

Environmental Management Plan

March 2021

Timor-Leste: Water Supply and Sanitation
Investment Project: Viqueque City

Prepared by the Ministry of Public Works for the Asian Development Bank.

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ABBREVIATIONS

WSSIP	-	Water Supply and Sanitation Investment Project
ACMs	-	Asbestos Containing Materials
ADB	-	Asian Development Bank
DED	-	Detailed Engineering Design
DNAP	-	National Directorate for Protected Areas
DNCP	-	National Directorate for Pollution Control
SMASA	-	Municipal Water, Sanitation and Environment Services
EARF	-	Environmental Assessment and Review Framework
EHS	-	Environment, Health and Safety
EIA	-	Environmental Impact Assessment
EIS	-	Environmental Impact Statement
EMP	-	Environmental Management Plan
EMR	-	Environmental Monitoring Report
ESS	-	Environmental Safeguard Specialist
ESA	-	Environmental Safeguard Assistant
FSTP	-	Faecal Sludge Treatment Plant
GRM	-	Grievance Redress Mechanism
IEE	-	Initial Environmental Examination
IFC	-	International Finance Corporation
MPW	-	Ministry of Public Works
PA	-	Protected Area
PD	-	Project Document
PDC	-	Project Design Consultant
PMU	-	Project Management Unit
PSC	-	Project Supervision Consultant
SEA	-	Superior Environmental Authority
SEIS	-	Simplified Environmental Impact Statement
CEMP	-	Site-specific Construction EMP
SPS	-	Safeguard Policy Statement
TOR	-	Terms of Reference
WDZ	-	Water Distribution Zone
WTP	-	Water Treatment Plant
WHO	-	World Health Organization
WSS	-	Water Supply and Sanitation

WEIGHTS AND MEASURES

amsl	-	above mean sea level
°C	-	degree Celsius
cm	-	Centimetre
dBA	-	A-weighted decibel
Ha	-	hectare
km	-	Kilometre
km ²	-	square kilometre
L	-	Litre
Lps	-	Litres per Second
LA _{eq}	-	Equivalent continuous level 'A weighting' – 'A'-weighting = correction by factors that weight sound to correlate with the sensitivity of the human ear to sounds at different frequencies
m	-	Metre
mm	-	Millimetre
m ³	-	cubic meter
m ³ /d	-	cubic meter per day (flow measurement)
mg/kg	-	milligram per kilogram (concentration)
mg/L	-	milligram per litre
MPN/100 mL	-	most probable number per 100 millilitres (coliform count)
µg/m ³	-	microgram per cubic meter
PM ₁₀	-	particulate matter 10 micrometres or less
PM _{2.5}	-	particulate matter 2.5 micrometres or less

NOTE

In this report, "\$" refers to United States dollars and "SMASA" refers to SMASA-Viqueque unless otherwise stated.

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1. INTRODUCTION

1.1. Project Overview

1. The Water Supply and Sanitation Investment Project (WSSIP) is a Government of Timor-Leste project that intends to provide access to improved water supply and sanitation in the three project cities (Lospalos, Viqueque and Same) by drawing on experiences and lessons learned from the ADB Second District Capitals Water Supply Project.
2. The WSSIP objective is to impact on the quality of life for urban populations, especially the poor and marginalized, achieving inclusive and sustainable access to WSS services in the cities, through the improvement of water supply and sanitation infrastructure in project municipalities and strengthening of institutional and community capacities.
3. While municipalities' capacity is being built, the government intends to implement the project over a 7-year period (indicative implementation period is 2022 to 2028) and will be supported through ADB financing using a project lending approach. The MPW is the implementing agency responsible for the overall management, implementation and monitoring of the project and the SMASA will manage day-to-day operation at the municipality level.
4. The project will deliver three outputs: (i) Output 1: Regulatory environment improved; (ii) Output 2: Water supply and sanitation infrastructure improved; and (iii) Output 3: Institutional effectiveness improved. Under Output 2 the project will improve Viqueque population access to water supply and sanitation infrastructures through WSSIP:
 - (i) rehabilitate and expand the Viqueque urban water supply system to cover the new demand volumes for the project horizon year of 2040, including: (i) rehabilitation and improvement of the existing Loihuno Spring intake and complement current water production through the construction of a river intake in River Cuha; (ii) Rehabilitation and improvement of existing water storage and treatment facilities; (iii) Rehabilitation of 43 Km within the expanded water supply distribution pipe system (4 Zones), simplifying management and substantially improving the level of service and reducing water losses in the project area; and (iv) Installation of bulk metering system within the distribution network and replacement and/or installation of domestic meters for all existing and new connections for proper accounting of water use and system losses;
 - (ii) establish fully functioning water supply and sanitation infrastructure in 4 (four) public locations that is effectively operated, maintained and managed to provide a minimum level of service for water supply and sanitation to all municipal dwellers while they are active in the city premises;
 - (iii) establish septic tank sludge treatment and disposal facilities and associated sludge transport system within a diameter area of 15 Km around the Viqueque municipal capital that is effectively operated, maintained and managed and that safely transports the septic tank sludge effluent from all households, buildings and schools to a future stand-alone Faecal Sludge Treatment Plant (FSTP) in Suco Maluro.
5. An Initial Environmental Examination (IEE) was prepared as the preliminary environmental evaluation for the Water Supply and Sanitation Investment Project– Viqueque (known as WSSIP - Viqueque) and was carried out during the Detailed Design phase, in accordance with ADB's Safeguards Policy Statement (SPS) 2009, and the Government of Timor-Leste environmental requirements and guidelines currently in effect.
6. The IEE concluded that the water supply and sanitation investment project in Viqueque is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, potential direct environmental impacts are mostly construction related and unlikely to affect areas

larger than the sites or facilities subject to physical works. These impacts are site-specific, few if any of them are irreversible, and in most cases can be prevented or mitigated with standard construction methodologies and procedures and operational safety measures designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

7. During the preparation of the IEE for the component, the present Environmental Management Plan (EMP) was also prepared.

1.2. Purpose of the EMP

8. This document is the environmental management plan (EMP) for the Water Supply and Sanitation Investment Project– Viqueque City (known as WSSIP - Viqueque).
9. This EMP is prepared for design, construction and operation of the Water Sourcing, Treatment and Storage and Distribution, Public Toilet Pilots and Faecal Sludge Treatment Plant (FSTP).
10. The EMP ensures all the project activities are in compliance with technical designs, environmental legislation (GovTL, 2010) and guidelines applicable in Timor-Leste and within the ADB SPS 2009. The activities shall be undertaken responsibly without decrementing or jeopardizing the environment and social aspects. Objectives of the EMP are:
 - (i) To provide a feasible and practical working tool to enable the measurement and monitoring of environmental performance on-site;
 - (ii) To guide and control the implementation of findings and recommendations of the environmental assessment conducted for the project;
 - (iii) Detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project;
 - (iv) To ensure that safety recommendations are complied with.
11. The EMP is based on the type, extent and duration of the identified environmental impacts for Viqueque Municipal Capital, and has been prepared following best practice and by reference to the ADB Safeguard Policy Statement (2009). It includes detailed requirements for:
 - a) Mitigation and monitoring measures;
 - b) Institutional arrangements and project responsibilities;
 - c) EMP budget for implementation;
 - d) Capacity building and training requirements;
 - e) Public consultation and information disclosure;
 - f) GRM including timescale and responsibilities.
12. The costs for the EMP implementation are regarding the construction (4 years) and the operation phase (supported by the contractor) of 2 years, estimated at the following:

• EHS officer:	\$72,000
• Environmental Quality Monitoring:	\$24,400
• Training and Capacity Building:	\$61,800
Total:	\$158,200
13. The overall responsibility for EMP implementation lies with the Implementing Agency, the Ministry of Public Works (MPW). The MPW will establish a Project Management Unit (PMU) based in Dili, responsible for general project implementation with the support of a Project Supervision Consultant (PSC).

2. OUTLINE OF THE PROJECT

14. This WSSIP in Viqueque City aims to rehabilitate, extend and improve existing water abstraction, treatment and distribution facilities in Viqueque City to water demands up to 2040, as well as provide designs and solutions for Sanitation for Public Buildings and Schools within a diameter area of 15 Km around the city. The project comprises 4 components:

- Water Sources (Loihuno Spring Intake and Cuha River Intake)
- Water Treatment and Storage System
- Water Distribution Network (Transmission, Mains and Distribution)
- Sanitation Treatment (Public Toilet Pilots and FSTP)

15. The major components of the proposed project components are shown in Figure 1 and described in Table 1.

Table 1 List of Infrastructure Investments for Viqueque City

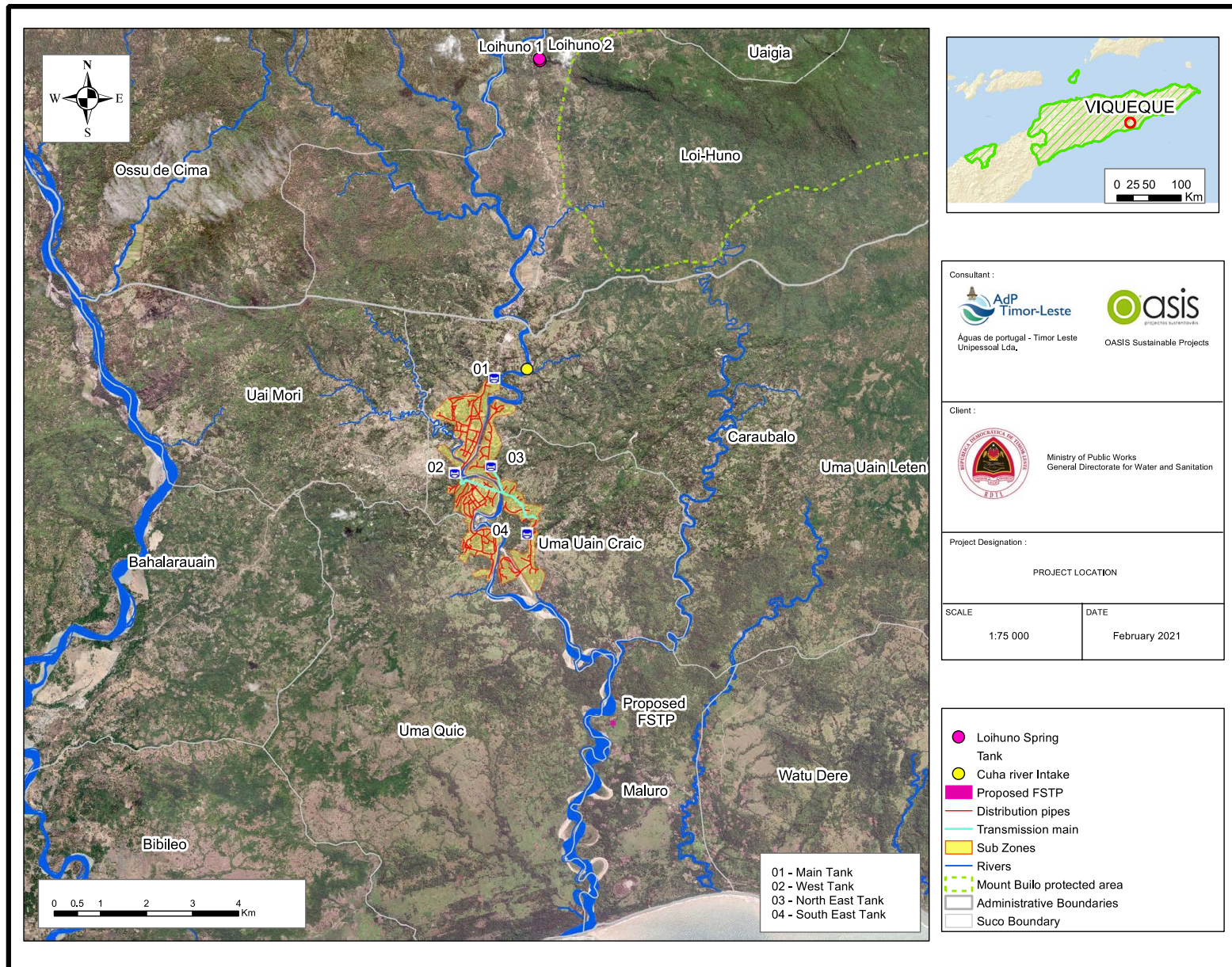
Proposed Components	Proposed Capacity	Notes
<u>Water Sources</u>		
Loihuno Intake	5 to 50 Lps (157,680 to 1,576,800 m ³ /year)	Rehabilitation
Cuha River Intake	5 to 50 Lps (157,680 to 1,576,800 m ³ /year)	New construction
<u>Water Distribution</u>		
Rehabilitation (Mains and Distribution)	43,046m	Rehabilitation
<u>Sanitation</u>		
Public Toilets Pilots (4)	Up to 300 users septic capacity each	New construction in: - Op 1 BNCTL, Aldeia Mamula, Suco Caraubalo - Op 2 Sede de Suco Uma Quic - Op 3 São Cristóvão Football Field, Suco Fuioro - Op 4 New Market, Aldeia Wessa, Suco Caraubalo
Faecal Sludge Treatment Plant (FSTP)	4,038 HH	New construction in Suco Maluro FSTP estimated inflow for treatment 328 m ³ /year (0.9 m ³ /d) in 2020 to 876 m ³ /year (2.4 m ³ /d) in 2040

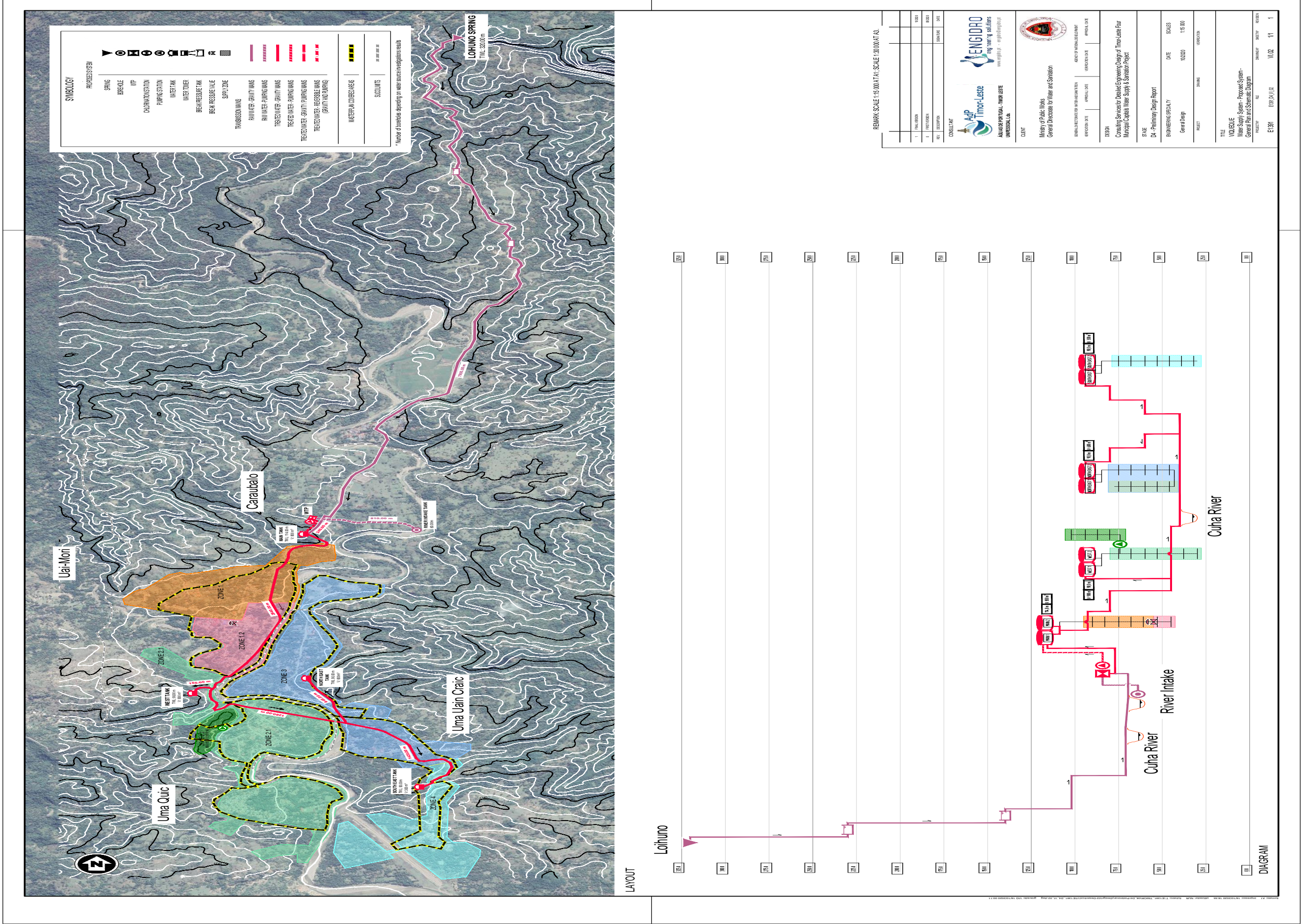
2.1.1. Water Source System

16. The project horizon includes expansion areas and user numbers for the next 20 years, up to 2040. Therefore, the water sourcing system will be a mixed system between spring and river intakes, specifically Loihunu Spring and the Cuha River. The spring and river intake (after preliminary water flow investigation results and comparison with water demands), pending a long term monitoring program, can produce enough flow to supply the distribution system in the dry season, with much more volume in the wet season to cover the requirements for the whole system up to 2040.

