is an advantage.

IKE1 Team Leader — Water Supply & Sanitation Specialist

(123) The Team Leader should have a water supply & sanitation engineering-related educational background. Proven project manager or team leader position for at least three similar or larger-size projects for five years. The Team Leader will demonstrate the ability to manage an interdisciplinary team, cultural empathy, gender awareness, and strong organizational, communication, and reporting skills. The Team Leader must have expertise in contract management for water supply & sanitation engineering and be familiar with the requirements of the Word Bank ESF and other IFI's safeguards policies.

(124) The tasks, roles, and responsibilities of the Team Leader include (1) planning, managing, overseeing, controlling, and leading the team members to work efficiently, (2) maintaining the schedule completion of deliverables, (3) quality assurance of deliverables, (4) action plan for capacity building of the national consultant and the BTL personnel at the municipal capital, and (5) to report and liaise with BTL, E.P/focal point/stakeholders' representatives.

IKE2 Water Supply Design Specialist

(125) The role, tasks, and responsibilities of the Water Supply Design Specialist include the following:

a) Identifying the existing water supply system components from the sources down to customer connections,

b) optimum allocation of projected water demand across the existing and future coverage areas,

c) hydraulic network analysis of water systems,

d) design of water system components based on the various field data collection and contribute to the preparation of BOQ, functional description, and O&M description of the future system,

e) collaboration with other experts and national consultants

IKE3 Environmental / Climate Change Specialist

(126) The Environmental Specialist should have an environmental engineering or a relevant related field and is familiar with the World Bank ESF's, ADB SPS, and other IFI/s safeguards policies or the equivalent ADB framework requirements for environmental documents. The tasks of an Environmental Specialist are the following:

a) Prepare the Project Documents for ANLA review and approval.

b) To prepare ESAs (EISs/ESIAs or SEISs and EMPs/ESMPs based on the risk categorization and classification) in accordance with the requirements of ANLA and the World Bank ESF/ADB SPS for the water supply & sanitation infrastructure development for the three municipal capitals.

c) To assess climate change risk vulnerability using available climate risk information and data.

IKE4 Social Development Specialist

(127) The Social Development Specialist should have a degree in social science or related fields such as sociology, social development, applied social science, or other related disciplines. Relevant international experience working in developing country's water supply & sanitation or public infrastructure sector, on social, poverty, gender assessment, participatory planning, social risk assessment and management, and involuntary resettlement assessment and planning. Familiar with World Bank/ADB's ESF and ADB SPS requirements and develop the relevant social safeguards documentation. The tasks, roles, and responsibilities of a Social Development Specialist are the followings:

a) To assess social risks, including issues related to labor, community health, and safety, gender and GBV(SEA/SH), Indigenous Peoples, cultural heritage, and involuntary resettlement in the project;

b) Preparation of relevant social impacts management plans, including Resettlement Action Plan, Cultural Heritage Management Plan, and Indigenous People Plan (if confirmed relevant);

c) Prepare a Stakeholder Engagement Plan to be implemented by the Project, which covers the pre-construction to operation phase; and

d) Prepare a Labor Management Procedure

IKE5 Water Resources Specialist

(128) The Water Resource Specialist's educational background in water resources engineering or similar. The tasks, roles, and responsibilities of the Water Resources Specialist are the following:

a) planning, assessing, and identifying suitable water resources and intake structures for all sources for the three municipal capitals' proposed water supplies;

b) develop scope of work for a service provider to assist flow measurement units for surface water and exploration bores, overseeing and data analysis.

c) planning, assessing, and identifying groundwater resources exploration and redevelopment work as indicated in the master plan, for the proposed municipal capitals' water supplies, where the potential bores will be reamed and constructed to become production bores;

d) develop scope of work for the service provider, evaluate bid documents, manage the national consultant to oversee the exploration drilling, geo-resistivity survey, lithology, gamma log, data interpretation, bore screen recommendation, bore construction, pumping test data analysis, and recommends safe yield.

IKE6 WTP Design Specialist

(129) The Water Treatment Plant (WTP) Design Specialist's educational background is in Water Supply Engineering or similar. The specialist has designed three units of conventional and compact WTPs for equivalent sizes. The tasks, roles, and responsibilities of the WTP Design Specialist are the following:

a) Collaborate with water quality specialists in designing the treatment process requirements for the surface water, spring water, and additional treatment for boreholes in case water quality assessment results require any specific treatment.

b) Collaborate with other experts, propose design criteria, flow diagram, design calculation of the proposed WTPs, pre-sedimentation, coagulation, flocculation, sedimentation, filtrations, disinfections, backwash, appropriate control system (SCADA), adequate size of warehouse and sludge handling if required at a suitable site.

c) Disinfection shall be analyzed and designed to accommodate sufficient storage of reagents, and mechanical and maneuvering of reagents.

d) Overseeing the DED drawings and contributing to preparing technical specifications and BOQ.

e) description of O&M of the system, including chemical reagents and dosing facilities requirements.

International - Non-Key Experts (INK)

(130) **All** international non-key experts must hold a minimum bachelor's degree of relevant educational background and 8 years of relevant work experience for the nominated position. The international personnel who have worked on the IFI funded projects, such as World Bank, ADB and EIB, would be an advantage. The experts have completed at least 5 (five) similar (relevant) urban water & sanitation assignments in a similar position. Having a minimum of 5 (five) years of work experience in the Asia Pacific Region and 5 (five) years in another region other than its country of origin is an advantage.

(131) Work experience in Timor-Leste and knowledge of the administrative systems and government organizations is an advantage. Each team member must hold a valid professional institution membership, written on the curriculum vitae (CV). All experts must be fluent in English, both written and spoken. Acquiring working fluency in Tetum, Portuguese language be an advantage.

INK1 Structural Specialist

(132) The Structural Specialist (civil, structural background) tasks, roles, and responsibilities are the following:

a) structural review and improvement of BTL, E.P standard drawings.

b) structural design of the main infrastructures, buildings, pipe bridges, water tanks, BPTs, reservoirs, FSTPs, and public toilets to incorporate the parameters resulting from the geotechnical investigations.

c) Overseeing the DED drawings, all details, and bar schedules. Preparation of relevant technical specifications, verifying the adequacy of DED drawings, Bill of Quantities, and cost estimation of the associated works.

INK2 Geotechnical Engineer

(133) The Geotechnical Specialist's educational background shall be civil/geotechnical engineering or similar. The tasks, roles, and responsibilities of the Geotechnical Specialist are the following:

a) prepare the detailed plan, logistics, equipment adequacy, and fieldwork coordination.

b) overseeing service providers to carry out geotechnical field work and assessment (test pit, undisturbed sampling of material, SPT for soil and rock strata, groundwater observation, laboratory test) of around 36 sites where structures are to be built, such as water tanks, BPTs, wastewater treatment facilities, and pipelines, etc.

c) substructure foundation design of infrastructures included in the project.

INK3 Electrical and Systems Engineer

(134) The Electrical and Control Systems Engineer's tasks, roles, and responsibilities are the following:

a) assessing, planning, and designing appropriate electrical supply to water infrastructures, mechanical and electrical equipment, and automation of the control system. Ensure the proposed solution is appropriate, has low O&M costs, and is auto/manual in case of trouble or failure. Prepare the control philosophy in the draft and final report.

b) contribute to preparing DED drawings, cost estimation, and technical specifications of electrical and control systems.

INK4 Mechanical Engineer

(135) The Mechanical Engineer's educational background, tasks, roles, and responsibilities will include the following:

a) Assessing and planning appropriate mechanical components of the infrastructure, including mechanical handling and maneuvering of heavy lifting equipment and reagents at various infrastructure sites as required.

b) Collaborate with the electrical engineer to automate the control and data acquisition of the mechanical and electrical equipment.

c) Contribute to preparing DED drawings, cost estimation, and technical specifications of mechanical equipment.

INK5 Quantity Surveyor / Cost Engineer

(136) The Quantity Surveyor / Cost Engineer's educational background shall be civil engineering or similar. The tasks, roles, and responsibilities of Quantity Surveyor / Cost Engineer are the following:

a) Collaborate with other experts, prepare conceptual BOQ, unit price analysis based on labor, material, and equipment pricelist,

b) Coordinate expertise to prepare for technical specifications of civil works, pipework, mechanical, electrical, and instrumentation.

INK6 GIS Mapping Engineer

(137) The GIS Mapping Engineer's educational background is in geodetic engineering, geography, or similar. The tasks of the GIS Mapping Engineer are the followings:

a) To prepare a GIS database with a consistent naming convention and mapping of all data collected across the three municipal capitals and adaptable as the basis for future consumers' data and billing.

b) Collaborate with BTL, E.P, the internal consulting team, plan and update customers' data, georeferenced adaptable to the future IT system of BTL, E.P and customer relations; at least 50% of the total existing consumers' data must be shown on the GIS system; the project will encourage the BTL, E.P at the municipal capital to complete the customers' data.

INK7 Wastewater Treatment Plant Design Specialist

(138) The Wastewater Treatment Plant Design Specialist's educational background is in environmental or chemical engineering or similar. Previous work experience designing wastewater treatment plants (FSTP) and sewerage of similar sizes, simple CSTS and public toilets. The tasks, roles, and responsibilities of the FSTP Design Specialist are the following:

a) In collaboration with other experts, review the FSTP design, the appropriateness, the O&M costs, and the suitability of the proposed site. Propose a more appropriate modification or alternative solution with low O&M cost. Preparing outline plan, outline design, a process flow of FSTP treatment plant, supporting building, warehouse, mini laboratory, access road, landscape design works, design calculation at the proposed site,

b) DED of public toilets and a pilot CSTS.

c) In collaboration with the Social Development Specialist, develop the operational costs and the cost-sharing options, and consult with the relevant stakeholders and beneficiaries.

d) Oversee the DED drawings, the preparation of technical specifications, DED drawings, Bill of Quantities, and CAPEX and OPEX estimation of the associated works, and the minimum staff requirements.

