DEMOCRATIC REPUBLIC OF TIMOR-LESTE

MINISTRY OF PUBLIC WORKS

CONSULTING SERVICES FOR DETAILED ENGINEERING DESIGN OF TIMOR-LESTE FOUR MUNICIPAL CAPITALS WATER SUPPLY & SANITATION PROJECT

Contract
RFP/039/MOP-2019

PROJECT DOCUMENT FOR ENVIRONMENTAL LICENSING

VIQUEQUE MUNICIPAL CAPITAL

Rev.0 – Draft for Client Review

DECEMBER 2020

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DOCUMENT TECHNICAL DATA

Title:	PROJECT DOCUMENT FOR ENVIRONMENTAL LICENSING – VIQUEQUE MUNICIPAL CAPITAL
OWNER:	Directorate General of Water and Sanitation (DGAS)
Location:	Viqueque, Viqueque, Timor-Leste
Name of Project:	Consulting Services for Detailed Engineering Design of Timor-Leste Four Municipal Capitals Water Supply & Sanitation Project
Consultant:	OASIS Sustainable Projects
Technical Supervision:	Vasco Lobato Leitão (Environmental Specialist)
Technical Inputs:	Maria Helena de Jesus (Environmental Engineer) Nofiano Ruas (Environmental Technician)
Date:	14 December 2020
Version:	Rev.0 – Draft for Client Review

ACRONYMS AND ABBREVIATIONS

2DCWSP	- Second Districts Capital Water and Sanitation Project
4MCWSSP	- 4 Municipal Cities Water Supply & Sanitation Project
ADB	- Asian Development Bank
FSTP	- Faecal Sludge Treatment Plant
PDC	- Project Design Consultant
DED	- Detailed Engineering Design
DGAS	- General Directorate for Water and Sanitation
SMASA	- Municipal Service for Water, Sanitation, and Environment
SMASA-National	- National office for SMASA
SMASA-Los Palos	- Los Palos Regional Office for SMASA
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
Masl	- meters above sea level
MPW	- Ministry of Public Works
PA	- Protected Area
PD	- Project Document
PMU	- Project Management Unit
SEA	- Superior Environmental Authority
SEIS	- Simplified Environmental Impact Statement
SEMP	- Site-specific 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

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INTRODUCTION

The significant growing number of the population in all Municipalities is resulting in the increase of water demand and wastewater production in the private and domestic sectors. Issues such as continuous water scarcity, poor infrastructures, inadequate water and wastewater quality has led the Government of Timor-Leste to focus on the water and sanitation improvement, particularly in the district areas.

The Four Municipal Capitals Water Supply & Sanitation Project (4MWSSP) will support the Government of Timor-Leste in providing access to improved water supply and sanitation (WSS) in 4 municipalities (Baucau, Los Palos, Viqueque and Same) by drawing on experiences and lessons learned from the ADB Second District Capitals Water Supply Project (46160-001) ADB TA-8064 TIM.

The project will build upon the current Government efforts in providing water supply and sanitation (WSS) services in Timor-Leste's urban areas, working towards the achievement of Sustainable Development Goal (SDG)-6 to ensure availability and sustainable management of water and sanitation for all by 2030, in line with the country's Strategic Development Plan 2011 – 2030 (G-RDTL, 2011), specifically the water sanitation strategy of "…providing a safe piped 24-hour water supply to households in 12 District [now "municipality"] centres…, by 2030,…" across Timor-Leste. It will also finance climate-resilient and inclusive WSS infrastructure in project municipalities and strengthen institutional and community capacity, sustainable service delivery, and project development.

The 4MWSS Project intends to produce the following outputs:

1) Propose the rehabilitation and expansion of the urban water supply system for Baucau, Los Palos, Same and Viqueque municipal capitals.
2) Establish fully functioning water supply and sanitation infrastructure in pilot schools and public areas i.e. markets that is effectively operated, maintained, and managed to provide a minimum level of service for water supply and sanitation to all citizens.
3) Facilitate new or improved household sanitation in all households in the Municipal capitals of Baucau, Los Palos, Same and Viqueque.
4) Establishing septic tank sludge treatment and disposal facilities and associated sludge transport system in the municipal capitals.

The Ministry of Public Works (MPW) is responsible for planning, implementation, regulation, and monitoring of WSS, specifically the General Directorate for Water and Sanitation (DGAS), which, under the MPW, supports the Water and Sanitation facilities in the municipalities, these operated locally by the SMASA regional office.

The MPW recognized its regulatory duty, as project proponent, as mandated in Decree Law No. 5/2011 - Environmental Licensing, to file a Project Document to the National Authority for Environmental Licensing (ANLA), as the start-up document for project screening and categorization under the environmental licensing process.

This Project Document's objective is to provide clear and relevant information on the proposed Water and Sanitation System Improvement Project for ***Viqueque Municipal Capital only*** (hereinafter called "Viqueque WATSAN Project") identified, located and described in Chapter Project Description, taking into account that its rehabilitation will be carried out under a future ADB loan to the Government of Timor-Leste.

One of the Project Document's primary source of information is a previous study carried out in 2015, by the consultancy firm Aurecon (ADB, 2016), commissioned by the ADB (Asian Development Bank)) to carry out the Technical Assistance (TA-8064) for the Second (2nd) District Capitals Water Supply Project (46160-001) and produce a demand responsive investment Masterplan to meet the water supply and sanitation needs of Timor-Leste's urban populations in Baucau, Lospalos, Viqueque and for Same, for the period to 2030, in line with national development plans and targets as outlined in the Timor-Leste Strategic Development Plan 2011 – 2030.

The ADB evaluated the environmental impact of the proposed rehabilitation through an Initial Environmental Examination (IEE) process under the ADB Safeguard Policy Statement (SPS) 2009 and concluded that the rehabilitation and management of the proposed Water and Sanitation components within the Viqueque project area, would improve significantly the life of the Viqueque Municipal Capital dwellers, classifying the project as a

Category B for environmental impact because the potential adverse environmental effects are site-specific, few (if any) were irreversible, and technical design and mitigation measures could be designed to address them.

Given the content of the information in the ADB commissioned IEE (ADB, 2015), this Project Document intends to propose a similar pathway and classification of the upcoming environmental study and provide updated information on the overall current legal and technical framework and secondary baseline data for the Viqueque components to, on the one hand, maintain the environmental thoroughness of the previous study and on the other hand verify if there is any change regarding the environmental impact conclusion and adapt and/or update the previous mitigation and management measures proposed to further improve the environmental sustainability of the future rehabilitated Water and Sanitation System in Viqueque Municipal Capital.

1. PROPONENT DETAILS

The Ministry of Public Works (MPW) is responsible for planning and oversight of the Water and Sanitation Sector and is the Proponent for the Viqueque WATSAN Project, supported by the General Directorate for Water and Sanitation (DGAS), responsible for the overall management, implementation and monitoring of the 4MWSSP project, while the SMASA Regional Office in Viqueque will manage day-to-day Viqueque WATSAN project implementation, construction and operation at the municipality level.

The project proponent and representative details/contacts for the Viqueque WATSAN Project are the following:

Proponent
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Mr. Salvador Pires, Minister
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Avenida 20 de Maio, Caicoli, Díli, Timor-Leste

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Proponent Secondary Contact
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National Directorate for Water Services (SMASA)
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Proponent Tertiary Contact
SMASA Viqueque Regional Office
Mr. Marito da Costa, Director
Suco Caraubalu, Viqueque, Viqueque, Timor-Leste
(Telephone: 77009015)

The Ministry of Public Works (MPW), on behalf of the Government of the Democratic Republic of Timor-Leste, contracted the consortium Águas de Portugal Timor-Leste / Engidro to prepare the "*Detailed Engineering Design of Timor-Leste Four Municipal Capitals Water Supply & Sanitation Project of Baucau, Manufahi, Lautem and Viqueque*", financed by the Infrastructure Fund of the Government of Democratic Republic of Timor-Leste. OASIS – Sustainable Projects is the Consultant subcontracted by ADP/Engidro for the environmental assessment and responsible in preparing this Project Document.

The Consultant contact details for the Viqueque WATSAN Project are as follows:

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2. PROJECT LOCATION AND SCALE

2.1 Geographical Location

The 4 MCWSS Viqueque project is located in the urban area of Viqueque Municiapla Capital Administrative post of Viqueque, Viqueque Municipality, Ossu Administrative post in the northern border, Uatulari and Uatucarbau Administrative Posts in the eastern border, Lacluta Administrative post in the west border, and the south bordering with the Timor sea (See Appendix 1). Geographical coordinates of the project site are in the SW

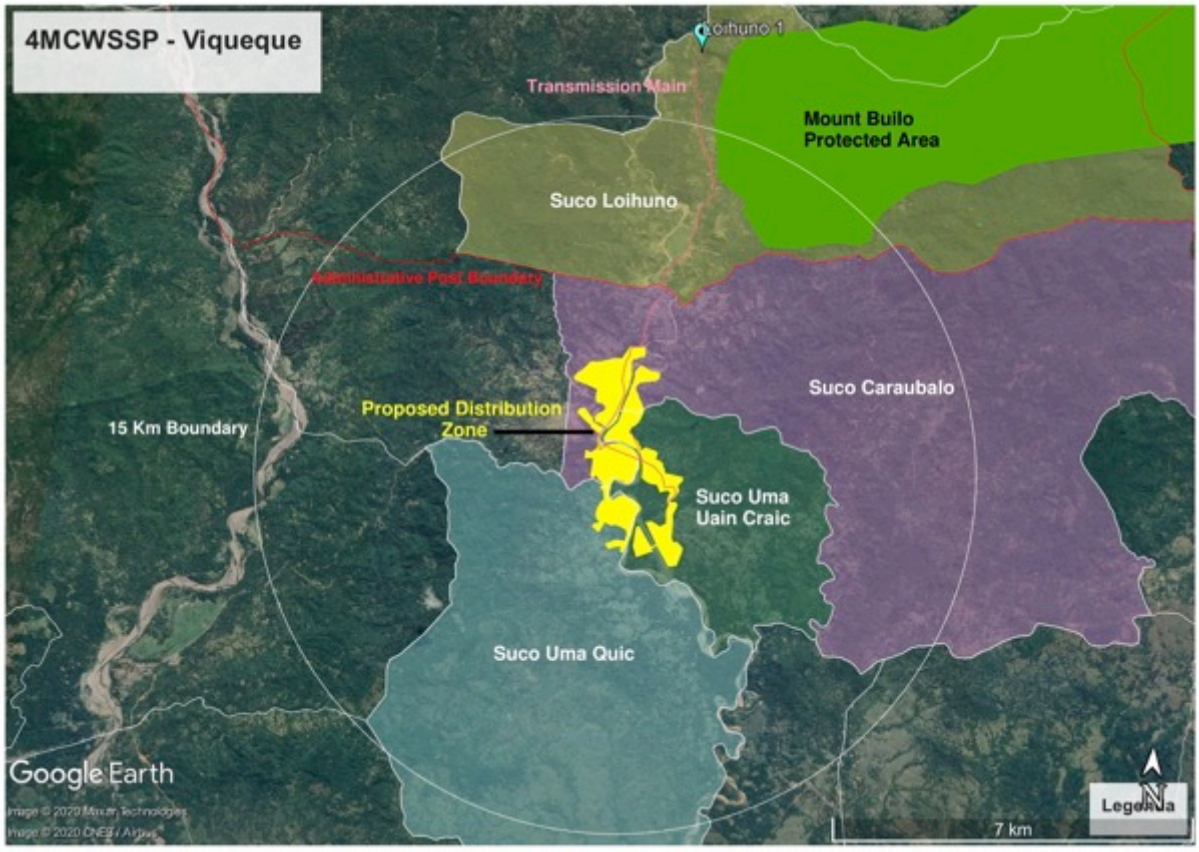
latitude of 8°56'17.94"S and longitude of 126°18'10.48"L and NE latitude of 8°47'53.13"S and longitude of 126°26'5.38"L.

2.2 Area Covered, Scale and Project

The Project scope includes all the areas that will be required to implement the Abstraction, Treatment and Distribution of Water for Human Consumption, as well as provide designs and solutions for Sanitation for Buildings, Schools and Housing within a diameter area of 15 Km around the municipal capital, as clarified by the client in April 2020, taking the Viqueque Water Distribution Zones defined in the Second District Capitals Water Supply Project (ADB, 2016) as the guidelines for the project area and scope.

The 15 km range area encompasses 8 sucos in total, namely Loihuno, Uai Mori, Bahalarauain, Uma Quic, Uma Uain Craic, Maluro, and Caraubalo. Moreover, the Mount Builo Protected Area slightly overlaps the Project Area Boundary but none of the components are within this PA, such as the Loihuno Spring, which is the closest component to this PA (See Figure 1).

Figure 1 - Existing & Proposed Water Distribution System Overlaying 3 Sucos Covered



During the Preliminary Design study, the team designated several location points and areas for the future pilot boreholes, the FSTP and the public toilets to be used for further investigation in the field. The water distribution system and future expansion to new household areas in Viqueque Municipal Capital are decided to serve 3 Sucos, as follows (see Figure 1):

- **Suco Loihunu**: included in Ossu Administrative Post, 2/5 of the Suco lies within the 15 Km project area, where a small part of the Southern area of the Suco includes one of the proposed pilot wells testing sites. While it does not include any of the proposed water distribution system, to the North, outside the 15Km project area it includes the Loihunu I, II and III Spring System, which is adjacent to the Mount Builo

Protected Area (PA), at a distance of 700m from the PA border and the Mount Mundo Perdido Protected Area, 4000m to the Northwest;

- **Suco Caraubalu**: included in the Viqueque Administrative Post, half of the Suco lies within the 15 Km project area, where a small part of the Western area of the Suco includes roughly a1/2 of the proposed Water Supply Network, 2 proposed pilot wells testing sites and 4 of the possible schools for the sanitation component;
- **Suco Uma Uain Craic**: lies totally in the centre of the 15 Km project area, where a small part of the Western area of the Suco includes roughly 1/3 of the proposed Water Supply Network and 1 of the possible schools for the sanitation component;
- **Suco Uma Quic**: 4/5 of the Suco lies within the 15 Km project area, where a small part of the Northeastern area of the Suco includes roughly a 1/6 of the proposed Water Supply Network, and 2 of the possible schools for the sanitation component;

Additionally, the Sanitation Component of Viqueque WATSAN Project area encompasses all households, buildings and schools within the 15Km diameter project area that are served by the proposed Faecal Sludge Treatment Plant (FSTP).

The implementation of the project is associated according to the cycle, which comprises of 4 phases, commencing from the design activity, aiming to meet the project's needs. The subsequent phases are the construction activities of infrastructures, following the operational and maintenances of the facilities, and the decommissioning.

Taking into account that each component is considered in order to elaborate the environmental management plan comprehensively, the project components are all aggregated within the 15 km radius project scope as shown in Figure 1 to be rehabilitated and/or newly constructed as described below:

a) *Water Sources:* Viqueque water supply system for the community comprehends one spring in which composed of three potential sources identified:

   i) the Loihunu I springs is located in close proximity to one another but at approximately 10 km northward from the Uluk Leu Rua Tank, they supply water to the urban area of Viqueque;

   ii) the Loihunu II springs is on the foothill of Mount Builo, a declared protected area under the Decree Law 5/2016;

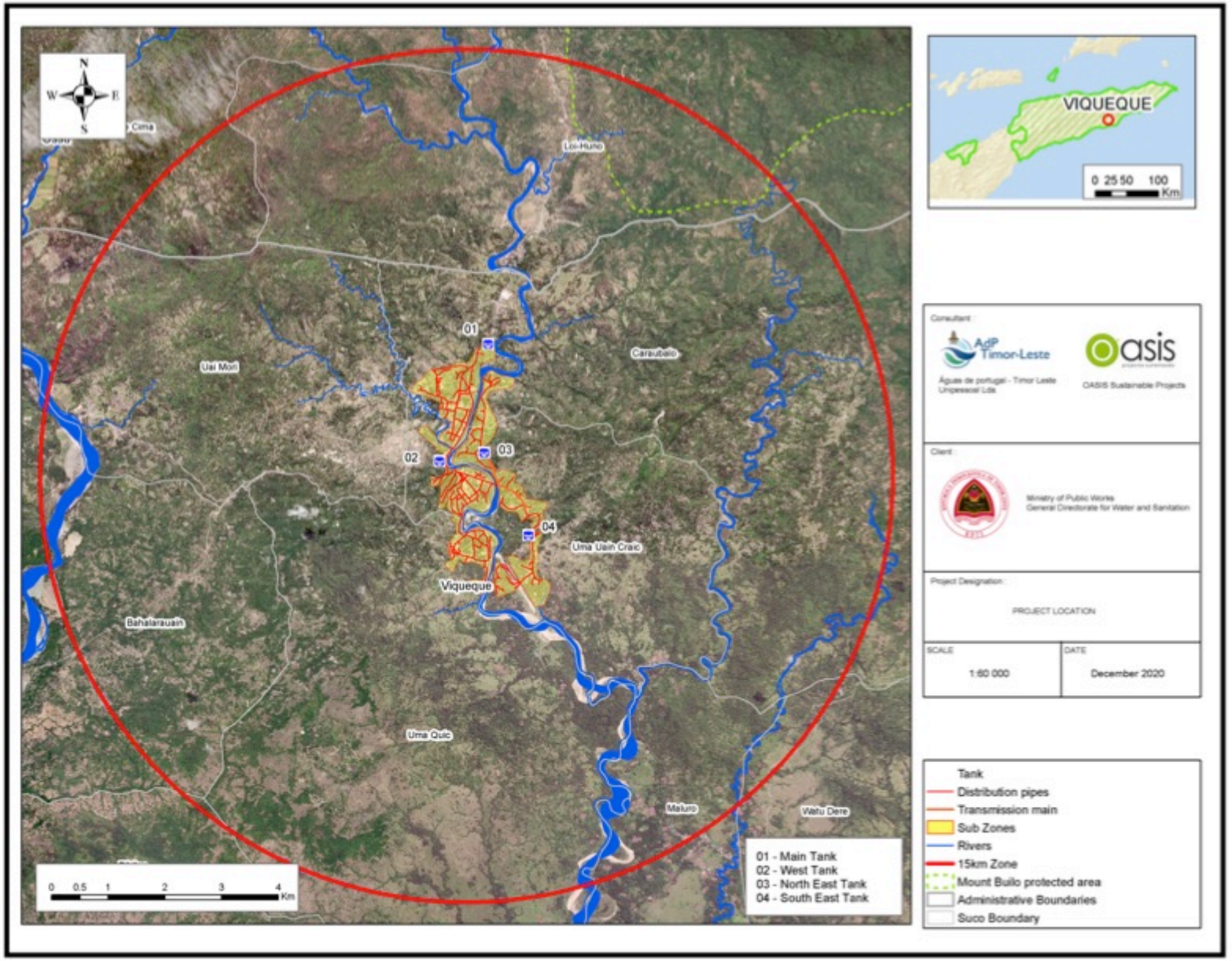
   iii) the Loihunu III springs is further upstream of Loihunu River where the water comes from Mundo Perdido (also a declared protected area in Timor-Leste under Decree Law 5/2015).

b) Several New Boreholes as additional sources complementing the existing springs and to be included in the system. Prospection areas were studied and selected for bore testing.

c) *Water Distribution Zones:* The main spring systems (Loi-Huno Spring) supply storage reservoirs and these subsequently supply to 4 distribution zones through transmission and distribution alignments with gravitational system.

d) *Sanitation sector:* 4 public toilets pilot tests in selected schools located within the 15 km project area and a new Faecal Sludge Treatment Plant (FSTP) to be implemented in Suco Maluru, at the end of Zone 1, in a distance of 450m from community settlements and 350 from the river. This proposed site is a flat area located on abandoned land with state-owned land status, according to SMASA - Viqueque.

Figure 2 - Project Location Viqueque Municipality



2.3 Material Source and Project Cost

This project will need raw materials for the implementation of construction activities such as sands, rocks and other necessary aggregated materials sourced from existing legitimate suppliers and designated quarry to be extracted nearby the project area. Before proceeding on the material extraction in the selected quarry, it is important to make sure that the activity is licensed, which will be prepared according to the procedure required. Although, trenching activity will preferably be chosen to do backfilling of the excavated soil, in order to minimize mobilization and reduce excessive extraction on the quarry, the cement is imported and the production of the concrete is done at projection sites.

The preliminary cost of the 4MCWSSP for Viqueque Municipality is estimated at USD$13,004,542 for proposed water supply and sanitation expenses, which is presented in the following table below:

Table 1 - Preliminary Cost Estimate for 4MCWSSP Viqueque Municipality

Water Supply System	**USD ($)**
Water sources and raw transmission mains	3,004,434
Water treatment plant	1,984,320
Water tanks and pumping stations	2,445,720
Transmission mains	982,950
Distribution network	3,777,718
Sanitation	**USD ($)**
Faecal Sludge Treatment Plant	603,960
Construction of 4 public toilets	205,440

3. DISTRICT AND VILLAGES

The 4MCWSS Viqueque Municipality project will cover 3 Sucos namely **Suco Caraubalu** (7 aldeias: Aldeia Cabira oan, Has Abut, Lamaclaran, Mamulac, Manehat, Siralari and Wessa), **Suco Uma Uain Craic** (3 aldeias: Aldeia Bosabein, Fatuhadan and Naeboruc), **Suco Uma Quic** (6 aldeias: Aldeia Aina Uain, Bahafou, Lua, Macadean, Maroman, and Raihun) and **Suco Maluro** (FSTP location)

However, there are some sucos that are included in or overlap a bit with the 15 Km project limit, which are **Suco Ossu de Cima, Uai Mori, Bahalarauain** and **Uato dere,** but no project component or activity is planned to occur within them**.**

4. PLANS AND TECHNICAL DESIGN OF THE PROJECT

4.1 Project Description

4.1.1 General Description

The aim of this project, in general, is to evaluate, assess and provide Detailed Engineering Designs for the following:

1) Rehabilitation of the Potable Water Distribution Network to consumers within the defined Water Zones;
2) Evaluate Existing and new sources for possible supply of the Water Distribution System;
3) Evaluate the condition and scale of the Sanitation situation in the Project Area and design wastewater treatment infrastructure for 4 Public toilets within the project's 15km diameter area;
4) Evaluate and Design a stand-alone Faecal Sludge Treatment Plant (FSTP) to receive the collection and treatment of septic tank sludge effluent from all households, buildings and schools within the 15 Km project range.

It is expected that by the end of the project, safe and reliable water supply will be provided to the municipal town (sucos and aldeias), and all households will have improved hygienic toilets as well as toilets available in public places. The improved water supply and sanitation facilities in the pilot schools will provide children with safe and

reliable water supply and toilets operated by competent operators in each pilot school, providing a template in other schools to improve water supply and toilets.

Finally, the wastewater produced by each household, in the form of septic tank sludge, will be safely transported and disposed of in purpose-built treatment facilities with the sludge transport and treatment facility operation contracted to a competent operator.

4.1.2 Water Supply System

A. Water Sources

The Viqueque municipality is located in the southeastern part of Timor-Leste, where it is composed by the Fractured Limestone of Mount Perdidu (declared a protected area under Decree-Law 5/2016) and Suco Loihuno where the base is sandy-shale and clay. The Loihuno Spring is associated to the existing fractures in this formation, and it consists of three main springs namely Loihuno 1, 2 and 3 although the community is also prevalent with different names for each spring.

Loihuno 1 spring: this spring is commonly known by the community as Buibau spring, according to information received from Uatolana Aldeia Chief (10th October 2020). Loihuno 1 is located in Aldeia Uatolana, Suco Ossorua and is used for public supply, which includes four private outlets (1/2" pipe and natural outlet). This spring has an approximate yield of 48 L/s (as per flow measurement survey on the 26th October 2020). During dry season the water is reported to have very low flow causing difficulty towards the inlet structure to allow water to enter the distribution system. Loihunu 1 spring is surrounded by 23 households (around 200 people) and only 8 houses that have an attempted cement but permeable septic tank. 15 households have hole-in-the-ground WC and animal husbandry activity is regularly found nearby the spring, which has led to contamination of the spring overflow and the next spring water source downstream.

Loihuno 2 spring: or Moloco spring is located 20 meters from Loihuno 1 and is on the foothill of Mount Builo, also a declared protected area under the Decree Law 5/2016. This spring has a considerable flow exclusively used for private users (14 users with rudimentary tubes between 1 and 3"). Loihuno 1 and 2 springs are located in proximity to one another but at approximately 10 km northward from the Uluk Leu Rua Tank.

Given the number of users of this spring, its use for public supply will be a source of conflicts, being preferable that the spring Loi-Huno 1 is exclusively for public use and Loi-Huno 2 for small private consumers as it is today. The combination of Moloco and Buibau spring is called Builau spring (Loihuno Suco Chief, 10th October 2020).

Loihuno 3 spring: The third spring is known as Loihuno 3 spring and the water comes directly from Mundo Perdido and only serves the community, mainly aquaculture activity such as fish farming. The water monitoring exercise shows an approximate flow of 20 L/s (26th October 2020) but it will be diverted for agriculture purposes only.

Figure 3 Loihuno 1 Spring and its Existing Infrastructure

Loihuno 1 known as Buibau spring

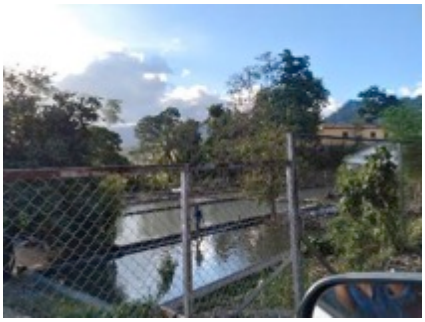
Transmission Main & other Private Tubes

Animal Husbandry and Dwellings Nearby Loihuno 1 Spring

Figure 4 Loihuno 2 Spring Water Abstraction System

Figure 5 Loihuno 3 Spring and Downstream Water Usage

Origin of Loihuno 3



Fish Farms Governed by the Municipality

Private Fish Farm

B. Distribution System

The Loi-Huno spring is the current water source for Viqueque Municipal Capital, which supplies separate reservoirs and subsequent transmission and distribution alignments with gravitational system into the Municipal

Capital's water distribution zones. The transmission main from Loihuno to the Main Reservoir has been built since Timor-Leste's independence and both it and the remaining transmission mains have inumerous leaks and illegal connections as observed during field visit. The other 3 existing water tanks are also in poor condition with lack of maintenance and very small capacity to store water. The team has come to the conclusion that, to safeguard water quality and public health, the whole existing network will be replaced by new infrastructure.

The distribution system includes old Portuguese pipes particularly in the old town area, as well as significant lengths of mains from the period of the Indonesia administration, and newer mains installed since independence. There are numerous duplicate mains. The distribution system requires rationalization and simplification as well as decommissioning and removal of all Portuguese era mains. Extensive use of 50 mm diameter during the emergency periods also requires replacement (except where installed as rider mains). Most importantly the distribution system needs to be redesigned to suit the revised zoning arrangements.

Figure 6 Example of Distribution Areas and existing installation

Suco Caraubalo (Zone 2.1) Example of Pre-existing alignments to be rehabilitated along existing roads

Suco Uma Ki'ik (Zone 1.2) alignment for rehabilitation

Suco Uma Uain Kraik (Zone 4) Airport area - alignment for rehabilitation

C. Gaps in Water Supply

Water Balance: Demand vs supply.

The water supplied to consumers throughout the years was proven to be insufficient due to higher demand and the infrastructures for water abstraction and delivery not being upgraded for a very long-time, hindering optimal operation and distribution, as well as the limited number of natural water sources available.

The Preliminary Design followed a dimensioning process that reviewed 2 different scenarios, namely Scenario A in adherence to 2016 Masterplan (equivalent to current distribution capacity and customers). However, the project should be able to provide reliable water sources sufficient for the expected expansion requirements for Viqueque Municipal Capital. Therefore, a Scenario B was chosen as the project horizon, as it includes expansion areas and user numbers for the next 20 years, up to 2040.

To clear the uncertainty of the production yield of the sources, a hydrogeological study was conducted in October 2020 (in equivalent conditions to the end of the Dry Season) to determine the available yield of proposed boreholes and existing springs through bore testing and v-notch installation. Table 2 – Water Demands versus Origins Availability presents the water demand versus water flow estimation.

Bore testing was carried out at all 4 proposed prospection points between 27th July and 12th September 2020. However, the test were not successful and it was concluded that groundwater is unavailable in the project area. Therefore, the team has decided to select Kuha River as final option for complementing the system with water for Viqueque. A Water Treatment Plant is to be constructed to support treatment from the water abstraction in the Kuha river, given the turbidity has been tested as very high with possible contamination.

Table 2 – Water Demands versus Origins Availability

Demands	**L/s**	**m³/day**							
2020 Scenario B	28.6	2,471.04							
2030 Scenario B	39.3	3,395.52							
2040 Scenario B	54.2	4,682.88							
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	5.0 to 50.0	432 to 4,320	5.0 to 50.0	432 to 4,320	-	-	-	-	0
Loihuno 3	20.0	1,728	-	-	-	-	20.0	1,728	100
Kuha River	50.0 to 0.0	4,320 to 0.0	50.0 to 0.0	4,320 to 0.0	-	-	-	-	N/A
Total	**75.0 to 120.0**	**6,480 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							

Figure 7 - Borehole Testing in 4 Designated Prospection Points

Bh#1 Aldeia Mamulac

Bh#2 Aldeia Cabira Oan

Bh#3 Aldeia Has Abut

Bh#4 Aldeia Fatuhadan

These preliminary results show that Loihunu 1 and Kuha River Intake are estimated to have more than enough water flow to supply the current and future demands Viqueque Municipal Capital, estimated at close to 2 times the 2040 water demand to cover all the proposed households within the supply zones.