17. Apart from the Cuha river intake, the water distribution system as a whole has not had substantial change and as a result the current Flow Diagram does not differ a lot from the 2015 Master plan (see Figure 3).

Figure 1 Viqueque City - Project Scope and Components





18. Loihuno spring and Cuha River will complement each other as weather variability may occur that naturally reduces the Loihuno Stream flow and the Cuha River, so both will compensate the system and maintain the water distribution within demand levels.

Table 2 – Water Demands versus Origins Availability

Demands	L/s	m³/day							
2020	28.6	2,471.04							
Scenario B									
2030	39.3	3,395.52							
Scenario B									
2040	54.2	4,682.88							
Scenario B									
Existing sources	Total Flow		Distribution		Social		Ecological		%
	L/s	m³/day	L/s	m³/day	L/s	m³/day	L/s	m³/day	
Loihuno 1 (Builau)	5.0 to 50.0	432 to 4,320	5.0 to 50.0	432 to 4,320	---	---	---	---	---
Loihuno 3	20.0	1,728	---	---	---	---	20.0	1,728	100
Kuha River	5.0 to 50.0	432 to 4,320	5.0 to 50.0	432 to 4,320	---	---	---	---	N/A
Total	30.0 to 120.0	2,592 to 10,368	10.0 to 100.0	864 to 8,640					
Potential Sources	L/s	m³/day							
Borehole 1, 2, 3 & 4	0	0							

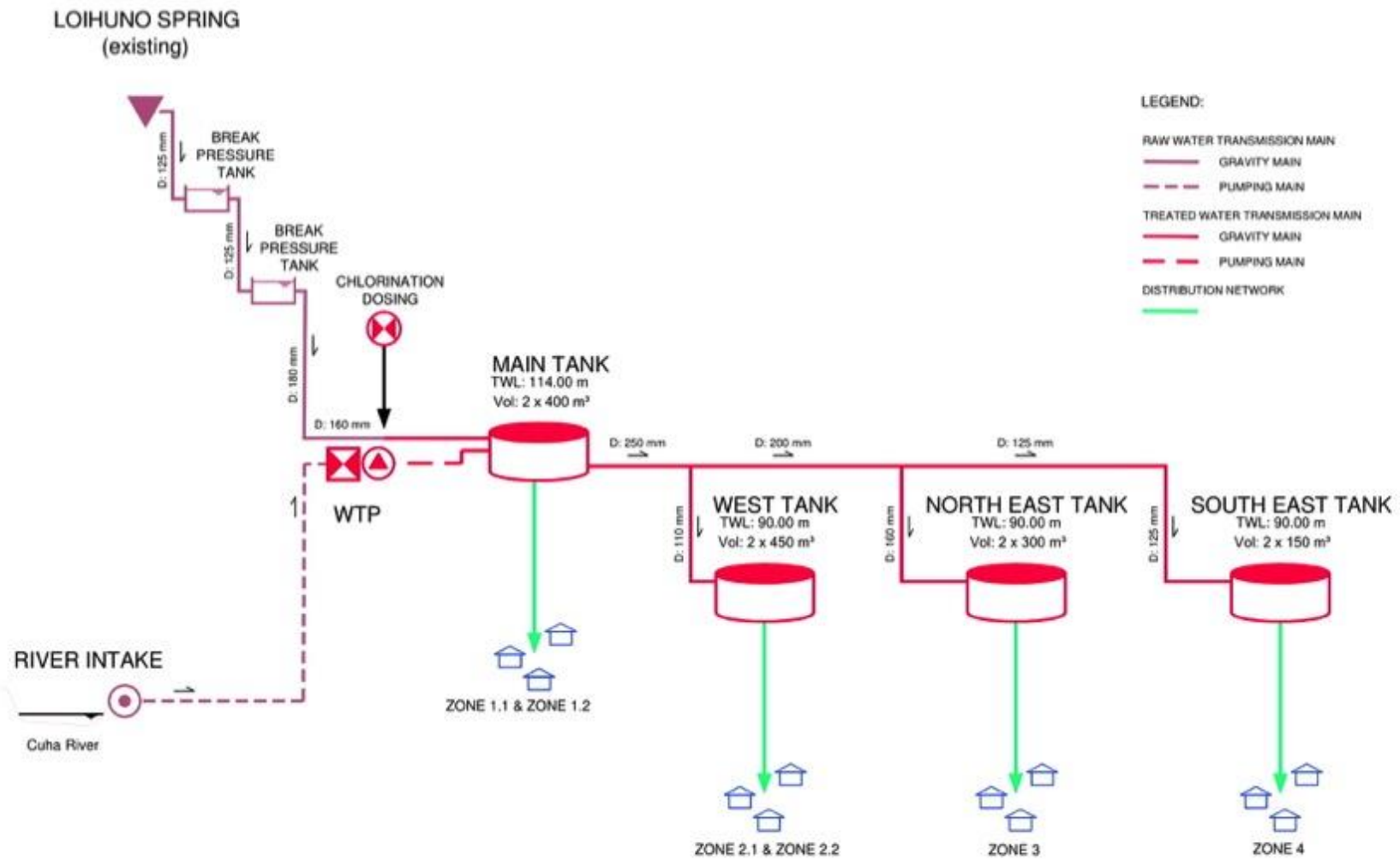
(1) Total Flow = Distribution flow + Social Flow + Ecological Flow

2.1.2. Storage, Transmission and Distribution

19. The project proposes a single Water Supply System with 3 Distribution Zones and respective subzones (see Figure 2). At present, Viqueque only has one possible Scenario, given the conditions of the available sources. This scenario considers that the water supply will be assured by the following water sources: a) Loihunu Spring; and b) River Cuha Intake. It was admitted that either the Loihuno springs and the river intake will have good productivity and that the water has good quality.
20. Due to the characteristics of raw water from the river intake, similar of a surface water, the water treatment process will have more treatment steps than the Loihuno spring. The WTP should have the following treatment line: coagulation, flocculation, sedimentation, filtration and disinfection with chlorine. WTP is expected to be located next to the road and at the city limits. Water from Loihuno spring will be disinfected in the WTP site.
21. The system operation should make increased use of the water from the spring in order to minimize the energy use (water from the boreholes needs to be pumped). This situation could arise during the first few years of operation, in the periods with less water consumptions and especially during the dry season.
22. The water supply system has an elevation range between 320 m at Loihuno spring and 37m at the distribution network. The water from Loihuno spring will feed the Main Tank by a gravity transmission main with 7.05 km of extension. Given the elevation gap, from 320 m at Loihuno spring to 114 m at Main Tank, it was planned to equip the transmission main with two pressure break tanks to limit the maximum pressure value to 10 bar.
23. The water extracted from the Cuha river to the river Intake Tank will be pumped directly into the WTP through a 0,81 km long pressure line. The water treated at WTP will be pumped through a 240 m long transmission main and stored at the Main Tank.

From the Main Tank (114m elevation), starts a gravity transmission main that, along its 6,04 km total length, will supply the West Tank, the Northeast Tank and the Southeast Tank, all three at 90m elevation.

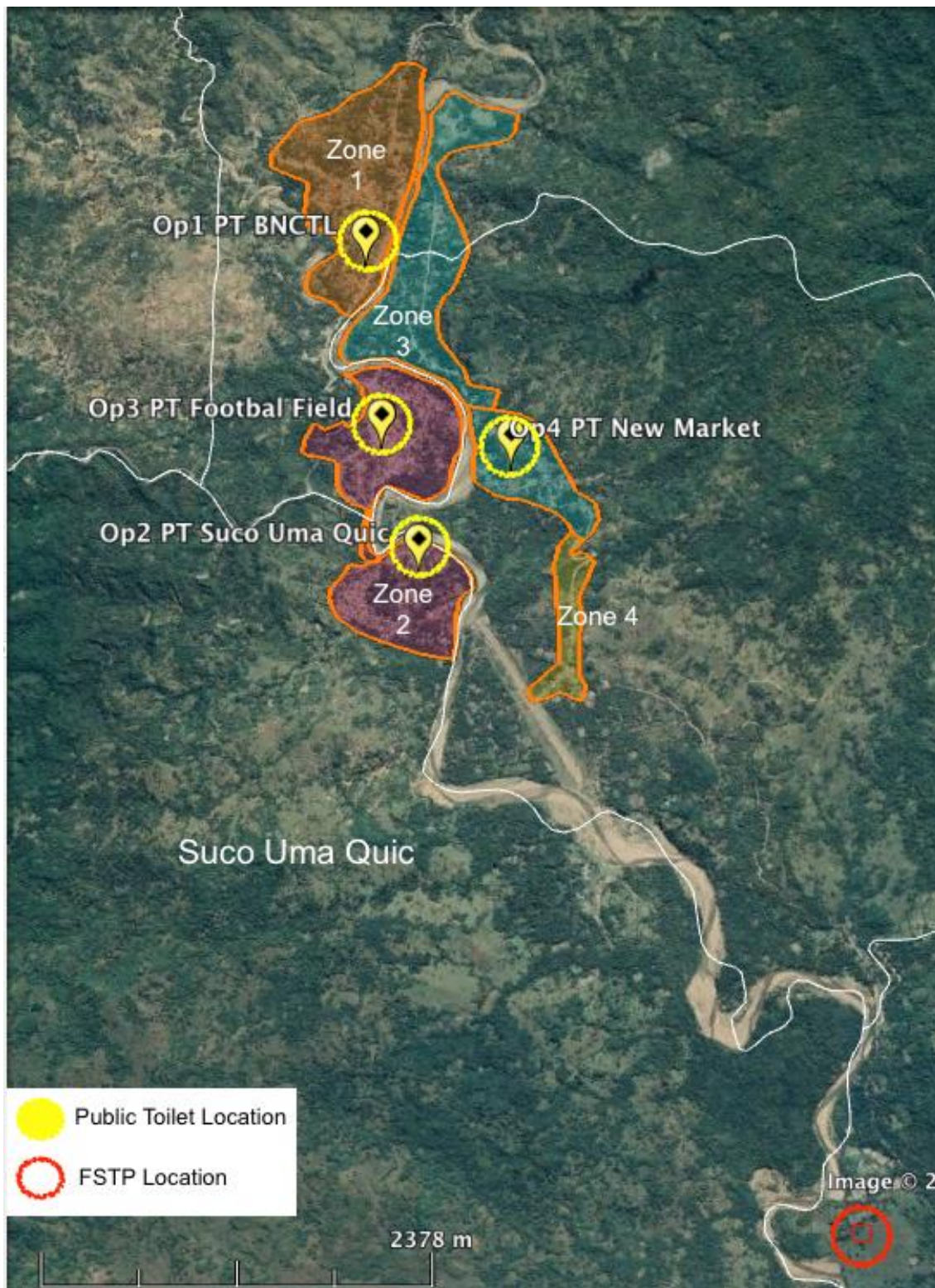
Figure 3 Flow Diagram for Viqueque proposed Water Distribution System (source: AdP-TL/Engidro, 2020)



2.1.3. Sanitation and Sludge Treatment

24. The proposed sanitation treatment sector is composed of 4 pilot test sites for public toilets (Male/Female/Physically disabled toilets (9 latrines) with septic tank and effluent soak pit system) and the construction of the Faecal Sludge Treatment Plant (FSTP) to receive the sludge from these pilots, as well as all buildings and households located within 15 km of the Viqueque Municipal capital.

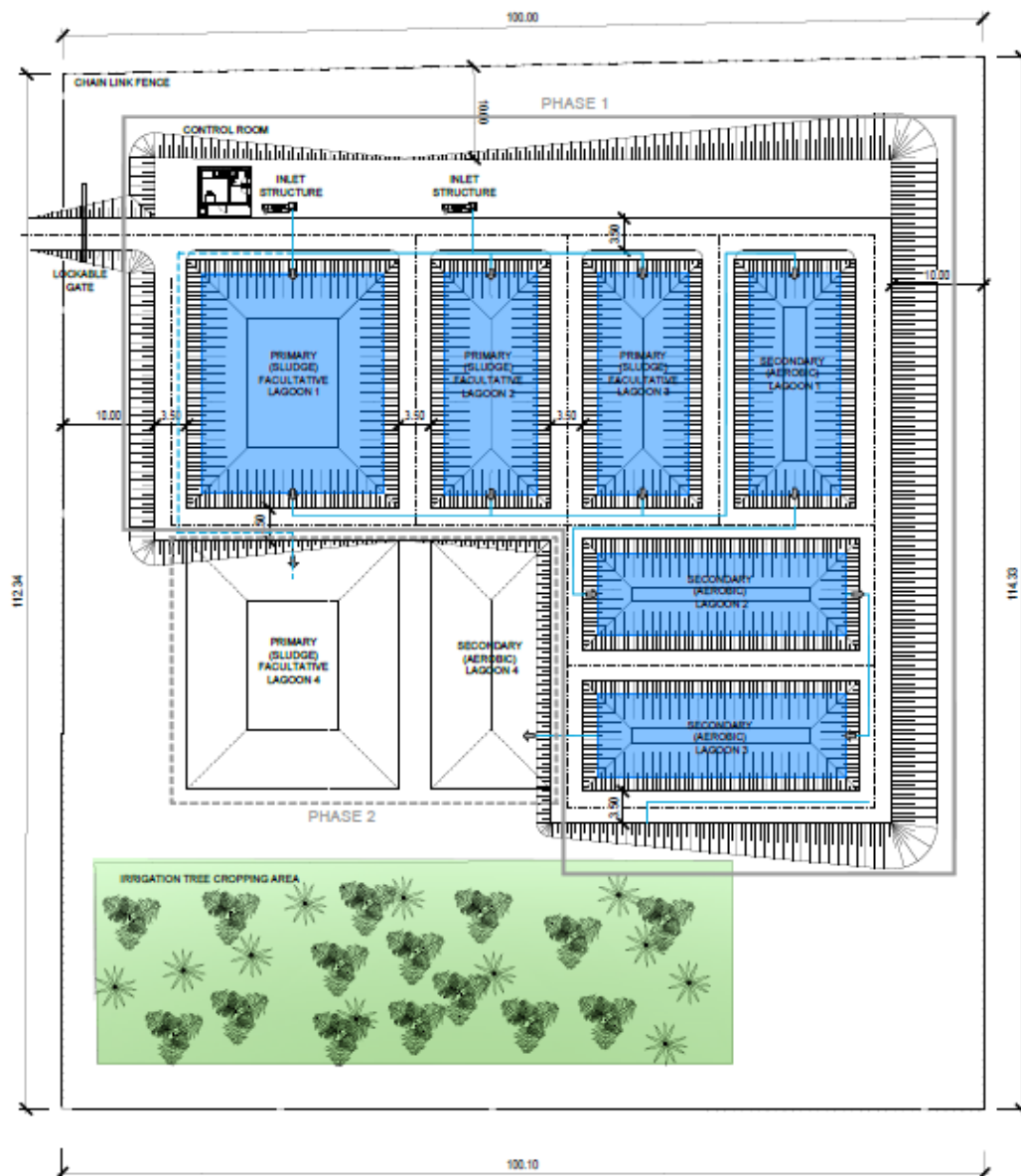
Figure 4 Public Toilets Proposed Location - Viqueque



25. The proposed FSTP has been chosen to be placed in Suco Maluro (see Figure 4), since the location is not earmarked for city expansion.
26. The FSTP was designed considering the future users of the sanitation system up to 2040, namely public buildings, households and schools and will be supplied with sludge collected by vacuum trucks from these sources, with an estimated coverage of 4,038 Households/families.

