

DEMOCRATIC REPUBLIC OF TIMOR-LESTE
MINISTRY OF PUBLIC WORKS

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

Contract
RFP/039/MOP-2019

VOLUME I

**SIMPLIFIED ENVIRONMENTAL IMPACT STATEMENT FOR THE ENVIRONMENTAL
LICENSING OF VIQUEQUE MUNICIPAL CAPITAL WATER SUPPLY PROJECT**

Rev. 2 – Delivery to Environmental Regulator

May 2022

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ACRONYMS AND ABBREVIATIONS

2DCWSP	- Second Districts Capital Water and Sanitation Project
4MCWSSP	- 4 Municipal Capitals Water Supply & Sanitation Project
ADB	- Asian Development Bank
BTL	- Be'e Timor-Leste
DED	- Detailed Engineering Design
DGAS	- General Directorate for Water and Sanitation
DNSA	- National Directorate for Water Services
EARF	- Environmental Assessment and Review Framework
EHS	- Environment, Health and Safety
EIA	- Environmental Impact Assessment
EIS	- Environmental Impact Statement
EMP	- Environmental Management Plan
EMR	- Environmental Monitoring Report
ESS	- Environmental Safeguard Specialist
ESA	- Environmental Safeguard Assistant
FSTP	- Faecal Sludge Treatment Plant
GRM	- Grievance Redress Mechanism
IEE	- Initial Environmental Examination
IFC	- International Finance Corporation
Masl	- meters above sea level
MPW	- Ministry of Public Works
PA	- Protected Area
PD	- Project Document
PDC	- Project Design Consultant
PMU	- Project Management Unit
SEA	- Superior Environmental Authority
SEIS	- Simplified Environmental Impact Statement
SEMP	- Site-specific EMP
BTL	- Municipal Service for Water, Sanitation, and Environment
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

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS	i
TABLE OF CONTENTS	i
LIST OF TABLES	iv
LIST OF FIGURES	v
1 Executive Summary	1
1.1 History of the Project	1
1.2 The Project.....	2
1.3 The IEE (SEIS/EMP) process	3
2 DETAILS OF THE PROJECT PROPONENT	7
3 DETAILS OF THE CONSULTANTS.....	7
4 DESCRIPTION OF THE PROJECT	9
4.1 Identification of the Project	9
4.2 Category of the Project	10
4.3 Brief Description of the Nature, Size and Location of the Project	11
4.3.1 Project Nature and Size.....	11
4.3.2 Location	17
4.3.3 Project Components	17
4.3.4 Projects Related to the Construction of the Project	41
4.3.5 Area Affected by the Project	41
4.4 Justification and Need for the Project.....	41
4.5 The Proponent’s Endorsement of the SEIS.....	42
4.6 Structure of the Simplified SEIS.....	42
5 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK.....	43
5.1 GOVERNMENT ENVIRONMENTAL RULES AND REGULATIONS	43
5.1.1 Constitution of the Democratic Republic of Timor-Leste, of 20 may 2002.....	43
5.1.2 Decree Law No. 26/2012 – Base Law of Environment.....	43
5.1.3 Decree Law No. 5/2011 – Environmental Licensing.....	43
5.1.4 Project Classification under Decree Law No. 5/2011 – Environmental Licensing.....	45
5.1.5 Other Relevant National Laws, Policies and Guidelines in Timor-Leste.....	47
5.1.6 Pollution Control Standards in Timor-Leste.....	49
5.2 The ADB Environmental Process.....	52
5.2.1 ADB Safeguard Policy Statement	52
5.2.2 ADB Environmental Guidelines (2003)	54
5.2.3 Project Category under ADB SPS 2009.....	55
6 DESCRIPTION OF THE ENVIRONMENT	56
6.1 Physical Environment.....	56
6.1.1 Climate.....	56

6.1.2	Topography.....	57
6.1.3	Geology.....	57
6.1.4	Air Quality and Noise	57
6.1.5	Water Resources and Hydrology	60
6.1.6	Soil.....	63
6.2	Ecological Components.....	64
6.2.1	Wetlands	65
6.2.2	Mangroves	65
6.2.3	Corals and Fisheries	65
6.2.4	Protected areas and National Parks	65
6.2.5	Flora and Fauna.....	67
6.2.6	Forests.....	68
6.3	Economic Components.....	70
6.3.1	Employment Sectors.....	70
6.3.2	Infrastructure Facilities.....	71
6.3.3	Land Use.....	72
6.3.4	Use of Forests and other natural resources	72
6.3.5	Fishing.....	72
6.3.6	Agriculture	72
6.3.7	Tourism.....	73
6.3.8	Any types of common or individual rights on natural resources.....	73
6.4	Social Components	75
6.4.1	Population and Communities	75
6.4.2	Health Profile.....	75
6.4.3	Institutions, schools and health facilities.....	75
6.4.4	Community and Family Structures	76
6.4.5	Land Ownership and other rights over the land.....	76
6.5	Cultural Components.....	78
6.5.1	Cultural heritage, Archaeological and Historic Sites	78
6.5.2	Sacred Sites and Unique landscapes	78
6.6	Site-Specific Environmental & Social Features.....	78
7	ALTERNATIVES.....	82
7.1	'Without-project' or 'do-nothing' Alternative'	82
7.2	Design Alternative.....	82
7.3	Faecal Sludge Treatment Plant (FSTP) Location Alternative	82
8	CLIMATE CHANGE	85
8.1	Historic Weather Observation and Trends	85
8.2	Climate Change Projections	85

8.2.1	Temperature and Rainfall	85
8.2.2	Sea Level Rise	85
8.2.3	Future Climate Change Projection Relative to Project Site.....	85
8.3	Implications for the Proposed Project	86
8.4	Adaptation Measures	87
8.4.1	Mitigation of Potential Adverse Impacts to the Environment	87
8.4.2	Mitigation of Potential Adverse Impacts to the Proposed Project.....	87
9	IMPACT ASSESSMENT AND MITIGATION MEASURES	88
9.1	Overview of Impacts.....	88
9.2	Impact Analysis.....	88
9.2.1	Overall Beneficial (Positive) Impacts	89
9.2.2	Impacts in Design/Pre-Construction Phase	90
9.2.3	Impacts in the Construction Phase.....	96
9.2.4	Impacts in the Operation and Maintenance	103
9.2.5	Decommissioning Phase	108
10	SUMMARY OF THE ENVIRONMENTAL MANAGEMENT PLAN	108
11	PUBLIC CONSULTATION AND INFORMATION DISCLOSURE.....	122
11.1	Consultation and Participation under the IEE process	122
11.1.1	Viqueque Municipality Public Consultation (10 th October 2020)	122
11.1.2	Suco Social Public Consultation (12 th and 13 th December 2020).....	123
11.2	Consultation in upcoming Project Phases	125
11.2.1	Consultation during the SEIS/EMP Domestic process	125
11.2.2	Consultation during Construction.....	125
11.3	Information Disclosure.....	125
12	DIFFICULTIES ENCOUNTERED.....	126
13	CONCLUSIONS AND RECOMMENDATIONS	127
14	NON-TECHNICAL SUMMARY.....	128
14.1	Introduction	128
14.2	Where does the Project Fall within the Decree Law 05/2011?	128
14.3	What is an IEE Process?	128
14.4	Purpose and Structure of the Simplified Environmental Impact Statement (SEIS).....	129
14.5	Description of the Surrounding Socio Economic and Environment.....	129
14.6	Project Description and the Affected Environment	129
14.6.1	What is the Project about?	129
14.6.2	Brief Description of the Nature, Size and Location of the Project.....	129
14.6.3	Why do we need the project?	130
14.7	What are the project's impacts?	130
14.8	Opportunity for Public Consultation, and Who have We Talked to About the Project?	131

14.9	Conclusions for Now	132
15	NON-TECHNICAL SUMMARY IN TETUM.....	133
	BIBLIOGRAPHY.....	138
APPENDIX 1.	General Location of the Project.....	140
APPENDIX 2.	Environmental License ADB 0258-TIM – Manatuto District.....	142
APPENDIX 3.	Environmental License ADB 0258-TIM Project – RAEOA	146
APPENDIX 4.	Transcripted Public Consultation Notes	150
APPENDIX 5.	Water Quality Records (2000-2014) – Viqueque (incomplete)	154
APPENDIX 6.	VIQUEQUE BORE INVESTIGATION RESULTS.....	174
APPENDIX 7.	ENVIRONMENTAL CATEGORIZATION FROM ANLA	178
APPENDIX 8.	VIQUEQUE PUBLIC CONSULTATION MEETING NOTES (10TH OCTOBER 2020). 179	
APPENDIX 9.	SELECTED PHOTOGRAPHS OF THE PUBLIC CONSULTATION FOR VIQUEQUE (10TH OCTOBER 2020).....	182
APPENDIX 10.	ATTENDANCE SHEET OF THE STAKEHOLDERS DURING PUBLIC CONSULTATION 185	
APPENDIX 11.	SPOIL MANAGEMENT PLAN	190
APPENDIX 12.	MEETING NOTES – NATIONAL DEPARTMENT OF CULTURAL PATRIMONY, SECRETARY OF STATE FOR ART AND CULTURE (SEAC) ON THE 7TH & 22ND SEPTEMBER 2020. 191	
APPENDIX 13.	ATTENDANCE SHEET - SEAC.....	193
APPENDIX 14.	VIQUEQUE – PROPOSED WATER SUPPLY SYSTEM – GENERAL PLAN.....	195
APPENDIX 15.	VIQUEQUE SOCIAL PUBLIC CONSULTATIONS - LIST OF PARTICIPANTS (SUÇO LOIHUNU, CARAUBALO, UMA QUIC AND UMA UAIN CRAIC)	197
APPENDIX 16.	PROPONENT ENDORSEMENT LETTER FOR THE SEIS/EMP.....	215
APPENDIX 17.	NO OBJECTION LETTER FOR VIQUEQUE MUNICIPAL CAPITAL WATER SUPPLY PROJECT COMPONENTS - FSTP	216

LIST OF TABLES

Table 4-1 - Estimated Environmental Classification for Viqueque Project Components.....	10
Table 4-2 - Sub-Project Components Geographical Locations.....	17
Table 4-3 - Water Demands versus Origins Availability	26
Table 4-4 - Water Sources Scenarios.....	27
Table 4-5 - Water Tanks Capacity to be increased.....	28
Table 4-6 - Viqueque Distribution Zones.....	29
Table 4-7 - Toilet Access in Viqueque as per 2014 Household Survey.....	33
Table 4-8 - Recommended sizes of Septic Tank	37
Table 4-9 - Total Sludge Volume to be collected daily projections.....	38
Table 4-10 - Faecal Sludge Treatment.....	39
Table 4-11 - SEIS Structure according to MD 46/2017.....	42

Table 5-1 - Environmental Licensing Categorisation Thresholds under Decree-Law No. 05/2011	45
Table 5-2 - Estimated Environmental Classification for Viqueque Project Components	46
Table 5-3 - Other relevant National Laws, Policies and Guidelines in Timor-Leste	47
Table 5-4 - Sample Categorisation for Project Types (ADB, 2003)	55
Table 6-1 - Project Relevant Air Quality Sampling Sites (G-RDTL, 2012)	57
Table 6-2 - Air Quality Results from SEIA 2012 - Chemical Compounds	59
Table 6-3 Air Quality Results from SEIA 2012 - Dust	59
Table 6-4 Soil Profiling in Nova Viqueque (G-RDTL, 2012)	64
Table 6-5 - List of Protected Areas in Timor-Leste	65
Table 6-6 - Population Over Ten Years Old Main Economic Activity in Viqueque	71
Table 6-7 Agricultural Activities in Viqueque Administrative Post (TLAC, 2019)	73
Table 6-8 Land Due Dilligence	74
Table 6-9 - Land due Diligence	76
Table 6-10 -List of Cultural Heritage Sites in Viqueque	78
Table 6-11 - Project Site Environmental and Social Features	80
Table 7-1 - FSTP Proposed Locations in Viqueque City	83
Table 9-1-Scales for Present Conditions and Impacts	89
Table 10-1 - Environmental Management Plan MatrixActivity	109

LIST OF FIGURES

Figure 4-1 - Existing & Proposed Water Distribution System Overlaying 4 Sucos Covered	12
Figure 4-2 - Sanitation Area Coverage and Water Distribution Zone	13
Figure 4-3 - Project Location Viqueque Municipality	16
Figure 4-4 - Viqueque Water Sources	20
Figure 4-5 - Viqueque City - Project Scope and Components	21
Figure 4-6 - Flow Diagram for Viqueque proposed Water Distribution System (source: AdP-TL/Engidro, 2020)	22
Figure 4-7 - Most importantly the distribution system needs to be redesigned to suit the revised zoning arrangements.	23
Figure 4-8 - Borehole Testing in 4 Designated Prospection Points	27
Figure 4-9 - Loihuno Transmission Main. Pressure Break Tanks	28
Figure 4-10 - Cuha River Proposed Intake Infrastructure	30
Figure 4-11 Weir Design for better extraction flow	31
Figure 4-12 - Laying of Transmission and Distribution Lines Along a Road. Typical Cross Sections	32
Figure 4-13 - Typical Double Trench Transmission Mains Service	33
Figure 4-14 - Public Toilets and FSTP Proposed Location – Viqueque	35
Figure 4-15 - Aerial Imageries of Public Toilets Proposed Locations	36

Figure 4-16 - Septic Tank for up to 50 Persons Capacity	37
Figure 4-17 - Septic Tank for up to 200 persons.....	37
Figure 4-18 - FSTP Viqueque proposed installation and segments	39
Figure 4-19 - Proposed FSTP and surrounding land use.....	40
Figure 5-1 - EIA and IEE process under DL5/2011 – Steps and Timing.....	44
Figure 6-1 - Average Temperature and Rainfall Patterns Throughout 2000 in VIQUEQUE (CCCB - TL, 2018) and Average Rainfall Pattern for Viqueque from 2010 to 2018 ((ADP/Engidro, 2020).....	56
Figure 6-2 Beaco Air Quality Study Area (G-RDTL 2012)	58
Figure 6-3 - Important Watersheds in Timor-Leste (JICA 2017).....	61
Figure 6-4 - River and Spring System in Viqueque Project Area	62
Figure 6-5 - IBAT mapping of Protected Areas and Key Biodiversity Areas near Viqueque Project (Source: www.IBAT-alliance.org, accessed 06.01.2021)	69
Figure 6-6 - Viqueque Cultural sites within Project Area	79
Figure 8-1 - Mean monthly Precipitation for 5 different station and average rainfall based on the altitude	85
Figure 9-1 - Impact Assessment Rating	89
Figure 11-1 - Viqueque Public Consultation; participation of the Local Leadership and Other Stakeholders ..	122
Figure 11-2 - Suco Carubalu Public Consultation.....	123
Figure 11-3 - Suco Loihunu Public Consultation.....	124
Figure 11-4 - Suco Uma Quic Public Consultation	124
Figure 11-5 - Suco Uma Uain Quic Public Consultation.....	124

I EXECUTIVE SUMMARY

I.1 History of the Project

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. ^[1]_{SEP}

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 WSSIP is expected to impact on the quality of life for urban populations, especially the poor and marginalized, achieving inclusive and sustainable access to WSS services in the cities, through the improvement of water supply and sanitation infrastructure and strengthening of institutional and community capacities.

Shortage of investment funds, skilled personnel, and inadequate operation and maintenance (O&M) budgets, hinders municipalities from providing adequate, cost-effective services, even though the Decentralization Policy (2016) and the Statute of the Municipal Authorities (2016) establishes municipalities as an autonomous government institution with responsibility for WSS services, after a transition period.

Viqueque, as one of the target cities, will see its water and sanitation capacity being built, and while this occurs the project will be implemented over a 7-year period (indicative implementation period is 2022 to 2028), which will be supported through ADB financing using a sector lending approach. The MPW, through BTL, E.P. is the implementing agency responsible for the overall management, implementation and monitoring of the project and the BTL Viqueque office will manage day-to-day operation at the municipality level.

The Project intends to produce the following outputs:

- 1) Propose the rehabilitation and expansion of the urban water supply system for Viqueque municipal capital.
- 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 Viqueque.
- 4) Establishing septic tank sludge treatment and disposal facilities and associated sludge transport system in the municipal capital.

The Ministry of Public Works (MPW) is responsible for planning, implementation, regulation, and monitoring of WSS, through Be'e Timor-Leste E.P. (BTL), which supports the Water and Sanitation facilities in the municipalities, operated locally by BTL Viqueque 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 on the 30th December 2020, to the National Agency for Environmental Licensing (ANLA), as the start-up document for project screening and categorization under the environmental licensing process with the objective 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 4.1, taking into account that its rehabilitation will be carried out under a future ADB loan to the Government of Timor-Leste.

The Project Document’s primary sources of information were:

- a) 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; and
- b) An Initial Environmental Examination (IEE) process carried out for the Water Supply and Sanitation Investment Project – Viqueque City (known as WSSIP - Viqueque), between March 2020 and March 2021, during the Detailed Design phase in accordance with ADB Safeguard Policy Statement (SPS) 2009 and the Government of Timor-Leste environmental requirements and guidelines currently in effect. This exercise 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.

After approval of the final Project Document version, by ANLA, on 18 March 2021, where the project was attributed a Classification "B", BTL requested the consultants to advance with this Initial Environmental Examination (IEE): Simplified Environmental Impact Statement (SEIS)), to provide clear and relevant information on the project, the environmental baseline, and the project’s environment and potential impacts, as well as other considerable information according to Decree-Law no. 05/2011 – Environmental Licensing process, and Annex I of Ministerial Diploma no. 46/2017 – Regulation on Detailed Requirements for Screening, Scope Definition, and Terms of Reference, of Environmental Impact Statement and Environmental Management Plan for the Environmental Assessment, in order to initiate the Environmental Licensing process for the project.

1.2 The Project

Viqueque Municipality and the city of Viqueque in particular is currently attracting an increasing population due to its strategic location on route to the Mount Mundo Perdido ecotourism attraction and also due to the South Coast Oil & Gas Development Plan. Because of this strategic location, the municipality will tend to grow moderately in the near future.

This adaptation requirement highlights the need for the Municipal Capitals Water Supply & Sanitation project in Viqueque Municipality, which is encompassed of a number of existing water sources and distribution alignments and this planned expansion will increase water demands and the equivalent wastewater.

The scope of the Detailed Engineering Design (DED) is prepared for Viqueque City, within Suco Loihuno, Carubalo, Uma Quic, Uma Uain Craic and Maluro, which has the following components under the project Output 2:

- Rehabilitate and expand the Viqueque urban water supply system to cover the new demand volumes for the project horizon year of 2040, including:
 - (i) Evaluate existing and new sources for possible supply of the water distribution system;
 - (ii) Rehabilitation and improvement of the existing Loihuni I Spring intake and complement current water production with the Kuha River;
 - (iii) Rehabilitation and improvement of existing water storage and treatment facilities;
 - (iv) Rehabilitation of 43 Km within the expanded water supply distribution pipe system (4 Zones),

simplifying management and substantially improving the level of service and reducing water losses in the project area; and

- (v) Installation of bulk metering system within the distribution network and replacement and/or installation of domestic meters for all existing and new connections for proper accounting of water use and system losses.
- Establish a fully functioning water supply and sanitation infrastructure in 4 (four) public locations that is effectively operated, maintained and managed to provide a minimum level of service for water supply and sanitation to all municipal dwellers while they are active in the city premises;
- Establish septic tank sludge treatment and disposal facilities and associated sludge transport system within a diameter area of 15 Km around the Viqueque municipal capital that is effectively operated, maintained and managed and that safely transports the septic tank sludge effluent from all households, buildings and schools to a future stand-alone Faecal Sludge Treatment Plant (FSTP) in Suco Maluro.

The DED scope also 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 city.

The various project infrastructure components are in poor condition and are required to be completely rehabilitated/substituted. These are the existing and proposed water origins i.e., springs and boreholes, water storage, water treatment facilities, transmission and distribution lines and public toilets and Faecal Sludge Treatment Plant (FSTP).

The water supply system will be composed of surface water source, namely Loihunu I (Buibau), with a current calculated production capacity of up to 70 L/s (6,048 m³/day) and Cuha River Intake, which will require a production capacity of up to 54.2 L/s (4,683 m³/day), aided by a 0.75-metre-high water dyke to guarantee water accumulation and continuous extraction during both wet and dry season. This system intends to guarantee response to a 2040 water demand of 58.4 L/s (5,046 m³/day), with varying production capacity between dry and wet season. This yield will be responsible to supply 4 different zones encompassing all the existing and projected households in Viqueque city up to 2040.

After storage, distribution and consumption, the generated wastewater and sludge are then treated primarily in the household septic tanks and afterwards transferred into the proposed Faecal Sludge Treatment Plant in Suco Maluro.

Clean, adequate drinking water is a basic human need and developing drinking water supply facilities has numerous beneficial impacts to individuals and communities. Furthermore, when coupled to sanitation improvement, there is a substantial increase in the quality of life within the project area. Some of the major beneficial impacts of the proposed project are the increase of local employment generation, skill enhancement, improved health and hygiene and also empowering more women.

1.3 The IEE (SEIS/EMP) process

The water supply and sanitation investment project in Viqueque has been categorized as a Category B (IEE) given it does not 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 and in most cases mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

The IEE has been carried out for the Viqueque city water supply and sanitation project, based on (i) the D4 - Preliminary Engineering Design, and (ii) most likely environmentally sensitive components, at the Detailed Engineering Design (DED) phase for the proposed project, in accordance with the Government of Timor-Leste environmental requirements and guidelines currently in effect and ADB's Safeguards Policy Statement (SPS) 2009. The objective of such a procedure is 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.

The IEE covers 3 Outputs under the project: Output 1: Regulatory environment improved; Output 2: Water supply and sanitation infrastructure improved; and Output 3: Institutional effectiveness improved, and all mitigation measures and monitoring under this IEE, have been compiled under a separate Environmental Management Plan (EMP).

The IEE report itself describes this process, where it (i) provides project information and environmental requirements; (ii) provides baseline physical, ecological, cultural and socioeconomic description 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 (vi) presents a grievance redress mechanism for the project.

The IEE analysis consisted of a stepped approach (characterization of the environment, description of project components, impacts analysis and management and mitigation measures) with close joint work with the ADP technical team in order to reduce the predicted significant impacts from the various proposed project components in the Design, Construction, Operation and Decommissioning Phases of the Project in this city.

The evaluation of the specific environmental conditions for Viqueque city was based on preliminary visits during the inception phase (on the 20 and 21 February 2020) and after a rather long period of delay due to COVID-19 restrictions, a more in-depth site visit to Viqueque (24 to 26 June 2020), with additional gap-analysis visits during the Public Consultation events. A photographic registry was carried out to the surrounding conditions of all proposed project components to help survey the preliminary environmental conditions and possible impacts of the WSS components in the project area and review project interactions in regards to the most significant component conditionalities i.e. location, biodiversity and climate change. It also supported and guided the team and client on the probable environmental categorization of the WSS rehabilitation project, depending of the difficulties and/or possible impact control regarding stand-alone, specific infrastructure or in regards to areas where project components may encounter environmental sensitivities and bottlenecks for the project.

The field characterization was complemented with a desktop review of generally available secondary information on each of the project areas, in particular from the 2016 Initial Environmental Examination (IEE) documents from the Second District Capitals Project and additional bibliography. The characterization intended to provide a description of the Environmental conditions in each of the project areas in Viqueque and has been described in Chapter 6

The team involved and collaborated with several local and national level institutions that supported the study, in particular during the field study and data collection, namely:

- i) Viqueque Directorate of Water and Sanitation (Mr. Marito da Costa and technician staff Mr. Celestino Freitas and Mr. Mário Pinto);
- ii) Ministry of Agriculture and Fisheries: General Director from Forestry, Coffee and Industrial Plants, (Mr. Raimundo Mau) and Chief of Department of Conservation (Mr. Joao Antalmo);
- iii) Secretary of State for Arts and Culture: General Director from Secretary of State for Arts and Culture (Mr. Manuel Ximenes Smith), National Director of Cultural Patrimony (Mr. Gil Paulino dos Santos Oliveira) and Chief of Department of Archaeology (Mrs. Irene dos Reis Goncalves);

- iv) Local authorities: Chief of Suco Loihuni (Mr. Miguel DC Melo), Chief of Suco Caraubalu (Mr. João Pinto), Chief of Suco Uma Uain Craic (Mr. Angelo Miguel da Silva) and Chief of Suco Uma Quic (Mr. Hermenegildo Rangel).

The SEIS assesses the project's impact significance through the application of an evaluation matrix and impact assessment rating for all components and activities in the Pre-construction, Construction, Operation and Decommissioning Phases of the Project. The significance of the impacts was assessed according to the condition of the affected environmental and social components at the time of evaluation and the scale of impact should the impact persist.

The estimated negative environmental and social impacts of this project, during the construction and operational stages, particularly the construction phase, is more likely to produce negative impacts towards the environment and the local community than the remaining phases of the projects, albeit temporary. Other than the pipe laying works (new and/or rehabilitation), the remaining construction activities will be restricted to their respective confined area, thus the interference with the public and surrounding community should be minimal. Negative impacts to be generated are predicted as mostly temporary, such as noise and air pollution (that causes disturbance to the nearby dwellings and commercial buildings), construction waste (solid and liquid), increased traffic (especially in narrow roads), as well as health and safety risk to workers, declining of water quality, soil erosion, etc.

The Environmental management of each significant impacts is presented in a separate volume, in a stand-alone Environmental Management Plan (EMP), as required by the environmental licensing law and Ministerial Diploma no 47/2017. It is an essential tool for ensuring that mitigation of the negative impacts and enhancement of the positive impacts is carried out effectively throughout the time life of the 4MCWSSP Project. The EMP addresses the environmental impacts that have been classified in the EIS as significant (medium) or above (very significant or high) and attributes mitigation measures to apply during the different phases, as well as the monitoring standards required to keep up-to-date their scale and progress and addresses the responsibilities of each entity within the project management and review structure, regarding the specific roles for the EMP operation. Comprehensive mitigation measures are set out for the project in Table 10-1, covering pre-construction, construction and operation.

The Contractor is expected to develop a specific Construction Environmental Management Plan (CEMP) for the project, which is a detailed plan that sets out the contractor's approach to implementing the required mitigation measures. The activities and mitigation measures reflect best-practice measures typical of the project's nature and, where relevant, specific to the conditions of the project components and of Viqueque City.

Throughout the DED phase and the IEE under the ADB process, the consultants undertook Public Consultation for Viqueque in the Viqueque Municipality Administrative Assembly Room on the 10th of October 2020, participated by local government agencies and authorities (Chief of Suco and Village), and representative members of the communities within the project area, where the issues of significant social concern, predicted environmental impacts and proposed mitigation measures were presented, in order to collect all useful and relevant inputs from them, for the project construction phase. The stakeholders presented their concerns, suggestions and recommendations for the project implementation, focusing mainly on issues such as Land & Property, Acceleration of the Project Implementation, Project Area, Water distribution system does not serve all villages, misuse by consumers (and direct impact on water availability in the distribution system and measurement for structural preservation of cultural and religious assets within the project area.

In addition, 4 other Public Consultations were 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), which registered a significant attendance and strong female participation and further confirmed the expectations and worries in the previous Public Consultation and reassured the team that there is very little risk of any water conflicts or impacts felt by the community during implementation and operation of the future system.

The SEIS and particularly the EMP provide for a procedure of communication between the proponent, the future contractor and the public and affected people. Every grievance shall be registered by the Contractor under a carefully documented process during construction and development of the project. The MPW will also be involved in the clients' complaints and establish a good network with the chefe suco and aldeia for cultural facilitation purposes. The environmental and social safeguards officer will be fully responsible on the overall grievance redress issues particularly on the environmental and social issues using a combination mechanism.

2 DETAILS OF THE PROJECT PROPONENT

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 Be'e Timor-Leste (BTL), responsible for the overall management, implementation and monitoring of the 4MWSSP project, while the BTL 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. Abel Pires, Minister
MPW Corporate Services Building
Avenida 20 de Maio, Caicoli, Díli, Timor-Leste

Proponent Primary Contact

Be'e Timor-Leste (BTL)
Mr. Carlos Peloi dos Reis, General Director
Be'e Timor-Leste (BTL)
BTL Compound, Avenida 20 de Maio, Caicoli, Díli, Timor-Leste
Telephone: +670 78001012
Email: cdosreis@gmail.com

Proponent Secondary Contact

Be'e Timor-Leste (BTL)
Mr. Almeida Boavida, Manager of Research, Project and GIS^{SEIS}
BTL Compound, Avenida 20 de Maio, Caicoli, Díli, Timor-Leste
(Telephone: 78305968)

Proponent Tertiary Contact

BTL Viqueque Office
Mr. Marito da Costa, Director
Suco Caraubalu, Viqueque, Timor-Leste
(Telephone: 77009015)

3 DETAILS OF THE CONSULTANTS

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. Vasco Leitão is the Environmental specialist responsible in preparing this Project Document on behalf of ADP-TL/Engidro.

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

ADP-TL/Engidro Lead Consultant:
Mário Santos
Mobile: +670 778 47 15 15
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Environmental Specialist:
Vasco Lobato Leitão
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Email: vasco.al.leitao@oasis-sustainable.com

Name of Consultant	Profession	Areas of Expertise
Vasco Lobato Leitão	Environmental Engineer	Integrated Pollution Control Environmental Baseline Evaluation, Impact Assessment and Monitoring Environmental Management Systems (Concept and Implementation) Industrial Safety Systems (Concept and Implementation)
Contribution to the SEIS	SEIS / EMP Management and Supervision Baseline Analysis of Project site conditions (Physical [climate, topography, geology, air quality], Economic, Cultural and Social components; and support to Ecological components) Impact Assessment and mitigation measures of above-mentioned components and relevant chapter drafting Final Drafting and review of SEIS and EMP	
Educational Background	Masters (MSc) in International Urban and Environmental Management (Australia) Specialisation in Environmental Management Systems (Portugal) Degree (BSc) in Environmental Engineering (Portugal)	

Name of Consultant	Profession	Areas of Expertise
Nofiano Ruas	National Junior Environmental Specialist	Environmental Science
Contribution to the IEE	Baseline Analysis of Project site conditions (Climate and Climate Change Projections) Impact Assessment and mitigation measures and relevant chapter drafting	
Educational Background	Degree (BSc) in Science, specialising in Meteorology (Brazil)	

Name of Consultant	Profession	Areas of Expertise
Inês Pereira	National Junior Environmental Specialist	Environmental Science
Contribution to the IEE	Impact Assessment and mitigation measures Relevant chapter drafting and SEIS / EMP review	
Educational Background	Master Degree (MSc) in Environmental Science (Phillipines) Degree (BSc) in Mining Engineering (Indonesia)	

Initial Support:

Name of Consultant	Profession	Areas of Expertise
Maria Helena de Jesus	Junior Environmental Technician	Environmental Management in Roads, Water and Sanitation
Contribution to the IEE	Baseline Analysis of Project site conditions (Physical [surface, ground, coastal and marine waters] and Ecological components) Impact Assessment and mitigation measures of above-mentioned components and relevant chapter drafting Preliminary SEIS and EMP Chapter drafting	
Educational Background	Degree (BSc) in Environmental Engineering (Indonesia)	

4 DESCRIPTION OF THE PROJECT

4.1 Identification of the Project

The Four Municipal Capitals Water Supply & Sanitation Project (4MWSSP) is a Government of Timor-Leste project that intends to provide 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 4MWSSP objective is to impact on the quality of life for urban populations, especially the underprivileged and marginalized, achieving inclusive and sustainable access to WSS services in the Municipal Capitals, through the improvement of water supply and sanitation infrastructure in project municipalities and strengthening of institutional and community capacities.

While municipalities' capacity is being built, the government intends to implement the project over a 20-year period (indicative implementation period is 2021 to 2040) and will be supported through ADB financing using a sector lending approach. The MPW is the executing agency, BTL the agency responsible for the overall management, implementation and monitoring of the project and the BTL Municipal Offices will manage day-to-day project implementation, construction and operation at the municipality level.

The components for the 4MWSSP – Viqueque, Viqueque Municipality Capital Project, have the following proposed outputs:

Output 1: rehabilitate and expand the Viqueque municipal capital urban water supply system to cover the new demand volumes for the project horizon year of 2040, including: (i) rehabilitation and improvement of the existing Loihuno Spring intake and complement current water production through the construction of a river intake in River Cuha; (ii) Rehabilitation and improvement of existing water storage and treatment facilities; (iii) Rehabilitation of 43 Km within the expanded water supply distribution pipe system (4 Zones), simplifying management and substantially improving the level of service and reducing water losses in the project area; and (iv) Installation of bulk metering system within the distribution network and replacement and/or installation of domestic meters for all existing and new connections for proper accounting of water use and system losses;

Output 2: establish fully functioning water supply and sanitation infrastructure in 4 (four) public locations that is effectively operated, maintained and managed to provide a minimum level of service for water supply and sanitation to all municipal dwellers while they are active in the city premises;

Output 3: at a macro level, influence and facilitate achieving new or improved household sanitation in all households in the Viqueque municipal capital;

Output 4: establish septic tank sludge treatment and disposal facilities and associated sludge transport system within a diameter area of 15 Km around the Viqueque municipal capital that is effectively operated, maintained and managed and that safely transports the septic tank sludge effluent from all households, buildings and schools to a future stand-alone Faecal Sludge Treatment Plant (FSTP) in Suco Maluro.

An Initial Environmental Examination (IEE) was prepared as the preliminary environmental evaluation for the Four Municipal Capitals Water Supply & Sanitation Project – Viqueque (known as 4MWSSP - Viqueque) and was carried out during the Detailed Design phase, in accordance with ADB's Safeguards Policy Statement (SPS) 2009, and the Government of Timor-Leste environmental requirements and guidelines currently in effect.

The IEE concluded that the Viqueque water supply and sanitation project is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, potential direct environmental impacts are mostly construction related and unlikely to affect areas larger than the sites or facilities subject to physical works. These impacts are site-specific, few if any of them are irreversible, and in most cases can be prevented or mitigated with standard construction methodologies and procedures and operational safety measures designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

During the preparation of the IEE for the component, an Environmental Management Plan (EMP) was also presented in a separate volume, in a stand-alone Environmental Management Plan (EMP), as required by the environmental licensing law and Ministerial Diploma no 47/2017. It is an essential tool for ensuring that mitigation of the negative impacts and enhancement of the positive impacts is carried out effectively throughout the time life of the 4MCWSSP Project. The EMP addresses the environmental impacts that have been classified in the EIS as significant (medium) or above (very significant or high) and attributes mitigation measures to apply during the different phases, as well as the monitoring standards required to keep up-to-date their scale and progress and addresses the responsibilities of each entity within the project management and review structure, regarding the specific roles for the EMP operation. Comprehensive mitigation measures are set out for the project in Table 10-1, covering pre-construction, construction and operation.

The Contractor is expected to develop a specific Construction Environmental Management Plan (CEMP) for the project, which is a detailed plan that sets out the contractor's approach to implementing the required mitigation measures. The activities and mitigation measures reflect best-practice measures typical of the project's nature and, where relevant, specific to the conditions of the project components and of Viqueque City.

4.2 Category of the Project

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 lines 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).

The Environmental assessment conducted for the Viqueque water supply and sanitation Project was 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 classification process the proponent has carried out under ANLA and Decree-Law no. 5/2011, particularly Annex II – Category B (IEE) thresholds, to follow the Timorese requirements regarding Environmental Licensing. As such, the Project was classified as Category B, by ANLA, in March 2021 (see Table 4-1)

Table 4-1 - 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
Faecal 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 I ⁽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 previous BTL-led projects in Pante Macassar and Manatuto (see APPENDIX 1.Appendix 2 and APPENDIX 1.Appendix 3).

4.3 Brief Description of the Nature, Size and Location of the Project

4.3.1 Project Nature and Size

The Project scope includes all the areas that will be required to implement the Abstraction, Treatment and Distribution of Water for Human Consumption, 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.

Its main objective is to provide water supply in 6 subzones covering 2.98Km², to a population horizon of 23,719 persons in 2040 or an equivalent 3,594 dwellings (at an average 6.6. persons/dwelling), although in this group one must assume other receiving infrastructure such as government buildings, schools, hospitals, etc. As an example, at a production of 4,251 m³/d, in the wet season, Loihunu Spring is expected to supply 84% of this population (or 2875 dwelling equivalent), while in the dry season the situation reverses and Cuha river comes online with 97% production, while Loihunu drops to 7% of total production or an equivalent 251 dwellings.

It is also to 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. The 15 Km diameter is based on limiting the project not to exceed its sanitation activities farther than the designated scope, so that it will not negatively impact on the environmental and social components, in other words, there will be no increase in terms of the magnitude of the impacts.

The 15 km range area encompasses 8 sucos in total, namely Loihuno, Uai Mori, Bahalarauain, Uma Quic, Uma Uain Craic, Maluro, and Caraubalo (see Figure 4-2 for Sanitation coverage in % per Suco covered). 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 4-1).

Figure 4-1 - Existing & Proposed Water Distribution System Overlaying 4 Sucos Covered

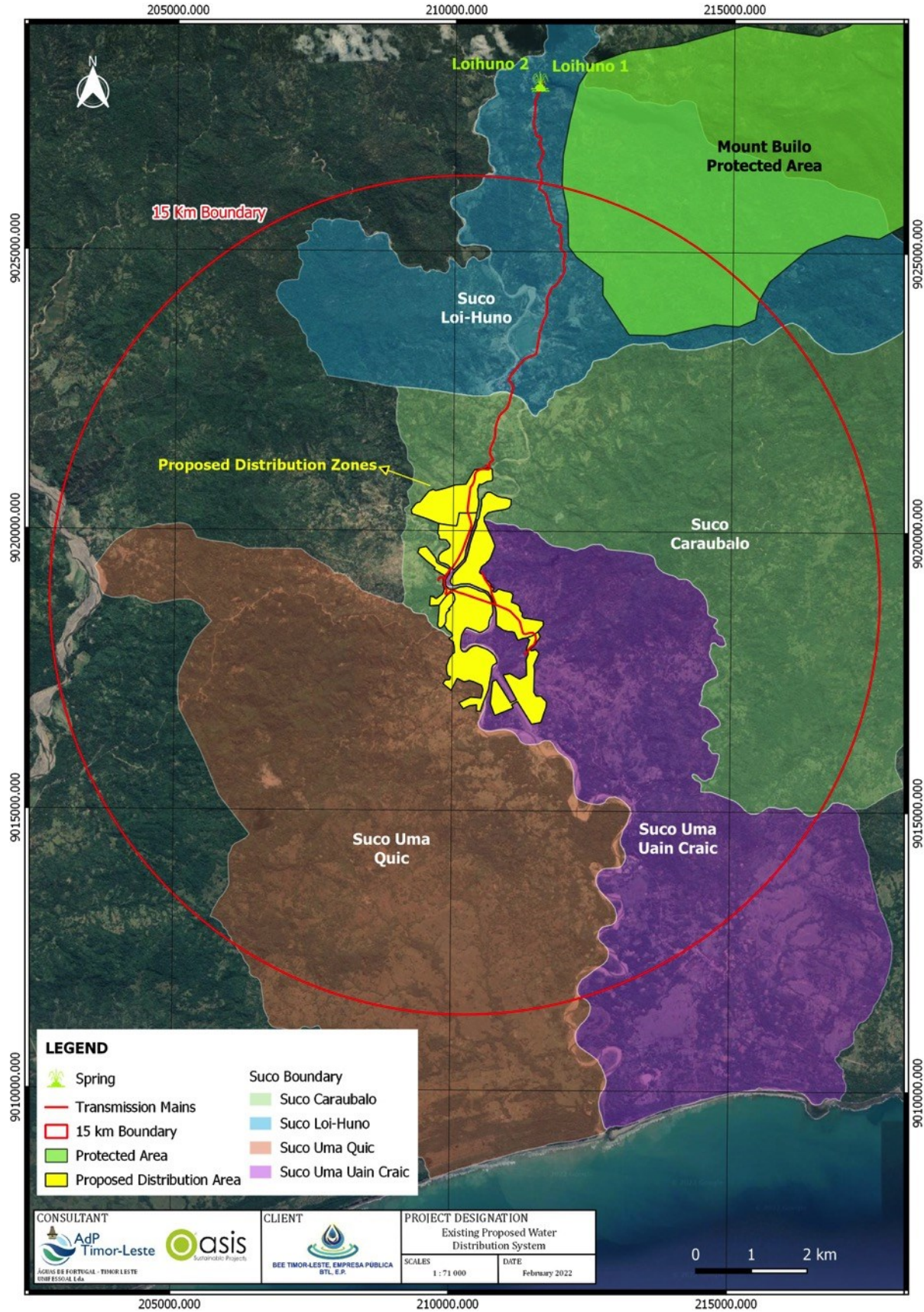
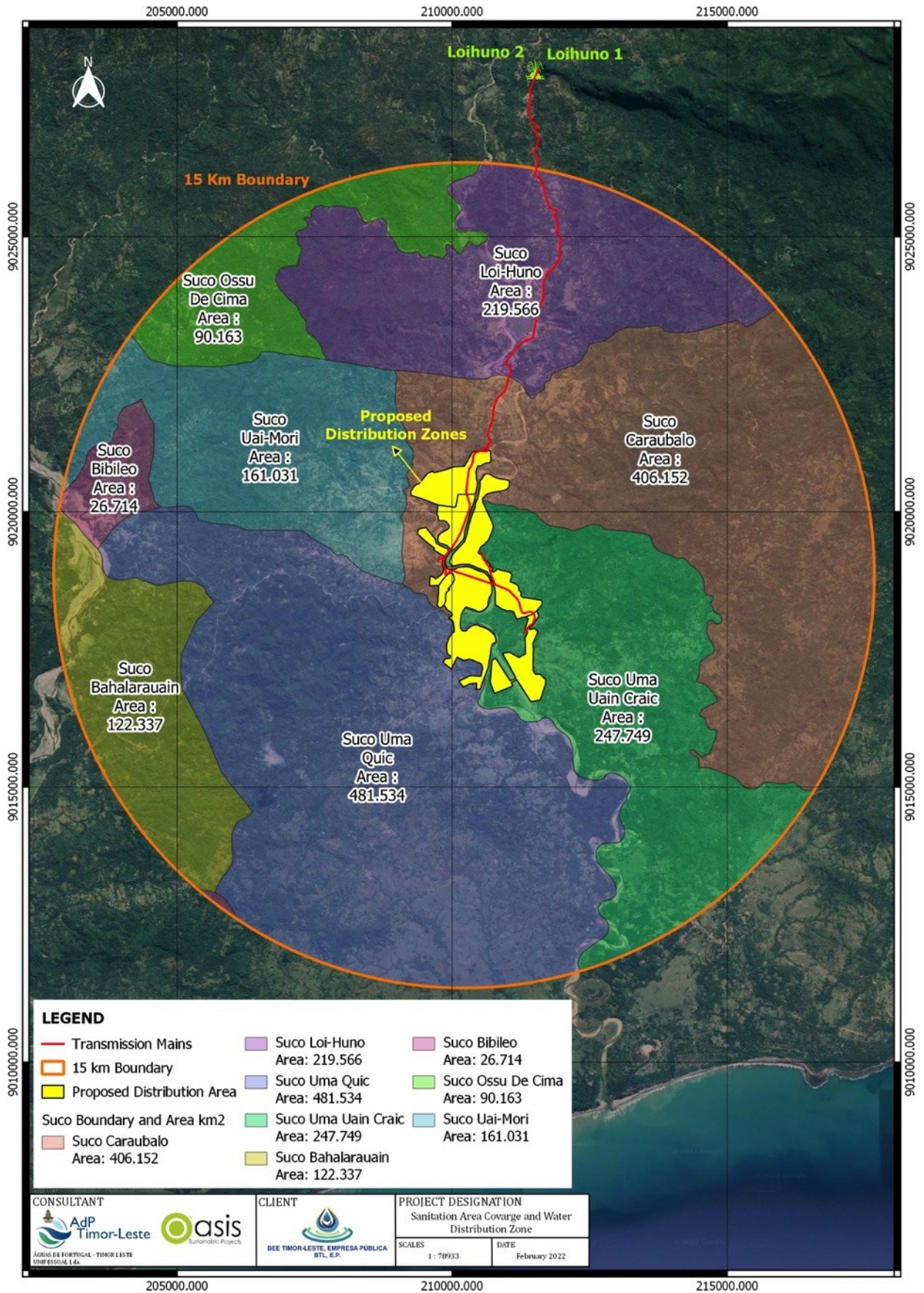


Figure 4-2 - Sanitation Area Coverage and Water Distribution Zone



During the Preliminary Design study, the team designated several location points and areas for the future pilot boreholes as what we called the "Prospection Areas", 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 4 Sucos, as follows (see Figure 4-1):

- **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. 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 a 1/2 of the proposed Water Supply Network;
- **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;
- **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;

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 team carried out site visits respectively on the 20th – 21st of February 2020 (inception phase) and 24th – 26th of June 2020 aiming to evaluate the specific environmental conditions of Viqueque city. The Team identified numerous cultural patrimony sites within the 15 Km project area, that lie adjacent and/or parallel to the project components i.e., transmission and distribution mains, albeit the proponent will guarantee the referred sites will not be impacted by applying mitigation measures during the construction and operation phases. The team carried out field observations and interviews with several entities and local authorities i.e., BTL technicians and Suco Chiefs in order to aid in the identification of the referred sites.