These preliminary results also take into account the social and ecological needs flow for the spring sources, including agriculture and aquaculture activities identified during the IEE characterisation. The Ecological flow considered provides for the variability of rain and flow between dry and wet season and has been determined, at a minimum, of 30% average monthly flow for Wet Season and 10% for Dry Season. The water sharing for Loihunu sources has been assumed to be divided by source, which lowers the importance and/or need to establish the ecological/social flow, as Loihunu 1 will continue to be a dedicated source for the Distribution system and Loihunu 3 will serve both the social and the ecological needs of the surrounding area.

Figure 8 - Kuha River Southeast Ward View

4.1.3 Sanitation System

Based on the 2016 Master plan, the National 2030 target for household sanitation is 100% access to hygienic toilets and improved hygiene behaviour, consistent with the Government Resolution No. 8/2012 - Sanitation policy. However, major deficiencies of current public toilets in Viqueque are: lack of cleanliness; insufficient water

supply; poor construction standards and inadequate lighting. School Sanitation is also not "User friendly" (where none of the toilets cater for special infrastructural requirement of children, physically handicapped persons or menstruating girls), and there is inadequacy of funds for operation and maintenance.

In addition, according to the Master plan, only 15% households in Viqueque practice open defecation and 44% of the households already have their own hygienic private toilet, which means the community is starting to have initiative movement on improving the quality of living standard. 35% coming from private and shared toilets have poor and unhygienic condition. Those that do not practice open defecation are contributing with septage, either through their own toilets or shared toilets. These are presumed to have leaching pits functioning as septic tanks for all practical purposes. Hence all these sanitation facilities are producing digested sludge, which needs to be removed once every two years.

4.2 Proposed Project Scenarios

4.2.1 Water Supply System

A. Water Sources

Previous to this study, SMASA-Viqueque has carried out numerous borehole drilling attempts to try and reinforce the current system, although none of the activities produced satisfying results i.e. available water. More recently, the water-drilling test under this study had the same results and verified that water dried out after drilling up to the maximum depth, which has led the team to agree on a single scenario that achieves the water production necessary to meet 2040 demands.

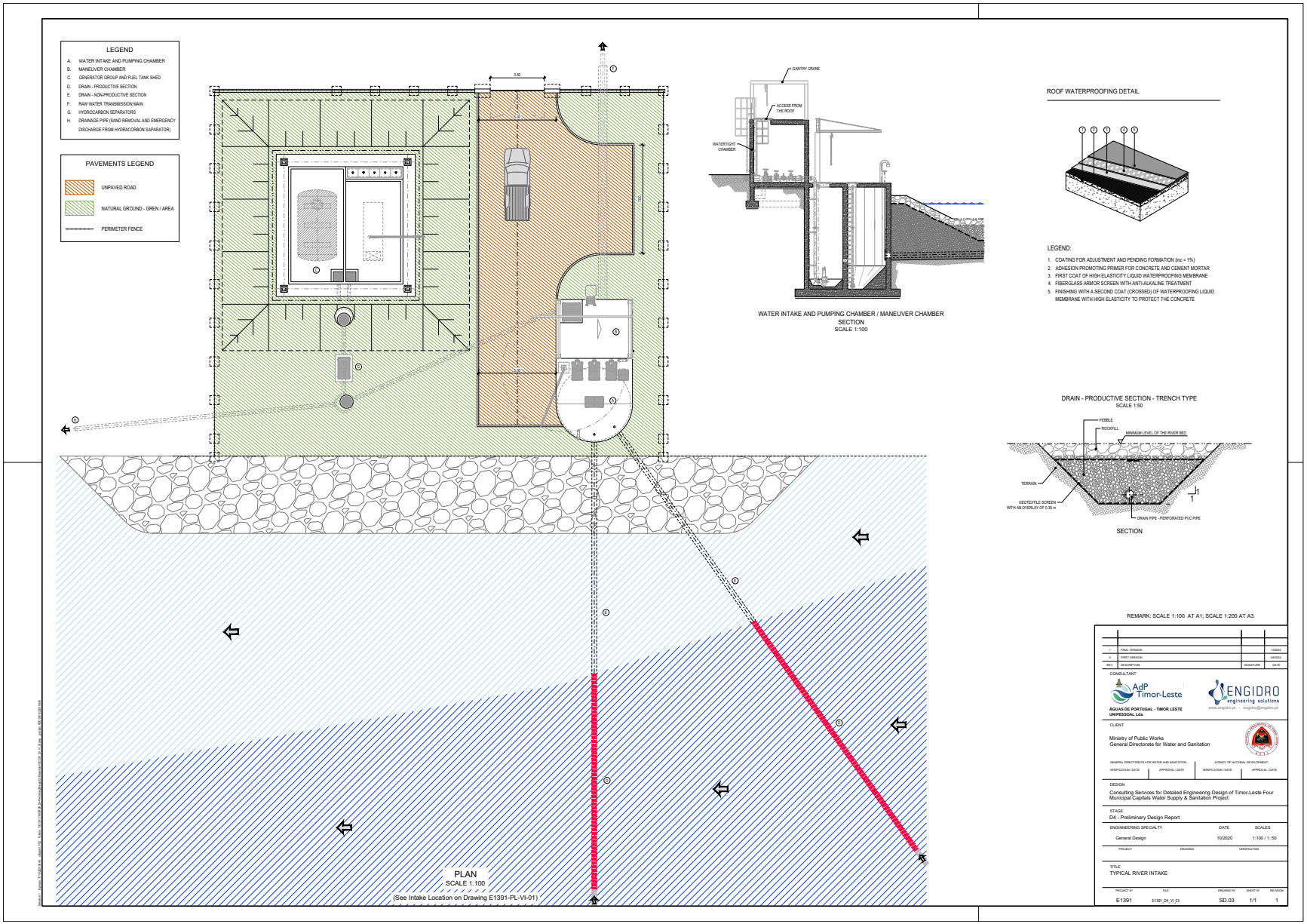
Table 3 - Preliminary Assumption for Water Scenario

Viqueque	Only Scenario	Proposed Water Sources	Loihuno springs and new river intake at north of the city
		Possible reinforce	Not available

Water abstraction from the Cuha river is going to be considered, made by a well located on the riverbank, or by one or more intake pipe screens in the riverbed (see). The intake pipes, screened along their entire length, are installed in a previously trenched excavation filled with medium to coarse gravel pebbles. If required, gabions may be installed to protect the pipes during the occurrence of large water flows.

This system will conduct and dump the water into a well. The well will be placed underground and built with reinforced concrete, composed by two compartments. The first well compartment (reception well) will carry the function of allowing sedimentation of the heavier particles that did not get retained before in the upstream. In this well, an electropump group for sand removal will be installed. Contiguous to the reception well compartment, another well will be installed with the objective to pump water to the water treatment plant. Adding to this, submersible pumps suitable for "waste waters" are going be installed.

Table 4 Kuha River Proposed Intake Infrastructure



B. Water Storage, Treatment and Conveyance

Due to the Kuha river that having high turbidity level and faecal contaminated due to animal livestock activities in its embankments and also in the water bodies i.e. buffalos, crocodiles, etc, the applicable treatment will include a WTP with the following treatment line: coagulation, flocculation, sedimentation, filtration and disinfection with chlorine. The WTP is expected to be located next to the road and at the city limits (Figure 10 and Figure 10).

Figure 9 - Loihuno Transmission Main. Pressure Break Tanks

A 7500 m long gravity transmission main will be built from Loihuno to the WTP. Given the elevation gap, from 320 m at Loihuno spring to 75 m at WTP, the transmission main will be equipped with two pressure break tanks to limit the maximum pressure value to 10 bar.

The water treated at WTP will be pumped through a 475m long transmission main and stored at the Main Tank. From the Main Tank (105m elevation), starts a gravity transmission main that, along its 5200m total length, will supply the West Tank, the Northeast Tank and the Southeast Tank, all three at 90m elevation.

According to the proposed design, the storage will be equivalent to 13 hours of MDP (Maximum Day Production), which includes the diurnal fluctuation and the emergency storage. These aim on reducing water losses and guaranteeing the reliable operation of the different supply zones. Therefore, water tower will be needed in the distribution centre. A minimum of two chamber storages will also be considered in each tank, so that water supply won't be interrupted during maintenance works. Overall, the 4 existing tanks will be upgraded for their capacity and infrastructure with another tank as an additional.

Table 5 - Water Tanks Capacity to be increased

City	Tank	MDP* (m^3/d)			Storage Needed (m^3)		Proposed Storage (m^3)
Viqueque	Main Tank	393	531	721	531	721	800
	West Tank	486	639	849	639	849	900
	North East Tank	278	398	563	398	563	600
	South East Tank	121	190	288	190	288	300
	Raw Water Tank (2)	-	-	-	-	-	700
	Total	1,277	1,759	2,422	1,759	2,422	3,300

Figure 10 - Proposed Water Intake & WTP Viqueque

C. Rehabilitation of the Transmission and Distribution Mains

The type of construction for transmission lines and distribution networks has to follow the design criteria, starting from the material selection, design type of trench and the operational system.

Material Selection: The following criteria regarding material selection is proposed:

Transmission Lines (HPDE and Ductile Iron):

- Transmission lines with nominal pressure below 16 bar and nominal diameters below 315 mm – use of HPDE;
- Transmission lines with nominal diameters equal or above 300 mm - use of ductile iron;
- All transmission lines with nominal pressure equal or above 16 bar (regardless of the diameter) – use of ductile iron.

Distribution Network (HPDE):

- Distribution network & house service connection – use of HDPE.
- Laying of Transmission Mains and Distribution Network

It was assumed that pipes will be implanted underground, laid along and within the road Right of Way (RoW) or outside the RoW for the purpose of replacing/rehabilitating existing pipes. Inside the city area, transmission mains will be laid below the distribution network level, as represented in Figure 11, in order to allow the construction of the service connections on each side of the roads without interference with transmission mains and, also, to become more difficult to do illegal connections. Typical trench details are presented in Figure 12.

Figure 11 - Laying of Transmission & Distribution Line Along a Road. Typical Cross Sections

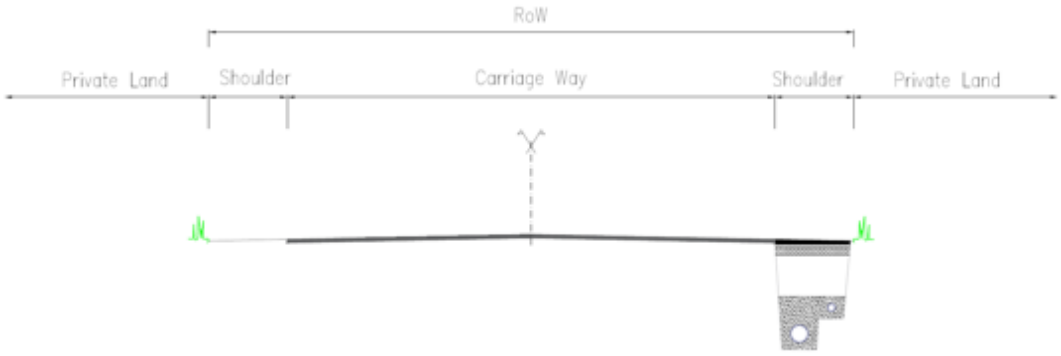
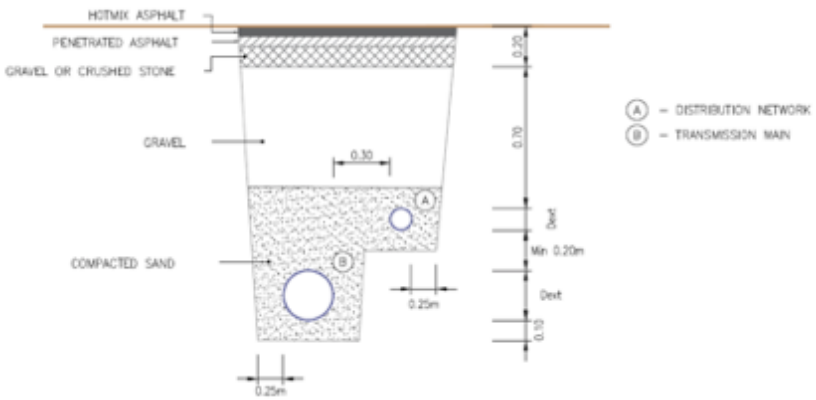


Figure 12 - Typical Double Trench



Transmission Mains Service

The distribution networks will be connected from water tanks. Even in situations where this option implies new network extension, the resulting benefits are significant since the operation of the systems will be facilitated and, therefore the transmission lines system will not be vulnerable to any ruptures in the distribution network.

Gravity Transmission Mains Operation

To ensure a balanced water supply to the water tanks, when a transmission main supplies more than one water tank, the connection to the tanks will be equipped with automatic control valves, which allows the flow control and will avoid the occurrence of random feeds depending on the value on piezometric head value in the pipe connection on each reservoir.

Distribution Network Pressure Zones

In each distribution zone, the pressure in the network can vary between 10 m - 60 m. When a water tank supplies a distribution network that has more than one pressure zone, the pressure zones will be set by Break Pressure Tanks (BPTs) or by Pressure Reducing Valves (PRVs).

Advantages of BPTs vs PRVs:

- Less maintenance BPTs have a higher turn down ratio than pressure reducing valves
- Even if the BPT fails, the downstream pipeline will never be exposed to excessive pressures
- A BPT has fewer components than a conventional pressure reducing installation
- PRVs will leak and need maintenance at some stage. PRVs requires more skills.

Disadvantages:

- BPTs are expensive and bulky.
- The level and flow control mechanisms are vulnerable to tampering and damages.
- Pressure is reduced all the way down to atmospheric pressure. This makes supplying areas immediately downstream at sufficient pressure difficult, which will imply the duplication of primary distribution mains since it will be necessary to install the BPT at a level that guarantees the minimum pressure value in the downstream distribution network.

4.2.2 Sanitation System

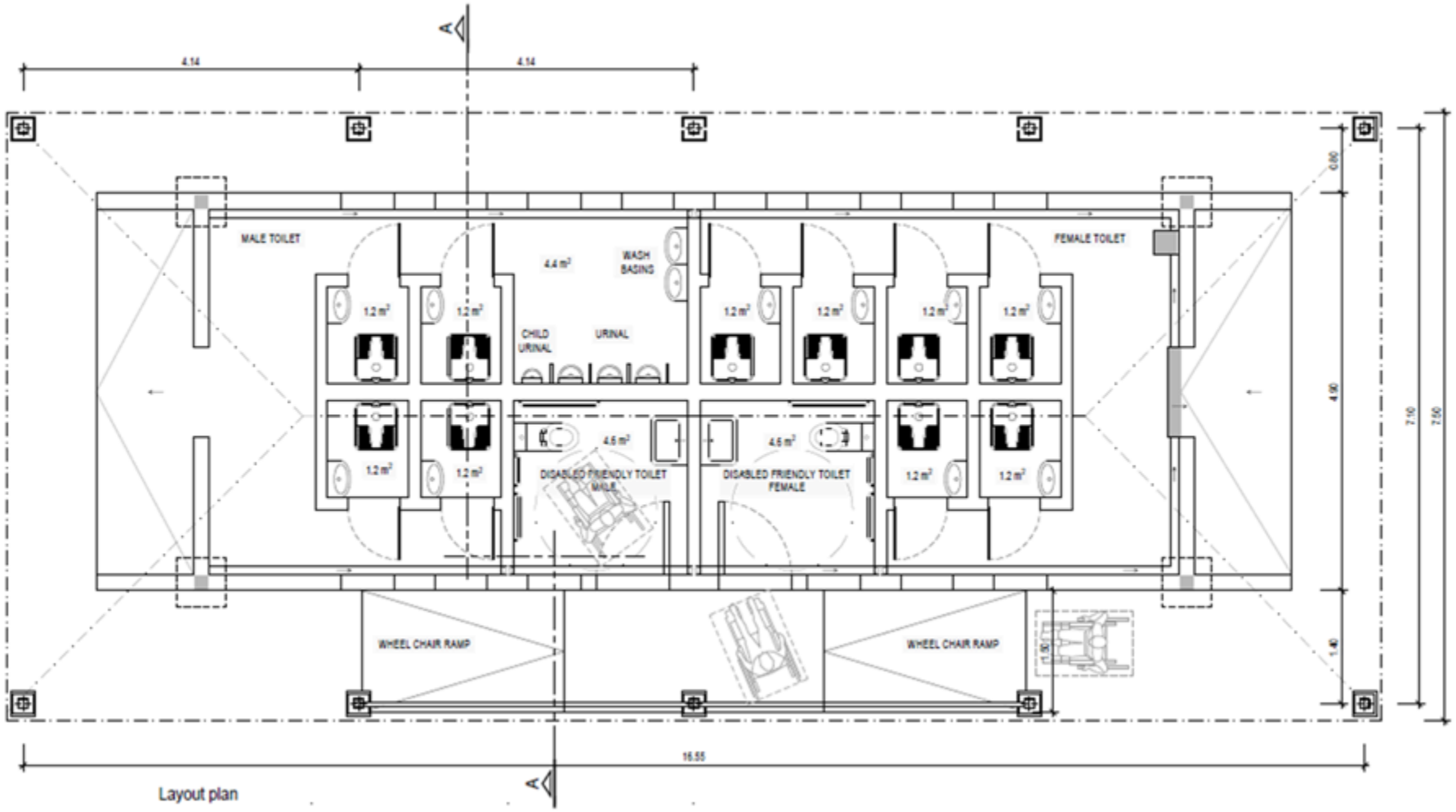
The proposed sanitation treatment sector is composed of 4 pilot test sites for public toilets (with septic tank and effluent soak pit system) and the construction of the Faecal Sludge Treatment Plant (FSTP) to receive the septage from these pilots, as well as all buildings and households located within 15 km of the Viqueque Municipal capital. According to the Master plan, it is inferred that National 2030 target for household sanitation is 100% access to hygienic toilets and improved hygiene behaviour as in consistent with the Government Resolution No. 8/2012 regarding to the Sanitation policy. The public toilets' pilot test locations will be chosen per the location and conditions of current sanitation infrastructure, users, as well as and specifically regarding schools, on the number of students, teachers and other school personnel, as well as the state of the toilet facilities.

A. Public Toilets

The proposed specifications for the Public Toilets are based on the information below:

1. Male Toilets:
   - Adult: 3 urinal stalls
   - Adult & Children: 3 latrines (each with 1.2 m^2[approx.]);
   - Children: 1 small urinal
2. Female Toilets:
   - Adults & Children: 5 latrines (each with 1.2 m^2[approx.]);
   - Facilities for menstruating girls.
3. Physically disabled Toilets:
   - Adults & Children: A common latrine for physically disabled person shall be provided at the centre of men's and women's section. Area of latrine with a ramp etc. for a handicapped person=3.70 m^2 [approx.]

Figure 13 - Public Toilet Layout



Layout plan

The treatment of the public toilet septage is being proposed in a two-step process, as described below:

1. Primary Treatment - Septic Tank: shall have minimum width of 750 mm, minimum depth of one metre below water level and a minimum liquid capacity of 1 000 litres. Inlet: The pipe shall be fixed inside the tank, with top limb rising above scum level and the bottom limb extending about 300 mm below the top water level. Outlet – It would be fixed like inlet but shall be 50 mm below the invert of the inlet pipe.
2. Secondary Treatment - Soak Pit or Dispersion trench or Subsurface absorption system

These infrastructures will be carefully selected and designed according to the available areas, local conditions and receiving environment, based on the number of expected users and adapted to the specific local characteristics where the public toilets will be implemented.

Figure 14 - Septic Tank up to 50 Persons Capacity

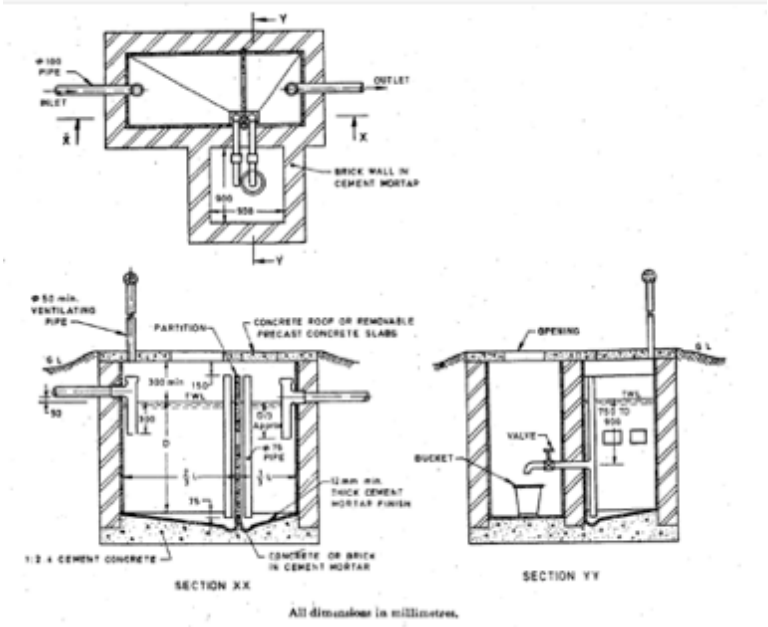
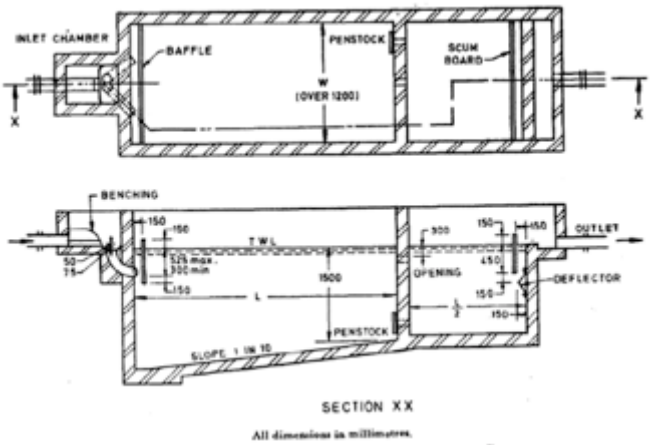
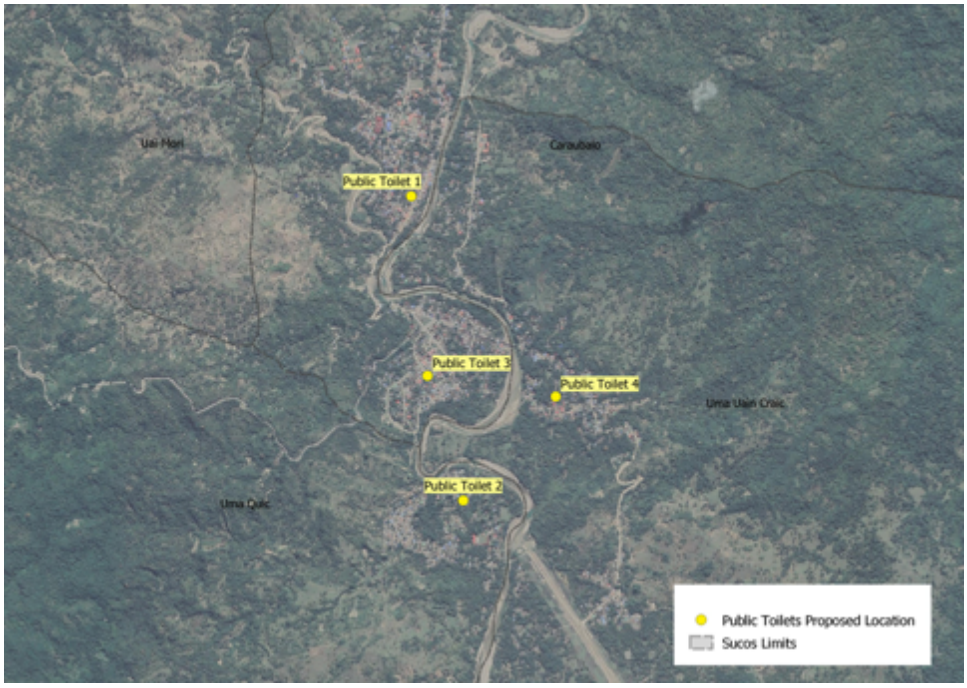


Figure 15 - Septic Tank for up to 200 Persons



The locations for future public toilets have been designated considering the magnitude of the benefits towards the community. Thus, the pilots are selected in places that have moderate to high mobility in which the beneficiaries are often conglomerated e.g. markets, terminals and other public spaces.

Figure 16 - Pubic Toilets Proposed Location – Viqueque



Source: AdP Timor-Leste/ Engidro

Figure 17 - Aerial Imageries of Public Toilets Proposed locations

VI PTF Op 1 - BNCTL and BNU, Suco Caraubalo, Aldeia Mamula

VI PTF Op 3 - St. Cristovao Football Field, Suco Caraubalo

VI PTF Op 2 - Sede Suco Uma Quic, Suco Uma Quic

VI PTF Op 4 - New Market, Suco Caraubalo, Aldeia Wessa

B. Faecal Sludge Treatment Plant

The FSTP was designed considering the future users of the sanitation system up to 2040, namely public buildings, households and schools. The FSTP will be supplied with septage collected by vacuum trucks from domestic and non-domestic sources and the estimated daily volume collected in Viqueque can be viewed in Table 6

Table 6 - Septage Volume projection for Urban Area of Viqueque

Viqueque	2020	2030	2040
No. of Households-[6.05 avg HH size] -DED	2130	2932	4038
Septic tank coverage assumption	62%	74.7%	90%
No. of septic tanks	1,320	2,190	3,633
Total sludge produced (m^3/year)	329	548	876
Total sludge produced (m^3/d)	0.9	1.5	2.4

To define the FSTP ideal/possible location, the following requirements were taken into account:

- Proposed location of FSTP shall be available within 15 km distance
- Easy road access
- The land should be relatively flat to facilitate the construction of lagoons without excessive earthworks
- The lagoons will be constructed using earthen embankments. Site is assumed to be on soil.

The proposed FSTP will be best placed in Suco Maluro, southern part of Viqueque Municipal Capital. The designated area was recommended by SMASA-Viqueque, it is approximately 4 kilometers away from the urban area and is the only routing for septage delivery. Current road is being rehabilitated and will guarantee the trucks to reach the FSTP without obstruction or foreseeable delays.