27. The FSTP will comprise of a 3 Stage Treatment process, composed of Sludge Stabilization (dewatering/drying beds), followed by the primary stages i.e. settler (for Sedimentation of any solids that have entered the modules along with the percolate where the liquid remains aerobic as not to generate offensive odour) and a second stage i.e. Anaerobic Filter for anaerobic degradation of any dissolved and suspended organic matter. Finally, the partially treated wastewater from the secondary treatment unit would be conveyed into a horizontal planted gravel filter. Therefore, the treated wastewater is safely used for irrigation purposes and the bio-solids can be used as soil conditioner for agricultural use.

Figure 5 FSTP Viqueque proposed installation and segments



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3. SUMMARY OF POTENTIAL RECEPTORS AND IMPACTS

28. The impacts of the project are influenced by the presence of receptors in the project area. Without receptors, there will not be any impacts. The receptors are summarized in Table 3.
29. In addition to facility-specific receptors, there are housing, business, cultural sites and access requirements that are also considered impact receptors at all locations where construction and operation of the components occurs. This pertains to all construction activities for all 4 project components, and must be seen on a case-by-case basis, before construction commences.

Table 3 Summary of Receptors in Project Area

Component	GPS	Surface Water	Receptors Socio-Economic and Cultural	Land Cover/ Ecological	Protected Area Status
Water Sources					
Loihuno Spring intake	8°47'2.50"S / 126°22'40.13"E	Overflow (not abstracted) runs South through to Cuha River and 25Km onwards to the South Coast	Downstream small scale fish ponds and Agriculture land, cultural area (sacred spring). Surrounded by 23 households (around 200 people) with poor sanitation.	Dense vegetation with tree species, shrubs and brushes consistent with upper tropical forest habitat	None
Cuha River Intake	8°50'41.17"S / 126°22'30.47"E	River, year round flow, Flows from top of watershed at Mount Mundo Perdido to the South coast, 50Km away	Rural Area, Open field, sparse, small agricultural spots	Flat, grassland area with several tree patches and small agricultural gardens within the RoW of future access road	None
Storage, Transmission and Distribution					
General	-----	Various creeks and tributaries of the Cuha River	- Houses, shops, gardens, etc, adjacent to distribution alignments - Cultural/sacred sites	Urban and Peri-Urban Area	None
Sanitation					
PTF 1 – BNCTL/BNU	8°51'35.51"S / 126°21'50.90"E	No (Soak Pit)	Buildings to either side of the site <10m	Urban Area	None
PTF 2 – Sede de Suco Uma Quic	8°52'36.92"S / 126°22'1.48"E	No (Soak Pit)	Sede de Suco location, Surrounded by Housing <50m	Urban Area with many coconut groves, medium density vegetation within urban area	None
PTF 3 – S.Cristovão Football Field	8°52'12.00"S / 126°21'54.04"E	No (Soak Pit)	Surrounded by Housing <50m, administrative buildings, houses and across to a Football Field	Urban Area	None
PTF 4 – New Market	8°52'15.99"S / 126°22'20.28"E	No (Soak Pit)	Open area, usually used for parking. Housing and administrative buildings <50m	Urban Area with many coconut groves, medium density vegetation to the West, within urban area	None
FSTP Suco Maluro	8°54'49.28"S / 126°23'31.38"E	No (Gravel Filter)	Farmers/agricultural area (41Ha) surrounding the area (except downstream of gravel filter). No downstream water abstraction points. Nearest housing area: 400 m SE of FSTP Distance to closest town boundary: 5 km	NW: Agricultural land Remaining area: open grassland with sparse to no tree coverage	None

30. A summary of adverse impacts on the receptors during construction and operation stages of project development is presented below in Table 4:

Table 4 Summary of Significant Impacts to Project Receptors

Impact Type	Construction Phase	Operations Phase
Air quality	Moderate temporary impacts are anticipated because of fugitive dust generation associated with all construction works, earth works and waste movements.	Not predicted

Impact Type	Construction Phase	Operations Phase
Noise	Noise impacts will be temporary and localized at all construction sites as construction machinery and vehicles generate noise while in operation.	Should not be a nuisance as pumps at the WTP and Boreholes are below ground and the FSTP is remote from the community.
Water (ground and surface)	Construction will take place in areas close to a network of natural and road drainage channels that discharge to streams and rivers. Short-term impacts from construction may be seen in terms of increased turbidity, accidental spills during maintenance, daily campsite activity or improper disposal of construction waste.	Source water quality may be hindered indirectly by upstream surrounding activities from community i.e. poor sanitation upstream. Water Volumes for environmental services may diminish with increased distribution. Ecological mean monthly flow defined at 30% (Wet Season) and 10% (Dry Season). Treated sludge and effluent discharge into the gravel filter will have a benefit during the dry season as the nutrient-rich water will be available to nearby farmers for irrigation. Groundwater impacts should be minimal as there are no private boreholes in the FSTP area.
Soil and Land use	Improper disposal of Excavation soils Possible modification of site topography, soil erosion and sedimentation to surrounding receptors due to site clearing and vegetation removal (if required), as well as ground levelling, excavations for the foundation of structures and pipe laying Possible use of private land for FSTP location may require compensation measures.	Not predicted
Biodiversity (flora and fauna)	The Loihuno Spring system is considered a sacred site, with pre-existing water abstraction 30-40 years and substantial agricultural practice in the vicinity of the area, although the stream area has terrestrial biodiversity. However, the nature and scale of the rehabilitation activities renders the impact on flora and fauna to be temporary and negligible.	Not predicted
Solid waste management	Impacts on resource use and effects associated with waste generated during construction i.e. disposal of inert wastes, excavated material from construction, biodegradable wastes (cleared vegetation), and hazardous wastes i.e. oily wastes from spills from construction machinery. Impact on public health from ACMs if not properly identified managed and disposed of in accordance with CEMP.	During operations the main potential adverse impact will be of spillage of sludge from hauling trucks
Community and occupational health and safety (H&S)	Construction sites and access roads may mean H&S and traffic risks to construction workers and the community and dwellers living working around the construction sites, excavation and trench work. The risk of transmitted diseases i.e. sexually transmitted and COVID-19 in the community may also likely increase due to the closer contact of the sub-contractor teams with the community, particularly if there is an influx of migrant workers.	Occupational H&S risks to workers at the WTP and FSTP, much reduced from the construction phase. COVID-19 transmission risks during WATSAN infrastructure operation, be it internally to or through contact with service provision outside of SMASA team.
Culture	Several Cultural/sacred sites throughout the project area. As activity will be mainly within ROW, with proper mitigation and prevention measures significant impacts are not expected. Springs have spiritual importance to Local communities. If construction opening/closing traditional ceremonies are carried out no social impact is expected.	Springs have spiritual importance to Local communities. Yearly ceremonies need to be done to avoid social/cultural impact and unrest with community.
Odour	Not expected.	Odour generation at the FSTP will be inevitable but occasional. The FSTP will be located close to an open agricultural field but over 800m to the nearest house located north-east of the plant and odour perception should not occur.
Socio-economic (accessibility)	The installation of water distribution pipe networks will require the excavation of parts of the roads and footpaths, in an urban and peri-urban setting where businesses and other activities take place. Community disruption by impaired access to their properties and businesses.	No adverse impact anticipated.

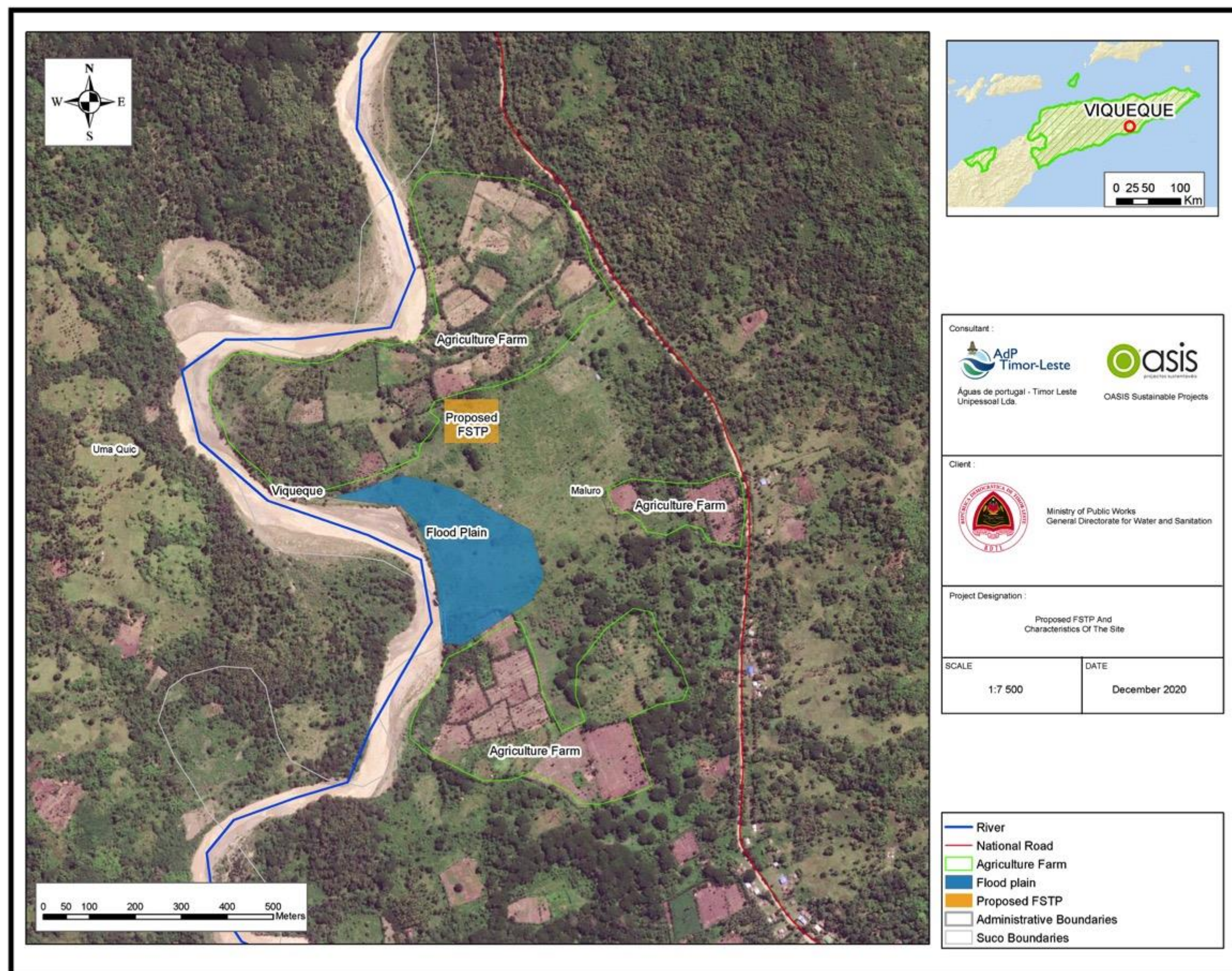
Table 5 - List of Cultural Heritage Sites in Viqueque

No.	Name of the Site	Types	Coordinates	Distance from Site ROW
1.	St. Cruz Cemetery	Socio-cultural Heritage	8° 51.184'S / 126° 21.953'E	ROW Parallel to East boundary (<10m)
2.	Chapel	Socio-cultural	8° 51.588' S / 126° 22.068' E	ROW Parallel to East boundary (<30m)
3.	Administration Office During Portuguese Time	Historical & Socio-Cultural	8° 52.041' S / 126° 21.922' E	ROW Parallel to NW and SW boundary (<20m)
4.	Cathedral	Socio-cultural & Touristic	8° 52.102' S / 126° 21.944' E	ROW Parallel to NE boundary (<10m)

5.	Residence of Sede Suco during Portuguese Time	Historical & Socio-Cultural	8° 52.183' S / 126° 22.006' E	ROW Parallel to NW boundary (<10m)
6.	Cemetery 2	Socio-cultural	8° 52.561' S / 126° 22.105' E	ROW Parallel to NW boundary (<10m)

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Figure 6 FSTP location in Suco Maluro



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4. INSTITUTIONAL ARRANGEMENTS & RESPONSIBILITIES

31. The key institutions, organizations and stakeholders relevant to the environmental management are set out below.
32. The overall responsibility for EMP implementation lies with the Ministry of Public Works, as the Implementing Agency (IA). The MPW has established a Project Management Unit (PMU) based in Dili, responsible for general project implementation.
33. A summary of the key functions for project implementation and environmental safeguards and detail on the responsibilities of each function is in Table 6.