The team was also aware that the single source Loihuno spring is very close to the Protected Area boundary of Mount Builo, however the information received only concludes the environmental description from the secondary data of the baseline study which was prepared for the Initial Environmental Examination (IEE) document (see Appendix I) and interviews to the local community and authorities in regards to certain areas of biodiversity e.g. downstream of Kuha river (southern part of the Proposed Water Supply Zones). Any existing activities or areas such as poaching or hunting areas were inconclusive in the Project Area.

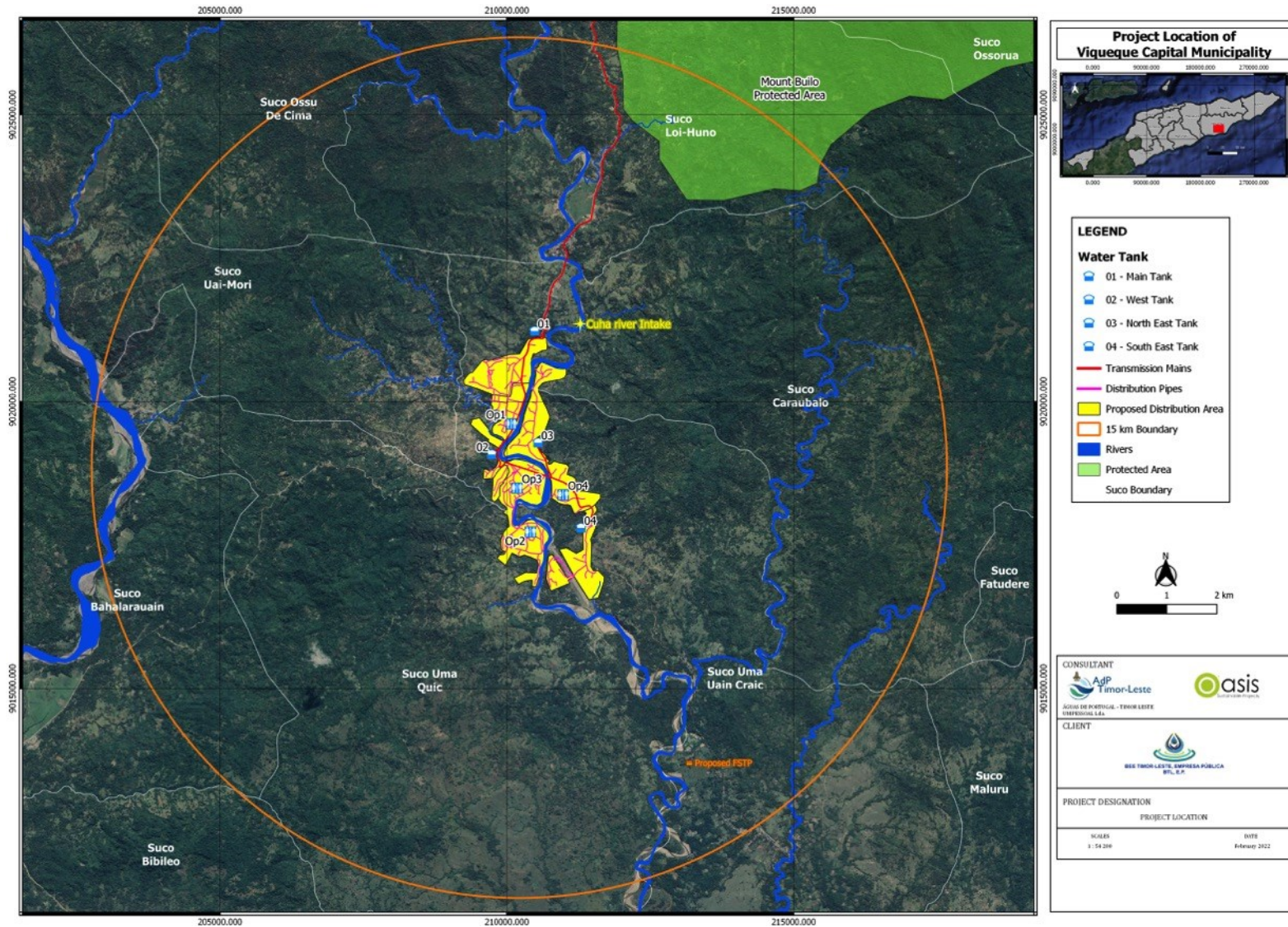
The implementation of the project is associated according to the project cycle, which comprises of 4 phases, commencing from the design activity. The subsequent phases are construction, followed by operation and maintenances of the facilities, and the decommissioning.

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 spring 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 spring is on the foothill of Mount Builo, a declared protected area under the Decree Law 5/2016;
 - iii) the Loihunu III spring 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);

- iv) Kuha River Intake is located in the eastern part of the water supply zone and was directed by the team due to zero yield during boreholes drilling under the DED phase.
- 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 and potential sites for exploration were drilled but were found to be unsuccessful.
- c) Water Distribution Zones: The main spring systems (Loi-Huno Spring) supply storage tanks and these subsequently supply to 4 distribution zones through a gravity transmission and distribution 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 I, 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 BTL - Viqueque.

Figure 4-3 - Project Location Viqueque Municipality



4.3.2 Location

The 4 MCWSS Viqueque project is located in the urban area of Viqueque Municipal 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. Geographical coordinates of the project site are in the SW latitude of 8°56'17.94"S and longitude of 126°18'10.48"E and NE latitude of 8°47'53.13"S and longitude of 126°26'5.38"E. The geographical locations of the remaining components for water supply and sanitation are listed in the table below as followed:

Table 4-2 - Sub-Project Components Geographical Locations

Components	GPS Coordinates
Water Supply Sector	
Loihuno I Spring	8°47'2.50"S 126°22'40.13"E
Loihuno II Spring	8°47'1.20"S 126°22'39.64"E
Loihuno III Spring	8°47'5.07"S 126°22'33.29"E
Kuha River Intake	8°50'40.97"S 126°22'29.64"E
Sanitation Sector	
Public Toilet I	8°51'35.66"S 126°21'50.98"E
Public Toilet II	8°52'36.36"S 126°22'1.88"E
Public Toilet III	8°52'12.07"S 126°21'54.19"E
Public Toilet IV	8°52'18.68"S 126°22'22.27"E
FSTP	8°54'48.85"S 126°23'31.21"E

4.3.3 Project Components

The Viqueque sub-project comprises two major components – the existing and proposed components, which are described in detail in this Chapter.

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 Public Buildings and Schools within a diameter area of 15 Km around the city, 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.

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).

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 treated at the proposed FSTP.

It is important to note that this DED (Detailed Engineering Design) project assignment consists of several phases prior delivering the final draft to the client and implementing the project sequentially. These phases are as followed:

I. Inception phase

The team had finalized the final draft of the Inception Report on February 2020. The said report was aimed on providing all necessary information of the existing components of the project during a preliminary site visit.

2. Water Resources Investigation and Reporting

The underground water investigation for Viqueque were carried out last October 2020 until January 2021. The status of this phase is in pending as this phase is still missing on the Baucau study at the field.

3. Survey and Mapping

Pending conclusion of field work.

4. Analysis Options

In this phase, the team provided the summary of several alternatives for the proposed projects that are to be analysed under the scope of the Preliminary Design report.

5. Preliminary Design

During the Preliminary Design stage, the team also went through the Initial Environmental Examination (IEE) and Environmental Management Plan (EMP) process under the ADB Safeguard Policy Statement (SPS) 2009 for environmental screening and for the purpose of ADB loan process. Throughout this phase, the team also carried out a Public Consultation in each of the 4 cities.

6. Final draft of DED

The inputs from the Public Consultations were collected and then used for improving and finalizing the design based on the preliminary design. The proponent expects the final DED to be done during the Simplified Environmental Impact Statement (SEIS) process.

4.3.3.1 Water Supply System

4.3.3.1.1 Existing Water Supply System

A. Water Sources

Current Public water supply in Viqueque depends on an existing system (See Figure 3, Map 1.1 in Appendix I and Appendix 14), with the following different sources, locations and volumes:

- Loihuno system: the Viqueque water supply system for the community includes 3 springs, composed of:
 - 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 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. Loihuno 1 spring is surrounded by 23 households (around 200 people) and only 8 houses that have a 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.

- Cuha River: given the variability and various competing water uses in the Loihunu system and that no groundwater was found during the borehole exercise, Cuha river has been brought forward as an option for water sourcing. From a quick Landsat satellite imagery evaluation (1987 to 2020), it was concluded that the river's volume of water is undervalued, as there is evidence of water in the dry months when the width of the river section is smaller. This capture could be done through wells in the alluvium or by direct intakes of river water through screened tubes that capture the water to a sealed well (see Figure 4-10). In addition, to guarantee that Cuha River Intake has enough flow to supply the water treatment in the dry season, the project proposes the construction of a dyke in the river, in the same intake area with a height of 0.75 m, to maintain a minimum water level in the river (see XXXX). A bottom discharge will be installed on the dyke, near the intake, which will allow the dike maintenance and the cleaning of the sediments deposited. The pumping station, to be constructed in the river intake, will have 3 pumps (2 active pumps plus 1 standby pump) and the proposed river intake (side intake) will have 3 lines, one for each pump. Each line will have 3 chambers, as follows:
 - First chamber - installation of a manual bar screen, with 4 cm opening, to avoid the entrance of solids in the intake;
 - Second chamber - sedimentation chamber, deeper than the adjacent chambers and with a submersible sand pump to allow the cleaning of the sediments deposited in the chamber bottom;
 - Third chamber - where the suction pipe of the pumping system will start. A screened entry will be adopted to avoid the entrance of small solids in the pumping system;
 - To allow the maintenance and cleaning of the river intake, sluice gates will be installed in the entrance of the first and third chambers.

The pumps and the valves will be installed in a single dry chamber, which will be watertight and the access will be from the top, in order to avoid the inundation risk. The control building, in which the electrical switchboards will be installed, will be constructed away from the river intake, on higher ground, in order to avoid the inundation risk.

Overall, the impact of the weir will fall under the construction phase and expected to have the same impacts as the Intake construction (see Chapter 9.2.3. Construction related impacts)

Apart from the Cuha River Intake, the water distribution system as a whole has not had substantial change and as a result the current Flow Diagram does not differ a lot from the 2015 Master plan (see Figure 4-5). The Design team is evaluating the long-term productivity/yield of the water sources after placing V-Notch equipment and have done investigations in October 2020, aiming to get definite numbers of the production yield. The total yield of the Loihunu System (Buibau + Loihuno [III]) can go up to approx. 90 lps.

According to DNSA previous water quality testing, the Loihuno source has episodes of biological contamination, mostly from upstream agriculture, husbandry and domestic activities i.e. poor sanitation practices and infrastructure.

These have provided preliminary water estimation data to be able to estimate supply towards the expected demands for the 2040 Scenario B = 58.4 lps. The project will propose a mix of abstraction between the existing spring and the river intake to guarantee sustainability of the extraction while guaranteeing water distribution to all BTL clients.

Figure 4-4 - Viqueque Water Sources



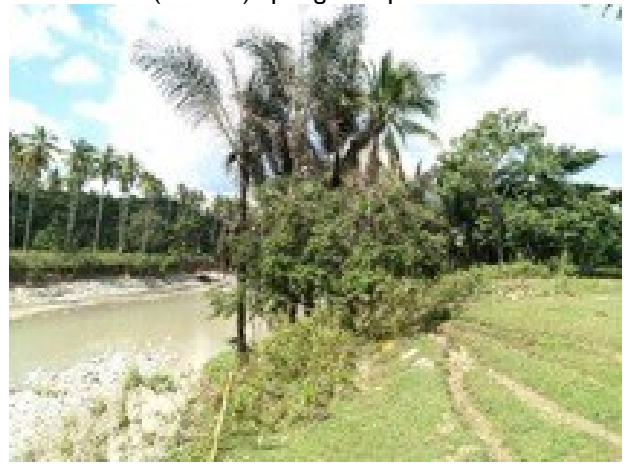
Loihuno I (Buibau spring)



Loihuno II (Moloco) Spring with private abstraction



Origin of Loihuno III



Kuha River (Southeast view of extraction point)

Figure 4-5 - Viqueque City - Project Scope and Components

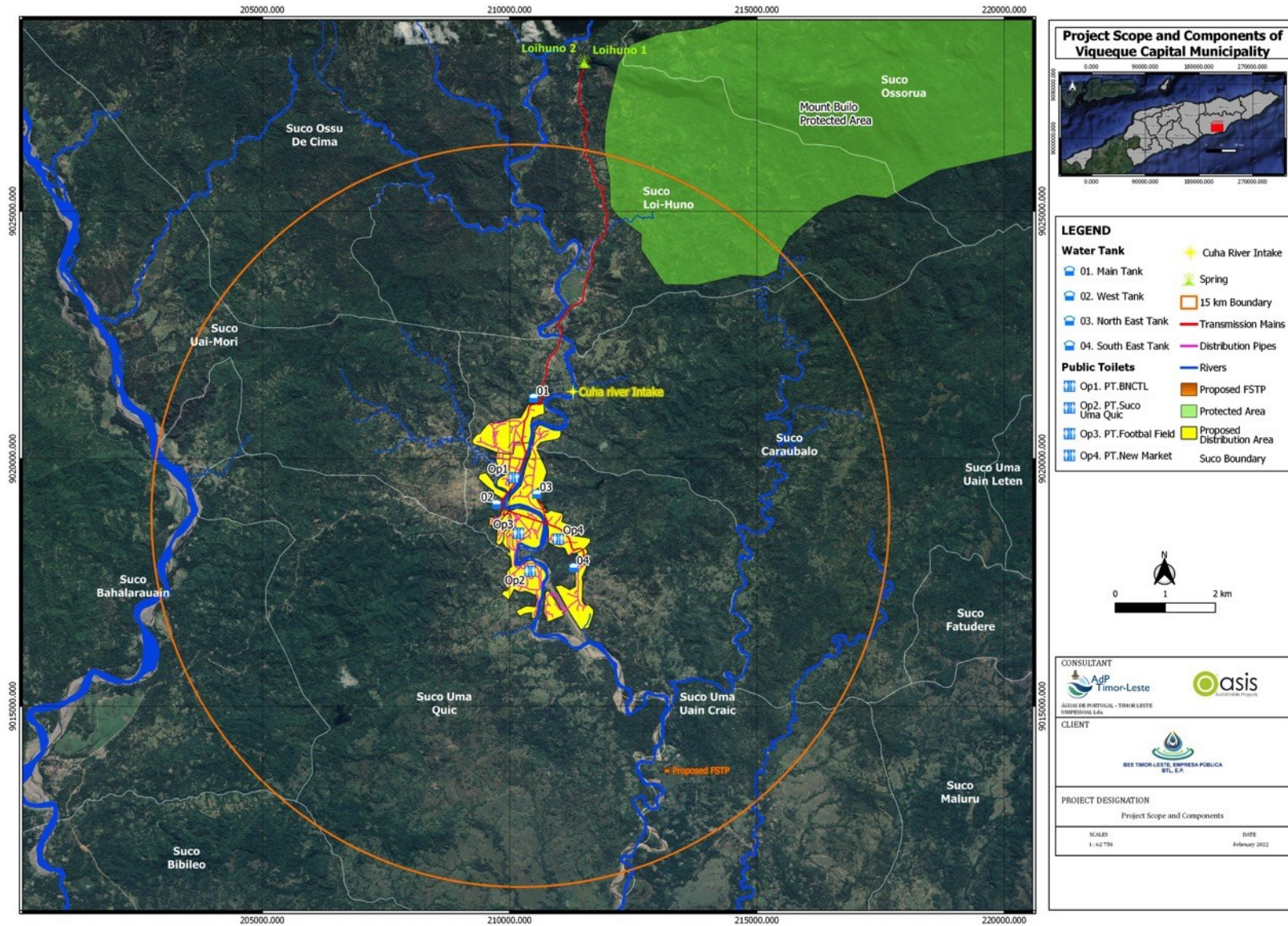
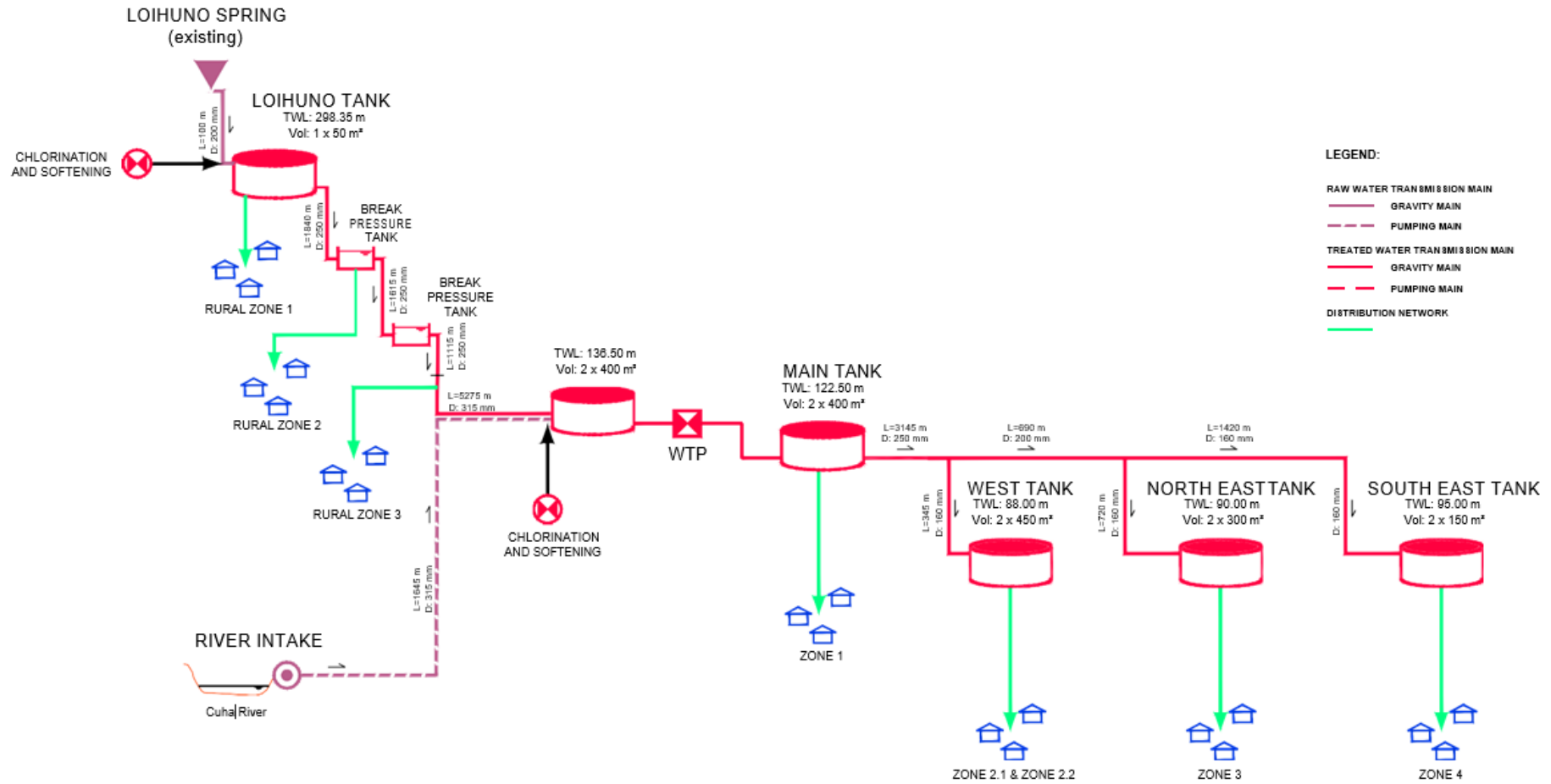


Figure 4-6 - Flow Diagram for Viqueque proposed Water Distribution System (source: AdP-TL/Engidro, 2020)



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 pipelines 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 numerous 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 distribution zone in Viqueque comprises of 4 different zones with manual rotation in terms of supplying to the customers on an intermittent basis. The service levels are very poor with low coverage, intermittent supply and low pressure. According to the test results and field observations, contamination of the water in the distribution occurs due to low pressure during periods when the supply is not operational. Depending on a single reservoir for distribution is considered ineffective as Viqueque is relatively flat and the town has grown substantially. The pumped system, pump maintenance issues and daytime operation exacerbate the poor service levels.

Most of the transmission and distribution pipes are galvanized steel pipelines of varying age from the period of Indonesian administration, old Portuguese pipes particularly in the old town area, and newer pipes installed previously by the BTL or by rural projects such as i.e., under the National Program for Suco Development (PNDS) project. According to the 2015 Master plan, there are also numerous duplicate mains identified. The distribution system requires rationalization and simplification as well as decommissioning and removal of all existing, inoperative pipes. 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. 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. Extensive use of 50 mm diameter during the emergency periods also requires replacement (except were installed as rider mains).

Most of the connections are unmetered with less sharing of piped water supply. The community mostly depends on sharing alternative sources including dug wells and tube wells. The 2015 Master plan states that 64% are registered and supplied to the houses in the urban area with low quantity and poor service quality. In general, many of the older pipes, intended to be abandoned and replaced by the JICA system, remain functioning and consumer connections have not been transferred to the new distribution pipelines. This resulted in continued utilization of the older distribution pipelines, along with leaking/water loss conditions.

Figure 4-7 - Most importantly the distribution system needs to be redesigned to suit the revised zoning arrangements.

Example of Distribution areas and existing installation



Northward is the existing transmission main (pipeline on the right side) from main source Loihuno I spring to be rehabilitated, Suco Loihuno (outside distribution zone)



Suco Uma Uain Craic (Zone 3.2) pipeline assumed to be in the left side and is to be rehabilitated



Suco Uma Quic (Zone 2.1) pipeline for rehabilitation



Main tank



C. Water Quality

The project has a recent history of water quality test results, some carried out between 2000 and 2008, with only one test per year from 2003 to 2008, while other tests were performed in 2014 for the 4 cities Master plan and other sporadic tests in 2019 and 2020, at various points in the distribution network and at some water sources. The results from the water quality tests can be seen Appendix 5..

Conclusions on these results were the following:

- For the period between 2000 and 2006, there is bacteriological contamination (total coliforms and Escherichia coli presence) in the distribution system and Loihuno water sources. The total hardness is tested until 2003 and is above the limit (around 290 mg/l) CaCO₃ for Loihuno intake and around 330 mg/l CaCO₃ for Loihuno Spring);
- Regarding the water quality tests performed in 2008, there is no bacteriological contamination (total coliforms and Escherichia coli) in the distribution system. There are some measurements of the residual chlorine in the distribution system and value is within the guideline limits;
- The water quality tests performed in 2014 for the Master plan (See Appendix 5) shown that there is bacteriological contamination (total coliforms) only at one point in the distribution system (in this system, the water is disinfected). The total hardness is above the limit (around 210 mg/l CaCO₃);
- The water temperature is normally high reaching temperatures of 30°C in some samples. The other parameters tested are according to the limits of the guidelines from Timor and WHO.

D. Gaps in the Water Supply

Water Balance: Demand vs supply.

The water supplied to consumers throughout the years has 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 Detailed Design followed a dimensioning design process that reviewed 2 different scenarios, namely Scenario A in adherence to 2016 Master plan (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 city. 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, exploration bores were carried out at all 4 proposed prospection points between 27th July and 12th September 2020 (in equivalent conditions to the end of the Dry Season). Other than that, water investigation in the existing Loihuno spring was also conducted on October 2020 by installing v-notch tool, principally aiming to determine the available yield.

However, the pumping tests were unsuccessful and it was concluded that groundwater is unavailable in the project area (see VIQUEQUE BORE INVESTIGATION RESULTS). Therefore, the team has decided to select Kuha River as final option for complementing the system. A Water Treatment Plant is to be constructed to treat raw water abstraction from the Kuha River that has predominantly high turbidity and bacteriological contamination.

Table 4-3 presents the water demands versus October 2020 water flow investigation results, which suggest that, under these numbers, and pending a long-term monitoring program, the current proposed sources can produce enough flow for the requirements of the distribution system up to 2040, for the bigger part of the Dry season. They show that Loihunu 1 and Kuha River Intake are estimated to have more than enough water flow to supply the current and future demands for Viqueque Municipal Capital.

These preliminary results also take into account the social and ecological needs from the spring's water sources, such as i.e., agriculture and aquaculture activities identified during the IEE characterisation. An ecological flow was initially considered to account for the variability of rain and flow between dry and wet season and guarantee minimum conditions for water-related ecological services downstream of the springs. This flow has been determined, at a minimum, of 30% average monthly flow for Wet Season and 10% for Dry Season. However, the water sharing for Loihunu sources has been assumed to be divided by sources and not by flow within individual sources, which lowers the importance and/or need to establish the ecological/social flow for Loihunu 1 as it will continue to be a dedicated source for the Distribution system and Loihunu 2 and 3 will serve both the social and the ecological needs of the surrounding area.

Table 4-3 - Water Demands versus Origins Availability

		2020				2030				2040								
Demands for water supply network		Lps	hours	Volume (m ³ /day)	Volume (m ³ /year)	Lps	hours	Volume (m ³ /day)	Volume (m ³ /year)	Lps	hours	Volume (m ³ /day)	Volume (m ³ /year)					
Water Supply Demand (Urban area)		29.6	24.0	2,557	933,466	39.3	24.0	3,396	1,239,365	54.2	24.0	4,683	1,709,251					
Water Supply Demand (Rural area)		4.2	24.0	363	132,451	4.2	24.0	363	132,451	4.2	24.0	363	132,451					
Water Supply Demand (Total area)		33.8	24.0	2,920	1,065,917	43.5	24.0	3,758	1,371,816	58.4	24.0	5,046	1,841,702					
Existing & Proposed Spring Sources	Maximum Yield	Flow to be extracted 2020				Flow to be extracted 2030				Flow to be extracted 2040								
	Lps	%	Lps	%	hours	Volume (m ³ /day)	Volume (m ³ /year)	Lps	%	hours	Volume (m ³ /day)	Volume (m ³ /year)	Lps	%	hours	Volume (m ³ /day)	Volume (m ³ /year)	
Wet Season																		
Loihuno Spring ⁽¹⁾		70.0	100%	70.0	100%	-	-	-	70.0	100%	-	-	-	70.0	100%	-	-	-
	Water Supply	1.3	2%	24.6	35%	24.0	2,125	387,893	34.3	49%	24.0	2,964	540,842	49	70%	24.0	4,251	775,786
	Social Demand	-	-	24.4	35%	-	-	-	14.7	21%	-	-	-	0	0%	-	-	-
	Remaining Flow	68.7	98%	21.0	30%	-	-	-	21.0	30%	-	-	-	21	30%	-	-	-
River Intake		5,860	100%	5,860	100%	-	-	-	5,860	100%	-	-	-	5,860	100%	-	-	-
	Water Supply	0	0%	9.2	0.16%	24.0	794.9	145,066	9.2	0.16%	24.0	794.9	145,066	9.2	0.16%	24.0	794.9	145,066
	Social Demand	-	-	4,093	70%	-	-	-	4,093	70%	-	-	-	4,093	70%	-	-	-
	Remaining Flow	5,860	100%	1,758	30%	-	-	-	1,758	30%	-	-	-	1,758	30%	-	-	-
Dry Season																		
Loihuno Spring ⁽²⁾		5.0	100%	5.0	100%	-	-	-	5.0	100%	-	-	-	5.0	100%	-	-	-
	Water Supply	1.3	26%	4.2	84%	24.0	363	66,226	4.2	84%	24.0	363	66,226	4.2	84%	24.0	363	66,226
	Social Demand	-	-	0	0%	-	-	-	0	0%	-	-	-	0	0%	-	-	-
	Remaining Flow	3.7	74%	0.8	16%	-	-	-	0.8	16%	-	-	-	0.8	16%	-	-	-
River Intake		1,400	100%	1,400	100%	-	-	-	1,400	100%	-	-	-	1,400	100%	-	-	-
	Water Supply	0	0%	29.6	2%	24.0	2,557	466,733	39.3	3%	24.0	3,395.52	619,682	54.2	4%	24.0	4,683	854,626
	Social Demand	0	0%	1,230	88%	-	-	-	1,221	87%	-	-	-	1,206	86%	-	-	-
	Remaining Flow	1,400	100%	140.0	10%	-	-	-	140	10%	-	-	-	140	10%	-	-	-
Total Production		Maximum Yield		Planned Extraction				Planned Extraction				Planned Extraction						
		Lps		Lps	%			Lps	%			Lps	%					
Wet Season																		
Total Spring Source Production		70.0		24.6		35%		34.3		49%		49.2		70%				
Total River Intake Production		5,860		9.2		0.16%		9.2		0.16%		9.2		0.16%				
Total Production Capacity (Spring + River)		5,930		33.8		0.57%		43.5		0.73%		58.4		0.98%				
Dry Season																		
Total Spring Source Production		5.0		4.2		84%		4.2		84%		4.2		84%				
Total River Intake Production		1,400		29.6		2.11%		39.3		2.81%		54.2		3.87%				
Total Production Capacity (Spring + River)		1,405		33.8		2.41%		43.5		3.10%		58.4		4.16%				

(1) Estimated flows

(2) According to BTL technicians

(3) Considering average flows estimated data from "ADB TA: TIM 3986 – Timor-Leste Integrated Water Resource Management Project (2004)". Estimated average flows for the wet season and dry season are 5,860 lps and 1,400 lps respectively. Estimated minimum flows for the wet season and dry season are 470 lps and 320 lps respectively.

As the river and springs are expected to surpass the 54.2 lps as soon as they come online, the table below shows the only scenario possible for Viqueque to guarantee supply and maintain sustainability up to 2040.

Table 4-4 - Water Sources Scenarios

Viqueque	Scenario 2040	Proposed Water Sources	Loihuno springs and new river intake at north of the city
----------	---------------	------------------------	---

The existing springs will be analysed for their current productivity and the other concurrent water uses i.e. the river to assure the estimate consumption for the next 10 – 20 years.

Figure 4-8 - 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

4.3.3.1.2 Proposed Water Supply System

E. Water Conveyance and Treatment

The proposed scenario of Viqueque water supply system considers a water supply assured by two water sources: Loihuno spring and Cuha river intake to be built in the north area of the city. It was admitted that either the Loihuno springs and the river intake will have good productivity and that the water has good quality.

Regading

Due to the characteristics of the raw water from the river intake, the water treatment process will have more treatment steps than the Loihuno spring. The WTP should have the following treatment line: coagulation, flocculation, sedimentation, filtration and disinfection with chlorine. WTP is expected to be located next to the road and at the city limits. Water from Loihuno spring will be disinfected in the WTP site.

The system operation should make increased use of the water from the spring in order to minimize the energy use (water from the boreholes needs to be pumped). This situation could arise during the first few years of operation, in the periods with less water consumptions and especially during the dry season.

The water supply system has an elevation range between 320 m at Loihuno spring and 37m at the distribution network. The water from Loihuno spring will feed the Main Tank by a gravity transmission main with 7.05 km of extension. Given the elevation gap, from 320 m at Loihuno spring to 114 m at Main Tank, it was planned to equip the transmission main with two pressure break tanks to limit the maximum pressure value to 10 bar.

Figure 4-9 - Loihuno Transmission Main. Pressure Break Tanks



The water extracted from the Kuha river to the river Intake Tank will be pumped directly into the WTP through a 0,81 km long pressure line. The water treated at WTP will be pumped through a 240 m long transmission main and stored at the Main Tank.

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

From the Main Tank to the bifurcation to the West Tank the transmission main has 2.54 km and the connection to the tank has 155 m of extension. From this bifurcation to the bifurcation to the North East Tank the transmission main trench has 1.28 km and the connection to the tank has 645 m of extension. The last trench of the gravity transmission main to the South East Tank is 1.42 km long.

In Table 7 is the proposed water tank storage calculated according to the water demand projection for 2040 and in Table 8 the list of proposed Water Distribution Zones for Viqueque

Table 4-5 - 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 (?)	-	-	-	-	-	700
	Total	1,277	1,759	2,422	1,759	2,422	3,300

Table 4-6 - Viqueque Distribution Zones

Water Tank	Distribution Zone	Elevation
Main Ground Tank (elev. 120 m)	Zone 1.1	From 80m to 58m
	Zone 1.2	From 60m to 51m
West Ground Tank (elev. 90 m)	Zone 2.1	From 69m to 38m
	Zone 2.2	From 94m to 75m
Northeast Ground Tank (elev. 90 m)	Zone 3	From 62m to 39m
Southeast Ground Tank (elev. 90 m)	Zone 4	From 76m to 37m

Figure 4-10 - Cuha River Proposed Intake Infrastructure

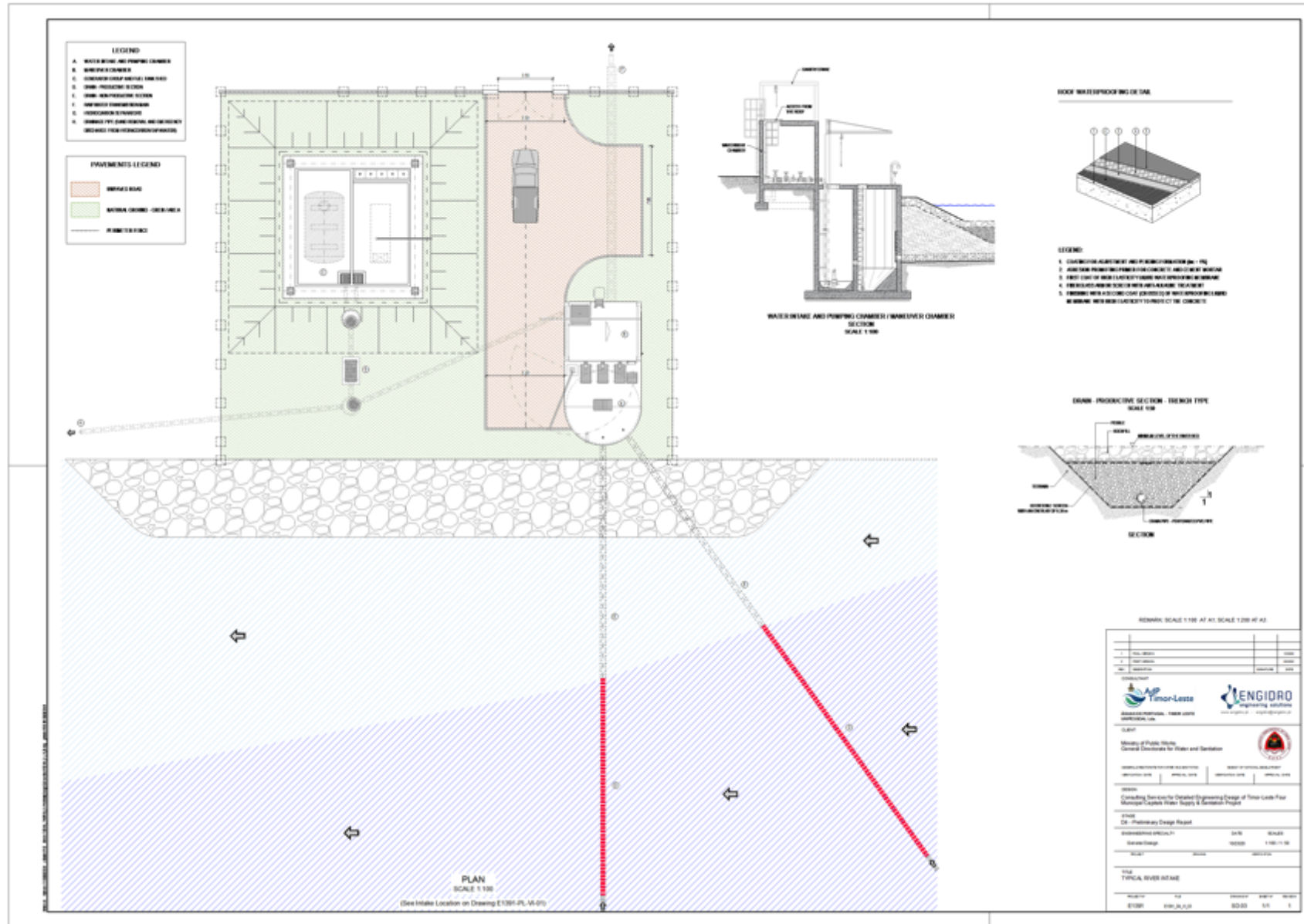
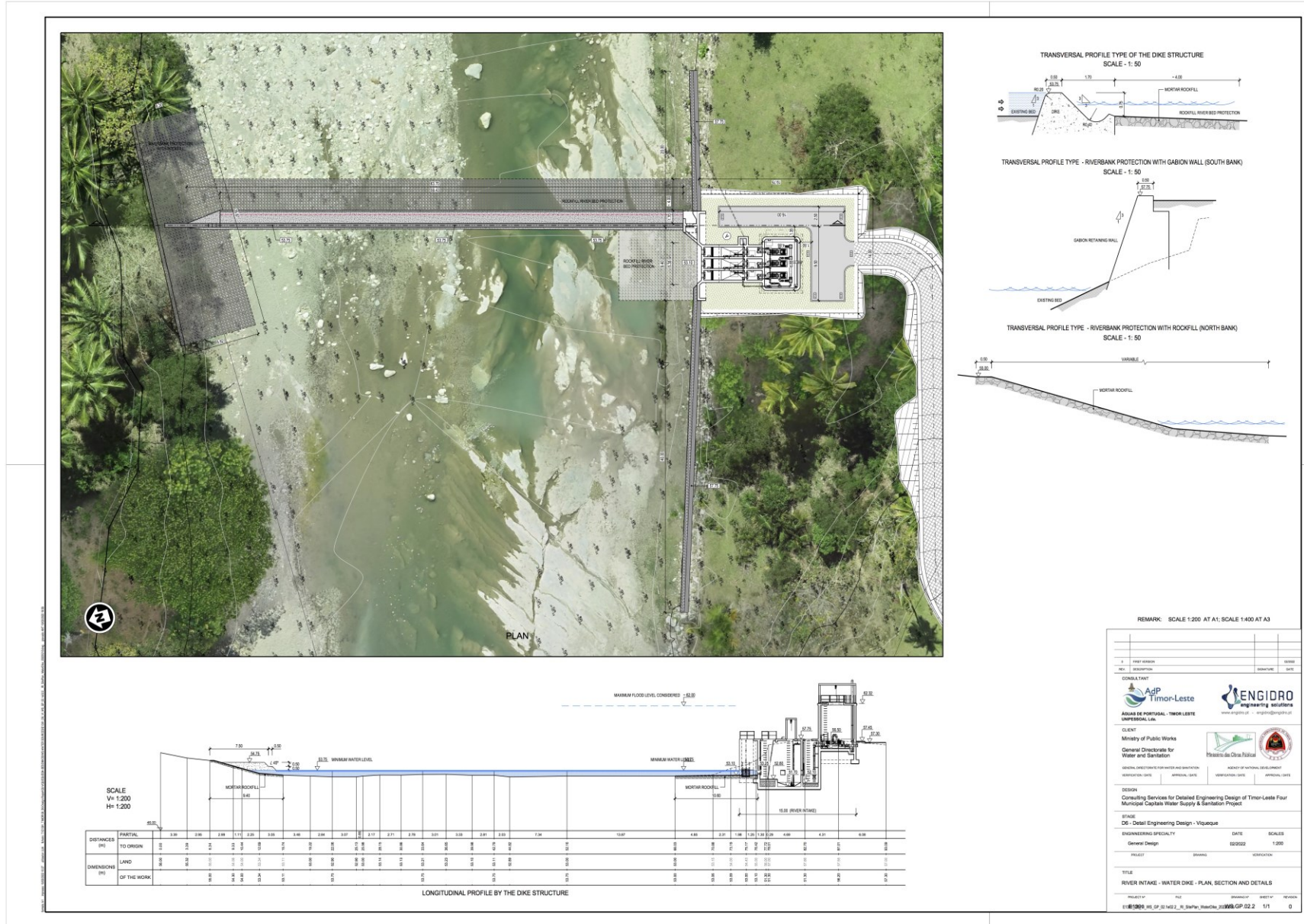


Figure 4-11 Weir Design for better extraction flow



4.3.3.1.3 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, trench design type and the operational system.

a) Material Selection

The following criteria is proposed regarding material selection:

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

b) Trench Design

It is assumed that pipes will be implanted underground, in general, 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 9, on both sides of the road alignments, in order to allow the construction of the service connections on each side of the road without interference with transmission mains and, also, to make it more difficult for illegal connections, while typical trench details are presented in Figure 10.

The distribution networks will be connected to the 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.

Figure 4-12 - Laying of Transmission and Distribution Lines Along a Road. Typical Cross Sections

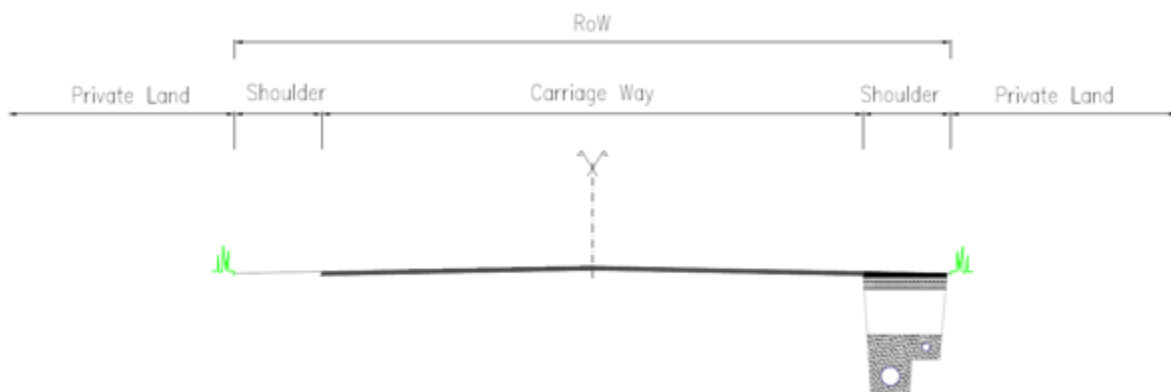
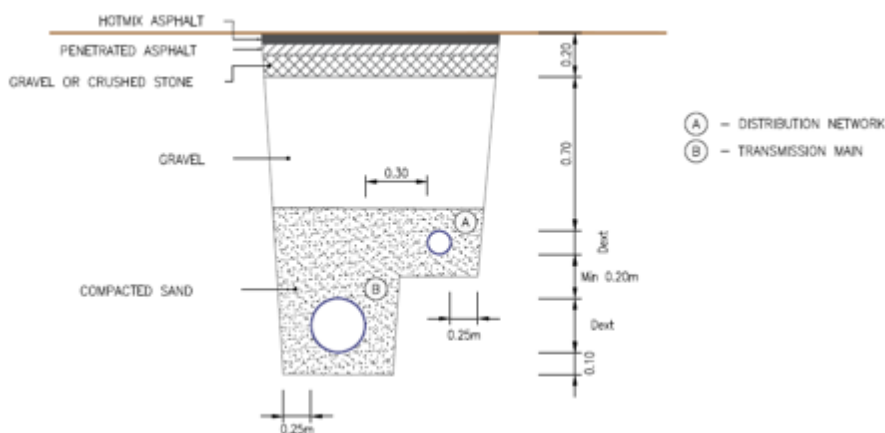


Figure 4-13 - Typical Double Trench Transmission Mains Service



c) 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.

d) Distribution Network Pressure Zones

In each distribution zone, the pressure in the network can vary between a minimum of 10 m and a maximum of 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)

4.3.3.2 Sanitation System

4.3.3.2.1 Existing Sanitation in Viqueque

According to 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 toilets in Viqueque are: open defecation practices; 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.

According to the 2016 Master plan, 15% households in Viqueque practice open defecation (see Table 9). All the remaining households that do not practice open defecation are contributing with sludge, through their own toilets or shared toilets.

It is presumed that nearly most Households in the project area have installed a sanitation system similar to a septic tank but with a permeable bottom that unfortunately serves as a leaching pit with an accumulating sludge top layer [referring to sub-section 3.4.4- Current Status on p-177 of the 2016 Master plan].

Although not ideal, these sanitation facilities are nevertheless producing digested sludge (which needs to be removed once in two years) and infiltrating semi-treated wastewater into the ground and water table.