Figure 18 - FSTP Viqueque proposed Installation and segments

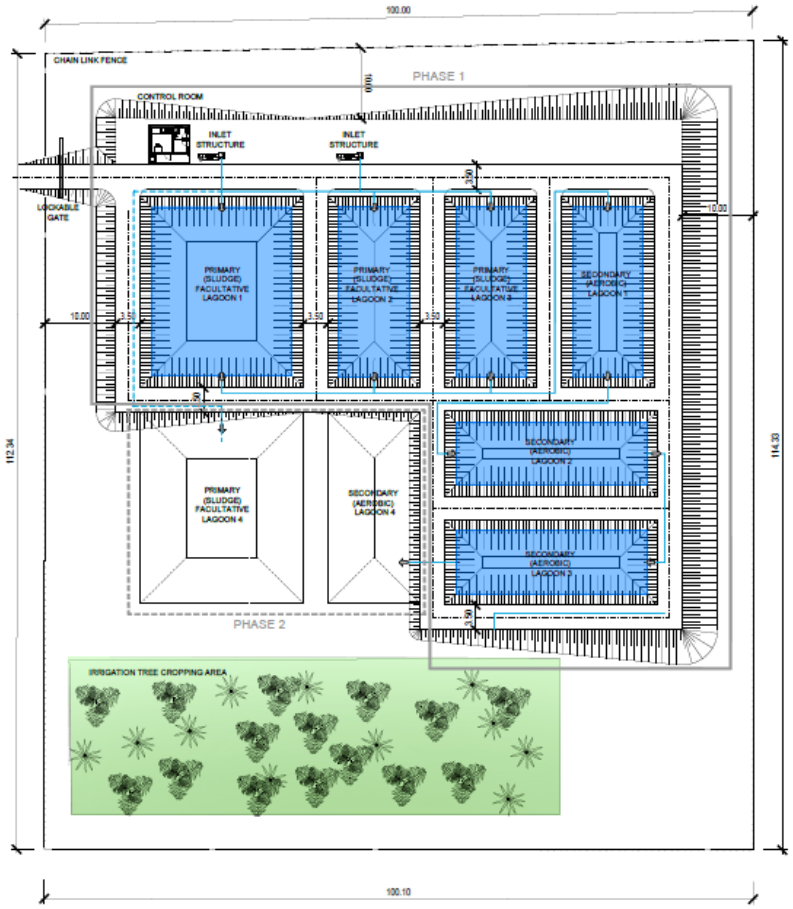


Figure 19 – Selected Location for FSTP and Characteristics of the Area

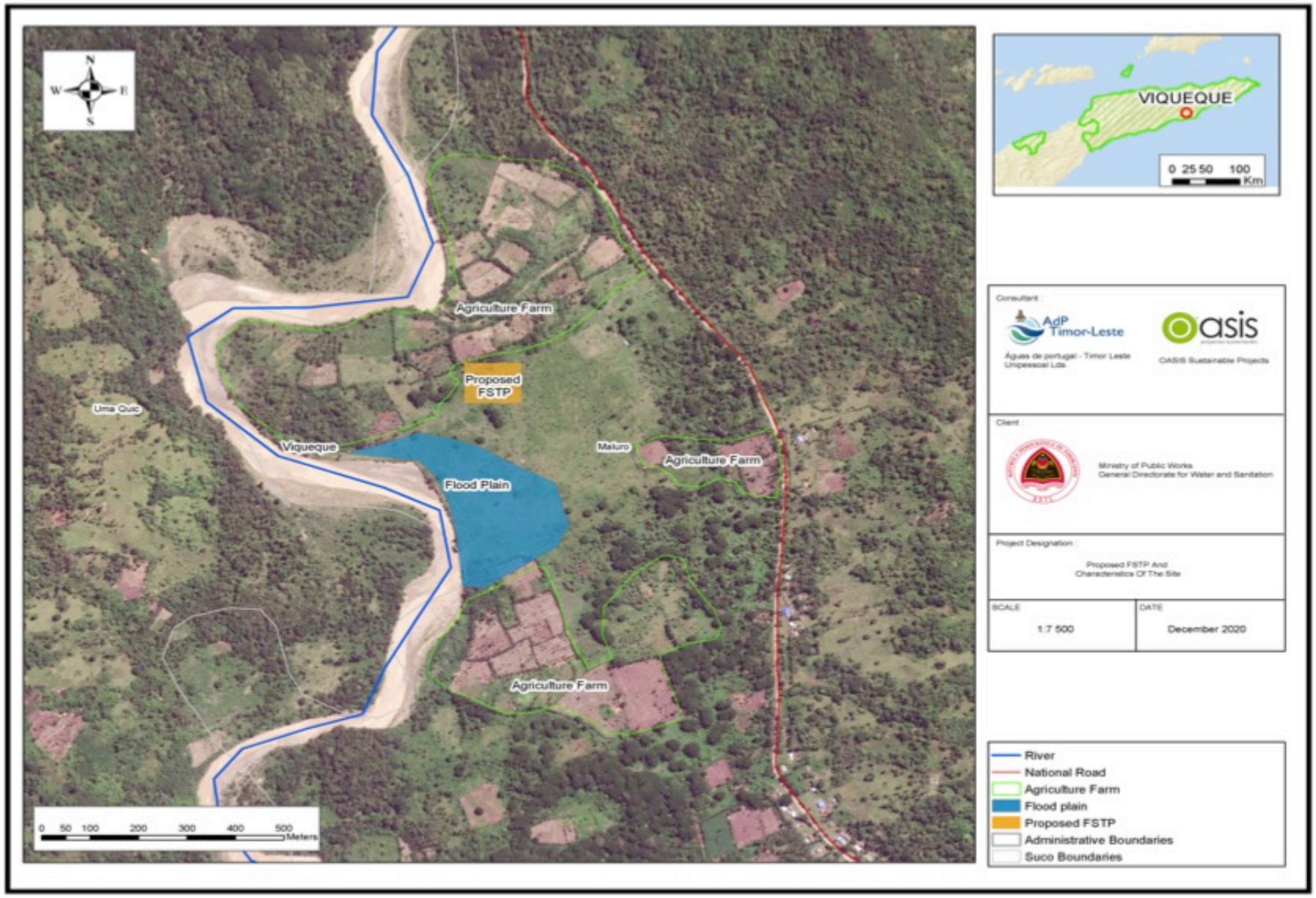


Table 7 – FSTP Possible Locations and Description

FSTP	Coordinates	Actual Area Available (m2)	Distance from (m)		Site elevation above MSL (m)	Description / Location Characteristics	Comments	
			Habitation	Water Body				
1	Lat: -8.913561° Long: 126.393317°	10000	450	350	21	Location characteristics: Recommended by SMASA-Viqueque Located on abandoned land with state-owned land status Flat area Distance from the road about 280 meters 450 meters from community settlements and 350 m from the river	Recommended	
2	Lat: -8.889219° Long: 126.379329°	8000	140	100	22 - 25	Location characteristics: Located above a community garden, a flat area, distance from the road about 700 meters, 120 meters from community settlements and 80 meters from the river In Lulik/sacred Area	Not recommended	
3	Lat: -8.891005° Long: 126.384807°	64000	Far from Habitation	250	54	Location characteristics: located on abandoned land with unclear land status, slope area, distance from the highway about 420 meters far from community settlements and 250 meters from the river In Lulik/sacred Area	Not recommended	

5. FEASIBILITY STUDY OF THE PROJECT

This Project Document's primary source of information for this study were (but not limited to):

- Master Plan for the Second (2nd) District Capitals Water Supply Project (46160-001) TA-8064 TIM in the four Districts Baucau, Lospalos, Viqueque and Same, carried out in 2016, by the consultancy firm Aurecon;
- Baucau, Lospalos, Viqueque and Same Initial Environment Examination (IEE) and Environmental Management Plan (EMP), carried out in 2016, under Grant no. 8064-TIM from the Asian Development Bank (ADB);
- Ongoing 4 MCWSS (The Four Municipal Capitals Water Supply & Sanitation Project) IEE for Same Municipality.

A preliminary, non-in-depth feasibility study has been conducted regarding geological, hydrogeological, topography and Water study (see Table 8). The aim of the study is to understand the Karst System in order to define water sources, water flow capacity, geospatialize the project area and to ensure the quality of the water is suitable for human consumption.

Table 8 - Summary and Timetable of Feasibility Studies Conducted

Study	Date	Description Activities
1. Geological Study	TBC	Identify the local geology and geomorphology for Viqueque Municipal Project Area as well as its geotechnical implications for the engineering design. Given that site investigation works haven' t yet started, very little information is available, essentially concerning bibliographical data coming from diverse sources, namely *Instituto do Petróleo e Geologia*, Private investigation works and scientific papers.
2. Hydrogeological Study	26th October 2020 (V-notch installation) 27th July – 17th September 2020 (Bore testing)	V-notch tests were conducted by the research team to the existing springs, in order to estimate the hydraulic properties of aquifers, while the bore testing is to evaluate well performance and identify aquifer boundaries. The test activity includes a field experiment in which a well is pumped at a controlled rate and water-level response is measured in one or more surrounding observation wells and optionally in the pumped well (control well) itself.
3. Topography Survey	- October 2020	The project area was surveyed through classic topography survey and aerial drone survey.
4. Water quality Testing	- May 2014 - December 2019 - January 2021	Water quality testing conducted by Aurecon under the 2015 IEE exercise; Two recent water quality testing from the National Directorate for Sanitation and Water (now SMASA), to register any occurrence of contamination to water for human consumption. Types of considered parameters that were analysed are physical, chemical and Bacteriological test under the WHO Standards. Water quality testing planned for all water sources, campaign to be done in 2021
5. Preliminary Design for the Detailed Engineering Design of Timor-Leste Four Municipal Capitals Ater Supply & Sanitation	March to present, 2020	Definition of solutions to be detailed in the Detail Design, define the locations, layouts and main characteristics of the proposed systems and infrastructures, including the water supply systems and the faecal sludge treatments plants, and review of the demands estimation and a preliminary cost estimate of all

Study	Date	Description Activities
Project – Same Municipal Capital		infrastructures including different scenarios and options.
6. Initial Environmental Examination (IEE) under ADB SPS 2009	March to present, 2020	The environmental assessment was conducted for the Same Municipal Capital water supply and sanitation project, based on (i) the preliminary engineering design, and (ii) most likely environmentally sensitive components. The IEE report itself describes this process, where it (i) provides project information and environmental requirements; (ii) provides baseline physical, ecological, cultural and socioeconomic information surrounding the project's area; (iii) identifies and assesses potential environmental impacts from the project's implementation; (iv) includes recommendations for measures to avoid, mitigate, and compensate adverse impacts; (v) informs on stakeholder consultations and participation activities during project preparation; (vi) provides an environmental management plan; and (vii) presents a grievance redress mechanism for the project.

6. LAND AND WATER USE

6.1 6.1 Land Use

Viqueque has been identified as having similar topographical and biological conditions to Manufahi Municipality (Worley Parsons, 2012). The higher regions of the Northern and Eastern upstream area of Viqueque consists of tropical rainforest, with high species diversity, whilst the lower land area (where the project is located) is a predominantly mix-use setting i.e. urban with some rural activity, transitioning from forested areas with some stands of tropical evergreen to semi evergreen forest to dry forest.

The predominant form of livelihood for households in the project area (Viqueque Administrative Post) is a mix-use setting i.e. urban activity from economic, education, health sector up to religious and a wide range of agricultural activities from animal husbandry (cattle and buffalo) to cropping (corn, maize, rice and others). These agricultural activities have put extreme pressure on the mid to high range forest areas, where the loss in dense forest has been occurring over the years and deforested areas are higher than sparse forest areas (ADB, 2016).

All proposed project activities will be carried out within 15 Km diameter Project Area Boundary around Viqueque Municipal capital and none of the components are found within a sensitive area. Mount Builo, which is defined as a Protected Area, slightly overlaps its boundary within the northwest of the Project Zone Boundary, Loihuno I spring being the closest project component but located outside of the PA, with dwellers and animal livestock activities surrounding the spring. The Loihuno I spring and Mount Builo are also said to be Sacred and cultural ceremonies are usually celebrated every year.

In addition, designation of the location for FSTP construction will also have to consider the land status, in which the government's property would be preferable. This requirement is accounted as part of the mitigation measures, aiming to avoid any sort of disputes in the future between the community, project proponent and selected contractor. Therefore the proposed FSTP site is presumed to be installed in a private land which was recommended by the SMASA-Viqueque.

6.2 Water use

The majority of the population is mostly composed of self-employed farmers (25% of the municipality population), representing 76% of the total employed population in the Municipality, and water has been an important source for securing their activity so as to have a sustainable income. Agriculture is heavily dependent to the amount of rainfall in a given year, followed by harvesting water from the nearest water stream.

Taking in account 15 km diameter of the proposed project, it's possible to identify three potential sources of water supply. These potential sources were Loihunu 1, Loihunu 2, and Loihunu 3 (Permanent Springs), emerging from a limestone aquifer. It is located in close proximity to one another but at approximately 10 km northward from the Uluk Leu Rua Tank (ADB, 2016). Those springs are being used primarily for sanitation purposes, including washing clothes, bathing, and crop watering but not for drinking and cooking given the water are contaminated with Ecoli due to livestock practices. Moreover, it is also being used privately to provide water for the aquaculture activity (i.e. fishponds).

At this moment, SMASA Viqueque provides a water supply service that has not been able to meet the growing demand for water from the consumers. The existing distribution alignments are not quite integrated, the poor condition of the pipelines, and high incidence of illegal connections are part of the main issues why the water system is currently unable to serve the Viqueque population. As such, refurbishing the existing network to repair leaks, increasing capacity and pressure, removing illegal connections, and providing a new system of metering to streamline leak detection within the 15 km diameter of the project, should solve all of these issues.

7. ENVIRONMENTAL IMPACTS

The 4 MCWSSP is expected to have numerous beneficial and negative impacts towards the environment and social aspects due to various project activities. The potential impacts and mitigation measures assessment for Viqueque Municipality are predicted based on each of the project components, namely: 1) water sourcing; 2) treatment and storage; 3) distribution networks; and 4) sanitation sector (public toilets and FSTP), according to the project cycle (Design phase, Construction phase, Operational and Maintenance phase, and Decommissioning phase), as well as the assessment conducted in the 2015 Master plan and the recent IEE exercise.

Most of the potential environmental impacts will occur in the *Construction phase*, particularly during the civil works, but it is expected to have short term duration and be mitigated.

The majority of previously identified environmental impacts (ADB, 2015) have not been concluded as significant and the proposed construction management safeguards and operational regimes defined therein provide a sound basis to address the range of potential environmental impacts identified, actioned through the Project EMP and checked in the environmental monitoring program.

The evaluation of potential impacts, with its nature, time scale and significance, were analysed and are presented in Table 9.

Table 9 Summary of Potential Environmental and Social Impacts of the Project

Phase	Types of Components	Potential Impacts	Nature	Incidence	Time-Scale	Significance
Pre-construction	Water quantity	Insufficient debit due to environment and social flow (illegal connection, agriculture necessity, etc)	Negative	Direct	Medium-term	High
	Socioeconomic	Water conflicts between communities	Negative	Direct	Short-term	High
	Socioeconomic	Social and ecological disruption due to project activities intruding the tara bandu and sacred area components e.g. hydrogeological study and water investigation i.e. bore well testing	Negative	Direct	Short-term	Moderate
	Water quality	Inadequate protection of intake works or wells, leading to pollution of water supply & drying up of the SMASA's boreholes & private wells due to over extraction	Negative	Direct	Medium-term	High
	Occupational health & safety	Health hazard arising from inadequate design and/or handling of facilities for receiving, storing and handling of chlorine and other hazardous chemicals	Negative	Direct	Medium-term	High
	Water quantity	Poor infrastructure and insufficient capacity of water storages can lead to impendence of water delivery	Negative	Direct	Medium-term	High
	Soil & land use	Inadequate designation of buffer zone around FSTP	Negative	Indirect	Medium-term	Moderate
	Soil & land use	Land use change for temporary sites used for contractor's camp site	Negative	Direct	Medium-term	Moderate
	Wastewater	Inadequate design causing increased volume of untreated sullage (wastewater from cooking and washing)	Negative	Direct	Medium-term	High
Construction	Noise	Increase in noise level from construction works	Negative	Direct	Short-term	High
	Air quality	Deterioration in air quality (dust)	Negative	Direct	Short-term	High
	Socioeconomic	Job creation to local community and enhance workers 'skills	Positive	Direct	Medium-term	High
	Socio-cultural	Impairment to the cultural heritage properties due to pipe replacement	Negative	Direct	Short-term	High
	Vehicular access and movement of construction vehicles	Traffic hindrance and amenity value to urban dwellers	Negative	Direct	Short-term	Low

Phase	Types of Components	Potential Impacts	Nature	Incidence	Time-Scale	Significance
	Soil & land use	Vegetation loss	Negative	Direct	Medium-term	Moderate
	Soil & land use	Silt runoffs can cause traffic accident & increasing volume of soil wastes (spoils, spare materials, etc) can lead to possible soil contamination, attract pests and serve as vectors for disease carrying insects, and negative visual impact	Negative	Direct	Short-term	Moderate
	Occupational health & safety	Accidents and even mortality for worst scenario towards the workforces and community	Negative	Direct	Short-term	High
Operational & Maintenance	Water quality	Expansion of housing in the upstream with inadequate sanitation facility leading to water deterioration in the sources	Negative	Indirect	Long-term	High
	Wastewater	Inadequate management of the treated sludge from the FSTP causing odour and excessive plot space consumption	Negative	Direct	Short-term	Moderate
	Water quantity	Achieve consumers water demands for consumption	Positive	Direct	Long-term	High
	Water quality	Water quality deterioration due to inadequate chlorination and irregular water quality testing	Negative	Direct	Short-term	High
	Occupational health & safety	Health hazards due to chlorine exposure	Negative	Direct	Short-term	High
	Public Health	Improvement of community's health and reduce mortality due to clean water and sanitation access	Positive	Direct	Long-term	High

7.1 Biophysical impacts

7.1.1 Water Quality

Construction works for distribution pipe replacement, water storage rehabilitation and FSTP installation will likely generate silt run offs to nearby surface water receptors i.e. streams and drainage system, if temporary drainage systems are not applied. However, this activity won't have adverse impacts to the water ecosystems, as the duration is considered temporary.

The presence of human activity in the upstream area of Loihuno 1 spring has existed for decades. This upstream area is inhabited by 23 families, with only 8 houses that have cement septic tank albeit permeable, as already mentioned in sub-chapter Water Supply System. The 15 remaining households have poor sanitation infrastructure i.e. hole-in-the-ground WC. This situation directly allows septage to perculate into the ground and groundwater. Moreover, agricultural activity i.e animal livestock and fish farm are also found in the upstream spring system. Those said activities are likely to cause water deterioration of the aquifer linked from and to the Loihuno 1 and 3 springs. This water contamination issue is also proven by several water quality tests showing E.coli presence in Loihuno 3 spring.

To preserve the sustainability of the proposed water collection and distribution system, the project can suggest SMASA in implementing an Upstream Watershed Protection Programs, with restriction to water quality impacting activities i.e. animal husbandry, slash and burn, etc, or an Improvement Program for all existing and future dwelling sanitary infrastructure i.e. SMASA septic tank design template, to implement in the community surrounding the water source.

7.1.2 Air quality and noise

Based on the ADB IEE (ADB, 2016), no measurement of air quality and noise level have been made within the project site. However, it was observed that in the construction activities will likely to produce more negative impacts towards the environmental stability and also the local community. The negative impacts generated are considered temporary, from the arising of noise and air pollution that causes disturbance to the nearby dwelling and commercial buildings.

Earthwork construction, stockpiling of natural aggregates, transport loading and unloading, heavy vehicles mobilizing, tend to generate dust and its dispersion, thus distracting the aesthetic of the environment and inhabitants living nearby the project site. Dust exposure will affect the respiratory system and eye visioning. Dust generation is considered a temporary negative impact on the air quality as the fuel emission from the heavy machineries will not have a significant negative influence as well.

The project will include various heavy machineries and vehicles to be operating during this phase, such as demolition works, movement of trucks and equipment, earthworks, concrete mixing, loading and unloading construction materials. These types of activities correspond to the potential impact of noise emission. The said impact will be very significant in areas of noise-sensitive institutions or buildings such as health care and educational facilities.

Besides Health, Safety and Environment (HSE) measures in the construction Right of Way and/or area, such as proper traffic or road signage and warning signs or disseminating HSE information to the community, other measures such as limiting noisy works to daytime hours and reducing the speed limit in the work site will minimize the risk of occurrence of these impacts.

7.2 Socio Economic Impacts

7.2.1 Health and Economic Impacts

Viqueque Municipal Capital is expected to get 24/7 access to clean and potable water will improve community health, as they are expected to benefit from the overall improvement of the water distribution system, people's

hygiene and public health and consequently reduce waterborne disease occurrence albeit during construction they will be moderately exposed to the resulting impacts on air, noise, etc.

This project will directly generate positive employment opportunities (either skilled or non-skilled work) for the local people. Their earnings will consequently affect the local economy, given the employment process will prioritize local people, reducing the need for in-migration.

The local economy will also benefit from major positive impacts from the network improvement works such as increase in business for shops and other economic activities. For Viqueque, although the network itself is located along the roadways, the people and commercial activities will unlikely be disturbed as the work will be carried out on individual short lengths of the network, thus the period of construction in each section area will not last long.

Nevertheless, there can be minor economic impacts if roads have to be closed for short periods and customers are unable to gain access to shops, or if trenches are constructed near the sides of roads, and customers are impeded to access the shops, resulting in loss of income which is expected to be short-lived.

7.2.2 Socio-Cultural and Heritage Buildings

Each district in Timor-Leste may have different tradition and local dialect, but most of all local people have similar objects and sites inherited by their ancestors and are typically considered Lulik or sacred. Objects can be manifested as trees, stones, rocks, or even animals, etc, while sites are usually referred to historical places and where natural resources are found i.e. water sources.

There are also previous infrastructures built during the Portuguese and Indonesian administration where local government are still actively using the buildings for commercial purpose and some are not well-preserved. Additionally, current infrastructures that have socio-cultural values are also found in Viqueque Municipal Capital and are managed by community, local government, and even religious organizations.

Within the 15 km radius, Viqueque city's roadways, where the majority of distribution pipelines exist, are also adjacent to a few cultural heritage buildings. Table 10 is a list of cultural sites that were identified by the team during the site visit for the Preliminary Design.

Table 10 - List of Cultural Heritage Sites in Viqueque

No.	Name of the Site	Types	Coordinates
1.	St. Cruz Cemetery	Socio-cultural Heritage	8° 51.184'S / 126° 21.953'E
2.	Chapel	Socio-cultural	8° 51.588' S / 126° 22.068' E
3.	Administration Office During Portuguese Time	Historical & Socio-Cultural	8° 52.041' S / 126° 21.922' E
4.	Cathedral	Socio-cultural & Touristic	8° 52.102' S / 126° 21.944' E
5.	Residence of Sede Suco during Portuguese Time	Historical & Socio-Cultural	8° 52.183' S / 126° 22.006' E
6.	Cemetery 2	Socio-cultural	8° 52.561' S / 126° 22.105' E

7.1 Biophysical impacts

7.1.1 Water Quality

Construction works for distribution pipe replacement, water storage rehabilitation and FSTP installation will likely generate silt run offs to nearby surface water receptors i.e. streams and drainage system, if temporary drainage systems are not applied. However, this activity won't have adverse impacts to the water ecosystems, as the duration is considered temporary.

The presence of human activity in the upstream area of Loihuno 1 spring has existed for decades. This upstream area is inhabited by 23 families, with only 8 houses that have cement septic tank albeit permeable, as already mentioned in sub-chapter Water Supply System. The 15 remaining households have poor sanitation infrastructure i.e. hole-in-the-ground WC. This situation directly allows septage to perculate into the ground and groundwater. Moreover, agricultural activity i.e animal livestock and fish farm are also found in the upstream spring system. Those said activities are likely to cause water deterioration of the aquifer linked from and to the Loihuno 1 and 3 springs. This water contamination issue is also proven by several water quality tests showing E.coli presence in Loihuno 3 spring.

To preserve the sustainability of the proposed water collection and distribution system, the project can suggest SMASA in implementing an Upstream Watershed Protection Programs, with restriction to water quality impacting activities i.e. animal husbandry, slash and burn, etc, or an Improvement Program for all existing and future dwelling sanitary infrastructure i.e. SMASA septic tank design template, to implement in the community surrounding the water source.

7.1.2 Air quality and noise

Based on the ADB IEE (ADB, 2016), no measurement of air quality and noise level have been made within the project site. However, it was observed that in the construction activities will likely to produce more negative impacts towards the environmental stability and also the local community. The negative impacts generated are considered temporary, from the arising of noise and air pollution that causes disturbance to the nearby dwelling and commercial buildings.

Earthwork construction, stockpiling of natural aggregates, transport loading and unloading, heavy vehicles mobilizing, tend to generate dust and its dispersion, thus distracting the aesthetic of the environment and inhabitants living nearby the project site. Dust exposure will affect the respiratory system and eye visioning. Dust generation is considered a temporary negative impact on the air quality as the fuel emission from the heavy machineries will not have a significant negative influence as well.

The project will include various heavy machineries and vehicles to be operating during this phase, such as demolition works, movement of trucks and equipment, earthworks, concrete mixing, loading and unloading construction materials. These types of activities correspond to the potential impact of noise emission. The said impact will be very significant in areas of noise-sensitive institutions or buildings such as health care and educational facilities.

Besides Health, Safety and Environment (HSE) measures in the construction Right of Way and/or area, such as proper traffic or road signage and warning signs or disseminating HSE information to the community, other measures such as limiting noisy works to daytime hours and reducing the speed limit in the work site will minimize the risk of occurrence of these impacts.

7.2 Socio Economic Impacts

7.2.1 Health and Economic Impacts

Viqueque Municipal Capital is expected to get 24/7 access to clean and potable water will improve community health, as they are expected to benefit from the overall improvement of the water distribution system, people's

hygiene and public health and consequently reduce waterborne disease occurrence albeit during construction they will be moderately exposed to the resulting impacts on air, noise, etc.

This project will directly generate positive employment opportunities (either skilled or non-skilled work) for the local people. Their earnings will consequently affect the local economy, given the employment process will prioritize local people, reducing the need for in-migration.

The local economy will also benefit from major positive impacts from the network improvement works such as increase in business for shops and other economic activities. For Viqueque, although the network itself is located along the roadways, the people and commercial activities will unlikely be disturbed as the work will be carried out on individual short lengths of the network, thus the period of construction in each section area will not last long.

Nevertheless, there can be minor economic impacts if roads have to be closed for short periods and customers are unable to gain access to shops, or if trenches are constructed near the sides of roads, and customers are impeded to access the shops, resulting in loss of income which is expected to be short-lived.

7.2.2 Socio-Cultural and Heritage Buildings

Each district in Timor-Leste may have different tradition and local dialect, but most of all local people have similar objects and sites inherited by their ancestors and are typically considered Lulik or sacred. Objects can be manifested as trees, stones, rocks, or even animals, etc, while sites are usually referred to historical places and where natural resources are found i.e. water sources.

There are also previous infrastructures built during the Portuguese and Indonesian administration where local government are still actively using the buildings for commercial purpose and some are not well-preserved. Additionally, current infrastructures that have socio-cultural values are also found in Viqueque Municipal Capital and are managed by community, local government, and even religious organizations.

Within the 15 km radius, Viqueque city's roadways, where the majority of distribution pipelines exist, are also adjacent to a few cultural heritage buildings. Table 10 is a list of cultural sites that were identified by the team during the site visit for the Preliminary Design.

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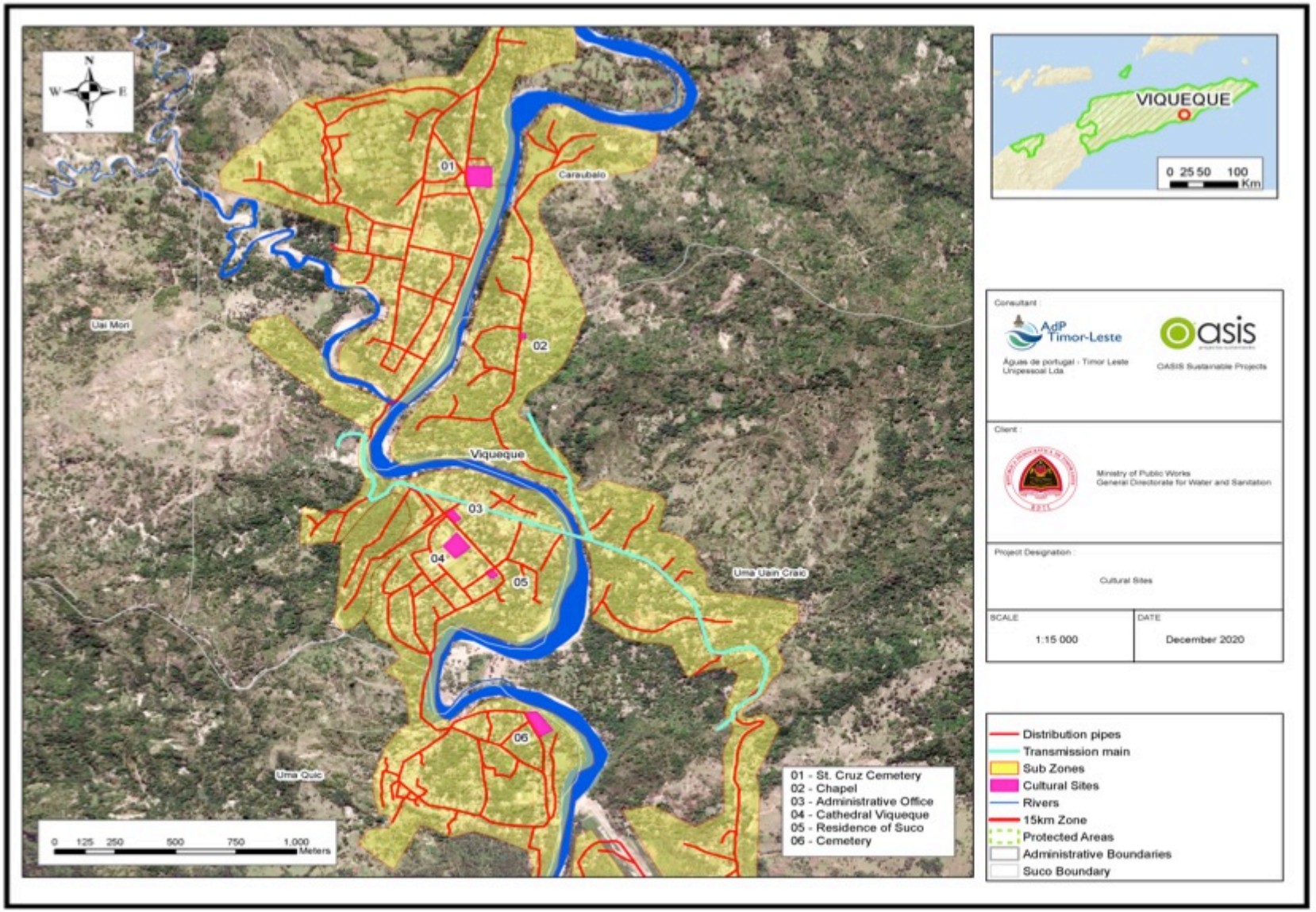
Figure 20 - Socio-Cultural Heritage Sites



8. PUBLIC CONSULTATION

The current IEE (ADB, 2020) undertook Public Consultation for Viqueque in Viqueque Municipality Administrative Assembly Room on the 10th of October 2020 and was 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, its 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.