Table 6 Key Functions and Responsibilities for Environmental Safeguards

ROLES AND RESPONSIBILITIES		
Pre-Construction Phase	Construction Phase	Operation Phase
Ministry of Public Works (Executing Agency)		
Overall responsibility for project design and implementation; Provide support and operating budget to the PMU; Ensure that sufficient funds are available to properly implement all agreed environmental safeguards measures; and On behalf of the GOTL, ensure that the project, regardless of financing source, complies with the provisions of development partners' policies to supplement as required the GOTL environmental laws and regulations.	Supervision of implementation and management of all activities under the Water Supply and Sanitation Investment Project so that they are conducted in accordance with: (i) the IEE/EMP; (ii) the national environmental, health and safety laws, regulations, procedures, and guidelines; (iii) relevant design standards and codes for WATSAN; and (iv) international best practices.	Oversee environmental regulatory compliance and reporting requirements, by the MPW/PMU, to ANLA
MPW (as well as PMU)		
Oversee the incorporation of EMP recommendations into the design, bid documents and O&M Manuals, and, if applicable, the revision of IEEs and corresponding EMPs; Ensure EMP is part of the bidding documents, EMP clauses are incorporated in bidding documents, contracts. Ensure procurement of environmentally responsible contractors; Ensure that all necessary approvals (e.g.: Environmental License from ANLA, Culture Licenses, construction permits) are secured prior to civil work contract award and that any conditions coming out of the domestic environmental license are included into the updated IEE and corresponding EMP; Review and approve the final CEMP of the winning or selected Contractors, and inform ADB of this approval for their assurance before awarding the no objection letter for commencement of works; Establish HSE baseline conditions in affected locations/villages; Conduct affected people consultation; Establish GRM (environment and Social) and making affected persons aware of GRM focal points, contacts and procedures; Conduct an intensive awareness campaign on health and safety impacts of the component's implementation, in coordination with Department of Health and WPCs, and on the grievance redress mechanism.	Conduct inspections and spot checks to monitor performance of the Contractors in implementing ADB-cleared EMP and approved CEMP by the PMU; Collect and review monthly EMRs from the Contractors; Prepare and submit semi-annual EMRs to ADB and ANLA; Oversee and monitor management and resolution of grievances as well as effectiveness of the established grievance redress mechanism; Conduct appropriate consultation and monitoring of effect of construction on affected people; Oversee observance of the grievance redress mechanism and prepare semi-annual grievance redress reports as an input to semi-annual component EMRs.	Conduct water quality tests for baseline data; PMU shall be responsible for: i) setting up a team to manage EMP implementation and reporting; ii) implementing mitigation and protection measures specified in the Component's EMP, O&M Manuals and other relevant documents; Prepare and submit Annual EMRs to ADB until loan and every 2 years for License renewal; Ensure all GRM complaints are closed out to affected person's satisfaction; Prepare and submit EMRs to ANLA every 2 years.
Design Consultants		

ROLES AND RESPONSIBILITIES		
Pre-Construction Phase	Construction Phase	Operation Phase
Incorporate all IEE/EMP requirements and recommendations into the Component's detail designs, bid documents and O&M Manual; Finalize the IEE and EMP (also including any conditions coming out of the domestic environmental licensing); Prepare and finalize PD, SEIS and EMP Reports based on the IEEs and EMPs, for Licensing purpose.	Not Applicable	Not Applicable
Contractor		
Appoint a HSE Manager for the project construction; The selected Contractors shall finalize CEMP, with inputs comments from MPW/PMU and seek PMU approval; No works are to commence without the domestic environmental license being secured and the CEMP approval. Organize disclosure of the Component's information before commencement of works.	Engage or mobilize engineers to manage the CEMP's implementation and reporting; Implement all environmental mitigation and protection measures, conduct environmental monitoring activities and ensure preparedness for emergency responses, as provided in the ADB-cleared EMP and PMU approved CEMP; Observe the grievance redress mechanism in addressing complaints; Prepare monthly and semi-annual CEMRs.	Not Applicable
Project Supervision Consultants (PSC)		
Provide technical advice/assistance, IEE/EMP update; Provide Environmental related training for PMU, MPW, contractors and stakeholders; Review bidding documents, review CEMP against the EMP; Confirm project readiness; Provide initial trainings to the MPW and PMU on purposes, content, roles and responsibilities in implementation of the CEMP; Ensure that all relevant safeguards of the approved EMPs are adequately addressed in the bidding documents.	Conduct inspections in monitoring performance of the Contractor in implementing the CEMP; Collect monthly EMRs from the Contractors, prepare and submitting semi-annual EMRs to PMU, ANLA and ADB; Oversee and monitor the management and resolution of grievances and effectiveness of the grievance redress mechanism.	Prepare semi-annual EMRs; Conduct inspections to monitor performance of the EMP implementation; Review results of water quality monitoring.
Local and National Authorities		
ANLA to Review, comment and approve the SEIS and EMP; Concerned Chefes de Suco and Aldeia shall be involved in: (i) public disclosure of the IEEs and EMPs; (ii) Contractor employment mechanism (local contracting numbers); (iii) community awareness program on health and safety impacts of the EMP implementation.	ANLA to monitor compliance with SEIS and EMP; Municipality and Suco Council to participate in the monitoring of the Contractor performance in EMP implementation; Chefes de Suco and Aldeia shall be involved in grievance resolution pursuant to grievance redress mechanism.	ANLA shall review EMRs and results of environmental monitoring; ANLA shall conduct validation and provide technical guidance on environmental effects and quality monitoring, when necessary.
ADB		
Clear the submitted IEE and EMP; Review bid documents, which include the incorporation of IEE recommendations, and final EMP; and Issue required clearances or No-objections; Disclose environmental due diligence documents on the ADB website.	Review submitted semi-annual EMRs by SMASA and carry out annual environmental review missions during construction. Disclose environmental due diligence documents on the ADB website.	Review submitted semi-annual EMRs by MPW and carry out environmental review missions during operation until loan closure.

4.1. Institutional Capacity Review and Needs

34. Currently there is limited experience of monitoring and implementing environmental mitigation measures, especially at a Municipal level, as well as limited enforcement of environmental or health and safety legislation or undertaking of routine environmental monitoring apart from

5. MITIGATION MEASURES PLAN

39. Comprehensive mitigation measures are set out for the project in Table 8, covering pre-construction, construction and operation.
40. The Contractor is expected to develop a specific Construction Environmental Management Plan (CEMP) for the project, which is a detailed plan that sets out the contractor's approach to implementing the required mitigation measures.
41. The activities and mitigation measures reflect best-practice measures typical of the project's nature and, where relevant, specific to the conditions of the project components and of Viqueque City.

Table 8 EMP Mitigation Measures

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
PRE-CONSTRUCTION (DESIGN) PHASE									
0.1 Disclosure & Engagement of community 0.2. GRM Dissemination	(No impacts)					01.1. Initiate Information Disclosure and Grievance process of IEE in VIQUEQUE	PMU / PSC	MPW	Included in Project Cost
	(No impacts)					0.2.1. Establish GRM and clarify roles and responsibilities (see GRM section of EMP) 0.2.2. Provide contractor with GRM contact details to be used for: A. GRM sign boards; B. GRM Contact Cards for Affected People	PMU / PSC	MPW	Included in Project cost
						0.2.3. Erect sign boards at the construction site entrance with: A. Project details B. GRM procedures and contact details 0.2.4. Print 'GRM Contact Cards' for all workers to give to complainants and keep cards with all vehicles, machinery and site managers/foremen 0.2.5. Affected People Training. Contractor to raise awareness of all workers on how to respond when an affected person or member of the public has a complaint i.e. direct the person to the most senior site manager present at the time and provide a 'GRM Contact Card'	Contractor	PMU	Included in Bid price
0.3. IEE and EMP Updated	(ALL)					0.3.1. Updated IEE and EMP to include: A. Final detailed design B. Additional environmental protection measures C. Approved national SEIS/EMP requirements & mitigation measures. D. Environmental quality baseline monitoring (water, air, noise) E. SEIS/EMP approved by SSE prior to contract award	Consultant / PSC	PMU / ADB	Included in Project Cost
0.4. Construction EMP (CEMP)	(ALL)					0.4.1. The contractor(s) will develop a Construction EMP (CEMP) that includes the mitigation measures set out in this table as a minimum and will include detailed individual management sub-plans for: A. Sensitive Areas Management Plan B. Cultural Sites Safeguard Plan C. Noise Management Plan D. Air Quality and Dust Management Plan E. Spoil Management Plan F. Community OHSE and Emergency Response G. Campsite and Construction Front Management Plan (if required) H. Site Cleanup Plan I. Traffic Management Plan	Contractor	PMU / PSC	Included in Bid price

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						J. COVID-19 Management Plan (see C3.3.7 and Appendix 2 for applicable COVID-19 Protection and Mitigation Measures) K. Solid and Liquid Waste Management Plan			
						0.4.2. The CEMP will include a map of each construction site, with copies held by the Contractor and PIU, showing as a minimum: a) Access routes, b) storage areas for waste, c) storage area for chemicals such as fuels, d) concrete mixing, e) stockpile storage areas (on & off site), f) first aid kit and equipment used in emergency response, g) location of worker camps (if required).	Contractor	PMU / PSC	Included in Bid price
0.5. Obtain & activate permits and licenses	Compliance Obligations					0.5.1. Contractors to comply with all statutory requirements set out by Government for use of construction equipment, and operation construction plants	Contractor	PMU / MPWc	Included in Bid price
						0.5.2. Contractor to ensure all required permits are in place prior to construction, such as (but not limited to): - Materials extraction permits; - Cultural Site Construction Protection License (for each cultural site <50m from project component)	Contractor	PMU / MPW	Included in Bid price
PC1. WATER SOURCES									
1.1. Location of water sources in sensitive area	1.1.1. Loiunu 1 Spring - Nuisance to the biodiversity (flora, fauna, water ecosystem) due to dust, silt runoff, noise, etc.	2	2	4	MS-	1.1.1.1. Increase sensitivity for construction and protection mitigation measures in the transmission line rehabilitation to springs i.e. Loiunu Spring System (see C3.) especially when close to sacred areas.	PSC / PMU	MPW	Included in Project Cost
						1.1.1.2. Guarantee contractor is trained, accepts and follows all operational procedures applicable within the protected areas. Contractor must not: • Kill, injure , damage , remove, handle, disturb or interfere with any endangered species or existing animals under any circumstances; • Bring domesticated animals on-site • Poaching on-site or the surrounding forests • sell endangered species or derivatives of these species ; • export endangered or derivatives of these species; • cleared trees without DNAP/Forest Guard inspection for nesting birds prior to cutting. The nest will be transferred carefully to another tree safe from project activities.	PSC / PMU	MPW	Included in Project Cost

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						<ul style="list-style-type: none"> carry out clearing of vegetation before a detailed layout of clearing is presented by the contractor and approved by the DNAP plant new/invasive species in the Project area, for reforestation purposes 			
	1.1.2. Cuha River Intake and access road construction - Nuisance to the river biodiversity (water ecosystem) - Impact on surface water (silt runoff) - Impact to local dwellers (land reclamation, dust, noise and vibration, etc.)	2	4	8	S-	1.1.2.1. Constructor must be informed/trained as in PC1.1.1.1, 1.1.1.2. and especially C3. Mitigation measures, as Intake construction is in River during Dry Season and requires access road construction	PSC / PMU	MPW	Included in Project Cost
1.2. Use water sources (springs and boreholes)	1.2.1. Insufficient water for all users	2	3	6	S-	1.2.1.1. Comprehensive monitoring and assessment of all water source availability throughout project life (springs and well monitoring program for aquifer performance tracking)	PSC / PMU	MPW	O&M Cost Included in subproject design
	1.2.2. Water use between environment, communities and Water Distribution System	2	3	6	S-	1.2.2.1. Loihunu II and III to be used for Social and Ecological flow (no extraction) Apply a minimum environmental flow for Loihunu II and III springs (Wet Season 30% of mean monthly flow / Dry Season 10% of mean monthly flow), for Downstream free flow and usage	SMASA / PSC	MPW	O&M Cost Included in subproject design
	1.2.3. Social and cultural disruption due to tara bandu and lulik/sacred area	2	2	4	MS-	1.2.3.1. Involve lia na'in in frequent cultural ceremonies i.e. "opening" for authorization to use cultural/natural water resource Project activities during construction phase will be monitored by assigned personnel from the Culture Department. The springs will be demarcated with tapes to limit construction works outside the area and restrict access to the springs unless authorized by relevant authority. Precautionary measures will be taken by all construction workers to prevent damage to the Lulic springs. After construction operations, the contractor shall seek clearance from relevant authorities that the springs are in its natural state prior to departure.	PSC / PMU	MPW	O&M Cost
PC2. WATER TREATMENT AND PROPOSED STORAGE									
2.1. New installation of disinfectant system in the	2.1.1. Waterborne disease towards consumers due to Water sources with lower quality and	3	2	6	S-	2.1.1.1. Upgrade of the design of new treatment plant and storage facilities by applying disinfection, chlorination or Calgon dosing system	DED Consultants	PMU / MPW	Included in Project Cost

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
proposed or selected storage	not in compliance with WHO standards								Included in subproject design
2.2. Remodelling / rehabilitation of existing water tanks	2.2.1. Insufficient treated water due to leakages (poor infrastructure) and lesser capacity of the water tanks	2	2	4	MS-	2.2.1.1. Increase the water storage capacity and design by adjusting water demand estimation for 2040	DED Consultants	PMU / MPW	Included in Project Cost Included in subproject design
PC3. PROPOSED DISTRIBUTION NETWORK									
3.1. Identification of cultural, historical & touristic sites	3.1.1. Impairment of the cultural heritage properties due to construction activities	3	5	15	S-	<p>3.1.1.1. Prepare Safeguard Plan for each cultural site under risk and request license for each at the Cultural Directorate</p> <p>Project activities during construction phase will be monitored by assigned personnel from the Culture Department.</p> <p>Preparation of the rehabilitation activity must be done together with the Directorate that represents the Secretariat of State for Culture at the Municipal level.</p> <p>Pre-construction, the contractor must review these immovable asset locations and request approval of a Safeguard Plan for each of the assets, making sure that during the Construction activities, those sensitive heritage sites within 50 m radius of the construction activities should not be interfered with or impacted on, and the rules as mentioned in Decree Law No. 33 /2017 for Cultural Patrimony Protection are followed, with the request, by the contractor, of a license /authorisation for intervention in the area.</p> <p>The sites will be demarcated to limit construction works outside the area and restrict access to the sites unless authorized by relevant authority.</p> <p>In case a new cultural/historical heritage site is identified during the construction, the Contractor will notify the SMASA and follow the same procedure regarding these sites.</p> <p>Precautionary measures will be taken by all construction workers to prevent damage to the sites.</p> <p>After construction operations, the contractor shall seek clearance from relevant authorities that the sites are in their natural state prior to departure.</p>	Contractor	MPW / PSC / PMU	Included in Bid price

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
4.1. Improvement of Water Distribution System in the city	4.1.1. Increase in wastewater volumes and groundwater contamination	2	3	6	S-Ind	4.1.1.1 Draft Proper Septic Tank design and implementation of rules for construction in dwellings	DED Consultant	PSC / PMU	Included in Project Cost Included in subproject design
						4.1.1.2 Widespread communication plan / program on recommended septic tank design	PSC	PMU / MPW	O&M Costs
4.2. Location for proposed FSTP	4.2.1. Inundation and erosion, emergence of odour, traffic accidents and noise towards the nearby community	3	2	6	S-	4.2.1.1. Flat terrain preferred, out of floodplain, distant from residences or sensitive areas, close to farming areas and river receptor	DED Consultant	PSC / PMU	Included in Project Cost Included in subproject design
	4.2.2. The FSTP might be located in private land	2	4	8	S-	4.2.2.1. Resettlement plan and Compensation to the affected party	DED Consultant	PMU / MPW	Included in Project Cost
4.3. Wastewater disposal from FSTP	4.3.1. Soil and Surface water contamination	3	2	6	S-	4.3.1. Design of FSTP for best quality effluent and irrigation cropping area as final refining treatment	DED Consultant	PMU / MPW	Included in Project Cost Included in subproject design
CONSTRUCTION PHASE									
C1. WATER SOURCES									
1.0. Activities related to Infrastructure Construction	1.0.1. General Impacts (noise, air quality, siltation, H&S, etc)					(see C3. Water Distribution for related impacts mitigation measures)			
1.1. Inadequate protection off spring intake structures during rehabilitation	1.1.1. The water from intake and river will flow and may cause soil/silt erosion.	3	1	3	MS-	1.1.1.1. Temporary drainage provision that links to safe surface water drainage.	Contractor	MPW / PMU / PSC	Included in Bid price
	1.1.2. Socio-cultural impact	3	2	6	S-	1.1.2.1. Involvement of <i>lia nain</i> for cultural ceremony preparation	Contractor / SMASA	MPW / PMU / PSC	Included in Bid price
C2. WATER TREATMENT AND PROPOSED STORAGE									
2.0. Activities related to Infrastructure Construction	2.0.1. General Impacts (noise, air quality, siltation, H&S, etc)					(see C3. Water Distribution for related impacts and mitigation measures)			