Table 4-7 - Toilet Access in Viqueque as per 2014 Household Survey

	Toilet type	Units	Percentage Access ¹
			Viqueque
I	Open defecation	%	15

Toilet type		Units	Percentage Access ¹
			Viqueque
2	Unhygienic toilet (owned)	%	26
3	Unhygienic toilet (shared)	%	9
4	Hygienic toilet (owned)	%	44
5	Hygienic toilet (shared)	%	6
Total			100
Current (2014)		Number of Households ²	
1	Open defecation	HH	278
2	Unhygienic toilet (owned)	HH	487
3	Unhygienic toilet (shared)	HH	174
4	Hygienic toilet (owned)	HH	835
5	Hygienic toilet (shared)	HH	104
Total			1,879

¹ Based on Household Survey

² Projected based on population growth with similar percentage access to 2014 Household Survey

4.3.3.2.2 Proposed Sanitation Projects

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 sludge from these pilots, as well as all buildings and households located within 15 km of the Viqueque Municipal capital (see Figure 12 and Figure 13).

The public toilets' pilot test locations will be chosen per the location and conditions of current sanitation infrastructure, users, as well as the state of the toilet facilities.

It is worth noting that there are concerns across the majority of these public toilet management responsible persons given that current sanitation facilities do not have regular maintenance or access to water supply.

Figure 4-14 - Public Toilets and FSTP Proposed Location – Viqueque

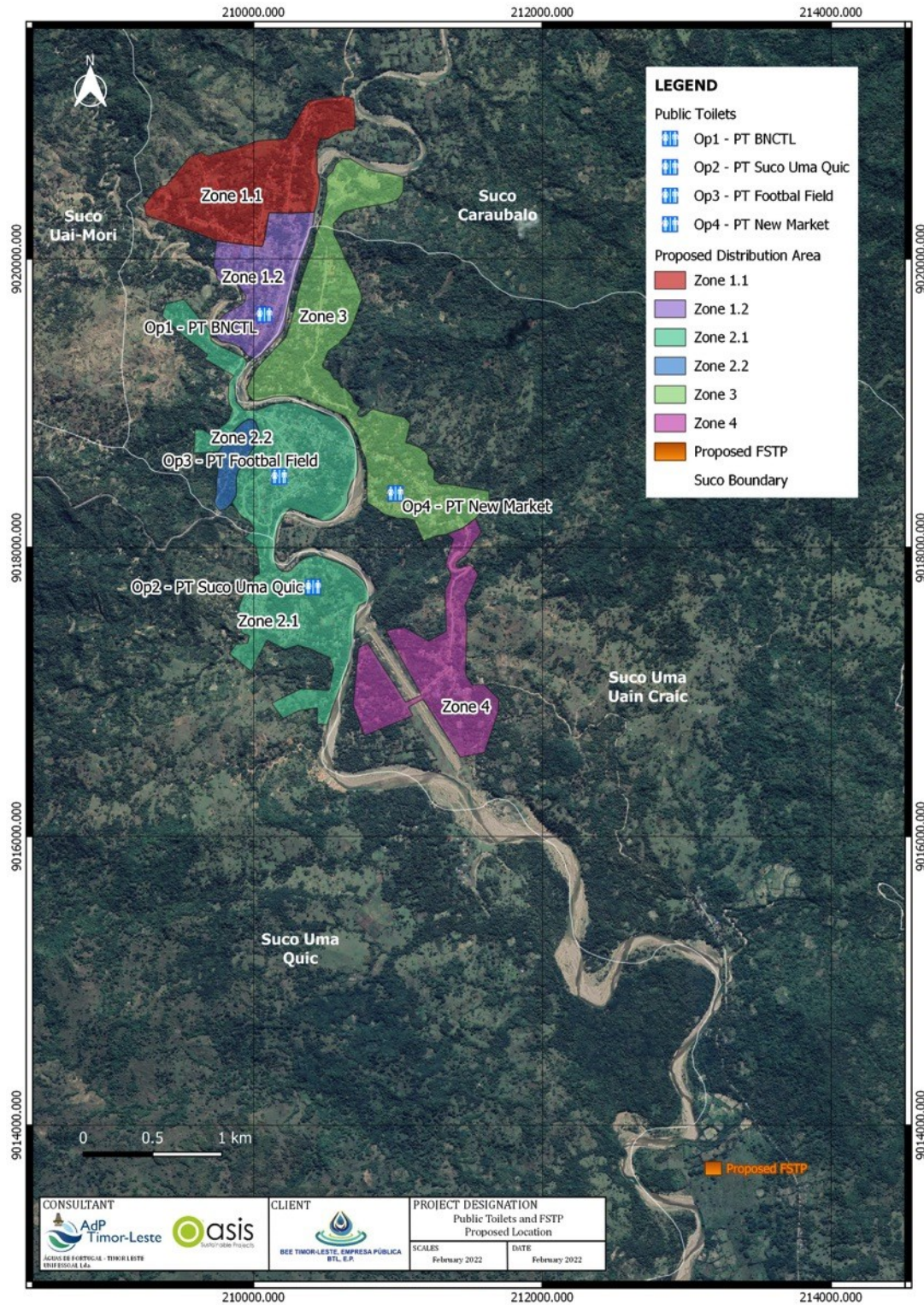


Figure 4-15 - Aerial Imageries of Public Toilets Proposed Locations



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

A. Public Toilets.

The proposed specifications for the Public Toilets are based on the information below, with gender separation of toilets:

Male Toilets:

- Adult: 3 urinal stalls
- Adult & Children: 3 latrines (each with 1.2 m2[approx.]);
- Children: 1 small urinal

Female Toilets:

- Adults & Children: 5 latrines (each with 1.2 m2[approx.]);
- Facilities for menstruating girls.

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 m2 [approx.]

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

- 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.
- 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.

Table 4-8 - Recommended sizes of Septic Tank

No. of users	Length [m]	Breadth (m)	Liquid depth [m] (Cleaning interval)	
			1 year	2 year
7	2.64	0.75	1.0	1.3
15	2.73	0.75	1.4	2.0
300	15.5	3.9	1.0	1.25

Figure 4-16 - Septic Tank for up to 50 Persons Capacity

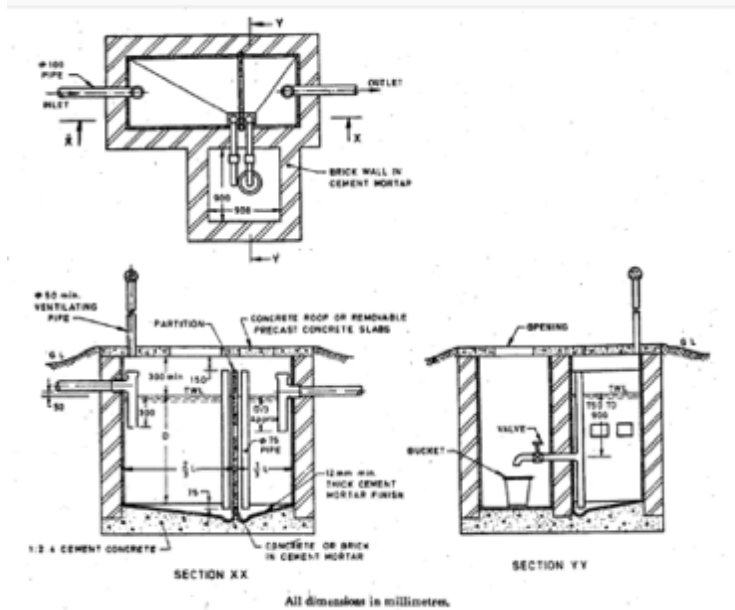
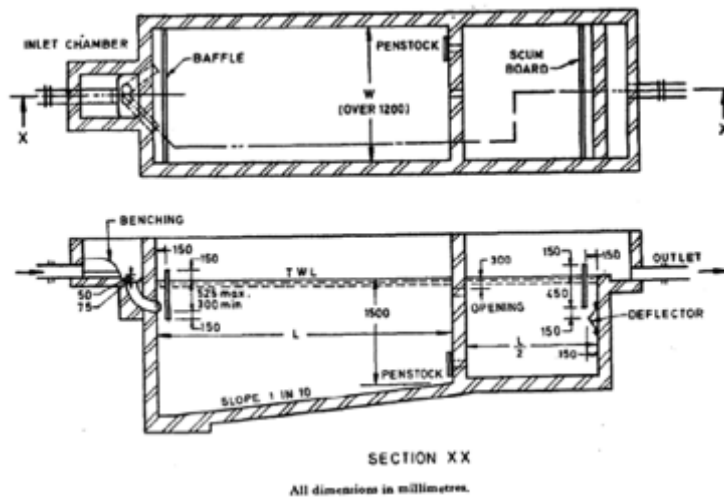


Figure 4-17 - Septic Tank for up to 200 persons



B. Proposed 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 sludge collected by vacuum trucks from domestic and non-domestic sources and the estimated daily volume collected in Viqueque can be viewed in Table 11.

Table 4-9 - Total Sludge Volume to be collected daily projections

Village	UNIT	2015	2020	2025	2030	2035	2040
Viqueque	m ³ /d	0.7	0.9	-----	1.5	-----	2.4

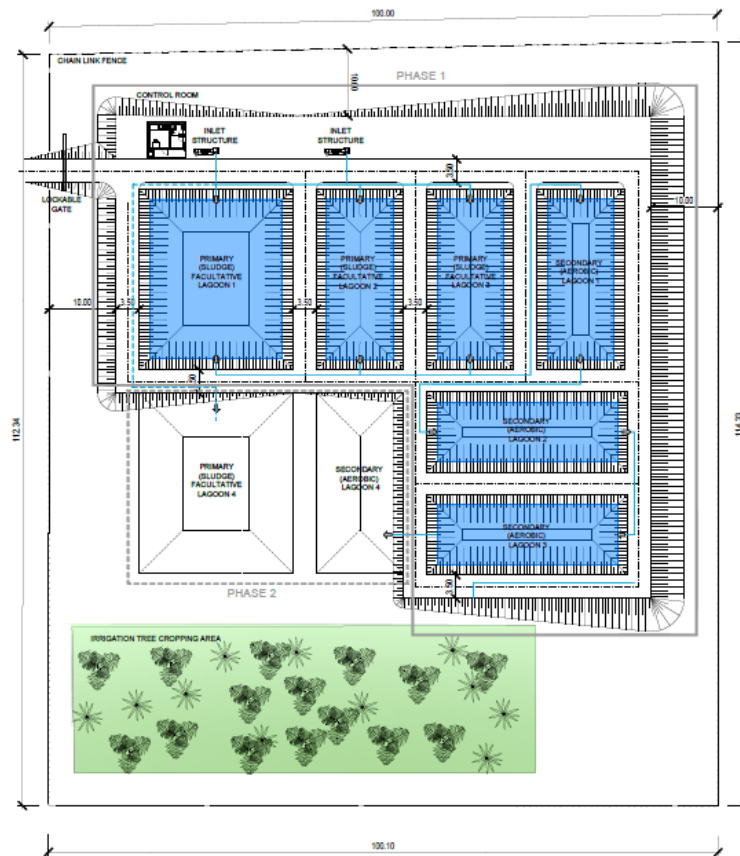
This service will then require transport from the sources to the FSTP, where accessibility of trucks for sludge collection and routing to the treatment plant are of the most importance, requiring easy access but with a reasonable distance from the proposed FSTP to the nearest household (>400m) and the route should be free from flood areas and/or possible landslide, with a duration of transport no longer than 30 minutes.

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.

Therefore, the proposed FSTP has been chosen to be located in Suco Maluro (See Figure 11, Figure 16 and Appendix I, Map 1.1.), since the location fills in all the above-mentioned requirements and a relatively safe distance of 100m from the highest floodplain level. In terms of land status, the location is not earmarked for city expansion, according to information from the Viqueque municipality and BTL, and it is declared as communal land use, by the local community.

Figure 4-18 - FSTP Viqueque proposed installation and segments



In regards to Treatment, the FSTP will combine the following technical steps in a modular manner:

Table 4-10 - Faecal Sludge Treatment

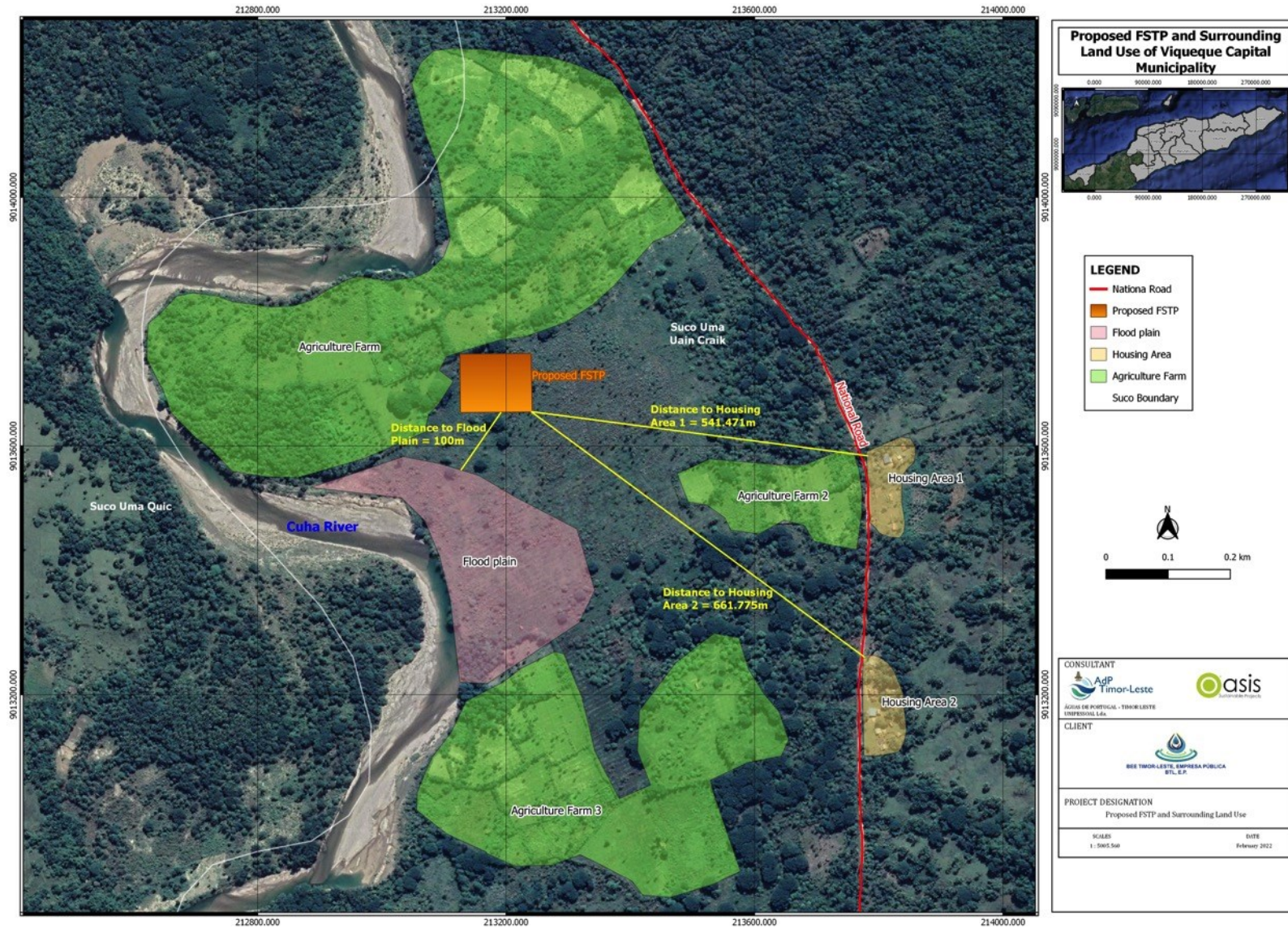
TREATMENT STAGES	TREATMENT MODULES
Sludge Stabilization/ Dewatering	Drying Beds
Liquid Wastewater Treatment	Integrated Settler and Anaerobic Filter
	Horizontal Planted Gravel Filter

The Sludge arrives at the FSTP where it is deposited into drying beds to undergo liquid-solid separation and drying. The dried sludge from the drying beds is removed once in 1 or 2 years depending on rate of feeding and directed to a Sludge Pasteurization Unit-Storage of bio-solids. The rest of the liquid percolates or the effluent wastewater is conveyed to separate treatment units, in two stages in the FSTP modules.

The primary stages i.e., settler, is mainly for Sedimentation of any solids that have entered the modules along with the percolate where the liquid remains aerobic as not to generate offensive odours. The second stage i.e., Anaerobic Filter is for anaerobic degradation of any dissolved and suspended organic matter.

The partially treated wastewater from the secondary treatment unit would be conveyed into a horizontal planted gravel filter. Therefore, the treated wastewater is safely used for irrigation purposes and the bio-solids can be used as soil conditioner for agricultural use.

Figure 4-19 - Proposed FSTP and surrounding land use



4.3.4 Projects Related to the Construction of the Project

The Project provides all that is necessary for Viqueque city in water supply and sanitation sectors, starting from water extraction, how it is being treated, distributed to the consumers, and proper final treatment of human waste. This Project is an upgrade for the improvement of previous water supply project from the Indonesian administration already existing in the region, whereas the sanitary infrastructures, WTP, and Kuha River Intake are new constructions.

The existing components that were already established will then be rehabilitated with a more qualified and sustained products, equivalent for the long-term needs i.e., exploring Loihuno water source and the replacement of water distribution and transmission mains. The trenching methodology during Construction Phase will be secured by avoiding exploration of material resources from other site and reusing the materials back will be performed, as described in Viqueque Project Document. The level of disruption for new infrastructures such as opening new access, materials delivery with heavy loaded trucks, traffic management will be temporary and will depend on the type of construction, as long as the guideline is fully abided by the contractor.

4.3.5 Area Affected by the Project

The Viqueque 4MCWSSP sub-project is to be implemented within the capital of the Viqueque city and the components are found within an area of 15 km of diameter, which integrates part of Suco Loihunu, Carabalu, Uma Quic and the entire Suco Uma Uain Craic (see Figure 4-5).

Given the scale of the project, comprehensively described in section 4.3.3, the impacts generated by the project activities during the different phases of its implementation have been preliminarily studied and assessed to be occurring within the above 15 km diameter given.

4.4 Justification and Need for the Project

At present BTL provides around 2,592 cubic meters of water per day to its population through an aggregate transmission and distribution network length of around 24 km. However, the project is needed because BTL presently provides an inadequate water supply service to the Viqueque residents with significant losses and insufficient cost recovery to the government.

The water supply has not been able to meet the growing demand for water from the consumers because the water springs are not producing sufficient flow and the capacity of water storages is very small.

There are numerous groups and communities with existing pipelines but the water cannot be supplied due to the poor condition of the pipelines. The existing distribution alignments are not quite integrated due to various old pipes built during the Indonesian occupancy combined with several NGO projects, leading to constant leakages. Issues of intermittent water supply and high incidence of illegal connections are part of the main issues why the water system is currently unable to serve the Viqueque population.

In addition, according to the BTL, there hasn't been a proper management system established for wastewater and solid waste disposal in the municipality. More importantly, the schools' sanitation facilities are not adequate, mainly due to a lack of maintenance from the responsible parties or operators.

The increase in water consumption leads to increased production of wastewater, and therefore, in this project, the sanitation scope will be specifically focused on the faecal sludge production from the household's septic tanks and public toilets and its consequent off-grid treatment.

The project will address all of these issues by refurbishing the existing network to repair leaks, increase capacity and pressure, remove illegal connections, and provide a new system of metering to streamline leak detection and aid cost recovery.

It is expected to benefit a base year population of Viqueque city of 12,883 (2020) and design year population of 24,424 (2040) by providing a reliable and adequate supply of safe and potable water, by

upgrading the existing water supply situation and creating an adequate sanitation management system within a 15 km diameter of service area around the Viqueque city centre.

The construction activities such as replacing or rehabilitating old pipes with new ones, increasing the water tank capacity and water treatment, upgrading water sources, creating pilot projects for 4 public toilets, and the installation of a faecal sludge treatment plant, will be implemented within this project, aiming to meet the growing water demand and sanitation requirements.

4.5 The Proponent's Endorsement of the SEIS

The Project Proponent, the President of Be'e Timor-Leste, E.P., endorses this SEIS and EMP prepared by its consultants, OASIS Sustainable Projects and Aguas de Portugal – Engidro. The endorsement letter can be seen in Appendix I6.

4.6 Structure of the Simplified SEIS

The structure of the SEIS follows the current format stipulated by ANLA in Annex V of the MD 46/2017 - Minimum Requirements for a Simplified Environmental Impact Statement, of the Ministerial Diploma Regulation on the Detailed Requirements for Screening, Scoping and the Terms of Reference, Environmental Impact Statements and Environmental Management Plans for Environmental Assessment (2017), with components relevant to the project.

The information presented in the SEIS document are basically the identification, assessment and description of present conditions of the existing social and environmental components within the study area, upon which the impacts of the project are potentially expected to be occurring. In conjunction, the SEIS also allows the proponent to be able to identify the proposed project components and its activities throughout the implementation phases and predict the associated impacts. Furthermore, the SEIS will serve as an important basis for the preparation of the EMP detailing the proponent's commitments to mitigate the impacts and carry out preventive measures and monitoring protocols throughout the duration of the project.

As per the provision of the above-mentioned Ministerial Diploma, the SEIS comprises fourteen chapters as presented on the following table:

Table 4-11 - SEIS Structure according to MD 46/2017

CHAPTER 1	Executive Summary
CHAPTER 2	Details of the Project Proponent
CHAPTER 3	Details of the Consultant
CHAPTER 4	Description of the Project
CHAPTER 5	Policy Legal and Institutional Framework
CHAPTER 6	Description of the Environment
CHAPTER 7	Alternatives
CHAPTER 8	Climate Change
CHAPTER 9	Impact Assessment and Mitigation Measures
CHAPTER 10	Summary of Environmental Management Plan
CHAPTER 11	Information Disclosure and Public Consultation
CHAPTER 12	Difficulties Encountered
CHAPTER 13	Conclusions and Recommendations
CHAPTER 14	Non-Technical Summary

5 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

5.1 GOVERNMENT ENVIRONMENTAL RULES AND REGULATIONS

5.1.1 Constitution of the Democratic Republic of Timor-Leste, of 20 may 2002

One of the most important pieces of legislation in Timor-Leste, it provides the guiding principle for environmental protection and recognizes the need to develop Timor-Leste's resources sustainably, providing a better quality of life for its citizens and a responsibility of the Government. Its Article 61 stipulates the following:

- “Everyone has the right to a humane, healthy, and ecologically balanced environment and the duty to protect it and improve it for the benefit of the future generations”.
- “The State shall recognize the need to preserve and rationalize natural resources”.
- “The State should promote actions aimed at protecting the environment and safeguarding the sustainable development of the economy

5.1.2 Decree Law No. 26/2012 – Base Law of Environment

Decree Law No. 26/2012, 4th July is the Basic Environmental Law, setting the framework for Environmental Protection in Timor-Leste, the environmental principles to follow and makes the State responsible to ensure that citizens are guaranteed a healthy, ecologically balanced environment and the use of natural resources is done in a sustainable way, as defined in the Constitution of the Democratic Republic of Timor-Leste. It sets the standard and commitment for all future environmental laws and policies (including all terrestrial and marine areas, soil and sub-soil), to single or collective persons, national or foreign, public or private, residing or undergoing activities in Timor-Leste.

It also commits the Government to compulsory Environmental Evaluation of its policies, plans and projects, and defines important procedures and requirements such as e.g. the Environmental Assessment and Licensing process and environmental standards, including the use of International Environmental Standards i.e. WHO or equivalent, if National Standards aren't established.

5.1.3 Decree Law No. 5/2011 – Environmental Licensing

While all projects funded by ADB 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 similar suit but is also dependent 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.

Decree Law No. 5/2011 was published on the 9th of February 2011 and is the regulatory implementation of article 15 of the Base Law for Environment, where it defines the methods of environmental classification/screening, evaluation, decision, licensing and monitoring of development projects, throughout their construction, operation and decommissioning phases.

It requires a proponent to screen the proposed project and undertake either Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) of the proposed project and have it reviewed and approved by the Environmental Regulator (ANLA)¹, prior to implementation.

The preparation, review, approval and monitoring of EIA and IEE projects are dealt with in the Articles within Chapters IV, VI, VII and X, while environmental screening and categorization is dependent on

¹ The National Authority for Environmental Licensing (ANLA) is responsible for the: (i) review of applications for Environmental Licensing; (ii) Screening approval for Project Categorization; (iii) review, analysis and approval of submitted IEE, EIA and related Reports/Documents; (iv) forward EIA/IEE Reports together with its technical opinions, suggestions and decision proposal to the SEA (currently the Secretary of State for Environment); and (v) monitoring and evaluation of project implementation impacts.

project component and scale comparison with Annexes 1 and 2, which list down the project activities and thresholds that define a Category A (EIA) or Category B (IEE) requirement or, concurrent with the principles of the ADB SPS 2009, the ANLA determines and duly justifies the category of a proposed project based on the most sensitive environmental component.

This means that a project may have components listed in different Sectors of both annexes (depending on the scale of each of them) but the project, overall, assumes the environmentally most significant Category of any of the sectors it falls into.

Most importantly, Ministerial Diploma no. 46/2017, determines not only the technical contents for the deliverable documentation but also empowers the Environmental Authority to determine/choose, duly justified, a category A for a proposed project based on the most sensitive environmental component, concurrent with the principles of the ADB and IFC or the determination of a less sensitive category i.e. downgrade A to B, if also duly justified.

Table 5-1 - indicates the possible screening categorization under the DL 05/2011, based on both the Category A and Category B thresholds, for the proposed project components referred in this report.

Figure 5-1 - EIA and IEE process under DL5/2011 – Steps and Timing

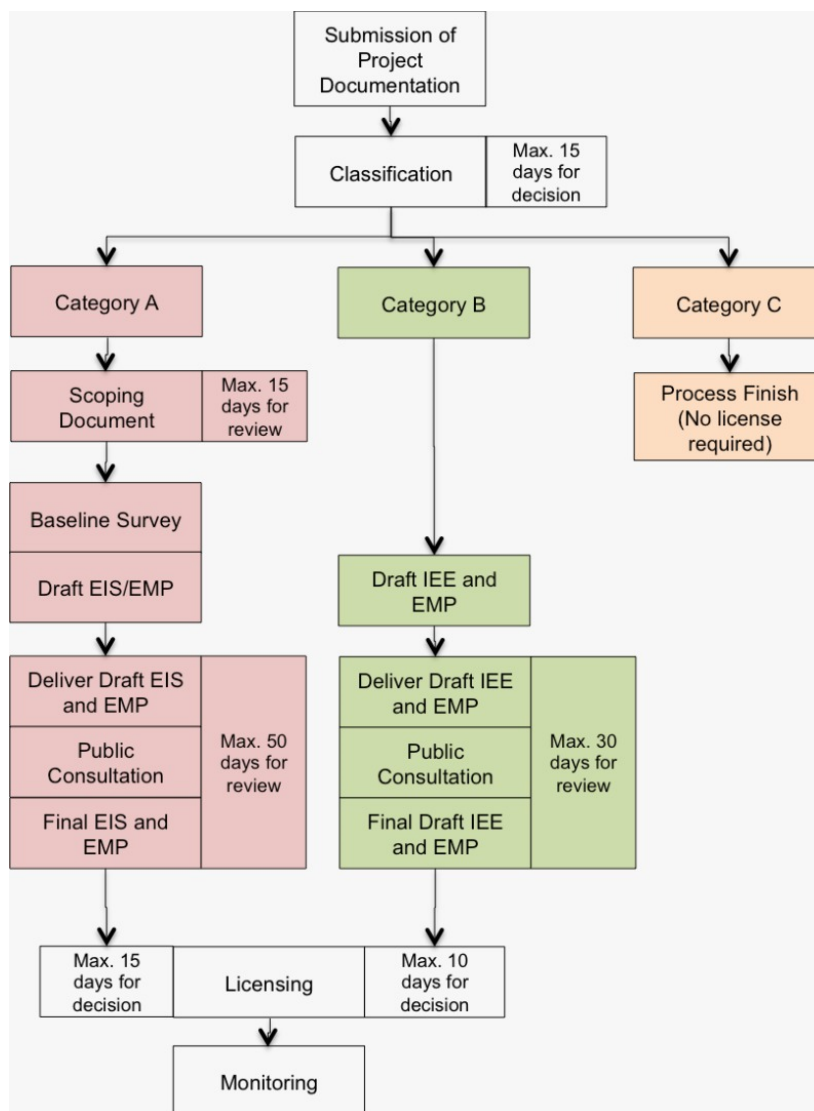


Table 5-1 - Environmental Licensing Categorisation Thresholds under Decree-Law No. 05/2011

	Category A Threshold (EIA required)	Category B Threshold (IEE required)
VII. Sanitation Sector		
3. Wastewater Treatment Plants (WWTP)	≥ 10,000 families/eq.	< 10,000 families/eq.
VIII. Water Sector		
5. Systems of water collection from lakes, rivers, springs and other water sources (excluding the soil or groundwater)	Annual Abstracted Volume > 1 million CBM/year	N/A
6. Abstraction of groundwater with boreholes	≥ 10 L/sec.	< 10 L/sec.
8. Construction of aqueducts and water networks	≥ 3 Km	< 3 Km
XII. Location Factors		
1. Sensitive ecosystems or with value (beaches, mangroves, coral reefs, protected areas, marine areas)	ALL	N/A
2. Unique and valuable landscape	ALL	N/A
3. Archaeological/ Historic site	ALL	N/A
4. Areas Densely populated	Resettlement ≥ 300 people	N/A
5. Cultural or tribal communities	ALL	N/A
6. Sensitive geographic areas	ALL	N/A

The ANLA review time (non-consecutive, non-inclusive of Consultant time of assessment and document drafting and without any delays) for a Category A (EIA) is the sum of: i) Project Document (PD) [15 days] + ii) Scoping Document (SD) [15 days] + 1st Draft EIS/EMP, Public Consultation and Final Draft EIS/EMP [50 days] + Decision on License [10 days], totalling 90 working days.

For Category B projects (IEE), the process does not include step ii) SD and step iii) Simplified Environmental Impact Statement (SEIS) has a turnaround requirement of 30 days review, bringing the process to a Total of 55 work days. The Environmental Regulator has the power to double (once) any or all timeframes within the process, if duly justified and always in written form to the project proponent, within the legal timeframes.

Also relevant to the Environmental Licensing Procedure are the diplomas that include implementing rules and regulations for certain aspects of DL 05/2011, which are:

- a) Ministerial Diploma no. 44/2017, of 2nd August - Regulation on Impact and Benefits Agreement;
- b) Ministerial Diploma no. 45/2017, of 2nd August - Regulation on the Statute and Rules of procedure for the Evaluation Committee for the Management of the Environmental Assessment Process for Category A projects;
- c) Ministerial Diploma no. 46/2017, of 2nd August - Regulation on the Detailed Requirements for Screening (Project Document [PD]), Scoping and the Terms of Reference (TOR), Environmental Impact Statements (EIS), Simplified Environmental Impact Statements (SEIS) and Environmental Management Plan (EMP) for Environmental Assessment;
- d) Ministerial Diploma no. 47/2017, of 2nd August - Regulation on the Public Participation Procedures and Requirements During the Environmental Assessment Process.

5.1.4 Project Classification under Decree Law No. 5/2011 – Environmental Licensing

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.

ANLA classified the Viqueque City Project under a Category B (see Appendix 7) given the project components do not fall within any sensitive or protected areas, it is a rehabilitation of the water network i.e. a brownfield project, with pre-existing pipe alignments and zones that have undergone significant land use change since almost 30 years ago, during the first installation and thus lead to the new intervention being less significant and of temporary duration, particularly given a few “greenfield” project components are located in the distribution system extension areas, outside of the PA boundaries.

This assumption is 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). These two projects are of similar nature to the Viqueque project and the scale of pipeline dimension and length, as well as water sourcing and borehole capacity, is higher than that proposed by the Viqueque project, legitimizing the assumption that the resulting screening exercise and categorization for the Viqueque project results in a Category B, as follows:

Table 5-2 - Estimated Environmental Classification for Viqueque Project Components

Proposed Components	Proposed Capacity	Estimated Classification	Included in XII. Location Factors?
Sanitation			
Public Bathrooms Septic Systems	N/A	N/A	No
Feacal Sludge Treatment Plant	4,038 HH	B	No
Water Distribution			
Rehabilitation (Mains and Distribution)	43,046m	B ⁽¹⁾	No
Water Sources (Existing and/or New)			
Loihuno I	(5 to 53.2) L/sec ⁽¹⁾ (157,680 – 920,852) m ³ /year	B ⁽¹⁾	No
Kuha River	(5 to 63.4) L/sec ⁽¹⁾ (157,680 – 999,692) m ³ /year	B ⁽¹⁾	No

⁽¹⁾ As in previous ANLA attributed Category B Licenses to similar-scaled water source volumes and length of distribution network such as previous BTL-led projects in Pante Macassar and Manatuto (see Appendix 2 and 3).

The proposed system in Viqueque is based on “brownfield” sub-projects i.e. existing water piping and/or springs or boreholes, established by BTL 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 authorization to extract under “cultural” rule (which is still very active today). Viqueque’s culture is very conspicuous and the essence is still strongly associated with people particularly in rural and semi-urban areas. Local people are still conceiving the notion of animism (see 5.3.2) where most natural resources are protected by natural spirits and the people’s ancestors. As a way of respecting the nature, the interested parties are obligated to comply the permission requirements prior exploiting the referred resource.

Currently, the Viqueque water distribution system has evolved around these established spring systems, particularly in regards to the Loihunu Springs. The importance of these two sources is now augmented by the fact that BTL requires the water distribution system to expand into the city’s urban expansion areas.

Based on the extension of proposed water extraction and the nature of the proposed rehabilitation works for the city, the rehabilitation of the water network to these sources will be a pipe substitution i.e. a brownfield project and thus lead to the current intervention being less significant and of temporary duration.

It is not likely that the rehabilitation and operation of these water sources will 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 and in most cases

mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

5.1.5 Other Relevant National Laws, Policies and Guidelines in Timor-Leste

Table 3 below summarizes all other national laws, policies and guidelines that are relevant to the Project.

Table 5-3 - Other relevant National Laws, Policies and Guidelines in Timor-Leste

Policy/Law/ Guideline	Relevant Provisions	Applicability
DL No. 6/2020 - Legal Framework for Protection and Conservation of Biodiversity	Defines the legal framework for biodiversity conservation and sustainable use of its components to meet the current needs of protection of biodiversity in Timor-Leste, for special areas inside and outside of the National Protected Areas System (Article 26), especially management measures for a list of special/priority ecosystems (swamps, estuaries, mangroves, corals and coral reefs, marine grasses and sacred Lulik sites. Includes the List of Protected (Annex I) and Exotic/Invasive Species (Annex II) and the rules and prohibited activities for their management (Chapters IV and V). Establishes the considerations to be taken in Environmental Impact Evaluations (Chapter VII), namely identification and description of adverse effects and appropriate measures proposed to prevent, minimize and mitigate the identified impacts.	Relevant to project components in areas adjacent to the Protected areas and stand-alone areas where protected Species may be found i.e., crocodiles in Cuha River.
DL No. 5/2016 – National System for Protected Areas (PA)	Establishes the necessary legal instruments for the protection of declared sensitive ecological areas in Timor-Leste (Article 11) and their allowed and prohibited activities. Provides for a List of Established Protected Areas (Article 50 and Annex I), their typology (Article 12) and geographical demarcation (Article 17) and management instruments (Article 23) for approved activities within Areas (Article 32) such as Land Use Zone i.e. allows infrastructure installation for human use.	Not relevant to project as none of the components are within a Protected area i.e. Mount Builo Protected Area.
Law no. 14/2017 – General Framework for Forestry	Defines the fundamental principles and norms regarding management, protection, conservation and sustainable use of forests and watersheds (Article 1), Forest Classification [State, Community and Private] (Article 8) and Forest (Article 14) and River Basin (Article 17) Management Plans and Forbidden Activities in these areas (Article 24). It also includes Climate Change requirements for Forest development (Article 28), for emissions reduction and conservation of carbon stocks.	Relevant to project components that traverse or are located within any type of forest in the project area. EMP implementation is the overall measure to mitigate adverse impacts.
Regulation UNTAET no.17/2000 – Prohibition of Logging operations and Export of Wood	Provided for in Law 14/2017, establishes the prohibition for felling, burning or destroying trees or forests (Article 2) and the activities exempt of these prohibitions (Article 3)	Relevant to project components that will require cutting trees within alignments and ROWs. EMP implementation is the overall measure to mitigate adverse impacts.
Government Resolution No. 33/2011 – National Adaptation Plan of Action (NAPA) for Climate Change	Adopts trans-sectoral measures to reduce Climate Change vulnerability in essential sectors in Timor-Leste (Agro-forestry, Water supply, Biodiversity, Health, Infrastructure, Natural Disasters). Definition and Prioritization of Proposed Adaptation measures for said sectors (NAPA Table 13), particularly those indicated in Annex 2 - Adaptation measures for the Water Sector (no. 1, 4, 5, 6, 9, 11 and 13) and for Natural Disasters (no. 3 – avoidance of landslides and 4. Early warning systems i.e., droughts or storms).	Relevant to project in the implementation of adaptation measures for Water Source and Distribution System.
Government Resolution No. 8/2012 – Sanitation Policy	Clarifies the sanitation responsibilities and encouragement on improving the sanitary section, including that each family and institution is responsible for the construction, use and maintaining their own hygienic and sanitary facilities, hand washing facilities and others. Also includes Strategies to follow such as Component 2 - Improved Sanitation: b) and c) management and safe integrated	Relevant to the Proponent responsibility for implementation of the project in the urban development of the city.

Policy/Law/ Guideline	Relevant Provisions	Applicability
	management, treatment and elimination of human excreta; Component 3 – Sanitation Financing: Institutional Sanitation (1) investment in public toilets; (2) financed by the user (per use); Urban Sanitation (1) Direct Investment in Urban Sanitation Infrastructure i.e. FSTP; (2) with user payment for O&M costs; (3) based on integrated Urban Planning. Defines the MOPW responsibilities (Section 3) in strengthening, planning, developing and managing urban sanitation services to a) collect sludge from septic tanks and b) operate centralized / decentralised sewer systems.	
Decree Law No. 33/2008 – Hygiene and Public Order	This law establishes the administrative policy measures for Districts regarding hygiene and public order, defining the relations between Public Administration and Citizens, applicable to urban areas in the Districts and specific locations in districts. Defines the prohibitions in general (Article 5) regarding impact to public infrastructure and land, from l.a) discharge polluted waters i.e., faecal sludge/sludge; b) Waste in streets; c) drainage obstruction; e) spoils and construction material on sidewalks; and h) noise to community.	Relevant regarding project Work Camps, construction ROW and FSTP treated sludge and distribution of dried bio digested sludge for Agricultural Distribution. EMP implementation is the overall measure to mitigate adverse impacts.
Decree Law No. 4/2004 – Legal Framework for Distribution of Water for Human Consumption	Establishes the conditions for the water distribution system for human consumption (Article 2). The Water and Sanitation Services are required to supply water to the public (urban) which is safe and sustainable (Article 4) and with adequate quality (Article 12)	Compliance with Water Quality Standards in effect in Timor-Leste.
Decree Law No. 33/2017 – Legal Framework for Cultural Heritage	Defines the concept of cultural heritage and the measures for its support, protection, preservation and conservation in Timor-Leste (Article 1) and its different cultural classification (Article 21). It also defines and regulates a 50 metre Protection Zone around immovable Heritage (Article 23) and the rules and licensing requirements for general work within these Zones (Article 26).	Relevant regarding project Work Camps, construction ROW. When Heritage sites Protection Zones cannot be avoided, EMP implementation is the overall measure to mitigate adverse impacts.
Decree-Law no. 4/2012 – Labour Code	describes the duties and obligations of the private employer and employee while exercising their function within the scope of work, or within the bounds of a work contract (Chapter 1), with the aim of creating good working conditions (Article 20) and a fair, safe and healthy working environment (Article 35).	Environmental management plan (EMP) provides measures to mitigate workers' health and safety hazards.
Law no. 6/2017 – Base Law for Planning	Base rules for Territorial Planning in Timor-Leste. Intends for (Article 3) sustainability of urban areas, with improvement of living conditions for citizens. Establishes the different soil uses (Article 8) and the Municipal Territory Plan and the Land Use Plan (Article 17).	Relevant to location of all project components, particularly FSTP.
Law no. 8/2017 – Public Expropriation	Rules on land expropriation for public interest reasons, responsibilities, procedures, fair compensation, respect for vulnerable groups (Article 10) and project planning requirements that include expropriation, such as public consultation (Article 22), environmental licensing [if applicable] and social or economic impact assessment studies (Article 19).	Relevant to location of all project components, particularly ROW. EMP implementation, Social Safeguards and LARAP are the overall measures to mitigate adverse impacts.
Decree-Law no. 3/2016 – Municipal Administration Statutes	The DL gives local government the functions, duties and powers to, among others: (i) conserve and protect their local environment and natural resources; (ii) plan, implement and/or operate and maintain local water supply projects; (iii) implement or arrange for implementation local sanitation/sewerage/solid waste and drainage projects; (iv) protect cultural heritage and religious sites; and/or (v) monitor project activities within their jurisdictions.	Provides basis for Viqueque Municipality, through BTL, to monitor the environmental performance of the subprojects.
Decree-Law no. 2/2017 – Urban Solid Waste Management System	Defines the rules that the urban solid waste management system abides by in Timor-Leste, led by the Municipal Authority (Article 2), the typology of Urban Solid Waste (Article 6), as well as the obligations of all users of the system (Article 16), especially the management and collection of waste from construction works (Article 33).	EMP implementation is the overall measure to mitigate adverse impacts and all subprojects to manage generated solid wastes accordingly.

5.1.6 Pollution Control Standards in Timor-Leste

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

(1) Ambient Air Quality Standards

Source: WHO Air Quality Guidelines (2000) and Global Update (2005)

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

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

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

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

(2) Ambient Noise Standards

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

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

(3) Water Quality Standards

Source: Decree-Law no. 31/2020 – Control of Water Quality for Human Consumption.

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

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

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

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

⁽³⁾ Ammoniacal nitrogen (mg NH₄/l) for WHO and Decreto-lei n° 152/2017 and mg/l NH₄-N for Timor-Leste legislation

⁽⁴⁾ Nitrate (mg NO₃/l) for WHO and Decreto-lei n° 152/2017 and mg/l NO₃-N for Timor-Leste legislation

⁽⁵⁾ Nitrite (mg NO₂/l) for WHO and Decreto-lei n° 152/2017 and mg/l NO₂-N for Timor-Leste legislation

(4) Wastewater Standards

Source: WHO Guidelines for Wastewater Irrigation (1989).

Wastewater, excreta and grey water use in agriculture is more and more considered a method that combines water and nutrient recycling, supporting increased household food security and nutrition in poor households. For the past few decades WHO guidelines have been influential regarding technical standard and policy level setting for this issue, and have been adopted by several countries for their wastewater and excreta use practices. They are also designed to protect the health of farmers (and their families), local communities and product consumers but adaptable to specific circumstances, to maximize overall public health benefits and the beneficial use of scarce resources.

The project intends to follow suit with this principle and use its resources efficiently and sustainably and attempt to have a positive influence on the local economy, by applying the dried treated FSTP sludge to the agricultural sector in the area, following the WHO 1989 Guidelines for Wastewater Irrigation and its thresholds for the effluent discharge and treated dried sludge use in agriculture:

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

However, the FSTP effluent will be discharged into an Irrigation Cropping Area and will require frequent testing before discharge for the purpose of groundwater and soil pollution prevention. The standards for such will be in accordance with the I.3. Wastewater and Ambiente Water Quality of the World Bank Group. IFC. 2007. Environmental, Health and Safety General Guidelines.

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

5.2 The ADB Environmental Process

5.2.1 ADB Safeguard Policy Statement

The ADB SPS 2009 (ADB, Safeguard Policy Statement, 2009) are operational policies that seek to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process. They consist of three operational policies on the environment, Indigenous Peoples, and involuntary resettlement and are supported by the Operations Manual sections on Environmental Considerations in Resettlement and Environmental Assessment Guidelines (2003), which provide information on good practice approaches to implementing ADB safeguards.

ADB SPS 2009 requires borrowers to meet a set of requirements (Safeguards Requirements I) when delivering environmental safeguards for projects supported by ADB, to ensure the environmental soundness and sustainability of projects and support the integration of environmental considerations into the project decision-making process, which BTL will be required to comply with these requirements, for this project, during the lending process. Below is a summary of the step-by-step process, while more detailed information can be sought in the ADB SPS 2009.