The stakeholders gave their concern, suggestion and recommendation for the project implementation, focussing mainly on issues such as:

- The implementation of maintenance for sustainable water supply and the scope of work of this project
- The timeframe for the project implementation
- Adequate public toilets for handicapped persons
- Integration between masterplan and urban planning development
- Coverage expansion areas to be more inclusive

In general, during the consultation, no issues of significant social concern or objections about the proposed project were raised and stakeholders were positive about the proposed project and expecting for this project to be implemented as soon as possible, since they are facing crucial issues on water for daily consumption and don't want to repeat uncertain schedule for water delivery into the households in the future.

Figure 21 - Viqueque Public Consultation; participation of the Local Community and Other Stakeholders

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). The objective of the consultation was to further confirm 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. During the consultations, Suco's communities acknowledged about the lack of proper water and sanitation system specifically for the water component because it is a time-consuming activity to transport water from the source to the household. They also stated that to make potable, water is then boiled before being used which entails in an additional cost for fuel (mainly wood). Therefore, the community is supportive of a paid water distribution system and the use of Public Toilets and they are welcoming the opportunity to be part of the project either in the construction phase or in the Operation and Maintenance stage, reinforcing the number of SMASA employees.

Figure 22 - Suco Caraubalu Public Consultation

Figure 23 - Suco Loihuno Public Consultation

Figure 24 - Suco Uma Quic Public Consultation

Figure 25 - Suco Uma Uain Craic Public Consultation

9. CONSULTATION WITH OTHER AUTHORITIES

Since the beginning of the 4 MCWSS project, the team has contacted various entities and stakeholders through meetings to inform and gain understanding of the issues faced in Same in terms of land acquisition, water source and its distribution and cultural heritage sites.

Some of the consultation meetings are highlighted below for their importance in terms of the project implementation process and to clarify on the communication process with Relevant Stakeholders. Many of the interviewees requested not to have photographs taken during the meetings and therefore only those that the team had permission to take have photos in this chapter.

- 2020 June 24 – 26 – Meeting with Viqueque' s municipalities entity
  The consultation meeting with Viquequei' s entity was conducted by the environmental team during the site visit. The meeting took place in SMASA (Municipal Service for Water, Sanitation & Environment) office in Suco Caraubalo between Viqueque SMASA director and technicians. Moreover, the team also had 4 meetings with the local authorities from Suco Caraubalo, Suco Uma Quic, Suco Uma Uain Craic, and Suco Loihuno.
  The main purpose of the consultation was to inform and explain to about the 4 MCWSSP and get the formal information about cultural site and protected area issues that may need to be taken into account, as well as their recommendation on the FSTP (Faecal Sludge Treatment Plan) location. The local authorities lead the team on a project site visit to identify and map several cultural heritage sites, which lie very close to the water distribution alignments.

Figure 26 - Meeting Session with SMASA Director

- 2020 July 06 – Meeting with Director General of DGAS (Direção Geral Agua e Saneamento)
  This meeting was conducted between the representatives of the consultant team AdP / Engidro, Oasis and Director General of DGAS. The main purposes of the meeting were to discuss issues regarding
  1. Illegal water connections;
  2. Laying water pipeline and
  3. Coverage area of Water Supply & Sanitation subprojects.

- 2020 September 22 – Meeting with the Secretary of State for Arts and Culture
  Another consultation meeting was also conducted between the representative of Secretary of State for Arts and Culture and Oasis team which was represented by the National Environmental Technician. The meeting took place in Secretary of State for Arts and Culture Office in Pantai Kelapa.
  The objective of the meeting was to request cultural heritage sites data in all 4 Municipals in adherence to a request letter sent from the General Directorate of Water and Sanitation Service (DGAS) with a reference number 172/C50605/Gab.DGAS/MOP/VII/2020. This aims on identifying whether or not the sites are located adjacent to the project components and how they will impact on the related sites.

10. PROPOSED CLASSIFICATION OF THE PROJECT

The project' s main objective is to guarantee that the overall balance of environmental and social impacts results in positive outcome, taking into special consideration the mitigation commitments in the Environmental Management Plan, the compliance with the RDTL environmental assessment process and especially given the project's special relationship with the institution's technical assistance support.

The proposed system in Viqueque is based on "brownfield" sub-projects i.e. existing water piping and/or springs or boreholes, established by SMASA several decades ago, in order to guarantee that their customers had minimum access to water for consumption. It is assumed that, at the time of their establishment, locational factors were not the priority for government institutions across the board, as opposed to guaranteeing water supply to the people. In addition, the location of the sources available at the time was very limited, resuming to existing springs that the local community leaders gave authorisation to extract under "cultural" rule (which is still very active today).

Currently, the Viqueque water distribution system has evolved around established spring system, particularly in regards to Loihuno 1 spring. The importance of this source is now augmented by the fact that SMASA requires the water distribution system to expand into the Municipal Capital's urban expansion areas due to the growing number of the population.

The project was previously classified as Category B under the ADB SPS 2009 (ADB, 2016) in the 2015 Masterplan, for the Viqueque area because the proposed water extraction and other works for project components are considered rehabilitation i.e. a brownfield project, with pre-existing pipe alignments and zones that have undergone previous impacts during the first installation (thus leading to the new intervention being less significant and of temporary duration, with very small portions of the project components requiring new infrastructure i.e. greenfield project areas).

This year (2020) Environmental assessment has been conducted for the Viqueque water supply and sanitation Project based on (i) Preliminary engineering design, and (ii) most likely environmentally sensitive components, applying ADB's rapid environmental assessment (REA) checklist and the field review in June 2020 to help guide the probable classification. This exercise showed that the Viqueque Water supply and sanitation project is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, or that potential impacts are 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 mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

This classification is consistent with the estimated classification process the proponent has carried out under Decree-Law no. 5/2011, particularly Annex I – Category A (EIA) or Annex II – Category B (IEE) thresholds, to follow the Timorese requirements regarding Environmental Licensing.

Table 11 - Estimated Environmental Classification for Viqueque Project Components

Proposed Components	Proposed Capacity	Estimated Classification	Included in XII. Location Factors
Sanitation			
Public Septic Tank Systems	N/A	N/A	No
Feacal Septage Treatment Plant	4,038 HH	B	No
Water Distribution			
Rehabilitation (Mains and Distribution)	24,298 m	B[(1)]	No
Water Sources (Existing and/or New)			
Loihuno 1[(4)]	(5 to 50) L/sec[(1)] (157,680 – 1,576,800) m^3/year	B[(1)]	No
Kuha River[(4)]	(50 to 0) L/sec[(1)] (1,576,800 to 0) m^3/year	B[(1)]	No

[(2)] As in previous ANLA attributed Category B Licenses to similar-scaled water source volumes and length of distribution network such as DGAS projects in Pante Macassar and Manatuto (see Appendix 2 and 3).

None of the project components in Viqueque Municipal Capital are located in a sensitive area i.e. protected or sacred area. As previously mentioned above, this is a rehabilitation project i.e. a brownfield project with few components requiring new infrastructure i.e. greenfield project areas. As a result, the proponent is certain that the classification of these sub-projects falls under a Category B, as per the example of the Environmental Classification system for the Roads Sector, where the Rehabilitation of all Pre-existing Infrastructure i.e. Roads falls under a Category B. Moreover, this assumption is also further justified based on the ANLA previously attributed Category B Environmental License for the Government Projects for Rehabilitation of Water Distribution Infrastructure in the District Capital Water Supply Project for Manatuto and Pante Macassar 2014 (see Appendix 2 and 3), which are basically a resemblance in terms of its objective.

Given this project has all the favourable conditions to be classified as a Category B project, as it is concurrent with both ADB SPS 2009 requirements and the Timorese legislation, if locational factors are not taken into account, ***the proponent hereby requests the Environmental Regulator to consider a Category B for this project,*** in accordance with the Regulator's choice of classification prerogative outlined in item 2 b) of article 4 of Decree-Law no. 05/2011, since the Decree Law and its Ministerial Diplomas provide flexibility of project Category choice to the Environmental Regulator, when duly justified, especially when the relative scale and gravity of the project's impacts and conditions are similar to the above-mentioned Category B.

11. EXECUTIVE SUMMARY

The Four Municipal Capitals Water Supply & Sanitation Project (4MWSSP) is based on the previous Master plan Design to support the Government of Timor-Leste in providing access to improved water supply and sanitation (WSS) in 4 municipalities (Baucau, Los Palos, Viqueque and Same) financed by the Infrastructure Fund of the Government of Democratic Republic of Timor-Leste with all enumerated infrastructure components, a total of USD$ 70,404,273 estimated project cost.

The primary objective of this Project Document is to provide clear and relevant information on the proposed Water and Sanitation System Improvement Project for ***Viqueque Municipal Capital only***, taking into account that its rehabilitation will be carried out under a future ADB loan to the Government of Timor-Leste. The preliminary cost of the 4MCWSSP for Manufahi Municipality is estimated around $13,004,542 for proposed water supply and sanitation expenses. It will include all the areas that will be required to implement the Abstraction, Treatment and Distribution of Water for Human Consumption, as well as provide designs and solutions for Sanitation for Buildings, Schools and Housing within a diameter area of 15 Km around the Municipal Capital particularly 4 Sucos overlaying water distribution system.

The 4 MCWSSP is expected to have numerous beneficial and negative impacts towards the environment and social aspects due to various project activities, although the pre-existing pipe alignments and zones that have undergone previous impacts during the first installation, thus leading to the new intervention being less significant and of temporary duration, with very small portions of the project components requiring new infrastructure i.e. greenfield project areas). In conclusion, the Viqueque Water supply and sanitation project is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, or that potential impacts are 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 mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

The project also will provide improvements and opportunities in several ways regarding employment generation, skill enhancement, improved Health and Hygiene as well as Women empowerment. Furthermore, it will directly generate employment opportunities to either skilled or non-skilled work for the local people. This type of employment opportunities will increase the skill of the workforce in terms of technical proficiency. By the end of the project, safe and reliable water supply will be provided to the municipal town (sucos and aldeias), and all households will have improved hygienic toilets as well as toilets available in public places. The improved water supply and sanitation facilities in the pilot schools will provide children with safe and reliable water supply and toilets operated by competent operators in each pilot school, providing a template in other schools to improve water supply and toilets.

To improve the efficiency, transparency and public involvements, the consultant conducted the Public Consultation for Viqueque in the Municipal Administrative Meeting Room on the on the 10th of October 2020 and was participated by the local government agencies, local authorities i.e. Suco and Aldeia Chiefs, and representative of the local communities that are in the Project Area. The majority of the issues that were raised are linked to the (i) integration of the masterplan of this project and the urban planning design, (ii) timeframe of the project implementation, (iii) Prioritizing handicapped persons in designing accessible public toilets, and (iv) coverage areas expansion to be more inclusive.

The consultation also discussed the environmental aspects of the project to request feedback and concerns from the people regarding the project and their existing water supply, the anticipated environmental impact of the proposed project and to gather people's opinion on how to improve their water supply system.

The estimation of classification for the project was done in accordance with the project component scale, as well as the scope referenced in the Second District Capitals Water Supply Project. While all projects funded by ADB and IFC must comply with their Safeguards to ensure that projects are environmentally sound, designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards, in Timor-Leste, environmental screening and categorization follows suit but is also dependant on project component and scale comparison with Decree-Law no. 5/2011 – Environmental Licensing, particularly Annex I – Category A (EIA) or Annex II – Category B (IEE) thresholds.

It is concluded that, overall, the project is not likely to have significant adverse environmental impacts and in most cases mitigation measures can be designed to for them, which, under the ADB and IFC guidelines, should place categorisation under a Category B, requiring an IEE process of evaluation for Viqueque.

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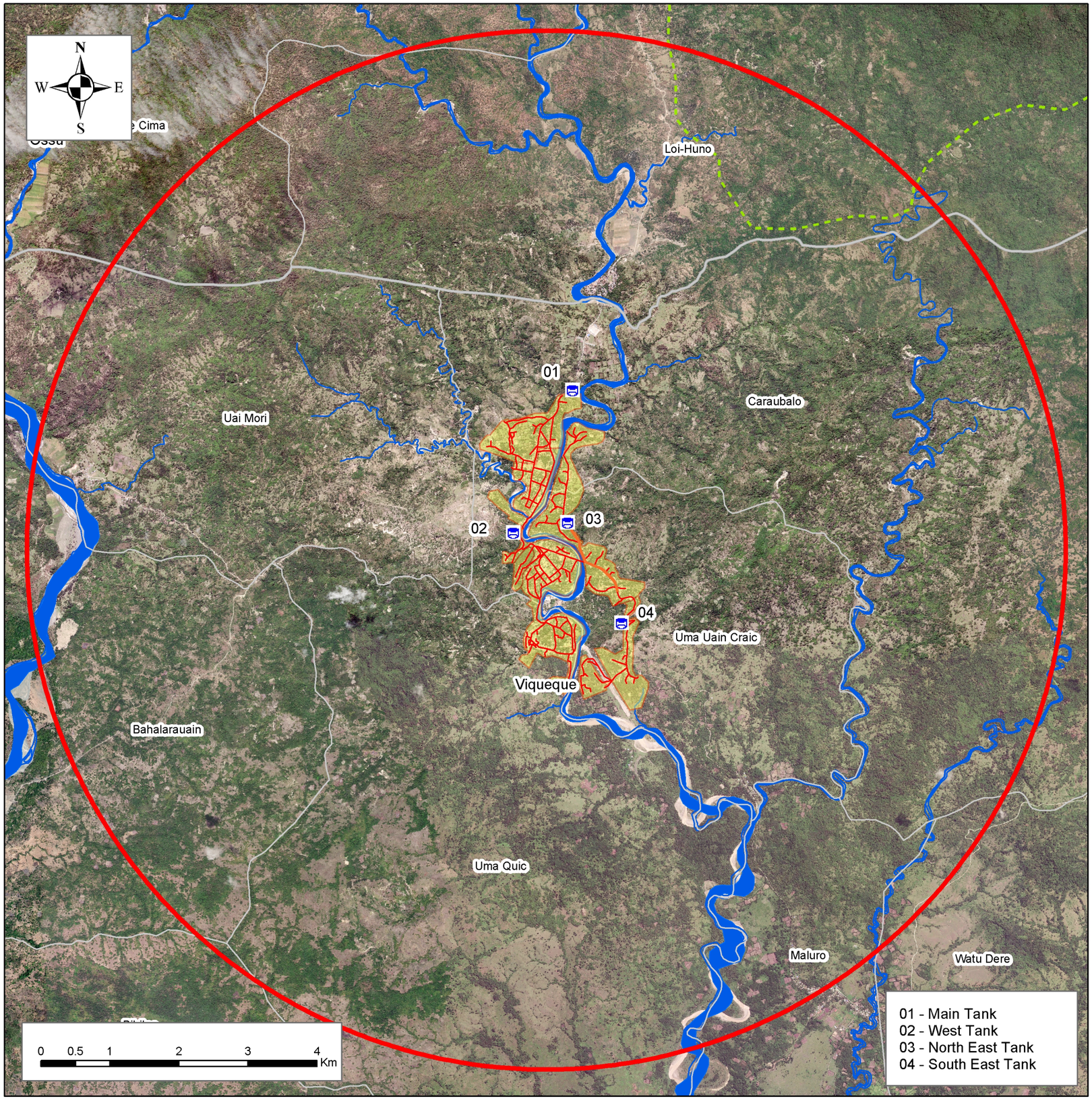
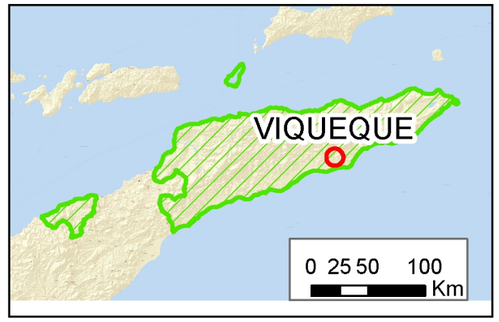
APPENDIXES

Appendix 1. Locational Map of Project in Manufahi Municipality





Consultant :

AdP Timor-Leste
Águas de portugal - Timor Leste Unipessoal Lda.

oasis projectos sustentáveis
OASIS Sustainable Projects

Client :

Ministry of Public Works
General Directorate for Water and Sanitation

Project Designation :

PROJECT LOCATION

SCALE	DATE
1:60 000	December 2020

- Tank
- Distribution pipes
- Transmission main
- Sub Zones
- Rivers
- 15km Zone
- Mount Builo protected area
- Administrative Boundaries
- Suco Boundary

Appendix 2. Environmental License ADB 0258-TIM Project – Manatuto District

REPÚBLICA DEMOCRÁTICA DE TIMOR-LESTE

National Directorate for Environment, State Secretariat for Environment, Ministry for Commerce, Industry and Environment

ENVIRONMENTAL LICENSE
Issued under *Decree Law on Environmental Licensing No. 05/2011*

In accordance with decision dated on 07th August 2014 by the **State Secretary for Environment** Mr. Numinando Soares Martins "Buras" Approved the Simplified Environmental Impact Statement. Hence, pursuant to the Chapter VI of Decree Law on *Environmental Licensing 05/2011 (Decree Law 05/2011)*, and Issued Environmental License for the activity referred to the **Schedule** below which subject to the conditions contained in the **Annex**.

Schedule

Proponent of Project:	**National Directorate of Water Supply Services**
Date Submitted Application:	**20th of March 2014**
Application Number:	**20/ AIA-DNMA /XI/ 2013**
Environmental License Number:	**06 / C:B-5 / SSE-MCIE / VIII / 2014**
Activity Scale:	**Distance 15.09 km(Transmission pipe 15090m and distribution pipe 68741m; maximum depth 1m)**
District and Sub-district:	**Manatuto**
Category of Project:	**Category B**
Project:	**Upgrading and Rehabilitation of Existing Water supply**
Date of Notification:	**07th of August 2014**

Notes

1. This Environmental License is non-transferrable in accordance with Articles 22 (4) of Decree Law 05/2011.
2. Proposed changes to the project affecting environmental impacts or the project area/size, or relocation, are subject to technical review and approval in accordance with Chapter VIII of Decree Law 05/2011.
3. Appeal rights are governed by *Decree Law 32/2008 on Administrative Procedure.*
4. The Proponent is solely responsible for ensuring all other necessary renewal license, permit, authorisations or recommendations are obtained from relevant government authorities.

5. The Proponent is responsible for ensuring that all subcontractors or others carrying out works associated with this Environmental License comply with the SEIS, EMP and terms of this Environmental License.

6. All future communications, documents and reports prepared by or on behalf of the Proponent in relation to the Project and submitted to the National Directorate for Environment ('DNMA') shall be in both Tetum and English, and in both electronic and hard copy.

Annex - Conditions of Environmental License

The conditions contained in this Annex are to protect the environment and to mitigate the environmental impacts of the Project.

General Conditions

1. Project in accordance with initial environmental examination documents, and future environmental licenses

1.1 The District Capital Water Supply Project must be conducted in accordance with the Final Report of Simplified Environmental Impact Statement (SEIS) prepared by Project Implementation Unit Consultant dated **20th of March 2014** and the incorporated Environmental Management Plan (EMP), except as modified or amended by this Environmental License.

1.2 The Expansion, Rehabilitation and operation and maintenance of Manatuto Water Supply Systems must be conducted in accordance with Asia Development Bank Safety Environmental Principle.

1.3 The Nature, Size, Location and Importance of the Project, described on page 12 – 15 (5.1-5.2) of the SEIS, strictly states the Project Site Boundary for all development and construction activities related to The District Capital Water Supply Project.

1.4 To successfully implement the EMP the SEIS has given adequate instructions for the Project Implementation Unit (PIU) to monitor and report environmental compliance all through the project implementation period.

1.5 As planned in the SEIS this Water Supply Project is given the Environmental License granted for two (2) years starting from the Date of the Notification mentioned in *Licensing*

1.6 Any proposed changes, alterations or additions to the Project that the Proponent wishes to undertake that are not consistent with the SEIS and EMP and this Environmental License will require an additional Environmental License or amendment of this Environmental License, in accordance with relevant provisions of *Decree Law 05/2011*.

1.7 DNMA may review and alter any conditions in this Environmental License, including by requiring alterations to the Environmental Management Plan, to respond to any proposed changes to any component of the Project through any application made by the Proponent to DNMA relating to the Project, if DNMA deems it necessary to do so to protect the environment.

Additional requirements and modifications

2. ***Construction phase***

2.1 When the activity starts, community near the area of the project must be included to offer them jobs in which could help minimize the social impacts.

2.2 The proponent must coordinate with other institution that related to this activity before implementing the project.

2.3 For air quality related to dust, inspection should be done to ensure that residents living along the construction route are not affected. Hence spreading water will help minimize dust emission close to the residential areas;

2.4 The proponent must assure that water bodies nearby are safe from siltation and contamination that includes fuel and lubricants used in the rehabilitation of the water supply project;

2.5 The proponent must enforce the disposal of surplus material at environmentally safe disposal/ fill sites and that spoil stockpiles are managed properly;

2.6 Soils from the excavation must not be disposed of near the water bodies, paddy field, Farmland and community's residential area along the road rehabilitation route;

2.7 Sites where rocks and sands are excavated should be 20 meters away from the river bank;

2.8 Avoiding excavation of soil and stone in the sensitive environmental areas (protected area/ Forest, potential landslides field, high elevation hills, etc);

2.9 When the project is complete, excavated areas must be rehabilitated, materials dumping, Facilities for staff and logistic installed must be demolished and managed it properly;

2.10 Actively monitor the water bodies that are close to the construction site during the Rehabilitation process;

2.11 The community from the residential areas, horticulture, paddy fields, And other types of farmlands and agricultural plantation whom are affected must be Given compensation in a fair and just manner;

2.12 Avoiding in necessary eviction. If any target household need to be remove, please Negotiate in fair manner and applying *prior consent principle*

2.13 During the rehabilitation activity, noise from the excavator must be controlled, need to Install appropriate warning signal for safety traffic, for the safety of worker and road Users;

2.14 Trucks carrying construction materials (sand, stones, cement etc) must be covered by Tarpaulin to prevent materials from falling off of the trucks;

2.15 Alternative roads must be built to ensure that public transportations are not delayed during the rehabilitation;

2.16 Rehabilitate eroded areas that caused by the construction activity;

2.17 During daytime construction site should be sprayed with water every three hours each day along the Rehabilitation project route;

2.18 Prepare disposal site for solid and liquid waste from the construction activity, excavator and trucks; except dangerous waste (oil ,lubricant and so on)

2.19 Worker and staff compound close by community village must be develop in coordination with local leaders and the residence. Worker and staff need to respect local people, ritual, symbols of believe and cultures;

2.20 Need to apply local content principle for the involvement of local people in working Opportunity and possible local material procurement;

2.21 Indentified appropriate location for material (sand, stone, wood, water and other material) collection;

2.22 Due to the instability of soil, high elevation of the areas and impact of climate change (more rain or less rain could cause erosion), there is need to have bio engineering expert in providing knowledge and techniques to community for re-vegetation and reforestation;

2.23 The Proponent must ensure that the waste is disposed of at disposal area;

2.24 After the project is finally done, the company is responsible to clean up all the waste and piles from the construction activity along the project route.

National Directorate of environment will be supervision and oriented company refer to the Environment License and Environment Management Plan.

Dili, 07th ofAugust 2014
Approved by:

Numinando Soares Martins "BURAS"
Secretary of State for Environment

Appendix 3. Environmental License ADB 0258-TIM Project – RAEOA

REPÚBLICA DEMOCRÁTICA DE TIMOR-LESTE
National Directorate for Environment, State Secretariat for Environment,
Ministry for Commerce, Industry and Environment

ENVIRONMENTAL LICENSE
Issued under *Decree Law on Environmental Licensing No. 05/2011*

In accordance with decision dated on 07th August 2014 by the **State Secretary for Environment** Mr. Numinando Soares Martins "Buras" Approved the Simplified Environmental Impact Statement. Hence, pursuant to the Chapter VI of Decree Law on *Environmental Licensing 05/2011 (Decree Law 05/2011)*, and Issued Environmental License for the activity referred to the **Schedule** below which subject to the conditions contained in the **Annex**.

Schedule

Proponent of Project:	**National Directorate of Water Supply Services**
Date Submitted Application:	**20th of March 2014**
Application Number:	**20/ AIA-DNMA /XI/ 2013**
Environmental License Number:	**06 / C:B-5 / SSE-MCIE / VIII / 2014**
Activity Scale:	**Distance 6.7 km(Transmission pipe 6768m and distribution pipe 39615m; maximum depth 1m)**
District and Sub-district:	**Pante Macasar, Oecusse**
Category of Project:	**Category B**
Project:	**Upgrading and Rehabilitation of Existing Water supply**
Date of Notification:	**07th of August 2014**

Notes

1. This Environmental License is non-transferrable in accordance with Articles 22 (4) of Decree Law 05/2011.
2. Proposed changes to the project affecting environmental impacts or the project area/size, or relocation, are subject to technical review and approval in accordance with Chapter VIII of Decree Law 05/2011.
3. Appeal rights are governed by *Decree Law 32/2008 on Administrative Procedure.*
4. The Proponent is solely responsible for ensuring all other necessary renewal license, permit, authorisations or recommendations are obtained from relevant government authorities.
5. The Proponent is responsible for ensuring that all subcontractors or others carrying out works associated with this Environmental License comply with the SEIS, EMP and terms of this Environmental License.

6 All future communications, documents and reports prepared by or on behalf of the Proponent in relation to the Project and submitted to the National Directorate for Environment ('DNMA') shall be in both Tetum and English, and in both electronic and hard copy.

Annex - Conditions of Environmental License

The conditions contained in this Annex are to protect the environment and to mitigate the environmental impacts of the Project.

General Conditions

1. Project in accordance with initial environmental examination documents, and future environmental licenses

1.1. The District Capital Water Supply Project must be conducted in accordance with the Final Report of Simplified Environmental Impact Statement (SEIS) prepared by Project Implementation Unit Consultant dated **20th of March 2014** and the incorporated Environmental Management Plan (EMP), except as modified or amended by this Environmental License.

1.2. The Expansion, Rehabilitation and operation and maintenance of Manatuto Water Supply Systems must be conducted in accordance with Asia Development Bank Safety Environmental Principle.

1.3. The Nature, Size, Location and Importance of the Project, described on page 13 – 19 (5.1-5.2) of the SEIS, strictly states the Project Site Boundary for all development and construction activities related to The District Capital Water Supply Project.

1.4. To successfully implement the EMP the SEIS has given adequate instructions for the Project Implementation Unit (PIU) to monitor and report environmental compliance all through the project implementation period.

1.5. As planned in the SEIS this Water Supply Project is given the Environmental License granted for two (2) years starting from the Date of the Notification mentioned in *Licensing*.

1.6. Any proposed changes, alterations or additions to the Project that the Proponent wishes to undertake that are not consistent with the SEIS and EMP and this Environmental License will require an additional Environmental License or amendment of this Environmental License, in accordance with relevant provisions of *Decree Law 05/2011*.

1.7. DNMA may review and alter any conditions in this Environmental License, including by requiring alterations to the Environmental Management Plan, to respond to any proposed changes to any component of the Project through any application made by the Proponent to DNMA relating to the Project, if DNMA deems it necessary to do so to protect the environment.

Additional requirements and modifications

2. ***Construction phase***

2.1 When the activity starts, community near the area of the project must be included to offer them jobs in which could help minimize the social impacts;

2.2 For air quality related to dust, inspection should be done to ensure that residents living along the construction route are not affected. Hence spreading water will help minimize dust emission close to the residential areas;

2.3 The proponent must coordinate with other institution that related to this activity before implementing the project;

2.4 The proponent must assure that water bodies nearby are safe from siltation and contamination that includes fuel and lubricants used in the rehabilitation of the water supply project;

2.5 The proponent must enforce the disposal of surplus material at environmentally safe disposal/ fill sites and that spoil stockpiles are managed properly;

2.6 Soils from the excavation must not be disposed of near the water bodies, paddy field, Farmland and community's residential area along the road rehabilitation route;

2.7 Sites where rocks and sands are excavated should be 20 meters away from the river bank;

2.8 Avoiding excavation of soil and stone in the sensitive environmental areas (protected area/ Forest, potential landslides field, high elevation hills, etc);

2.9 When the project is complete, excavated areas must be rehabilitated, materials dumping, Facilities for staff and logistic installed must be demolished and managed it properly;

2.10 Actively monitor the water bodies that are close to the construction site during the Rehabilitation process;

2.11 The community from the residential areas, horticulture, paddy fields, And other types of farmlands and agricultural plantation whom are affected must be Given compensation in a fair and just manner;

2.12 Avoiding in necessary eviction. If any target household need to be remove, please Negotiate in fair manner and applying *prior consent principle*

2.13 During the rehabilitation activity, noise from the excavator must be controlled, need to Install appropriate warning signal for safety traffic, for the safety of worker and road Users;

2.14 Trucks carrying construction materials (sand, stones, cement etc) must be covered by Tarpaulin to prevent materials from falling off of the trucks;

2.15 Alternative roads must be built to ensure that public transportations are not delayed during the rehabilitation;

2.16 Rehabilitate eroded areas that caused by the construction activity;

2.17 During daytime construction site should be sprayed with water every three hours each day along the Rehabilitation project route;

2.18 Prepare disposal site for solid and liquid waste from the construction activity, excavator and trucks; except dangerous waste (oil ,lubricant and so on)

2.19 Worker and staff compound close by community village must be develop in coordination with local leaders and the residence. Worker and staff need to respect local people, ritual, symbols of believe and cultures;

2.20 Need to apply local content principle for the involvement of local people in working Opportunity and possible local material procurement;

2.21 Indentified appropriate location for material (sand, stone, wood, water and other material) collection;

2.22 The Proponent must ensure that the waste is disposed of at disposal area;

2.23 Due to the instability of soil, high elevation of the areas and impact of climate change (more rain or less rain could cause erosion), there is need to have bio engineering expert in providing knowledge and techniques to community for re-vegetation and reforestation;

2.24 After the project is finally done, the company is responsible to clean up all the waste and piles from the construction activity along the project route.