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
2.1. Upgrading construction activities for water tanks and water treatment plant	2.1.1. Chemical substance exposure towards the workforces due to disinfection installation	2	3	6	S-	2.1.1.1. Provision and obligatory use of PPE for chemical handling	Contractor	MPW / PMU / PSC	Included in Bid price
C3. PROPOSED DISTRIBUTION NETWORK									
3.1. Induction of Contractor	3.1.1. Enhanced impacts because of lack of knowledge of the EMP	3	3	9	S-	3.1.1.1. Induction meeting for EMP understanding and Project "Go-ahead"	PSC / PMU	MPW	Included in Project Cost
3.2. Construction Activities – Macro Benefits	3.2.1. Local Employment Generation	3	3	9	S+	3.2.1.1. Recruitment of skilled and unskilled workers from affected community, in coordination with the local authorities	Contractor	MPW / PMU / PSC	Included in Project Cost
	3.2.2. Enhance workers' skills	3	3	9	S+	3.2.2.1. "on-the-job" training program for workers, particularly unskilled workers	Contractor	MPW / PMU / PSC	Included in Project Cost
3.3. Construction campsite	3.3.1. Campsite Location and Landslides	2	2	4	MS-	3.3.1.1. Establishment of camp on stable and flat surface area, and where it would not cause soil erosion.	Contractor	MPW / PMU / PSC	Included in Bid price
	3.3.2. Wastewater and soil/water contamination	2	3	6	S-	3.3.2.1. Establishment of a Proper Latrine System Installation of appropriate latrine with Septic Tank for construction workers in the camp site, at least 30 m away from any water source or constructed downhill from water sources within 30 m.	Contractor	MPW / PMU / PSC	Included in Bid price
	3.3.3. Water Source for Campsite may compete with Community Sources	2	2	4	MS-	3.3.3.1. Establish a water tank and source water for construction from SMASA authorised sources	Contractor	MPW / PMU / PSC	Included in Bid price
						3.3.3.2. Purchasing sufficient potable water supply in the form of litre bottles or in gallons, for all construction staff throughout the duration of the construction activities.	Contractor	MPW / PMU / PSC	Included in Bid price
	3.3.4. Storage and Management of Hazardous chemicals and materials may bring spills, fire hazards and H&S problems	2	3	6	S-	3.3.4.1. Proper storage and handling of chemicals and materials Allocation of proper containments and labelled, suited for the nature of chemicals and/or waste will be provided by the contractor and maintained throughout the duration of the Construction phase; Refuelling only in designated areas which are to be 50 m from a water course and drip trays to be used when refuelling or topping up / changing machinery fluids Materials hauled directly to work front, minimizing storage at campsite.	Contractor	MPW / PMU / PSC	Included in Bid price

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						Asbestos containing material i.e., used pipes to be identified, managed and disposed of in accordance with management plan to be included in the CEMP; Train/Inform workers/draft Guideline on identifying and risks of mishandling ACMs Prepare special team to remove ACMs from construction areas Coordinate with DNCP to determine final solution for ACMs			
	3.3.5. Non-hazardous Solid Waste Improper handling and storage and vector diseases	2	2	4	MS-	3.3.5.1. Implementation of Solid Waste Management System; Minimize domestic waste production on site and implement reuse of waste where possible; Immediate disposal of waste in designated bins/areas induced by the contractor; Waste bins will be kept closed to prevent the accumulation of water during rain events; Regular emptying of waste bins and transport to approved disposal sites, with coordination with local authorities of appropriate dumpsites. If no accredited landfills exist near the area or service contractors are not available, burning of solid wastes may be permitted only in controlled conditions under the guidance of the Environmental authority.	Contractor	MPW / PMU / PSC	Included in Bid price
	3.3.6. Food for construction personnel may compete with food supply for the local communities	2	3	6	S-	3.3.6.1. Food for Workers may conflict with local community supply Ensuring adequate source or supply of food for workers so as not encourage poaching or interfering with the local food production unauthorized. Prohibition of poaching in the protected area or anywhere else Encouraging purchase of food from local vendors. Provision of cooking facility so as not to encourage the use of firewood for cooking If the availability of fuel is limited, the use of firewood for cooking will be confined in designated areas and the use of wood will be limited from timbers harvested from the project's clearing activity and no other.	Contractor	MPW / PMU / PSC	Included in Bid price
	3.3.7. COVID-19 transmission risks between workers and community in Camp and Work sites	3	3	9	S-	3.3.7.1. COVID-19 Construction site and Work Site Management mitigation measures <ul style="list-style-type: none"> Follow Appendix 2 indications for campsite and worksite COVID-19 management Plan and execute work in compliance with country-specific COVID-19 risk management regulations and directives including directions of the 	Contractor	MPW / PMU / PSC	Included in Bid price

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						<p>General Department of Labour, Secretariat of State of Labour, and Vocational Training.</p> <ul style="list-style-type: none"> • Conduct workplace risk assessment to identify low, medium or high exposure risk to COVID-19. Include an action plan for prevention and mitigation of the spreading of COVID-19 in the COHSE Plan. • Risk communication, training, and education. Training of workers in infection prevention and control practices. • Adopt engineering, organizational and administrative measures, plan work so employees can keep distance from each other and minimize contact. • Provide clear and visible guidelines on how to prevent infection at the construction site and initiatives taken. • Regularly clean and disinfect. • Screen on entry the temperature of each person entering the work site and record their contact details to facilitate tracking of infected persons should there be a need • Promote personal hygiene (including hand and respiratory hygiene), make wash basins and sanitizers available at entry, break area, and washrooms. • Provide PPE and inform workers of its correct use. • Health surveillance and insurance. • Consider other hazards, including psychosocial. • Review emergency preparedness plans. • Review and update preventive and control measures as the situation evolves and Involve workers/ occupational H&S groups in the review. 			
3.4. Construction Materials	3.4.1. Sand and stone Extraction and disturbances to environment	3	5	15	S-	<p>3.4.1.1. Sand and Stone Sourcing Management</p> <p>Extraction will be limited to quantities required by the project</p> <p>Regular monitoring and inspection of extraction activities</p> <p>Restore non-established extraction sites to natural contours and vegetation</p>	Contractor	MPW / PMU / PSC	Included in Bid price
3.5. Construction Work Front: All Infrastructure	3.5.1. Servicing and Fuelling of Construction Equipment and spills and pollution	2	4	8	S-	<p>3.5.2.1. Equipment and Vehicle Maintenance and Monitoring</p> <p>Ensuring all construction vehicles are in good condition and an acceptable state of repair before the start of the construction phase;</p> <p>Prohibition of use of dilapidated equipment and vehicles with leaks and causing spills;</p> <p>Designating suitable locations for re-fuelling and changing oil and lubricant;</p> <p>Accidental spills will be cleaned immediately and provision of drip trays to collect any oil or fluid drips;</p>	Contractor	MPW / PMU / PSC	Included in Bid price

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						Fuel will be stored in a central depot, made of concrete slab or impermeable surface capable of containing at least a volume of one container, located within the central base camp.			
	3.5.2. Excavation, Cutting and Filling and safety hazards to Public and workers	3	3	9	S-	3.5.2.1. HSE demarcations and signage Set up adequate demarcations/barriers and establish visible warning signs in excavated, cut and filled areas for safety precautions (pedestrians and traffic).	Contractor	MPW / PMU / PSC	Included in Bid price
	3.5.3. Stockpiling and Storage of Construction materials and dust, water runoff damage to existing utilities due, buildings and drainage blockage	2	3	6	S-	3.5.3.1. Spoils and Stockpiles Handling and Storage Plan Preference must be given to use of spoil other construction sites, or disposed in spent quarries or borrow pits ^[1] . Uncontaminated spoil to be disposed of in Government approved sites, which will not be on agriculturally productive land, within 50m of a water course, including stream, river or irrigation channel, on sloped land, within 50 m of cultural heritage sites, within 100 m of any other culturally or ecologically sensitive feature ^[1] . All stockpiles will be situated within the campsite or designated areas on-site that can easily be accessed by equipment and personnel and will cause minimal interference to the movements of vehicle and personnel in the project site. Identify stockyard areas in consultation with local administration, if not in base camp Reuse excess spoils and materials at all times; Covering of stockpiles with impermeable material like plastic, to protect from wind and rain events. Excess rocks and sand as a result of excavation activities to be disposed properly and not dumped next to surface waters or left prior to departure. Design with adequate drainage for outlets to prevent wastewater into water sources.	Contractor	MPW / PMU / PSC	Included in Bid price
	3.5.4. Excavation, Cutting and Filling and soil Erosion	2	2	4	MS-	3.5.4.1. Excavation procedures Excavations will only be started once all required materials and services are on their allocated sites and a layout already established for the transport of materials. Excavations, cuttings and fillings will be carried out in a manner to reduce soil erosion. Sand, aggregates and cement will not be situated in areas prone to soil erosion.	Contractor	MPW / PMU / PSC	Included in Bid price

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						Where access is impeded, provide for temporary passageways and communicate/inform dwellers and institutions			
	3.5.5. Construction and Noise Disturbance to surrounding communities and sensitive areas	3	2	6	S-	3.5.5.1. Implementation of Noise Management System; Implementation of working hours (permissible working activity from 7 AM to 7 PM) Queuing and idling of construction vehicles outside the premises of the camp site and outside operating hours specified is prohibited Use of power horns is banned. Dissemination of information to the community	Contractor	SMASA / PSC / PMU	Included in Bid price Included in subproject design
	3.5.6. Construction and dust (Air quality decrease) to the community	3	2	6	S-	3.5.6.1. Implementation of Air Quality and Dust Management System; Watering of surface through water truck, sprinklers or hoses, 2-3 times a day, particularly during dry season and high traffic volume, near residential and built-up areas, or whenever required due to inspection and/or GRM complaint. Keep a detailed log of incidents when excessive visible dust emissions occur, the actions taken and an approximate rate of water application noted. Covering of stockpiles during periods of high wind Minimize movement of heavy vehicles and Limit velocity to 40 km/h in residential and 50 Km/h maximum in urban area.	Contractor	MPW / PMU / PSC	Included in Bid price
	3.5.7. Construction and Impact on Ecological Resources	3	2	6	S-	3.5.7.1. Sensitive Areas Management Plan Apply measures in PC1.1.1.2 Vegetation and tree re-planting Limitation of noisy works in order to stabilize the fauna's mobility Restrict haphazard site clearing, parking, and movement of heavy vehicles and equipment stockpiling	Contractor	MPW / PMU / PSC	Included in Bid price
	3.5.8. Impacts on Socioeconomic Resources, Infrastructure and Utilities and Cultural Sites	2	3	6	S-	3.5.8.1. Reduction of Impact on established business activities and others Make available temporary access ways to all businesses and activities affected Determine compensation to business justifiably affected and demonstrate reduction of income due to project Follow the Heritage License rules for each site, defined by the SS Culture and apply measures in PC1.2.3.1 and PC3.1.1.1.	Contractor	MPW / PMU / PSC	Included in Bid price
3.6. Site clean-up and rehabilitation of locations	3.6.1. Unattended construction materials left on site may pose health and safety hazards to the public.	2	2	4	MS-	3.6.1.1. Site Clean-up Plan All temporary structures, materials, waste and facilities used for construction activities will be removed upon completion of the project. Excess rocks and sand as a result of excavation activities are not to be dumped next to surface waters and left prior to departure.	Contractor	MPW / PMU / PSC	Included in Bid price

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						Coordinate with local authorities of appropriate sites where mass load are needed. This had to be spread in natural looking manner and left in a stable state. Latrines will be covered with soil prior to departure. If full, cover with 30 cm of soil mixed with dry plant matter.			
C4. SANITATION (PUBLIC TOILETS & FSTP)									
4.0. Activities related to Infrastructure Construction	1.0.1. General Impacts (noise, air quality, siltation, H&S, etc)					(see C3. Water Distribution for related impacts mitigation measures)			
OPERATIONAL AND MAINTENANCE PHASE									
O1. WATER SOURCES									
1.1. Protection of the water source quality	1.1.1 Declining of the water source quality	2	3	6	IS-	1.1.1.1 Implementation of Upstream Watershed Protection Programs, with restriction to water quality impacting activities i.e. animal husbandry, slash and burn, etc;	SMASA / PSC	PMU / MPW	O&M Costs
						1.1.1.2. Improvement program for all existing and future dwelling sanitary infrastructure i.e. SMASA septic tank design template, in the community surrounding the water source	SMASA / PSC	PMU / MPW	O&M Costs
						1.1.1.3. Involve the lia naín and communities for cultural ceremony preparation and Tara Bandu protection of the source			
O2. WATER TREATMENT AND PROPOSED STORAGE									
2.1 Mishandling of chlorine	2.1.1 Health hazards towards the operators	3	3	9	S-	2.1.1.1 Ensure proper storage and handling practices for chemicals Chemicals should be placed properly in an indoor warehouse, banded, with no sun exposure and room temperature control and access limited to authorized ^{SEP} personnel only ^{SEP}	PMU / PSC	MPW	O&M Costs Included in subproject design
						2.1.1.2 Ensure the knowledgeable and skilled person is in charge of chlorine handling Provide training with simulation performances and equipment to improve worker on handling the Chlorine			
						2.1.1.3 Ensure use of PPE while using chemicals			
O3. PROPOSED DISTRIBUTION NETWORK									
3.1. Sound Operation of Clean Water Distribution System	3.1.1. Improved Health and Hygiene	3	5	15	S+	3.1.1.1. Proper operation of the Distribution system Regular maintenance of the project's components, monitoring and running the system and enforcing policies and procedures	SMASA / PSC	PMU / MPW	O&M Costs Included in subproject design

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
3.2 Drinking water supply system	3.2.1 Delivery of unsafe Water	3	3	9	MS-	3.2.1.1 Contractor to prepare operations and maintenance plan for the whole water system, particularly for water treatment and storage	Contractor / PSC	PMU / MPW	O&M Costs
						3.2.1.2 Implement SPS-compliant EMP and a Water Quality Control Program (WQCP) (as per DL31/2020) that: • Identifies the location of water sources (ground or surface) • Identification of Supply Zones • Description of the water treatment applied • Average daily Volume per Supply Zone • Population served by supply zone • Identification of sampling points per supply zone • Sampling Plan (Chronogram) with sampling points and dates	PMU / PSC	MPW	O&M Costs
						3.1.1.3 Monitor water quality Perform water analysis according to DL31/2020 Annex II (Daily Routine Control at each WTP exit and monthly Full Control at Sampling point grid)	PMU / PSC	MPW	O&M Costs
	3.2.2 Detection and repair of leaks and pipe bursts	1	3	3	MS-	3.2.2.1 Ensure leak detection and restoration time is minimized to the extent possible	PMU / PSC	MPW	O&M Costs
	3.2.3 Excessive algal growth in Tanks.	2	1	2	IS-	3.2.3.1 Water Tank Maintenance and Cleaning Schedule Close water tanks all the time to avoid algae growth Clean tanks as per the O&M frequency schedule.	PMU / PSC	MPW	O&M Costs
O4. SANITATION (PUBLIC TOILETS & FSTP)									
4.1. Sanitation facilities (toilets and sludge disposal site)	4.1.1. Contamination of land or waterways due to overflow of septic tanks and the uncontrolled dumping of the sludge	3	2	6	S-	4.1.1.1. Further septic tanks will be designed to ensure maximum retention is achieved and will be emptied at the required frequency (min every 2 years). Households will be educated to reduce the likelihood of septic tank overflows and uncontrolled dumping of sludge	PMU / PSC	MPW	O&M Costs Included in subproject design
4.2. Operation of FSTP	4.2.1. Soil and Groundwater contamination from Sludge disposal	2	2	4	MS-	4.2.1.1. Treated dried sludge distributed for farming activities and Effluent to Cropping Area	PMU / PSC	MPW	O&M Costs Included in subproject design
						4.2.1.2. FSTP Malfunction • Commissioning phase of WWTP to ensure design discharge standards can be met. • Discharge to be tested prior to release into the environment. • Provision of adequate budget for O&M to ensure regular effluent quality monitoring.	PMU / PSC	MPW	O&M Costs MM already included in subproject design