- a) **Screening and Categorization:** Subprojects are screened for their expected environmental impacts, and assigned to a specific category². Categorization must be based on the most environmental sensitive component. However, for subproject(s) with component(s) that can trigger Category A or with potentially significant adverse impacts that are diverse, irreversible, or unprecedented, the Project Design Team shall examine alternatives to the subproject's location, design, technology, and components to avoid, and, if avoidance is not possible, minimize adverse environmental impacts and risks, and to meet Category B categorization. The screening/categorisation process must be properly documented, taking into account the environmental costs and benefits of the various alternatives considered and the "no action" alternative.
- b) **Environmental Assessment:** a description of environmental and social baseline information within the project area to provide an understanding of current conditions, thus forming the benchmark for assessment against identified subproject activities and respective impacts. Environmental impacts and risks are then analysed for all relevant stages of the project cycle, including design and planning stage, construction, operation, decommissioning, and post-closure activities such as rehabilitation or restoration.
- c) **Environmental Planning and Management:** After environmental impact assessment, the Project Design Team prepares an environmental management plan (EMP) to be included in the IEE report. The EMP describes and addresses the potential impacts and risks identified by the environmental assessment and the level of detail and complexity of the EMP and the priority of the identified measures and actions is commensurate with the project's impact and risks. The EMP includes the proposed mitigation measures, environmental monitoring and reporting requirements, emergency response procedures, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.

² Per ADB SPS 2009 (i) **Category A:** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required. (ii) **Category B:** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible and, in most cases, mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required. (iii) **Category C:** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed. (iv) **Category FI:** A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary.

- d) **Public Information Disclosure:** The Project owner, in this case BTL, shall submit, for disclosure i.e. on ADB or MPW, BTL or other website or paper copies in the BTL office, a final draft IEE in a form and language(s) understandable to affected people and other stakeholders so that they, as well as other stakeholders and the public can provide meaningful inputs into the project design and implementation.
- e) **Consultation and Participation:** The BTL, together with the PDC and the ESS, shall carry out meaningful consultation³ with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation, where the consultation process and its results must be documented and reflected in the environmental assessment report.
- f) **Grievance Redress Mechanism:** MPW, through BTL, shall establish a mechanism to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the subproject's environmental performance, scaled to the risks and adverse impacts of the subproject.
- g) **Monitoring and Reporting:** BTL, together with the PMU, shall monitor, measure and document the progress of implementation of the EMP and identify necessary corrective actions and reflect them in a corrective action plan. These events shall be reported to ADB semi-annually in an environmental monitoring report (EMR) that describes progress in EMP implementation and compliance issues and corrective actions, if any.
- h) **Unanticipated Environmental Impacts:** Where unanticipated environmental impacts become apparent during subproject implementation, BTL and the PMU shall update or prepare a new the environmental assessment and EMP to assess the potential impacts, evaluate the alternatives and outline mitigation measures and resources to address those impacts.
- i) **Pollution Prevention and Control Technologies:** During the design, construction, and operation of the project, the BTL and PMU must apply pollution prevention and control technologies and practices consistent with international good practices i.e. internationally recognized standards such as the IFC EHS guidelines. When the Government of Timor-Leste regulations differ from these levels and measures, the PMU shall achieve whichever is more stringent.
- j) **Occupational Health and Safety:** the BTL and the PMU shall ensure that all workers⁴ are provided with a safe and healthy working environment, taking into account internationally recognised standards such as i.e. IFC HSE, to identify risks inherent to the sector and specific classes of hazards in the subproject work areas (physical, chemical, biological, and radiological hazards, etc) and ensure steps are taken to prevent accidents, injury, and disease arising from or during the course of work i.e. follow guidance from World Bank Group's Environmental, Health and Safety Guidelines.
- k) **Community Health and Safety:** the BTL and the PMU shall ensure that risks are identified and potential impacts assessed on the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and guarantee that preventive measures and plans are established to address them in a manner commensurate with the identified risks and impacts.
- l) **Physical Cultural Resources:** the BTL and the PMU are responsible for overseeing the siting and designing of the project so as to avoid significant damage to physical cultural resources. Such resources will be identified and the subproject's potential impacts on these resources assessed using

³ ADB SPS, 2009: meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

⁴ Means ALL workers, including nonemployee workers engaged by the borrower/client through contractors or other intermediaries, that work directly in the project sites or perform work directly related to the project's core functions.

field-based surveys in the environmental assessment process and especially chance finds procedures shall be included in the EMP.

- m) Bidding and Contract Documents:** the BTL and the PMU shall ensure the IEE, SEIS and EMP are included in bidding and contract documents and verified by the BTL, ensuring that these include specific provisions requiring contractors to (i) comply with all other regulatory conditions required by the Government of Timor-Leste and ADB⁵ and (ii) to submit to BTL, for review and approval, a site-specific environmental management plan (SEMP)⁶. No works can commence prior to approval of SEMP, a copy of the EMP or approved SEMP must be on site during the construction period at all times and Non-compliance with, or any deviation from, the conditions set out in the EMP or SEMP will constitute a failure in compliance and shall require corrective actions from the contractor.
- n) Conditions for Award of Contract and Commencement of Work:** BTL shall not award any Works contract until (i) relevant EMP provisions are incorporated into the Works contract; and (ii) the IEE is updated to reflect the Project's detailed design and the PMU has obtained BTL and ADB's clearance of the IEE.

5.2.2 ADB Environmental Guidelines (2003)

The ADB Environmental Guidelines (2003) in particular are extremely important as they define the form of environmental evaluation and classification of projects through its Technical Guidelines - V. Determination of the Environment Category (ADB, 2003), under a process that includes: a) the use of Rapid Environmental Assessment (REA) Checklists; b) sample categorization based on Project type; and c) ultimately, the ADB SPS 2009 is self-defined as the minimum standard for categorization, based on its own requirements and especially the most environmentally sensitive component.

Firstly, the REA uses sector-specific checklists, developed based on the ADB's past knowledge and experience. These checklists consist of questions relating to (i) the sensitivity and vulnerability of environmental resources in project area, and (ii) the potential for the project to cause significant adverse environmental impacts. REA screening checklists take into account the type, size, and location of the proposed project.

Secondly, the ADB sample categorization in the Environmental Assessment Guidelines (ADB, 2003) places urban water and sanitation projects under a Category B, requiring an Initial Environmental Examination (IEE), a similar process to the Timor-Leste Government requirements for the same environmental category.

⁵ Contractors to comply with (i) all applicable labor laws and core labor standards on (a) prohibition of child labor; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; and (c) elimination of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites.

⁶ SEMP to include (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures as per EMP; (iii) monitoring program as per SEMP; and (iv) budget for SEMP implementation.

Table 5-4 - Sample Categorisation for Project Types (ADB, 2003)

Category A	Category B	Category C	Category FI
Dams and reservoirs	Agro-industries	Forestry research and extension	Credit Lines
Forestry and production projects (large-scale)	Rural electrification	Rural health services	Equity Investments
Industrial plants (large-scale)	Electrical Transmission	Marine research	
Irrigation, drainage, and flood control (large-scale)	Urban water supply and sanitation	Family planning program	
Mineral development (oil and gas)	Rural water supply and sanitation	Microfinance projects likely to have minimal or no adverse impacts	
Port and harbor development	Irrigation and drainage (small-scale)		
Thermal and hydropower development	Watershed projects		
	Renewable energy		

Thirdly, the ADB SPS 2009 includes a safeguard that obligates projects to consider the ADB classification and evaluation methods IF the local regulations classify the project in an inferior level of classification than the minimum requirements that the ADB classification system places for those projects, in order to avoid the risk of occurrence of unnecessary significant environmental and social impacts related to the project.

5.2.3 Project Category under ADB SPS 2009

All projects funded by ADB must comply with its Safeguard Policy Statement (SPS) 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.

Environmental assessment has been conducted for the Viqueque water supply and sanitation Project based on (i) Detailed Engineering Design, and (ii) most likely environmentally sensitive components. The environmental assessment used ADB's rapid environmental assessment (REA) checklist and the field review during the project. The environmental assessment of the Viqueque Water supply and sanitation project shows it 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.

Therefore, under the ADB SPS 2009 system, the Viqueque water supply and sanitation project is classified as Category B for environment, even though Environmental Assessment beyond the IEE will take into account the result from the screening process under the Timor-Leste legislation.

6 DESCRIPTION OF THE ENVIRONMENT

6.1 Physical Environment

6.1.1 Climate

Based on the Köppen climate classification, Timor-Leste's climate is classified as Type A. Köppen's A climates are controlled mainly by the seasonal fluctuations of the trade winds, the intertropical convergence zone (ITCZ), and the Asian monsoon (Beck et al, 2005). As located in tropical region i.e Southeast Asia, experiences a tropical monsoon climate with two distinct seasons, dry and wet season. Due to its irregular topography, the country can be divided into three regions that present the same rainfall and temperature pattern:

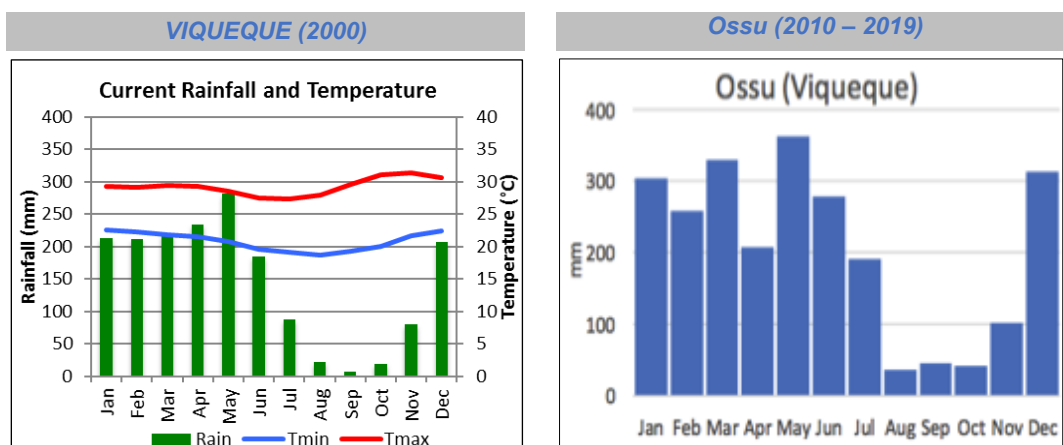
- along the northern coast (between 0 and 600 m altitude) with annual average below 1500 mm and average temperature above 24 °C,
- central region of the Island (mountainous areas) with annual average above 1500 mm and average temperature below 24 °C (Sandlund et al, 2001) and
- southern coast with annual average of 2063 mm and average temperature above 24°C (Bacon et al, 2013)

Likewise, the relative humidity also presents different values depending on the regions. On the north coast, the mean monthly relative humidity ranges from 69 to 78% (Yance, 2004). On the south coast, it varies from 73 to 80%, whereas in the highlands it varies from 75 to 78%.

The potential evaporation is one of the key factors of the hydrological cycle. It provides an indication of maximum possible evaporation under saturated surface conditions. Timor-Leste's potential evaporation mainly varied depends on the altitude of the regions. In the lowlands, the monthly evaporation ranges from 60 to 230 mm while in the highlands it is 100 to 190 mm per month. The average daily potential evaporation is range between 5.2 and 6.5 mm in the lowlands and 2.6 to 4.9 mm in midlands (Kirono, 2010).

Due to the Viqueque geographical location experiences typical tropical monsoonal climate characterized with southern bimodal rainfall pattern leading to a 7 to 9 months wet season with two peaks in January and May (ALGIS, 2020). Annual rainfall totals in the Viqueque Municipality usually exceeded 1000 millimetres in low level areas, and can be as high as 1700 millimetres, in the mountain regions (Seeds of life, 2012). The temperature varies very little throughout the year, maximum temperature range between 28°C to 32 °C and minimum range between 18°C to 23°C (ALGIS, 2020).

Figure 6-1 - Average Temperature and Rainfall Patterns Throughout 2000 in VIQUEQUE (CCCB - TL, 2018) and Average Rainfall Pattern for Viqueque from 2010 to 2018 (ADP/Engidro, 2020)



Information on climate change projected for the project area is provided in section 8.2 of this document.

6.1.2 Topography

The Loihunu area, located to the north of the project site, is surrounded by Mount Mundo Perdido (1,763m) in the west and Mount Builo (1,234m) in the East (ADB, 2016).

The geologic formations present in the area around Mount Mundo Perdido and Loihunu are Highly Fractured Limestone and the base sandy-shale and clay. Moving southward from Loihunu towards Viqueque, the hills comprise the Baucau Limestone Formation, where the eastern two-thirds of Viqueque is underlain by the Bobonaro Scaly Clay Formation, whilst the western third is underlain by the Viqueque Formation (Worley Parsons, 2012).

Moving south from Viqueque city, the terrain develops into a broad coastal plain with hills that extend to the coastline at intervals. Rivers are numerous and mainly without water, and there are large drainage areas between rivers. Soil erosion is high, especially within drainage basins.

6.1.3 Geology

The Ossu administrative post area, to the north of the project site, is surrounded by Mount Mundo Perdido (1,763m) to the west and Mount Builo (1,234m) to the East (ADB, 2016).

The geologic formations present in the area around Loihunu are Highly Fractured Limestone and the base sandy-shale and clay. Moving southward from Loihunu towards Viqueque, the hills comprise the Baucau Limestone Formation, where the eastern two-thirds of Viqueque is underlain by the Bobonaro Scaly Clay Formation, whilst the western third is underlain by the Viqueque Formation (Worley Parsons, 2012).

Moving south from Viqueque city, the terrain develops into a broad coastal plain with hills that extend to the coastline at intervals. Rivers are numerous and mainly without water, and there are large drainage areas between rivers. Soil erosion is high, especially within drainage basins.

6.1.4 Air Quality and Noise

Air pollution is commonly defined as the introduction into the atmosphere of chemicals, particulate matter or biological materials that can cause adverse impacts on human health or other aspects of the environment. Air pollutants are by nature primarily emitted from anthropogenic sources (i.e., related to human activity) and very rarely by Natural causes i.e. volcanoes.

Primary data on Air Quality is very scarce for the Viqueque Region and previous IEE or EIA Reports are, in general, inaccessible to the general public. Nevertheless, in 2012 the Tasi Mane Project Strategic Environmental Impact Assessment (G-RDTL, 2012) carried out an Air Quality Assessment in the immediate locations of the Project Area (see Figure 6-2), with three test sites relevant to the project, namely the following:

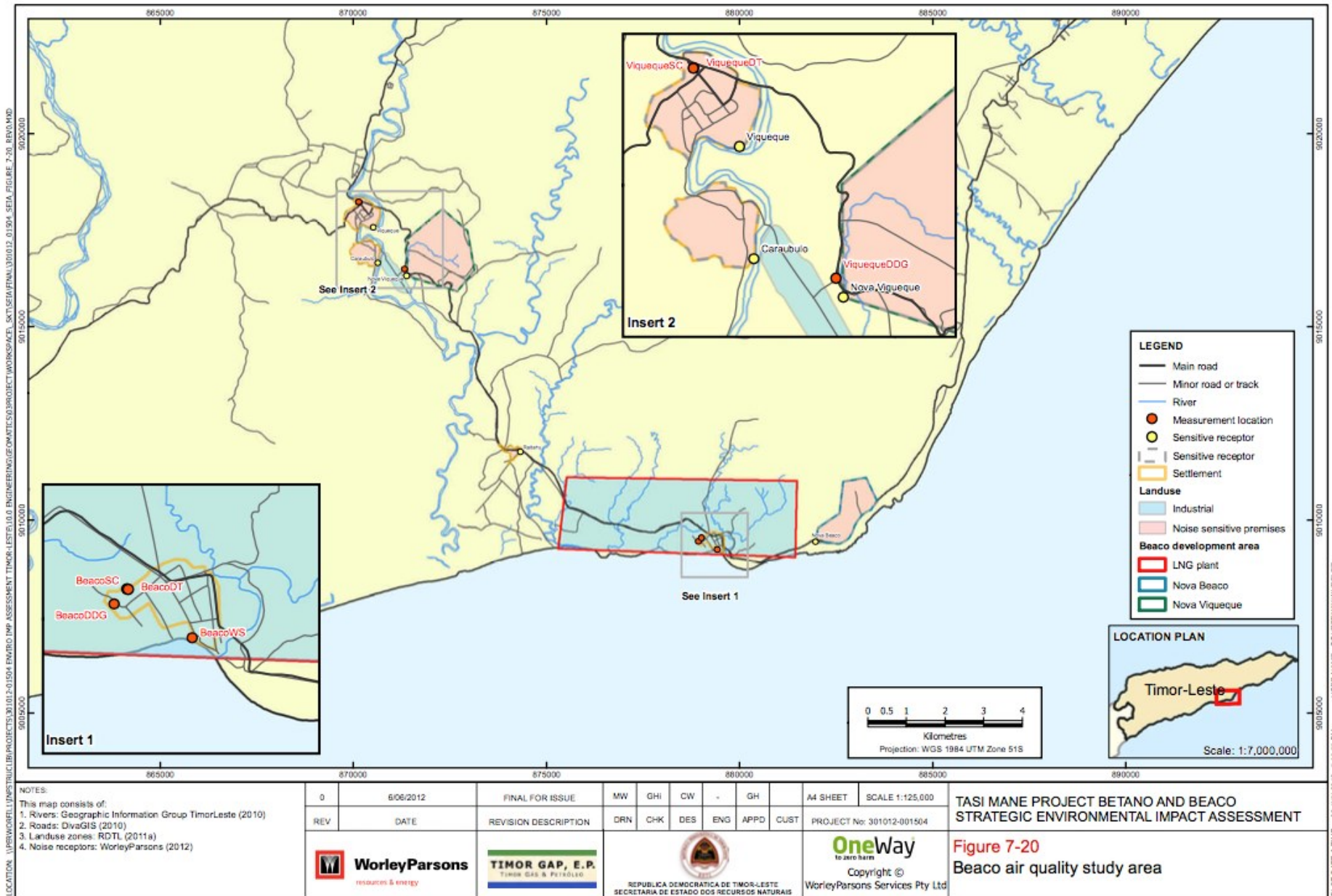
Table 6-1 - Project Relevant Air Quality Sampling Sites (G-RDTL, 2012)

Beaco study area specific air quality sensitive receptors

Location	Relevant Project Area	Centroid Coordinates	
		Latitude	Longitude
Nova Beaco	Primary worker settlement.	8° 56' 21.5" S	126° 28' 48.0" E
Raitahu	Existing settlement.	8° 55' 28.5" S	126° 24' 07.0" E
Nova Viqueque	Primary worker settlement/airport upgrade.	8° 52' 40.0" S	126° 23' 00.0" E
Viqueque	Existing settlement.	8° 52' 09.0" S	126° 21' 57.0" E
Caraubulo (south Viqueque)	Existing settlement/airport upgrade.	8° 52' 40.0" S	126° 22' 00.0" E

The samples were collected at the above sampling sites and sent to a laboratory in Australia for testing against international standards, given the inexistence of Timorese standards at the time of the study. These were: a) WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide (WHO, 2005); b) The US EPA set of National Ambient Air Quality Standards for airborne pollutant standards (US EPA, 2011); and c) The Australian NEPC National Environment Protection (Ambient Air Quality) Measure (OLD, 2003).

Figure 6-2 Beaco Air Quality Study Area (G-RDTL 2012)



With the exception of NOX and SOX, only concentrations of compounds greater than the limit of reporting were listed by the SEIA study, as follows:

Table 6-2 - Air Quality Results from SEIA 2012 - Chemical Compounds

Laboratory analysis results of chemical compounds in Beaco and Viqueque air samples

Compound	CAS Number	Limit of Reporting	Assessment Criteria	Beaco Chefe suco's house	Viqueque Town Square
				20/12/2011 5:33 p.m.	06/01/2012 9:49 a.m.
US EPA air toxics TO-14 (Chronic inhalation non-cancer)					
Freon 12	75-71-8	0.5 ppbv	---	0.9 ppbv	0.8 ppbv
		2 µg/m ³		4 µg/m ³	4 µg/m ³
Benzene	71-43-2	0.5 ppbv	300 µg/m ³	< 0.5 ppbv	1.7 ppbv
		2 µg/m ³		< 2 µg/m ³	5 µg/m ³
Toluene	108-88-3	0.5 ppbv	5,000 µg/m ³	0.6 ppbv	3.4 ppbv
		2 µg/m ³		2 µg/m ³	13 µg/m ³
Meta- and para-Xylene	108-38-3 106-42-3	1.0 ppbv	---	< 1.0 ppbv	1.3 ppbv
		4 µg/m ³		< 4 µg/m ³	6 µg/m ³
Ortho-xylene	95-47-6	0.5 ppbv	---	< 0.5 ppbv	0.5 ppbv
		2 µg/m ³		< 2 µg/m ³	< 2 µg/m ³
Total xylenes	1330-20-7	6 µg/m ³	100 µg/m ³	< 6 µg/m ³	8 µg/m ³
Hexachlorobutadiene	87-68-3	0.5 ppbv	---	0.8 ppbv	< 0.5 ppbv
		5 µg/m ³		90 µg/m ³	8 µg/m ³
Additional parameters					
Nitrogen dioxide (NO ₂)	10102-44-0	0.0001%	Refer to Table 7-13	< 0.0001%	< 0.0001%
Nitric oxide (NO)	---	0.0001%	---	< 0.0001%	< 0.0001%

Table 6-3 Air Quality Results from SEIA 2012 - Dust

Beaço LNG Plant Deposited Dust Samples – Laboratory Analysis Results

Analyte	Limit of Reporting	Unit	Beaço CSH ¹	Viqueque Airport
			14/02/2012	13/02/2012
Ash Content				
Total	1	mg	21	24
Deposition Rate	0.1	g/m ² /month	0.6	0.8
Combustible Matter				
Total	1	mg	16	15
Deposition Rate	0.1	g/m ² /month	0.5	0.5
Coarse Particulates				
Total	0.1	g	<0.1	<0.1
Total Soluble Matter				
Total	1	mg	2	17
Deposition Rate	0.1	g/m ² /month	<0.1	0.5
Total Insoluble Matter				
Total	1	mg	38	40
Deposition Rate	0.1	g/m ² /month	1.2	1.2
Total Solids				
Total	1	mg	40	56
Deposition Rate	0.1	g/m ² /month	1.2	1.8

Note: 1 – CSH = Chefe Suco's House

The resulting baseline measurements conducted during the fieldwork were deemed representative of the 'typical' air quality in the region at the time, where many of the "above-threshold" results in both Chemical and Dust testing were typical of the activities existing in Viqueque at the time.

Regarding chemical compounds, the trace levels detected for BTEX, NO_x and SO_x were representative of the emissions from vehicles and power generators in the city urban area, while the higher proportions of ash content and combustible matter in the Dust results (PM₁₀ and PM_{2.5}) suggest resulting ash and un-combustible materials from local burning activities and vehicle-generated dust due to local unsealed roads in close proximity to the housing and busy business areas.

For the current Water project, and for the same area as the 2012 study (2 sampling sites), the team's site visits and meetings and interviews with local stakeholders identified the very same activities and situations that continue to be carried to date in the project area, mainly burning of vegetation (due to seasonal shifting agriculture), transportation or burning wood for domestic purposes, among others.

Thus ambient air conditions in Viqueque city can be said to be, to an extent, already slightly deteriorated due to everyday urban city life activities and the project's activities, especially the temporary dust generating construction activities, would not be significantly higher than the already existing emissions in the Dry season. The air quality in the project area is deemed to be generally good in the wet season but degenerate and become dusty in the dry season, given a great number of the city roads are in bad condition and unpaved or fugitive emissions from movement of vehicles. ^[1]_[SEIP]

6.1.5 Water Resources and Hydrology

Timor-Leste is comprised of 191 "hydrologic units" or watersheds, of which a total of 29 were selected as important (JICA, 2017). Within them, in total there are 29 main river systems, of which 12 are situated in the north and 17 in the south.

These watersheds produce an estimated 22,300 million m³ of water per year (mm³/yr), with a total internal renewable water resources of 8,215 mm³/yr or 6,932 mm³/yr per inhabitant, ranking 63 out of 179 countries on renewable water resources availability per capita (WorldBank, 2018). This lower potential derives from a dry tropical climate characterized by long dry seasons. Based on 2004 available data, water withdrawal was 14% of the total country's renewable water resources, of which 91% was used for irrigation and livestock and 9% for domestic use.

Surface water accessibility is more problematic than that of groundwater sources. The meteorological variation results in highly variable river flows and flash floods in the wet season and low or no flows in the dry season. These distinct variations between the northern and southern coastlines result in smaller river catchments with diverse hydrological patterns.

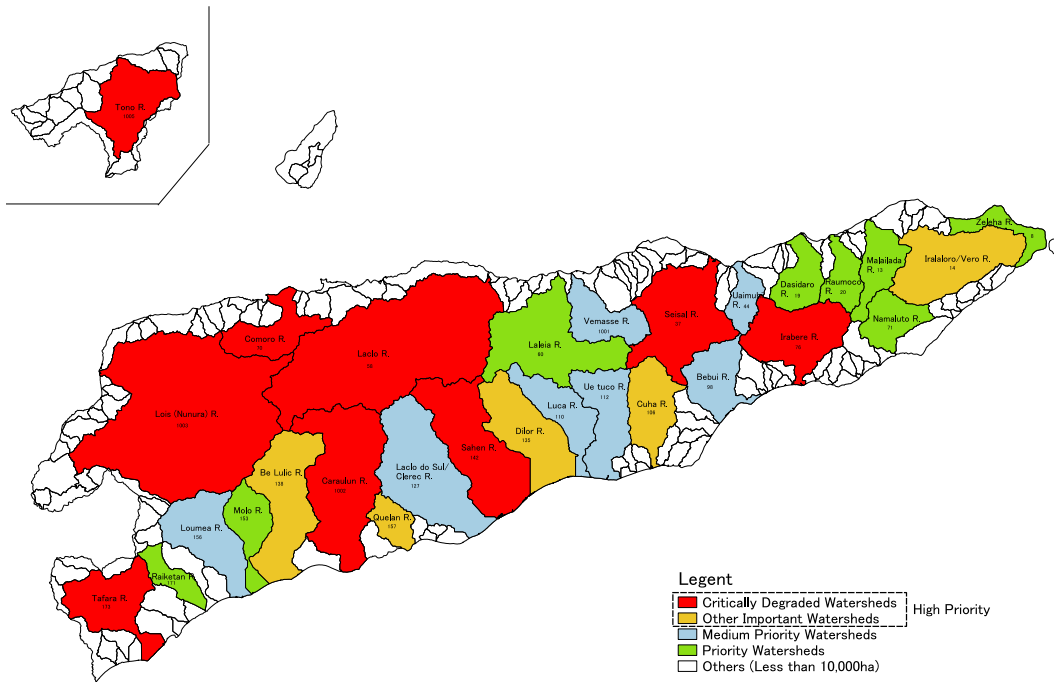
Figure 6-3 - Im shows that the Northern catchments tend to be larger than those located in the south. Most of catchments in the northern coast generate semi-permanent (i.e. seasonal) flows during the wet season after heavy rainfall events. On the other hand, the southern coast benefits from higher rainfall and thus is able to supply larger permanent river systems in the wet season and several rivers with a permanent base flow in the dry season.

Water Resources relevant to the Project Area

A. Surface and Groundwater

The hydrological system in Viqueque falls into the Sungai (River) Cuha Watershed (300 Km²), considered a High Priority [Yellow] (JICA, 2017), composed of several secondary water body elements (streams) draining southwards by the river into the coast in the Timor Sea (ADB, 2016).

Figure 6-3 - Important Watersheds in Timor-Leste (JICA 2017)



The main river, Cuha River, is located upstream in Northern Viqueque, North of Viqueque city. Along the higher end of the watershed, Natural groundwater springs appear (seasonally) and are considered the primary source of water for domestic and agricultural uses for most villages. Water from the various springs is used for domestic water are Loihunu 1, Loihunu 2, and Loihunu 3 (Permanent River), emerging from a limestone aquifer. 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 (ADB, 2016).

The Loihunu 2 spring is on the foothill of Mount Builo, a declared protected area under the Decree Law 5/2016. Westward from Loihunu 2, there is Loihunu 1 and further upstream of Loihunu River, there is Loihunu 3, where the water comes from Mundo Perdido (also a declared protected area in Timor-Leste under Decree Law 5/2015).

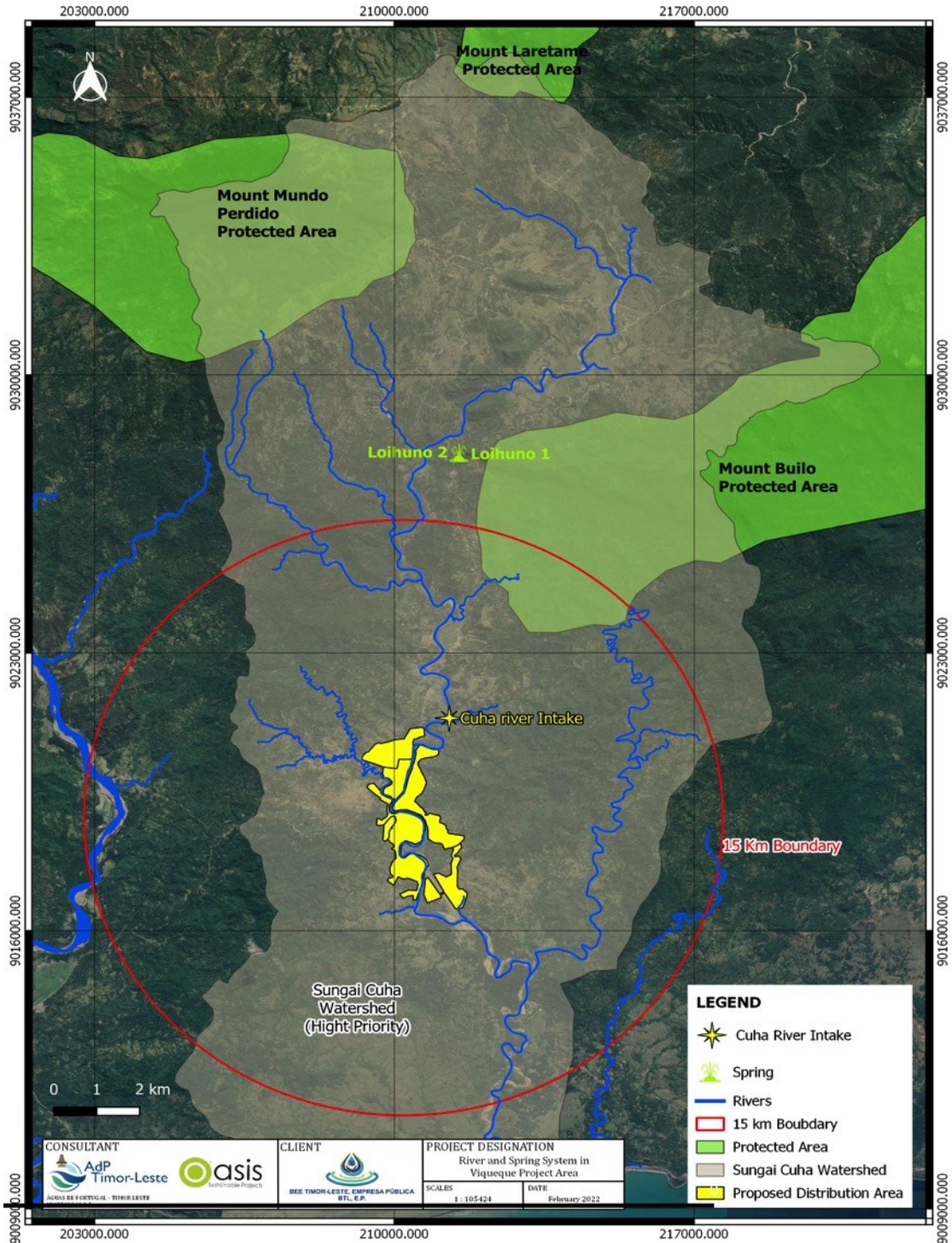
In Loihunu 1, the water is being used primarily for sanitation purposes, including washing clothes, bathing, and crop watering but not for drinking and cooking given the water is contaminated with E.coli due to livestock practices. Loihunu 3 is also being used privately to provide water for the aquaculture activity (i.e. fishponds).

B. Water Quality

Several water quality studies have been carried since 2000 up to 2019, to several water sources in Viqueque, particularly those used for the Water Distribution system and during the Master plan in 2014 (ADB, 2016). These have been evaluated and assessed in Chapter 4.2. – Water Quality Investigations.

Throughout the years, the overall quality of the sources has indicated that, in general, most of the indicators are within the World Health Organisation (WHO) limits for water consumption use of the water, despite several occurrences of higher-level turbidity in certain cases, that could be attributed to rainy season or other. However, there is a historical trend of occurrence of water contamination results regarding Total Coliforms and E. coli which may relate to the common agricultural husbandry activities and therefore, contaminating the water.

Figure 6-4 - River and Spring System in Viqueque Project Area



The project has a recent history of water quality test results, carried out between 2000 and 2008, with only one test per year from 2003 to 2008, while other tests were performed in 2014 for the 4 cities Master plan and other sporadic tests in 2019 and 2020, at various points in the distribution network and at some water sources. The results from the water quality tests can be seen in Appendix 5.

Conclusions on these results were the following:

- For the period between 2000 and 2006, there is bacteriological contamination (total coliforms and Escherichia coli presence) in the distribution system and Loihuno water sources. The total hardness is tested until 2003 and is above the limit (around 290 mg/l) CaCO₃ for Loihuno intake and around 330 mg/l CaCO₃ for Loihuno Spring);

- Regarding the water quality tests performed in 2008, there is no bacteriological contamination (total coliforms and *Escherichia coli*) in the distribution system. There are some measurements of the residual chlorine in the distribution system and value is within the guideline limits;
- The water quality tests performed in 2014 for the Master plan (See Appendix 5) shown that there is bacteriological contamination (total coliforms) only at one point in the distribution system (in this system, the water is disinfected). The total hardness is above the limit (around 210 mg/l CaCO₃);

The water temperature is normally high reaching temperatures of 30°C in some samples. The other parameters tested are according to the limits of the guidelines from Timor and WHO.

C. Coastal and Marine Waters

In Timor-Leste, coastal areas have been the most important area and preferred to be inhabited by rural communities who are mainly dependent on (semi) subsistence farming and fishing. Nationally, a only few urban settlements are located directly along the coast i.e. Dili, however, it is significant that 66% of the population lives in the coastal and lowland areas below the elevation of 500m (UNDP, 2018). Coastal zones of Timor-Leste generally have shallow seas with valuable marine resources such as fish, seagrasses, seaweeds, coral reefs, etc. Most evident vegetation along Timor's coast are mangroves forest, which are found predominant in the northern coast, and some coastal forests, including arid woodlands (UNDP, 2018). Timor is also the home for 1,200 reef fish species and 400 reef building coral species (UNDP, 2018) which classifies Timor-Leste as an important region of the coral triangle.

In regards to the project area itself, the closest coastal and marine waters are 4Km away from the nearest project component i.e. FSTP location, and 2,5km outside of the 15Km diameter project border and therefore, at a significant distance to assume the project does not include and/or impact any coastal and/or marine waters.

6.1.6 Soil

Available Secondary data from the Betano and Beaco SEIA (G-RDTL, 2012) describes a sampling campaign that covered the area of Nova Viqueque, parallel to Zone 6 of the proposed Distribution Zone and North of the Viqueque Airport strip.

This campaign included 5 test pits, which concluded that the soil profiling in the area was predominantly Clay based, with varying levels of expansivity, elasticity and humidity. Results from this Soil Study are presented in Table 6-4.

It concluded that the Bobonaro Scaly Clay Formation underlies a large portion of Nova Viqueque, and is likely to impact significantly on development in this area, given it is characterised by a soft, scaly, and variegated matrix, with Montmorillonite (highly colloidal and plastic) as the predominant clay mineral. This clay is clearly expansive, implying significant volume changes with a change in moisture content, which explained the abundance of slickensiding evidence, such as fissures due to shrinkage on drying, particularly significant due to the distinct wet and dry seasons experienced in Timor- Leste.

The formation gives rise to highly expansive clay, which loses all cohesion when wet and becomes highly compressible, is dispersive, and very unstable in slopes when saturated. In typically fairly steep gradients, such as those existent in a large part of the project Water Supply project area, to the North of the Nova Viqueque site, where the Water Distribution Zones lie, and in all likelihood, there is a higher risk of geotechnical problems in higher grade hillsides.

Nevertheless, northwards of the Nova Viqueque site towards the remaining Water Distribution zones the area surrounding Viqueque city is predominantly lain with the Viqueque formation, entirely marine by origin but with rapid deposition, with massive white marls and grey claystones interbedded with a few chalky limestones, which become gradually more silty and sandy, leading to a reasonable grade of erosion risk.

Table 6-4 Soil Profiling in Nova Viqueque (G-RDTL, 2012)

Summarised soil profiles – LNG Plant (cont'd)

Test Pit Number and Coordinates	Depth	Description
TPNV I (Nova Viqueque) X = 872370 Y = 9016173	0 to 0.5 m	CLAY: Medium to high plasticity clay, dark grey-black, stiff to very stiff, fissured and slickensided, with trace of fine to coarse-grained sand and trace of fine gravel (mostly calcareous concretions). Moist with wet patches.
	0.5 to 1.5 m	CLAY: Medium to high plasticity clay, brown mottled yellow-brown, reddish-brown and grey-brown, stiff to very stiff, with some fine to coarse-grained sand and some fine to medium gravel (mostly calcareous concretions). Moist.
TPNV II (Nova Viqueque) X = 872403 Y = 9016554	0 to 1.2 m	CLAY: Medium to high plasticity clay, dark grey-black, firm to very stiff with depth, fissured and slickensided, with trace of fine to coarse-grained sand and trace of fine gravel (mostly calcareous concretions). Moist. Refusal on exotic blocks within the Bobonaro Scaly Clay Formation.
TPNV III (Nova Viqueque) X = 872021 Y = 9016672	0 to 1.5 m	CLAY: Medium to high plasticity clay, brown mottled red-brown and grey, stiff to very stiff, fissured and slickensided, with trace of fine to coarse-grained sand and trace of fine gravel (mostly calcareous concretions). Moist.
TPNV IV (Nova Viqueque) X = 871827 Y = 9016973	0 to 1.1 m	CLAY: Medium to high plasticity clay, dark grey-black mottled dark brown, stiff to very stiff, fissured and slickensided, with trace of fine to coarse-grained sand and trace of fine gravel (mostly calcareous concretions). Moist with wet patches. Refusal on exotic blocks within the Bobonaro Scaly Clay Formation.
TPNV V (Nova Viqueque) X = 871551 Y = 9017306	0 to 0.9 m	GRAVELLY CLAY: Medium to high plasticity clay, dark brown mottled red-brown, stiff to very stiff, with some fine to medium gravel (mostly calcareous concretions and sandstone fragments) and trace of fine to coarse-grained sand. Moist with wet patches.
	0.9 to 1.5 m	CLAY: Medium to high plasticity clay, reddish-brown, stiff to very stiff, with some fine to medium-grained sand and fine gravel (mostly calcareous concretions and sandstone fragments). Moist.

6.2 Ecological Components

Situated within the Wallacea Biodiversity Hotspot (defined as the islands in the Indonesian archipelago and Timor-Leste between the Sunda and Sahul continental shelves), Timor-Leste hosts a number of globally significant ecosystems and endemic species, originated from Asia and Australasia and spread through the Wallacea region but through long isolation have developed very high levels of endemism (G-RDTL, 2010), many of which are threatened with extinction by IUCN.

Additionally, according to NEGA (2010), Timor-Leste is also part of the Coral Triangle, harbouring many important species, such as: "...76% of the world's coral species; six of the world's seven marine turtle species, more than 3,000 reef fish species, whale sharks, manta rays and a diversity of marine mammals, such as 22 dolphin species and a variety of whale species".

In general, natural ecosystems in Timor-Leste have been severely depleted in the last century, through intensive deforestation, forest degradation, loss of soil due to 'slash-and-burn' agricultural methods and heavy rains, mangrove destruction, pollution of waters and sedimentation of rivers. Native vegetation is a fundamental element of ecosystems, encompassing most of its biomass and has therefore been equally affected.

6.2.1 Wetlands

As explained previously, within the project location, the only water feature that exists is the River Cuha, wriggling through the Viqueque valley (and the project area) from Loihunu down to the coastal area. Within this area there are no wetlands i.e. marshes and swamps and thus this component is considered as non- significant to the scope of the project.

6.2.2 Mangroves

Mangroves have an important role in Marine Ecosystems. In Viqueque, the only location where there is sparse but infrequent occurrence of mangrove tree specimens is at the mouth of the Cuha river, 2.5 km South of the project border. However, the project is not expected to have direct impacts to this component.

6.2.3 Corals and Fisheries

According to NEGA (2010), Timor-Leste is also part of the Coral Triangle, harbouring many important species, such as: "...76% of the world's coral species; six of the world's seven marine turtle species, more than 3,000 reef fish species, whale sharks, manta rays and a diversity of marine mammals, such as 22 dolphin species and a variety of whale species".

Line fishing and net fishing from boats are the most widespread fishing activities in Timor-Leste, occurring adjacent to 11 coastal municipalities, including Viqueque (Worldfish, 2019). The top fish species that fishers in Timor-Leste consider most important for sale include Sardines (*Sardinella* spp. and others) and a short-bodied mackerel (*Rastrelliger* spp. and possibly some *Decapterus* spp.), while other species ranked highly for trade included bullet tuna (*Auxis* spp.), garfish (*Hemiramphus* sp.), trevally (*Carangoides* spp.), grouper/rock cod (*Epinephelus* sp.), Spanish mackerel (*Scomberomorus* sp.), flying fish (*Cypselurus* spp.) and snapper (*Lutjanus* sp.)

As explained above, given the substantial distance of the project to the coast, the project is not expected to contribute with an impact that may affect this component such as i.e., siltation of coastal waters directly from the project activities, as it is 4 Km away from the coast.

6.2.4 Protected areas and National Parks

Timor-Leste has a total of 49 declared Protected Areas (PA), according to Decree-Law no. 05/2016 – Protected Areas Network in Timor-Leste, containing the majority of the country's remaining primary forest cover. The majority of these areas are mountainous and have high species endemism. The first and most established Protected Area in the country is Nino Konis Santana National Park (NKSNP), composed of three main areas, namely, Jaco Island Marine Park, the Lake Iralalaru Park, and the community led marine protected area in vicinity of Com Village. Below is the list of protected areas in Timor-Leste according to the DL 05/2016, NEGA (2010) and GIS documentation and boundaries of the protected areas for the year 2018, from the Ministry of Agriculture and Forestry (MAF).