National Directorate of environment will be supervision and oriented company refer to the Environment License and Environment Management Plan.

Dili, 07th ofAugust 2014
Approved by:

Numinando Soares Martins "BURAS"
Secretary of State for Environment

Appendix 4. Transcripted Public Consultation Notes

4MCWS Project
Public Consultation – Viqueque
10 October 2020

1. Introduction

The public consultation was led by the Administrator of Viqueque Municipality as the chairman, accompanied by the National Director for Basic Sanitation, and lastly attendees coming from local authorities, representatives from the PNDS, Ministry of Public Works and ADB, with a total of 45 participants (Attendance Sheet provided in the subsequent Appendix). This Public Consultation aimed on presenting the technical design of the referred project to the stakeholders in order for them to have the acknowledgement. The said program also created opportunities to the local community to express their voices, which the Consultants will then referenced as inputs for further adaptation on the design.

The public consultation was conducted at the Viqueque Municipality Administrative Assembly Room at 14:00 Timor-Leste Time zone and terminated at 17:00. The agenda comprised of several sessions, as described below:

a. Registry and video presentation
b. Introduction: opening remarks from Aguas de Portugal Project Manager, National Director for Basic Sanitation and Viqueque Municipality Administrator, and at the same time officially opened the meeting
c. Technical presentation from the Consultant team, composed of:
    i. General Vision of the Urban Water Cycle (Presented by Gaudencia, AdP Technical Engineer)
    ii. General Vision of the Work for the Project (Presented by Gaudencia, AdP Technical Engineer)
    iii. Water Component (Presented by Sandra Gusmao, AdP Technical Engineer)
    iv. Sanitation Component (Presented by Sandra Gusmao, AdP Technical Engineer)
    v. Environmental Component (Presented by Maria Helena, OASIS National Environmental Technician)
    vi. Social Component (Presented by Mario, AdP Project Manager)
d. Coffee Break
e. Discussion session (Q&A)
f. Conclusion and Closure

Questions and recommendations during the Discussion session raised by the participants are accumulated and are described below.

2. Questions, Recommendation, Reclamations, Responds and Discussion (Q&A session)

2.1 Suco Chief Uma Uain Craic

- Question 1:
  If the project reaches the implementation phase, will all the features be utilised according to the design? I believe everyone has the same doubt in regards to this matter.
- Question 2:
  We can see that this project refers to urban area only. Is there any way that the water supply can also reach to the rural areas?
- Consultant's Clarifications:

One of the solution for the reservatory system will be in the final version but in order to get into the implementation phase, we will not do the boreholes in that site, we will mantain all the features as before in terms of the measurements of the reservatory and all the documents that will deliver to the governmemt entity will include tank measures in which will be the same as in the construction phase.

2.2 Suco Chief Uma Quico

- Question 1:
  After the construction works, how will the maintenance plan be implemented? Which agents are going to be responsible?
- Consultant's clarification:
  The period for maintenance is 3 years, in order to allow the personnel or other operators from SMASA to understand well in terms of operating the system under supervision of the Contractor. Thus, the SMASA operators will gain an indirect positive impact such as improving their capacity. The contracted Contractor will be responsible to also monitor whether or not the operators are following the O&M manuals. This also applies to treatment facilities in the porposed reservoirs.

2.3 A) Estevao de Carvalho from PNDS
B) Representative from Ministry of Public Works

- Recommendation:
  According to him, it will be better if this project use the existing source (Koha river) by making an abstraction and treatment and than distribute to the community. He concerns that if they continue do the borewell than they will spend a lot money to do the work but they will not get any results at the end. He recomends that the important thing to do is to determine numbers of abstraction site to be implemented.

- Consultant's Clarification:
  Noted.

2.4 Estevao de Carvalho from PNDS

- Recommendation 1:
  Old pipelines should be decommissioned if this project is still maintaining the Loihuno spring, and pipe installation should be performed through trenching activity, burried under the ground to avoid the community from illegal connection. Water that supplies through the main and secondary pipelines cannot be illegaly connected without SMASA authorization.
- Recommendation 3:
  He recommends to change the old pipes with the new one because according to him if continue mantain the old system than the community will continue to do the illegal connections. Therefore if we changed the system with the newer pipes, underground installations and prepare rules to the community to follow than we solved the issues regarding deficit of water.
- Recommendation 4:
  Make a regulations with proper management of water to solve the issue related to the deficit of water.
- Consultant's Clarification:
  Recomendation from Mr. Estevão – He informed that they will extract water from loihunu and the transmission and distribution line will follow the roads and to know about how it will be implemented, they have a close cooperation with the road consultant to allow and help them to

identify the place and install the pipes. They also recieved a lot of information regarding the illegal connection from SMASA and also about the distribution schedule that implemented in Viqueque at the moment. Therefore he stated that because of the mentioned problems, the have decided to change the old system to the new system so that can allow the community to acces the water for 24 hour.

2.5 Jaime Pereira Gonzaga – Ex Suco Chief

- Question 1:
  Questioned about the project term, regarding the implementation timing?
- Question 2:
  Based on the explanation from Municipal Administrator regarding urbanization plan for Viqueque municipality and with the project from AdP, which program will be implemented first? Because if we implement the WATSAN project first and the urbanization plan come after it than will create another problem related to the water.
- Recommendation:
  Recommends to the Municipal Administrator to determine the exact urbanization plan that covers all the aspect and needs of the Viqueque communities.
- Consultant's Clarification:
  Regarding concerns from xefe suco about the budget for new office building for agriculture, the consultant have no right to answer that question.

2.6 Alcino Pinto – Uma Uain Quic Local Community

- Recommendation:
  Recomends to AdP to create adequate toilet for peoples with disabilities iha 3 sucos that covers by the WATSAN project.
- Consultant's Clarification:
  Noted.

2.7 Mariano Soares – Aldeia Chief Osolin, Suco Uma Uain Craic

- Recommendation:
  Recommends to extend the distribution line to reach Ratau (Uma wain kiik) because based on the Viqueque municipal plan, administration office, municipal football stadium, agriculture office will move to Ratau.

- Administrator Clarification:
  Viqueque Municipality Administrator clarifies that for the new office building that will open in Ratau was a desetralization plan that was made to prepare for the urbanization plan.
  He also stated that they have done DED for the urbanization plan, and it will only need a fund to execute the plan according to the studies that already done.
  The Underground Water test for Viqueque had done by some company few years ago and the results suggest that it is not reliable to do the borewell in Viqueque city, therefore he reccomends to coolaborate in order to get water from another place.

2.8 Representative from Ministry of Public Works

- Question 1:
  He questioned about the master plan and suggest to create an integrated plan so that it can be easy to follow in the future.
- Consultant's Clarification:

Based on our design, it is well coordinated and it is integrated to the municipal plan and acommodate the population needs till 2040.

2.9 Ceverina Marques da Silva – CVTL Coordinator Viqueque City

- Recommendation 1:
  Recommends to build public toilets near Police station because that place is considered as a bus stop for the local community.
- Recommendation 2:
  Recommends to control the system related to the transmission and distribution line because at the moment some communities still use pump (Sanyo) that connect directly to the pipes in which minimize the water flow to anoter households. Suggest also to the project owners to increase the covers area so that another suco in viqueque city can have access to the project.

- Consultant's Clarification:
  Noted

MINISTÉRIO DAS OBRAS PÚBLICAS
DIRECÇÃO GERAL AGUA E SANEAMENTO (DGAS)
Rua: Avenida 20 de Maio – Caicoli, Caixa postal No 17, Tel. 3317157, 3317156 - Díli

"Consulta Pública ba Desenvolvimento Projeto Abastecimento Be'e Mos no Saneamento iha Capital Munícipio"
Dia: 10 de Outubro de 2020

LISTA PREZENSA

MUNICIPIO VIQUEQUE

NO	NARAN	SEXO		INSTITUISAUN/POZISAUN	SUCO/ALDEIA	NO CONTACTO	ASSINATURA
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AdP Timor-Leste Grupo Águas de Portugal

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23	Natalino pinto		M	RHTO	Caraubalo	77456562 WESSA	[signature]
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DISCLAIMER

This Project Document has been prepared by ADP/ENGIDRO/OASIS on behalf of and for exclusive use of the Government of the Democratic Republic of Timor-Leste, through the General Directorate for Water and Sanitation (DGAS) and is issued in accordance with the agreements between MPW, DGAS, the Asian Development Bank (ADB) and ADP - TL, as well as the legal requirements in effect in Timor-Leste.

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DOCUMENT TECHNICAL DATA

Title:	PROJECT DOCUMENT FOR ENVIRONMENTAL LICENSING – VIQUEQUE MUNICIPAL CAPITAL
OWNER:	Directorate General of Water and Sanitation (DGAS)
Location:	Viqueque, Viqueque, Timor-Leste
Name of Project:	Consulting Services for Detailed Engineering Design of Timor-Leste Four Municipal Capitals Water Supply & Sanitation Project
Consultant:	OASIS Sustainable Projects
Technical Supervision:	Vasco Lobato Leitão (Environmental Specialist)
Technical Inputs:	Maria Helena de Jesus (Environmental Engineer) Nofiano Ruas (Environmental Technician)
Date:	14 December 2020
Version:	Rev.0 – Draft for Client Review

ACRONYMS AND ABBREVIATIONS

2DCWSP	- Second Districts Capital Water and Sanitation Project
4MCWSSP	- 4 Municipal Cities Water Supply & Sanitation Project
ADB	- Asian Development Bank
FSTP	- Faecal Sludge Treatment Plant
PDC	- Project Design Consultant
DED	- Detailed Engineering Design
DGAS	- General Directorate for Water and Sanitation
SMASA	- Municipal Service for Water, Sanitation, and Environment
SMASA-National	- National office for SMASA
SMASA-Los Palos	- Los Palos Regional Office for SMASA
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
Masl	- meters above sea level
MPW	- Ministry of Public Works
PA	- Protected Area
PD	- Project Document
PMU	- Project Management Unit
SEA	- Superior Environmental Authority
SEIS	- Simplified Environmental Impact Statement
SEMP	- Site-specific 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

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INTRODUCTION

The significant growing number of the population in all Municipalities is resulting in the increase of water demand and wastewater production in the private and domestic sectors. Issues such as continuous water scarcity, poor infrastructures, inadequate water and wastewater quality has led the Government of Timor-Leste to focus on the water and sanitation improvement, particularly in the district areas.

The Four Municipal Capitals Water Supply & Sanitation Project (4MWSSP) will support the Government of Timor-Leste in providing access to improved water supply and sanitation (WSS) in 4 municipalities (Baucau, Los Palos, Viqueque and Same) by drawing on experiences and lessons learned from the ADB Second District Capitals Water Supply Project (46160-001) ADB TA-8064 TIM.

The project will build upon the current Government efforts in providing water supply and sanitation (WSS) services in Timor-Leste's urban areas, working towards the achievement of Sustainable Development Goal (SDG)-6 to ensure availability and sustainable management of water and sanitation for all by 2030, in line with the country's Strategic Development Plan 2011 – 2030 (G-RDTL, 2011), specifically the water sanitation strategy of "…providing a safe piped 24-hour water supply to households in 12 District [now "municipality"] centres…, by 2030,…" across Timor-Leste. It will also finance climate-resilient and inclusive WSS infrastructure in project municipalities and strengthen institutional and community capacity, sustainable service delivery, and project development.

The 4MWSS Project intends to produce the following outputs:

1) Propose the rehabilitation and expansion of the urban water supply system for Baucau, Los Palos, Same and Viqueque municipal capitals.
2) Establish fully functioning water supply and sanitation infrastructure in pilot schools and public areas i.e. markets that is effectively operated, maintained, and managed to provide a minimum level of service for water supply and sanitation to all citizens.
3) Facilitate new or improved household sanitation in all households in the Municipal capitals of Baucau, Los Palos, Same and Viqueque.
4) Establishing septic tank sludge treatment and disposal facilities and associated sludge transport system in the municipal capitals.

The Ministry of Public Works (MPW) is responsible for planning, implementation, regulation, and monitoring of WSS, specifically the General Directorate for Water and Sanitation (DGAS), which, under the MPW, supports the Water and Sanitation facilities in the municipalities, these operated locally by the SMASA regional office.

The MPW recognized its regulatory duty, as project proponent, as mandated in Decree Law No. 5/2011 - Environmental Licensing, to file a Project Document to the National Authority for Environmental Licensing (ANLA), as the start-up document for project screening and categorization under the environmental licensing process.

This Project Document's objective is to provide clear and relevant information on the proposed Water and Sanitation System Improvement Project for ***Viqueque Municipal Capital only*** (hereinafter called "Viqueque WATSAN Project") identified, located and described in Chapter Project Description, taking into account that its rehabilitation will be carried out under a future ADB loan to the Government of Timor-Leste.

One of the Project Document's primary source of information is a previous study carried out in 2015, by the consultancy firm Aurecon (ADB, 2016), commissioned by the ADB (Asian Development Bank)) to carry out the Technical Assistance (TA-8064) for the Second (2nd) District Capitals Water Supply Project (46160-001) and produce a demand responsive investment Masterplan to meet the water supply and sanitation needs of Timor-Leste's urban populations in Baucau, Lospalos, Viqueque and for Same, for the period to 2030, in line with national development plans and targets as outlined in the Timor-Leste Strategic Development Plan 2011 – 2030.

The ADB evaluated the environmental impact of the proposed rehabilitation through an Initial Environmental Examination (IEE) process under the ADB Safeguard Policy Statement (SPS) 2009 and concluded that the rehabilitation and management of the proposed Water and Sanitation components within the Viqueque project area, would improve significantly the life of the Viqueque Municipal Capital dwellers, classifying the project as a

Category B for environmental impact because the potential adverse environmental effects are site-specific, few (if any) were irreversible, and technical design and mitigation measures could be designed to address them.

Given the content of the information in the ADB commissioned IEE (ADB, 2015), this Project Document intends to propose a similar pathway and classification of the upcoming environmental study and provide updated information on the overall current legal and technical framework and secondary baseline data for the Viqueque components to, on the one hand, maintain the environmental thoroughness of the previous study and on the other hand verify if there is any change regarding the environmental impact conclusion and adapt and/or update the previous mitigation and management measures proposed to further improve the environmental sustainability of the future rehabilitated Water and Sanitation System in Viqueque Municipal Capital.

1. PROPONENT DETAILS

The Ministry of Public Works (MPW) is responsible for planning and oversight of the Water and Sanitation Sector and is the Proponent for the Viqueque WATSAN Project, supported by the General Directorate for Water and Sanitation (DGAS), responsible for the overall management, implementation and monitoring of the 4MWSSP project, while the SMASA Regional Office in Viqueque will manage day-to-day Viqueque WATSAN project implementation, construction and operation at the municipality level.

The project proponent and representative details/contacts for the Viqueque WATSAN Project are the following:

Proponent
Ministry of Public Works (MPW),
Mr. Salvador Pires, Minister
MPW Corporate Services Building
Avenida 20 de Maio, Caicoli, Díli, Timor-Leste

Proponent Primary Contact
General Directorate for Water and Sanitation (DGAS)
Mr. Gustavo da Cruz, General Director
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Proponent Secondary Contact
SMASA National Office
Mr. Eduardo Ximenes, Director
National Directorate for Water Services (SMASA)
DGAS Compound, Avenida 20 de Maio, Caicoli,
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Proponent Tertiary Contact
SMASA Viqueque Regional Office
Mr. Marito da Costa, Director
Suco Caraubalu, Viqueque, Viqueque, Timor-Leste
(Telephone: 77009015)

The Ministry of Public Works (MPW), on behalf of the Government of the Democratic Republic of Timor-Leste, contracted the consortium Águas de Portugal Timor-Leste / Engidro to prepare the "*Detailed Engineering Design of Timor-Leste Four Municipal Capitals Water Supply & Sanitation Project of Baucau, Manufahi, Lautem and Viqueque*", financed by the Infrastructure Fund of the Government of Democratic Republic of Timor-Leste. OASIS – Sustainable Projects is the Consultant subcontracted by ADP/Engidro for the environmental assessment and responsible in preparing this Project Document.

The Consultant contact details for the Viqueque WATSAN Project are as follows:

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2. PROJECT LOCATION AND SCALE

2.1 Geographical Location

The 4 MCWSS Viqueque project is located in the urban area of Viqueque Municiapla Capital Administrative post of Viqueque, Viqueque Municipality, Ossu Administrative post in the northern border, Uatulari and Uatucarbau Administrative Posts in the eastern border, Lacluta Administrative post in the west border, and the south bordering with the Timor sea (See Appendix 1). Geographical coordinates of the project site are in the SW

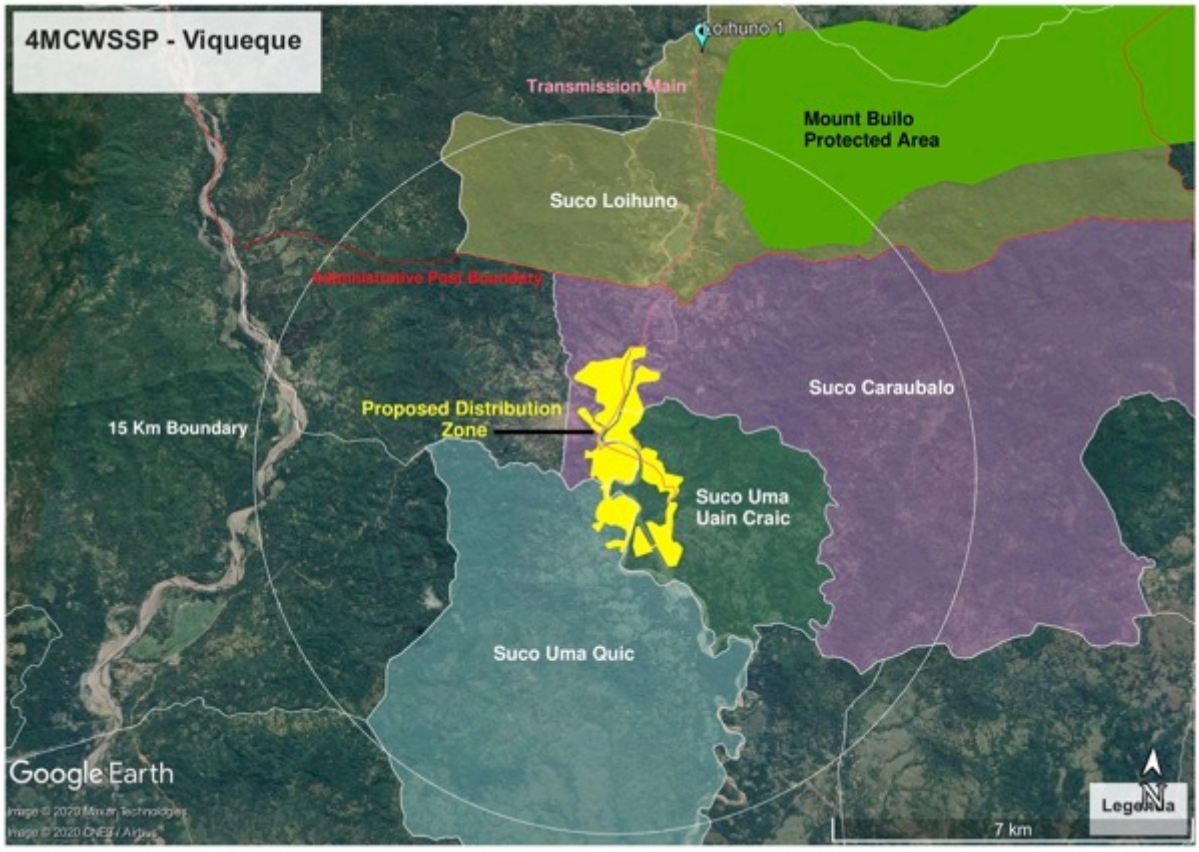
latitude of 8°56'17.94"S and longitude of 126°18'10.48"L and NE latitude of 8°47'53.13"S and longitude of 126°26'5.38"L.

2.2 Area Covered, Scale and Project

The Project scope includes all the areas that will be required to implement the Abstraction, Treatment and Distribution of Water for Human Consumption, as well as provide designs and solutions for Sanitation for Buildings, Schools and Housing within a diameter area of 15 Km around the municipal capital, as clarified by the client in April 2020, taking the Viqueque Water Distribution Zones defined in the Second District Capitals Water Supply Project (ADB, 2016) as the guidelines for the project area and scope.

The 15 km range area encompasses 8 sucos in total, namely Loihuno, Uai Mori, Bahalarauain, Uma Quic, Uma Uain Craic, Maluro, and Caraubalo. Moreover, the Mount Builo Protected Area slightly overlaps the Project Area Boundary but none of the components are within this PA, such as the Loihuno Spring, which is the closest component to this PA (See Figure 1).

Figure 1 - Existing & Proposed Water Distribution System Overlaying 3 Sucos Covered



During the Preliminary Design study, the team designated several location points and areas for the future pilot boreholes, the FSTP and the public toilets to be used for further investigation in the field. The water distribution system and future expansion to new household areas in Viqueque Municipal Capital are decided to serve 3 Sucos, as follows (see Figure 1):

- **Suco Loihunu**: included in Ossu Administrative Post, 2/5 of the Suco lies within the 15 Km project area, where a small part of the Southern area of the Suco includes one of the proposed pilot wells testing sites. While it does not include any of the proposed water distribution system, to the North, outside the 15Km project area it includes the Loihunu I, II and III Spring System, which is adjacent to the Mount Builo

Protected Area (PA), at a distance of 700m from the PA border and the Mount Mundo Perdido Protected Area, 4000m to the Northwest;

- **Suco Caraubalu**: included in the Viqueque Administrative Post, half of the Suco lies within the 15 Km project area, where a small part of the Western area of the Suco includes roughly a1/2 of the proposed Water Supply Network, 2 proposed pilot wells testing sites and 4 of the possible schools for the sanitation component;
- **Suco Uma Uain Craic**: lies totally in the centre of the 15 Km project area, where a small part of the Western area of the Suco includes roughly 1/3 of the proposed Water Supply Network and 1 of the possible schools for the sanitation component;
- **Suco Uma Quic**: 4/5 of the Suco lies within the 15 Km project area, where a small part of the Northeastern area of the Suco includes roughly a 1/6 of the proposed Water Supply Network, and 2 of the possible schools for the sanitation component;

Additionally, the Sanitation Component of Viqueque WATSAN Project area encompasses all households, buildings and schools within the 15Km diameter project area that are served by the proposed Faecal Sludge Treatment Plant (FSTP).

The implementation of the project is associated according to the cycle, which comprises of 4 phases, commencing from the design activity, aiming to meet the project's needs. The subsequent phases are the construction activities of infrastructures, following the operational and maintenances of the facilities, and the decommissioning.

Taking into account that each component is considered in order to elaborate the environmental management plan comprehensively, the project components are all aggregated within the 15 km radius project scope as shown in Figure 1 to be rehabilitated and/or newly constructed as described below:

a) *Water Sources:* Viqueque water supply system for the community comprehends one spring in which composed of three potential sources identified:

   i) the Loihunu I springs is located in close proximity to one another but at approximately 10 km northward from the Uluk Leu Rua Tank, they supply water to the urban area of Viqueque;

   ii) the Loihunu II springs is on the foothill of Mount Builo, a declared protected area under the Decree Law 5/2016;

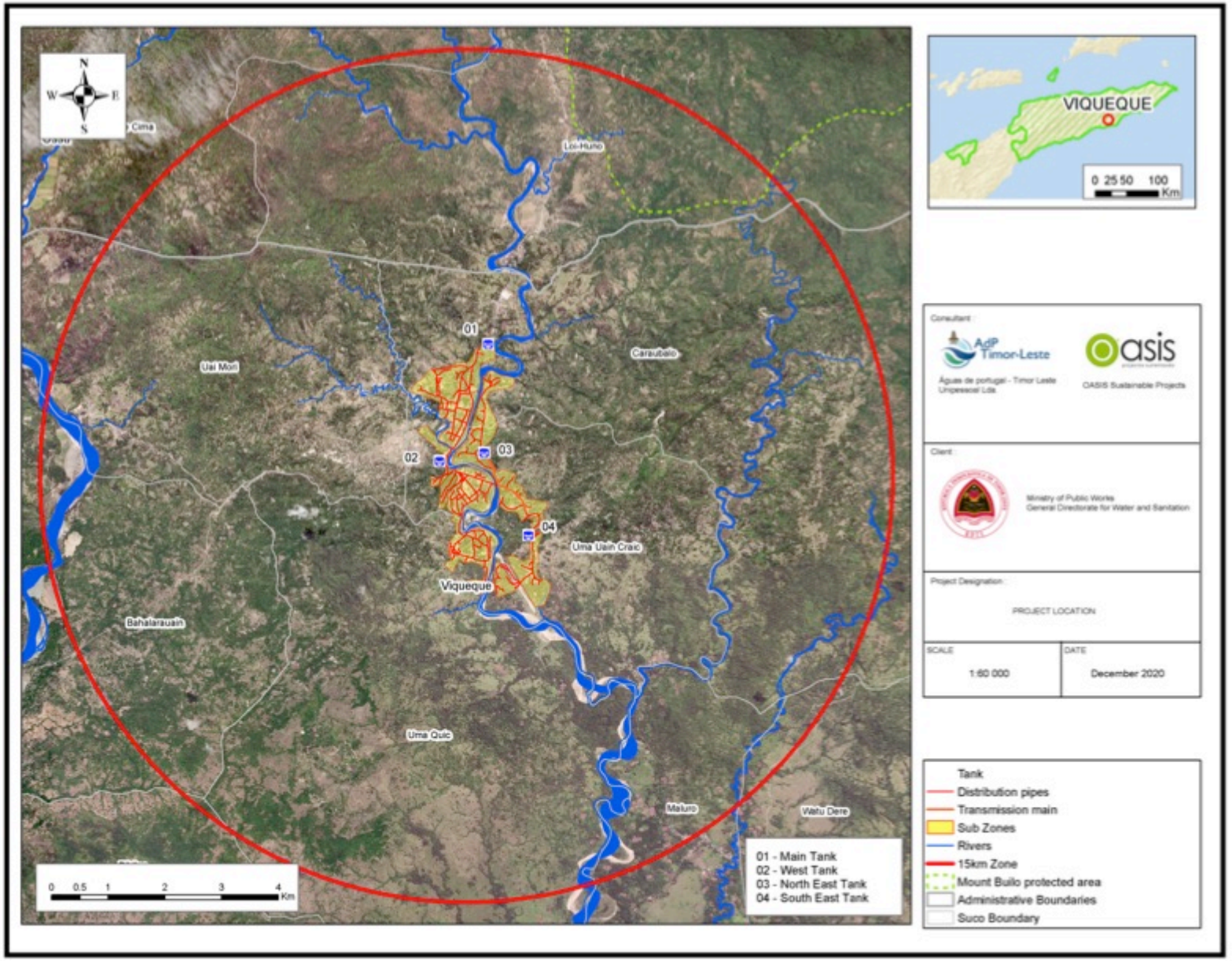
   iii) the Loihunu III springs is further upstream of Loihunu River where the water comes from Mundo Perdido (also a declared protected area in Timor-Leste under Decree Law 5/2015).

b) Several New Boreholes as additional sources complementing the existing springs and to be included in the system. Prospection areas were studied and selected for bore testing.

c) *Water Distribution Zones:* The main spring systems (Loi-Huno Spring) supply storage reservoirs and these subsequently supply to 4 distribution zones through transmission and distribution alignments with gravitational system.

d) *Sanitation sector:* 4 public toilets pilot tests in selected schools located within the 15 km project area and a new Faecal Sludge Treatment Plant (FSTP) to be implemented in Suco Maluru, at the end of Zone 1, in a distance of 450m from community settlements and 350 from the river. This proposed site is a flat area located on abandoned land with state-owned land status, according to SMASA - Viqueque.

Figure 2 - Project Location Viqueque Municipality



2.3 Material Source and Project Cost

This project will need raw materials for the implementation of construction activities such as sands, rocks and other necessary aggregated materials sourced from existing legitimate suppliers and designated quarry to be extracted nearby the project area. Before proceeding on the material extraction in the selected quarry, it is important to make sure that the activity is licensed, which will be prepared according to the procedure required. Although, trenching activity will preferably be chosen to do backfilling of the excavated soil, in order to minimize mobilization and reduce excessive extraction on the quarry, the cement is imported and the production of the concrete is done at projection sites.