INK8- Water Quality Specialist

(139) The Water Quality Specialist's educational background is in chemistry or similar. The tasks, roles, and responsibilities of the Water Quality Specialist are the following:

a) plan, analyze, overseeing sampling and testing of water resource samples (surface and groundwater) with a national laboratory in accordance with Decree-Law no. 31, 2020,

b) collaborate with WTP specialists on designing the treatment process requirements, and analyze the conversion from disinfection using calcium hypochlorite (Stage-1) to sodium hypochlorite (Stage-2).

c) collaborate with WTP specialist on designing additional treatment for boreholes in case of water quality assessment results require additional treatment, and

d) estimate the annual requirement for various chemical reagents for each municipal capital and the annual budget.

9.4 National Consultants' Requirements

General Requirements

a) All Non-key experts– (national consultants, including surveyors or facilitators), except CAD operators, must hold a minimum bachelor's degree of relevant educational background and three years of relevant work experience for the nominated position as shown on the CVs. The deputy team leader shall be a water supply engineer or proven five years of relevant work experience as shown on the CV. Acquiring English, Indonesian, or Portuguese language will be an added advantage. The team leader will define the work relations between national consultants and international personnel.

b) The tasks, roles, and responsibilities of national consultants shadow the international personnel. It is in the government's interest to ensure that the national consultant's capacity building is reflected in this project. The consultant shall elaborate on the detailed description of the national consultants' tasks, roles, and responsibilities for the project.

9.3 Facilities Provided by the GoTL

(140) BTL, E.P will not provide office space for the consultant. BTL, E.P will provide limited space at "no cost" without any facility in each municipal capital for a limited number of consultants for temporary visits only.

9.4 Facilities Provided by the DED Consultant

(141) The DED Consultant is responsible for providing its own office space, transportation facilities, accommodations, all necessary equipment, and all necessary expenses to fulfill, to the full extent, the scope of works of these TOR. The international consultants must provide their computers and the standard software related to their roles.

(142) Establishing the consultant's main office in one of the municipal capitals is encouraged.

10 PAYMENT

(143) Upon meeting the administrative requirements, verification, and approval, the payments to the Consultant are as follows:

a) The consultant may request an Advance Payment in accordance with the procurement regulation.

b) The subsequent payments will be based on the approved deliverables indicated below:

Table 11: Payment Value

Code	Deliverables (D-Draft, P-Presentation, F-Final)	Subject to payment certificate approval
D1	Inception Report	10% of services*
D2	**Interim Reports, consisting of:** D2.1 Preliminary Design Report D2.2 Hydraulic Modelling Report (D) D2.3 BOQ Report (D)	20% of services*
D3	**Interim Reports, consisting of:** D3.1 Topographical & Drone Survey D3.2 Surface Water Resource Report (F) D3.3 Groundwater Resource Report D3.4 Water Quality Test Report D3.5 Ambient Air Quality Index Report D3.6 Geotechnical Investigation Report	100% of a specific report
D4	**Environmental and Social Safeguard Reports** D4.1 Project Documents (for categorization – ANLA,IP) D4.2 Environmental-related Reports, (D,P,F), various reports D4.3 Social-related Reports, (D,P,F) various reports	 5% of services* 20% of services* 15% of services*
D5	DED Reports (F)	20% of services*
D6	ANLA Environmental License	10% of services*

*Services mainly related to the eligible personnel costs, reimbursable expenses (except for the specific technical fieldwork and laboratory testing reports), and eligible provisional sums. All payments subject to retention.

11 WORK PROGRAM

(144) The Consultant should arrange a work program that, at a minimum, should cover thefollowing:

(a) Work Schedule in detail

(b) Human Resources Schedule

(c) Allocation of experts and their discipline and expertise. The curriculum vitae and a Letter of Availability to Work with the proposed experts should be attached.

(d) Concept of design work method.

(145) The Employer should approve the work program after the presentation and comments provided by the Employer have been addressed accordingly.

12 PREPARATION OF PROPOSAL

a) **Note:** this Chapter is not required at the Expression of Interest (shortlisting) stage, but for the second stage, the request for proposal (RFP) to be fulfilled by the invited shortlisted firm(s).

b) Proposing entities are requested to prepare a detailed description of how they propose to deliver on the outputs of the contract in the section of their proposal called "Approach and Methodology," including the transfer of knowhow from the international specialist to the national consultants and the BTL, E.P personnel in executing the proposed six parts activities, including how the Consultant submit to optimize the resources. The provision of generic information shall be avoided. In this narrative, entities should explicitly explain how they will achieve the outputs and include any information on their experience delivering similar projects.

c) Only one curriculum vitae (CV) must be submitted for each expert included in the proposal. Curriculum Vitae follows the generic format – a maximum of 5 pages, including a university diploma, two referees, and electronically signed. Also, the membership number on a recognized professional institution must be included, as a web address where that membership can be validated.

d) At the RFP stage, the CVs of the international non-key expert and the national consultant will be attached but not evaluated; however, the consulting firm(s) needs to propose only suitable and experienced candidates.

e) All positions under the contract must be included and budgeted for in the financial proposal. Within the approach and methodology, the Consultant shall link the number of person-month proposed to the output delivery, justifying the allocation accordingly.

f) Consultant's Quality Assurance: Describe briefly (two pages) your firm's standard policies, procedures, or practices in place that promote quality in the workplace, your interaction with clients, and the outputs you produce. Describe (two pages) also how you will ensure the quality of your firm's performance over the life of this assignment. A company that is ISO certified should show proof of ISO certification. This certification is not part of the maximum 2-pages requirement.

13 IMPLEMENTATION ARRANGEMENT

(146) The recruitment of the Consultants and the administration of the Consultant's contract will be undertaken by the Government of Timor-Leste. The Consultants will mobilize promptly after signing the contract agreement and compile, prepare, and submit all required reports and documentation according to the delivery milestones agreed in the contract.

(147) The counterpart Government agency is the PMU, in close collaboration with BTL, under the Ministry of Public Works. PMU will engage the relevant stakeholders' focal points in all preparation processes for the DED. PMU and BTL, E.P. will also offer to the Consulting Firm, free of charge, relevant available data, information, and documents, which the Consulting Firm may reasonably request, e.g., Master Plan report, technical guidelines, standard drawings, QGIS files, water quality data, existing survey information, any planning information like land ownership and acquisition, legal requirements, permits needed and public information, among others.

(148) The government will provide information in good faith but takes no responsibility for the accuracy of any information relied upon in design. All information is to be returned to the Government upon project completion. While counterpart agencies may help arrange and facilitate stakeholder consultation meetings and workshops, the Consultant shall retain responsibility for delivery. Any assumptions the Consultant makes concerning data and support shall be clearly stated in its offer by written.

(149) The Consultants shall include all costs necessary to undertake this assignment within its proposal. It is expected that the Consultant's cost will consist of but not be limited to the following:

a) Team leader and the water supply engineer should work full-time in Timor-Leste. The remaining international key personnel shall intermittently be in the project area for 40% of the indicated minimum person months.

b) Consultants, including their remuneration, mobilization, and demobilization costs (cost of tickets, transport to and from the airport, hotel, and visas, etc.), accommodation and allowances, etc.;

c) Office space, all office equipment, office personnel, and any other office requirements, including software licensing, etc.;

d) Presentation of reports, drawings, and documents, including printing, binding, and electronic formats and any translation works.

e) All project-related transportation for site visits, meetings, surveys, etc.

f) Consultation costs, including meetings, household survey, etc.;

g) Hiring or purchasing of equipment and resources, contract out service providers to undertake:

h) Routine flow measuring and water quality testing (in particular turbidity) of water sources for each of the three municipal capitals;

i) Exploratory bores, including mobilization of plant and drilling team bore construction; flow and water quality testing, analysis, bore decommissioning as required, and demobilization;

j) Borehole assessment including mobilization of plant and drilling team, pump lifting, downhole camera inspections, bore surging/developing, pumping tests, analysis, and demobilization, etc.;

k) Water quality testing, including testing to determine the water treatment process;

l) Topographical surveys, including all survey equipment and survey team personnel;

m) Geotechnical surveys, including all survey equipment and survey team personnel;

n) GPS survey of all properties in the three municipal capitals, including all equipment, 3 units of GPS-map, and survey team personnel; and

o) Any excavation work to locate/identify existing pipe work.

p) Government taxes to be paid related to the Consultant's services; and any other inputs deemed necessary by the Consultant.

q) All the equipment procured during the services and all the documents produced are the government's property.

r) The change of institution or agencies' name, no longer existed, or may be dissolved due to government policies, shall not reduce the consultant's scope of services.

A. APPENDIX A – WATER SUPPLY MASTER PLAN

A.1.1 Summary of Ainaro Water System Master Plan

The current Ainaro water sources are the springs Teliga1, Teliga2, and River Sarae Intake. The water quality was known as high potential for pipe scaling. An existing Slow Sand Filter was built in 2010 (funded by JICA), approximately 800 meters from Teligas. The water sources need to be metered. Storage capacity is below the design criteria. Ainaro municipal capital is predominantly hilly, and the water supply services are relatively uneasy. Many pipes are exposed above the ground. Most connections are unmetered and unregistered connections are high. The billing collectability is considerably low. Technical records are minimal.