Table 6-5 - List of Protected Areas in Timor-Leste

No	Name	Area (Ha)	Ref	Remarks
1	Nino Konis Santana National Park	126249.619	GR 08/2007	Area REDUCED to 123600 ha in DL 5/2016
2	Mount Legumau	10035.876	NEGA 2010	Area INCREASED to 35967 ha in DL 5/2016
3	Lake Maurei	200.312	NEGA 2010	Area INCREASED to 500 ha in DL 5/2016
4	Be'e Matan Irabere	0	DL 5/2016	New proposed protected area, area not defined
5	Mount Matebian	10340.534	NEGA 2010	Area INCREASED to 24000 ha in DL 5/2016
6	Mount Mundo Perdido	4168.339	NEGA 2010	Area INCREASED to 25000 ha in DL 5/2016
7	Mount Laretame	896.449	NEGA 2010	Area INCREASED to 16429 ha in DL 5/2016
8	Mount Builo	6987.437	NEGA 2010	Area INCREASED to 8000 ha in DL 5/2016
9	Mount Burabo	3927.136	NEGA 2010	Area INCREASED to 18500 ha in DL 5/2016
10	Mount Aitana	4236.951	NEGA 2010	Area INCREASED to 17000 ha in DL 5/2016
11	Mount Bibileo	4545.537	NEGA 2010	Area INCREASED to 19000 ha in DL 5/2016
12	Mount Diatuto	9897.168	NEGA 2010	Area INCREASED to 15000 ha in DL 5/2016
13	Mount Kuri	1766.019	NEGA 2010	Area not defined in DL 5/2016

No	Name	Area (Ha)	Ref	Remarks
14	Kay Rala Xanana Gusmao National Park	18000	DL 5/2016	New proposed protected area
15	Ribeira de Clere	9926.638	NEGA 2010	Area INCREASED to 30000 ha in DL 5/2016
16	Lake Modomahut	22	DL 5/2016	New proposed protected area
17	Lake Welenas	20	DL 5/2016	New proposed protected area, part of Mt. Cblaque
18	Mount Manucoco	1773.192	NEGA 2010	Area INCREASED to 4000 ha in DL 5/2016
19	Cristo Rei	1810.001	NEGA 2010	Area REDUCED to 1558 ha in DL 5/2016
20	Lake Tasitolu	378.195	NEGA 2010	Area not defined in DL 5/2016
21	Mount Fatumasin	1412.862	NEGA 2010	Area INCREASED to 4000 ha in DL 5/2016
22	Mount Guguleur	6962.938	NEGA 2010	Area INCREASED to 13159 ha in DL 5/2016
23	Lake Maubara	0	DL 5/2016	New proposed protected area, area not defined
24	Mount Tatamailau	14418.235	NEGA 2010	Area INCREASED to 20000 ha in DL 5/2016
25	Mount Talobu/Laumeta	15000	DL 5/2016	New proposed protected area
26	Mount Loelako	1078.986	NEGA 2010	Area INCREASED to 4700 ha in DL 5/2016
27	Mount Tapo/Saburai	3767.788	NEGA 2010	Area INCREASED to 5000 ha in DL 5/2016
28	Lake Be'e Malae	0	DL 5/2016	New proposed protected area, area not defined
29	Korluli	0	DL 5/2016	New proposed protected area, area not defined
30	Mont Lakus/Sabi	0	DL 5/2016	New proposed protected area, area not defined
31	Mount Taroman	5888.429	NEGA 2010	Area INCREASED to 19155 ha in DL 5/2016
32	Tilomar	4731.239	NEGA 2010	Area INCREASED to 7000 ha in DL 5/2016
33	Mount Cutete	8590.356	NEGA 2010	Area INCREASED to 13300 ha in DL 5/2016
34	Mount Manoleu	10844.206	DL 5/2016	Area INCREASED to 20000 ha in DL 5/2016
35	Area Mangal Citrana	1000	DL 5/2016	New proposed protected area
36	Oebatan	300	DL 5/2016	New proposed protected area
37	Ek Oni	700	DL 5/2016	New proposed protected area
38	Us Metan	200	DL 5/2016	New proposed protected area
39	Makfahik	0	DL 5/2016	New proposed protected area, area not defined
40	Area de Mangal Metinaro	0	DL 5/2016	New proposed protected area, area not defined
41	Area de Mangal Hera	0	DL 5/2016	New proposed protected area, area not defined
42	Lake Hasan Foun & Onu Boot	12	DL 5/2016	New proposed protected area
43	Lake Bikan Tidi	110	DL 5/2016	New proposed protected area
44	Samiksaron	0	DL 5/2016	New proposed protected area, area not defined
45	Batugade	112.59	DL 5/2016	New proposed protected area
46	Atauro Island	10897.131	NEGA 2010	Area REDUCED to 50.85 ha in DL 5/2016
47	Lamsanak	15064.143	NEGA 2010	Not included in DL 5/2016
48	Mount Cblaque	12623.434	NEGA 2010	Not included in DL 5/2016 (Substituted by #14)
49	Behau	27491.337	NEGA 2010	Not included in DL 5/2016

Protected Areas in and around the Project Area

Of the 46 declared Protected Areas (PA) in the country, Viqueque has within it the Mount Mundo Perdido PA, the Mount Laretame PA and the Mount Builo PA, the latter the closest one to the Project components. The Mount Builo PA has a total span of 8,000 ha encompassing Sucos Loihunu, Uagua, Ossu Rua (Ossu Post Administrative) and Matahoi (Uatu Lari Post Administrative), while the Monte Mundo Perdido (at 16,100 hectares) covers part of the project relevant suco Ossu de Cima. Within the 15 km diameter project limit for the Municipal Water Supply and Sanitation Project (see Figure 6-5) only Suco Loihuno boundary reaches into the Mount Builo protected area at its northeastern border.

None of the project components overlap or border the PA, as they are planned to be implemented in Sucos Carabalo, Uma Uain Craic and Uma Quic, within the urbanised area of Viqueque, with the closest component to the protected area being the Loihunu I Spring (approximately 700m away from the PA boundary). The overlapping seen in Figure 6-6 - represents only project border overlapping and not physical overlapping of project components within or close to the PA or KBAs.

The team met with Mr. João Antalmo, (National Director for Protected Areas) on the 12th September 2020, to procure updated GIS documentation on the National Protected Areas Borders. Whilst at the time these were not available, the team further complemented this consultation with a meeting with the General Director for Forestry, Mr. Raimundo Mau (on the 10th December 2020), where it was confirmed that the 2018 boundaries should be used as the most current PA boundary reference.

Updated GIS data were supplied which have made it possible to define the areas of the project that may be in and out of the PA.

The environmental features, flora, fauna, etc, regarding this new National Park are reflected in the following chapters.

6.2.5 Flora and Fauna

Based on a preliminary survey of the flora and fauna of Timor-Leste conducted in collaboration with Birdlife International, more than 251 tree species had been identified as native with a great deal of biodiversity in agriculture. The agro-biodiversity database elaborated by MAF, GIZ/AMBERO, UNTL and Permatil lists 200 crop species in 555 varieties that are cultivated and/or used by Timorese farmers. While the database only includes data from 26 pilot villages (sucos) distributed over five districts, actual diversity is likely to be much higher.

Flora in the project area

The Loihunu 2 spring area is the only one with denser vegetation compared to other identified water sources in Viqueque. At least 8 keystone tree species and herbaceous plants and perennials were seen on site, such as dita bark tree (*Alstonia scholaris*), hazel steriula (*Stericula foetida*), cottonwood tree (*Ceiba petandra*), breadfruit (*Artocarpus communis*), taro plant (*Colocasia esculenta*), candlenut (*Aleurites molucana*), palm tree (*Corypha utan*), and black sugar palm (*Arenga pinnata*), etc.

In the Viqueque city area, there are patches of very open forest or scattered trees over grassland and introduced weed communities, with Tree species recorded including *Borassus flabellifer*, *Schleichera oleosa*, *Pterocarpus indicus*, *Santalum album*, *Dichrostachys cinerea*, *Acacia nilotica* subsp. *indica*, *Cassia javanica* ssp. *nodosa*, *Timonius timon*, *Swietenia mahagoni*, *Glochidion xerocarpum*, *Ziziphus timoriensis*, and *Casuarina* sp. *affin. Junghuhniana*, as well as Coconut, mango and teak trees. Siam weed, Coffee bush, Crown flower and Golden false beard grass (*Chrysopogon aciculatus*) are prevalent. (Worley Parsons, 2012) Flora and Fauna

Fauna

The 5th UNCBD Report (GovTL, 2015) indicates that bird life in Timor-Leste is usually better documented than the non-bird fauna of Timor-Leste, although some main species groups such as mammals, reptiles and amphibians have been studied to some degree at some locations within the country. Roughly half of the bird fauna originates from Asia and Australasia, whereas the mammal, amphibian and reptile faunas are dominated by Asian families and species. New species of bats, frogs, geckos and skinks have been discovered with evidence indicating high levels of endemism.

Bird fauna related information is relatively established in Timor-Leste. The country hosts 262 bird species and 39 of them are threatened or restricted range species –8 of which are endemic to Timor-Leste (GovTL, 2010). Realizing the importance of conserving the birds to maintain the ecosystem services that the species are offering, the country has determined Important Bird Area (IBA) with accumulative land of 1,852 km² across the municipalities in Timor (Trainor, 2007). The 5th National Report to the UNCBD (G-RDTL, 2015) states that these Important Bird Areas (IBAs) form the core of a network of sites for all wildlife: the Key Biodiversity Areas (KBAs). They are 16 IBAs, 14 on the mainland and two (2) on offshore islands (Atauro and Jaco islands), covering roughly 12.5% of Timor-Leste's total land area, supporting populations of both restricted-range birds of the Timor and Wetar Endemic Bird Area (EBA), as well as globally threatened bird species.

The NBSAP (G-RDTL, 2015), based on studies conducted by (Trainor, 2007), substantiates this importance, registering at least 262 bird species that are known to be from Timor, from which 169 are considered resident, 76 regular migrants and 17 considered as vagrants. Of all these, three (3) species are identified as endangered, namely the Timor Green Pigeon (*Treron psittacea*, local name (LN): Punai Timor], the Timor Imperial Pigeon (*Ducula cineracea*, LN: Pergam Timor) and the Wetar Ground Dove (*Gallinolumba hoedtii*, LN: Delimukan Wetar). Additionally, one is classified as critically endangered –

Yellow-Crested Cockatoo (*Cacatua sulphurea*, LN: Kakatua jambulkuning) and another as vulnerable – Timor Sparrow (*Padda fuscata*, LN: Gelatik Timor).

The country also has a rich, highly endemic, oceanic island terrestrial fauna that also consists of 60 mammals, including 24 non-volant (non-flying) mammals (of which two of these are the Timor Shrew *Crociodura tenuis* and Timor Rat *Rattus timorensis*), but overall dominated by 31 bat species and 40 reptile (15 lizard and 15 snake) species, one of which, the crocodile (*crocodilus porosus*) is very important spiritually in Timor-Leste. Other common species of low conservation significance are the Timor Deer, Common spotted Cuscus, Common Palm Civet, pigs and Long-tailed Macaque. Almost all these land mammals are introduced and all are affected by hunting and habitat loss.

Fauna around and in the Project Area

Previous studies have concluded that fauna dispersion and variety is generalized throughout the Southern coast of Timor-Leste (Worley Parsons, 2012) and many existing IBAs and Pas scattered throughout the South coast, provide significant foraging and nesting habitat potential for vertebrate fauna species and in particular species of conservation significance such as the Yellow-crested cockatoo (*Cacatua sulphurea*), as well as others such as the Slaty Cuckoo Dove (*Turacoena modesta*), Pink-headed Imperial Pigeon (*Ducula rosacea*) or Olive-shouldered Parrot (*Aprosmictus jonquillaceus*), or more common species including the Spotted Dove (*Streptopelia chinensis*), the Barred Dove (*Geopelia maugei*) and the Streak-breasted Honeyeater (*Meliphaga reticulata*) (Trainor, 2007).

Reptiles also follow this tendency, including: Tokay (*Gekko gekko*), Asian House Gecko (*Hemidactylus frenatus*), Fat-tailed House Gecko (*Hemidactylus platyurus*), Common Wolf Snake (*Lycodon capucinus*), Indonesian Water Python (*Liasis macklotti macklotti*) and Saltwater Crocodile (*Crocodylus porosus*).

In Viqueque, the mammals commonly existing in south coast are *Macaca fascicularis* (crab-eating macaque), *Phalanger orientalis* (Northern common cuscus), *Cervus timorensis* (Javan rusa), *Rattus Timorensis* (Timor rat), *Sus scrofa* (Wild boar), *Rhinolophus philippensis montanus* (Large-eared Horseshoe Bat) and *Paradoxurus hermaproditus* (Asian palm civet), the Indonesian Short-nosed Fruit Bat (*Cynopterus titthaechilus*), Domestic Dog/Dingo (*Canis familiaris*), Domestic Pig (*Sus scrofa*), Bali Cattle (*Bos javanicus*), Domestic Cattle (*Bos taurus*) and the Domestic Goat (*Capra hircus*), amongst others, all not included in the IUCN list of endangered species (Santana, 2006).

Previous studies have also recorded several species of conservation significance, such as the Canut's Horseshoe Bat (*Rhinolophus canuti*), listed as Vulnerable on the IUCN Red List, canut's horseshoe bat (*Rhinolophus canuti timoriensis*), beach thick-knee (*Esacus magnirostris*), slaty cuckoo dove (*Turacoena modesta*) and Timor bush-chat (*Saxicola gutturalis*) (Worley Parsons, 2012).

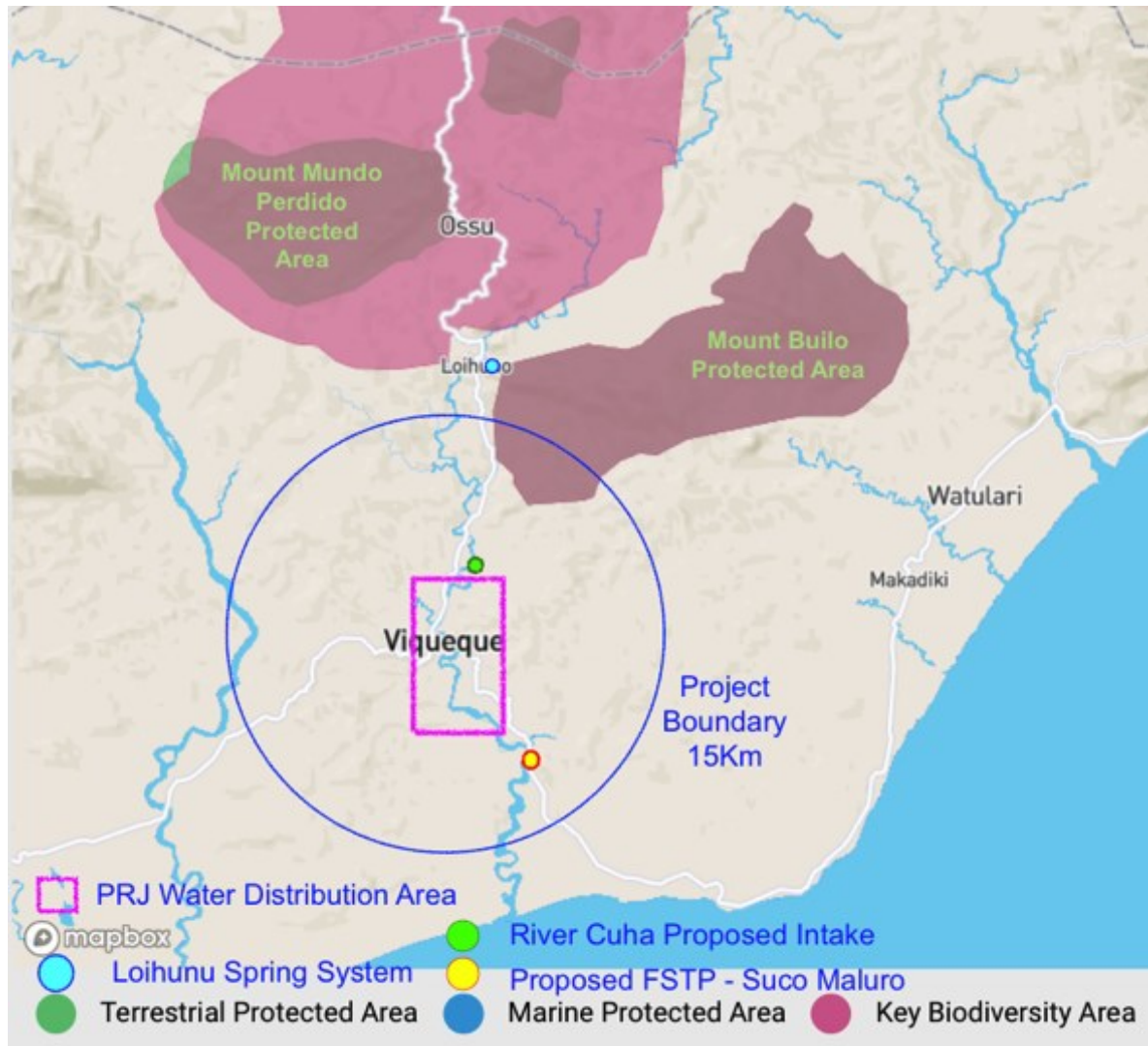
6.2.6 Forests

In general, forest and woodland of several structural types are the predominant original vegetation throughout much of Timor-Leste. Tall evergreen forests grow in areas with high moisture while drier and more extreme climatic conditions lead to the appearance of semi deciduous and tropical dry forests (JICA, 2013).

Prior to the country's independence, its forest had been significantly exploited due to the foreign demand of country products, such as sandalwood (*Santallum album*). From 1.5 million hectares of total land in Timor, 57% are classified as forest or woodland (GovTL, 2010). The identified forest woodland has been degraded due to Timber harvesting and illegal logging, and slash-and-burn for agricultural practices.

In 2012 the forest area of Timor-Leste was estimated in the draft National Forest Conservation Plan (Nippon Koei, 2013) to be 869 thousand hectares, which represented 58% of the whole country. Dense forest with a crown cover was found on 60 to 70% of the forestland, the remaining balance being sparse forest. Agricultural land was estimated at 26 % of the whole country.

Figure 6-5 - IBAT mapping of Protected Areas and Key Biodiversity Areas near Viqueque Project (Source: www.IBAT-alliance.org, accessed 06.01.2021)



Altogether, the area of sparse forest is almost 1.8 times the size of the area of dense forest. Between districts, in general, forest cover does not markedly differ. Based on these national forest maps, only 1.7% of the total land area of Timor-Leste is still covered by primary forest; significant areas can be seen in Lautem and Covalima districts. The last major stretches of old primary forest are mainly located in the Tutuala sub-district of Lautem.

The Malesian region, where Timor-Leste is located, is a region of high plant biodiversity with an estimated 41,000 plant species, including 70 per cent of species endemic to the region (GovTL, 2015)

The vegetation of Viqueque, consists of sparse moist lowland forest and dense moist highland forest. The vegetation characteristics in the spring area are not as dense as those springs in Viqueque. This is due to intense slash and burning for subsistence agricultural purposes and urban expansion. The location of the springs was previously reported vacant, however, verified as occupied during the brief inception visit, where presumably the trees have been cut down to free the land for housing and other activities.

The Forest Transition Report prepared by the National Directorate of Forests, in collaboration with the Japan International Cooperation System (JICS), have shown that Viqueque is the district that has most significantly decreased its forest cover from 2003 to 2010 (20.9% of its total forest cover, loss of 31,265.87 ha), followed by Manufahi (29.6% of its total forest cover, a loss of 30,978.72 ha), (JICA, 2017). The loss in dense forest has occurred in all of municipalities in Timor-Leste and deforested areas are higher than sparse forest areas.

6.2.6.1 Coastal Resources

Timor-Leste has approximately 700 km of coastline, holding many coastal and marine resources including fish, sea grasses, seaweeds, coral reefs, mangrove forests and pristine beaches (very suitable for recreation and with a high tourism value). These coastal habitats vary from region to region around the country, with areas such as lagoons, fringing coral reefs, sea grass beds and steep cliffs with adjacent deep-water drop-offs, mangrove stands, beaches and shallow bays. These coastal habitats are places of varying abundance and diversity of fish stocks, some representing spawning grounds whilst others a transition area between onshore and offshore habitats or seasonal migratory pathways to many mega fauna species.

Thus, the coastal zone (and habitats) of Timor-Leste are subject to a high degree of human dependency and impact on said resources, be it for Tourism or socioeconomic activities i.e., mangrove forests, have been reduced at an alarming rate throughout decades since 1940, due to timber harvesting, fuel wood, and opening up spaces near the mangrove forests for shrimp and fish ponds.

Being part of the Coral Triangle (CT) also befits Timor-Leste of a rich Marine fauna, since it is estimated the CT harbours 76 per cent of the world's coral species, six of the world's seven marine turtle species, more than 3,000 reef fish species, whale sharks, manta rays and a diversity of marine mega fauna, such as saltwater crocodiles, 22 dolphin species and a variety of whale species, namely "...76% of the world's coral species; six of the world's seven marine turtle species, more than 3,000 reef fish species, whale sharks, manta rays and a diversity of marine mammals, such as 22 dolphin species and a variety of whale species" (G-RDTL, 2010).

This declaration follows reports such as Veron (2000) where Timor-Leste is among those places on the planet with the highest coral species diversity, with over 500 species of coral reported from the sea around Timor-Leste, putting emphasis of the fact that any activity along the coastline, coastal development projects, marine pollution, sedimentation, overfishing and destructive fishing are considered having impact to the corals.

This enormous marine resource places Fisheries in Timor-Leste as a primary food source, although it is still considered small-scale and mainly for subsistence purposes, where fishermen use non-motorized boats with gill nets and hook and line to capture reef and surface-dwelling fish. The Fish and Animal Consumption and Availability Survey conducted in 2011 by Regional Fisheries Livelihoods Program in five Timorese municipalities, estimated average fish consumption to be 6.1 kg/person/year all throughout Timor-Leste, while people living near the coast stood at 17.6 kg/person/year versus those living inland consumed 4/kg/person/year (Poblacion, 2013).

Coastal Resources in and around the Project Area

The coastal resources around the Viqueque District cover the Southern Coast and boast special importance in marine richness and diversity. However, as they are well outside the 15 Km Project scope Area, and are substantially far from any possible impacts from any of the project activities and/or components, they have not been considered in this characterisation.

6.3 Economic Components

In order to provide an overview of the current Economic characteristics of the project area and Viqueque Municipality, the team has resorted to a desktop review of relevant literature and aerial photography and secondary data analysis (sources indicated in the text) and on the site visits and meetings with BTL staff and stakeholders, carried out during the environmental assessment process.

6.3.1 Employment Sectors

The project is situated in the Viqueque Municipality and its population was projected, in 2015 to be at 76,033 persons and the population of Loihunu to be 1,272 persons, of Caraubalu to be 6,594 persons, of Uma Uain Craic to be 4,454 persons and of Uma Quic to be 1,981 persons (General Directorate of

Statistics, 2015). This Suco population is the primary receptor of the water supply services from this project, which, in 2015, counted with 2,315 private households.

Human interaction within the employment setting results in several land-uses in the country such as agricultural, forestry, settlements, industrial and dry lands land use. According to the Timor-Leste Agricultural Census (2019), the agriculture sector is the predominant form of livelihood in Viqueque, with a total 12,774 Agricultural Households (HHs) or 80% of total enumerated HHs, mostly near subsistence swidden agriculture for the production of primary staple crops such as i.e., maize, cassava, etc for farmer households, whilst a larger proportion of livestock activities i.e. buffalo, spread out towards the lower land areas towards Viqueque.

The majority of the population is mostly composed of self-employed farmers (17% of the municipality population, representing 63% of the total employed population in the Municipality) with 4% unemployed/looking for work. Water has been an important source for securing their activity so as to have a sustainable income, since agriculture is heavily dependent to the amount of rainfall in a given year, followed by harvesting water from the nearest water stream.

While a smaller percentage are engaged in fishing activities in the municipality (2.3%), Viqueque, being the capital, is the centre of urban development of the Municipality. Industries evident in the city are Construction (road and housing) and commercial and business areas within an urban and peri-urban setting, represent the remaining 13%.

Table 6-6 - Population Over Ten Years Old Main Economic Activity in Viqueque

Units	Total population over 10 years old	Employed	Unemployed (looking for work)	Economically Inactive
Viqueque Municipality	47,920 (100%)	13,055 (27%)	1,994 (4%)	21 116 (69%)

Source: Statistics Agriculture Census, 2019

6.3.2 Infrastructure Facilities

Education Facilities. In Viqueque Administrative Post, the total percentage of population aged 3 years old and above with an education level is 69%, while the numbers of population with no schooling are high at around 30% (TLAC, 2019). Basic Education in the Administrative Post counts with a total of 3 schools, 16 teachers and 25 students while on the other hand Secondary Education has 3 schools, 167 teachers and a total of 1,739 students (Direccao Geral de Estatistica Municipio de Viqueque, 2018).

Transportation. Public transportation in Administrative Post Viqueque varies comparing to Dili city with access only to *microlet* service for rural and urban destination. For travelling outside Municipality, public vehicles such as bus heading to Dili and vice versa is commonly used by the community.

Viqueque Municipality also has a rudimentary runway for aircraft landing located in the northern part of Suco Uma Uain Craic. The mentioned site is said to be included for future expansion and re-functioning implementation as in accordance with the urban planning design.

Road. A national road rehabilitation project is currently ongoing from Viqueque to Baucau city, allowing local community and people from outside Viqueque Municipality for mobility access. Aside from that, the condition of well-paved national road from Viqueque to Baucau and vice versa may have a potential to boost trade and construction sectors. However, the condition of some roads in Viqueque urban area are still poor, especially when it comes to accessing public buildings and households.

Power sources and transmission. Energy consumption increased since the number of clients also increased. In Viqueque, in 2015 there were 4,264 clients and in 2018 increased to 5,032 clients (DNE, 2018). Of these, 9,137 households (78%) have access to the electricity grid.

Health Services. Viqueque Administrative Post has available to its public, 1 Hospital, 1 Health Centre, 12 Health Posts, 13 SISca and 2 Private Clinics, around 29% of the health sector capacity in the whole of the Municipality (G-RDTL 2021), supported by medical staff covering 35% of the whole Viqueque staff.

6.3.3 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.

Viqueque is also identified as a rural agricultural district where traditional agriculture is generally practiced, such as non-irrigated rice, corn, cassava, beans and other staples. These 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).

Likewise, the coastal plain of southern Timor-Leste has largely been cleared in association with swidden agriculture, sandalwood harvesting, plantation estates and timber plantations. Remnant vegetation exists as highly fragmented and secondary vegetation communities, mostly dominated by invasive weeds, particularly Siam weed (*Chromolaena odorata*) and Cogon Grass (*Imperata cylindrica*), common in the area and results from repeated cycles of 'slash and burn' or swidden agriculture. Grasses are extensively grazed by cattle, water buffalo, pigs and goats.

In general, the development of the Water project will not result in a change in land use or impact on the landscape and the lifestyle of the local residents. The planned development will result in pressure on existing land uses but will not increase the rate of land degradation (forest clearance, erosion and water harvesting), as it will be included in the Viqueque urban area and transmission lines will be placed in pre-existing ROW under the road alignments.

6.3.4 Use of Forests and other natural resources

Several of the tree species mentioned in 6.2.6 are of economic or local importance, primarily for timber, fruit harvesting as food crops or for firewood or household use for cooking. However, this use is deemed to be more for household use and no small or medium industrial scale forest activities were identified in the project area.

A positive note was the identification of Vetiver grass (*Chrysopogon zizanioides*) abundant use at roadside construction, which is good news for erosion control and slope protection within the project area (ADB, 2016).

In addition, small scale sand extraction exists in the river systems of Viqueque, for construction purposes, in the form of single truck extraction with manual digging and metal sieving.

6.3.5 Fishing

The commercial fishing industry in Timor Leste has recently undergone major redevelopment and expansion, however the industry is predominantly concentrated on the north coast and there is little information of any commercial operations in the Coastal Area, South of the project area, where only Artisan subsistence fishing occurs.

However, as these areas are well outside the 15 Km Project scope area, and are substantially far from any possible impacts from any of the project activities and/or components, they have not been considered in this characterisation.

6.3.6 Agriculture

As seen in 6.3.1, agriculture plays a major role in the Viqueque Municipality. The predominant landuse in the region is agriculture, although natural forests remain in the upper catchments and other areas that are too rugged for agriculture.

The Timor-Leste Agriculture Census (2019) identified that out of 12774 Households in the Viqueque Municipality, 3847 (or 24%) are established in Viqueque Administrative Post.

Table 6-7 Agricultural Activities in Viqueque Administrative Post (TLAC, 2019)

Activity	Fishery	Aquaculture	Crops / Plants / Trees	Livestock (Mixed)
Households	166	142	2495	3776
% in AP	4%	3.6%	65%	98%

One can see the substantial proportion of crops and livestock, particular to subsistence farming and rotational cropping that supports the majority of these rural communities.

The primary crops grown are corn, cassava, sweet potato, peanuts, long beans, papaya, watermelon and bananas and free grazing by water buffalo, cattle and goats is widespread in the project area, with pigs and chicken rearing coming in as the preferential livestock.

6.3.7 Tourism

Tourism sources⁷ and the team's site visits and interviews with stakeholders identified several Tourism hotspots for Viqueque, from Mundo Perdido (1,775m), deemed Timor-Leste's largest tract of rainforest and a protected area due to its rich plant, bird and animal life, exceptional for guided hiking and to find out how local people use the forest for food and materials, as well visits to the Larigutu Water falls or Lekiraka (Reki Raka) limestone caves in Loihunu, where Falintil guerrillas used to hide and protect themselves from the Indonesian army during the independence war. There are also several Hot Water springs i.e., Wai Kana (Ossu), Wai Luli Manis (Viqueque), Lacota (Viqueque) or Kraras (Viqueque), that are identified as potential Tourism hotspots.

In terms of lodgement, in Loi hunu there is a Community Based Ecotourism Establishment (Wai Lau Rini Lodge), while in the city, there are several established local lodgings commonly known as "Los Men" or "Pensaun".

6.3.8 Any types of common or individual rights on natural resources

Community land management is commonplace in the project area. Tara bandu, as a communal method of natural resources management, is also practiced throughout the Viqueque municipality, just as it is practiced throughout Timor-Leste, which includes temporary prohibitions on resource extraction such as cutting of trees, including mangroves, and the designation of specific areas as sacred i.e., a water source or spring or a location which are considered sacred by the local community. Fines for violations are prescribed and certain selected villagers are responsible for ensuring that village laws are followed.

In Viqueque, there are several areas where the community practices communal land management. However, the Social team of the DED consultant performed a Land Due Dilligence survey in December 2020, to assess the project impacts of all planned project infrastructure, with transect walks within affected areas and where information of use and ownership was confirmed by local communities. This is necessary as land ownership is managed by customary law and so land titles or other documents normally used to verify ownership are not available in rural Timor-Leste. All land was clear of encroachers and the use of land documented.

Table 6-8 results from the Social team survey regarding land ownership within the project components, namely public/government, private, and community land. This survey followed ADB Social Safeguards and procedures. Most of the land required for the project component has been identified as public land. Those plots registered, as private land, will follow the compensation process applicable in Timor-Leste, such as the customary land methodology or the legal procedure in the law.

⁷ <https://www.timorleste.tl/>, <http://www.cbet-timorleste.com>

Table 6-8 Land Due Dilligence

Project Components	Physical site		Site ownership		Comments
	Area ('000 m2)	Date Visited	Public	Private	
Intakes – All existing structures will be improved.					
Loihuno Spring	0.0250	14-12-20	√		With existing structures (Intake, transmission pipes (please refer to Plate 1) Members of the community near the vicinity of the spring also confirmed that the location is public land
Cuha River intake	0.6850	13-12-20	√	√	The intake is in middle of River Cuha The water treatment facility is located in a land claimed as private based on customary law (please refer to Plate 2)
Raw Water Transmission (Length x 0.6m-width)					
Loihuno Spring - Second BPT		13-12-20	√		Transmission pipes will run along the road corridor
Second BPT - Main Tank		13-12-20	√		
River intake - Raw water tank	0.4860	13-12-20	√		
Raw water tank - WTP		13-12-20	√		
WTP - Main Tank	0.1440	13-12-20	√		
Water Treatment Plant (WTP)	8.8208	13-12-20		√	Land is claimed as private based on customary law (please refer to Plate 3) Members of the community who were present during the visit confirms that the AH are actual users and claimant of the land.
Reservoirs (including pump stations)					
Main Tank	0.9207	12-12-20		√	Land is claimed as private based on customary law (please refer to Plate 3) Members of the community who were present during the visit confirms that the AH are actual users and claimant of the land.
Loihuno Tank	0.0100	14-12-20	√		Members of the community near the vicinity of the spring also confirmed that the location is a public land (please refer to Plate 4)
West Tank and pumping station	1.0036	14-12-20		√	Land is claimed by 3 AH as private based on customary law (please refer to Plate 5) Members of the community who were present during the visit confirms that the AH are actual users and claimant of the land.
North East Tank	0.8963	14-12-20		√	Land is claimed by 2 AH as private based on customary law (please refer to Plate 6) Members of the community who were present during the visit confirms that the AH are actual users and claimant of the land.
South East Tank	0.5364	14-12-20		√	Land is claimed as private based on customary law (please refer to Plate 7) Members of the community who were present during the visit confirms that the AH are actual users and claimant of the land.
Treated Water Transmission Mains (Length x 0.6m-width)					
Main tank - bifurcattion to West Tank	1.5240	14-12-20	√		Transmission pipes will run along the road corridor
Connection to West Tank	1.6680	14-12-20	√		
Bifurcation to West Tank - Bifurcation to North East Tank	7.4280	14-12-20	√		
Connection to North East Tank	9.4830	14-12-20	√		
Connection to South East Tank	11.4720	14-12-20	√		
Distribution network (Length x 0.6m-width)	16.7903	14-12-20	√		Distribution pipes will run along the road corridor
FSTP	10.0925	14-12-20	√		Members of the community who were present during the visit confirms that the land is a communal land (please refer to Figure 11)
Toilets					
Toilet 1 (Carubalo)	0.1400	14-12-20	√		Location is within the Church-owned land accessible to the town center (please refer to Figure 12)
Toilet 2 (Carubalo)	0.1400	14-12-20	√		Location is within the new location of the market (please refer to Figure 13)
Toilet 3 (Carubalo)	0.1400	14-12-20	√		Location is within the perimeter of the Suco Center (please refer to Figure 14)
Toilet 4 (Uma Quic)	0.1400	14-12-20	√		Location is within the perimeter of the Suco Center (please refer to Figure 15)

The results showed that there are 8 affected households predicted in Viqueque, none are severely affected by the project as land acquisition is minor or does not contribute to livelihood income. Other losses are confined to secondary structures, trees and crops which will be compensated for. In addition, there will be some temporary disturbance to activities along main roads where the replacement pipe network will be laid but this will be temporary and will be managed by ensuring continued access and therefore there is no anticipated economic displacement.

6.4 Social Components

6.4.1 Population and Communities.

The project is situated in the Viqueque Municipality and its population was projected, in 2018 to be at 78,265 persons and the aggregated population of Suco Caraubalu, Uma Uain Craic and Uma Quic are estimated to be 14,784 persons (DGE Viqueque, 2018). The total number of households in Viqueque Administrative Post is at 5,032 and an extremely low unemployment rate of 1%, countered by an economically inactive rate of 48% of the population, which is in line with previous reports (WorldBank, 2016) of 36.9% poverty rate in the municipality.

6.4.2 Health Profile

There are 36,200 live births and 9,209 deaths reported to have occurred in 2015 by the Government of Timor-Leste (Census 2015), which gives an approximate 4 birth to 1 death ratio in Timor-Leste. The healthy life expectancy in 2019 for the people of Timor-Leste is at 69.5 years (Worldbank, 2019) for both female and male.

Fertility rates in Viqueque municipality are average (4.6 births per woman) in comparison with other municipalities but still above the national average of 4.5 births for every woman aged 14 to 49 (Census, 2015), while under-5 mortality rate (85 deaths/1,000 live births) was 13 points higher than the National average at 72 deaths/1,000 live births (National Statistics Directorate, 2015).

Up to 2015, the mortality ratio for children under five years and maternal mortality ratio has declined by 8,37% which indicates that the country is making effective improvement in reducing child mortality (WHO, 2015).

The nutritional status of children in the country has been suffering from stunted growth and malnutrition. In Viqueque alone, 52% of the children under five years have stunted growth, at the 2nd highest tier among the other municipalities (highest at 60%) (National Statistics Directorate, 2016).

The top 10 causes of death in Timor-Leste have been (in descending order): Tuberculosis, Lower respiratory infections, Ischaemic heart disease, Stroke, Birth asphyxia and birth trauma, Diarrheal diseases, Preterm birth complications, Road injury, Neonatal sepsis and infections and Cancer, the highest being Tuberculosis, killing 800 people in 2012 (WHO, 2015). The leading causes of death for children are acute respiratory infections, birth asphyxia, prematurity, diarrhoea, neonatal sepsis, injuries, congenital anomalies and malaria. Diarrhoea remains to be the second leading cause of child mortality under 5 years of age. Diarrhoea, helminth infection, malaria and dengue are still prevailing have been associated with lack of proper sanitation facilities across the country.

However, the prevalence of stunting is lower among children of families who had access to improved sanitation and hand-washing facilities, perhaps because there is less exposure to potential sources of infection due to better hygiene practices (National Statistics Directorate, 2013).

6.4.3 Institutions, schools and health facilities.

In 2018, Basic Education counted with a total of 100 schools, 917 teachers and a total of 20,675 students. On the other side Secondary Education only has 11 schools, 167 teachers and a total of 4,057 students (DGE Viqueque, 2018). The level of Education in Viqueque Administrative Post is predominantly Pre-Primary to Secondary (76.7%) with the remainder belonging to Higher Education (23.3%).

In terms of facilities in Posto Administrativo of Viqueque, there are 14 Health Centres and private clinic with 66 Health professionals (DGE Viqueque, 2018), an average 1 Health professional per 76 inhabitants. These Health professionals helped deliver 612 new babies in 2017, with a minimal death rate of pre and post-natal deaths of 5,8%.

6.4.4 Community and Family Structures

Despite being a 95% Catholic country, there is an underlying and very vast animistic culture in all the ethno-linguistic communities of Timor-Leste, maintaining institutional forms associated with the importance of the “Sacred” or *Lulik* beliefs in contemporary social life.

Society and households in Timor-Leste engage with in a variety of ways, engaging in exchange relationships and customs that maintain narrative stories and founding myths, ancestral regalia and inherited knowledge, as well as landed property and ritual practices.

These extend to the ritual of agriculture management and seasonal monsoons, life cycle ceremonies (birth, marriage and funerals), clan group rituals of solidarity and, more importantly, as a traditional approach to land management.

Viqueque society follows (with slight local variation e.g., local dialect) in line with the general indications of those practiced in Timor-Leste, where the sacred or *Lulik* plays a central role in their contemporary social relationships and community, especially in what regards agricultural management and conservation of resources and *lulik* areas appear in more disperse but nevertheless important symbols such as trees or water sources.

In regards to Springs and water Sources, the Lia Na'in (or traditional leader) has the core role to lead a procession accompanied and witnessed by the representative of community, local authorities, and other relevant and interested parties throughout the ritual. Offerings are usually provided before commencing the ritual according to the objective that the interested party wants to achieve. The Lia Nain will then start to pray whilst presenting the offerings to God, Ancestors and Sacred Objects.

Traditional regulations and customs in Timor-Leste also contribute to conserving the natural resources such as forests and crops, a communal protection system known as *Tara bandu*. It is an agreement within a community to protect a special area or resource for a period of time, usually carried out for the harvest of agricultural produce, cutting of trees or collecting of forest products, and hunting or fishing but is also currently being used to regulate social behaviour or protection of cultural locations.

There are several types of symbolic actions used for this practice. In agriculture, objects may be hung near or a piece of rattan tied around the trunk of specific trees or next to a garden to indicate custodianship of the resource. It is also widely believed that people who steal the goods subject to *Tara bandu* may suffer from an accident, misfortune or illness, while the *Tara Bandu* itself also provides for mediation of land disputes.

6.4.5 Land Ownership and other rights over the land.

Table 6-9 results from the Social team survey regarding land ownership within the project components, namely public/government, private, and community land. This survey followed ADB Social Safeguards and procedures. Most of the land required for the project component has been identified as public land. Those plots registered, as private land, will follow the compensation process applicable in Timor-Leste, such as the customary land methodology or the legal procedure in the law.

Table 6-9 - Land due Diligence

Project Components	Physical site		Site ownership		Comments
	Area ('000 m2)	Date Visited	Public	Private	
Intakes – All existing structures will be improved.					
Loihuno Spring	0.0250	14-12-20	√		With existing structures (Intake, transmission pipes (please refer to Plate 1) Members of the community near the vicinity of the spring also confirmed that the location is public land.

Project Components	Physical site		Site ownership		Comments
	Area ('000 m2)	Date Visited	Public	Private	
Cuha River intake	0.6850	13-12-20	√	√	The intake is in middle of River Cuha The water treatment facility is located in a land claimed as private based on customary law.
Raw Water Transmission (Length x 0.6m-width)					
Loihuno Spring - Second BPT		13-12-20	√		Transmission pipes will run along the road corridor.
Second BPT - Main Tank		13-12-20	√		
River intake - Raw water tank	0.4860	13-12-20	√		
Raw water tank - WTP		13-12-20	√		
WTP - Main Tank	0.1440	13-12-20	√		
Water Treatment Plant (WTP)	8.8208	13-12-20		√	Land is claimed as private based on customary law (please refer to Plate 3) Members of the community who were present during the visit confirms that the AH are actual users and claimant of the land.
Reservoirs (including pump stations)					
Main Tank	0.9207	12-12-20		√	Land is claimed as private based on customary law. Members of the community who were present during the visit confirms that the AH are actual users and claimant of the land.
Loihuno Tank	0.0100	14-12-20	√		Members of the community near the vicinity of the spring also confirmed that the location is a public land.
West Tank and pumping station	1.0036	14-12-20		√	Land is claimed by 3 AH as private based on customary law. Members of the community who were present during the visit confirms that the AH are actual users and claimant of the land.
North East Tank	0.8963	14-12-20		√	Land is claimed by 2 AH as private based on customary law. Members of the community who were present during the visit confirms that the AH are actual users and claimant of the land.
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Treated Water Transmission Mains (Length x 0.6m-width)					
Main tank - bifurcation to West Tank	1.5240	14-12-20	√		Transmission pipes will run along the road corridor
Connection to West Tank	1.6680	14-12-20	√		
Bifurcation to West Tank - Bifurcation to North East Tank	7.4280	14-12-20	√		
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FSTP	10.0925	14-12-20	√		Members of the community who were present during the visit confirms that the land is a communal land (please refer to Figure 11)
Toilets					
Toilet 1 (Carubalo)	0.1400	14-12-20	√		Location is within the Church-owned land accessible to the town center (please refer to Figure 12)
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6.5 Cultural Components

6.5.1 Cultural heritage, Archaeological and Historic Sites

Viqueque Municipality has various physical or immobile material objects that are registered and conserved by the Secretary of State of Arts and Culture⁸ and are widely known by their heritage value. As for Viqueque in particular there are a few objects and sites that are immaterial and sensitive, that are protected not only by the State but also by the community itself. Therefore, during site visit, the team made sure that the referred features were identified diligently within the distribution zones. Information was also collected with help from the local authorities for the site identification to be more efficient and accurate.

All 6 locations are within 10m to 20 m of one of the borders of these assets, while below are the cultural heritage sites listed by the team and identified in all sites will require approval from the local and National Culture Directorate, regarding protection during the Construction Phase.

Table 6-10 -List of Cultural Heritage Sites in Viqueque

No.	Name of the Site	Types	Coordinates	Distance from Site ROW
1.	St. Cruz Cemetery	Socio-cultural Heritage	8° 51.184'S / 126° 21.953'E	ROW Parallel to East boundary (<10m)
2.	Chapel	Socio-cultural	8° 51.588' S / 126° 22.068' E	ROW Parallel to East boundary (<30m)
3.	Administration Office During Portuguese Time	Historical & Socio-Cultural	8° 52.041' S / 126° 21.922' E	ROW Parallel to NW and SW boundary (<20m)
4.	Cathedral	Socio-cultural & Touristic	8° 52.102' S / 126° 21.944' E	ROW Parallel to NE boundary (<10m)
5.	Residence of Sede Suco during Portuguese Time	Historical & Socio-Cultural	8° 52.183' S / 126° 22.006' E	ROW Parallel to NW boundary (<10m)
6.	Cemetery 2	Socio-cultural	8° 52.561' S / 126° 22.105' E	ROW Parallel to NW boundary (<10m)

6.5.2 Sacred Sites and Unique landscapes

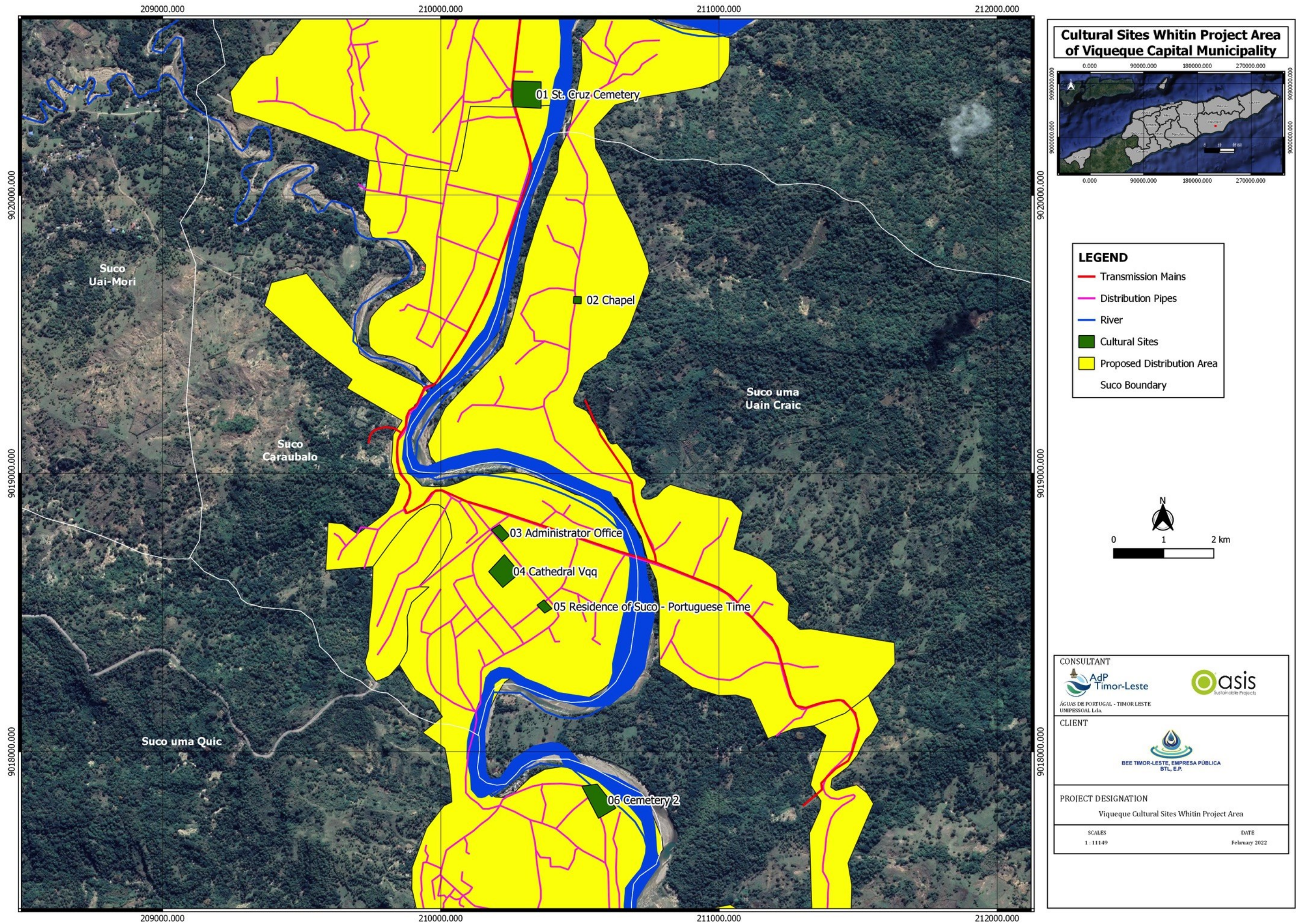
In the project area, a few related locations were identified as Lulik locations by the local leaders. These were the Loihunu Spring System (currently authorised to be used for Water Distribution by cultural rules), two stretches of the Cuha River confirmed as lulik (none traversed by project components, particularly the proposed water intake location) and two further lulik locations South of the city (Lamasu 1&2), which were initially proposed FSTP locations but were cancelled in deterrence of the current FSTP location, which has no lulik location issues.