The preliminary cost of the 4MCWSSP for Viqueque Municipality is estimated at USD$13,004,542 for proposed water supply and sanitation expenses, which is presented in the following table below:

Table 1 - Preliminary Cost Estimate for 4MCWSSP Viqueque Municipality

Water Supply System	**USD ($)**
Water sources and raw transmission mains	3,004,434
Water treatment plant	1,984,320
Water tanks and pumping stations	2,445,720
Transmission mains	982,950
Distribution network	3,777,718
Sanitation	**USD ($)**
Faecal Sludge Treatment Plant	603,960
Construction of 4 public toilets	205,440

3. DISTRICT AND VILLAGES

The 4MCWSS Viqueque Municipality project will cover 3 Sucos namely **Suco Caraubalu** (7 aldeias: Aldeia Cabira oan, Has Abut, Lamaclaran, Mamulac, Manehat, Siralari and Wessa), **Suco Uma Uain Craic** (3 aldeias: Aldeia Bosabein, Fatuhadan and Naeboruc), **Suco Uma Quic** (6 aldeias: Aldeia Aina Uain, Bahafou, Lua, Macadean, Maroman, and Raihun) and **Suco Maluro** (FSTP location)

However, there are some sucos that are included in or overlap a bit with the 15 Km project limit, which are **Suco Ossu de Cima, Uai Mori, Bahalarauain** and **Uato dere,** but no project component or activity is planned to occur within them**.**

4. PLANS AND TECHNICAL DESIGN OF THE PROJECT

4.1 Project Description

4.1.1 General Description

The aim of this project, in general, is to evaluate, assess and provide Detailed Engineering Designs for the following:

1) Rehabilitation of the Potable Water Distribution Network to consumers within the defined Water Zones;
2) Evaluate Existing and new sources for possible supply of the Water Distribution System;
3) Evaluate the condition and scale of the Sanitation situation in the Project Area and design wastewater treatment infrastructure for 4 Public toilets within the project's 15km diameter area;
4) Evaluate and Design a stand-alone Faecal Sludge Treatment Plant (FSTP) to receive the collection and treatment of septic tank sludge effluent from all households, buildings and schools within the 15 Km project range.

It is expected that by the end of the project, safe and reliable water supply will be provided to the municipal town (sucos and aldeias), and all households will have improved hygienic toilets as well as toilets available in public places. The improved water supply and sanitation facilities in the pilot schools will provide children with safe and

reliable water supply and toilets operated by competent operators in each pilot school, providing a template in other schools to improve water supply and toilets.

Finally, the wastewater produced by each household, in the form of septic tank sludge, will be safely transported and disposed of in purpose-built treatment facilities with the sludge transport and treatment facility operation contracted to a competent operator.

4.1.2 Water Supply System

A. Water Sources

The Viqueque municipality is located in the southeastern part of Timor-Leste, where it is composed by the Fractured Limestone of Mount Perdidu (declared a protected area under Decree-Law 5/2016) and Suco Loihuno where the base is sandy-shale and clay. The Loihuno Spring is associated to the existing fractures in this formation, and it consists of three main springs namely Loihuno 1, 2 and 3 although the community is also prevalent with different names for each spring.

Loihuno 1 spring: this spring is commonly known by the community as Buibau spring, according to information received from Uatolana Aldeia Chief (10th October 2020). Loihuno 1 is located in Aldeia Uatolana, Suco Ossorua and is used for public supply, which includes four private outlets (1/2" pipe and natural outlet). This spring has an approximate yield of 48 L/s (as per flow measurement survey on the 26th October 2020). During dry season the water is reported to have very low flow causing difficulty towards the inlet structure to allow water to enter the distribution system. Loihunu 1 spring is surrounded by 23 households (around 200 people) and only 8 houses that have an attempted cement but permeable septic tank. 15 households have hole-in-the-ground WC and animal husbandry activity is regularly found nearby the spring, which has led to contamination of the spring overflow and the next spring water source downstream.

Loihuno 2 spring: or Moloco spring is located 20 meters from Loihuno 1 and is on the foothill of Mount Builo, also a declared protected area under the Decree Law 5/2016. This spring has a considerable flow exclusively used for private users (14 users with rudimentary tubes between 1 and 3"). Loihuno 1 and 2 springs are located in proximity to one another but at approximately 10 km northward from the Uluk Leu Rua Tank.

Given the number of users of this spring, its use for public supply will be a source of conflicts, being preferable that the spring Loi-Huno 1 is exclusively for public use and Loi-Huno 2 for small private consumers as it is today. The combination of Moloco and Buibau spring is called Builau spring (Loihuno Suco Chief, 10th October 2020).

Loihuno 3 spring: The third spring is known as Loihuno 3 spring and the water comes directly from Mundo Perdido and only serves the community, mainly aquaculture activity such as fish farming. The water monitoring exercise shows an approximate flow of 20 L/s (26th October 2020) but it will be diverted for agriculture purposes only.

Figure 3 Loihuno 1 Spring and its Existing Infrastructure

Loihuno 1 known as Buibau spring

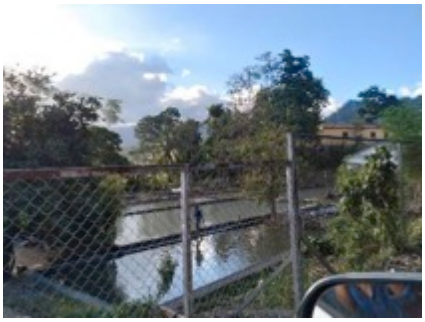
Transmission Main & other Private Tubes

Animal Husbandry and Dwellings Nearby Loihuno 1 Spring

Figure 4 Loihuno 2 Spring Water Abstraction System

Figure 5 Loihuno 3 Spring and Downstream Water Usage

Origin of Loihuno 3



Fish Farms Governed by the Municipality

Private Fish Farm

B. Distribution System

The Loi-Huno spring is the current water source for Viqueque Municipal Capital, which supplies separate reservoirs and subsequent transmission and distribution alignments with gravitational system into the Municipal

Capital's water distribution zones. The transmission main from Loihuno to the Main Reservoir has been built since Timor-Leste's independence and both it and the remaining transmission mains have inumerous leaks and illegal connections as observed during field visit. The other 3 existing water tanks are also in poor condition with lack of maintenance and very small capacity to store water. The team has come to the conclusion that, to safeguard water quality and public health, the whole existing network will be replaced by new infrastructure.

The distribution system includes old Portuguese pipes particularly in the old town area, as well as significant lengths of mains from the period of the Indonesia administration, and newer mains installed since independence. There are numerous duplicate mains. The distribution system requires rationalization and simplification as well as decommissioning and removal of all Portuguese era mains. Extensive use of 50 mm diameter during the emergency periods also requires replacement (except where installed as rider mains). Most importantly the distribution system needs to be redesigned to suit the revised zoning arrangements.

Figure 6 Example of Distribution Areas and existing installation

Suco Caraubalo (Zone 2.1) Example of Pre-existing alignments to be rehabilitated along existing roads

Suco Uma Ki'ik (Zone 1.2) alignment for rehabilitation

Suco Uma Uain Kraik (Zone 4) Airport area - alignment for rehabilitation

C. Gaps in Water Supply

Water Balance: Demand vs supply.

The water supplied to consumers throughout the years was proven to be insufficient due to higher demand and the infrastructures for water abstraction and delivery not being upgraded for a very long-time, hindering optimal operation and distribution, as well as the limited number of natural water sources available.

The Preliminary Design followed a dimensioning process that reviewed 2 different scenarios, namely Scenario A in adherence to 2016 Masterplan (equivalent to current distribution capacity and customers). However, the project should be able to provide reliable water sources sufficient for the expected expansion requirements for Viqueque Municipal Capital. Therefore, a Scenario B was chosen as the project horizon, as it includes expansion areas and user numbers for the next 20 years, up to 2040.

To clear the uncertainty of the production yield of the sources, a hydrogeological study was conducted in October 2020 (in equivalent conditions to the end of the Dry Season) to determine the available yield of proposed boreholes and existing springs through bore testing and v-notch installation. Table 2 – Water Demands versus Origins Availability presents the water demand versus water flow estimation.

Bore testing was carried out at all 4 proposed prospection points between 27th July and 12th September 2020. However, the test were not successful and it was concluded that groundwater is unavailable in the project area. Therefore, the team has decided to select Kuha River as final option for complementing the system with water for Viqueque. A Water Treatment Plant is to be constructed to support treatment from the water abstraction in the Kuha river, given the turbidity has been tested as very high with possible contamination.

Table 2 – Water Demands versus Origins Availability

Demands	**L/s**	**m³/day**							
2020 Scenario B	28.6	2,471.04							
2030 Scenario B	39.3	3,395.52							
2040 Scenario B	54.2	4,682.88							
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	5.0 to 50.0	432 to 4,320	5.0 to 50.0	432 to 4,320	-	-	-	-	0
Loihuno 3	20.0	1,728	-	-	-	-	20.0	1,728	100
Kuha River	50.0 to 0.0	4,320 to 0.0	50.0 to 0.0	4,320 to 0.0	-	-	-	-	N/A
Total	**75.0 to 120.0**	**6,480 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							

Figure 7 - Borehole Testing in 4 Designated Prospection Points

Bh#1 Aldeia Mamulac

Bh#2 Aldeia Cabira Oan

Bh#3 Aldeia Has Abut

Bh#4 Aldeia Fatuhadan

These preliminary results show that Loihunu 1 and Kuha River Intake are estimated to have more than enough water flow to supply the current and future demands Viqueque Municipal Capital, estimated at close to 2 times the 2040 water demand to cover all the proposed households within the supply zones.

These preliminary results also take into account the social and ecological needs flow for the spring sources, including agriculture and aquaculture activities identified during the IEE characterisation. The Ecological flow considered provides for the variability of rain and flow between dry and wet season and has been determined, at a minimum, of 30% average monthly flow for Wet Season and 10% for Dry Season. The water sharing for Loihunu sources has been assumed to be divided by source, which lowers the importance and/or need to establish the ecological/social flow, as Loihunu 1 will continue to be a dedicated source for the Distribution system and Loihunu 3 will serve both the social and the ecological needs of the surrounding area.

Figure 8 - Kuha River Southeast Ward View

4.1.3 Sanitation System

Based on the 2016 Master plan, the National 2030 target for household sanitation is 100% access to hygienic toilets and improved hygiene behaviour, consistent with the Government Resolution No. 8/2012 - Sanitation policy. However, major deficiencies of current public toilets in Viqueque are: lack of cleanliness; insufficient water

supply; poor construction standards and inadequate lighting. School Sanitation is also not "User friendly" (where none of the toilets cater for special infrastructural requirement of children, physically handicapped persons or menstruating girls), and there is inadequacy of funds for operation and maintenance.

In addition, according to the Master plan, only 15% households in Viqueque practice open defecation and 44% of the households already have their own hygienic private toilet, which means the community is starting to have initiative movement on improving the quality of living standard. 35% coming from private and shared toilets have poor and unhygienic condition. Those that do not practice open defecation are contributing with septage, either through their own toilets or shared toilets. These are presumed to have leaching pits functioning as septic tanks for all practical purposes. Hence all these sanitation facilities are producing digested sludge, which needs to be removed once every two years.

4.2 Proposed Project Scenarios

4.2.1 Water Supply System

A. Water Sources

Previous to this study, SMASA-Viqueque has carried out numerous borehole drilling attempts to try and reinforce the current system, although none of the activities produced satisfying results i.e. available water. More recently, the water-drilling test under this study had the same results and verified that water dried out after drilling up to the maximum depth, which has led the team to agree on a single scenario that achieves the water production necessary to meet 2040 demands.

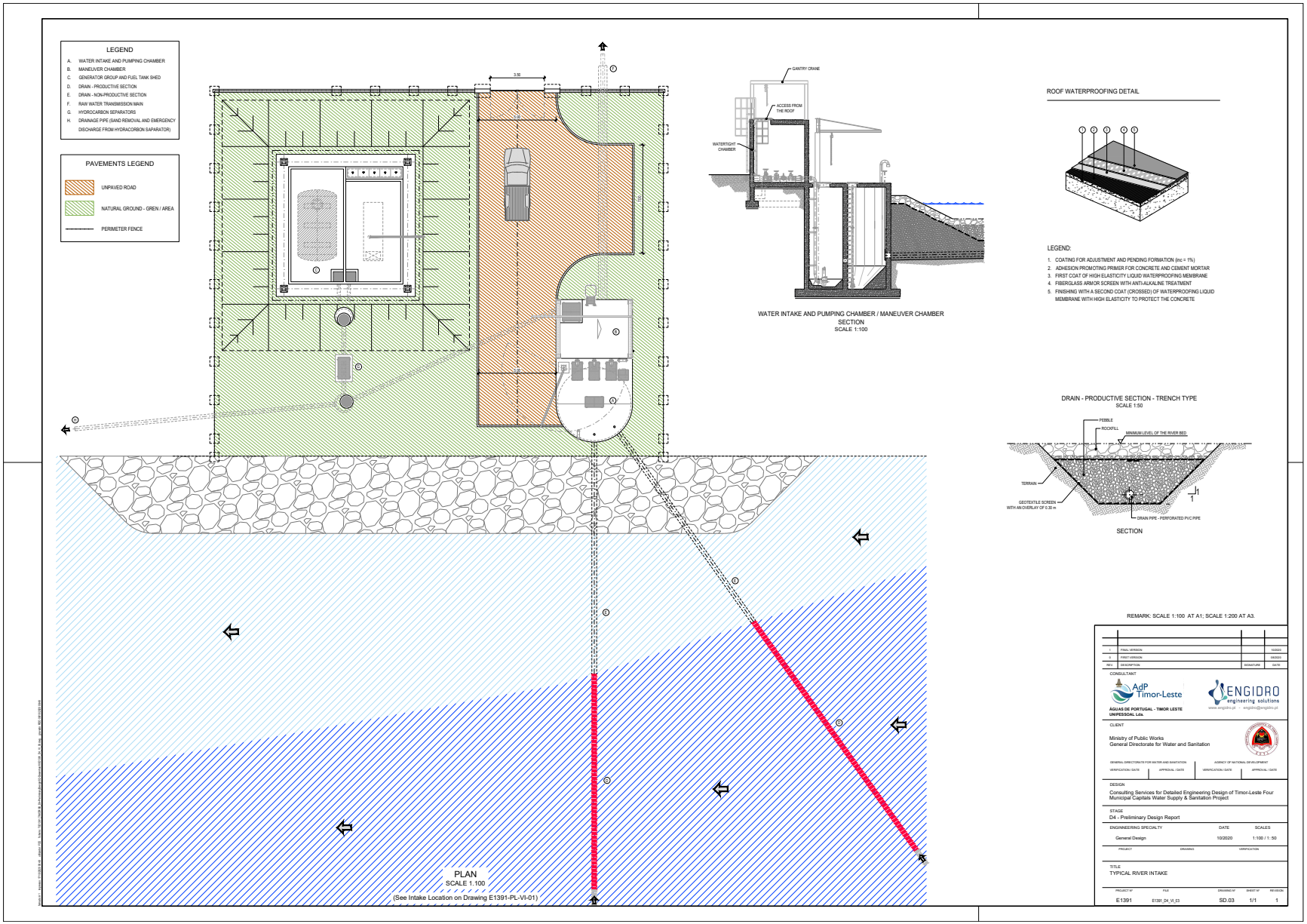
Table 3 - Preliminary Assumption for Water Scenario

Viqueque	Only Scenario	Proposed Water Sources	Loihuno springs and new river intake at north of the city
		Possible reinforce	Not available

Water abstraction from the Cuha river is going to be considered, made by a well located on the riverbank, or by one or more intake pipe screens in the riverbed (see). The intake pipes, screened along their entire length, are installed in a previously trenched excavation filled with medium to coarse gravel pebbles. If required, gabions may be installed to protect the pipes during the occurrence of large water flows.

This system will conduct and dump the water into a well. The well will be placed underground and built with reinforced concrete, composed by two compartments. The first well compartment (reception well) will carry the function of allowing sedimentation of the heavier particles that did not get retained before in the upstream. In this well, an electropump group for sand removal will be installed. Contiguous to the reception well compartment, another well will be installed with the objective to pump water to the water treatment plant. Adding to this, submersible pumps suitable for "waste waters" are going be installed.

Table 4 Kuha River Proposed Intake Infrastructure



B. Water Storage, Treatment and Conveyance

Due to the Kuha river that having high turbidity level and faecal contaminated due to animal livestock activities in its embankments and also in the water bodies i.e. buffalos, crocodiles, etc, the applicable treatment will include a WTP with the following treatment line: coagulation, flocculation, sedimentation, filtration and disinfection with chlorine. The WTP is expected to be located next to the road and at the city limits (Figure 10 and Figure 10).

Figure 9 - Loihuno Transmission Main. Pressure Break Tanks

A 7500 m long gravity transmission main will be built from Loihuno to the WTP. Given the elevation gap, from 320 m at Loihuno spring to 75 m at WTP, the transmission main will be equipped with two pressure break tanks to limit the maximum pressure value to 10 bar.

The water treated at WTP will be pumped through a 475m long transmission main and stored at the Main Tank. From the Main Tank (105m elevation), starts a gravity transmission main that, along its 5200m total length, will supply the West Tank, the Northeast Tank and the Southeast Tank, all three at 90m elevation.

According to the proposed design, the storage will be equivalent to 13 hours of MDP (Maximum Day Production), which includes the diurnal fluctuation and the emergency storage. These aim on reducing water losses and guaranteeing the reliable operation of the different supply zones. Therefore, water tower will be needed in the distribution centre. A minimum of two chamber storages will also be considered in each tank, so that water supply won't be interrupted during maintenance works. Overall, the 4 existing tanks will be upgraded for their capacity and infrastructure with another tank as an additional.

Table 5 - Water Tanks Capacity to be increased

City	Tank	MDP* (m^3/d)			Storage Needed (m^3)		Proposed Storage (m^3)
Viqueque	Main Tank	393	531	721	531	721	800
	West Tank	486	639	849	639	849	900
	North East Tank	278	398	563	398	563	600
	South East Tank	121	190	288	190	288	300
	Raw Water Tank (2)	-	-	-	-	-	700
	Total	1,277	1,759	2,422	1,759	2,422	3,300

Figure 10 - Proposed Water Intake & WTP Viqueque

C. Rehabilitation of the Transmission and Distribution Mains

The type of construction for transmission lines and distribution networks has to follow the design criteria, starting from the material selection, design type of trench and the operational system.

Material Selection: The following criteria regarding material selection is proposed:

Transmission Lines (HPDE and Ductile Iron):

- Transmission lines with nominal pressure below 16 bar and nominal diameters below 315 mm – use of HPDE;
- Transmission lines with nominal diameters equal or above 300 mm - use of ductile iron;
- All transmission lines with nominal pressure equal or above 16 bar (regardless of the diameter) – use of ductile iron.

Distribution Network (HPDE):

- Distribution network & house service connection – use of HDPE.
- Laying of Transmission Mains and Distribution Network

It was assumed that pipes will be implanted underground, laid along and within the road Right of Way (RoW) or outside the RoW for the purpose of replacing/rehabilitating existing pipes. Inside the city area, transmission mains will be laid below the distribution network level, as represented in Figure 11, in order to allow the construction of the service connections on each side of the roads without interference with transmission mains and, also, to become more difficult to do illegal connections. Typical trench details are presented in Figure 12.

Figure 11 - Laying of Transmission & Distribution Line Along a Road. Typical Cross Sections

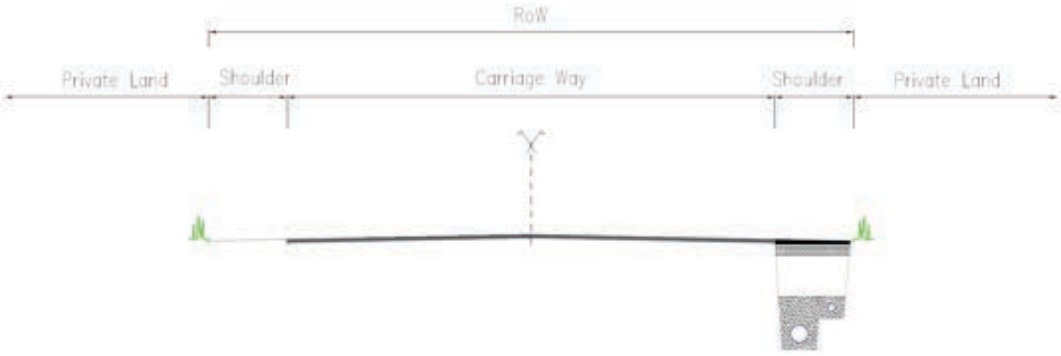
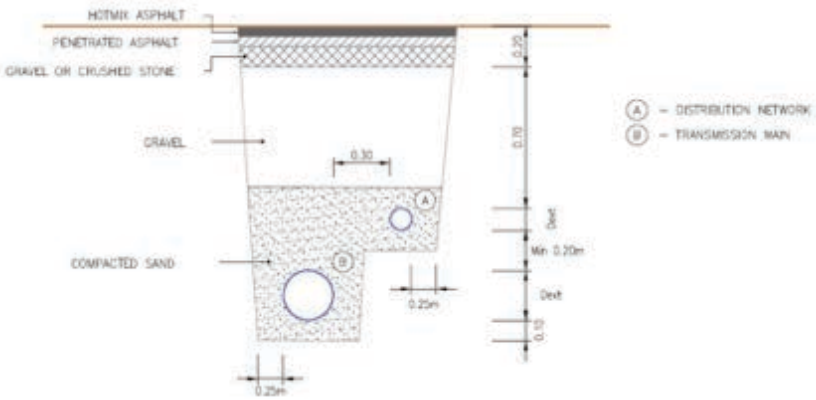


Figure 12 - Typical Double Trench



Transmission Mains Service

The distribution networks will be connected from water tanks. Even in situations where this option implies new network extension, the resulting benefits are significant since the operation of the systems will be facilitated and, therefore the transmission lines system will not be vulnerable to any ruptures in the distribution network.

Gravity Transmission Mains Operation

To ensure a balanced water supply to the water tanks, when a transmission main supplies more than one water tank, the connection to the tanks will be equipped with automatic control valves, which allows the flow control and will avoid the occurrence of random feeds depending on the value on piezometric head value in the pipe connection on each reservoir.

Distribution Network Pressure Zones

In each distribution zone, the pressure in the network can vary between 10 m - 60 m. When a water tank supplies a distribution network that has more than one pressure zone, the pressure zones will be set by Break Pressure Tanks (BPTs) or by Pressure Reducing Valves (PRVs).

Advantages of BPTs vs PRVs:

- Less maintenance BPTs have a higher turn down ratio than pressure reducing valves
- Even if the BPT fails, the downstream pipeline will never be exposed to excessive pressures
- A BPT has fewer components than a conventional pressure reducing installation
- PRVs will leak and need maintenance at some stage. PRVs requires more skills.

Disadvantages:

- BPTs are expensive and bulky.
- The level and flow control mechanisms are vulnerable to tampering and damages.
- Pressure is reduced all the way down to atmospheric pressure. This makes supplying areas immediately downstream at sufficient pressure difficult, which will imply the duplication of primary distribution mains since it will be necessary to install the BPT at a level that guarantees the minimum pressure value in the downstream distribution network.

4.2.2 Sanitation System

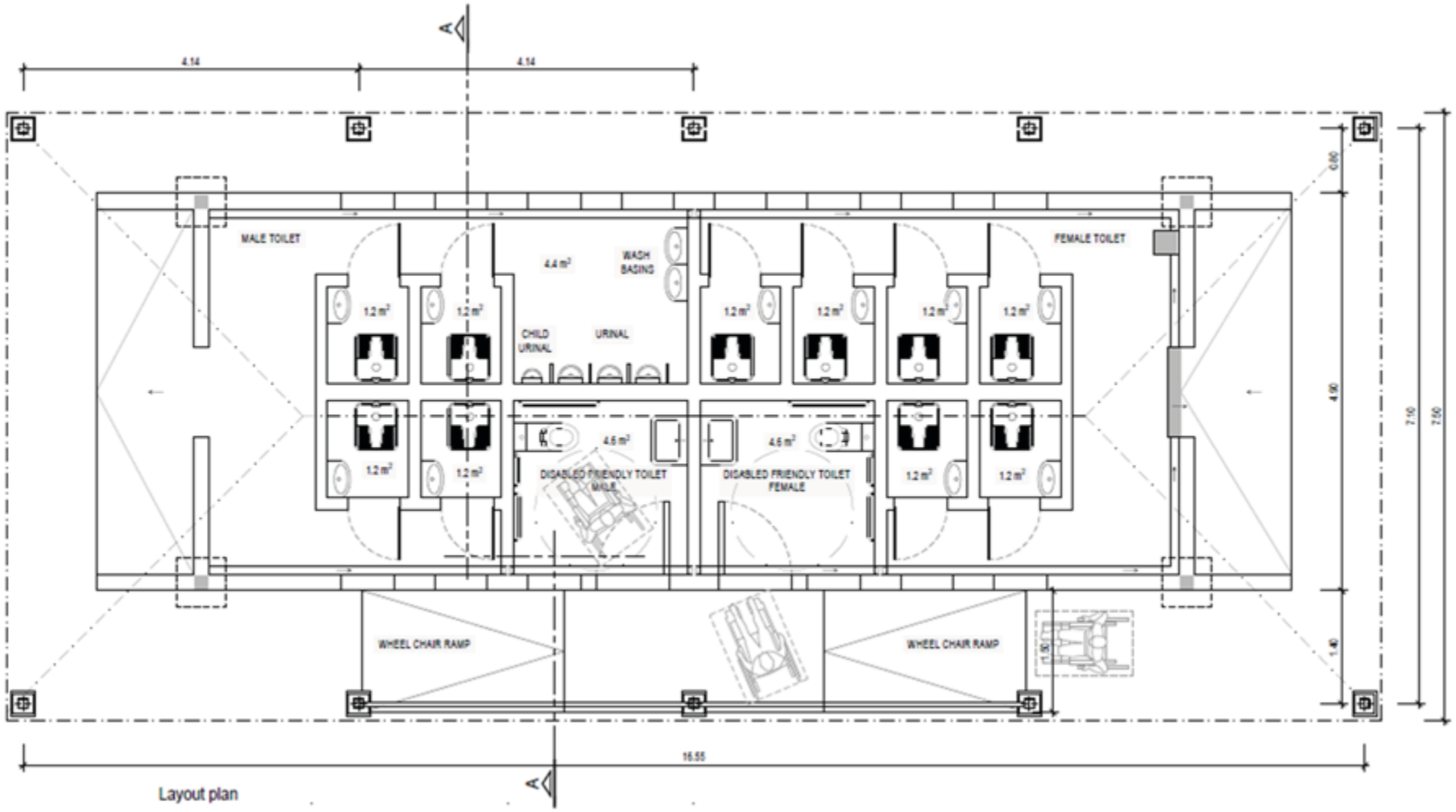
The proposed sanitation treatment sector is composed of 4 pilot test sites for public toilets (with septic tank and effluent soak pit system) and the construction of the Faecal Sludge Treatment Plant (FSTP) to receive the septage from these pilots, as well as all buildings and households located within 15 km of the Viqueque Municipal capital. According to the Master plan, it is inferred that National 2030 target for household sanitation is 100% access to hygienic toilets and improved hygiene behaviour as in consistent with the Government Resolution No. 8/2012 regarding to the Sanitation policy. The public toilets' pilot test locations will be chosen per the location and conditions of current sanitation infrastructure, users, as well as and specifically regarding schools, on the number of students, teachers and other school personnel, as well as the state of the toilet facilities.

A. Public Toilets

The proposed specifications for the Public Toilets are based on the information below:

1. Male Toilets:
   - Adult: 3 urinal stalls
   - Adult & Children: 3 latrines (each with 1.2 m^2[approx.]);
   - Children: 1 small urinal
2. Female Toilets:
   - Adults & Children: 5 latrines (each with 1.2 m^2[approx.]);
   - Facilities for menstruating girls.
3. Physically disabled Toilets:
   - Adults & Children: A common latrine for physically disabled person shall be provided at the centre of men's and women's section. Area of latrine with a ramp etc. for a handicapped person=3.70 m^2 [approx.]

Figure 13 - Public Toilet Layout



The treatment of the public toilet septage is being proposed in a two-step process, as described below:

1. Primary Treatment - Septic Tank: shall have minimum width of 750 mm, minimum depth of one metre below water level and a minimum liquid capacity of 1 000 litres. Inlet: The pipe shall be fixed inside the tank, with top limb rising above scum level and the bottom limb extending about 300 mm below the top water level. Outlet – It would be fixed like inlet but shall be 50 mm below the invert of the inlet pipe.
2. Secondary Treatment - Soak Pit or Dispersion trench or Subsurface absorption system

These infrastructures will be carefully selected and designed according to the available areas, local conditions and receiving environment, based on the number of expected users and adapted to the specific local characteristics where the public toilets will be implemented.