The proposed solutions are:

Proposed solutions, which will be part of the DED services are summarized in the table below:

Table 12: Summary of Ainaro Water System Solutions

#	System components	DED requirements, detailed design, mechanical, electrical, control, and power supply, calculations, detailed drawings, technical specifications, and cost estimates
1	Water Sources	Total 22 Lps from 3 intakes to be modified (Teliga-1, Teliga-2, and Sarae river) with V-notch. Monthly flow monitoring commencing month 3 Bi-monthly water quality testing A sanitary survey is required around the upstream of the intakes, village Telega.
2	Gravity raw water transmission mains	(1) Teliga1 source to WTP – 650m; (2) Teliga2 to WTP- 750m; and (3) river Sarae intake to WTP-900m open channel. Including raw water bulk meters.
3	WTP	Design modification of SSF to reduce pipe scaling potential, plus chlorine injection, uprated from 14.5 Lps to 22 Lps treatment capacity.
4	Break-Pressure Tanks	Seven units.
5	Reservoir	6 units (4x 250m3 and 2x 500m3), total storage capacity 2,000 m3 with bulk water meters.
6	Distribution	Reconfiguring the distribution network by applying 14 pressure zones, primary, secondary, and tertiary (reticulation) pipes. In between tanks require 11,400m of pipes from DN 90-DN160, and the distribution network requires 51,700m of DN63 – DN250 pipes. The optimum diameters are subject to

#	System components	DED requirements, detailed design, mechanical, electrical, control, and power supply, calculations, detailed drawings, technical specifications, and cost estimates
		the optimum result of the hydraulic analysis.
7	House connections	There are 850 registered customers.
8	Sucos	(1) Ainaro, (2) Soro
9	Environmental & Social Documents	Project document; ESA in the form of EIA2/ESIA3 or SEIS4 and EMP/ESMP5, including identification of Affected Persons, Corridors of Impacts/project impact zone; Resettlement Plan, Stakeholders Engagement Plan, Labor Management Plan (LMP), SEP and Grievance Redress mechanism, CHMP and IPP (if confirmed relevant); GBV Action Plans

Note: The final length, the diameter of pipelines, pressure zoning, and reservoir sizing are subject to the optimum locations of water system components and the result of the hydraulic analysis.

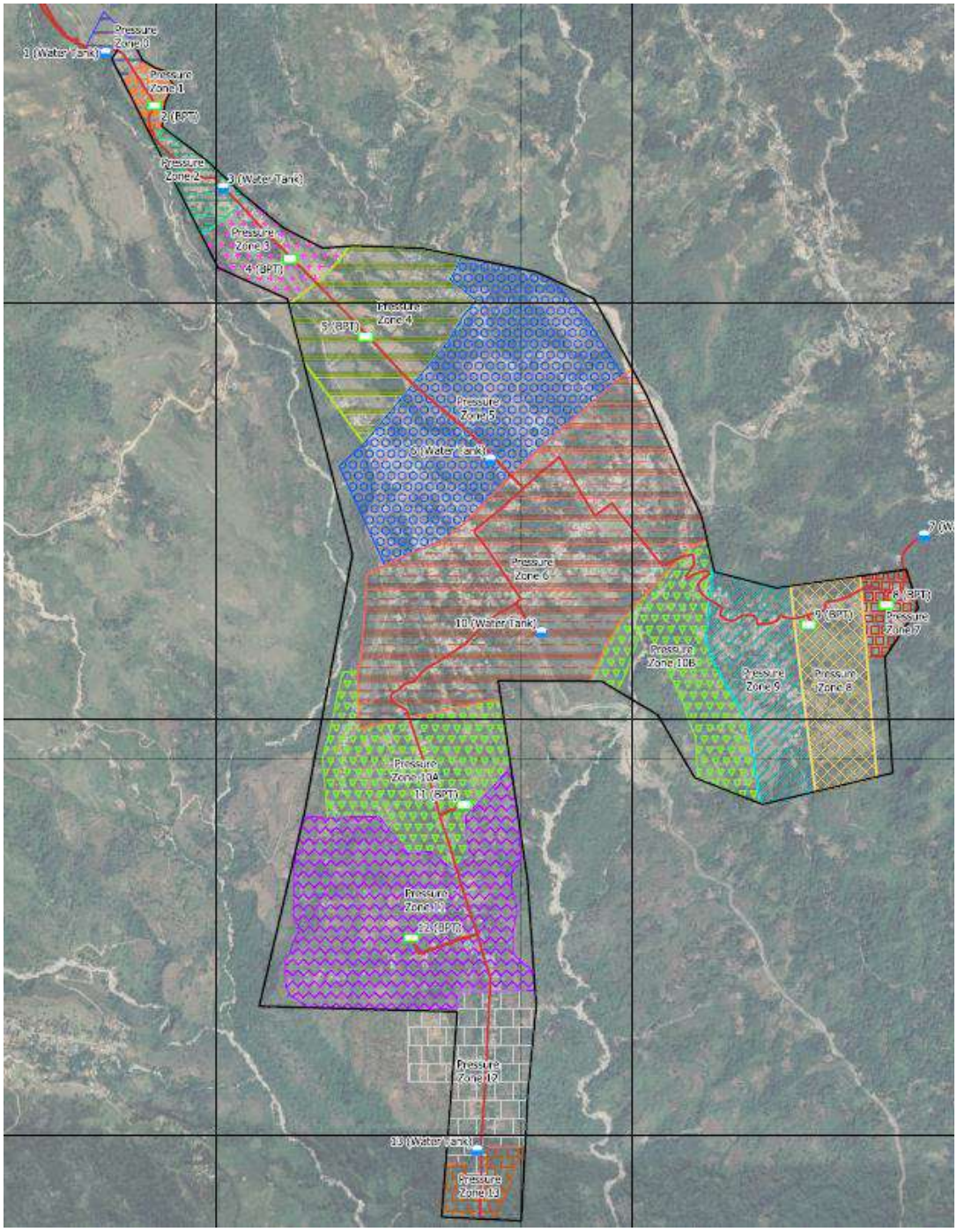

Figure 2: Proposed Ainaro Water Supply Zoning Scheme

The three water sources are about 700 meters northeast of the existing SSF (WTP)

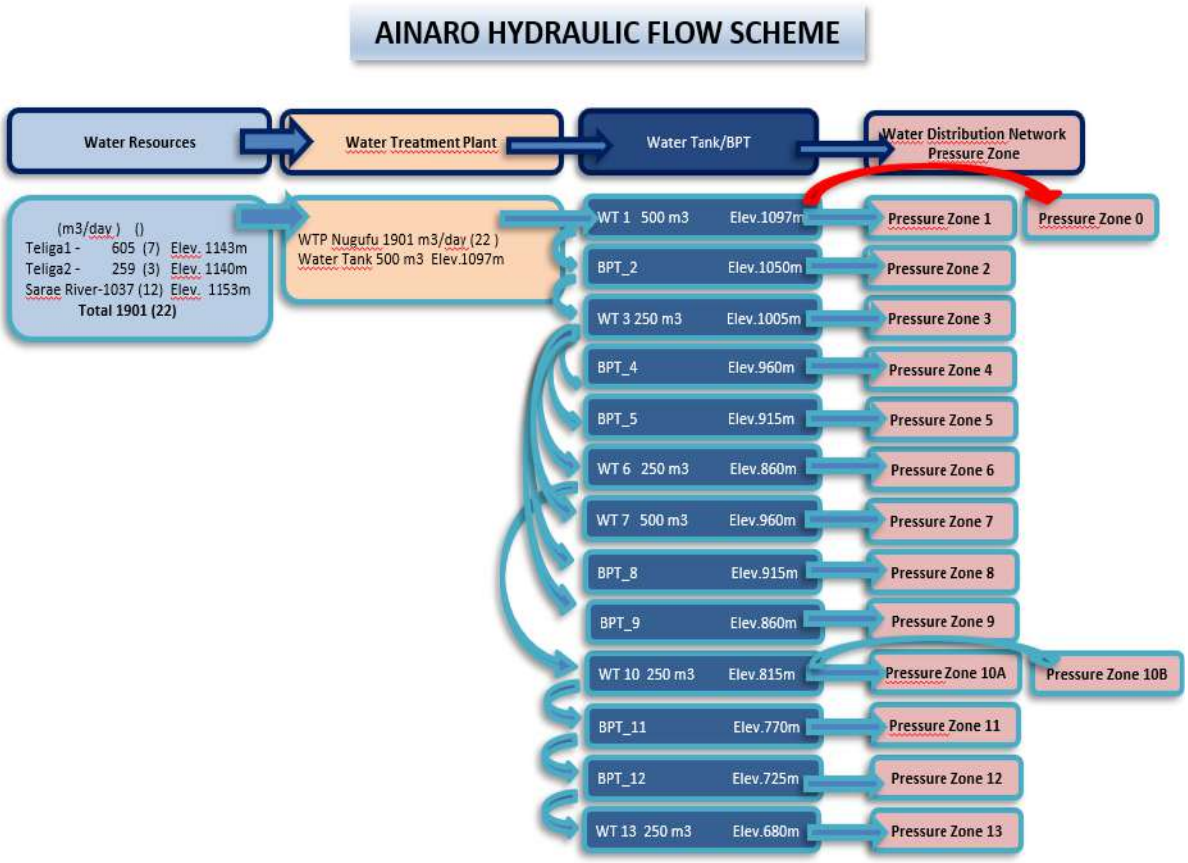

Figure 3: Schematic of Proposed Ainaro Water System

A.1.2 Summary of Maliana Water System Master Plan

Water for Maliana urban water is currently from mountain springs from several different low-yield water sources. In the dry seasons, about 7 Lps and from Bulobu River, tapping from the irrigation channel passing by the WTP, 10 Lps to WTP Lesupu. The total is less than 28 Lps in the dry season. The service and the revenue could be better, and some areas require a pumping supply. The chlorination system is not reliable. Documentation of water operations is considerably limited. Some people in the urban area along the irrigation channel fetch water from the channel. In other areas, communities organize themselves to provide different solutions for a water supply because the service could be more regular and reliable.