6.6 Site-Specific Environmental & Social Features

Table 6-11 - Summarizes site-specific conditions of the component locations/sites/alignments.

⁸ The team had previously requested for data regarding to the cultural heritage sites for all the 4 Municipal Capitals of Water Supply and Sanitation Project to the National Department of Cultural Patrimony, Secretary of State of Arts and Culture. The SEAC provided the Consultant team hardcopies of lists available from current studies in which all of the referred sites are located outside the project area. Thus, site visit was conducted to fortify the said necessity for further assessment of environmental impact and monitoring plan. Minutes of meetings are provided in Appendix 9.

Figure 6-6 - Viqueque Cultural sites within Project Area



Cultural Sites Within Project Area of Viqueque Capital Municipality

0.000 90000.000 180000.000 270000.000

9020000.000 9019000.000 9018000.000

LEGEND

- Transmission Mains
- Distribution Pipes
- River
- Cultural Sites
- Proposed Distribution Area
- Suco Boundary

0 1 2 km

CONSULTANT
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CLIENT
BEE TIMOR-LESTE, EMPRESA PÚBLICA BTL, E.P.



PROJECT DESIGNATION
Viqueque Cultural Sites Within Project Area

SCALES
1 : 11149

DATE
February 2022

Table 6-11 - Project Site Environmental and Social Features

Components and Site Salient Features	Site Photographs
I. Intakes	
A. Loihuno spring	
<ul style="list-style-type: none"> ● Loihuno 1 (Builua) is located in Aldeia Samaleu, Suco Ossorua and is used for public supply, which includes four private outlets (1/2" pipe and natural outlet) and an approximate yield of 48 L/s (as per flow measurement on the 26th October 2020). Access road to spring goes through the middle of the dwellings in Aldeia Uatolana. ● 700m Upstream of the spring is Mount Builo Protected Area, with dense vegetation and medium forest cover, with mature and sturdy tree species, herbaceous plants and perennials in an ecosystem that is more intact and has limited human intervention. ^{[[SEP]]} ● 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. According to the chefe suco Loihunu, there has been a drought occurrence at the end of 2015 during 4 months where the Loi Huno (2) spring could not produce and provide water to the community surrounding it. ● Historically has had upstream forest degradation due to shifting agriculture and deforestation by community, which is believed by the community to have reduced the spring flow at the time. Some upstream activities (subsistence agriculture) still occur. ● Loihunu 1 spring is surrounded by 23 households (around 200 people) and only 8 houses that have cement but permeable septic holding tank, while 15 households have hole-in-the-ground WC. This has caused water quality reduction and E.coli contamination in the downstream Loihunu 2 (Loihunu) spring, only used for agriculture and fish farming by the community. ● Directly within 50m downstream the community's has small agriculture plots and small-scale fish pond plots that benefit from this water source as well as using the water for animal husbandry and public washing/laundry purposes, which has led to contamination of the spring overflow and the next spring water source downstream. ● The springs have a cultural sacredness, considered <i>lulik</i> or sacred by the local community, and a yearly cultural ^{[[SEP]]} ceremony is provided by DNSA and local authorities to guarantee the continuous provision of water provision services, as per the local community. 	 <p>Loihunu 1 (Builua) Spring</p>  <p>Spring and Downstream usage</p>  <p>Animal Husbandry and Dwellings Nearby Loihunu 1 Spring</p>  <p>Fish Farms downstream of Loihunu System</p>
B. Cuha River Intake	

Components and Site Salient Features	Site Photographs
<ul style="list-style-type: none"> • Located in Suco Carabalu, 1.2Km North of Viqueque city limit; • Site recommended by BTL, identified as state-owned land; • River curves South to SE and provides for a deeper section for abstraction; • Flat, grassland area with several tree patches and small agricultural gardens within the RoW of future access road, with gentle slope Northwest towards the National road; • Distance to the national road to Viqueque is about 340meters and 450 meters from nearest dwelling; • River flows year round to South Coast, 8Km away; • Adjacent to agricultural areas to the North (sludge reuse); • No sacred or cultural sites or tara bandu in the surroundings or in river intake area. 	 <p style="text-align: center;">Cuha River (Aerial photo 2019, specific intake area photos not available)</p>
<p>2. Proposed FSTP location #3 – Suco Maluro</p> <ul style="list-style-type: none"> • Located in Suco Maluro, 5.0Km South of Viqueque city limit; • Site recommended by BTL, identified as state-owned land • Flat, grassland area with gentle slope Southwest towards the river Cuha; • Distance to the national road to Viqueque is about 340meters and 450 meters from nearest dwelling • River (year round) 200 meters away, flowing year round to South Coast, 5Km away. • Adjacent to agricultural areas to the North and South (sludge reuse). • No sacred or cultural sites or tara bandu in the surrounding site 	 <p style="text-align: center;">Proposed FSTP site (North view)</p>

7 ALTERNATIVES

7.1 'Without-project' or 'do-nothing' Alternative.

The citizens of Viqueque city are currently consuming untreated or partially treated water from the existing water supply systems, increasing the possibility of water-borne disease incidence due to poor access to safe and potable water supply, resulting in health hazards in the subproject area and exposing the surroundings to environmental problems.

The existing water supply in the project area is intermittent, not able to meet the increasing demands of the increasing population of Viqueque. Limited water supply will compel BTL customers to control the use of water for various purposes, including sanitation practices, such as flushing after use of latrine, bathing, washing clothes etc. influencing negatively on the domestic hygiene of the project area. This may pose increase in the risk of the incidence of diseases such as Typhoid, Cholera, Dysentery, or increase stunting and in turn result in the environmental problems.

The 'Do-Nothing' alternative reduces substantially the chance of people in the project area to combat diseases such as these because they continue to consume untreated water, increasing the risk of infections that will obviously have an impact on public health, animal health and the health of the ecosystems. It may also be an impediment to the development of Viqueque City, hindering further social and economic development of the municipality and, indirectly, the Government of Timor-Leste's commitment to SDG-6 to increase the percentage of the population with access to sustainable, safe drinking water and basic sanitation.

Overall, the proposed project and its components, as the 'with project alternative' will be the best solution to overcome the aforementioned threats that are likely to occur in its absence and a whole city will have convenient access to reliable, adequate, safe, potable water supply and a sanitation system that extends from the domestic area to public spaces and thus, good hygiene and sanitation practices will be promoted and the consequent reduction of possible health and safety risks. It will bring about improved public health and a living environment that will contribute to improved quality of life in the municipality and create an enabling environment for local economic development and improved social services that communities within the project area will benefit from.

7.2 Design Alternative.

The proposed project has been designed as a totally gravity surface water system with a distribution system comprising a bulk water system and a household distribution system. In this way the whole of the service area will be divided into a number of service areas with dedicated storage reservoirs, divided on the basis of elevation differences and proximity. However, all subsystems can be operated independently as they are also inter-linked, where possible, and water from neighbouring subsystems can be supplied to another adjacent subsystem in case of maintenance and other unforeseen events.

7.3 Faecal Sludge Treatment Plant (FSTP) Location Alternative

The choice of the FSTP location depends on a series of considerations and conditions that have been identified during the project site visit, as well as during the application of the REA checklists, such as a) distance to communities to avoid impact and loss of amenity; b) reasonable existing access to avoid impacts with new road constructions; c) no sensitive ecological areas; d) preferably public land; and d) close to agricultural land for application of dried sludge treated from the FSTP maintenance activities.

3 sites were identified, all with the land space of 15,000m² required for the implementation of the FSTP (see Table 7-1). Site 3 – Suco Maluro was the chosen location for the FSTP since it filled almost all the criteria, had the best conditions regarding distance to community and the existence of substantial agricultural land adjacent to the site to absorb the proposed dried treated sludge while reasonably not far from the city.

The site was not the only choice. Site 2 was part of the options with the existence of substantial agricultural land, although the area is coincidentally adjacent to a sacred area (Lamasu 1), according to the information received from local community. Site 3 was also considered sacred by the community (Lamasu 1&2), and has a very significant slope which renders it difficult to construct future FSTP and will be very expensive in terms of the construction cost.

Table 7-1 - FSTP Proposed Locations in Viqueque City

FSTP	Coordinates	Actual Area Available (m ²)	Distance from (m)		Site Masl (m)	Description / Location Characteristics	Comments
			Houses	Water Body			
1	Lat: - 8.891005° Long: 126.384807°	64000	350	250	30	Location characteristics: located on abandoned land with unclear land status, difficult terrain and extreme slopes requiring major investment for new access road construction for trucks Distance from the road about 420 meters, 350m away from closest community settlement and 140 meters from the river In Lulik/sacred Area (Lamasu Hill 1)	Not recommended
2	Lat: - 8.889219° Long: 126.379329°	8000	140	100	50	Location characteristics: Located above a community garden, flat area, distance from the road about 700 meters, 120 meters from community settlements and 80 meters from the river In Lulik/sacred Area (Lamasu Hill 1&2) where foreigners are not allowed to access without the community's permission	Not recommended
3	Lat: - 8.913561° Long: 126.393317°	10000	450	350	21	Location characteristics: Recommended by BTL 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

Components and Site Salient Features

A. FSTP No. 2, Suco Uma Uain Craic

- (+)
- a) The topography is relatively flat and surrounded by community's farms
- (-)
- 120 meters from community settlements. The sludge transference will result amenity either odour, and noise from movement of sludge trucks and operational activity
- High chance that the land status is private
- The site is not easily accessed, road in poor condition requires rehabilitation
- Surrounded by sacred area in the West and East (Lamasu 1&2)
- 55 m from a small creek connecting to the Cuha river which may lead to flood prone
Landslide anticipation occurrence due to sedimentary soil structure and visible natural landslides



East view of the Proposed Location. Agriculture plot.



Northeast view of the sacred area 30-50 m from the proposed site

B. FSTP No. 1, Suco Uma Uain Craic

(+)

b) 400 m from community settlements

(-)

- Unclear land status with no agricultural activities found
- Areas with various of slopes
- The site is not easily accessed, no existing road which may require new construction
- The site is considered in a sensitive area since it is located near the Lamasu I Hill top, known as a sacred area



South view of the Proposed Area. Unstable slope



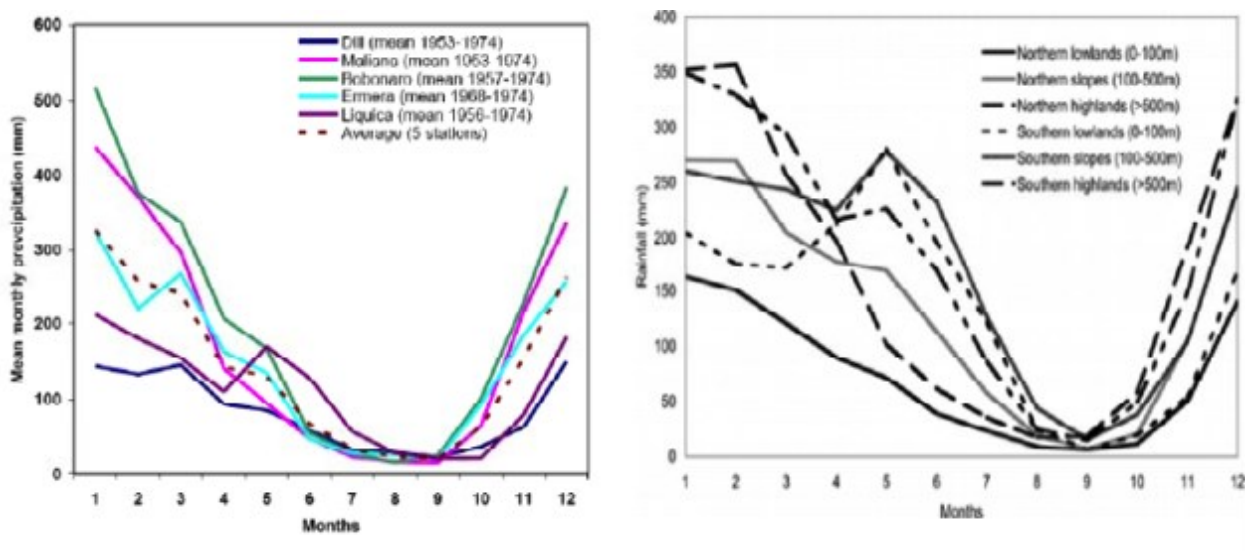
South view of the Proposed area. Slope land.

8 CLIMATE CHANGE

8.1 Historic Weather Observation and Trends

Timor-Leste's climate follows the trend of tropical countries, characterized by intense monsoon rain followed by a pronounced dry season. Its climate is affected by the West Pacific Monsoon, moving north to mainland Asia during the Southern Hemisphere winter and south to Australia in the Southern Hemisphere summer, usually bringing a switch from very dry to very wet conditions. Rainfall is mainly due to northwest monsoon coming from the south China Sea, while the dry southeast trade winds come from the Australian Continent (AusBM/CSIRO, 2014). Recent study shows that by comparing historical weather data from the middle of the 20th century with recent data, it's possible to observe an increase in temperature of 0.16 °C per decade since 1950 and decrease of 19% in average annual rainfall (More weather data needs to be collected in order to establish a real trend, specially concerning to the rainfall decrease) (Seeds of life, 2010). It also suggests an increase in sea surface temperatures by 0.15 °C – 0.2 °C per decade and rise in sea levels by 9 mm per year since 1993 (PCCSP, 2015).

Figure 8-1 - Mean monthly Precipitation for 5 different station and average rainfall based on the altitude



8.2 Climate Change Projections

8.2.1 Temperature and Rainfall

Based on 2050 IPCC4 CSIRO A2A Projection (GovTL, 2010) by considering WORDLCLIM rainfall and temperature dataset from 1950 to 2000 with approximately 5 km spatial resolution (Hijmans et al, 2005) as a baseline data suggest that from 2000 - 2050, there is an estimated 3.18% decrease in average annual rainfall (1768 mm to 1708 mm) and 5.11% increase in average annual temperature (26.05°C to 27.45°C) in Viqueque.

8.2.2 Sea Level Rise

The increasing temperature that occurs worldwide is gradually increasing the sea level to rise and is affecting small islands including Timor-Leste. Under the SRES A1B scenario, it is projected that the sea level surrounding Timor-Leste is expected to increase around 0.76 meters by 2100 (SEA, 2014). Viqueque southern coast is vulnerable to sea level rise phenomena and it is one of the main concerned issues for the local people, however it will not contribute any impacts to the Project Area given that the said area is far from the coast and is situated in a slightly higher elevation.

8.2.3 Future Climate Change Projection Relative to Project Site

This climate change predicts dryer and hotter periods (increase of approximately 1.0-1.4 °C across the project sucos, based on 2050 IPCC4 CSIRO A2A Projection) in Viqueque and less frequent rain events but with higher intensities of rainfall, leading to high-risk probability of flash-floods and landslides occurrences.

Timor-Leste and its community are vulnerable to climate change, with significant variability of rainfall and temperature due to El Niño/El Niña frequent oscillations. Each El Niño and La Niña can bring negative impacts to the Project Site caused by the significant changes of the temperature and rainfall versus long period of time. Regions that are affected by El Niño will have to suffer from long drought in which it will lower the water levels in reservoirs, lakes, and ponds, reduced stream flow and groundwater level depletion. This means that water productivity in Loihuno and Kuha River intake will be less than usual due to the absence of rain and water infiltration to the ground. Meanwhile, heavy rainfall during La Niña will trigger the generation of silt and sediment which then can destroy the nearby transmission and distribution line, and the flooding occurrence in the routing track will hinder the faecal transportation and runoffs of the incomplete treated wastewater on site. This can also relate to the possible landslide occurrence in the hilly area where the future raw transmission main will be replaced.

8.3 Implications for the Proposed Project

Climate change is expected to have negative impact on water and wastewater management in the project area, due to projected air temperature increase and rainfall decrease, particular to drought conditions with less rain in short period of time. The impacts to the water supply and sanitation system in the project areas including:

Water Source: The projected increase in air temperature in Viqueque will induce higher rates of evaporation and plant transpiration, thereby speeding up water loss from the soil and plants. Moreover, rising air temperature will cause surface water temperatures to increase which are expected to result in the following issues to water quality:

- Increase of algal blooms that impair water quality through undesirable colour, odour and taste;
- Enhance the transfer of volatile and semi-volatile pollutants such as ammonia, mercury, PCBs (polychlorinated biphenyls), dioxins, pesticides) from water and waste water to the atmosphere (IPCC, 2008).

On the other hand, extreme changes in precipitation and characteristic due to climate change will continue to trigger flood and landslide hazards in the project areas. The consequences of these hazards towards water sources may include:

- Sedimentation, resulting in silting up of water bodies;
- Total or partial destruction of intakes located in rivers or ravines;
- Loss of intakes because of changes in the course of rivers;
- Contamination of surface water due to excessive increase in the turbidity of water, or pollution from other types of contaminants and
- Flood levels that surpass the height of well head walls, or waters that flow directly over wells and other intakes;
- Total or partial destruction in intakes located on or in the main path of active slides, especially in unstable mountainous zones with steep slopes or in slopes with steep grades that are susceptible to slides;
- Contamination of water in surface intakes in mountainous areas;

Furthermore, the climate change and climate variability-induced drought will also affect the water sources in the project areas. The main effects of the droughts on water sources are the following:

- Decrease in the flow of surface or ground water;
- Rationing and suspension of service;
- Reliance on water from tank trucks, with the consequent loss of water quality and increase in costs and;
- Abandonment of the system.

Transmission and Distribution Mains: The climate change also will affect the transmission and distribution lines in the project areas. Due to the increase in temperature and decrease in rainfall which intercalate with higher intensities of rainfall in short period of time may trigger several issues include:

- Failures on steel pipes;
- Breaks where exposed pipe crosses ravines and/or rivers;
- Total or partial destruction of the installations, in particular the transmission and distribution structures, located on or in the main path of active slides, especially in unstable mountainous zones with steep slopes or in slopes with steep grades that are susceptible to slides and;

A static analysis performed in Netherland identified that due to increase in air temperature causes failures in steel pipes. This failure is doubled during warm periods, which often simultaneously occurred when water consumptions were high. The study also suggests that no effect of weather conditions on pipe failure were observed for polyvinyl chloride and polyethylene pipes (Wols & Thienen, 2014).

Water Treatment Plant (WTP) and Tanks: The natural hazard induced by climate change will influence water quality and compromise the integrity of water storage facility in the project areas. The increase in surface water temperature will affect the efficiency of chlorination. Moreover, the contamination of surface water due to excessive increase in the turbidity of water will reduce the concentration of chlorine residual, hence it will influence on the chlorine demand.

On the other hand, studies suggest that increase in water temperature will result in the loss of disinfectant residual and the increase in the activity of ammonia-oxidizing bacteria (Kimbrough, 2019). Furthermore, statistical analysis performed in Netherland on concrete cement water tanks identified failures in concrete cement due to the increase air and water temperatures. These failures doubled during warm periods, which often simultaneously occurred when water consumptions were high (Wols & Thienen, 2014).

As the project areas are prone to natural hazards, the planning design when selecting the sites for water treatment plant (WTP) facilities and tanks should consider topography and atmospheric factors as well. The location of WTP should be relatively high for the rest of land to protect them from floods and adequate soil exploration is essential in site selection to guard against structural failure and functional damage due to landslides.

Faecal Sludge Treatment Plan (FSTP) – Climate change is considered to be one of the main challenges in this project especially for the FSTP installation. The temperature increase will raise the likelihood of odour problems. Another challenge is caused by extreme rain event when combined with (wastewater and storm water) overflows can reach urban rivers. Extreme rain events will result in higher risks associated with flooding and impact on the FSTP installation due to the landslides.

The planning design for selecting the sites for FSTP installation should consider topography and atmospheric factors. The location for FSTP should be relatively high for the rest of land to protect them from floods and adequate soil exploration is essential in site selection to guard against structural failure and functional damage due to landslides.

8.4 Adaptation Measures

8.4.1 Mitigation of Potential Adverse Impacts to the Environment

Given the implications envisaged above, it is important for water utilities in Viqueque to plan accordingly. To mitigate decreasing in water availability, it is necessary to protect the water sources and its surrounding area from illegal logging. On the other hand, it is important to implement the reforestation program to help in the improvement of water cycle thus increases the amount of rain and reduces the lack of water due to increase in temperature. Shade provided by riparian forest can help reduce the evaporation and can protect soils and reduce erosion rates and sediment delivery to water sources.

8.4.2 Mitigation of Potential Adverse Impacts to the Proposed Project

The design of the water distribution system in Viqueque Watsan project will need to adapt to the implication of climate change. The proposed key adaptation measures including build climate consideration and environmentally friendly infrastructure to protect water sources to provide safe water supply during climate change extreme event periods and creating/enhancing water harvesting model and water distribution system as well as management system at all levels to avoid water shortage due to climate change. Selecting the location for future FSTP should also aligned with technical, environmental and social considerations in order to help minimizing adverse climate impacts that will be possible to occur in the future.

9 IMPACT ASSESSMENT AND MITIGATION MEASURES

9.1 Overview of Impacts

The Four Municipal Capitals Water Supply and Sanitation Project for Viqueque is expected to produce numerous beneficial and negative impacts towards the environmental and social aspects due to various project activities.

A characterization study of existing origins and pilot well testing areas was conducted during a site visit (24 to 26 June 2020) aiming to identify specific protected biodiversity, sacred site, water usage, land status, and activities downstream and upstream and the main objective of the Assessment was to evaluate the impacts based on the characterization study and the site visits, as well as the social safeguards impacts evaluation from the Social Specialist and stakeholder and public consultations carried out during the IEE survey.

The potential impacts and mitigation measures assessment for Viqueque Municipal capital project were assessed within the respective city IEE, based on each of the project components, namely: 1) water sourcing; 2) treatment and storage; 3) distribution networks; 4) and sanitation sector (public toilets and FSTP), and the analysis followed the project cycle (Design phase, Construction phase, Operational and Maintenance phase, and Decommissioning phase), as well as information gathered from applying the ADB REA (Rapid Environmental Assessment) checklist.

The IEE concluded that the Viqueque water supply and sanitation project is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, potential direct environmental impacts are mostly construction related and unlikely to affect areas larger than the sites or facilities subject to physical works. These impacts are site-specific, few if any of them are irreversible, and in most cases can be prevented or mitigated with standard construction methodologies and procedures and operational safety measures designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

The assessment was an analysis of the existing situation (information gathering - using existing information) and the identification of the social, economic and biophysical resources, impacts or others that should be maintained, enhanced, prevented and/or mitigated under the project scope, providing for an identification of the biophysical and socio-economic opportunities and constraints, potential environmental “no-go areas”, red flag areas, potential environmental impacts including potential cumulative environmental impacts, potential health risks and water related risks, as well as the identification of “alongside-project” considerations which will be included in the preliminary E&S impact analysis and will seek to identify what pros and cons may exist within each of the proposed project components.

9.2 Impact Analysis

An Impact evaluation was carried out for all project components and activities by applying an evaluation matrix (see example in Figure 9-1 -) and impact assessment rating applied for the Pre-construction, Construction, Operation and Decommissioning Phases of the Project. The significance of the impacts was assessed according to the condition of the affected environmental and social component’s present condition and the scale of impact should the impact persist, at the time of evaluation.

“S (+/-)” denotes a positive/negative significant impact whereas “MS (+/-)” represents moderate significance and “IS (+/-)” is insignificant. Priority should be given to significant negative impacts, emphasised in the EMP.

These classifications are the result of the product between “Scale of Present Condition” and “Scale of Impact”, based on the criteria in Table 9-1- 24, where present condition has three classifications, treated independently from the scale of impact, according to the present condition of the affected component. On the other hand, the scale of impact accounts for the nature of the impact whether it will have a minor, moderate or strong impact and whether the impact would be temporary or permanent.

Table 9-I-Scales for Present Conditions and Impacts

Scale of Present Condition	
3	Good = Sensitive Environmental/Social conditions of the location and surrounding area, with little to no impact sources
2	Moderate = Moderate Environmental/Social conditions, and with pre-existing sporadic (temporary or permanent) impact sources not related to the project.
1	Bad = Deteriorated Environmental/Social conditions, and with large numbers of pre-existing (temporary or permanent) impact sources (other than the project).
Scale of Impact	
1	Minor, temporary: Inside Project Boundary - Zero or minor Environmental/Social impact/damage, temporary Outside the Project Boundary - No Environmental/Social impact
2	Moderate, temporary: Inside Project Boundary – Release/Impact with limited Environmental/Social damage/impact, temporary Outside the Project Boundary: Minor Environmental/Social impact/damage, temporary
3	Strong, temporary Inside Project Boundary – Release/Impact with major damage, temporary Outside the Project Boundary - Strong Environmental/Social impact/damage, temporary
4	Minor, permanent Inside Project Boundary – Release/Impact with minor Environmental/Social damage/impact, permanent Outside the Project Boundary: Minor Environmental/Social damage/impact, permanent
5	Moderate, permanent Inside Project Boundary – Release/Impact with limited Environmental/Social damage/impact, temporary Outside the Project Boundary: Moderate Environmental/Social damage/impact, permanent
6	Strong, permanent Inside Project Boundary – Major Environmental/Social impact/damage, permanent Outside the Project Boundary – Major Environmental/Social impact/damage, permanent
Conclusion	
S	Significant Impact
MS	Moderate Significant Impact
IS	Insignificant impact

The product of the scale of present condition and the scale of impact is used to assess whether the impact is significant (S), Moderate Significant (MS) or insignificant (IS). Figure 9-1 - Impact Assessment Rating, presents the matrix for the assessment of impacts based on the values for the scale of importance and the scale of impact.

Figure 9-1 - Impact Assessment Rating

		Scale of Impact					
		1	2	3	4	5	6
Scale of present condition	1	1	2	3	4	5	6
	2	2	4	6	8	10	12
	3	3	6	9	12	15	18

	Insignificant (+/-)	IS
	Moderately Significant Impact (+/-)	MS
	Significant Impact (+/-)	S

Several codes are reflected in this sub-chapter and are related according to the Project Phases as shown in the Summary of EMP, for instance PC refers to Pre-Construction Phase, C to Construction Phase, whereas O to Operational and Maintenance Phase. Each phase is also numbered based on the type of the components and possible generated impacts, starting from water abstraction up to faecal sludge treatment process.

9.2.1 Overall Beneficial (Positive) Impacts

Clean, adequate drinking water is a basic human need and developing drinking water supply facilities has numerous beneficial impacts to individuals and communities. Furthermore, when coupled to sanitation improvement, there is a substantial increase in the quality of life within the project area. Some of the major beneficial impacts of the proposed project and suggestions to achieve these benefits are described below and the numbering is related to the EMP.

C3.2.1. Local Employment Generation.

This project will directly generate 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 (S+ = Positive Significant). Recruitment of unskilled workers from affected community within the project area, in coordination with local authorities i.e., Municipality, Suco, etc, and in accordance with Timor-Leste Law, will be the most effective mitigation measure.

C3.2.2. Skill Enhancement. Employment opportunities will increase the skill of the workforce in terms of technical proficiency. This kind of enhancement will be an investment for individuals to implement in the future, as well as to augment incomes and improve their economic status (S+ = Positive Significant). The contractor must prepare a training program i.e., “on-the-job” for all workers and, equally important, training on the Environmental and Social management plan and its Mitigation Measures, particularly to create the competency, skills and abilities of all the relevant staff to ensure they are aware and apply the provisions of the EMP effectively.

O3.1.1. Improved Health and Hygiene. This project is aimed at improving water supply and sanitation to the community, improving people’s hygiene and public health and consequently reduce waterborne disease occurrence. A regular maintenance of the project’s components will provide continuous benefits to the local people (S+ = Positive Significant).

O3.1.2. Women Empowerment. Women play an important role in the family: they manage the household, bear children and expect to live a healthy menstrual cycle. Having good access to improved water and sanitation will result in a significant health improvement, reduce mortality and balance family and at an individual level, it will improve their working performance which will lead to a more advanced economic condition in the household daily life (S+ = Positive Significant).

9.2.2 Impacts in Design/Pre-Construction Phase

The pre-construction works involve field survey and investigation, development of design and detailed drawings, carrying out cost estimate etc, as well as the evaluation of water availability and competing uses. A characterization study of existing origins and pilot well testing area was conducted during site visit (2 to 4 June 2020) for the preliminary design, aiming to identify specific protected biodiversity, sacred sites, water usage, land status, and competing activities downstream and upstream.

9.2.2.1 PCI. Water Sources

PCI.1. Location and Sensitive Areas

1.1.1. Loihunu I Spring - Nuisance to the biodiversity (flora, fauna, water ecosystem)

The Loihunu Spring and Intake are located in a sensitive environmental and cultural area. The Loihunu system has been supplying water for Viqueque for at least 40 years, pre-existing to the project i.e. “brownfield projects”, already have working water distribution infrastructure and surrounding the spring there are dwellings and housing with agricultural activities and a road within a 100m radius. The environmental assessment of these components shows that it is not likely the project activities have significant adverse environmental impacts that are irreversible, diverse, or unprecedented and unlikely to affect areas larger than the sites or facilities subject to physical works. These impacts are site-specific and few if any of them are irreversible (MS- = Negative Moderate Significant).

Irrespective of this situation, it is important that the proponent provides for an induction to the constructor regarding these sensitive areas, specifically to apply more stringent forms of implementing the mitigation measures identified in C3 that may prevent and manage the activities of the project when working in the ROW and accessory areas of the rehabilitation of the Loihunu Intake and Springs.

While there are no official lists of Mitigation Measures to be applied by Projects in Sensitive areas, previous measures in past project should be the closest applicable measures for the construction phase, such as (but not limited to) the following:

- (i) The contractor, his employees or subcontractors are prohibited to carry out the following activities;
 - Kill, injure, damage, remove, handle, disturb or interfere with any endangered species or existing animals under any circumstances;

- Bring domesticated animals on-site;
 - Poaching on-site or the surrounding forests;
 - Sell endangered species or derivatives of these species;
 - Export endangered or derivatives of these species;
- (ii) Trees that will be cleared should be inspected for nesting birds prior to cutting. The nest will be transferred carefully to another tree safe from project activities. Trees with nesting birds near the trees to be cut will be marked and the direction of fall should be inclined away from the trees with nests. If chicks are already present felling must take place, where possible, > 50 m distance from the nest. All activities must be supervised and decided upon by a Forest Guard or representative of the National Directorate for Protected Areas (DNAP);
- (iii) A detailed layout of clearing will be presented by the contractor before clearing of vegetation is carried out. The site clearing will be confirmed by the contractor before clearing starts. Clearing will be limited in accordance to the project layout/design and the extent will be limited with relevance to the project. The Contractor is prohibited to deface, paint, mark natural and pre-existing vegetation even if of no relevance to the project.

All tree species will not be harmed and will be protected throughout the lifespan of the project. If an endangered tree is to be cut, under special circumstances and technically justified, DNAP must approve the felling and guarantee that the planting of the Viqueque tree species at a quantity to be determined will be conducted at pre-defined and approved site.

1.1.2. Cuha River Intake and access road construction - Nuisance to the river biodiversity (water ecosystem), Impact on surface water (silt runoff), Impact to local dwellers (land reclamation, dust, noise and vibration, etc.)

The Cuha River Intake is located in a water ecosystem, considered naturally as a sensitive environmental area. There are dwellings and housing with agricultural activities and a road within a 100m radius.

The area will require access and thus opening of an access road from the national road to the construction site, which will have land use impacts wherever soil is not Government owned, as well as the customary construction associated impacts (see C.3).

The environmental assessment of these components shows that it is not likely the project activities have significant adverse environmental impacts that are irreversible, diverse, or unprecedented and unlikely to affect areas larger than the sites or facilities subject to physical works. These impacts are site-specific and few if any of them are irreversible. The only major significance will be from the sensitivity of the river site itself (S- = Negative Significant).

Given the variability and various competing water uses in the Loihunu system and that no groundwater was found during the borehole exercise, Cuha river has been brought forward as an option for water sourcing. From a quick Landsat satellite imagery evaluation (1987 to 2020), it was concluded that the river's volume of water is undervalued, as there is evidence of water in the dry months when the width of the river section is smaller. This capture could be done through wells in the alluvium or by direct intakes of river water through screened tubes that capture the water to a sealed well.

It is important that the proponent follows all the indications as in PCI.1.2. especially in providing for an induction to the constructor regarding these sensitive areas, specifically to apply more stringent forms of implementing the mitigation measures identified in C3 that may prevent and manage the activities of the project when working in the ROW and accessory areas of the construction of the Cuha River Intake.

PCI.2. Use of Water Sources (springs)

1.2.1. Available Water for all users

Consumers in Viqueque have received insufficient water supply due to an increasing urban water demand and degradation of the existing water infrastructures over time, hindering optimal operation and distribution of water from a limited number of natural water sources available. The high incidence of illegal connections in the system also results in a weak and slim water distribution to each Viqueque consumer (S- = Negative Significant).

Preliminary production yield of the sources was carried out in October 2020 (in equivalent conditions to the end of the Dry Season) of existing springs through pump testing. The water demands versus October 2020 water flow

investigation results, suggest that, under these numbers, and pending a long-term monitoring program, the current Loihunu spring and Cuha River sources may produce enough flow to contribute to the requirements of the distribution system for the bigger part of the Dry season.

For the Loihunu Spring System [Loihunu I (Buibau), Loihunu II (Moloco) and Loihunu III (Loihunu) springs, there is a need to guarantee a sharing of this area's resources to maintain source sustainability.

In this regard, Loihunu I will be earmarked as a dedicated source for the Distribution System to Viqueque, while Loihunu II and III will be left for social and ecological flow purposes. This overflow will be substantial for social use (agriculture and other) and especially an ecological flow, which now represents 100% - X [social use] in each of the remaining springs. In any case, it is suggested to maintain an ecological flow in Loihunu II and III of 30% of Wet Season Spring flow (November to May) and 10% of Dry Season Spring flow (June to October)) to compensate for the full abstraction of Loihunu I with much more volume in the wet season to cover the requirements for the whole ecosystem.

The increase in supply will be obtained from the refurbishment of the distribution network and increase in distribution efficiency (which will significantly reduce system losses from leakage), and the installation of a new metering system (which will improve leak detection and cost recovery). This is expected to both improve the supply of water to the consumer and reduce the decline in groundwater from over-abstraction in the Loihunu spring system as a whole.

However, if the Dry season spring flow reduces naturally, to guarantee the distribution system maintains service to Viqueque consumers throughout its lifetime, it is necessary that a Monitoring system is put in place to monitor daily flow in all operational sources and help estimate water production variability and decreases that may require other sources i.e., Cuha River to come online to support the water distribution, especially in the dry season. The Cuha River must also have a monitoring program to be able to track flow and aquifer performance.

1.2.2. Water User needs between Environment, Communities and Water Distribution System on water consumption

The issue of water benefits with source area communities has been raised by local authorities and Chiefs of Suco (Village) during the Public Consultation. This, together with a mixed urban/rural setting that has several different water consumptions beyond human consumption alone i.e., agriculture and rice fields, etc, downstream of nearly all the existing and future sources, has brought discussions regarding source sustainability for all users, not only for the targeted urban areas, although no indications were given that water was scarce to the point of depletion (S- = Negative Significant).

Given the borehole attempts were unsuccessful, Loihunu I spring and Cuha River were identified as primary sources and have been concluded as sufficiently productive - total of 106 lps (2040 horizon year demand 54.2 lps, see Table 4-3), if abstraction is properly planned and managed, to guarantee continuous supply during natural season variability.

To provide for the social benefits, defining Loihunu II and III as sources for the surrounding communities (thus, the social and environmental flow) is the primary mitigation measure (thus avoiding possible user conflicts), in addition to the implementation of a sustainable water balance and feasible/fair environmental flow for each of these sources, which takes into account the seasonal variability of the project area (Wet Season 30% of mean monthly flow / Dry Season 10% of mean monthly flow).

1.2.3. Social and cultural disruption due to tara bandu and lulik/sacred areas

Several National Laws i.e., Cultural Framework, Base Law for Environment, etc, as well as the requirements of the ADB SPS 2009 ADB are the project guidelines to protect and mitigate impacts to related cultural segments, as a project that involves, exploits, or associates with any type of natural resource use. However, the project also needs to follow customary Law regarding localised cultural customs applied by the community, aiming at the natural preservation, sustainability of the natural elements and social balance.

It is important to understand that almost all springs, new and currently in use i.e., Protected Spring and Stream area, are and have always been involved in and have a spiritual importance to the community, under cultural/animistic protection (S- = Negative Significant).

Therefore, it is important to involve the *lia na'in* i.e., cultural leader, and communities to lead in the preparation of cultural ceremony preparation i.e., “opening” and *Tara Bandu* for authorization to i.e., yearly ceremonies at *Loihunu* springs or while conducting investigations for existing and proposed water sources, their use, continuance of use and/or cultural/natural protection of the source water resource, to avoid conflicts and distribution interruptions.

Project activities during construction phase will be monitored by assigned personnel from the Culture Department. The springs will be demarcated with tapes to limit construction works outside the area and restrict access to the springs unless authorized by relevant authority.

Precautionary measures will be taken by all construction workers to prevent damage to the *Lulic* springs. After construction operations, the contractor shall seek clearance from relevant authorities that the springs are in its natural state prior to departure.

9.2.2.2 PC2. Water Treatment and Storage

PC 2.1. New Disinfectant and Storage Systems

The storage and treatment of the water predicted activities encompasses generalised impacts, especially those related to the Water Distribution Network i.e., minor civil construction works of Water Reservoirs. However, there are a few designs phases impact and mitigation measures worth noting for this project component.

2.1.1. Waterborne Diseases towards consumers; and 2.2.1. Insufficient treated water due to poor infrastructure and lesser capacity of the water tanks

Insufficient water storage capacity and increasing water demand due to population increase and requirements for 2040 supply levels has pushed this project to upgrade the proposed storage infrastructure in order to avoid interruption of quality water distribution to the current and future registered consumers (MS- = Moderately Negative Significant)

In general, the upgrade of the design of new treatment plant and storage facilities that apply a disinfection, chlorination or Calgon dosing system to the Water sources with lower quality and which are not in compliance with WHO standards, becomes the necessary mitigation measure to avoid waterborne disease towards consumers (S- = Negative Significant).

9.2.2.3 PC3. Water Distribution Network

PC 3.1. Identification of Cultural Heritage sites

3.1.1. Impairment of Cultural heritage properties

Cultural heritage refers to sites, structures and remains of archaeological, historical, religious, cultural and aesthetic value. Its identification and examination are helpful in understanding the significance of a site, according to its aesthetic, historic, scientific and social value. Several cultural heritage, touristic and other sensitive sites have been identified and mapped within the Project Area (6 in total) during the field visits in the Inception and Preliminary Design Phase, which are within <20m from and may be impacted by the construction activities, if precautions are not taken (S- = Negative Significant)

Preparation of the rehabilitation activity must be done together with the Directorate that represents the Secretariat of State for Culture at the Municipal level. Pre-construction, the contractor must review these and other immovable asset locations that may appear during construction and request approval of a Safeguard Plan for each of the assets, making sure that during the Construction activities, those sensitive heritage sites within 50 m radius of the construction activities should not be interfered with or impacted on, and the rules as mentioned in Decree Law No. 33 /2017 for Cultural Patrimony Protection are followed, with the request, by the contractor, of a license /authorisation for intervention in the area. In case a new cultural/historical heritage site is identified during the construction, the Contractor will notify the BTL and follow the procedure regarding these sites.

PC 3.2. Preparation of Project for Health & Safety and O&M

3.2.1. Risk to Health and Safety of Workers - General

3.2.1.1. Health & Safety Plan

Workers will be exposed to many threats during construction works such a range of accidents in site due to earthwork activities, dehydration, communicable and transmittable diseases, exposure to hazardous substances, poor sanitation, poor handling and/or operation of the equipment.

The preparation of the Contractor for the project requirements is extremely important to guarantee that impacts are minimised and community perspective of the construction management is maintained at a “high” (S- = Negative Significant).

At contractor choice, there must be a requirement in the Bid Contract that compromises the contractor to develop a Health and Safety Plan, taking into account all occupational health and safety requirements, such as: i) Install cautionary signage; ii) Ensure sufficient visibility and safety instructions in the work areas; iii) Construction site free of drugs and alcohol; iv) Use of personal protection equipment (PPE) by all workers, etc.

It is also fundamental that the contractor provides the name, details of qualifications and experience of the person on the contractor's team who will be responsible for the environmental compliance requirements of the EMP.

The Health and Safety Plan must be in accordance with National Law, IFC EHS 2007 and ADB SPS 2009 guidelines to ensure the following:

- a. Train all site personnel on environmental health and safety;
- b. Provision of PPE and proper utilization;
- c. Health and safety training and toolbox meeting, including the communicable diseases and operational system of the equipment;
- d. Maintain records of reports and complaints concerning health & safety occurrences
- e. Installation of sick bay in the base campsite including recruitment of medical staff (intermittent, on-call) for primary response prior delivering to the hospital or closest clinic;
- f. Emergency plan and collection of all contacts in Viqueque related to accident response;
- g. COVID-19 prevention and response (as per C3.3.7 and Appendix 2 of the EMP)

The contractor will provide all handling and safety equipment to all his/her staff to ensure their safety during construction works. The employer shall permit only those employees qualified by training or experience to operate equipment and machinery.

3.2.1.2. HSE Manuals and documentation in Tetum

This project is concentrated on rehabilitation of existing structures only and therefore there are minimal projected negative effects on construction, which will only occur as a result of the proposed activities, since improvement works are generally aimed at improving benefits to surrounding communities.

However, workers and Communities will be moderately exposed to impacts on air and water quality, ambient noise level; mobility of people, goods, and services; accesses to properties, economic activities, and social services; service disruptions, etc. and this impact may be enhanced if manuals and signage are not properly prepared and understood (S- = Negative Significant).

Catalogues, manuals and signage shall be prepared in Timorese with sketches on community health and safety and potential occupational health and safety impacts to help explain and avoid occurrence of said impacts.

3.2.2. Risk to Health and Safety of Community – Traffic Accidents and Communicable Diseases

While the volume of vehicles that will be operated from the simultaneous construction fronts at project component sites may not be very large, the condition and characteristics of the roads in Viqueque City i.e., narrow access roads and particularly in market areas, can create traffic jams and hinder the mobility of people, good, and services and people may be exposed to safety hazards from the constricted road space. Communities are also a potential actor in the spreading of communicable diseases (S- = Negative Significant).

Apart from the applicable mitigation measures, proper coordination with relevant local authorities, social service institutions and businesses should help mitigate these impacts.

Therefore, mitigation measures to be taken are as:

- a. Prepare a Traffic Management Plan
- b. Proper traffic or road signage and warning signs with good quality of shining barriers to restrict access to the site and minimize road accidents to the local community
- c. The Contractor to ensure that all vehicles that may be required to pass through villages and transport equipment and materials are operated safely without endangering these communities.
- d. Protect the community by applying the H&S Plan and distancing them from physical, chemical or other hazards associated with sites under construction and decommissioning
- e. Disseminating information through flyers or others regarding communicable and transmittable diseases (including COVID-19 prevention and response (as per C3.3.7 and Appendix 2 of the EMP))

9.2.2.4 PC4. Sanitation (Public Toilets & FSTP)

PC 4.1. Improvement of Water Distribution

4.1.1. Increase of Groundwater pollution from poor sanitation in Viqueque city

With water availability at home comes the increase of and the need to treat the resulting wastewater (Ind S- = Indirect Negative Significant).