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						<ul style="list-style-type: none"> If the treated effluent consistently fails to meet discharge standards, operator to discuss and agree with MPW and SSE on a way forward to return to compliance. 			
	4.2.2. Community and Occupational Health & Safety risks of the FSTP infrastructure	2	2	4	MS-	4.2.2.1. Health a & Safety Manual as Part of the Operation & Maintenance Manual which includes: <ul style="list-style-type: none"> A signed commitment from the operator to a) understand and b) comply with IFC Environmental Health and Safety guidelines (2007) A training program for workers in workplace safety of FSTP operation Conduct safety orientation trainings including regular safety drills for workers. Provision of appropriate and adequate PPE for all operational staff and workers (including regular training and drills on the use of PPE and other emergency equipment). Prevent public access to the FSTP with fencing and appropriate signage. Cover as much standing water as possible and regularly treat for mosquitoes during seasons of high incidence of mosquito- borne diseases such as dengue fever 	Contractor / PSC	PMU / MPW	O&M Costs
	4.2.3. Odour occurrence	2	1	2	IS-	4.3.3.1. Odour Management Measures Odour monitoring and procedures for recording and managing complaints from the public. Consult with residents to identify record odour or nuisance issues – preferably date, time and duration of odorous events.	PMU / PSC	MPW	O&M Costs
DECOMMISSIONING PHASE									
D1. WATER SOURCES									
Abandoning certain low flow-water sources according to Scenario 1, 2 and 3	No expected impacts	0	0	0	-	N/A	N/A	N/A	N/A

Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
D2. WATER TREATMENT AND PROPOSED STORAGE									
N/A	No expected impacts	0	0	0	-	N/A	N/A	N/A	N/A
D3. PROPOSED DISTRIBUTION NETWORK									
Existing pipes to be deactivated	Reduce aesthetic value	2	1	2	IS-	Buried pipes located along the trench of new pipes are to be removed and all the material have to be transported to a final safe disposal area	Contractor	MPW / PSC / PMU	Included in Bid price Included in subproject design
	Risk of asbestos particle becoming airborne from damaged AC Pipe	2	2	4	MS-	Buried pipes located outside the trench of the new pipes are to be maintained buried in order to avoid more works, costs and other impacts			
	Mixture of older and new pipes for future installation or replacement	3	1	3	MS-	Pipes installed above the ground will be removed and all the material have to be transported to a final safe disposal			
D4. SANITATION (PUBLIC TOILETS & FSTP)									
Management plan	N/A	0	0	0	-	Provide justification data for the decommissioning including technical and socio-economic studies	PMU / PSC	MPW	O&M Costs
						Stakeholder engagement (Liaise with the stakeholders in identifying the need for decommissioning)			
						Develop decommissioning Action Plan			
Conduct a comprehensive environmental Audit	Demolition affecting the existing trees to be cut down, and other vegetation to be removed	3	1	3	MS-	Carryout benching and landscaping after demolition	PMU / PSC	MPW	O&M Costs
					Improve on the catchment's protection through planting vegetation cover				
		Leftover Solid waste reduces environment aesthetic ,and stockpile runoff may cause decline of water quality	3	1	3	MS-	Recycling and reuse of all wastes generated	PMU / PSC	MPW

6. MONITORING & REPORTING

6.1. Monitoring Scope

42. The Consolidated IEE for this sub-project contains details of the consultation undertaken during preparation of this project. This includes:
- (i) Consultation during project preliminary design in October 2020, regarding environmental impacts of the project;
 - (ii) Consultation during project preliminary design in December 2020, regarding social, land and water use impacts of the project;
43. In addition, consultation will take place during implementation. The MPW and PMU will collaborate to undertake consultation after detailed designs are completed and will conduct consultation interviews within 4-6 weeks of construction starting and then again, every 3 months until the end of construction. This is set out in the Environmental Monitoring Plan.
44. The project monitoring conducted under the EMP includes:
- (i) **Project readiness monitoring.** Monitoring to check progress on project readiness and close gaps through corrective actions.
 - (ii) **Environmental quality monitoring.** To be conducted by a competent authority or person appointed by the contractor, involving the collection and analyses of (if required by the ANLA) air quality, noise and water quality data at designated monitoring locations for assessing compliance with applicable environmental quality and emission standards during construction.
 - (iii) **EMP compliance monitoring.** To be conducted by the MPW / PSC to verify EMP compliance during project implementation.
 - (iv) **Affected People monitoring (consultation).** This is to be conducted by the PSC via consulting affected people on the impacts during construction.
 - (v) **Operational monitoring.** This is required as part of the operations of the project and will be undertaken by the relevant government department or nominated operator.

6.2. Project Readiness Assessment

45. Before construction, the PSC will assess the subproject's readiness on environmental management based on a set of indicators and report it to PMU and ADB. This assessment will formally demonstrate that environmental commitments are being carried out and environmental management systems are in place before construction starts or suggest corrective actions to ensure that all requirements are met.

Table 9 Project Readiness Assessment Indicators

Indicator	Criteria	Are the criteria met?	If No, What corrective action is needed?	Date for corrective action completion
		Yes/No		
1. EMP update	EMP updated after detailed design and approved by ADB	Y/N		
2. Compliance with loan covenants	The borrower complies with loan covenants related to project design and environmental management	Y/N		
3. Public involvement effectiveness	Meaningful consultation completed	Y/N		
	GRM established with entry points	Y/N		
	Recruitment of external staff as set out in the institutional arrangements for this EMP	Y/N		

Indicator	Criteria	Are the criteria met?	If No, What corrective action is needed?	Date for corrective action completion
		Yes/No		
5. Environmental supervision and monitoring in place	Nomination of government staff for PMU and PIU roles as set out in the institutional arrangements for this EMP	Y/N		
5. Bidding documents and contracts with environmental safeguards	Bidding documents and contracts incorporate the environmental activities and mitigation measures required by this EMP	Y/N		
	Bidding documents and contracts incorporate the Particular Conditions for bidding (see Appendix 1)	Y/N		
6. EMP financial support	The required funds have been set aside for EMP implementation including training and capacity building	Y/N		
7. Completion of CEMP including associated sub-plans*	Required preparation of CEMP including associated sub-plans by contractor have been completed and get approval from PIAC	Y/N		

6.3. Environmental Quality Monitoring

46. During construction, the contractor is expected to maintain an adequate budget to ensure environmental monitoring can be undertaken as specified in Table 10. Impact on sensitive environmental receptors will be monitored and compared against the relevant national and international standards.
47. During operation, the relevant operator will be expected to maintain an adequate budget to ensure environmental monitoring can be undertaken as specified.

6.4. EMP Compliance Monitoring

48. In order for the EMP to be effective, all its mitigation measures must be monitored to ensure they are implemented. Compliance monitoring requirements are summarized in Table 11. Note this applies to construction only; during operation, it is the responsibility of the MPW to ensure monitoring of operational facilities is incorporated in the operations and maintenance manual and carried out routinely.

Table 10 Environmental Quality Monitoring

Environmental Indicators	Location	Method & Frequency	Responsibility		Estimated Costs (\$)	
			Supervision	Implementation	Per Sample	Total per site/yr
Construction Phase						
Air quality – dust	Construction sites	Visual assessment during the works – daily	PMU / PSC	Contractor	N/A	N/A
Noise	Construction sites and nearest sensitive receptor (e.g. residential receptor) (2 locations)	Inspection through rough assessment by answering the question: “Do you have to raise your voice to talk to someone respectively 1 m and 2 m away?” - daily	PMU / PSC	Contractor	N/A	N/A
Water quality	Upstream and downstream at nearest water body (canal or river) to construction sites	Visual inspection during the works – daily Monitor when and where construction active	PMU / PSC	Contractor	N/A	N/A
Water quality (parameters: pH, BOD ₅ , COD, TSS, oil and grease, turbidity (NTU))	Upstream and downstream to construction sites (Loihunu Spring, Cuha River Intake and FSTP Suco Maluro – two samples per site (Monitor when construction active))	Every 3 months during construction period. Assume 2 sites (Cuha Intake and Loihunu Spring (i.e. 2 samples per episode)) In response to complaint not resolved after application of (additional) mitigation measures Means in accordance with national standard	PMU / PSC	Contractor	\$900	\$3,600
Noise	Nearest residential receptors (2 locations)	1 day (daytime only) each quarter per location In response to complaint not resolved after application of (additional) mitigation measures Method in accordance with WHO guidelines	PMU / PSC	Contractor	\$1,500	\$1,500
Operations Phase						
Water quality (parameters: pH, BOD ₅ , COD, N, P, , oil and grease, TSS, Total Coliform Bacteria	At FSTP effluent discharge (before entrance to Horizontal Planted Gravel Filter)	Every 6 months during operation period. Means in accordance with national standard	PMU / PSC	Operator	\$500	\$1,000
Odour	Site boundary of TPS and WWTP	Odour boundary monitoring method to be established within operational plan	PMU / PSC	Operator	Included in operational costs – O&M budget	
Worker and public injury associated with FSTP and WTP operations	On property of FSTP and WTP	Regular record keeping	PMU / SEPFOPE	Operator	Included in operational costs – O&M budget	

Table 11 EMP Compliance Monitoring

Environmental Indicators	Location	Method and Frequency	Responsibility		Estimated Costs (\$)
			Verification	Implementation	
Construction Phase					
Air quality	Civil works sites	Monthly checking against mitigation measures specified in this EMP	PMU / PSC	Contractor	Included in contract
Noise	Civil works sites	Monthly checking against mitigation measures specified in this EMP	PMU / PSC	Contractor	Included in contract
Flora	Civil works sites	Monthly checking against mitigation measures specified in this EMP	PMU / PSC	Contractor	Included in contract
Water quality	Civil works sites	Monthly checking against mitigation measures specified in this EMP	PMU / PSC	Contractor	Included in contract
Soil and land resources	Quarries, Borrow and Spoil Disposal Sites	Monthly checking against mitigation measures specified in this EMP	PMU / PSC	Contractor	Included in contract
Resource use and natural resource contamination	Implementation site of Solid and Liquid Waste Management Sub-Plan B	Monthly checking against mitigation measures specified in this EMP	PMU / PSC	Contractor	Included in contract
Human health and safety	Implementation of Community and Occupational H&S and Emergency Response Sub-Plan C	Monthly checking against mitigation measures specified in this EMP	PMU / PSC	Contractor	Included in contract
Contamination of water, soil, waste production and social issues	Implementation of Construction Workers Management Sub-Plan E	Monthly checking against mitigation measures specified in this EMP	PMU / PSC	Contractor	Included in contract
Community Issues <ul style="list-style-type: none">• Environmental impacts of civil works (e.g., solid and liquid waste, erosion, local flooding, and pollution).• Any unforeseen impacts caused accidentally e.g. through spillages• Civil nuisance (e.g., noise, disrupted business and farming activity, social issues, community health and safety).• Impaired use of access roads (e.g. traffic issues and access).• GRM and its procedures & key contacts• Accessibility	At construction locations Accessibility – at all sites of pipe excavations in urban areas	Consultation with community and distribution of Public Information Booklet (PIB) prior to start of construction in a section. Consultation interview with Affected People Using the form in 4-6 weeks after construction starts Every 3 months until end of construction	PMU	SMASA / PSC	O&M Costs

6.5. Environmental Policy and Standards

49. The construction and operation phases of the project will follow relevant national and international environmental quality standards.
50. In regards to pollution prevention and control technologies and practices, the Government of Timor-Leste has yet to implement their National Standards (for Air, Water, Noise, etc) and therefore, under the legal requirements of the Base Law for Environment, these minimum requirements are safeguarded by the use of World Health Organization (WHO) guidelines and, where non-existent, the IFC Environmental, Health and Safety Guidelines are usually referred to as international good practice, consistent with ADB SPS 2009 practice.

Table 12 Ambient Air Quality Standards

Parameter	Averaging Period ^a	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)		Standards to be followed by Project ($\mu\text{g}/\text{m}^3$)
		Global Update 2005 ^b	Second Edition 2000 ^c	
PM ₁₀	Annual	20		20
	24-Hour	50		50
PM ₂₅	Annual	10		10
	24-Hour	25		25
SO ₂	24-Hour	20		20
	10-minute	500		500
NO ₂	1-year	40		40
	1-Hour	200		200
CO	8-hour		10,000	10,000
	15-minute		100,000	100,000
Pb	1-year		0.5	0.5

^a Due to short term duration of civil works, the shortest period will be more practical to use. ^[11]

^b Source: World Bank Group. IFC. 2007. Environmental, Health and Safety General Guidelines.

^c Source: Air Quality Guidelines for Europe, Second Edition, 2000; WHO Regional Office for Europe, Copenhagen

Table 13 Noise Level Standards

Receptor / Source	Standards to be Used for Project WHO Guideline Values for Noise Measured Out of Doors ^a (one hour LA ₉ in dBA)	
	07:00 – 22:00	22:00 – 07:00
Industrial Area ^a	70	70
Commercial Area ^a	70	70
Educational Area ^a	55	45
Rural Residential Area	55	45
Urban Residential Area	55	45
Mixed Residential Area	55	45
Quiet Area	55	45

^a Source: World Bank Group. IFC. 2007. Environmental, Health and Safety General Guidelines.

51. Timor-Leste is currently developing new legislation in drinking water quality and The Guidelines for Drinking Water Quality in Timor-Leste have been drafted based on Guidelines for Drinking Water Quality (WHO, 1993), other guidelines in nearby countries, and various factors of natural, social and economic aspects in Timor-Leste. The document provides guideline values and testing methods on a certain range of microbiological indicators, chemical substances and physical properties of water quality, to ensure the drinking water does not pose any significant health risk to consumers and is aesthetically acceptable.

Table 14 – Guidelines for Drinking Water Quality in Timor-Leste and comparison with WHO and Portuguese values

Parameters	Units	Timor-Leste (DL 31/2020 – Control of Water Quality for Human Consumption)	WHO Guidelines ^{(1) (2)}
Bacteriological tests			
Total Coliform	CFU/100 ml	0	0
Escherichia coli (E.coli)	CFU/100 ml	0	0
Physical and chemical tests			
Aluminum	mg/l Al	0.2	0.2
Arsenic	mg/l As	0.01	0.01
Ammonia	mg/l ⁽³⁾	0.5	1.5
Calcium	mg/l Ca	100	100-300
Chlorides	mg/l CL	250	250
Chlorine	mg/l Cl	0.2-0.6	5
Conductivity	µS/cm	2500	
Colour	mg/l Platinum-Cobalt Scale	20	15
Fluoride	mg/l F	1.5	1.5
Hardness	mg/L CaCO ₃	110-500	200-500
Iron	mg/l Fe	0.3	0.3
Langelier Index		-0.5 – 0.5	-
Magnesium	mg/l Mg	50	-
Manganese	mg/l Mn	0.05	0.1
Nitrate	mg/l ⁽⁴⁾	11	50
Nitrite	mg/l ⁽⁵⁾	0.15	3
pH	Sorensen	6.5-8.5	6.5-8.5
Sulphate	mg/l SO ₄ ²⁻	250	250
Taste and odour	dilution rate	Free of taste and odour	Free of taste and odour
Total dissolved solids	mg/L	1000	1000
Turbidity	NTU	5	4

⁽¹⁾ The values indicated are guideline values for microbiological indicators or chemicals that are of health significance in drinking water or recommended values based on other reasons, like the acceptability of water and corrosion control.