The current supply is far below the demand. The master plan estimates the Maliana water system demand in 2040 is 72 Lps.

The water from the Bulobu River, taken from the irrigation channel, must be pumped to higher areas surrounding the WTP Lesupu.

The proposed solutions are:

Proposed solutions which will be part of the Maliana DED services are summarized in the table below:

Table 13: Summary of Maliana Water System Solutions

#	System components	DED requirements, detailed design, mechanical, electrical, control, and power supply, calculations, detailed drawings, technical specifications, and cost estimates
1	Water Sources	Total 72 Lps from proposed two new intakes: II Culba spring - 30 Lps, and Bulobu River - 42 Lps Exploration drilling two units. PNTL bore will also be handed over to BTL, E.P for public water supply. Bi-monthly water quality testing A sanitary survey is required around the upstream of the intakes. All the existing water sources will be decommissioned.
2	Gravity raw water transmission mains	(1) II Culba spring to WTP – 8500m (2) Bulobu intake to WTP Lesupu – 1,300m;
3	WTP	New WTP Saburai 30 Lps and New WTP Lesupu (42 Lps) Inclusive of power supply, four months of chemical storage, pre-sedimentation as needed, and chlorination facility.
4	Break-Pressure Tanks	Four units
5	Reservoir	9 units, 7x500m3 and 2x 2,000m3 gives a total storage capacity of 7,500 m3 equipped with bulk water meters.
6	Distribution	Eleven pressure zones are to be reconfirmed at the DED stage. WTP to tanks and between tanks: 15,800m Other distribution pipe network: 51,200m All diameters, 63-315, are subject to the optimum hydraulic analysis result. Long sections and detailed junctions are required.
7	Bulk water meters	To be installed at all tanks,
8	House connections	There are 1,100 registered customers will increase to 6,630 connections in 2040. All will be reinstalled as required.
9	Sucos	(1) Holsa, (2) Lahomea, (3) Raifun, (4) Odomau, (5) Ritabou,
10	Environmental & Social Documents	Project document

#	System components	DED requirements, detailed design, mechanical, electrical, control, and power supply, calculations, detailed drawings, technical specifications, and cost estimates
		ESA in the form of EIA[6]/ESIA[7] or SEIS[8] and EMP/ESMP[9], including identification of Affected Persons, Corridors of Impacts/project impact zone; Resettlement Plan, Stakeholders Engagement Plan, Labor Management Plan (LMP), SEP and Grievance Redress mechanism, CHMP and IPP (if confirmed relevant); GBV Action Plans
11	Drilling exploration	A hydrological assessment is required to investigate the groundwater potential at two sites, and the potential bore will be reamed for a possible backup supply. Successful bores will be linked up to the water system if feasible.

Note: The final length, the diameter of pipelines, pressure zoning, and reservoir sizing are subject to the optimum locations of water system components and the result of the hydraulic analysis.

A map of the Maliana water supply master plan and the schematic of the proposed solution are shown below.

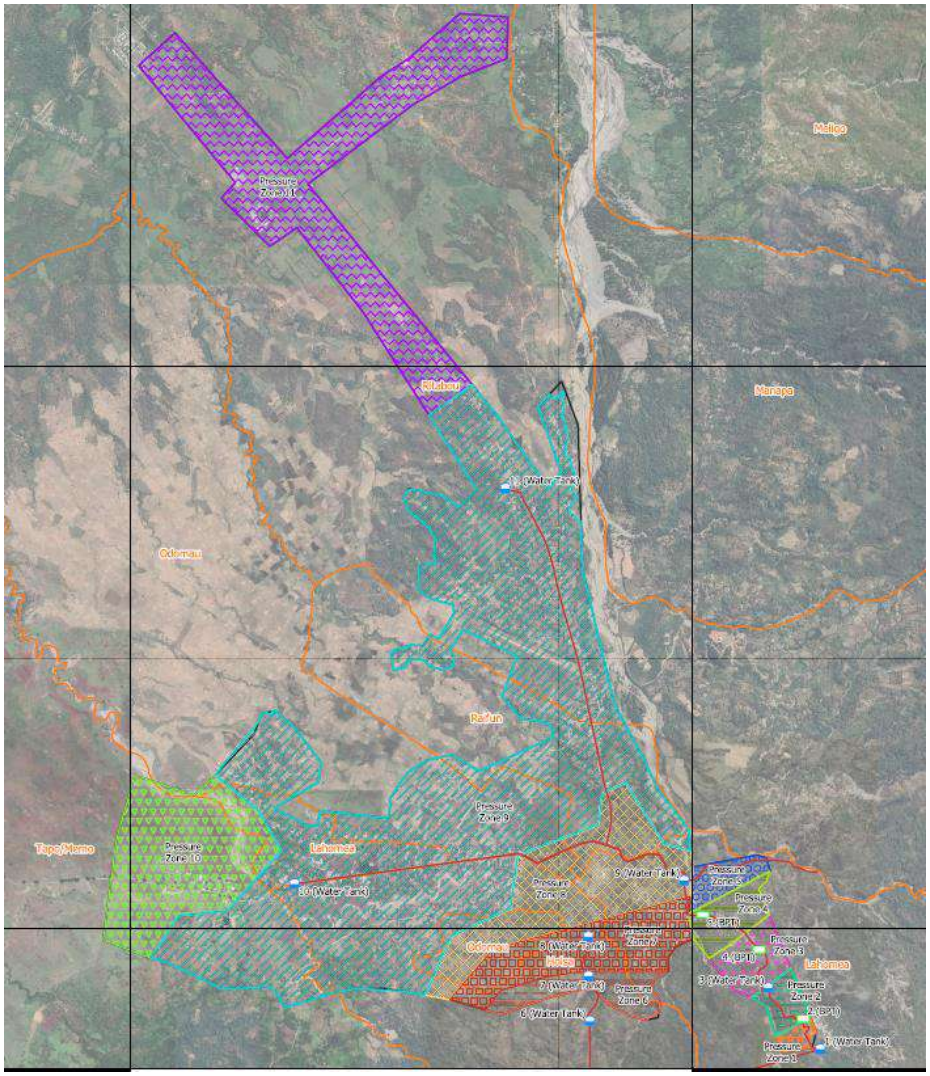

Figure 4: Proposed Maliana Water Supply Zoning Scheme

Il Culba water source, raw water transmission line, Saburai WTP, and water tank on the south from here

The drawings in the appendix 1 and QGIS files allow a better understanding of the proposed solution and its infrastructures.