Figure 14 - Septic Tank up to 50 Persons Capacity

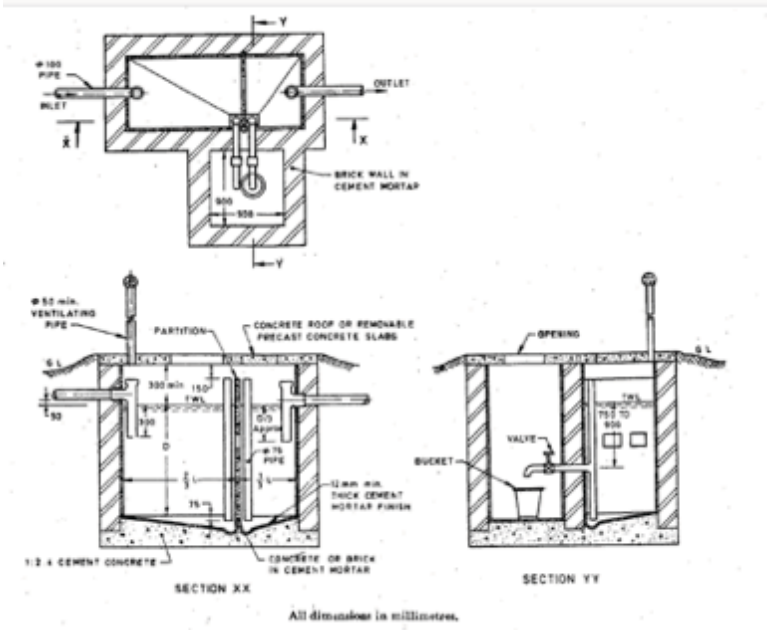
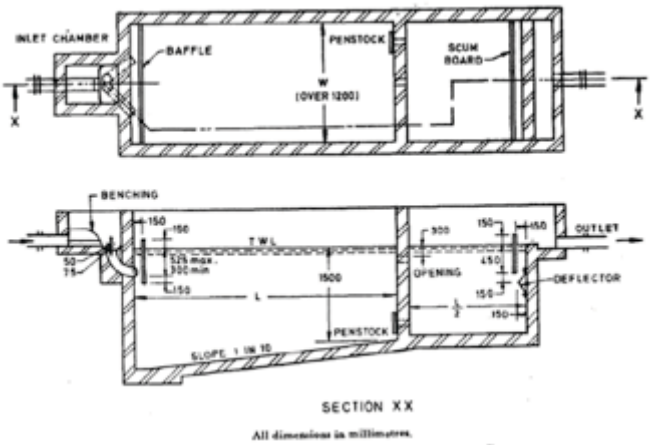
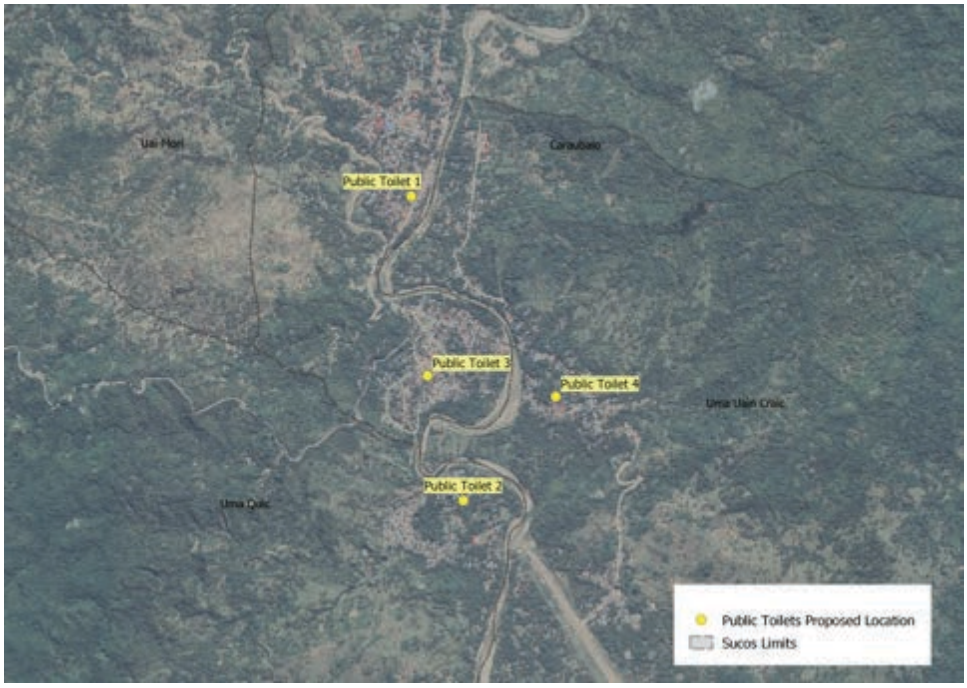


Figure 15 - Septic Tank for up to 200 Persons



The locations for future public toilets have been designated considering the magnitude of the benefits towards the community. Thus, the pilots are selected in places that have moderate to high mobility in which the beneficiaries are often conglomerated e.g. markets, terminals and other public spaces.

Figure 16 - Pubic Toilets Proposed Location – Viqueque



Source: AdP Timor-Leste/ Engidro

Figure 17 - Aerial Imageries of Public Toilets Proposed locations

VI PTF Op 1 - BNCTL and BNU, Suco Caraubalo, Aldeia Mamula

VI PTF Op 3 - St. Cristovao Football Field, Suco Caraubalo

VI PTF Op 2 - Sede Suco Uma Quic, Suco Uma Quic

VI PTF Op 4 - New Market, Suco Caraubalo, Aldeia Wessa

B. Faecal Sludge Treatment Plant

The FSTP was designed considering the future users of the sanitation system up to 2040, namely public buildings, households and schools. The FSTP will be supplied with septage collected by vacuum trucks from domestic and non-domestic sources and the estimated daily volume collected in Viqueque can be viewed in Table 6

Table 6 - Septage Volume projection for Urban Area of Viqueque

Viqueque	2020	2030	2040
No. of Households-[6.05 avg HH size] -DED	2130	2932	4038
Septic tank coverage assumption	62%	74.7%	90%
No. of septic tanks	1,320	2,190	3,633
Total sludge produced (m^3/year)	329	548	876
Total sludge produced (m^3/d)	0.9	1.5	2.4

To define the FSTP ideal/possible location, the following requirements were taken into account:

- Proposed location of FSTP shall be available within 15 km distance
- Easy road access
- The land should be relatively flat to facilitate the construction of lagoons without excessive earthworks
- The lagoons will be constructed using earthen embankments. Site is assumed to be on soil.

The proposed FSTP will be best placed in Suco Maluro, southern part of Viqueque Municipal Capital. The designated area was recommended by SMASA-Viqueque, it is approximately 4 kilometers away from the urban area and is the only routing for septage delivery. Current road is being rehabilitated and will guarantee the trucks to reach the FSTP without obstruction or foreseeable delays.

Figure 18 - FSTP Viqueque proposed Installation and segments

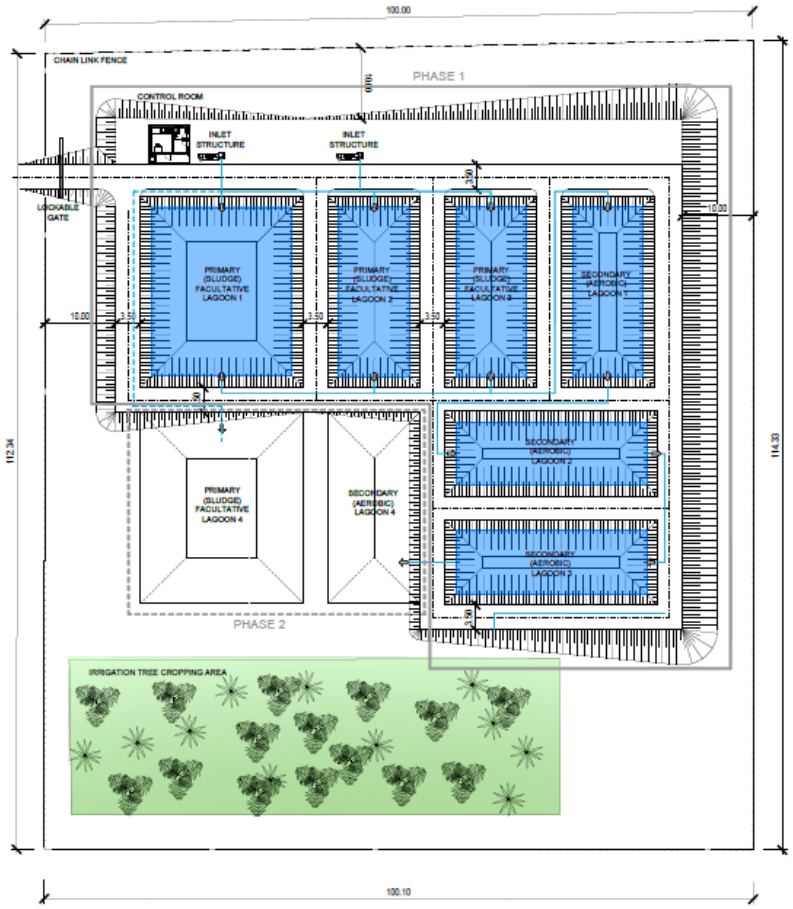


Figure 19 – Selected Location for FSTP and Characteristics of the Area

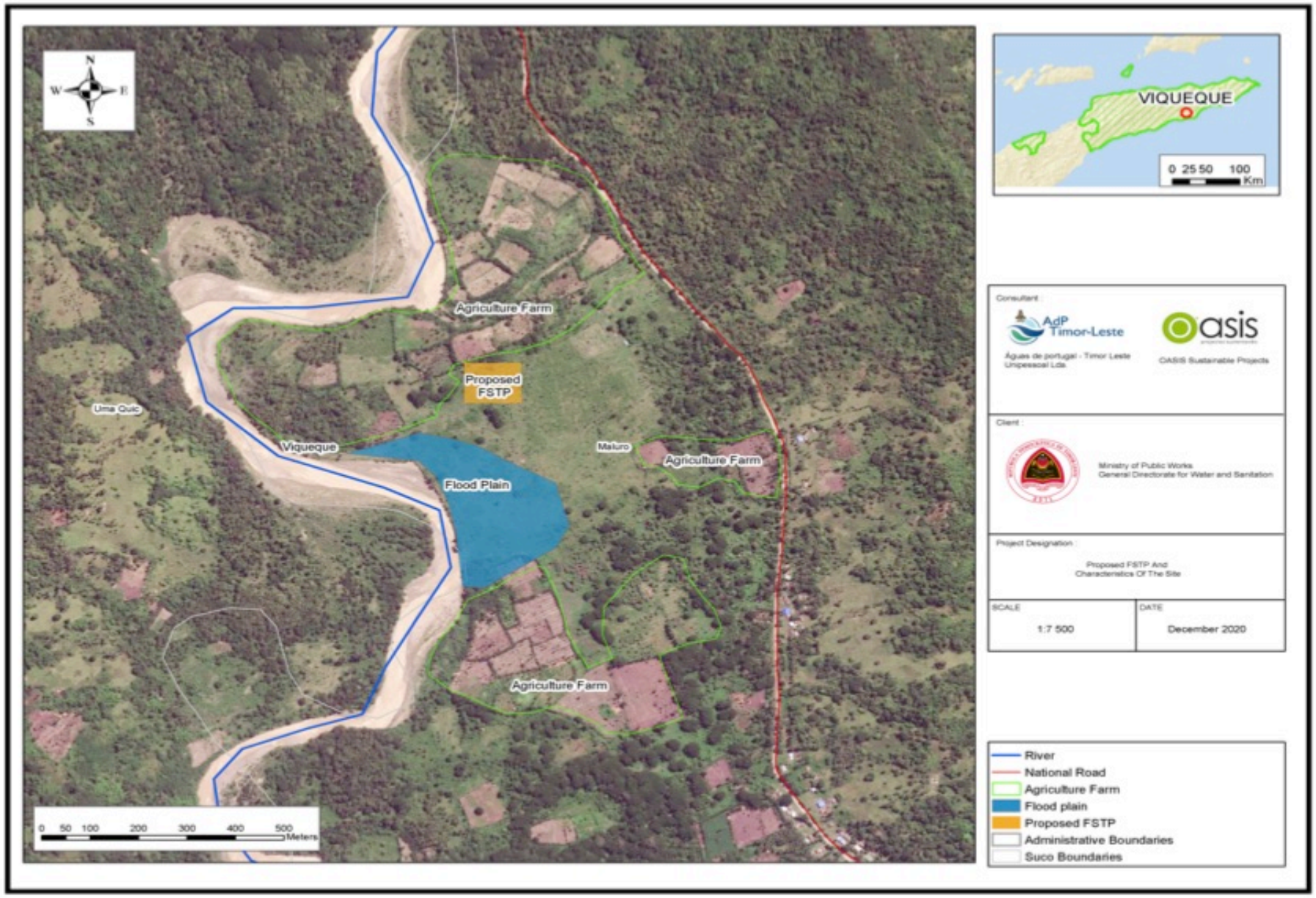


Table 7 – FSTP Possible Locations and Description

FSTP	Coordinates	Actual Area Available (m2)	Distance from (m)		Site elevation above MSL (m)	Description / Location Characteristics	Comments	
			Habitation	Water Body				
1	Lat: -8.913561° Long: 126.393317°	10000	450	350	21	Location characteristics: Recommended by SMASA-Viqueque Located on abandoned land with state-owned land status Flat area Distance from the road about 280 meters 450 meters from community settlements and 350 m from the river	Recommended	
2	Lat: -8.889219° Long: 126.379329°	8000	140	100	22 - 25	Location characteristics: Located above a community garden, a flat area, distance from the road about 700 meters, 120 meters from community settlements and 80 meters from the river In Lulik/sacred Area	Not recommended	
3	Lat: -8.891005° Long: 126.384807°	64000	Far from Habitation	250	54	Location characteristics: located on abandoned land with unclear land status, slope area, distance from the highway about 420 meters far from community settlements and 250 meters from the river In Lulik/sacred Area	Not recommended	

5. FEASIBILITY STUDY OF THE PROJECT

This Project Document's primary source of information for this study were (but not limited to):

- Master Plan for the Second (2nd) District Capitals Water Supply Project (46160-001) TA-8064 TIM in the four Districts Baucau, Lospalos, Viqueque and Same, carried out in 2016, by the consultancy firm Aurecon;
- Baucau, Lospalos, Viqueque and Same Initial Environment Examination (IEE) and Environmental Management Plan (EMP), carried out in 2016, under Grant no. 8064-TIM from the Asian Development Bank (ADB);
- Ongoing 4 MCWSS (The Four Municipal Capitals Water Supply & Sanitation Project) IEE for Same Municipality.

A preliminary, non-in-depth feasibility study has been conducted regarding geological, hydrogeological, topography and Water study (see Table 8). The aim of the study is to understand the Karst System in order to define water sources, water flow capacity, geospatialize the project area and to ensure the quality of the water is suitable for human consumption.

Table 8 - Summary and Timetable of Feasibility Studies Conducted

Study	Date	Description Activities
1. Geological Study	TBC	Identify the local geology and geomorphology for Viqueque Municipal Project Area as well as its geotechnical implications for the engineering design. Given that site investigation works haven' t yet started, very little information is available, essentially concerning bibliographical data coming from diverse sources, namely *Instituto do Petróleo e Geologia*, Private investigation works and scientific papers.
2. Hydrogeological Study	26th October 2020 (V-notch installation) 27th July – 17th September 2020 (Bore testing)	V-notch tests were conducted by the research team to the existing springs, in order to estimate the hydraulic properties of aquifers, while the bore testing is to evaluate well performance and identify aquifer boundaries. The test activity includes a field experiment in which a well is pumped at a controlled rate and water-level response is measured in one or more surrounding observation wells and optionally in the pumped well (control well) itself.
3. Topography Survey	- October 2020	The project area was surveyed through classic topography survey and aerial drone survey.
4. Water quality Testing	- May 2014 - December 2019 - January 2021	Water quality testing conducted by Aurecon under the 2015 IEE exercise; Two recent water quality testing from the National Directorate for Sanitation and Water (now SMASA), to register any occurrence of contamination to water for human consumption. Types of considered parameters that were analysed are physical, chemical and Bacteriological test under the WHO Standards. Water quality testing planned for all water sources, campaign to be done in 2021
5. Preliminary Design for the Detailed Engineering Design of Timor-Leste Four Municipal Capitals Ater Supply & Sanitation	March to present, 2020	Definition of solutions to be detailed in the Detail Design, define the locations, layouts and main characteristics of the proposed systems and infrastructures, including the water supply systems and the faecal sludge treatments plants, and review of the demands estimation and a preliminary cost estimate of all

Study	Date	Description Activities
Project – Same Municipal Capital		infrastructures including different scenarios and options.
6. Initial Environmental Examination (IEE) under ADB SPS 2009	March to present, 2020	The environmental assessment was conducted for the Same Municipal Capital water supply and sanitation project, based on (i) the preliminary engineering design, and (ii) most likely environmentally sensitive components. The IEE report itself describes this process, where it (i) provides project information and environmental requirements; (ii) provides baseline physical, ecological, cultural and socioeconomic information surrounding the project's area; (iii) identifies and assesses potential environmental impacts from the project's implementation; (iv) includes recommendations for measures to avoid, mitigate, and compensate adverse impacts; (v) informs on stakeholder consultations and participation activities during project preparation; (vi) provides an environmental management plan; and (vii) presents a grievance redress mechanism for the project.

6. LAND AND WATER USE

6.1 6.1 Land Use

Viqueque has been identified as having similar topographical and biological conditions to Manufahi Municipality (Worley Parsons, 2012). The higher regions of the Northern and Eastern upstream area of Viqueque consists of tropical rainforest, with high species diversity, whilst the lower land area (where the project is located) is a predominantly mix-use setting i.e. urban with some rural activity, transitioning from forested areas with some stands of tropical evergreen to semi evergreen forest to dry forest.

The predominant form of livelihood for households in the project area (Viqueque Administrative Post) is a mix-use setting i.e. urban activity from economic, education, health sector up to religious and a wide range of agricultural activities from animal husbandry (cattle and buffalo) to cropping (corn, maize, rice and others). These agricultural activities have put extreme pressure on the mid to high range forest areas, where the loss in dense forest has been occurring over the years and deforested areas are higher than sparse forest areas (ADB, 2016).

All proposed project activities will be carried out within 15 Km diameter Project Area Boundary around Viqueque Municipal capital and none of the components are found within a sensitive area. Mount Builo, which is defined as a Protected Area, slightly overlaps its boundary within the northwest of the Project Zone Boundary, Loihuno I spring being the closest project component but located outside of the PA, with dwellers and animal livestock activities surrounding the spring. The Loihuno I spring and Mount Builo are also said to be Sacred and cultural ceremonies are usually celebrated every year.

In addition, designation of the location for FSTP construction will also have to consider the land status, in which the government's property would be preferable. This requirement is accounted as part of the mitigation measures, aiming to avoid any sort of disputes in the future between the community, project proponent and selected contractor. Therefore the proposed FSTP site is presumed to be installed in a private land which was recommended by the SMASA-Viqueque.

6.2 Water use

The majority of the population is mostly composed of self-employed farmers (25% of the municipality population), representing 76% of the total employed population in the Municipality, and water has been an important source for securing their activity so as to have a sustainable income. Agriculture is heavily dependent to the amount of rainfall in a given year, followed by harvesting water from the nearest water stream.

Taking in account 15 km diameter of the proposed project, it's possible to identify three potential sources of water supply. These potential sources were Loihunu 1, Loihunu 2, and Loihunu 3 (Permanent Springs), emerging from a limestone aquifer. It is located in close proximity to one another but at approximately 10 km northward from the Uluk Leu Rua Tank (ADB, 2016). Those springs are being used primarily for sanitation purposes, including washing clothes, bathing, and crop watering but not for drinking and cooking given the water are contaminated with Ecoli due to livestock practices. Moreover, it is also being used privately to provide water for the aquaculture activity (i.e. fishponds).

At this moment, SMASA Viqueque provides a water supply service that has not been able to meet the growing demand for water from the consumers. The existing distribution alignments are not quite integrated, the poor condition of the pipelines, and high incidence of illegal connections are part of the main issues why the water system is currently unable to serve the Viqueque population. As such, refurbishing the existing network to repair leaks, increasing capacity and pressure, removing illegal connections, and providing a new system of metering to streamline leak detection within the 15 km diameter of the project, should solve all of these issues.

7. ENVIRONMENTAL IMPACTS

The 4 MCWSSP is expected to have numerous beneficial and negative impacts towards the environment and social aspects due to various project activities. The potential impacts and mitigation measures assessment for Viqueque Municipality are predicted based on each of the project components, namely: 1) water sourcing; 2) treatment and storage; 3) distribution networks; and 4) sanitation sector (public toilets and FSTP), according to the project cycle (Design phase, Construction phase, Operational and Maintenance phase, and Decommissioning phase), as well as the assessment conducted in the 2015 Master plan and the recent IEE exercise.

Most of the potential environmental impacts will occur in the *Construction phase*, particularly during the civil works, but it is expected to have short term duration and be mitigated.

The majority of previously identified environmental impacts (ADB, 2015) have not been concluded as significant and the proposed construction management safeguards and operational regimes defined therein provide a sound basis to address the range of potential environmental impacts identified, actioned through the Project EMP and checked in the environmental monitoring program.

The evaluation of potential impacts, with its nature, time scale and significance, were analysed and are presented in Table 9.

Table 9 Summary of Potential Environmental and Social Impacts of the Project

Phase	Types of Components	Potential Impacts	Nature	Incidence	Time-Scale	Significance
Pre-construction	Water quantity	Insufficient debit due to environment and social flow (illegal connection, agriculture necessity, etc)	Negative	Direct	Medium-term	High
	Socioeconomic	Water conflicts between communities	Negative	Direct	Short-term	High
	Socioeconomic	Social and ecological disruption due to project activities intruding the tara bandu and sacred area components e.g. hydrogeological study and water investigation i.e. bore well testing	Negative	Direct	Short-term	Moderate
	Water quality	Inadequate protection of intake works or wells, leading to pollution of water supply & drying up of the SMASA's boreholes & private wells due to over extraction	Negative	Direct	Medium-term	High
	Occupational health & safety	Health hazard arising from inadequate design and/or handling of facilities for receiving, storing and handling of chlorine and other hazardous chemicals	Negative	Direct	Medium-term	High
	Water quantity	Poor infrastructure and insufficient capacity of water storages can lead to impendence of water delivery	Negative	Direct	Medium-term	High
	Soil & land use	Inadequate designation of buffer zone around FSTP	Negative	Indirect	Medium-term	Moderate
	Soil & land use	Land use change for temporary sites used for contractor's camp site	Negative	Direct	Medium-term	Moderate
	Wastewater	Inadequate design causing increased volume of untreated sullage (wastewater from cooking and washing)	Negative	Direct	Medium-term	High
Construction	Noise	Increase in noise level from construction works	Negative	Direct	Short-term	High
	Air quality	Deterioration in air quality (dust)	Negative	Direct	Short-term	High
	Socioeconomic	Job creation to local community and enhance workers 'skills	Positive	Direct	Medium-term	High
	Socio-cultural	Impairment to the cultural heritage properties due to pipe replacement	Negative	Direct	Short-term	High
	Vehicular access and movement of construction vehicles	Traffic hindrance and amenity value to urban dwellers	Negative	Direct	Short-term	Low

Phase	Types of Components	Potential Impacts	Nature	Incidence	Time-Scale	Significance
	Soil & land use	Vegetation loss	Negative	Direct	Medium-term	Moderate
	Soil & land use	Silt runoffs can cause traffic accident & increasing volume of soil wastes (spoils, spare materials, etc) can lead to possible soil contamination, attract pests and serve as vectors for disease carrying insects, and negative visual impact	Negative	Direct	Short-term	Moderate
	Occupational health & safety	Accidents and even mortality for worst scenario towards the workforces and community	Negative	Direct	Short-term	High
Operational & Maintenance	Water quality	Expansion of housing in the upstream with inadequate sanitation facility leading to water deterioration in the sources	Negative	Indirect	Long-term	High
	Wastewater	Inadequate management of the treated sludge from the FSTP causing odour and excessive plot space consumption	Negative	Direct	Short-term	Moderate
	Water quantity	Achieve consumers water demands for consumption	Positive	Direct	Long-term	High
	Water quality	Water quality deterioration due to inadequate chlorination and irregular water quality testing	Negative	Direct	Short-term	High
	Occupational health & safety	Health hazards due to chlorine exposure	Negative	Direct	Short-term	High
	Public Health	Improvement of community's health and reduce mortality due to clean water and sanitation access	Positive	Direct	Long-term	High

7.1 Biophysical impacts

7.1.1 Water Quality

Construction works for distribution pipe replacement, water storage rehabilitation and FSTP installation will likely generate silt run offs to nearby surface water receptors i.e. streams and drainage system, if temporary drainage systems are not applied. However, this activity won't have adverse impacts to the water ecosystems, as the duration is considered temporary.

The presence of human activity in the upstream area of Loihuno 1 spring has existed for decades. This upstream area is inhabited by 23 families, with only 8 houses that have cement septic tank albeit permeable, as already mentioned in sub-chapter Water Supply System. The 15 remaining households have poor sanitation infrastructure i.e. hole-in-the-ground WC. This situation directly allows septage to perculate into the ground and groundwater. Moreover, agricultural activity i.e animal livestock and fish farm are also found in the upstream spring system. Those said activities are likely to cause water deterioration of the aquifer linked from and to the Loihuno 1 and 3 springs. This water contamination issue is also proven by several water quality tests showing E.coli presence in Loihuno 3 spring.

To preserve the sustainability of the proposed water collection and distribution system, the project can suggest SMASA in implementing an Upstream Watershed Protection Programs, with restriction to water quality impacting activities i.e. animal husbandry, slash and burn, etc, or an Improvement Program for all existing and future dwelling sanitary infrastructure i.e. SMASA septic tank design template, to implement in the community surrounding the water source.

7.1.2 Air quality and noise

Based on the ADB IEE (ADB, 2016), no measurement of air quality and noise level have been made within the project site. However, it was observed that in the construction activities will likely to produce more negative impacts towards the environmental stability and also the local community. The negative impacts generated are considered temporary, from the arising of noise and air pollution that causes disturbance to the nearby dwelling and commercial buildings.

Earthwork construction, stockpiling of natural aggregates, transport loading and unloading, heavy vehicles mobilizing, tend to generate dust and its dispersion, thus distracting the aesthetic of the environment and inhabitants living nearby the project site. Dust exposure will affect the respiratory system and eye visioning. Dust generation is considered a temporary negative impact on the air quality as the fuel emission from the heavy machineries will not have a significant negative influence as well.

The project will include various heavy machineries and vehicles to be operating during this phase, such as demolition works, movement of trucks and equipment, earthworks, concrete mixing, loading and unloading construction materials. These types of activities correspond to the potential impact of noise emission. The said impact will be very significant in areas of noise-sensitive institutions or buildings such as health care and educational facilities.

Besides Health, Safety and Environment (HSE) measures in the construction Right of Way and/or area, such as proper traffic or road signage and warning signs or disseminating HSE information to the community, other measures such as limiting noisy works to daytime hours and reducing the speed limit in the work site will minimize the risk of occurrence of these impacts.

7.2 Socio Economic Impacts

7.2.1 Health and Economic Impacts

Viqueque Municipal Capital is expected to get 24/7 access to clean and potable water will improve community health, as they are expected to benefit from the overall improvement of the water distribution system, people's

hygiene and public health and consequently reduce waterborne disease occurrence albeit during construction they will be moderately exposed to the resulting impacts on air, noise, etc.

This project will directly generate positive employment opportunities (either skilled or non-skilled work) for the local people. Their earnings will consequently affect the local economy, given the employment process will prioritize local people, reducing the need for in-migration.

The local economy will also benefit from major positive impacts from the network improvement works such as increase in business for shops and other economic activities. For Viqueque, although the network itself is located along the roadways, the people and commercial activities will unlikely be disturbed as the work will be carried out on individual short lengths of the network, thus the period of construction in each section area will not last long.

Nevertheless, there can be minor economic impacts if roads have to be closed for short periods and customers are unable to gain access to shops, or if trenches are constructed near the sides of roads, and customers are impeded to access the shops, resulting in loss of income which is expected to be short-lived.

7.2.2 Socio-Cultural and Heritage Buildings

Each district in Timor-Leste may have different tradition and local dialect, but most of all local people have similar objects and sites inherited by their ancestors and are typically considered Lulik or sacred. Objects can be manifested as trees, stones, rocks, or even animals, etc, while sites are usually referred to historical places and where natural resources are found i.e. water sources.

There are also previous infrastructures built during the Portuguese and Indonesian administration where local government are still actively using the buildings for commercial purpose and some are not well-preserved. Additionally, current infrastructures that have socio-cultural values are also found in Viqueque Municipal Capital and are managed by community, local government, and even religious organizations.

Within the 15 km radius, Viqueque city's roadways, where the majority of distribution pipelines exist, are also adjacent to a few cultural heritage buildings. Table 10 is a list of cultural sites that were identified by the team during the site visit for the Preliminary Design.