⁽²⁾ Guidelines for drinking-water quality: fourth edition incorporating the first addendum, World Health Organization, 2017

⁽³⁾ Ammoniacal nitrogen (mg NH₄/l) for WHO and Decreto-lei nº 152/2017 and mg/l NH₄-N for Timor-Leste legislation

⁽⁴⁾ Nitrate (mg NO₃/l) for WHO and Decreto-lei nº 152/2017 and mg/l NO₃-N for Timor-Leste legislation

⁽⁵⁾ Nitrite (mg NO₂/l) for WHO and Decreto-lei nº 152/2017 and mg/l NO₂-N for Timor-Leste legislation

52. Wastewater, excreta and grey water use in agriculture is more and more considered a method that combines water and nutrient recycling, supporting increased household food security and nutrition in poor households. For the past few decades WHO guidelines have been influential regarding technical standard and policy level setting for this issue, and have been adopted by several countries for their wastewater and excreta use practices. They are also designed to protect the health of farmers (and their families), local communities and product consumers but adaptable to specific circumstances, to maximize overall public health benefits and the beneficial use of scarce resources.
53. The project intends to follow suit with this principle and use its resources efficiently and sustainably and attempt to have a positive influence on the local economy, by applying the dried treated FSTP sludge to the agricultural sector in the area, following the WHO 1989 Guidelines for Wastewater Irrigation and its thresholds for the effluent discharge and treated dried sludge use in agriculture:

Table 15- WHO Guidelines for Wastewater Irrigation (WHO 1989)

ITEM	BOD (mg/L)		NH ₄ -N (mg/L)	Helminth eggs (No. /filter)	FC (No. /100 ml)
	Total	Filtered			
A. Liquid effluent - Discharge into receiving waters:					
Seasonal stream estuary	100-200	30-60	10-30	≤2-5	≤10 ⁴
Perennial river or sea	200-300	60-90	20-50	≤10	≤10 ⁵
B. Reuse					
Restricted irrigation	n.c.		1)	≤1	≤10 ⁵
Unrestricted irrigation	n.c.		1)	≤1	≤10 ³
C. Treated Plant Sludge					
Use in agriculture	n.c.		n.c.	≤3-8 g TS ²⁾	3)
NOTES:					
1) ≤ Crop's nitrogen requirement (100-200 kg N/ ha-year)					
2) Based on the nematode egg load per unit surface area derived from WHO guidelines for wastewater irrigation (WHO 1989) and on maturing rate of 2-3 tons of dry matter /ha-year					
3) Safe level if egg standard is met.					
n. c.----not critical					

54. However, the FSTP effluent will be discharged into an Irrigation Cropping Area and will require frequent testing before discharge for the purpose of groundwater and soil pollution prevention. The standards for such will be in accordance with the 1.3. Wastewater and Ambient Water Quality of the World Bank Group. IFC. 2007. Environmental, Health and Safety General Guidelines.

Table 1.3.1 Indicative Values for Treated Sanitary Sewage Discharges ^a		
Pollutants	Units	Guideline Value
pH	pH	6 – 9
BOD	mg/l	30
COD	mg/l	125
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total coliform bacteria	MPN ^b / 100 ml	400 ^a
Notes:		
^a Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation.		
^b MPN = Most Probable Number		

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7. PUBLIC CONSULTATION AND PARTICIPATION

7.1. Consultation and Participation

55. The IEE procedure for Category B projects, under Decree-Law no. 05/2011, requires the proponent to undergo a full Public Consultation. Likewise, the project follows ADB's Safeguard Policy (ADB, April 2009), which requires borrowers/clients to perform meaningful consultation with affected people.
56. The ADB IEE (ADB, 2020) undertook Public Consultation for Viqueque in the Municipal Administrative Meeting Room on the 10th of October 2020, participated by local government agencies and authorities (Chief of Suco and Village), and representative members of the communities within the project area, where the issues of significant social concern, predicted environmental impacts and proposed mitigation measures were presented, in order to collect all useful and relevant inputs from them, for the project construction phase.
57. In addition, 4 other Public Consultations, carried out under the social component in Suco Caraubalu (12th December 2020), Suco Loihuno (12th December 2020), Suco Uma Quic (13th December 2020) and Suco Uma Uain Craic (13th December 2020), further confirmed the expectations and worries in the previous Public Consultation and reassured the team that there is very little risk of any water conflicts or impacts felt by the community during implementation and operation of the future system.
58. Consultation will also take place during the SEIS/EMP domestic review and during implementation. The MPW and PMU will collaborate to undertake consultation after detailed designs are completed and will conduct consultation interviews within 4-6 weeks of construction starting and then again, every 3 months until the end of construction. This is set out in the Environmental Monitoring Plan provided in the Environmental Management Plan for each sub-project.
59. Informal monitoring interviews with affected people will focus on complaints about community disturbance from construction activities, such as construction noise, dust, solid waste and wastewater, as well as public concerns about ecological protection, soil / land concerns and access issues. A sample Environmental Monitoring Interview Form is given in Appendix 3. This will contribute to project monitoring.
60. All consultation will be undertaken in compliance with national regulation and legislation in force, including those put in place to prevent the spread of COVID-19 (see details in Appendix 2).

7.2. Information Disclosure

61. For disclosure and information purposes, a copy of the IEE will be distributed to SMASA and one copy to each of the Chiefs of Aldeia, for local public access to information. As MPW does not have an active website, additional copies can be made available to the public, on request.

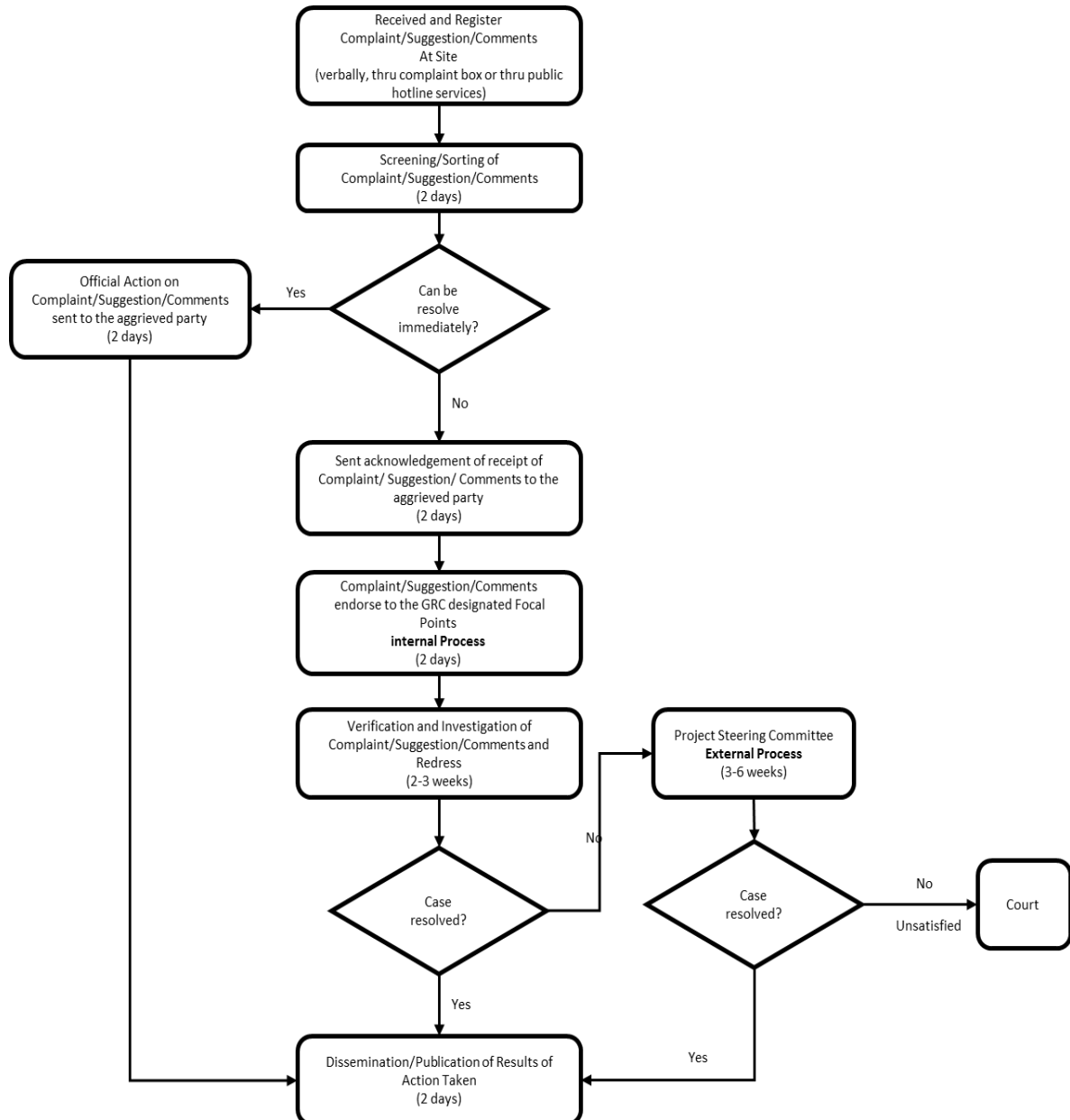
8. GRIEVANCE REDRESS MECHANISM

62. The Grievance Redress Mechanism's main objective is to provide a transparent mechanism for the stakeholders and public to voice their social and environmental concerns or issues linked to the project, arising during the pre-construction, construction and development of the Project, with the objective of ensuring that concerns and potential conflicts can be satisfactorily addressed.
63. The function of GRM is to receive, evaluate and facilitate resolution of affected persons' concerns, complaints, and grievances related to social, environmental and other concerns on the project in a form of forum which can be accessible to other related parties with a provision of Complaint Registry Form (See Appendix 5) by the Contractor as described below on the Grievance Procedure.
64. The proposed mechanism for grievance redress of environmental matters in construction and operation of the project's infrastructure subcomponents uses existing Suco ("village") and Aldeia ("Hamlet") administrative structures (affected persons/ village committees/ village groups), any of which can be complainants.
65. The benefits contribute to the project itself and also the affected persons and other stakeholders. The benefits of the project will resolve any relative disputes before they escalate to a higher level, help building trust and confidence to the related community members, create productive relationships between the parties, and helps avoid project delays and increasing of costs, thus will improve the quality of work. Other benefits that can contribute to the affected persons and stakeholders are easing and facilitating access to information and providing an effective way to report their grievances and complaints.
66. Every grievance shall be registered by the Contractor under a carefully documented process. The MPW will also be involved in the clients' complaints and establish a good network with the chefe suco and aldeia for cultural facilitation purposes. The environmental and social safeguards officer will be fully responsible on the overall grievance redress issues particularly on the environmental and social issues using a combination mechanism.

8.1. Grievance Procedure

67. Grievance regarding the process can be redressed at two levels, which are during the construction, and during Operation of the project, following the process in Figure 7.
68. At the project level, a complaint registry shall be set up in the project work area, under the responsibility of the contractor, identifying a staff member that is management level and whom, due to the nature of his/her function, will always be available on site and people shall be informed of his/her presence.
69. The contractor representative shall accept complaints on environmental safeguards issues during the rehabilitation works, by registering them in the Complaint Template, identifying the name of the complainant and the date of receipt. For a verbal complaint the contractor must make written records properly and record them in a complaint register.
70. The contractor representative will inform the MPW representative of the occurrence and review the nature of the complaint with MPW to make sure it is environment related. MPW performs an internal review of the issue, contacting the safeguards specialist for technical support to solve the grievance, if required, and after will agree with the Contractor on the necessary action and reasonable timeframe for correction/response to the grievance.

Figure 7 - Grievance Redress Procedure for the Project



71. If the grievance requires local mediation, MPW and contractor representatives should consult quickly with local Chefes de Suco and Aldeia (in the area of related grievance) and the affected stakeholder/person to arrive at a conclusion on the correction of the grievance.
72. MPW must follow up on the corrective measure, within the agreed timeframe. If the Contractor has not taken any satisfactory corrective action within the defined timeframe, MPW will take action in accordance to environmental legal and contractual clauses in effect.
73. If the Grievance cannot be solved at the project level, by MPW, the case will be referred to the court of law to adjudicate the matter. Complainants can also file a direct complaint to MPW, under their official Department for Client Support (Address: MPW, Caicoli, Díli; Telephone: 331 71 57), who will follow up directly with the project complaint registry at the construction level.
74. This MPW Department for Client Support is the official grievance redress representative for water supply purposes, when the operation phase of the project comes online.

9. REPORTING

75. Environmental monitoring reports (using ADB's semi-annual environmental safeguards monitoring report format) will be prepared semi-annually for the executing agency by the MPW in collaboration with the PMU and sent to the ADB. The reports will table all indicators measured with the monitoring plan of EMP including performance monitoring indicators, and will include relevant national and international environmental quality standards. Table 16 gives reporting requirements.

Table 16 Reporting Requirements

Report	Frequency	Purpose	From	To
Contractor's progress report	Monthly	EMP implementation progress and monitoring results	Contractor	PMU
CEMP and EMP compliance report	Monthly	CEMP and EMP compliance	Site Contractor EHS specialist	PMU
CEMP and EMP progress and compliance report	Quarterly	CEMP / EMP Implementation and compliance	Site Contractor EHS specialist	PMU
Environmental monitoring report (environmental safeguards monitoring report format)	Semi-annual	Full CEMP and EMP implementation and adherence to environmental covenants/conditions	PMU	ADB
FSTP	Quarterly	Effluent quality, sludge disposal, H&S	Operator	PMU

10. ESTIMATED COST OF THE EMP

76. The total cost for EMP implementation for the Project comprises the following:

- The cost of the mitigation measures is to be included in the construction contract and operations budget – hence no additional cost.
- Contractor's environment, H&S officer(s) including contractor's GRM focal point, for construction – this cost is included in the construction contract price and to be estimated by the contractor. The amount estimated for one environment H&S officer is \$72,000 (\$1,500/month for 48 months).
- The cost of environmental quality monitoring, detailed in Table 10, is to be included in construction contract and operations budget – for construction this cost is estimated at \$24,400 for a period of 48 months and for operation is estimated at \$10,000;
- EMP preparation, implementation monitoring and compliance monitoring, including public consultations (affected People and GRM) is covered under the contract, hence no additional cost. The amount estimated is about \$20,000 over the 48 months construction period, included in Table 7.
- The cost of Capacity Building and Training (excludes Affected people and GRM) during construction and Operation is estimated \$41,800, described in Table 7.

77. Therefore, the overall cost of preparing and implementing the EMP including measures during construction and supervision is estimated to be approximately \$158,200.