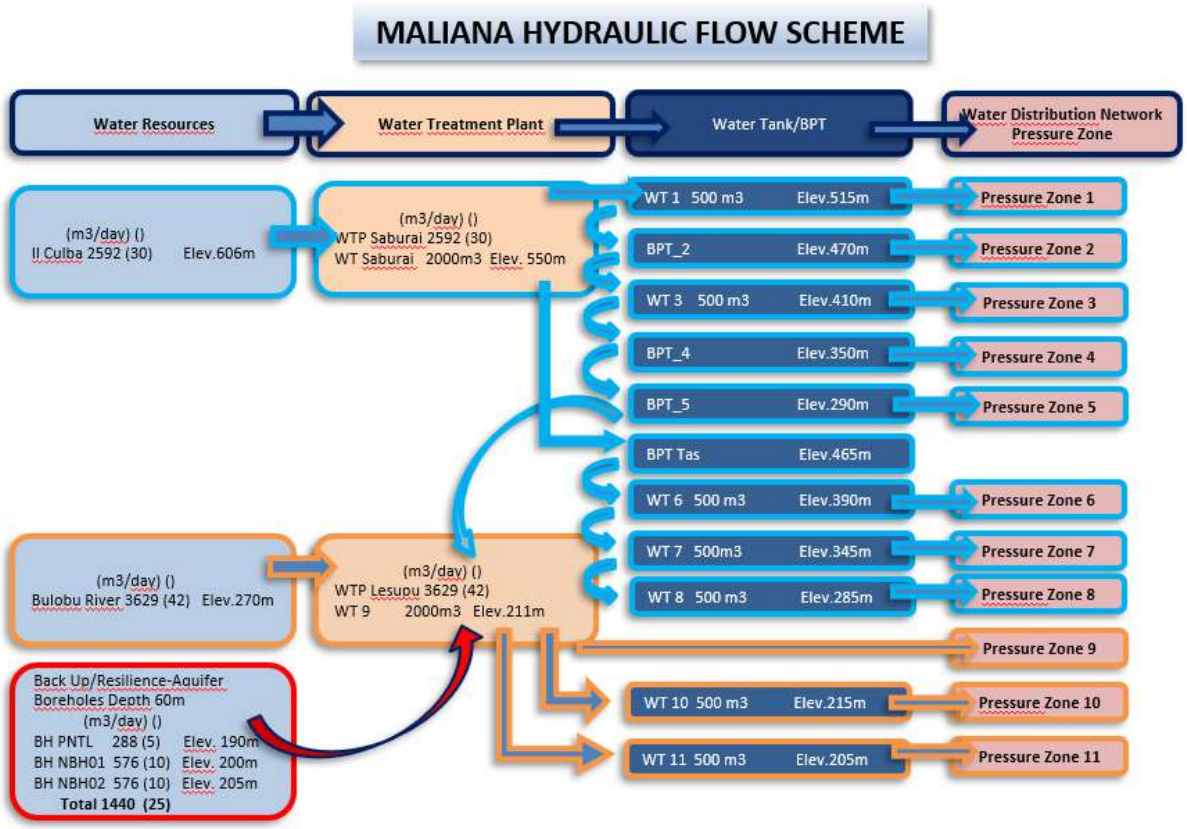

Figure 5: Schematic of Proposed Maliana Water System

A.1.3 Summary of Suai Water System Master Plan

The Suai water supply relies on three boreholes (Sukabi Laran I, Sukabi Laran II, Ladi) and a small Americo spring. The O&M of the boreholes is poor, and during the preparation of the Master Plan, only the Sukabi Laran I borehole was in operation. Due to power supply issues, the other two boreholes, Sukabi Laran II and Ladi, never worked. The combined three boreholes' production capacity is approximately 35 Lps. Water production and customer connections still need to be fully metered. The existing distribution system is complex, poorly planned, and largely undocumented; the water supply was intermittent, and valves must be manually operated daily to maintain services for all. Water quality control is not exercised regularly. Unregistered connections rate and physical losses are high. The system is currently used by 13 BTL, E.P personnel.

The booster pump must be fully functional and closer to the Suai Hospital and Santa Rosa water tank facilities.

Many small communities are built on the east side of the current urban area because of resettlements from the Tasi Mane Project future areas and Suai international airport.

There are plans for development in Suai for the Tasi Mane Project, with a new Suai City planned and the Suai Supply Base concerning oil exploitation. The combined water demand in 2040 will reach 107 Lps in 2040. Relying on groundwater poses the possibility of saline intrusion, oil

contamination, and drying out of the aquifer. The proposed solution is to rely on three springs in the mountains, Wemasei (Dato Rua) 43 Lps, Naes (Lactos) 32 Lps, and Wekbotuk (Dato Tolu) 32 Lps, with a total capacity of 107 Lps.

The three springs are about 28 km from the proposed WTP, but with gravity flow, and considerably low O&M costs, local communities agree to share their water.

The proposed solutions are:

Proposed solutions which will be part of the Suai DED services are summarized in the table below:

Table 14: Summary of Suai Water System Solutions

#	System components	DED requirements, detailed design, mechanical, electrical, control, and power supply, calculations, detailed drawings, technical specifications, and cost estimates
1	Water Sources	Total 107 Lps from proposed three new water source intakes: Wemasei (Dato Rua) 43 Lps, Naes (Lactos) 32 Lps, and Wekbotuk (Dato Tolu) 32 Lps Surface water monthly flow measurements, bi-monthly water quality. Groundwater redevelopment and rehabilitation of the existing three boreholes for backup supply. A sanitary survey is required around the upstream of the proposed intakes.
2	Gravity raw water transmission mains	A total of 28,4km from the proposed three surface water intakes to WTP.
3	WTP	A new WTP Bereloik will treat water from the mountain's springs (Wemasei, Naes, and Wekbotuk), including operation rooms, four months of chemical storage, a pre-sedimentation tank as needed, a chlorination facility, and optimum power supply.
4	Break-Pressure Tanks	Six units
5	Reservoir	6 units, 1x500m3 and 2x 1,000m3 and 3x 2,000m3 gives a total storage capacity of 8,500 m3 equipped with bulk water meters.
6	Distribution	99kms of various pipes network DN63 to DN 315 48,5km pipeline between WTP to tanks and between tanks DN160mm to DN 400mm Five pressure zones are to be reconfirmed at the DED stage.

#	System components	DED requirements, detailed design, mechanical, electrical, control, and power supply, calculations, detailed drawings, technical specifications, and cost estimates
		All various diameters, 63-315mm subject to the optimum hydraulic analysis result. Long sections and detailed junctions are required.
7	House connections	There are 1,300 registered customers will increase to 8,800 connections in 2040. All will be reinstalled as required.
8	Sucos	(1) Maucatar, (2) Belecasac, (3) Holpilat, (4) Matai, (5) Ogues, (6) Labarai, (7) Camenaça, (8) Suai Loro, (9) Debos
9	Environmental & Social Documents	Project document. ESA in the form of EIA[10]/ESIA[11] or SEIS[12] and EMP/ESMP[13], including identification of Affected Persons, Corridors of Impacts/project impact zone; Resettlement Plan, Stakeholders Engagement Plan, Labor Management Plan (LMP), SEP and Grievance Redress mechanism, CHMP and IPP (if confirmed relevant); GBV Action Plans
10	Drilling exploration	A hydrological assessment is required to investigate the groundwater potential at two sites, and the potential bore will be reamed for a possible backup supply. Successful bores will be linked up to the water system if feasible.

Note: The final length, the diameter of pipelines, pressure zoning, and reservoir sizing are subject to the optimum locations of water system components and the result of the hydraulic analysis.

A map of the Suai water supply master plan and the proposed solution schemas are shown below.

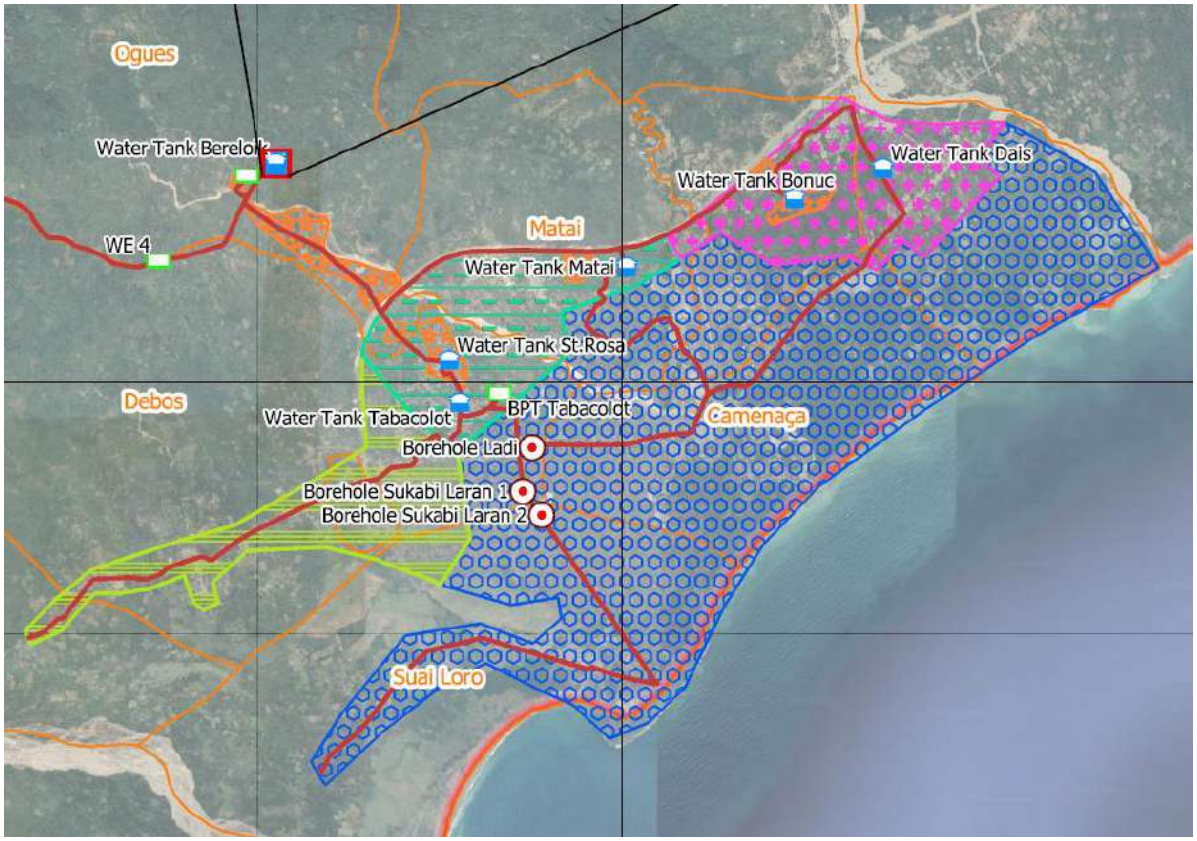

Figure 6: Proposed Suai Water Supply Zoning Scheme

The Wemasei, Naes, and Wekbotuk water sources and raw water transmission lines are northeast of Bereloik WTP and water tank. The total raw water transmission line is 28Kms.