Table 10 - List of Cultural Heritage Sites in Viqueque

No.	Name of the Site	Types	Coordinates
1.	St. Cruz Cemetery	Socio-cultural Heritage	8° 51.184'S / 126° 21.953'E
2.	Chapel	Socio-cultural	8° 51.588' S / 126° 22.068' E
3.	Administration Office During Portuguese Time	Historical & Socio-Cultural	8° 52.041' S / 126° 21.922' E
4.	Cathedral	Socio-cultural & Touristic	8° 52.102' S / 126° 21.944' E
5.	Residence of Sede Suco during Portuguese Time	Historical & Socio-Cultural	8° 52.183' S / 126° 22.006' E
6.	Cemetery 2	Socio-cultural	8° 52.561' S / 126° 22.105' E

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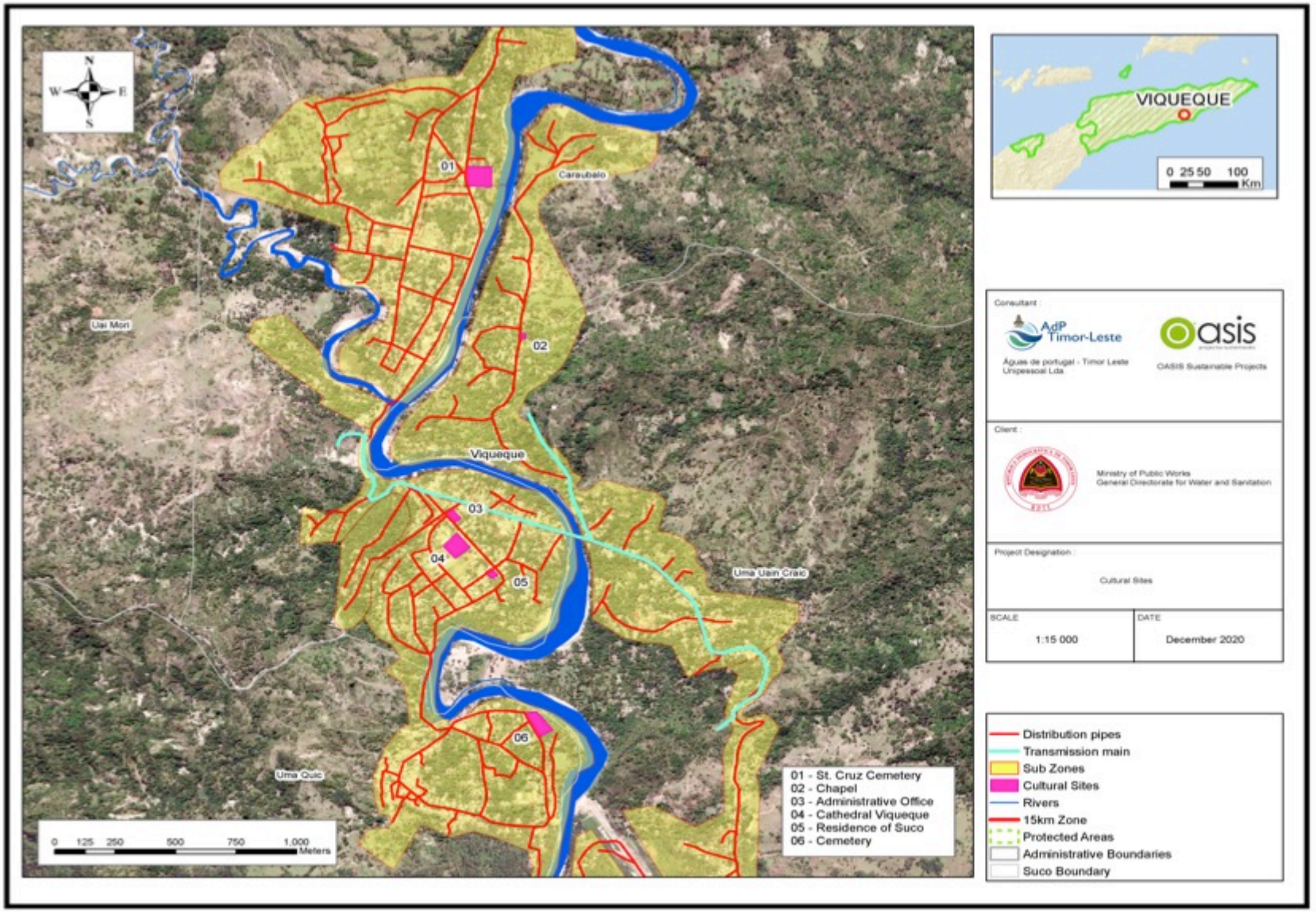
Figure 20 - Socio-Cultural Heritage Sites



8. PUBLIC CONSULTATION

The current IEE (ADB, 2020) undertook Public Consultation for Viqueque in Viqueque Municipality Administrative Assembly Room on the 10th of October 2020 and was 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, its 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.

The stakeholders gave their concern, suggestion and recommendation for the project implementation, focussing mainly on issues such as:

- The implementation of maintenance for sustainable water supply and the scope of work of this project
- The timeframe for the project implementation
- Adequate public toilets for handicapped persons
- Integration between masterplan and urban planning development
- Coverage expansion areas to be more inclusive

In general, during the consultation, no issues of significant social concern or objections about the proposed project were raised and stakeholders were positive about the proposed project and expecting for this project to be implemented as soon as possible, since they are facing crucial issues on water for daily consumption and don't want to repeat uncertain schedule for water delivery into the households in the future.

Figure 21 - Viqueque Public Consultation; participation of the Local Community and Other Stakeholders

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). The objective of the consultation was to further confirm 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. During the consultations, Suco's communities acknowledged about the lack of proper water and sanitation system specifically for the water component because it is a time-consuming activity to transport water from the source to the household. They also stated that to make potable, water is then boiled before being used which entails in an additional cost for fuel (mainly wood). Therefore, the community is supportive of a paid water distribution system and the use of Public Toilets and they are welcoming the opportunity to be part of the project either in the construction phase or in the Operation and Maintenance stage, reinforcing the number of SMASA employees.

Figure 22 - Suco Caraubalu Public Consultation

Figure 23 - Suco Loihuno Public Consultation

Figure 24 - Suco Uma Quic Public Consultation

Figure 25 - Suco Uma Uain Craic Public Consultation

9. CONSULTATION WITH OTHER AUTHORITIES

Since the beginning of the 4 MCWSS project, the team has contacted various entities and stakeholders through meetings to inform and gain understanding of the issues faced in Same in terms of land acquisition, water source and its distribution and cultural heritage sites.

Some of the consultation meetings are highlighted below for their importance in terms of the project implementation process and to clarify on the communication process with Relevant Stakeholders. Many of the interviewees requested not to have photographs taken during the meetings and therefore only those that the team had permission to take have photos in this chapter.

- 2020 June 24 – 26 – Meeting with Viqueque' s municipalities entity
  The consultation meeting with Viquequei' s entity was conducted by the environmental team during the site visit. The meeting took place in SMASA (Municipal Service for Water, Sanitation & Environment) office in Suco Caraubalo between Viqueque SMASA director and technicians. Moreover, the team also had 4 meetings with the local authorities from Suco Caraubalo, Suco Uma Quic, Suco Uma Uain Craic, and Suco Loihuno.
  The main purpose of the consultation was to inform and explain to about the 4 MCWSSP and get the formal information about cultural site and protected area issues that may need to be taken into account, as well as their recommendation on the FSTP (Faecal Sludge Treatment Plan) location. The local authorities lead the team on a project site visit to identify and map several cultural heritage sites, which lie very close to the water distribution alignments.

Figure 26 - Meeting Session with SMASA Director

- 2020 July 06 – Meeting with Director General of DGAS (Direção Geral Agua e Saneamento)
  This meeting was conducted between the representatives of the consultant team AdP / Engidro, Oasis and Director General of DGAS. The main purposes of the meeting were to discuss issues regarding
  1. Illegal water connections;
  2. Laying water pipeline and
  3. Coverage area of Water Supply & Sanitation subprojects.

- 2020 September 22 – Meeting with the Secretary of State for Arts and Culture
  Another consultation meeting was also conducted between the representative of Secretary of State for Arts and Culture and Oasis team which was represented by the National Environmental Technician. The meeting took place in Secretary of State for Arts and Culture Office in Pantai Kelapa.
  The objective of the meeting was to request cultural heritage sites data in all 4 Municipals in adherence to a request letter sent from the General Directorate of Water and Sanitation Service (DGAS) with a reference number 172/C50605/Gab.DGAS/MOP/VII/2020. This aims on identifying whether or not the sites are located adjacent to the project components and how they will impact on the related sites.

10. PROPOSED CLASSIFICATION OF THE PROJECT

The project' s main objective is to guarantee that the overall balance of environmental and social impacts results in positive outcome, taking into special consideration the mitigation commitments in the Environmental Management Plan, the compliance with the RDTL environmental assessment process and especially given the project's special relationship with the institution's technical assistance support.

The proposed system in Viqueque is based on "brownfield" sub-projects i.e. existing water piping and/or springs or boreholes, established by SMASA several decades ago, in order to guarantee that their customers had minimum access to water for consumption. It is assumed that, at the time of their establishment, locational factors were not the priority for government institutions across the board, as opposed to guaranteeing water supply to the people. In addition, the location of the sources available at the time was very limited, resuming to existing springs that the local community leaders gave authorisation to extract under "cultural" rule (which is still very active today).

Currently, the Viqueque water distribution system has evolved around established spring system, particularly in regards to Loihuno 1 spring. The importance of this source is now augmented by the fact that SMASA requires the water distribution system to expand into the Municipal Capital's urban expansion areas due to the growing number of the population.

The project was previously classified as Category B under the ADB SPS 2009 (ADB, 2016) in the 2015 Masterplan, for the Viqueque area because the proposed water extraction and other works for project components are considered rehabilitation i.e. a brownfield project, with pre-existing pipe alignments and zones that have undergone previous impacts during the first installation (thus leading to the new intervention being less significant and of temporary duration, with very small portions of the project components requiring new infrastructure i.e. greenfield project areas).

This year (2020) Environmental assessment has been conducted for the Viqueque water supply and sanitation Project based on (i) Preliminary engineering design, and (ii) most likely environmentally sensitive components, applying ADB's rapid environmental assessment (REA) checklist and the field review in June 2020 to help guide the probable classification. This exercise showed that the Viqueque Water supply and sanitation project is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, or that potential impacts are 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 mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

This classification is consistent with the estimated classification process the proponent has carried out under Decree-Law no. 5/2011, particularly Annex I – Category A (EIA) or Annex II – Category B (IEE) thresholds, to follow the Timorese requirements regarding Environmental Licensing.

Table 11 - Estimated Environmental Classification for Viqueque Project Components

Proposed Components	Proposed Capacity	Estimated Classification	Included in XII. Location Factors
Sanitation			
Public Septic Tank Systems	N/A	N/A	No
Feacal Septage Treatment Plant	4,038 HH	B	No
Water Distribution			
Rehabilitation (Mains and Distribution)	24,298 m	B[(1)]	No
Water Sources (Existing and/or New)			
Loihuno 1[(4)]	(5 to 50) L/sec[(1)] (157,680 – 1,576,800) m^3/year	B[(1)]	No
Kuha River[(4)]	(50 to 0) L/sec[(1)] (1,576,800 to 0) m^3/year	B[(1)]	No

[(2)] As in previous ANLA attributed Category B Licenses to similar-scaled water source volumes and length of distribution network such as DGAS projects in Pante Macassar and Manatuto (see Appendix 2 and 3).

None of the project components in Viqueque Municipal Capital are located in a sensitive area i.e. protected or sacred area. As previously mentioned above, this is a rehabilitation project i.e. a brownfield project with few components requiring new infrastructure i.e. greenfield project areas. As a result, the proponent is certain that the classification of these sub-projects falls under a Category B, as per the example of the Environmental Classification system for the Roads Sector, where the Rehabilitation of all Pre-existing Infrastructure i.e. Roads falls under a Category B. Moreover, this assumption is also further justified based on the ANLA previously attributed Category B Environmental License for the Government Projects for Rehabilitation of Water Distribution Infrastructure in the District Capital Water Supply Project for Manatuto and Pante Macassar 2014 (see Appendix 2 and 3), which are basically a resemblance in terms of its objective.

Given this project has all the favourable conditions to be classified as a Category B project, as it is concurrent with both ADB SPS 2009 requirements and the Timorese legislation, if locational factors are not taken into account, ***the proponent hereby requests the Environmental Regulator to consider a Category B for this project,*** in accordance with the Regulator's choice of classification prerogative outlined in item 2 b) of article 4 of Decree-Law no. 05/2011, since the Decree Law and its Ministerial Diplomas provide flexibility of project Category choice to the Environmental Regulator, when duly justified, especially when the relative scale and gravity of the project's impacts and conditions are similar to the above-mentioned Category B.

11. EXECUTIVE SUMMARY

The Four Municipal Capitals Water Supply & Sanitation Project (4MWSSP) is based on the previous Master plan Design to support the Government of Timor-Leste in providing access to improved water supply and sanitation (WSS) in 4 municipalities (Baucau, Los Palos, Viqueque and Same) financed by the Infrastructure Fund of the Government of Democratic Republic of Timor-Leste with all enumerated infrastructure components, a total of USD$ 70,404,273 estimated project cost.

The primary objective of this Project Document is to provide clear and relevant information on the proposed Water and Sanitation System Improvement Project for ***Viqueque Municipal Capital only***, taking into account that its rehabilitation will be carried out under a future ADB loan to the Government of Timor-Leste. The preliminary cost of the 4MCWSSP for Manufahi Municipality is estimated around $13,004,542 for proposed water supply and sanitation expenses. It will include all the areas that will be required to implement the Abstraction, Treatment and Distribution of Water for Human Consumption, as well as provide designs and solutions for Sanitation for Buildings, Schools and Housing within a diameter area of 15 Km around the Municipal Capital particularly 4 Sucos overlaying water distribution system.

The 4 MCWSSP is expected to have numerous beneficial and negative impacts towards the environment and social aspects due to various project activities, although the pre-existing pipe alignments and zones that have undergone previous impacts during the first installation, thus leading to the new intervention being less significant and of temporary duration, with very small portions of the project components requiring new infrastructure i.e. greenfield project areas). In conclusion, the Viqueque Water supply and sanitation project is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, or that potential impacts are 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 mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

The project also will provide improvements and opportunities in several ways regarding employment generation, skill enhancement, improved Health and Hygiene as well as Women empowerment. Furthermore, it will directly generate employment opportunities to either skilled or non-skilled work for the local people. This type of employment opportunities will increase the skill of the workforce in terms of technical proficiency. By the end of the project, safe and reliable water supply will be provided to the municipal town (sucos and aldeias), and all households will have improved hygienic toilets as well as toilets available in public places. The improved water supply and sanitation facilities in the pilot schools will provide children with safe and reliable water supply and toilets operated by competent operators in each pilot school, providing a template in other schools to improve water supply and toilets.

To improve the efficiency, transparency and public involvements, the consultant conducted the Public Consultation for Viqueque in the Municipal Administrative Meeting Room on the on the 10th of October 2020 and was participated by the local government agencies, local authorities i.e. Suco and Aldeia Chiefs, and representative of the local communities that are in the Project Area. The majority of the issues that were raised are linked to the (i) integration of the masterplan of this project and the urban planning design, (ii) timeframe of the project implementation, (iii) Prioritizing handicapped persons in designing accessible public toilets, and (iv) coverage areas expansion to be more inclusive.

The consultation also discussed the environmental aspects of the project to request feedback and concerns from the people regarding the project and their existing water supply, the anticipated environmental impact of the proposed project and to gather people's opinion on how to improve their water supply system.

The estimation of classification for the project was done in accordance with the project component scale, as well as the scope referenced in the Second District Capitals Water Supply Project. While all projects funded by ADB and IFC must comply with their Safeguards to ensure that projects are environmentally sound, designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards, in Timor-Leste, environmental screening and categorization follows suit but is also dependant on project component and scale comparison with Decree-Law no. 5/2011 – Environmental Licensing, particularly Annex I – Category A (EIA) or Annex II – Category B (IEE) thresholds.

It is concluded that, overall, the project is not likely to have significant adverse environmental impacts and in most cases mitigation measures can be designed to for them, which, under the ADB and IFC guidelines, should place categorisation under a Category B, requiring an IEE process of evaluation for Viqueque.

12. BIBLIOGRAPHY

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APPENDIXES

Appendix 1. Locational Map of Project in Manufahi Municipality

Appendix 2. Environmental License ADB 0258-TIM Project – Manatuto District

REPÚBLICA DEMOCRÁTICA DE TIMOR-LESTE

National Directorate for Environment, State Secretariat for Environment, Ministry for Commerce, Industry and Environment

ENVIRONMENTAL LICENSE
Issued under *Decree Law on Environmental Licensing No. 05/2011*

In accordance with decision dated on 07th August 2014 by the **State Secretary for Environment** Mr. Numinando Soares Martins "Buras" Approved the Simplified Environmental Impact Statement. Hence, pursuant to the Chapter VI of Decree Law on *Environmental Licensing 05/2011 (Decree Law 05/2011)*, and Issued Environmental License for the activity referred to the **Schedule** below which subject to the conditions contained in the **Annex**.

Schedule

Proponent of Project:	**National Directorate of Water Supply Services**
Date Submitted Application:	**20th of March 2014**
Application Number:	**20/ AIA-DNMA /XI/ 2013**
Environmental License Number:	**06 / C:B-5 / SSE-MCIE / VIII / 2014**
Activity Scale:	**Distance 15.09 km(Transmission pipe 15090m and distribution pipe 68741m; maximum depth 1m)**
District and Sub-district:	**Manatuto**
Category of Project:	**Category B**
Project:	**Upgrading and Rehabilitation of Existing Water supply**
Date of Notification:	**07th of August 2014**

Notes

1. This Environmental License is non-transferrable in accordance with Articles 22 (4) of Decree Law 05/2011.
2. Proposed changes to the project affecting environmental impacts or the project area/size, or relocation, are subject to technical review and approval in accordance with Chapter VIII of Decree Law 05/2011.
3. Appeal rights are governed by *Decree Law 32/2008 on Administrative Procedure.*
4. The Proponent is solely responsible for ensuring all other necessary renewal license, permit, authorisations or recommendations are obtained from relevant government authorities.

5. The Proponent is responsible for ensuring that all subcontractors or others carrying out works associated with this Environmental License comply with the SEIS, EMP and terms of this Environmental License.

6. All future communications, documents and reports prepared by or on behalf of the Proponent in relation to the Project and submitted to the National Directorate for Environment ('DNMA') shall be in both Tetum and English, and in both electronic and hard copy.

Annex - Conditions of Environmental License

The conditions contained in this Annex are to protect the environment and to mitigate the environmental impacts of the Project.

General Conditions

1. Project in accordance with initial environmental examination documents, and future environmental licenses

1.1 The District Capital Water Supply Project must be conducted in accordance with the Final Report of Simplified Environmental Impact Statement (SEIS) prepared by Project Implementation Unit Consultant dated **20th of March 2014** and the incorporated Environmental Management Plan (EMP), except as modified or amended by this Environmental License.

1.2 The Expansion, Rehabilitation and operation and maintenance of Manatuto Water Supply Systems must be conducted in accordance with Asia Development Bank Safety Environmental Principle.

1.3 The Nature, Size, Location and Importance of the Project, described on page 12 – 15 (5.1-5.2) of the SEIS, strictly states the Project Site Boundary for all development and construction activities related to The District Capital Water Supply Project.

1.4 To successfully implement the EMP the SEIS has given adequate instructions for the Project Implementation Unit (PIU) to monitor and report environmental compliance all through the project implementation period.

1.5 As planned in the SEIS this Water Supply Project is given the Environmental License granted for two (2) years starting from the Date of the Notification mentioned in *Licensing*

1.6 Any proposed changes, alterations or additions to the Project that the Proponent wishes to undertake that are not consistent with the SEIS and EMP and this Environmental License will require an additional Environmental License or amendment of this Environmental License, in accordance with relevant provisions of *Decree Law 05/2011*.

1.7 DNMA may review and alter any conditions in this Environmental License, including by requiring alterations to the Environmental Management Plan, to respond to any proposed changes to any component of the Project through any application made by the Proponent to DNMA relating to the Project, if DNMA deems it necessary to do so to protect the environment.

Additional requirements and modifications

2. ***Construction phase***

2.1 When the activity starts, community near the area of the project must be included to offer them jobs in which could help minimize the social impacts.

2.2 The proponent must coordinate with other institution that related to this activity before implementing the project.

2.3 For air quality related to dust, inspection should be done to ensure that residents living along the construction route are not affected. Hence spreading water will help minimize dust emission close to the residential areas;

2.4 The proponent must assure that water bodies nearby are safe from siltation and contamination that includes fuel and lubricants used in the rehabilitation of the water supply project;

2.5 The proponent must enforce the disposal of surplus material at environmentally safe disposal/ fill sites and that spoil stockpiles are managed properly;

2.6 Soils from the excavation must not be disposed of near the water bodies, paddy field, Farmland and community's residential area along the road rehabilitation route;

2.7 Sites where rocks and sands are excavated should be 20 meters away from the river bank;

2.8 Avoiding excavation of soil and stone in the sensitive environmental areas (protected area/ Forest, potential landslides field, high elevation hills, etc);

2.9 When the project is complete, excavated areas must be rehabilitated, materials dumping, Facilities for staff and logistic installed must be demolished and managed it properly;

2.10 Actively monitor the water bodies that are close to the construction site during the Rehabilitation process;

2.11 The community from the residential areas, horticulture, paddy fields, And other types of farmlands and agricultural plantation whom are affected must be Given compensation in a fair and just manner;

2.12 Avoiding in necessary eviction. If any target household need to be remove, please Negotiate in fair manner and applying *prior consent principle*

2.13 During the rehabilitation activity, noise from the excavator must be controlled, need to Install appropriate warning signal for safety traffic, for the safety of worker and road Users;

2.14 Trucks carrying construction materials (sand, stones, cement etc) must be covered by Tarpaulin to prevent materials from falling off of the trucks;

2.15 Alternative roads must be built to ensure that public transportations are not delayed during the rehabilitation;

2.16 Rehabilitate eroded areas that caused by the construction activity;

2.17 During daytime construction site should be sprayed with water every three hours each day along the Rehabilitation project route;

2.18 Prepare disposal site for solid and liquid waste from the construction activity, excavator and trucks; except dangerous waste (oil ,lubricant and so on)

2.19 Worker and staff compound close by community village must be develop in coordination with local leaders and the residence. Worker and staff need to respect local people, ritual, symbols of believe and cultures;

2.20 Need to apply local content principle for the involvement of local people in working Opportunity and possible local material procurement;

2.21 Indentified appropriate location for material (sand, stone, wood, water and other material) collection;

2.22 Due to the instability of soil, high elevation of the areas and impact of climate change (more rain or less rain could cause erosion), there is need to have bio engineering expert in providing knowledge and techniques to community for re-vegetation and reforestation;

2.23 The Proponent must ensure that the waste is disposed of at disposal area;

2.24 After the project is finally done, the company is responsible to clean up all the waste and piles from the construction activity along the project route.

National Directorate of environment will be supervision and oriented company refer to the Environment License and Environment Management Plan.

Dili, 07th ofAugust 2014
Approved by:

Numinando Soares Martins "BURAS"
Secretary of State for Environment

Appendix 3. Environmental License ADB 0258-TIM Project – RAEOA

REPÚBLICA DEMOCRÁTICA DE TIMOR-LESTE
National Directorate for Environment, State Secretariat for Environment,
Ministry for Commerce, Industry and Environment

ENVIRONMENTAL LICENSE
Issued under *Decree Law on Environmental Licensing No. 05/2011*

In accordance with decision dated on 07th August 2014 by the **State Secretary for Environment** Mr. Numinando Soares Martins "Buras" Approved the Simplified Environmental Impact Statement. Hence, pursuant to the Chapter VI of Decree Law on *Environmental Licensing 05/2011 (Decree Law 05/2011)*, and Issued Environmental License for the activity referred to the **Schedule** below which subject to the conditions contained in the **Annex**.

Schedule

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Date Submitted Application:	**20th of March 2014**
Application Number:	**20/ AIA-DNMA /XI/ 2013**
Environmental License Number:	**06 / C:B-5 / SSE-MCIE / VIII / 2014**
Activity Scale:	**Distance 6.7 km(Transmission pipe 6768m and distribution pipe 39615m; maximum depth 1m)**
District and Sub-district:	**Pante Macasar, Oecusse**
Category of Project:	**Category B**
Project:	**Upgrading and Rehabilitation of Existing Water supply**
Date of Notification:	**07th of August 2014**

Notes

1. This Environmental License is non-transferrable in accordance with Articles 22 (4) of Decree Law 05/2011.
2. Proposed changes to the project affecting environmental impacts or the project area/size, or relocation, are subject to technical review and approval in accordance with Chapter VIII of Decree Law 05/2011.
3. Appeal rights are governed by *Decree Law 32/2008 on Administrative Procedure.*
4. The Proponent is solely responsible for ensuring all other necessary renewal license, permit, authorisations or recommendations are obtained from relevant government authorities.
5. The Proponent is responsible for ensuring that all subcontractors or others carrying out works associated with this Environmental License comply with the SEIS, EMP and terms of this Environmental License.

6 All future communications, documents and reports prepared by or on behalf of the Proponent in relation to the Project and submitted to the National Directorate for Environment ('DNMA') shall be in both Tetum and English, and in both electronic and hard copy.

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1.2. The Expansion, Rehabilitation and operation and maintenance of Manatuto Water Supply Systems must be conducted in accordance with Asia Development Bank Safety Environmental Principle.

1.3. The Nature, Size, Location and Importance of the Project, described on page 13 – 19 (5.1-5.2) of the SEIS, strictly states the Project Site Boundary for all development and construction activities related to The District Capital Water Supply Project.

1.4. To successfully implement the EMP the SEIS has given adequate instructions for the Project Implementation Unit (PIU) to monitor and report environmental compliance all through the project implementation period.

1.5. As planned in the SEIS this Water Supply Project is given the Environmental License granted for two (2) years starting from the Date of the Notification mentioned in *Licensing*.

1.6. Any proposed changes, alterations or additions to the Project that the Proponent wishes to undertake that are not consistent with the SEIS and EMP and this Environmental License will require an additional Environmental License or amendment of this Environmental License, in accordance with relevant provisions of *Decree Law 05/2011*.

1.7. DNMA may review and alter any conditions in this Environmental License, including by requiring alterations to the Environmental Management Plan, to respond to any proposed changes to any component of the Project through any application made by the Proponent to DNMA relating to the Project, if DNMA deems it necessary to do so to protect the environment.

Additional requirements and modifications

2. ***Construction phase***

2.1 When the activity starts, community near the area of the project must be included to offer them jobs in which could help minimize the social impacts;

2.2 For air quality related to dust, inspection should be done to ensure that residents living along the construction route are not affected. Hence spreading water will help minimize dust emission close to the residential areas;

2.3 The proponent must coordinate with other institution that related to this activity before implementing the project;

2.4 The proponent must assure that water bodies nearby are safe from siltation and contamination that includes fuel and lubricants used in the rehabilitation of the water supply project;

2.5 The proponent must enforce the disposal of surplus material at environmentally safe disposal/ fill sites and that spoil stockpiles are managed properly;

2.6 Soils from the excavation must not be disposed of near the water bodies, paddy field, Farmland and community's residential area along the road rehabilitation route;

2.7 Sites where rocks and sands are excavated should be 20 meters away from the river bank;

2.8 Avoiding excavation of soil and stone in the sensitive environmental areas (protected area/ Forest, potential landslides field, high elevation hills, etc);

2.9 When the project is complete, excavated areas must be rehabilitated, materials dumping, Facilities for staff and logistic installed must be demolished and managed it properly;

2.10 Actively monitor the water bodies that are close to the construction site during the Rehabilitation process;

2.11 The community from the residential areas, horticulture, paddy fields, And other types of farmlands and agricultural plantation whom are affected must be Given compensation in a fair and just manner;

2.12 Avoiding in necessary eviction. If any target household need to be remove, please Negotiate in fair manner and applying *prior consent principle*

2.13 During the rehabilitation activity, noise from the excavator must be controlled, need to Install appropriate warning signal for safety traffic, for the safety of worker and road Users;

2.14 Trucks carrying construction materials (sand, stones, cement etc) must be covered by Tarpaulin to prevent materials from falling off of the trucks;

2.15 Alternative roads must be built to ensure that public transportations are not delayed during the rehabilitation;

2.16 Rehabilitate eroded areas that caused by the construction activity;

2.17 During daytime construction site should be sprayed with water every three hours each day along the Rehabilitation project route;

2.18 Prepare disposal site for solid and liquid waste from the construction activity, excavator and trucks; except dangerous waste (oil ,lubricant and so on)

2.19 Worker and staff compound close by community village must be develop in coordination with local leaders and the residence. Worker and staff need to respect local people, ritual, symbols of believe and cultures;

2.20 Need to apply local content principle for the involvement of local people in working Opportunity and possible local material procurement;

2.21 Indentified appropriate location for material (sand, stone, wood, water and other material) collection;

2.22 The Proponent must ensure that the waste is disposed of at disposal area;

2.23 Due to the instability of soil, high elevation of the areas and impact of climate change (more rain or less rain could cause erosion), there is need to have bio engineering expert in providing knowledge and techniques to community for re-vegetation and reforestation;

2.24 After the project is finally done, the company is responsible to clean up all the waste and piles from the construction activity along the project route.

National Directorate of environment will be supervision and oriented company refer to the Environment License and Environment Management Plan.

Dili, 07th ofAugust 2014
Approved by:

Numinando Soares Martins "BURAS"
Secretary of State for Environment

Appendix 4. Transcripted Public Consultation Notes