Table 17 EMP Estimated Cost

Particulars	Stages	Unit	Total Number	Rate (\$)	Cost (\$)	Cost covered by:
A Mitigation Measures						
1 Mitigation Measures per Project Activity	Construction and Operation	N/A	N/A	To be defined in Bid	To be defined in Bid	Contractor
2 Contractor's HSE Officer	Construction	Person	1	\$1,500 / month	\$72,000	Contractor
Subtotal (A)					\$72,000	
B Environmental Monitoring Measures						
1 Water Quality (upstream and downstream of Loihunu Spring, Cuha River intake and FSTP Suco Maluru)	Construction	(as in DL31/2020)	16	\$900	\$14,400	Contractor
2 Noise (if complaint at sensitive/residential location)	Construction	dBa	4	\$1,500	\$6,000	Contractor
3 Water Quality (FSTP discharge before Gravel Filter)	Operation	(as in IFC Guidelines)	8	\$500	\$4,000	Contractor
Subtotal (B)					\$24,400	
C Capacity Building and Training						
1 EMP Development and Implementation	Before and during Construction	Training Session	2	\$1,000	\$2,000	Contractor
2 Consultation with Affected People	Before and during Construction	Training and PC Sessions	16	\$1,000	\$16,000	Constructor
3 Grievance Redress Mechanism	Before and during Construction	Training Session	2	\$2,000	\$4,000	Constructor
4 Environmental Protection	Before Construction	Training Session	1	\$1,000	\$1,000	Constructor
5 Environmental Monitoring	Before Construction	Training Session	1	\$1,000	\$1,000	Constructor
6 FSTP Operation and Maintenance	Before and during Operation (2 years Contractor)	Training and on-the-job Sessions	3	\$12,600	\$37,800	Constructor
Subtotal (C)					\$61,800	
TOTAL (A+B+C)					\$158,200	

78. Excluded from the EMP budget as separate items are:

- Measures required as part of good construction practice. This includes provision of PPE for workers working at site. Cost estimate for such provisions is \$20,000 over four years based on 100 workers and covers PPE such as hard hats, gloves masks, ear plugs, safety glasses, and safety boots.
- Clean up of spills from machinery maintenance cost and mobile noise barriers which are included in the general overhead of the construction contractor.
- Remuneration and associated costs for the PMU and PSC as this is covered elsewhere in the overall project budget.
- Cost for the PSC which includes national and international environmental safeguards specialists.

79. The Contractor will bear the costs for all mitigation measures during 4 years construction, including those specified in the tender and contract documents as well as those to mitigate unforeseen impacts due to their construction activities.

80. The Contractor will also bear all environmental monitoring and reporting costs during the 2 year operational stage. The EMP operational environmental mitigation and monitoring measures will be incorporated in the operations and maintenance manual.

11. CONCLUSIONS

81. Overall, the project is anticipated to bring environmental benefits to the populations of the project cities. It will serve to improve the current water and sanitation situation and will provide long-term environmental improvements.
82. The most significant impacts from the project are expected to arise in the construction phase, especially in the distribution network construction. Therefore, there is a focus on training and capacity building and information to this phase that is essential for ensuring the investment is financially and environmentally sustainable and beneficial.
83. Regarding the proposed FSTP, the sense is overall positive in that both the construction and operation of the plant will have some (potential) negative impacts, but of a low to moderate significance and all can be mitigated to acceptable levels. Particularly important is that the final destination of the processed (dried and largely decomposed) sludge may safely be used as manure in agriculture activities around the project area.
84. In general, the EMP, if implemented as directed, will mitigate impacts on the natural environment and affected people to an acceptable level. The key parties for mitigation measure implementation are the construction contractor and the operator. The implementation of this EMP will be closely monitored and reported on by the relevant stakeholders in the project.
85. A robust GRM will be established, as outlined in this EMP. It will ensure that all unplanned impacts which cause grievance to affected persons are managed swiftly and a satisfactory outcome brought about.

APPENDIXES

Appendix 1. Particular Conditions (for Bidding Documents)

The following clauses shall be added to the Bidding Document, Section 8 Particular Conditions in relation to the Environmental Safeguards for the Project:

The contractor will undertake to develop and submit to the PMU/CSC for approval, a site specific Construction Environmental Management Plan (CEMP) with the following management sub-plans:

- A. Sensitive Areas Management Plan
- B. Cultural Sites Safeguard Plan
- C. Noise Management Plan
- D. Air Quality and Dust Management Plan
- E. Spoil Management Plan
- F. Community and OHSE and Emergency Response
- G. Campsite and Construction Front Management Plan (if required)
- H. Site Clean-up Plan
- I. Traffic Management Plan
- J. COVID-19 Management Plan
- K. Solid and Liquid Waste Management

The management sub-plans will be sufficiently detailed as to allow a clear understanding of the approach the contractor will take to mitigate environmental impacts during construction. The contractor will adhere to the management sub-plans at all times unless prior agreement has been given by the PMU under extenuating circumstances.

The Contractor will commit to ensuring a full time environmental health and safety officer on site who is competent, nominated to manage health and safety risks, and who can implement the EMP requirements for occupational health and safety and ensure relevant health and safety legislation is followed.

The Contractor will commit to enabling the project staff or consultants tasked with monitoring, full access to all information and data required in order that the Environmental Management Plan can be fully monitored.

Appendix 2. COVID-19 Protection and Mitigation Measures

1 Construction Site Working Conditions Mitigation Measures for COVID-19	
1. Form a joint team to plan and organize return to work	<ul style="list-style-type: none"> Develop or convene a joint occupational safety and health committee with members representing the employer and workers. Train team members on the basic principles for the formulation and implementation of occupational safety and health preventive and control measures. Develop and communicate a work plan on safe working for COVID-19. Such plan should be fully aligned with any government regulations and guidelines on COVID-19 prevention and control, or in the absence thereof, with international good practice guidelines as may be updated from time to time.
2. Risk assessment to decide when to work, who works and how	<ul style="list-style-type: none"> Undertake a risk assessment to determine the preventive and control measures. Ensure preventative measures are in place before resuming or beginning construction work.
3. Adopt engineering, organizational and administrative measures	<ul style="list-style-type: none"> Avoid physical interaction and maintain physical distancing requirements as prescribed by national policy, or in the absence thereof, international good practice. Ventilate enclosed workplaces including work camps and communal spaces. Avoid concentration of workers - limit the capacity of common areas such as work camp dining rooms and changing rooms to allow the minimum separation of 2 m and organize one-way systems. This includes sleeping areas which must be a minimum of 2 m between beds. Put in place training and information on COVID-19 and measures required for its management. The construction site is to be segregated to the extent possible in zones or other methods to keep different crews physically separated at all time. Stagger break and lunch schedules to minimize the number of people in close proximity to one another.
4. Regularly clean and disinfect	<ul style="list-style-type: none"> Increase the frequency of cleaning and disinfection, in particular heavily trafficked areas and common areas, including work camps. All door handles, railings, ladders, switches, controls, eating surfaces, shared tools and equipment, taps, toilets, and personal areas are wiped down at least twice a day with a disinfectant. Discourage the sharing of items such as cups, glasses, plates, tools.
5. Promote personal hygiene	<ul style="list-style-type: none"> Provide workers with the conditions and means necessary for frequent hand washing (soap, water or alcohol gel) with a posted hand washing protocol at site entries, exits, bathrooms, communal areas, offices, and any other areas with commonly touched surfaces. Inform workers of the need to avoid physical contact when greeting, and avoid touching eyes, nose and mouth. Inform workers of the need to cover the mouth and nose with a disposable handkerchief when coughing or sneezing or the crook of their arm. Dispose of tissues in a lined and covered waste bin and wash hands afterwards.
6. Provide PPE and inform workers of its correct use	<ul style="list-style-type: none"> Identify appropriate PPE related to the tasks and health and safety risks faced by workers according to the results of risk assessment and the level of risk, and provide it to workers free of charge and in sufficient number, along with instructions, procedures, training and supervision. Non-medical face-coverings (such as homemade cloth masks) should be worn as mitigation for catching and transmitting the virus, but are not to be treated as substitutes for proper handwashing.
7. Health surveillance and insurance	<ul style="list-style-type: none"> Before entering the site, staff and visitors must confirm that they are not currently exhibiting flu-like symptoms. Monitor the health status of workers, develop protocols for cases of suspected and confirmed COVID-19. The protocol will state that: <ul style="list-style-type: none"> Workers with symptoms or confirmed cases must be isolated within the construction camp or stay at home for 7 days after symptoms started. If symptoms persist after 7 days the person must isolate until the symptoms stop. People who have been in close contact with the person with confirmed COVID-19 be quarantined for 14 days.
8. Consider other hazards, including psychosocial	<ul style="list-style-type: none"> Promote a safe and healthy working environment free from violence and harassment. Encourage health promotion and wellbeing in the workplace through enough rest, balance of physical and mental activity and adequate work- life balance. Implement prevention and control measures for the use and storage of chemicals, particularly those used for disinfection during COVID-19.
9. Review emergency preparedness plans	<ul style="list-style-type: none"> Develop an emergency plan adapted to COVID-19 and regularly review it.

1 Construction Site Working Conditions Mitigation Measures for COVID-19

10. Review and update preventive and control measures as the situation evolves	<ul style="list-style-type: none"> Periodically monitor prevention and control measures to determine whether they have been adequate to avoid or minimize risk, and identify and implement corrective actions for continuous improvement. Establish and maintain records related to work-related injuries, illnesses and incidents, worker exposures, monitoring of the work environment and workers' health.
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Source: Adapted from: ILO, WHO, Canada Construction Association, and UK Government.

2. Worker Camp Siting and Management Mitigation Measures for H&S and COVID-19

1. Siting	<ul style="list-style-type: none"> Not in area liable to flooding, landslide or other natural disaster Not in area affected by construction dust, noise, sewage or other pollution Not in a residential area.
2. Minimum housing standards	<ul style="list-style-type: none"> A separate bed for each worker Beds should not be arranged in tiers of more than two; Separate accommodation of the sexes or to accommodate couples Adequate natural light during the daytime and adequate artificial light Adequate ventilation to ensure sufficient movement of air Adequate supply of safe potable water Adequate sanitary facilities (see below); Adequate drainage Adequate furniture for each worker to secure his or her belongings, such as a locker. Common dining rooms, canteens or mess rooms, located away from the sleeping areas Appropriately situated and furnished laundry facilities Reasonable access to plug sockets for charging telephones and other devices Rest and recreation rooms and health facilities, where not available in the community.
3. Minimum accommodation sizes	<ul style="list-style-type: none"> Sleeping space Inside dimensions over 198 cm by 80 cm; sleeping room: headroom of over 203 cm allowing full free movement Beds minimum 2 m apart for COVID-19 risk management
4. Sanitation Facilities	<ul style="list-style-type: none"> One toilet, one tap / basin, one toilet for every 6 people Convenient location to accommodation Provision of soap Separate facilities for men and women Ventilation to open air Fresh cold running water Clean and hygienic Septic tank / sewage treatment facility, or pit latrines located at least 200 m from surface waters, and in areas of suitable soil profiles and above the groundwater levels
5. H&S within worker accommodation	<ul style="list-style-type: none"> Separate area for sick workers to prevent transmission of disease Smoke detector in sleeping area Fire safety throughout accommodation such as fire extinguishers, fire alarms, fire blankets Worker training in fire prevention and procedures Fire exit sign, adequate means of escape and clearly maintained exit Security lighting within camp and for sanitation block and lighting for route from sleeping area to sanitation block. Electrical cables to be in safe condition, elevated and not in areas liable to flood
6. Inspection	<ul style="list-style-type: none"> 2 weekly inspect to inspect for cleanliness, state of repair of building, accommodation and fire equipment. Record inspection results and retain for review

Appendix 3. Affected Person Monitoring Form

Consultation / Interview Form

Date of Interview		Name of Interviewer	
Interview site: <i>Where is the interview held? In school, on the road, in shop?</i>		Stakeholder name and status: <i>Full name, status is business owner, school teacher, religious leader, resident</i>	
Construction site and date construction started <i>Which road, GPS location if available</i>		Has this stakeholder been interviewed before? <i>Yes/No (if yes, when were they interviewed?)</i>	


Interview Discussion Points:

1. NOISE	Record of Discussion
Before the project started, was the person disturbed by noise? If yes, explain how and when. <i>Where did the noise come from? e.g. traffic, machinery, people, music</i> <i>When did it disturb the person? e.g. all day, at night, intermittently</i>	
During the construction, is the person disturbed by noise from the project? If yes, explain how and when. <i>What type of noise and where did the noise come from?</i> <i>All day, at night, intermittently?</i>	
If noise from construction is a problem, what changes does the person suggest to make?	
2. AIR QUALITY	Record of Discussion
Before the project started, was the person affected by air pollution or dust? If yes, explain how and when. <i>Where did the pollution or dust come from? e.g. traffic, machinery, construction, burning garbage, cooking stoves</i> <i>When was the dust or pollution a problem? e.g. all day, at night, intermittently</i>	
During the project, is the person disturbed by dust or pollution? If yes, explain how and when. <i>What type of noise and where did the noise come from? e.g. increased traffic congestion, construction machinery, construction workers, burning construction garbage etc.</i> <i>When did it disturb the person? e.g. all day, at night, intermittently</i>	
If dust or air pollution from the construction is a problem, what changes does the person suggest are made?	



3. VEGETATION AND LAND USE	Record of Discussion
<p>Before the project started, what was the vegetation like in the project area? <i>e.g. pasture land, trees, shrubs, rice fields.</i></p>	
<p>During the project, has the person found the vegetation situation has changed? If yes, explain how and when.</p>	
<p>If impact on vegetation is unacceptable, what changes does the person suggest are made</p>	
4 COMMUNITY SAFETY	Record of Discussion
<p>Before the project started, can you describe the community safety situation in the project area? <i>e.g. no problems, some accidents, difficulty crossing the roads</i></p>	
<p>During the project, has the person found the community safety situation has changed? If yes, explain how and when. <i>Slower traffic so easier to cross the roads, construction vehicles are making a crossing harder or easier, more / less accidents, construction site dangers</i></p>	
<p>If change in road safety is unacceptable, what changes does the person suggest are made?</p>	
5. WATER QUALITY	Record of Discussion
<p>Before the project started, was the person affected by poor water quality? If yes, explain how and when. <i>Which water source; groundwater and/or surface water? How was it polluted?</i></p>	
<p>During the project, is the person affected by water pollution? If yes, explain how and when. <i>Which water source; groundwater and/or surface water? How is quality being affected?</i></p>	
<p>If water quality from the construction is a problem, what changes does the person suggest are made?</p>	
6. ACCESS	Record of Discussion
<p>During the project, is the person affected by reduced access to their business, home or land? What is the nature of the effect and how does it affect the business?</p>	
<p>If access limitations are not acceptable, please suggest changes which can be made?</p>	
7. OTHER ISSUES	Record of Discussion
<p>Any other issues about the construction sites that the person wants to discuss? <i>e.g. wastewater concerns, waste disposal, Other concerns, labor force,</i></p>	

Appendix 4. Viqueque – Proposed Water Supply System – General Layout

Appendix 5. Complaints Registry Form



Democratic Republic of Timor-Leste
Project RFP039- Consultancy Services for Detailed Engineering Design of Timor-Leste
Four Municipal Capitals Water Supply and Sanitation

COMPLAINT REGISTRY FORM

DATE: ____/____/____ (dd/mm/yy) **CRF: 001**

Capital (please check) : ☐ Lospalos ☐ Viqueque ☐ Same

Complainant Profile

Name	:		Age	:	
Gender	:	<input type="checkbox"/> Male	Civil Status	:	<input type="checkbox"/> Single
		<input type="checkbox"/> Female			<input type="checkbox"/> Married
					<input type="checkbox"/> Widow/er
Address		<u>Aldeia</u>			
		<u>Suco</u>			
		<u>Administrative Post</u>			

Complaint Details

Attending Officer:	
Name/Designation	Complainant Signature