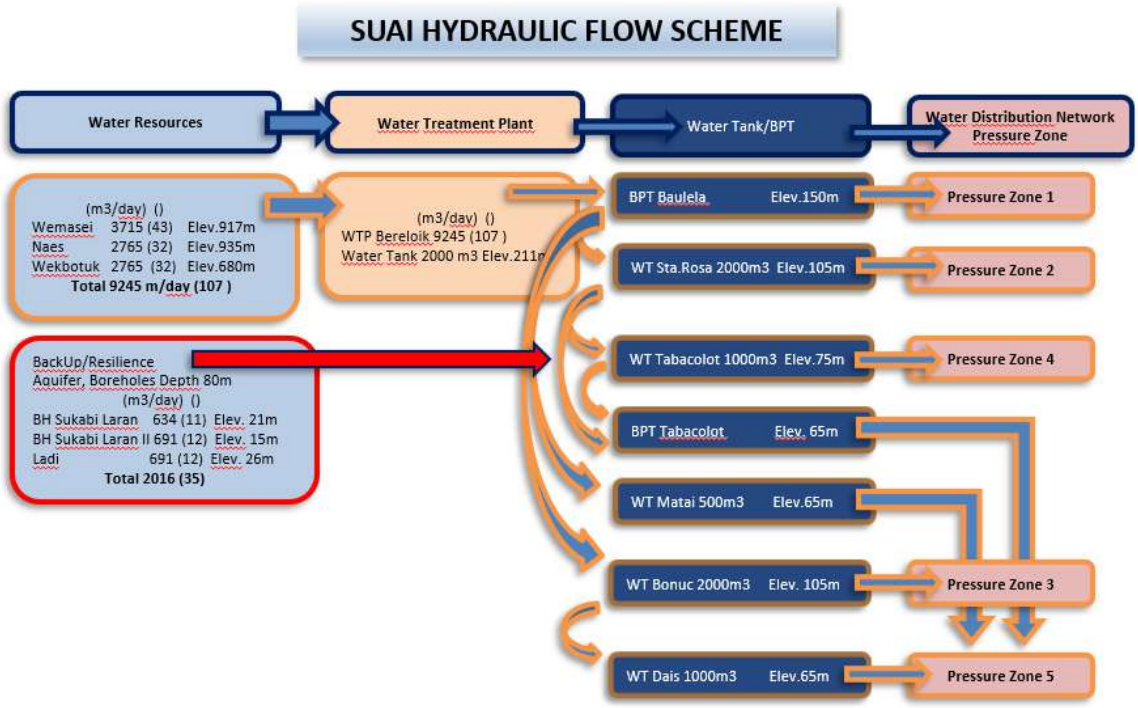

Figure 7: Schematic of Proposed Suai Water System

B. APPENDIX B – SANITATION FACILITIES

(150) There are two categories of public sanitation facilities to be built under this project, (1) public toilets and (2) fecal sludge treatment plant (FSTP). A follow-up consultation with relevant stakeholders, the written approval of the proposed sites, and the detailed site measurements must be attached.

B.1.1 Public Toilets

a) The consultant must prepare DED for 11 public toilets with septic tanks, 3 in Ainaro, 4 in Maliana, and 4 in Suai, typically at the markets, bus terminals, and other appropriate public spaces. The design shall be accessible to strollers for disabled people and must be gender disaggregated. The consultant shall include a percolation pit test.

b) A follow-up consultation with relevant stakeholders shall include no land and compensation issues and the facilities' future management and O&M.

c) In addition, typical DED drawings for typical septic tanks for 7, 20, and 50 users will be submitted by the consultant.

B.1.2 CSTS

(151) Prepare DED for one pilot "Community Sewer Treatment System, CSTS" for a small community in a denseness of 50 users (not 50 houses), to be agreed upon PMU. The CSTS shall consist of connection to toilets, pipework, communal septic tank, percolation pipes and the operation of the proposed system.

B.1.3 FSTP

a) The capacity of the FSTP presented in the master plan was an estimate only. The consultant must obtain information on the number and condition of domestic and non-domestic septic tanks to realistically estimate the size of the FSTP for 2040 demand. A revised estimate of FSTP size shall be based on the inventory of domestic and non-domestic septic tanks and the projected population within 15kms of the urban center to be completed as part of the DED;

b) The Master Plan proposals for sanitation are based on an integrated approach that will address household septic tanks, schools, public toilets (public areas), and offices.

c) Three FSTPs are included in the DED for (1) Ainaro, (2) Maliana, and (3) Suai (ref. Master Plan).

The proposed solutions, which will be part of the DED services, are summarized in the table below:

Table 15: FSTP DED Requirements

	System components	**DED requirements, detailed drawings, technical specifications, and cost estimates**
1	Number of FSTP	3 sites: (1) Ainaro, (2) Maliana and (3) Suai
2	Indicative size of the area	Ainaro 0.7 Ha; Maliana 1.3 Ha; Suai 2.0 Ha for Terrestrial topo/contour survey
3	Target beneficiaries	Septic tanks within 15 km of the urban center

	System components	DED requirements, detailed drawings, technical specifications, and cost estimates
4	Design horizon	2040, assuming the DED will be completed in 2025.
5	Treatment process	Biological treatment + disinfection facilities
6	FSTP features	FSTP (facultative and aerobic lagoons), embankment, operation rooms, gender-segregated twin toilet, water supply, mini laboratory, storage, internal road, and truck maneuvering, and roofed parking for a minimum of 3 trucks, low maintenance landscaping, fencing, guard post, irrigated land and perhaps the use of vetiver grass if suitable, mechanical, electrical power supply, combined with PV power. Each site's unit of a desludging truck must be included in the BOQ.
7	Site Investigation	Environmental, Social, and technical
8	Drone survey	Around the corridor of impact for clarity of image and contour as required: Ainaro 3 Ha; Maliana 3 Ha; (3) Suai 4 Ha

Based on the Master Plan, the typical layout of FSTP is presented in the figure below.

Aspects of the design are noted as follows:

a) The operation of the lagoon treatment system will vary seasonally. Key variables include rainfall, evaporation, septage volumes, dry beds, the concentration of wastewater pollutant load, detention time through dilution, and hydraulic load.

b) A brief functional description of the FSTP and the annual operational cost must be provided in the report.

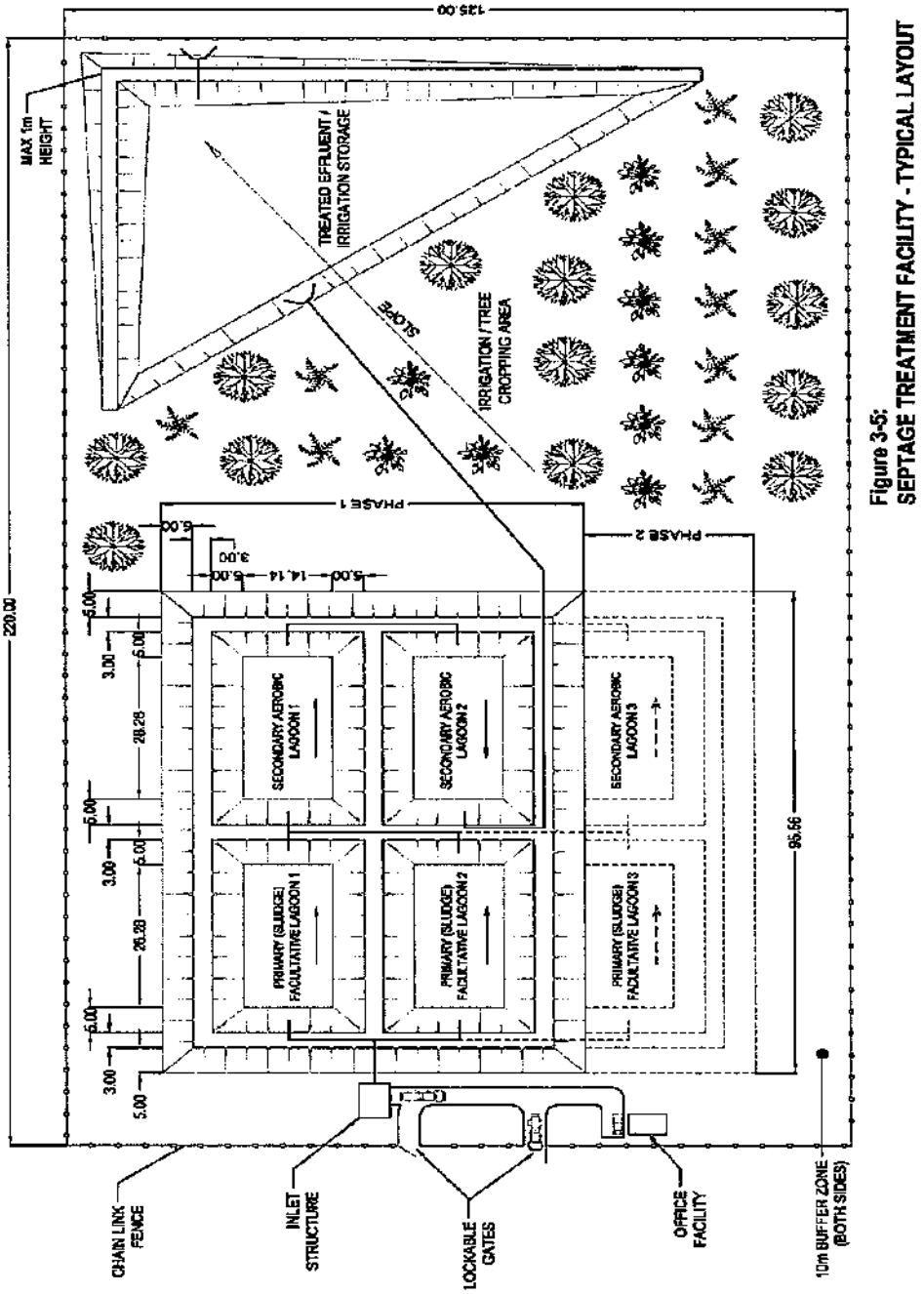

Figure 3-5:
SEPTAGE TREATMENT FACILITY - TYPICAL LAYOUT

Figure 8: Typical Layout of FSTP

C. APPENDIX C – ESIA & ESMP OUTLINES

Disclaimer: The consultant shall not assume that the description in this appendix is an intention for World Bank to co-finance the construction of this package. This is only a guide for the proposed international consultants with extensive and successful experiences preparing social and environmental documents for the international multilateral funding requirements (for example, World Bank-IDA, ADB, and European bank.).