Viqueque will thus have a two-step wastewater treatment system, consisting of 1) a first stage with a septic tank system at each dwelling; and 2) a second stage treatment through the FSTP supplied by the Government. However, for the wastewater to be treated in an optimum way and to avoid soil and water contamination in the urban area, it is recommended that a widespread communication plan and program is prepared to influence construction license-related Government entities and the public to upgrade existing or construct their new septic tanks in the households according to the standards provided by the BTL/National Department for Basic Sanitation.

PC 4.2. Location for Proposed FSTP

4.2.1. Several impacts due to FSTP project nature

In terms of location, the requirements to select a proposed FSTP site considered the specific social, environmental and technical aspects, such as: a) Flat terrain; b) Far from the community's residence; c) Land status to be preferred as Government land; d) No landslide and flooding risk in the selected site; e) an existing water medium as the receptor of the final effluent; f) good road access; g) within range of agricultural areas; and h) outside of and/or no impact to sensitive environmental areas. The choice of the best location with the least possible associated impacts is, in itself, the mitigation measure (S- = Negative Significant).

These conditions are aimed to avoid several impacts i.e. inundation and erosion, traffic accidents, emergence of odour and noise towards the nearby community. In particular, instead of occupying unnecessary space in a landfill, the treated dried sludge from the FSTP may contribute to agriculture production as compost and the existing good access to the FSTP avoids impacts from the construction of new road access.

4.2.2. Possible location in Private Land

At present, albeit all effort put forward by the DED consultants, there is no official indication on land ownership. Copies of the preliminary locations, with the layouts of the infrastructure to be built (reservoirs, FSTPs, WTPs, etc...) have been submitted both to the Department for Land & Property both at Municipal and National Level and BTL also pursued this issue without success.

The social component has conducted a land due diligence survey of the affected land and property on the 14th December 2020, in order to substantiate future compensations, if required. Members of the community who were present during the visit confirm reported that the area is communal land (S- = Negative Significant).

While almost all the mitigation measures in PC 4.2.1 were met, in terms of location choice, there is a possibility that the chosen location (Site 1) is included in private land. At least three (3) FSTP possible locations were identified and proposed due to their technical and environmental characteristics, but due to the reasons below, Option I was the location chosen and decided upon by BTL:

- a. Site 3 (the chosen site) in Suco Maluro – overall presented most of the required conditions, No sacred or cultural sites or tara bandu in the surrounding site, although there is still doubts regarding site's status, if it is government or Private land. (S- = Negative Significant);
- b. Sites 1 in Suco Uma Uain Craic – overall presented all the requirements except for the site bordering a Lulik area (Lamasu Hillside 1) surrounded by the edge of a forest area, and the access road is not established and would need to be rehabilitated, increasing the impacts, therefore not a feasible option; and
- c. Site 2 in Suco Uma Uain Craic – This site is located on a sloped area with sedimentary and erosion prone soil conditions, in a Lulik area (Lamasu Hillside 1&2) surrounded by a forest area with no road access (would have to be constructed) and therefore is not a feasible option.

Therefore, if site 3 is indeed in private land, resettlement and compensation measures will have to be defined for the owner of the land, in order to guarantee that the locational environmental and social impacts in 4.2.1. are minimized.

PC 4.3. Sludge Disposal from FSTP

4.3.1. Soil and Groundwater Pollution

Faecal Sludge Treatment entails that the wastewater at the end of the process must be of a level that it will not impact the receiving environment after treatment, namely surface, groundwater or soil (S- = Negative Significant).

Designing an effective sludge treatment is key to achieve this objective and thus, taking into account the constraints in Timor-Leste regarding operation and maintenance or human resource know-how, the project has proposed to implement a system of earthen lagoons for biological treatment of the sludge, with Primary (2+1 facultative lagoons) and Secondary (3 aerobic lagoons) treatment. At the end of this process, the effluent will be directed to a final treatment, namely an irrigation cropping area with a vegetative and permeable soil medium in order to absorb the last remaining nutrients in the effluent and devolve the water up to an acceptable standard into the receiving environment.

9.2.3 Impacts in the Construction Phase

As mentioned previously, the construction activities will likely produce more negative impacts towards environmental stability and the local community. Other than the pipe laying works (new and/or rehabilitation), the rest of the construction activities will be restricted to their respective confined area, thus the interference with the public and surrounding community should be minimal. Negative impacts to be generated are predicted as mostly temporary, such as noise and air pollution (that causes disturbance to the nearby dwellings and commercial buildings), construction waste (solid and liquid), increased traffic (especially in narrow roads), as well as health and safety risk to workers, declining of water quality, soil erosion, etc.

These are all general impacts of construction in urban areas, but it is important to remember there may be serious impacts that jeopardize private and public properties if the contractor does not implement the proposed mitigation measures. Therefore, methods of mitigation have been developed and suggested, adapted to Viqueque city, in order to prevent negative impacts, and are all established in the EMP.

The above-mentioned impacts, albeit in different scales, are common to all four project components i.e. water a) sources; b) treatment and storage; c) distribution; and d) sanitation, in regards to the construction of all these infrastructures. Therefore, in this subchapter (and in the EMP), they are described in general in Section C3. Water Distribution, since this component is the most significant regarding the construction phase, while only the specific impacts to the other components will be described in each of their subchapters.

9.2.3.1 C1. Water Sources

C1.1. Inadequate protection of intake/bore structures during rehabilitation

1.1.1. Intake overflow to cause erosion

The spring and river intakes will require minimal protection during their rehabilitation so as to avoid any overflow into unplanned areas, and possible erosion of adjacent areas (MS- = Moderate Negative Significant)

It is important that the intake has adequate land for perimeter fencing and connection to a temporary drainage that shares the overflow with pre-existing neighbours, thus avoiding any unnecessary erosion or impact to adjacent communities.

For the river intake, the constructor must ensure that no spoils or obstacles are left in the river that may cause ripples or current that cause erosion in embankments of other.

1.1.2. Socio-Cultural Impact

Just as in PC 1.2.3, the spiritual opening of the construction activity is extremely important to avoid conflicts with the local communities, particularly in locations as sacred as the springs (S- = Negative Significant).

Thus, it is important to involve the lia na'in i.e., cultural leader, and communities to lead in the of cultural ceremony of i.e., "opening" for the continuance of use and/or cultural/natural protection of the source water resource, to avoid conflicts and distribution interruptions.

9.2.3.2 C2. Water Treatment and Storage

C2.1. Upgrading activities to Water Treatment and Storage

2.1.1. Worker exposure to disinfection chemicals during installation

During construction there may be some risk of contact with the disinfection chemicals, on the part of the workers that are installing and/or storing the first batch of disinfection equipment and materials (S- = Negative Significant).

For this activity in particular, it is fundamental that the contractor provides and obligates the use of PPE to handle these substances, such as i.e., mask, gloves, and safety boots and restrict access to a minimal number of authorised persons.

9.2.3.3 C3. Water Distribution

C3.1. Induction of Contractor

3.1.1. Enhanced impacts because of lack of knowledge of the EMP

Clear understanding of the EMP, by the Contractor, is paramount to avoid enhancement of potentially adverse impacts in the project area (S- = Negative Significant).

Therefore, after selection of the Contractor, BTL and the PMU will meet the Contractor's HSE responsible staff prior to contract commencement and on-site to explain and confirm understanding of the EMP conditions. After BTL and the PMU are confident that the contractor understands and can comply with the EMP, BTL will give the "go-ahead" for the Contractor to commence work. During construction, the Contractor will work according to the requirements of the project EMP.

C3.2. Construction Activities – Macro Benefits

See Subchapter 9.2.1 Overall Beneficial Benefits

C3.3. Construction Campsite

3.3.1. Campsite Location, Community and Landslide Risk

Typical construction camps cannot be established on the sides of the roads of the alignments as most of the sites are surrounded by housing, private property or buildings and therefore there isn't sufficient space to accommodate the campsite (MS- = Moderate Negative Significant).

Thus, basecamp and work site camps sites are proposed to be established in central locations, preferably in Government land that are flat and landslide and floodplain risk free and shall not be located near settlements, water supply intakes or sites that affect local access to drinking water.

The Contractor shall make his own arrangements for all land, yards, stores, workshops, offices, etc. required by him for the purposes of the Contract and for all services in connection therewith.

All sites must apply mitigation measures to prevent impacts to surrounding community and environment i.e., wastewater, waste, dust, noise, etc. After use, sites shall be cleared and restored to status as they were and, if required due to their surroundings, to near natural or stable conditions with vegetative cover.

The locations of all yards, stores, workshops, offices, etc., shall follow the CEMP specifications for location, etc and be agreed beforehand with Be'e TL and the Engineer and shall be such as to minimize obstruction and nuisance to the public. In particular, the Contractor shall demonstrate that he will take such measures as are necessary to prevent pollution of the environment from fuel and oil spillages, washing of concrete mixers and the like.

The Contractor shall provide, maintain suitable and sufficient shelters and mess rooms for his workmen and supervisory staff as are customary and necessary.

The Contractor shall provide sufficient closets or latrines to the satisfaction of the Engineer and the relevant authority, for the use of his personnel. They shall be properly screened and maintained in clean and sanitary state at all times.

The mess rooms, closets and latrines shall be located in positions to be approved by the Engineer. The Contractor shall be responsible for making all arrangements for the disposal of waste from mess rooms, closets and latrines.

There is also a need to perform an assessment of compliance of proposed camp with the workers' camp siting and management - mitigation measures for H&S and COVID-19.

3.3.2. Wastewater and soil/water contamination

Throughout the duration of the project, the campsite will house many personnel and facilities in the campsite will need to be available for those who do not lodge in the area. A suitable latrine is a primary facility for a construction camp, which also brings wastewater issues (S- = Negative Significant).

Good housekeeping practices, maintenance of latrines, and protection from surface runoff provides favourable hygienic conditions for the workers. This will also prevent the accumulation of flies in the area, which are vectors for transferring food-borne illnesses.

The latrines must include a proper septic tank design (at a minimum) and should be located in an area at least 30 m from any domestic well, to minimize the risk of contamination or downhill of wells within 30 m distance. It will be elevated to prevent surface water from flooding the sanitation facility especially during rainy season.

3.3.2. Water Source for Campsite may compete with Community Sources

While some water distribution exists currently in Viqueque, the campsite may require to be established in an area where the distribution system does not exist yet. The communities, under these conditions, may experience shortages in water supply during the dry season and thus sourcing water for the campsite locally from tap water/pipe line/boreholes may create conflict with the adjacent community (MS- = Moderate Negative Significant).

The campsite should establish a water tank large enough to provide for the campsite requirements, to be filled with water purchased to BTL from authorised water sources. Also, purchasing sufficient potable water supply in the form of water litre bottles and/or gallon containers will ensure the health safety of the workers and prevent disturbances to the communities in their utilization of public water from taps.

3.3.4. Storage of Hazardous chemicals, waste and construction materials may bring spills, fire hazards and H&S problems

Improper storage and handling of construction materials may have the potential to impact the surrounding areas (S- = Negative Significant).

Properly stored chemicals will minimize human contact, thus providing a healthy environment for the workers. Fuel and lubricants for construction machinery will be stored as delivered in steel drums in the work areas and properly handled to prevent contamination of nearby water bodies. Allocating appropriate containment for hazardous materials will reduce vulnerability to fires and health effects of exposure to chemicals like cement and hydrocarbon-based products.

In the event of conflagration, fire protection facilities such as fire extinguishers, water tanks with available buckets and stock of sand to cover fuel spill will be provided. Also, containing flammable materials in a fire-resistant enclosure will prevent the spread of fire and provides additional fire safety measures for the workers and the public.

When existent, Asbestos Containing Materials (ACMs) i.e., used pipes must be handled under controlled conditions (with gloves, mouth and eye protection and under moist conditions so as to not break the materials and risk inhalation. Contractor HSE representative must train/inform/draft guideline for workers on identifying and the dangers of mishandling this material and prepare special team to handle these materials if they are found during construction and coordinate with the DNCP on solution for deposition of these materials.

Materials for the works i.e., sand, gravel and cement, fuel and lubricants, will be planned duly to be hauled directly into the work sites and utilized as work progresses, with all haul trucks covered with tarpaulin, especially when hauling aggregates and sand.

3.3.5. Non-hazardous Solid Waste Improper handling and storage and vector diseases

Implementation of a Solid Waste Management System throughout the duration of the project will improve hygienic conditions of the workers. A clean environment is less vulnerable to disease carrying insects and less likely to be a source of health complication (MS- = Moderate Negative Significant).

Minimisation and proper handling and storage of solid waste in the campsite will maintain a pleasant environment for the workers and the local communities. Keeping non-hazardous waste in closed bins will prevent luring in scavengers such as rats, dogs, pigs and wild animals that could displace waste in the campsite.

Proper disposal of solid waste to authorized dump sites/landfills, referred and identified by the BTL or DNCP-Viqueque will ensure that waste is not disposed in random areas of the forest where it may have implications to wildlife and local communities.

Also important is the inclusion of mitigation measures for COVID-19, in the form of a COVID-19 response plan, to comply with country-specific COVID-19 risk management regulations and directives including Government rules and guideline.

Conduct workplace risk assessment to identify low, medium or high exposure risk to COVID-19. Prepare an action plan for prevention and mitigation of the spreading of COVID-19. At a minimum, Screen on entry the temperature of each person entering the work site and record their contact details to facilitate tracking of infected persons should there be a need and PPE and inform workers of its correct use.

3.3.6. Food for construction personnel may compete with food supply for the local communities

To ensure that workers do not interfere with local food supply, adequate food supply will be provided by the contractor, sourced from local vendors (S- = Negative Significant).

This will also discourage poaching of wild animals and of communities' livestock grazing freely in the forest. In addition, prohibiting poaching will protect local *fauna* and livestock of the communities.

3.3.7. COVID-19 transmission risks between workers and community in Camp and Work sites

Construction Camps and work sites and access roads will necessarily mean OH&S risks not only to construction workers, but also to people living and working around the sites. These risks not only come from a range of activities including the use of heavy machinery, excavation and trench work, earth moving, and use of chemicals but also the risk of transmissible diseases i.e. sexually transmitted diseases or the more current COVID-19, which may likely increase in the community if there is a significant influx of migrant workers (S- = Negative Significant).

It is important that mitigation measures are put in place that help the contractor minimize or prevent these occurrences. Information dissemination is extremely important for the management of the site regarding these diseases but COVID-19 has been the recent focus due to the ease of contamination. To help prevent and mitigate

this threat, the Contractor will have to implement a COVID-19 Management Plan that focuses on (but not limited to) the following major tasks:

- ❑ Plan and execute work in compliance with country-specific COVID-19 risk management regulations and directives including directions of the General Department of Labour, Secretariat of State of Labour, and Vocational Training.
- ❑ Conduct workplace risk assessment to identify low, medium or high exposure risk to COVID-19. Include an action plan for prevention and mitigation of the spreading of COVID-19 in the COHSE Plan.
- ❑ Risk communication, training, and education. Training of workers in infection prevention and control practices.
- ❑ Adopt engineering, organizational and administrative measures, plan work so employees can keep distance from each other and minimize contact.
- ❑ Provide clear and visible guidelines on how to prevent infection at the construction site and initiatives taken.
- ❑ Screen on entry the temperature of each person entering the work site and record their contact details to facilitate tracking of infected persons should there be a need
- ❑ Promote personal hygiene (including hand and respiratory hygiene), make wash basins and sanitizers available at entry, break area, and washrooms. Regularly clean and disinfect.
- ❑ Provide PPE and inform workers of its correct use.
- ❑ Health surveillance and insurance.
- ❑ Review emergency preparedness plans.
- ❑ Review and update preventive and control measures as the situation evolves and Involve workers/ occupational H&S groups in the review.

C3.4. Construction Materials

3.4.1. Sand and Stone Extraction and disturbances to environment

Although most of the trenching will reapply the excavated soil from pre-existing alignments, there is still a need for a percentage of the trench to in-fill with sand and gravel for the cushioning of the pipe bed and support the top layer asphalt. This extraction activity can disrupt natural land contour, soil erosion, loss of vegetation, scouring of riverbeds, ponding, water logging or water pollution (S- = Negative Significant).

The Contractor will be obligated to source/buy its materials from duly authorised suppliers, licensed by the necessary authorities (ANPM). The Contractor must also make sure that these suppliers carry out their extraction activities without provoking unacceptable environmental damage. The BTL weekly supervision will allow monitoring of the extent and volume of BTL-related extraction based on the current conditions of the material sources i.e. quarries and/or rivers (sand extraction) and ensure the quality and good condition of the extraction sites, ensuring that extraction activities will not have social or ecological disturbances, and that the quantities of extracted sand and stone conform to the project specifications, which will also reduce the generation of spoils in the construction site.

C3.5. Construction Work Front: all Infrastructure (Inlet / Tank / WTP / Water pipes / FSTP)

3.5.1. Servicing and Fuelling of Construction Equipment and spills and pollution

Hydrocarbon based products are toxic to humans and straying wildlife upon prolonged exposure and exposure to high quantities. It is also a possible source of fire (S- = Negative Significant).

Define rules from using unmaintained vehicles and ensuring that all equipment is in good condition prior to operation minimizes the likelihood of leaks and accidental spills. Prohibiting equipment and vehicle with leaks and causing spills prevents the accumulation of toxic contaminants in the forest, and minimize the probability of bush fires, thereby maintaining a safe environment for wildlife and local communities.

Maintenance and repair of vehicles such as washing, repairing leaks, changing parts etc. should be done in the central base camp site, confined within a designated area. This area should have a concrete surface or lined with an impermeable surface (ex. plastic) with built drainage to contain wastewater contaminants. The drainage may be built as a subsurface drainage for direct treatment. Otherwise, the drainage should channel wastewater to an infiltration trench system for treatment of wastewater constituents (hydrocarbon and metals) prior to infiltration

to the subsoil. A fuel secondary containment must be available in the event of fuel spills and Removable Well Cap for monitoring and sampling purposes.

3.5.2. Excavation, Cutting and Filling and safety hazards to Public and workers

Construction sites, especially those with trenching, have a high risk for low height/high impact accidents for workers and the community (S- = Negative Significant).

Placing adequate visual signage in excavated, cut and filled areas will reduce safety risk of the workers and the public. Installation of light reflecting road signs will provide safety measures for people and vehicles accessing the road during night-time. Vivid and readable Warning signs maintained on sites of construction, especially haphazard zones will inform public of danger sites and caution to take precautions. This will reduce the likelihood of construction and road accidents.

3.5.3. Stockpiling and Storage of Construction materials and dust, water runoff damage to existing utilities, buildings and drainage blockage

Improper storage and handling of construction materials may have the potential to contaminate the surrounding areas (S- = Negative Significant).

Periods of high wind events may disperse stockpiles, generating airborne dust particulates, particularly during dry season. Covering stockpiles with impermeable material will minimize the generation of fugitive dust or wastewater runoff in the surrounding areas. Where possible, it should be stored in the campsite, otherwise utilized at once when stored on-site. Easily accessible storage areas will minimize interferences to water runoff into drainage and the movement of vehicles and personnel in the campsite and will allow fast transport of materials.

3.5.4. Excavation, Cutting and Filling and Soil Erosion and Land Disturbance

Excavation activities have the potential to cause soil instability, erosion and silt runoff especially during wet season, and spoil materials from earthwork activities that are not being managed properly can disturb the construction work and/or traffic, and decrease the aesthetic and economic values of the area. This resulting activity may also impede the access to the community's houses and other buildings (MS- = Moderate Negative Significant).

Mitigation measures to be taken should be: a) Proper backfilling trenches; b) Earthworks targeted for dry season as soil erosion vulnerability is high during wet season, thus, stockpiles (sand, cement and aggregates) will not be situated at or near steep areas; c) Exposed soil will be stabilized and re-vegetated to prevent further soil erosion; d) Provide for temporary access and diversion to dwellings and buildings where these are impeded, to avoid traffic accident or others. All these measures must follow the guidelines of the Spoil Management Plan in Appendix I I.

3.5.5. Construction and Noise Disturbance to surrounding communities and sensitive areas

The project will include heavy machinery and vehicles activity during this phase, such as demolition works, movement of trucks and equipment, earthworks, concrete mixing, loading and unloading construction materials. These types of activities may have a potential impact in noise-sensitive areas i.e., residential or buildings such as government, health care or educational facilities. Noise level will be done in adherence to WHO Community noise level guidelines (S- = Negative Significant).

The Contractor must implement a Noise Management System with the following Mitigation measures: a) Limit and/or no unnecessary engine idling duration in construction area, as well as use of power horns; b) Reduce speed limit in the work site and all road-worthy project equipment must not circulate above 40 Km/h in residential areas and 50 Km/h in urban areas; c) Construction Monday to Friday (7:00 am to 7:00 pm), Saturday (7:00 am to 1:00 pm if inaudible at residential premises), No construction works during night-time (7pm to 7am), Sundays and Holidays; d) No construction works on a particular time wherein cultural and religious practices are carried out.

3.5.6. Construction and Dust (Air quality decrease) to the community

No major air quality concerns are projected to occur during the project implementation as the planned works require small scale and not much equipment, confined excavation to be undertaken and it is not projected to result in a significant increase in particulates matter in the area, only dust generation which can affect the respiratory and eye systems (S- = Negative Significant).

The Contractor must apply an Air Quality and Dust Management System with mitigation/control measures such as watering and sprinkling of the excavated ground surface, to suppress dust from becoming airborne (at least twice

a day or whenever visual inspection/monitoring or GRM complaint require immediate dust suppression), especially required frequently during dry season. Covering stockpiles will protect them from wind and will contain light particulates to the surface. Minimising the movement of vehicles to 40 km/h in residential and 50 Km/h maximum in urban area will also reduce the generation of fugitive dust.

3.5.7. Construction and Impact on Ecological Resources

During the implementation for the rehabilitation project, attention must be given to protect and minimize negative impacts on environmental sensitive areas and ecosystems, or the natural environment. Overall, the project area is in urban area and the trenches and trenchless works will not have direct impacts since the work will be done within the ground adjacent to the road (ROW) or confined to the planned area of construction.

Nevertheless, the project only has 2 locations that are deemed sensitive (see PC1.1.1. Loihunu and 1.1.2. Cuha River) and should other areas be encountered during the construction activities, the contractors must ensure to establish a Sensitive Areas Management Plan to make sure no impacts occur in this regard (S- = Negative Significant), namely vegetation and trees removal are avoided and no fauna is destroyed.

However, if some of the construction works must forcefully remove roadside trees under the supervision of the NDPA and BTL, the contractor is required to compensate with trees replanting and re-vegetation. It is also important to limit noisy activities within these areas, in order to stabilize the fauna's mobility, and restrict permanent campsite location, clearing, parking, and movement of heavy vehicles and equipment stockpiling.

3.5.8. Impacts on Socioeconomic Resources, Infrastructure, Utilities and Cultural Sites

3.5.8.1. Reducing impact on established Businesses activities and others

Large numbers of shops, businesses, industries, and other economic activities may be affected by the network improvement works, as most of the components are located in an urban area, with ROWs in roadways, although 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.

No major impacts will be expected on the economy of the city or its citizens given the installation of distribution pipes will be conducted by trenchless methods as much as possible, which require small-scale excavation, conducted the road in right-of-way (RoW), not requiring land from private owners. Additionally, the proposed FSTP is located far from the community's households and commercial buildings.

Nevertheless, there can be 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 by the presence of trenches, excavation, workers and machineries. Resulting losses in income are expected to be small (or inexistent) and short-lived (S- = Negative Significant).

Applicable mitigation measures would be planning and making available temporary access ways to all businesses and activities affected and, in extreme cases, determine compensation to the affected business that have justifiably been impacted and demonstrate reduction of income due to the project's direct construction activities.

3.5.8.1. Reducing impact on established Businesses activities and others

Cultural sites and infrastructure can be impacted if the constructor does not apply caution to the construction ROW (S- = Negative Significant).

Constructor must follow the precautionary measures and rules in the Construction Protection License (see PC 0.5.2) and his/her own Safeguard Plan (see PC3.2.1) for each site, in order to avoid any impact and/or degradation of these sites.

3.6. Construction Work Front: all Infrastructure (Inlets / Tank / WTP / Water pipes / FSTP)

3.6.1. Site clean-up and rehabilitation of locations

The project should endeavour to return the project sites to their original state, where possible, in order to guarantee the constructed infrastructure blends with its surroundings and does not impact communities or the environment (MS- = Moderate Negative Significant).

The contractor must remove all his/her materials, facilities, etc, as the completion of the project components occur. Excess rocks and sand as a result of excavation activities are not to be dumped next to surface waters and left prior to departure and proper coordination with local authorities must be done of appropriate sites where mass load are needed. This had to be spread in natural looking manner and left in a stable state.

At campsites, besides all equipment, all evidence of the project being there must be retrieved and the latrines and septic tanks must be filled with a soil mixed of dry plant matter soil prior to departure.

9.2.3.4 C4. Sanitation

All construction activities for this component are alike and reflected in C3. Water Distribution.

9.2.4 Impacts in the Operation and Maintenance

The operation and maintenance phase is a stage where the constructed facilities are ready to be used and how BTL, as the responsible agent, is going to manage them properly so that they can function accordingly with the O&M manual as a foundation for all the related procedures. The EMP will guide BTL with some provided mitigation measures aiming to minimize or inhibit possible impacts from occurring. This too, enables BTL to resolve the anticipated issues as fast as possible.

Various activities in this phase generate both positive and negative impacts originally come from each component of water sources, treatment and storage, distribution up to sanitation which are described below.

9.2.4.1 O1. Water Sources

O1.1. Protection of the Water Source Quality

The existing condition in the Loihuno water source in Viqueque is concluded as not well protected and according to the field observation, the upstream and surrounding area of Loihuno system has intensive human activities such as agriculture or housing areas with no proper sanitary infrastructure, as previously cited in Chapter 3.2.3.

Given the circumstance that the existing conditions needed to be upgraded with more advance designs and programs to maintain a good quality of potable water for the community's consumption, therefore, it is mandatory for the BTL operators to be duly consistent on implementing programs as mentioned below as part of mitigating such impacts.

1.1.1. Declining of the Water Source Quality

As the population number ascends, there will be more houses built adjacent to where the water sources are located (upstream) as the community's main target, especially when the sanitation facilities in each household are built inadequately. The more intense human activities intervention in that specific area, the more polluted the water quality will be. The said impact is likely to be indirect significant (IS-).

1.1.1.1. Implementation of Upstream Watershed Protection Programs

Protecting the upstream zones and area encompassing the water source such as restriction to slash and burn activity, animal husbandry, other typical deforestation activity, irresponsibly disposing household chemicals, etc. Information also needs to be disseminated to the community regarding to watershed protection in order to expand awareness which can thus trigger them for the implementation, promptly as possible. The responsible agent i.e. BTL and Municipality should be able to encourage the local leaders such as Suco Chiefs, Aldeia Chiefs, and also the community to take part in this program.

1.1.1.2. Improvement Program for all Existing and Future Dwelling Sanitary Infrastructure

Community in the district either in the urban, semi-urban, or rural areas, particularly the low-income family, are proven to scarcely own sanitation infrastructure of septic tanks with any further preliminary treatment process and de-sludging activity. It is considered very crucial because the untreated sewage that's being generated from the households would flow directly to the water bodies and even to the ground, which can then cause water and soil

contamination. The presence of water stored in the ground is easily to be impacted with this sort of condition mentioned above.

Improving the existing and future private sanitary facility is also part of the Watershed protection program aiming to conserve the underground water volume and its quality. The such program that can be offered and applied for is to promote the BTL septic tank design template to the community in a comprehensive way, but also to mainly focus on the community surrounding the water source and other upstream watershed area.

1.1.1.3. Involve the Lia Na'in and Communities for Cultural Ceremony Preparation and Tara Bandu Protection of the Source

The programs mentioned above will not be successfully attained if they are not fortified by the establishment of Tara Bandu (local regulation) and the cooperation and involvement between the local Lia Na'in with the community. The local community and its culture play important contribution on managing the resources, although BTL will be the one responsible for all the requirements to prepare for the Cultural Ceremony.

9.2.4.2 O2. Water Treatment and Proposed Storage

O2.1 Mishandling of Chlorine

Water quality tests in Viqueque have shown that some water sources are commonly contaminated by E. Coli and Total Coliform contamination. To ensure the potable water conveyance to the consumers and due to the design analysis, some of the water tanks to be reconstructed will be designed with treatment facility i.e., disinfection type by injecting Sodium Hypochlorite into the proposed tanks with stored water.

After the construction phase, the BTL operators will still have to encounter some risky tasks e.g., dealing with operating chemical hazards which subsequently may threaten the workers' health and safety. The impact of chemical exposure is adverse and significant (S-) towards the workers and some mitigation measures should be seriously taken into account, as described below.

2.1.1 Health Hazards towards the Operators

When it comes to mishandling of hazardous substance, the impact will directly and solely effect on the workers. Chlorine, hypochlorous acid and hypochlorite ion exposures can result in irritation of the oesophagus, a burning sensation in the mouth and throat, and spontaneous vomiting.

2.1.1.1. Ensure Proper Storage and Handling Practices for Chemicals

Chemicals either they are imported or not, should be placed properly in an indoor warehouse, avoidance of sun exposure and room temperature control, in order to maintain the chemical composition in its original state, and diverting fire and explosion from occurring.

2.1.1.2. Ensure the Knowledgeable and Skilled Person is in Charge of Chlorine Handling

Operators still need to be provided with training skills with simulation performances and equipment if any, in order to improve their capacity in the working field especially on handling the Chlorine.

2.1.1.3. Ensure use of PPE while Using Chemicals

Workers or operators are obligated to use PPE as part of HSE procedures during working hours. Face masks, safety boots & jackets, gloves and goggles are examples of equipment that workers must wear to protect themselves from any undesirable accidents.

Supervisor needs to do monitoring in each of the water storage location and do registry of workers who are or are not in compliance with the usage of PPE, as a mechanism for the workers working performance and their consistency.

9.2.4.3 O3. Proposed Distribution Network

O3.1. Sound Operation of Clean Water Distribution System

3.1.1. Improved Health and Hygiene

This project is aimed to improve water supply and sanitation sectors to the community. This project will result in improvement of local people's hygiene and public health and thereby reduce the waterborne disease. A regular maintenance of the project's components will provide continuous benefits to the local people. The impact is therefore direct in nature, local in extent, high in magnitude and long-term in duration (S+).

3.1.1.1. Proper Operation of the Distribution System

This mitigation measure is aimed on providing an adequate and reliable supply of safe water to its users. Operation includes monitoring the system state, running the system and enforcing policies and procedures.

03.2. Drinking Water Supply System

Monitoring activity conducted by operators is to ensure the water distribution components are operating properly and consequently can guarantee the necessity to the users in terms of quantity and quality of water. Although, there will be certain impacts expected to occur, similar as other water supply projects e.g., pipe leaks and bursts, and changes in the water quality due to natural phenomena, inadvertent negligence or non-compliance of O&M manual.

Nevertheless, this phase will not anticipate any illegal connections in the sources and other locations because mitigation measures are already established previously in the design phase in terms of water sources protection of the rehabilitated intakes and boreholes area, and additionally water pipelines are designed to be implanted under the ground. However, impacts that are constituted in the EMP matrix particularly on water delivery system are described below along with their mitigation measures.

3.2.1. Delivery of Unsafe Water

This refers on the diminishing of the water quality and volume with a rating impact of moderate significant (MS-) because they can be quickly mitigated and somehow the duration will only be temporary without causing any acute effect on the environment and public health.

The water quality that is affected depends on the activities upstream contaminating the immediate area of the sources and also pipe leaks along the distribution line.

3.2.1.1. Prepare Operations and Maintenance Plan

The referred manual is prepared by the selected Contractor for this project and should provide detailed information on the related matter. The O&M manual will then be used by the BTL as a guideline during operating and maintaining the quality of the facilities from impairments.

3.2.1.2. Implement a Water Quality Control Program (WQCP)

The WQCP should be drafted based on the requirements of Decree-Law no. 31/2020 – Water Quality, in order to ensure the system monitors and distributes safe drinking-water to prevent contamination of water sources, to treat water, to reduce or remove contamination that could be present to the extent necessary to meet the water quality targets in Timor-Leste, and to prevent re-contamination during storage, distribution and handling of drinking-water.

3.2.1.3. Monitor Water Quality

The BTL as the responsible agent should plan its sampling schedule for water quality testing as per Decree-Law no. 31/2020 – Water Quality, specifically under the requirements of Annex II of said regulation, daily at each WTP exit and monthly in all sampling points defined in the WQCP

3.2.2. Detection and Repair of Leaks and Pipe Bursts

Pipe bursts are commonly happened in the water distribution systems. Detection of pipe burst events usually comes from direct visual observation or customer report, although this sort of method is not efficient and time-consuming. Leaks and pipe bursts should be solved accurately and quickly to reduce water loss and further damages to the pipes (MS-).

3.2.2.1. Ensure Leak Detection and Restoration Time is Minimized to the Extent Possible

To mitigate leaks and pipe bursts, there should be an advance design with time-efficient method for burst detection techniques either equipment-based method or software-based methods. Not to mention that giving trainings to the workers in regards to implement those methods is also essential.

3.2.3. Excessive Algal Growth in Tanks

The presence of algal in reservoir can affect in deteriorating water quality because it releases toxins that often lead to several disruptions e.g., health concerns, water taste and odour problems. Water that is contaminated with algae can endanger the whole water supply system, since not all water tanks or reservoirs will be installed with treatment facilities. This kind of impact is likely to be moderately significant (MS-).

3.2.3.1. Water Tank Maintenance and Cleaning Schedule

Mitigation measures to be taken: a) Close Water Tanks All the Time; b) Clean Reservoirs as per the O&M Schedule.

9.2.4.4 O4. Sanitation (Public Toilets & FSTP)

O4.1. Sanitation Facilities (Toilets & Sludge Disposal Site)

Community toilets are used by the public with numerous people coming in and out every day to utilize the facility. The absence of operation and maintenance is a frequent cause of failure of service. This general impact also applies to primary treatment on-site septic tanks of each household.

4.1.1. Contamination of Land or Waterways due to Overflow of Septic Tanks and the Uncontrolled Dumping of Sludge

Contamination of land and waterways and dumping of Sludge may generate odours and nuisance to the community and the environment such as health problems and soil contamination (S- = Negative Significant) if not properly addressed.

4.1.1.1. Further Septic Tanks Design

The design of the septic tanks' dimensions should be able to ensure maximum retention to avoid overflow of the wastewater. In addition, routine maintenance and health of the system should be associated in one part of the process to have a smooth operational progress and sustain the facilities in good condition, such as scheduling and implementing de-sludging and cleaning activity regularly. Septic tanks will be emptied at the required frequency of minimum every 3 years. Households will also be educated to reduce the likelihood of septic tanks overflows and uncontrolled dumping of sludge.

O4.2. Operation of FSTP

Sludge is composed of by-products collected from different household on-site septic tanks to the wastewater treatment process. It contains both compounds of agriculture value and pollutants which usually consist of heavy metals, organic pollutants and pathogens.

4.2.1. Soil and Groundwater Contamination

Uncontrolled nutrient introduction in soils from the mistreatment effluent from the FSTP is a major environmental concern. Transport of the nutrients through the soil may eventually lead to groundwater contamination significant impact (MS- = Moderate Negative Significant).

4.2.1.1. Treated Dried Sludge Distributed for Farming Activities and Effluent to Irrigation Cropping Area

Treatment and disposal of sewage sludge and effluent are major factors in the operation of the specific faecal sludge treatment plant. Treating sludge before final disposal is aimed on reducing its volume and stabilizing the organic materials, nitrogen, phosphorus and potassium. The treated dried sludge will derive from the maintenance cycles of the primary treatment and may be contributed for surrounding agriculture activities, while the effluent

will be discharged into a horizontal planted gravel filter for final treatment before absorption into the soil medium. Stabilized sludge does not have an offensive odour and can be handled without causing nuisance or health hazard.

4.2.1.2. FSTP Malfunction

There are also certain environmental risks from the failure of properly operating the FSTP, most notably disposal of untreated faecal material or incompliant wastewater pollutant levels to soil and groundwater, which can damage human health and contaminate both soil and groundwater.

It will be important therefore that the BTL follows O&M manuals and ensures all the components are maintained as per specifications, and establishes a procedure to routinely check the operation and integrity of the FSTP, particularly when beds are (nearly) full and during the rainy season, to implement rapid and effective repairs where necessary.

Additionally, and while downstream from the FSTP site no dwellings or activities were identified, there is a need for frequent effluent testing (3 monthly) just before the horizontal planted gravel filter, to guarantee that the facility's effluent complies with the wastewater guidelines in effect in Timor-Leste.

In the event of a malfunction and sludge maintenance must be carried out, then the BTL must coordinate with the Municipality of Viqueque and the Municipal Environmental Directorate to follow their instructions regarding a final safe and correct sludge deposition location.

4.2.2. Community and Occupational Health & Safety risks of the FSTP infrastructure

Uncontrolled access and proximity of both staff and community may bring increased risks for their health and safety (MS- = Moderate Negative Significant).

4.2.2.1. Health & Safety Manual as Part of the Operation & Maintenance Manual

The contractor will be required to prepare an Operations & Maintenance Manual that includes a Health & Safety Manual and at commissioning, provide a signed commitment from the operator to a) understand and b) comply with IFC Environmental Health and Safety guidelines (2007), as well as provide for and conduct training programs for workers in workplace safety of FSTP operation and safety orientation trainings including regular safety drills for workers. It is also important that the operator provides appropriate and adequate PPE for all operational staff and workers (including regular training and drills on the use of PPE and other emergency equipment).

Equally important is the need for the operator to implement fencing and appropriate signage to prevent public access to the FSTP infrastructure, as well as cover as much standing water as possible and regularly treat for mosquitoes during seasons of high incidence of mosquito- borne diseases such as dengue.

4.2.3 Odour Occurrence

It is important that the FSTP is performing as designed and constructed so that odour perception around the plant is within acceptable limits. This odour may also occur due to the frequent dumping of truckloads of faecal sludge in and around the FSTP, although the distance to the closest dwelling is substantial and thus odour shouldn't be significant (IS- = Negative Insignificant).

However, the FSTP is located in a gently sloping area and with distance from the highway about 350 meters and 220 from the river. Additionally, the closest dwelling is 400m away from the site.

To avoid any deterioration of the FSTP and odour occurrence, good operation practices will be instituted in the FSTP operation procedures and proper maintenance of the facility will be upheld, including avoidance of pools of dirty stagnant waters and spills in the FSTP area and surroundings i.e. Regular Cleaning of access road for minor truck septage spills.

Odour monitoring will be practiced by the FSTP operators and maintain procedures for recording and managing complaints from the public, in order to identify odour non-compliance occurrences cases that require improvement as well as consult with residents to identify record odour or nuisance issues – preferably date, time and duration of odorous events.

9.2.5 Decommissioning Phase

The decommissioning phase is the dismantling of the project's facilities due to the incapacity of the facilities to be operating. The BTL will be responsible for evaluation on whether or not the facilities should be improved. Distribution pipes which are no longer used will be removed and exchanged with new pipes, while the older pipes will be buried in the ground or moved to a final disposal area depends on the technical design. Smaller water tanks that are no longer functioning will be decommissioned.

10 SUMMARY OF THE ENVIRONMENTAL MANAGEMENT PLAN

Table below summarized the Environmental Management Plan starting from the Pre-construction up to the Decommissioning Phase.