C.1.1 Indicative outline of ESIA

Environmental and social impact assessment (ESIA) is an instrument to identify and assess a proposed project's potential environmental and social impacts, evaluate alternatives, and design appropriate mitigation, management, and monitoring measures.

The content of the ESIA will include the following:

(a) Executive Summary

Concisely discusses significant findings and recommended actions.

(b) Legal and Institutional Framework

Analyzes the legal and institutional framework for the project, within which the environmental and social assessment is carried out, including the issues set out in ESS1,

Compares the Borrower's existing environmental and social framework and the ESSs and identifies their gaps.

Identifies and assesses the environmental and social requirements of any co-financiers.

(c) Project Description

Concisely describes the proposed project and its geographic, environmental, social, and temporal context, including any offsite investments that may be required (e.g., dedicated pipelines, access roads, power supply, water supply, housing, and raw material and product storage facilities), as well as the project's primary suppliers.

Consideration of the project details indicates the need for any plan to meet the requirements of ESS1 through 10.

Includes a good, detailed map showing the project site and the area that may be affected by the project's direct, indirect, and cumulative impacts.

(d) Baseline Data

Sets the baseline data relevant to decisions about project location, design, operation, or mitigation measures in detail. This should include a discussion of the accuracy, reliability, and sources of the data and information about dates surrounding project identification, planning, and implementation.

Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions.

Based on current information, it assesses the scope of the area to be studied and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences.

Takes into account current and proposed development activities within the project area but not directly connected to the project.

(e) Environmental and Social Risks and Impacts

Takes into account all relevant environmental and social risks and impacts of the project. This will include the environmental and social risks and effects specifically identified in ESS2–8 and any other environmental and social risks and impacts arising as a consequence of the specific nature and context of the project, including the risks and impacts identified in ESS1.

(f) Mitigation Measures

Identifies mitigation measures and significant residual negative impacts that cannot be mitigated and, to the extent possible, assesses the acceptability of those residual negative impacts.

Identifies differentiated measures so that adverse impacts do not disproportionately affect the disadvantaged or vulnerable.

Assess the feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of proposed mitigation measures, their suitability under local conditions; and the institutional, training, and monitoring requirements for the proposed mitigation measures.

Specifying issues that do not require further attention provides the basis for this determination.

(g) Analysis of Alternatives

Systematically compares feasible alternatives to the proposed project site, technology, design, and operation—including the "without project" situation—regarding their potential environmental and social impacts.

Assesses the alternatives' feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of alternative mitigation measures and their suitability under local conditions; and the institutional, training, and monitoring requirements for the alternative mitigation measures.

For each alternative, quantifies the environmental and social impacts to the extent possible and economic values where feasible.

(h) Design Measures

Sets out the basis for selecting the proposed project design and specifies the applicable EHSGs or if the ESHGs are inapplicable, justifies recommended emission levels and approaches to pollution prevention and abatement that are consistent with GIIP.

(i) Appendices

List the individuals or organizations that prepared or contributed to the environmental and social assessment.

References—setting out the published and unpublished written materials that have been used.

Record meetings, consultations, and surveys with stakeholders, including those with affected people and other interested parties. The record specifies the means of such stakeholder engagement used to obtain the views of affected people and other interested parties.

Tables presenting the relevant data referred to or summarized in the main text.

List of associated reports or plans.

C.1.2 Indicative outline of ESMP

An ESMP consists of a set of mitigation, monitoring, and institutional measures to be taken during the implementation and operation of a project to eliminate adverse environmental and social risks and impacts, offset them, or reduce them to acceptable levels. The ESMP also includes the measures and actions needed to implement these measures. The Borrower will (a) identify the set of responses to potentially adverse impacts; (b) determine requirements for ensuring that those responses are made effectively and promptly; and (c) describe the means for meeting those requirements.

The content of the ESMP will include the following:

(a) Mitigation

The ESMP identifies measures and actions in accordance with the mitigation hierarchy that reduces potentially adverse environmental and social impacts to acceptable levels. The plan will include compensatory measures, if applicable. Specifically, the ESMP:

(i) identifies and summarizes all anticipated adverse environmental and social impacts (including those involving indigenous people or involuntary resettlement),

(ii) describes with technical details for each mitigation measure, including the type of impact to which it relates and the conditions under which it is required (e.g., continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate,

(iii) estimates any potential environmental and social impacts of these measures, and

(iv) considers other mitigation plans required for the project (e.g., for involuntary resettlement, indigenous peoples, or cultural heritage),

(b) Monitoring

The ESMP identifies monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed in the environmental and social assessment and the mitigation measures described in the ESMP. Specifically, the monitoring section of the ESMP provides (a) a specific description and technical details of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions;

and (b) monitoring and reporting procedures to (i) ensure early detection of conditions that necessitate particular mitigation measures, and (ii) furnish information on the progress and results of mitigation.

(c) Capacity Development and Training

To support the timely and effective implementation of environmental and social project components and mitigation measures, the ESMP draws on the environmental and social assessment of responsible parties' existence, role, and capability on-site or at the agency and ministry level.

Specifically, the ESMP provides a specific description of institutional arrangements, identifying which party is responsible for carrying out the mitigation and monitoring measures (e.g., for operation, supervision, enforcement, implementation monitoring, remedial action, financing, reporting, and staff training).

To strengthen environmental and social management capability in the agencies responsible for implementation, the ESMP recommends the establishment or expansion of the parties responsible, the training of staff, and any additional measures necessary to support mitigation measures and any other recommendations of the environmental and social assessment.

(d) Implementation Schedule and Cost Estimates

For all three aspects (mitigation, monitoring, and capacity development), the ESMP provides (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) the capital and recurrent cost estimates and sources of funds for implementing the ESMP. These figures are also integrated into the total project cost table.

(e) Integration of ESMP with Project

The Borrower's decision to proceed with a project, and the Bank's decision to support it, are predicated in part on the expectation that the ESMP (either stand-alone or as incorporated into the ESCP) will be executed effectively. Consequently, the measures and actions to be implemented will be specified, including the individual mitigation and monitoring standards and activities and the institutional responsibilities relating to each. The costs of so doing will be integrated into the project's overall planning, design, budget, and implementation.

Addendum No. 1
3 June 2025

CONSULTING SERVICES FOR DETAILED ENGINEERING DESIGN (DED) PREPARATION FOR AINARO-SUAI-MALIANA WATER SUPPLY AND SANITATION TENDER-RFP/055/MOP-2025

This Addendum No.1 is issued to amend certain items in the RFP Document in accordance with Clause 13.1 of the Instruction to Consultant (ITC) for **TENDER-RFP/055/MOP-2025 Consulting Services for Detailed Engineering Design (DED) Preparation for Ainaro-Suai-Maliana Water supply and sanitation**

NO	Part of RFP Document	As per this original RFP Document	As per this Addendum No.1
1	Section 2 Instruction to Consultant and Data Sheet 14.1.4 (QCBS with maximum budget)	Maximum budget for the assignment: **USD 2,906,820.00** (United States Dollars One Million Four Hundred One Thousand Six Hundred Fifty) inclusive of Provisional-sum and all taxes. The Employer may disqualify the technical and financial proposal if an **Evaluated Financial Proposal** exceeds the maximum budget.	Maximum budget for the assignment: **USD 2,906,820.00** (United States Dollars Two Million Nine Hundred Six Thousand Eight Hundred twenty) inclusive of Provisional-sum and all taxes. The Employer may disqualify the technical and financial proposal if an Evaluated Financial Proposal exceeds the maximum budget.
2	Section 5 Terms of Reference (TOR) Issued in a separate Volume as Volume 2	Terms of Reference **ISSUED IN A DEPARATE VOLUME AS VOLUME II**	The Original TOR issued in RFP is Deleted The revised Terms of Reference is attached as Appendix-1

Hermingardo Albano Soares
Executive Director of NPC

EMENDA Nº 1
3 Junho 2025

SERVIÇOS DE CONSULTORIA PARA A PREPARAÇÃO DO DESENHO DETALHADO DE ENGENHARIA (DDE) PARA O ABASTECIMENTO DE ÁGUA E SANEAMENTO DE AINARO-SUAI-MALIANA

TENDER-RFP/055/MOP-2025

A presente Emenda nº 1 é emitida para alterar os seguintes itens do Programa de Procedimento/Caderno de Encargos nos termos da Instrução aos Concorrentes 13.1 para os **Serviços de Consultoria para a Preparação do Desenho Detalhado De Engenharia (DDE) para o Abastecimento de Água e Saneamento de Ainaro-Suai-Maliana (TENDER-RFP/055/MOP-2025).**

Nº	Parte do Programa de Procedimento /Caderno de Encargos	Conforme o Programa de Procedimento	Conforme a Emenda nº 1
1	Secção 2 Instrução aos Concorrentes 4.1.4 da Ficha Técnica (SBQC com orçamento máximo)	Orçamento máximo para o projeto: US$ **2.906.820,00** (um milhão, novecentos e seis mil, oitocentos e vinte dólares norte-americanos) incluindo montante provisional e todos os impostos aplicáveis. A Entidade Adjudicante poderá desqualificar as propostas técnicas e financeiras caso uma **proposta financeira avaliada** exceda o orçamento máximo.	Orçamento máximo para o projeto: **US$ 2.906.820,00** (dois milhões, novecentos e seis mil, oitocentos e vinte dólares norte-americanos) incluindo montante provisional e todos os impostos aplicáveis. A Entidade Adjudicante poderá desqualificar as propostas técnicas e financeiras caso uma **proposta financeira avaliada** exceda o orçamento máximo.
2	Secção 5 Termos da Referência (emitido em volume separado - Volume 2)	Secção 5. Termos de Referência **EMITIDO EM VOLUME SEPARADO - VOLUME 2**	Os Termos de Referência originais são eliminados. Os Termos de Referência revistos são anexados como Apêndice 1.

Hermingardo Albano Soares
Diretor-Executivo da CNA

LETTER OF INVITATION

RFP No.: TENDER-RFP/055/MOP-2025

29 May 2025

1. In accordance with paragraph a) (1) article 43.º, article 44.º, (2) article 73.º from de Decree-Law no. 22/2022, May 11th, amended by the Decree-Law no. 14/2023, April 12th, the National Procurement Commission (NPC), as instructed by the Ministry of Public Works - Government of Timor-Leste - is inviting interesting consulting firms to provide the following consulting services (hereinafter called "Services"):

Consulting Services for Detailed Engineering Designed (DED) Preparation for Ainaro-Suai-Maliana Water Supply and Sanitation

More details on the Services are provided in the Request for Proposal (RFP).

2. Funding for these Services will be made from the Infrastructure Fund of the Government of the Democratic Republic of Timor-Leste.
3. The Project is located in **Ainaro, Suai and Maliana Municipalities.**
4. The main objective of this DED is to increase the service coverage of safely managed water supply and sanitation access, improve the quality of service at an affordable price and enhance O&M capability in the targeted municipal capitals and the scope of services in the development of a DED of the climate resilient the Water Supply and Sanitation Project of three (3) municipal capital of Aileu, Gleno and Liquica public consultation and environmental-social safeguard activities and documentation.
5. The Consulting Services comprises of **81 person-months of international experts and 192 person-months of national experts** input over a duration of **15 months** from the date of signing of contract.
6. A firm will be selected under the **Quality and Cost Base Selection (QCBS) Method** with weights given to Technical & Financial Proposals are (90:10) as described in the RFP document. The Technical Proposal will be evaluated based on the Qualification of the Firms (The consultant has successfully completed 3 similar projects in Detailed Engineering Design with a contract price of **US$: 2,300,000.00** (similar in scope as required in ToR) as Lead Firm or Joint Venture Partner), Approach & Methodology & Experts CV. **The minimum technical score (St) required to pass is: 75%.** The Employer shall award the contract to the Consultant with the highest combined score evaluated in accordance with the procedure specified under Section 2 & 3, provided further that the Consultant is determined to be qualified to perform the Contract satisfactorily.

ANÚNCIO DE CONCURSO

Nº: TENDER-RFP/055/MOP-2025

29 de Maio de 2025

1. Nos termos da alínea a) do nº 1 do artigo 43º, artigo 44.º, nº 2 do artigo 73.º do Decreto-Lei nº 22/2022 de 11 de Maio, alterado pelo Decreto-Lei nº 14/2023, de 12 de Abril, a Comissão Nacional de Aprovisionamento (CNA), conforme instruída pela Entidade Adjudicante – Ministério das Obras Públicas - convida empresas de consultoria interessadas a prestarem os seguintes serviços de consultoria (doravante designados por "Serviços"):

Serviços de Consultoria para a Preparação do Desenho Detalhado de Engenharia (DDE) para o Abastecimento de Água e Saneamento de Ainaro-Suai-Maliana

Do Programa de Procedimento/Caderno de Encargos constam mais detalhes sobre os serviços em epígrafe.

2. Os Serviços serão financiados pelo Fundo das Infraestruturas do Governo da República Democrática de Timor-Leste.
3. O projeto localiza-se nos **Municípios de Ainaro, Suai e Maliana.**
4. Os principais objetivos do supracitado projeto são o aumento da cobertura do serviço de abastecimento de água e saneamento gerido de forma segura, a melhoria da qualidade do serviço a um preço acessível, o reforço da capacidade de operação e manutenção nas capitais municipais visadas bem como do âmbito dos serviços no desenvolvimento de um projeto de engenharia sustentável de abastecimento de água e saneamento de três (3) capitais municipais - Ainaro, Suai e Maliana - através de consulta pública e atividades e documentação de salvaguarda ambiental e social.
5. Os serviços de consultoria em questão compreendem a contribuição de **81 pessoas-mês de peritos internacionais e 192 pessoas-mês** de peritos nacionais durante um período de **15 meses** desde a data de assinatura do Contrato.
6. Será selecionada uma empresa nos termos do método de **Seleção Baseada em Qualidade e Custo (*QCBS*),** com ponderações atribuídas às Propostas Técnica e Financeira de 90:10, respetivamente, conforme descrito no Programa de Procedimento. A avaliação das propostas técnicas incidirá sobre a qualificação da empresa (o concorrente deverá ter concluído com sucesso 3 projetos semelhantes de desenho detalhado de engenharia com um valor contratual de **US$ 2.300.000,00** – de âmbito semelhante conforme exigido pelos TdR – como empresa principal ou sócio de consórcio), abordagem e metodologia e CV dos peritos. **A pontuação técnica mínima para qualificação é de**

7. The procurement shall be conducted as single stage-two envelope procedures, wherein the Technical and Financial Proposals shall be submitted together in separately-sealed envelopes;

8. The maximum budget for this project **US$: 2,906,820.00 inclusive of all applicable taxes.** The employer may disqualify the financial proposal exceeding the budget. Consultant shall provide justification Note, justifying an abnormally low financial proposal, when the price presented in the proposal is abnormally low, an abnormally low price is the price that does not reach 70% of the value of maximum budget.
9. The validity of the proposal is 120 calendar days.
10. Interested Consulting firms may obtain further information from:

    National Procurement Commission
    Avenida de Balide, Partimonio Estado, Dili, Timor-Leste
    Email: mj@cna.gov.tl
    Cc: as@cna.gov.tl, ns@cna.gov.tl, ab@cna.gov.tl, at@cna.gov.tl and tr@cna.gov.tl

11. Participation in this bidding process is open to all interested international and national Consultants. The attention of interested Consultants is drawn to the qualification requirements detailed in the RFP.

12. The consultant must enclose with their technical proposal security in the form of the bank guarantee of amount **USD: 29,000.00 (Twenty-Nine Thousand United States Dollars)** valid twenty-eight (28) days beyond the original validity of the proposal.

13. The RFP is available free-of-charge to any interested Consultants (Local or International Consulting Firms) by sending a written request by email after which a PDF copy of the RFP will be sent also by email.

14. A pre-proposal conference will be held at **11:00 hour's** local time on **12 June 2025** the same address specified above.

15. The proposals must be received in the Tender Box located at the same address specified above no later than **16:00 hour's** local time on **10 July 2025.**

16. Any Proposal or its modification received by the Employer after the deadline shall be declared late and rejected, and promptly returned unopened.

Hermingardo Albano Soares
Diretor-Executivo, Comissão Nacional de Aprovisionamento

75%. A Entidade Adjudicante adjudicará o contrato ao concorrente com a pontuação global mais elevada nos termos dos procedimentos especificados nas secções 2 e 3 das peças de procedimento desde que, além disso, o concorrente seja considerado como qualificado para a execução satisfatória do Contrato.

7. O concurso será realizado sob fase única - procedimento de dois envelopes - sendo que as propostas Técnica e Financeira deverão ser apresentadas juntamente mas em envelopes separados e selados.
8. O orçamento máximo para este projeto é de **US$ 2.906.820,00, incluindo todos os impostos aplicáveis.** A Entidade Adjudicante desqualificará as propostas financeiras avaliadas que excedam o orçamento máximo. O concorrente deverá apresentar justificação - na proposta financeira - caso o preço proposto não atinja 70% da estimativa de custo (preço anormalmente baixo).
9. A validade da proposta é de 120 dias civis.
10. As empresas de consultoria interessadas poderão obter informações adicionais através da:

    Comissão Nacional de Aprovisionamento
    Avenida de Balide, Património do Estado, Díli, Timor-Leste
    E-mail: mj@cna.gov.tl
    Cc: as@cna.gov.tl, ns@cna.gov.tl, ab@cna.gov.tl, at@cna.gov.tl e tr@cna.gov.tl

11. A participação no processo de concurso em epígrafe encontra-se aberta a todos os consultores interessados, internacionais e nacionais. Chama-se a atenção dos candidatos interessados para os requisitos de qualificação detalhados no programa de procedimento.

12. Os concorrentes deverão anexar às suas propostas técnicas uma garantia de concurso, sob a forma de garantia bancária, no valor de **US$29.000,00 (vinte e nove mil dólares norte-americanos)** com a validade de vinte e oito (28) dias para além do prazo de validade original da proposta.

13. O Programa de Procedimento +Caderno de Encargos, será disponibilizado gratuitamente a quaisquer candidatos interessados (empresas de consultoria nacionais ou internacionais) mediante solicitação por escrito enviada através de e-mail. Posto isto, será enviada, pela mesma via, uma cópia em PDF dos documentos solicitados.

14. Terá lugar uma conferência prévia às **11 horas locais** do dia **12 de Junho de 2025** no supracitado endereço.

15. As propostas deverão ser recebidas na Caixa de Concurso do supracitado endereço **até às 16 horas locais** do dia **10 de Julho de 2025.**

16. Quaisquer propostas ou respetivas alterações recebidas pela Entidade Adjudicante após o prazo determinado, serão declaradas tardias e rejeitadas, sendo imediatamente devolvidas sem serem abertas.