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
PRE-CONSTRUCTION (DESIGN) PHASE									
0.1 Disclosure & Engagement of community	(No impacts)					01.1. Initiate Information Disclosure and Grievance process of IEE in VIQUEQUE	BTL	PMU	Included in Project Cost
0.2. GRM Dissemination	(No impacts)					0.2.1. Establish GRM and clarify roles and responsibilities (see GRM section of EMP)	BTL	PMU	Included in Project cost
						0.2.2. Provide contractor with GRM contact details to be used for: A. GRM sign boards; B. GRM Contact Cards for Affected People			
						0.2.3. Erect sign boards at the construction site entrance with: A. Project details; B. GRM procedures and contact details 0.2.4. Print 'GRM Contact Cards' for all workers to give to complainants and keep cards with all vehicles, machinery and site managers/foremen 0.2.5. Affected People Training. Contractor to raise awareness of all workers on how to respond when an affected person or member of the public has a complaint i.e. direct the person to the most senior site manager present at the time and provide a 'GRM Contact Card'	Contractor	PMU	Included in Bid price
0.3. IEE and EMP Updated	(ALL)					0.3.1. Updated IEE and EMP to include: A. Final detailed design; B. Additional environmental protection measures; C. Approved national SEIS/EMP requirements & mitigation measures. D. Environmental quality baseline monitoring (water, air, noise) E. SEIS/EMP approved by SSE prior to contract award	Local Consultant / PMISC	PMU / ADB	Included in Project Cost
0.4. Construction EMP (CEMP)	(ALL)					0.4.1. The contractor(s) will develop a Construction EMP (CEMP) that includes the mitigation measures set out in this table as a minimum and will include detailed individual management sub-plans for: A. Sensitive Areas Management Plan B. Cultural Sites Safeguard Plan C. Noise Management Plan D. Air Quality and Dust Management Plan E. Spoil Management Plan F. Community OHSE and Emergency Response G. Campsite and Construction Front Management Plan (if required) H. Site Cleanup Plan I. Traffic Management Plan J. COVID Management Plan (see C3.3.7 and Appendix 2 for applicable COVID Protection and Mitigation Measures) K. Solid and Liquid Waste Management Plan	Contractor	PMU / PMISC	Included in Bid price
						0.4.2. The CEMP will include a map of each construction site, with copies held by the Contractor and PIU, showing as a minimum: a) Access routes, b) storage areas for waste, c) storage area for chemicals such as fuels, d) concrete mixing, e) stockpile storage areas (on & off site), f) first aid			

Table 10-1 - Environmental Management Plan Matrix Activity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						kit and equipment used in emergency response, g) location of worker camps (if required).			
0.5. Obtain & activate permits and licenses	Compliance Obligations					0.5.1. Contractors to comply with all statutory requirements set out by ^{SEIS} Government for use of construction equipment, and operation construction plants	Contractor	PMU / BTL	Included in Bid price
						0.5.2. Contractor to ensure all required permits are in place prior to construction, such as (but not limited to): - Materials extraction permits; - Cultural Site Construction Protection License (for each cultural site <50m from project component)	Contractor	PMU / BTL	Included in Bid price
PCI. WATER SOURCES									
1.1. Location of water sources in sensitive area	1.1.1. Loihunu I Spring - Nuisance to the biodiversity (flora, fauna, water ecosystem) due to dust, silt runoff, noise, etc.	2	2	4	MS-	1.1.1.1. Increase sensitivity for construction and protection mitigation measures in the transmission line rehabilitation to springs i.e. Loihunu Spring System (see C3.) especially when close to sacred areas.	PMISC / PMU	BTL	Included in Project Cost
						1.1.1.2. Guarantee contractor is trained, accepts and follows all operational procedures applicable within the protected areas. Contractor must not: • Kill, injure, damage, remove, handle, disturb or interfere with any endangered species or existing animals under any circumstances; • Bring domesticated animals on-site • Poaching on-site or the surrounding forests • sell endangered species or derivatives of these species; • export endangered or derivatives of these species; • cleared trees without DNAP/Forest Guard inspection for nesting birds prior to cutting. The nest will be transferred carefully to another tree safe from project activities. • carry out clearing of vegetation before a detailed layout of clearing is presented by the contractor and approved by the DNAP • plant new/invasive species in the Project area, for reforestation purposes	PMISC / PMU	BTL	Included in Project Cost
	1.1.2. Cuha River Intake and access road construction - Nuisance to the river biodiversity (water ecosystem) - Impact on surface water (silt runoff) - Impact to local dwellers (land reclamation, dust, noise and vibration, etc.)	2	4	8	S-	1.1.2.1. Constructor must be informed/trained as in PCI.1.1.1, 1.1.1.2. and especially C3. Mitigation measures, as Intake construction is in River during Dry Season and requires access road construction	BTL / PMISC	PMU - BTL	Included in Project Cost
1.2. Use water sources (springs and	1.2.1. Insufficient water for all users	2	3	6	S-	1.2.1.1. Comprehensive monitoring and assessment of all water source availability throughout project life (springs and well monitoring program for aquifer	BTL / PMISC	PMU - BTL	O&M Cost Included in

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
boreholes						performance tracking)			subproject design
	1.2.2. Water use between environment, communities and Water Distribution System	2	3	6	S-	1.2.2.1. Loihunu II and III to be used for Social and Ecological flow (no extraction) Apply a minimum environmental flow for Loihunu II and III springs (Wet Season 30% of mean monthly flow / Dry Season 10% of mean monthly flow), for Downstream free flow and usage	BTL / PMISC	PMU - BTL	O&M Cost Included in subproject design
	1.2.3. Social and cultural disruption due to tara bandu and lulik/sacred area	2	2	4	MS-	1.2.3.1. Involve lia na'in in frequent cultural ceremonies i.e. "opening" for authorization to use cultural/natural water resource Project activities during construction phase will be monitored by assigned personnel from the Culture Department. The springs will be demarcated with tapes to limit construction works outside the area and restrict access to the springs unless authorized by relevant authority. Precautionary measures will be taken by all construction workers to prevent damage to the Lulic springs. After construction operations, the contractor shall seek clearance from relevant authorities that the springs are in its natural state prior to departure.	BTL	PMU	O&M Cost
PC2. WATER TREATMENT AND PROPOSED STORAGE									
2.1. New installation of disinfectant system in the proposed or selected storage	2.1.1. Waterborne disease towards consumers due to Water sources with lower quality and not in compliance with WHO standards	3	2	6	S-	2.1.1.1. Upgrade of the design of new treatment plant and storage facilities by applying disinfection, chlorination or Calgon dosing system	BTL and DED Consultants	PMU / BTL	Included in Project Cost Included in subproject design
2.2. Remodelling / rehabilitation of existing water tanks	2.2.1. Insufficient treated water due to leakages (poor infrastructure) and lesser capacity of the water tanks	2	2	4	MS-	2.2.1.1. Increase the water storage capacity and design by adjusting water demand estimation for 2040	BTL and DED Consultants	PMU / BTL	Included in Project Cost Included in subproject design
PC3. PROPOSED DISTRIBUTION NETWORK									
3.1. Identification of cultural, historical & touristic sites	3.1.1. Impairment of the cultural heritage properties due to construction activities	3	5	15	S-	3.1.1.1. Prepare Safeguard Plan for each cultural site under risk and request license for each at the Cultural Directorate Project activities during construction phase will be monitored by assigned personnel from the Culture Department. Preparation of the rehabilitation activity must be done together with the Directorate that represents the Secretariat of State for Culture at the Municipal level. Pre-construction, the contractor must review these immovable asset locations and request approval of a Safeguard Plan for each of the assets, making sure that during the Construction activities, those sensitive heritage sites within 50 m radius of the construction activities should not be interfered with or impacted on, and the rules as mentioned in Decree Law No. 33 /2017 for Cultural Patrimony Protection are followed, with the request, by the contractor, of a	Contractor	BTL / PMISC / PMU	Included in Bid price

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						license /authorisation for intervention in the area. The sites will be demarcated to limit construction works outside the area and restrict access to the sites unless authorized by relevant authority. In case a new cultural/historical heritage site is identified during the construction, the Contractor will notify the BTL and follow the same procedure regarding these sites. Precautionary measures will be taken by all construction workers to prevent damage to the sites. After construction operations, the contractor shall seek clearance from relevant authorities that the sites are in their natural state prior to departure.			
3.2 Preparation of Project for H&S and O&M	3.2.1. Risk to Workers H&S - General	2	3	6	S-	3.2.1.1. Preparation of a Health and Safety Plan and definition of Contractor HSE representative (including COVID-19 related mitigation measures (see C.3.3.7 and Appendix 2 for applicable COVID Protection and Mitigation Measures)) Toolbox meeting Train all site personnel on environmental health and safety Provide personal protective equipment to workers and ensure their effective usage Maintain accident reports and records Make first aid kits readily available Ensure moving equipment is outfitted with audible backup alarms	Contractor	BTL / PMISC / PMU	Included in Bid price
		2	3	6	S-	3.2.1.2. Catalogues, manuals and signage shall be provided in Tetum translation	Contractor	BTL / PMISC	Included in Bid price
	3.2.2. Risk to Community H&S - Traffic Accidents and Communicable Diseases	2	6	12	S-	3.3.2.1. Traffic management plan Prepare traffic management plan which will include: a) How the contractor will inform the community and businesses of construction traffic routes b) Any advice/information the contractor will give to affected people during construction c) How the contractor will manage traffic including any road closures. Trained traffic marshal will be used to direct vehicle movements on and around construction sites and in all urban areas. Disseminate information to the community on Safe Traffic during Construction Speed limits will be determined for vehicles, below 50 km/hour per hour in city area and <40 km/hour in residential areas Apply the H&S Plan and distance the community from physical, chemical or other hazards associated with sites under construction and decommissioning (including COVID-19 related prevention and reaction (see C3.3.7 and Appendix 2 for applicable COVID Protection and Mitigation Measures))	Contractor	BTL / PMISC / PMU	Included in Bid price
		3	2	6	S-	3.3.2.2. Disseminate information i.e. information flyers to the community within the 15 km radius of the project area related to transmissible disease i.e. COVID-19, etc and relation to project activities	Contractor	BTL / PMISC	Included in Bid price

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
PC4. SANITATION (PUBLIC TOILETS & FSTP)									
4.1. Improvement of Water Distribution System in the city	4.1.1. Increase in wastewater volumes and groundwater contamination	2	3	6	S-Ind	4.1.1.1 Draft Proper Septic Tank design and implementation of rules for construction in dwellings	BTL / DED Consultant	PMISC / PMU	Included in Project Cost Included in subproject design
						4.1.1.2 Widespread communication plan / program on BTL recommended septic tank design	BTL / PMISC	PMU / BTL	O&M Costs
4.2. Location for proposed FSTP	4.2.1. Inundation and erosion, emergence of odour, traffic accidents and noise towards the nearby community	3	2	6	S-	4.2.1.1. Flat terrain preferred, out of floodplain, distant from residences or sensitive areas, close to farming areas and river receptor	BTL DED Consultant	PMISC / PMU	Included in Project Cost Included in subproject design
	4.2.2. The FSTP might be located in private land	2	4	8	S-	4.2.2.1. Resettlement plan and Compensation to the affected party	BTL / DED Consultant	PMU / BTL	Included in Project Cost
4.3. Wastewater disposal from FSTP	4.3.1. Soil and Surface water contamination	3	2	6	S-	4.3.1. Design of FSTP for best quality effluent and irrigation cropping area as final refining treatment	BTL / DED Consultant	PMU / BTL	Included in Project Cost Included in subproject design
CONSTRUCTION PHASE									
C1. WATER SOURCES									
1.0. Activities related to Infrastructure Construction	1.0.1. General Impacts (noise, air quality, siltation, H&S, etc)					(see C3. Water Distribution for related impacts mitigation measures)			
1.1. Inadequate protection off spring intake structures during rehabilitation	1.1.1. The water from intake and river will flow and may cause soil/silt erosion.	3	1	3	MS-	1.1.1.1. Temporary drainage provision that links to safe surface water drainage.	Contractor	BTL / PMISC	Included in Bid price
	1.1.2. Socio-cultural impact	3	2	6	S-	1.1.2.1. Involvement of <i>lia nain</i> for cultural ceremony preparation	Contractor / BTL	PMISC / PMU / BTL	Included in Bid price
C2. WATER TREATMENT AND PROPOSED STORAGE									
2.0. Activities related to Infrastructure Construction	2.0.1. General Impacts (noise, air quality, siltation, H&S, etc)					(see C3. Water Distribution for related impacts and mitigation measures)			
2.1. Upgrading construction activities for water tanks and	2.1.1. Chemical substance exposure towards the workforces due to disinfection	2	3	6	S-	2.1.1.1. Provision and obligatory use of PPE for chemical handling	Contractor	BTL / PMISC	Included in Bid price

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
water treatment plant	installation								
C3. PROPOSED DISTRIBUTION NETWORK									
3.1. Induction of Contractor	3.1.1. Enhanced impacts because of lack of knowledge of the EMP	3	3	9	S-	3.1.1.1. Induction meeting for EMP understanding and Project "Go-ahead"	BTL / PMISC / PMU	BTL	Included in Project Cost
3.2. Construction Activities – Macro Benefits	3.2.1. Local Employment Generation	3	3	9	S+	3.2.1.1. Recruitment of skilled and unskilled workers from affected community, in coordination with the local authorities	Contractor	BTL / PMISC / PMU	Included in Project Cost
	3.2.2. Enhance workers' skills	3	3	9	S+	3.2.2.1. "on-the-job" training program for workers, particularly unskilled workers	Contractor	BTL / PMISC / PMU	Included in Project Cost
3.3. Construction campsite	3.3.1. Campsite Location and Landslides	2	2	4	MS-	3.3.1.1. Establishment of camp on stable and flat surface area, and where it would not cause soil erosion. The contractor arranges all land, yards, stores, workshops, offices, etc. for the purpose of the contract. Apply mitigation measures to all sites to prevent impacts to surrounding community and environment. After use, sites shall be cleared and restored to status as they were or to stable conditions with vegetative cover. The contractor demonstrates and follows the CEMP specifications for the all sites to minimize obstruction and nuisance to the public e.g., pollution of fuel and oil spillages, washing of concrete mixers and etc. The Contractor provides, maintain suitable and sufficient shelters, and mess rooms for his workmen, as well as provide sufficient closets or latrines to the Engineer and relevant authority, and the closets shall be screened and maintain in clean and sanitary state at all times. The mess rooms, closets and latrines shall be located in positions to be approved by the Engineer. The Contractor responsible for making arrangements for the disposal of waste from mess rooms, closets and latrines.	Contractor	BTL / PMISC / PMU	Included in Bid price
						3.3.2.1. Establishment of a Proper Latrine System Installation of appropriate latrine with Septic Tank for construction workers in the camp site, at least 30 m away from any water source or constructed downhill from water sources within 30 m.			
	3.3.3. Water Source for Campsite may compete with Community Sources	2	2	4	MS-	3.3.3.1. Establish a water tank and source water for construction from BTL authorised sources 3.3.3.2. Purchasing sufficient potable water supply in the form of litre bottles or in gallons, for all construction staff throughout the duration of the construction activities.	Contractor	BTL / PMISC / PMU	Included in Bid price

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
	3.3.4. Storage and Management of Hazardous chemicals and materials may bring spills, fire hazards and H&S problems	2	3	6	S-	3.3.4.1. Proper storage and handling of chemicals and materials Allocation of proper containments and labelled, suited for the nature of chemicals and/or waste will be provided by the contractor and maintained throughout the duration of the Construction phase; Refuelling only in designated areas which are to be 50 m from a water course and drip trays to be used when refuelling or topping up / changing machinery fluids Materials hauled directly to work front, minimizing storage at campsite. Asbestos containing material i.e. used pipes to be confined covered, unbroken and with limited access from people; Train/Inform workers/draft Guideline on identifying and risks of mishandling ACMs Prepare special team to remove ACMs from construction areas Coordinate with DNCP to determine final solution for ACMs	Contractor	BTL / PMISC / PMU	Included in Bid price
	3.3.5. Non-hazardous Solid Waste Improper handling and storage and vector diseases	2	2	4	MS-	3.3.5.1. Implementation of Solid Waste Management System; Minimize domestic waste production on site and implement reuse of waste where possible; Immediate disposal of waste in designated bins/areas induced by the contractor; Waste bins will be kept closed to prevent the accumulation of water during rain events; Regular emptying of waste bins and transport to approved disposal sites, with coordination with local authorities of appropriate dumpsites. If no accredited landfills exist near the area or service contractors are not available, burning of solid wastes may be permitted only in controlled conditions under the guidance of the Environmental authority.	Contractor	BTL / PMISC / PMU	Included in Bid price
	3.3.6. Food for construction personnel may compete with food supply for the local communities	2	3	6	S-	3.3.6.1. Food for Workers may conflict with local community supply Ensuring adequate source or supply of food for workers so as not encourage poaching or interfering with the local food production unauthorized. Prohibition of poaching in the protected area or anywhere else Encouraging purchase of food from local vendors. Provision of cooking facility so as not to encourage the use of firewood for cooking If the availability of fuel is limited, the use of firewood for cooking will be confined in designated areas and the use of wood will be limited from timbers harvested from the project's clearing activity and no other.	Contractor	BTL / PMISC / PMU	Included in Bid price
	3.3.7. COVID-19 transmission risks between workers and community in Camp and Work sites	3	3	9	S-	3.3.7.1. COVID-19 Construction site and Work Site Management mitigation measures <ul style="list-style-type: none"> Follow Appendix 2 indications for campsite and worksite COVID-19 management Plan and execute work in compliance with country-specific COVID-19 risk management regulations and directives including directions of the General Department of Labour, Secretariat of State of Labour, and Vocational Training. Conduct workplace risk assessment to identify low, medium or high exposure 	Contractor	BTL / PMISC / PMU	Included in Bid price

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						<p>risk to COVID-19. Include an action plan for prevention and mitigation of the spreading of COVID-19 in the COHSE Plan.</p> <ul style="list-style-type: none"> • Risk communication, training, and education. Training of workers in infection prevention and control practices. • Adopt engineering, organizational and administrative measures, plan work so employees can keep distance from each other and minimize contact. • Provide clear and visible guidelines on how to prevent infection at the construction site and initiatives taken. • Regularly clean and disinfect. • Screen on entry the temperature of each person entering the work site and record their contact details to facilitate tracking of infected persons should there be a need • Promote personal hygiene (including hand and respiratory hygiene), make wash basins and sanitizers available at entry, break area, and washrooms. • Provide PPE and inform workers of its correct use. • Health surveillance and insurance. • Consider other hazards, including psychosocial. • Review emergency preparedness plans. • Review and update preventive and control measures as the situation evolves and involve workers/ occupational H&S groups in the review. 			
3.4. Construction Materials	3.4.1. Sand and stone Extraction and disturbances to environment	3	5	15	S-	3.4.1.1. Sand and Stone Sourcing Management Contractor to source its materials from duly authorised/licensed suppliers Contractor to ensure these suppliers carry out their extraction activities without provoking unacceptable environmental damage	Contractor	BTL / PMISC / PMU	Included in Bid price
3.5. Construction Work Front: All Infrastructure	3.5.1. Servicing and Fuelling of Construction Equipment and spills and pollution	2	4	8	S-	3.5.2.1. Equipment and Vehicle Maintenance and Monitoring Ensuring all construction vehicles are in good condition and an acceptable state of repair before the start of the construction phase; Prohibition of use of dilapidated equipment and vehicles with leaks and causing spills; Designating suitable locations for re-fuelling and changing oil and lubricant; Accidental spills will be cleaned immediately and provision of drip trays to collect any oil or fluid drips; Fuel will be stored in a central depot, made of concrete slab or impermeable surface capable of containing at least a volume of one container, located within the central base camp.	Contractor	BTL / PMISC / PMU	Included in Bid price
	3.5.2. Excavation, Cutting and Filling and safety hazards to Public and workers	3	3	9	S-	3.5.2.1. HSE demarcations and signage Set up adequate demarcations/barriers and establish visible warning signs in excavated, cut and filled areas for safety precautions (pedestrians and traffic).	Contractor	BTL / PMISC / PMU	Included in Bid price
	3.5.3. Stockpiling and Storage of Construction materials and dust, water runoff damage to existing	2	3	6	S-	3.5.3.1. Spoils and Stockpiles Handling and Storage Plan Preference must be given to use of spoil other construction sites, or disposed in spent quarries or borrow pits ^{SEP}	Contractor	BTL / PMISC / PMU	Included in Bid price

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
	utilities due, buildings and drainage blockage					<p>Uncontaminated spoil to be disposed of in Government approved sites, which will not be on agriculturally productive land, within 50m of a water course, including stream, river or irrigation channel, on sloped land, within 50 m of cultural heritage sites, within 100 m of any other culturally or ecologically sensitive feature.</p> <p>All stockpiles will be situated within the campsite or designated areas on-site that can easily be accessed by equipment and personnel and will cause minimal interference to the movements of vehicle and personnel in the project site.</p> <p>Identify stockyard areas in consultation with local administration, if not in base camp</p> <p>Reuse excess spoils and materials at all times;</p> <p>Covering of stockpiles with impermeable material like plastic, to protect from wind and rain events.</p> <p>Excess rocks and sand as a result of excavation activities to be disposed properly and not dumped next to surface waters or left prior to departure.</p> <p>Design with adequate drainage for outlets to prevent wastewater into water sources.</p>			
	3.5.4. Excavation, Cutting and Filling and soil Erosion	2	2	4	MS-	<p>3.5.4.1. Excavation procedures</p> <p>Excavations will only be started once all required materials and services are on their allocated sites and a layout already established for the transport of materials.</p> <p>Excavations, cuttings and fillings will be carried out in a manner to reduce soil erosion.</p> <p>Sand, aggregates and cement will not be situated in areas prone to soil erosion.</p> <p>Where access is impeded, provide for temporary passageways and communicate/inform dwellers and institutions</p>	Contractor	BTL / PMISC / PMU	Included in Bid price
	3.5.5. Construction and Noise Disturbance to surrounding communities and sensitive areas	3	2	6	S-	<p>3.5.5.1. Implementation of Noise Management System;</p> <p>Implementation of working hours (permissible working activity from 7 AM to 7 PM)</p> <p>Queuing and idling of construction vehicles outside the premises of the camp site and outside operating hours specified is prohibited</p> <p>Use of power horns is banned.</p> <p>Dissemination of information to the community</p>	Contractor	BTL / PMISC / PMU	Included in Bid price Included in subproject design
	3.5.6. Construction and dust (Air quality decrease) to the community	3	2	6	S-	<p>3.5.6.1. Implementation of Air Quality and Dust Management System;</p> <p>Watering of surface through water truck, sprinklers or hoses, 2-3 times a day, particularly during dry season and high traffic volume or whenever required due to inspection and/or GRM complaint. Keep a detailed log of incidents when excessive visible dust emissions occur, the actions taken and an approximate rate of water application noted.</p> <p>Covering of stockpiles during periods of high wind</p> <p>Minimize movement of heavy vehicles and Limit velocity to 40 km/h in residential and 50 Km/h maximum in urban area.</p>	Contractor	BTL / PMISC / PMU	Included in Bid price

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)			
							Implementer	Supervision				
	3.5.7. Construction and Impact on Ecological Resources	3	2	6	S-	3.5.7.1. Sensitive Areas Management Plan Apply measures in PCI.1.1.2 Vegetation and tree re-planting Limitation of noisy works in order to stabilize the fauna's mobility Restrict haphazard site clearing, parking, and movement of heavy vehicles and equipment stockpiling	Contractor	BTL / PMISC / PMU	Included in Bid price			
	3.5.8. Impacts on Socioeconomic Resources, Infrastructure and Utilities and Cultural Sites	2	3	6	S-	3.5.8.1. Reduction of Impact on established business activities and others Make available temporary access ways to all businesses and activities affected Determine compensation to business justifiably affected and demonstrate reduction of income due to project Follow the Heritage License rules for each site, defined by the SSCulture and apply measures in PCI.2.3.1 and PC3.1.1.1.	Contractor	BTL / PMISC / PMU	Included in Bid price			
3.6. Site clean-up and rehabilitation of locations	3.6.1. Unattended construction materials left on site may pose health and safety hazards to the public.	2	2	4	MS-	3.6.1.1. Site Clean-up Plan All temporary structures, materials, waste and facilities used for construction activities will be removed upon completion of the project. Excess rocks and sand as a result of excavation activities are not to be dumped next to surface waters and left prior to departure. Coordinate with local authorities of appropriate sites where mass load are needed. This had to be spread in natural looking manner and left in a stable state. Latrines will be covered with soil prior to departure. If full, cover with 30 cm of soil mixed with dry plant matter.	Contractor	BTL / PMISC / PMU	Included in Bid price			
C4. SANITATION (PUBLIC TOILETS & FSTP)												
4.0. Activities related to Infrastructure Construction	1.0.1. General Impacts (noise, air quality, siltation, H&S, etc)					(see C3. Water Distribution for related impacts mitigation measures)						
OPERATIONAL AND MAINTENANCE PHASE												
O1. WATER SOURCES												
1.1. Protection of the water source quality	1.1.1 Declining of the water source quality	2	3	6	IS-	1.1.1.1 Implementation of Upstream Watershed Protection Programs, with restriction to water quality impacting activities i.e. animal husbandry, slash and burn, etc;	BTL / PMISC	PMU / BTL	O&M Costs			
						1.1.1.2. Improvement program for all existing and future dwelling sanitary infrastructure i.e. BTL septic tank design template, in the community surrounding the water source				BTL / PMISC	PMU / BTL	O&M Costs
						1.1.1.3. Involve the liaison and communities for cultural ceremony preparation and Tara Bandu protection of the source						
O2. WATER TREATMENT AND PROPOSED STORAGE												
2.1 Mishandling of chlorine	2.1.1 Health hazards towards the operators	3	3	9	S-	2.1.1.1 Ensure proper storage and handling practices for chemicals Chemicals should be placed properly in an indoor warehouse, banded, with no sun exposure and room temperature control and access limited to authorized personnel only	BTL / PMISC	PMU / BTL	O&M Costs Included in subproject design			

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						2.1.1.2 Ensure the knowledgeable and skilled person is in charge of chlorine handling Provide training with simulation performances and equipment to improve worker on handling the Chlorine			
						2.1.1.3 Ensure use of PPE while using chemicals			
O3. PROPOSED DISTRIBUTION NETWORK									
3.1. Sound Operation of Clean Water Distribution System	3.1.1. Improved Health and Hygiene	3	5	15	S+	3.1.1.1. Proper operation of the Distribution system Regular maintenance of the project's components, monitoring and running the system and enforcing policies and procedures	BTL / PMISC	PMU / BTL	O&M Costs Included in subproject design
3.2 Drinking water supply system	3.2.1 Delivery of unsafe Water	3	3	9	MS-	3.2.1.1 Contractor to prepare operations and maintenance plan for the whole water system, particularly for water treatment and storage	Contractor / BTL / PMISC	PMU / BTL	O&M Costs
						3.2.1.2 Implement SPS-compliant EMP and a Water Quality Control Program (WQCP) (as per DL31/2020) that: • Identifies the location of water sources (ground or surface) • Identification of Supply Zones • Description of the water treatment applied • Average daily Volume per Supply Zone • Population served by supply zone • Identification of sampling points per supply zone • Sampling Plan (Chronogram) with sampling points and dates	BTL / PMISC	PMU / BTL	O&M Costs
					3.2.1.3 Monitor water quality Perform water analysis according to DL31/2020 Annex II (Daily Routine Control at each WTP exit and monthly Full Control at Sampling point grid)	BTL / PMISC	PMU / BTL	O&M Costs	
	3.2.2 Detection and repair of leaks and pipe bursts	1	3	3	MS-	3.2.2.1 Ensure leak detection and restoration time is minimized to the extent possible	BTL / PMISC	PMU / BTL	O&M Costs
	3.2.3 Excessive algal growth in Tanks.	2	1	2	IS-	3.2.3.1 Water Tank Maintenance and Cleaning Schedule Close water tanks all the time to avoid algae growth Clean tanks as per the O&M frequency schedule.	BTL / PMISC	PMU / BTL	O&M Costs
O4. SANITATION (PUBLIC TOILETS & FSTP)									
4.1. Sanitation facilities (toilets and sludge disposal site)	4.1.1. Contamination of land or waterways due to overflow of septic tanks and the uncontrolled dumping of the sludge	3	2	6	S-	4.1.1.1. Further septic tanks will be designed to ensure maximum retention is achieved and will be emptied at the required frequency (min every 2 years). Households will be educated to reduce the likelihood of septic tank overflows and uncontrolled dumping of sludge	BTL / PMISC	PMU / BTL	O&M Costs Included in subproject design
4.2. Operation of FSTP	4.2.1. Soil and Groundwater contamination from Sludge disposal	2	2	4	MS-	4.2.1.1. Treated dried sludge distributed for farming activities and Effluent to Cropping Area	BTL / PMISC	PMU / BTL	O&M Costs Included in subproject design

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
						4.2.1.2. FSTP Malfunction <ul style="list-style-type: none"> Commissioning phase of WWTP to ensure design discharge standards can be met. Discharge to be tested prior to release into the environment. Provision of adequate budget for O&M to ensure regular effluent quality monitoring. If the treated effluent consistently fails to meet discharge standards, operator to discuss and agree with MPW and SSE on a way forward to return to compliance. 	BTL / PMISC	PMU / BTL	O&M Costs MM already included in subproject design
	4.2.2. Community and Occupational Health & Safety risks of the FSTP infrastructure	2	2	4	MS-	4.2.2.1. Health a & Safety Manual as Part of the Operation & Maintenance Manual which includes: <ul style="list-style-type: none"> A signed commitment from the operator to a) understand and b) comply with IFC Environmental Health and Safety guidelines (2007) A training program for workers in workplace safety of FSTP operation Conduct safety orientation trainings including regular safety drills for workers. Provision of appropriate and adequate PPE for all operational staff and workers (including regular training and drills on the use of PPE and other emergency equipment). Prevent public access to the FSTP with fencing and appropriate signage. Cover as much standing water as possible and regularly treat for mosquitoes during seasons of high incidence of mosquito- borne diseases such as dengue fever 	Contractor BTL / PMISC	PMU / BTL	O&M Costs
	4.2.3. Odour occurrence	2	1	2	IS-	4.3.3.1. Odour Management Measures Institute good operation practices in the FSTP operation procedures and uphold proper maintenance of the facility Regular Cleaning of access road for truck septage spills Recording and managing complaints from the public to identify odour non-compliance occurrences cases that require improvement	BTL / PMISC	PMU / BTL	O&M Costs
DECOMMISSIONING PHASE									
D1. WATER SOURCES									
Abandoning certain low flow-water sources according to Scenario 1, 2 and 3	No expected impacts	0	0	0	-	N/A	N/A	N/A	N/A
D2. WATER TREATMENT AND PROPOSED STORAGE									
N/A	No expected impacts	0	0	0	-	N/A	N/A	N/A	N/A
D3. PROPOSED DISTRIBUTION NETWORK									
Existing pipes to be deactivated	Reduce aesthetic value	2	1	2	IS-	Buried pipes located along the trench of new pipes are to be removed and all the material have to be transported to a final safe disposal area	Contractor	BTL / PMISC / PMU	Included in Bid price

Table 10-1 - Environmental Management Plan MatrixActivity	Potential Impact	Scale of present condition (1-3)	Scale of impact (1-6)	Product	Rating	Mitigation Measures	Responsibility		Estimated Cost (\$)
							Implementer	Supervision	
	Risk of asbestos particle becoming airborne from damaged AC Pipe	2	2	4	MS-	Buried pipes located outside the trench of the new pipes are to be maintained buried in order to avoid more works, costs and other impacts			Included in subproject design
	Mixture of older and new pipes for future installation or replacement	3	1	3	MS-	Pipes installed above the ground will be removed and all the material have to be transported to a final safe disposal			
D4. SANITATION (PUBLIC TOILETS & FSTP)									
Management plan	N/A	0	0	0	-	Provide justification data for the decommissioning including technical and socio-economic studies Stakeholder engagement (Liaise with the stakeholders in identifying the need for decommissioning) Develop decommissioning Action Plan	BTL / PMISC	PMU / BTL	O&M Costs
Conduct comprehensive environmental Audit	Demolition affecting the existing trees to be cut down, and other vegetation to be removed	3	1	3	MS-	Carryout benching and landscaping after demolition Improve on the catchment's protection through planting vegetation cover	BTL / PMISC	PMU / BTL	O&M Costs O&M Costs
	Leftover Solid waste reduces environment aesthetic, and stockpile runoff may cause decline of water quality	3	1	3	MS-	Recycling and reuse of all wastes generated	BTL / PMISC	PMU / BTL	O&M Costs

II PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

II.1 Consultation and Participation under the IEE process

The IEE procedure for Category B projects, under Decree-Law no. 05/2011, requires the proponent to undergo a full Public Consultation. Likewise, the project follows ADB's Safeguard Policy (ADB, April 2009), which requires borrowers/clients to perform meaningful consultation with affected people.

II.1.1 Viqueque Municipality Public Consultation (10th October 2020)

The ADB IEE (ADB, 2020) undertook Public Consultation for Viqueque in the Municipal Administrative Assembly Room on the 10th of October 2020, participated by local government agencies and authorities (Chief of Suco and Village), and representative members of the communities within the project area, where the issues of significant social concern, predicted environmental impacts and proposed mitigation measures were presented, in order to collect all useful and relevant inputs from them, for the project construction phase.

The stakeholders presented their concerns, suggestions and recommendation for the project implementation, focussing mainly on issues such as Coverage area of the project, Design of the public Toilets, Water distribution system that does not cover or serve all villages, Misuse by consumers (and direct impact on water availability in the distribution system and Cultural sites and new constructions within project area (see Appendix 8 for Viqueque Public Consultation Notes).

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 II-1 - Viqueque Public Consultation; participation of the Local Leadership and Other Stakeholders



11.1.2 Suco Social Public Consultation (12th and 13th December 2020)

In addition, 4 other Public Consultations, carried out under the social component in Suco Carabalu (12th December 2020), Suco Loihuno (12th December 2020), Suco Uma Quic (13th December 2020) and Suco Uma Uain Craic (13th December 2020). All PCs registered a significant attendance especially with a strong female participation. After the non-technical presentation of the project, the floor was given to the attendees to discuss water supply and sanitation issues related to the project. Suco community deliberated on the location and the layout of the future Public Toilets. The list of participants are displayed in Appendix 15.

The Suco community members present deliberated on the location and the layout of the future Public Toilets. A layout with gender segregation was generally accepted by the community.

The community acknowledges the lack of proper water and sanitation system. Specifically, for the water component it is a time-consuming activity to transport water from the source to the household. To make potable, water is then boiled before using which entails in an additional cost for fuel (mainly wood).

It was observed that the community in general is willing to extend their cooperation as the activities are proposed to enhance the infrastructure service levels and their living standards. Thus, they are supportive of a paid water distribution system and the use of Public Toilets. The creation of a water users association that would support BTL teams is also generally accepted. The community welcomes the opportunity to be part of the project either in the construction phase or in the Operation and Maintenance stage, reinforcing the role of BTL employees.

The results of these Public Consultations further confirmed the expectations and worries stated in the previous general Viqueque 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.

Figure 11-2 - Suco Carabalu Public Consultation



Figure 11-3 - Suco Loihunu Public Consultation



Figure 11-4 - Suco Uma Quic Public Consultation



Figure 11-5 - Suco Uma Uain Quic Public Consultation



11.2 Consultation in upcoming Project Phases

11.2.1 Consultation during the SEIS/EMP Domestic process

As we have seen above, many instances and public consultation events have been done for this project, in the feasibility stage under the ADB SPS process, covering both estimated social and environmental impacts and mitigation measures for all project components. However, the national domestic process has the same requirements regarding Public Consultation. If the ANLA considers that all the public consultations carried out, to date, for this project, are not enough to fulfil the legal requirements, the PDC, together with the BTL and PMU, will conduct a Public consultation regarding the SEIS/EMP of the project, with the objective to receive final comments and questions regarding the project's environmental safeguards, from the communities and their local leaderships. A tentative agenda for said meeting is below: (i) general overview of the projects; (ii) project benefits, positive impacts and outcomes; (iii) potential environmental impacts from the subprojects; (iv) proposed measures to mitigate them; (v) existence & implementation of the SEIS Environmental Management Plan (EMP) that includes environmental mitigation and monitoring; (vi) the construction phase and the obligation of the Constructor Environmental Management Plan (CEMP); (vii) existence and observance of a grievance redress mechanism during project implementation; and (viii) compliance with Timor-Leste and ADB environmental safeguard policies.

11.2.2 Consultation during Construction

Prior to the start of construction, the contractor, BTL and the PMISC will conduct information dissemination sessions and request support of the local community leaders to encourage the participation of the people to discuss the various environmental issues. At each Aldeia, focus group meetings will be conducted (lead by BTL and the constructor) to discuss and plan construction work with local communities and thus reduce disturbance and other impacts, as well as provide a mechanism through which stakeholders can participate in project monitoring and evaluation.

Constant communication will be established with the residents and communities to redress the environmental issues likely to surface during construction and operational phases and also regarding the grievance redress mechanism. The Municipality, together with BTL and PMISC will organize public meetings and will appraise the communities about the progress on the implementation of the EMP. Meetings will also be organized at potential hotspots/sensitive locations before and during the construction i.e., Water Sources and/or close to cultural sites.

11.3 Information Disclosure

For disclosure and information purposes, a copy of the IEE/SEIS/EMP with the Executive summary translated into Tetum (local language) will be distributed to each of the BTL relevant Department Heads and one copy to each of the Chiefs of Aldeia, for local public access to information, creating wider public awareness. As BTL does not have an active website, additional copies will be made available to the public, on request, to the BTL Management.

An Electronic version of the IEE/SEIS/EMP in English and Executive Summary in Tetum will be placed in a website indicated by the BTL (MPW, ADB, Consultant or other) and the stakeholders will be made aware of the grievance register and redress mechanism.

Public disclosure meetings will be conducted at key project stages to inform the public of progress and future plans. Prior to construction start, the Municipal Authority and BTL will issue a Notification on the start date of implementation.

A board showing the details of the project will be displayed at the construction site for general public information.

12 DIFFICULTIES ENCOUNTERED

The process to SEIS and EMP preparation phase has been quite challenging for the Team. The Covid-19 pandemic had been affecting nationwide with the establishment regulations during the State of Emergency last year in 2020 up to June 2021. In the earlier 2020, the Environment Team had to postpone the second field visits after carrying out preliminary site visits for the Inception Report due to sanitary restrictions to leave the Capital city, creating a time gap in commencing the ADB Initial Environmental Examination (IEE) draft which led the Team to depend temporarily on the available information from desktop research and previous collected data. In addition, during the State of Emergency, Government services, working hours and conducting physical meetings were limited or not possible to carry out, thus only long-distance communication i.e., phone or video calls, were the preferential method of communication to continue the project to where possible.

After the restrictions were loosened in the middle year of 2020, the Team successfully managed to collect necessary information as needed through second site visits, under compliance with the Covid-19 protocol i.e., wearing face masks, regularly washing hands, social distancing, etc. During the visit, it was quite difficult to propose future infrastructure location, given it somehow coincided in or adjacent to a sensitive area, private land status, or was environmentally incompatible, or was even earmarked for municipal development expansion. To accelerate the working progress, the Team was able to get help from Municipal BTL technicians in order to perform due diligence actions for final project chosen locations.

The natural conditions in the project area also proved to be a technical challenge. Previously, it was expected that there would be enough water in the existing area from the proposed boreholes, irrespective of the scenarios prepared in the Assumption Report. After performing bore well testing on October 2020, the prospection areas didn't present the water required and expected, with scarce water production in all of the 4 selected boreholes, as demonstrated in VIQUEQUE BORE INVESTIGATION RESULTS. This predicament triggered more delay and technical engineering requirements to substitute borehole sources for another viable source: surface water Kuha River exploration, with a new water intake and water treatment plant, to bring the water quality in said river does to the drinking water quality standards in effect.

The water quality sampling and testing had also been hindered due to another total lockdown since March 2021 until June 2021, forbidding again citizens to travel to districts. After the abolishment of lockdown in June 2021 and in adherence to a new regulation, technical members will start the related activity in the project area once they are all vaccinated. The result of the activity will then be analysed to complete the project's design.

13 CONCLUSIONS AND RECOMMENDATIONS

This IEE study was carried out at the planning stage of the project, where primary and secondary data have been used to assess the potential environmental impacts in a comprehensive manner. This report provides a picture of all potential environmental impacts associated with the Project, and recommended suitable mitigation and monitoring measures.

Assessment of the project characteristic and details with the existing conditions revealed that, although the project traverses a relative number of residences along its road route, the proposed works will be temporary and of short duration, as well as the impacts.

The EMP (disclosed as a separate document), if implemented as directed, will mitigate impacts on the natural environment and affected people to an acceptable level. The extent of adverse impacts is expected to be local, confined within the projects' main areas of influence, quarry or burrowing sites, waste disposal sites, and the routes to and from these sites. With mitigation measures in place and ensuring that the bulk of earthworks are completed before the onset of the rainy season, the potential adverse impacts during construction would be site-specific.

The few adverse impacts of moderate magnitude during construction will be temporary and short-term (i.e., most likely to occur only during peak construction activities). Noise, dust/emissions or indeed impacts on the natural hydrology or ecology are not anticipated and all the predicted impacts that have been identified can be mitigated and managed to minor levels.

During operation, the potential delivery of unsafe water can be mitigated with good operation and maintenance, prompt action on leaks, and complying with the required quality monitoring of supplied water as prescribed in the National Drinking Water Quality Standards Legislation.

The mitigation measures, integral to socially and environmentally responsible construction practices, are commonly used at construction sites and are well known to Contractors. Hence, they will not be difficult to implement.

The key parties for mitigation measure implementation are the construction contractors and the BTL. The implementation of the EMP will be closely monitored and reported on by the relevant stakeholders in the project.

14 NON-TECHNICAL SUMMARY

14.1 Introduction

The Project is a continuation of the ADB Second District Capitals Water Supply Project, now in the Detailed Engineering Design (DED) phase. Its main objective is to provide improved water supply and sanitation services to Viqueque city community, rehabilitating the existing infrastructures that are currently in a very poor condition, and to encourage and give technical training to members of related stakeholders in maintaining the sustainability of the future facilities.

Part of the design is to draft documents relevant to what is mandated in Decree Law 5/2011 about environmental licensing. As the initial stage prior to project categorization, the Ministry of Public Works (MPW) recognized its duty to file a Project Document as a scoping document for the National Authority for Environmental Licensing (ANLA) to consider and categorize the project under the environmental licensing regulations.

Now with a Category B, classified by ANLA under DL 05/2011 - Environmental Licensing, this SEIS/EMP has been prepared by Endidro / Aguas de Portugal / OASIS to continue the process with the Environmental Regulator. The work undertaken in preparing this report is based on the information collected by the Environmental Consultant during the preliminary meetings with the proponent and project site visits as a first step to follow the Environmental Licensing Procedure.

14.2 Where does the Project Fall within the Decree Law 05/2011?

This Project falls under the Decree-Law no. 5/2011 – Environmental Licensing, where all projects of public and private sectors that are expected to have significant impacts to the environment, must apply for an environmental license.

The 4 Municipal Capitals Water Supply and Sanitation Project (4 MCWSSP) for Viqueque falls into a Category B as stated in the letter from ANLA (Ref. No: 99/ANLA/SEA/MCAE/III/2021) issued on 18 March 2021. The categorization was decided based on the scale, location, activities and environmental impacts of the Project. Consequently, the Project carried out an Initial Environmental Examination (IEE) process by drafting the Simplified Environmental Impact Statement (SEIS) and the Environmental Management Plan (EMP).

14.3 What is an IEE Process?

The IEE is a process ruled by Timor-Leste legislation, through Decree-Law n. 05/2011 – Environmental Licensing, and supported by Ministerial Diplomas on the assessment of public and private projects.

After establishing the correct Category, the IEE follows a process with the stages mentioned below:

- Baseline analysis and Environmental Impact Assessment – this information is initially used to understand the potential environmental effects caused by the project (directly or indirectly), and inform the design team of the proposed development to minimize significant negative impacts;
- When significant negative impacts cannot be minimized through design changes, measures are considered to reduce those effects. Monitoring may also be considered to measure those impacts during construction phase to allow determine if measures applied are sufficient and appropriate;
- Once the IEE is completed, a draft of SEIS and EMP are submitted to the Environmental Regulator for Public Consultation;
- Public Consultation: the Proponent takes on board the comments from the Public Consultation and revises/finishes the SEIS/EMP documents and delivers a final version for decision on the environmental licensing to ANLA (National Environmental Licensing Agency / Agência Nacional de Licenciamento Ambiental).

14.4 Purpose and Structure of the Simplified Environmental Impact Statement (SEIS)

The SEIS is the document that provides the information about the baseline of the existing environmental condition of the Project and its surroundings.

The SEIS is comprised of different chapters that provide information on:

- Project Proponent; Consultant who prepared the IEE; Legal Framework;
- Description of the Project and the Environment; Alternatives;
- Impacts, Mitigation Measures and Monitoring;
- Public Consultation;
- Issues occurred in the SEIS;
- Conclusions and Recommendations.

14.5 Description of the Surrounding Socio Economic and Environment

The project is situated in the Viqueque Municipality, covering only certain Sucos namely Loihuno, Caraubalu, Uma Uain and Uma Quic. This Suco population is the primary receptor of the water supply services from this project, which, in 2015, counted with 2,315 private households, therefore water quality particularly in Loihuno I spring should also be the main focus for its treatment, given that the results show bacteriological contamination due to miscellaneous activities in the vicinity of the water sources and lack of protection from local BTL during operational activity.

Loihuno I spring is located in the foothill of a protected area Mount Builo in Loihuno Suco, northern part of the project site and surrounded by Mount Mundo Perdido. The geological formations in the Loihuno area and Mount Mundo Perdido are highly fractured limestone and the base sandy-shale and clay. Moving southward from Loihuno towards Viqueque in the hilly area is comprised of Baucau Limestone Formation and Bobonaro Scaly Clay Formation in the eastern two-thirds of Viqueque, which implies to landslide prone in certain part of the area.

While some areas slightly overlay the 15 Km project boundary, such as Mount Builo or several cultural heritage sites within the Project Area, identified during the environmental characterisation study, it is concluded that none are traversed or will be interfered with by any of the project sub-components or activities.

14.6 Project Description and the Affected Environment

14.6.1 What is the Project about?

The project is expected to produce several outputs, as described in the following below:

- To rehabilitate and expanding the Viqueque municipal capital urban water supply system in order to cover the demand volumes up to 2040;
- Establish fully functioning water supply and toilets in 4 (four) public locations;
- Influence and facilitate achieving new or improved households' sanitation in all served households in the Viqueque municipal capital and;
- Establish Faecal Sludge Treatment Plant (FSTP) and its disposal facilities within the 15 km diameter area.

The Viqueque Municipal Capital Water Supply and Sanitation Project will be loaned to the Government of Timor-Leste by the Asian Development Bank (ADB) and Be'e Timor-Leste, E.P. as the proponent will be responsible throughout the pre-construction up to the operational phase of the project. The project is expected to start its operation in 2022.

14.6.2 Brief Description of the Nature, Size and Location of the Project

The 4 MCWSS Viqueque project is located in the urban area of Viqueque Municipal 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.

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 infrastructures encompassing 15 km diameter urban area of Viqueque Municipal Capital.

The water distribution system and future expansion to new household areas in Viqueque Municipal Capital are decided to serve 3 Sucos, as followed:

- **Suco Loihunu:** includes the Loihunu I, II and III Spring System without any existing distribution system;
- **Suco Caraubalu:** where a small part of the Western area of the Suco includes roughly a 1/2 of the proposed Water Supply Network;
- **Suco Uma Uain Craic:** where a small part of the Western area of the Suco includes roughly 1/3 of the proposed Water Supply Network; and
- **Suco Uma Quic:** where a small part of the Northeastern area of the Suco includes roughly a 1/6 of the proposed Water Supply Network.

4 public toilets pilot tests are to be 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 I, 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 BTL - Viqueque.

14.6.3 Why do we need the project?

The Project will contribute into enhancing the quality life of the local people in health and hygiene sector particularly on women. The future significant improvement in women's health will lead to low rate of mortality, balance family and individual level. Other than that, shaping the local economy and boosting the livelihood of the community will likely occur as job opportunities will be available once the Project is commenced.

14.7 What are the project's impacts?

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.

All possible adverse impacts associated with the respective activities have been identified and discussed thoroughly in both SEIS and EMP. Based on the activities identified, the possible impacts listed below are considered significant and mitigation measures for each of them as elaborated in the EMP are needed to mitigate the impacts on site. The simplified potential impacts are as followed:

Possible Impact	Pre-Construction	Construction	Operation and Maintenance
Water quality	<ul style="list-style-type: none"> • Water pollution due to inadequate protection • drying up of the BTL boreholes & private wells due to over extraction 	Silt runoffs and soil wastes without final disposal site will trigger underground water contamination	Expansion of housing in the upstream with inadequate sanitation facility leading to water deterioration in the sources

Possible Impact	Pre-Construction	Construction	Operation and Maintenance
Noise		Increase in noise level from construction works, particularly nearby the affected households	
Air Quality		Increasing dust concentration	
Socio-economic	Water conflicts between communities	Job creation to local community and skill enhancement	Increasing life quality in health and hygiene sector due to the depleting rate of mortality and waterborne diseases. The community will be able to be more productive
Odour	Inadequate designation of buffer zone around FSTP	Organic wastes from construction materials without proper treatment and designating final site will reduce aesthetic view and produce odour nuisance	Irregular maintenance e.g., cleaning and treated sludge kept in an open space for certain period of time
Soil	Contamination to soil due to inadequate design causing increased runoff volume of untreated sillage	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	Soil pollution caused by: <ul style="list-style-type: none"> Households' septic tanks design does not follow BTL standard Runoff from the untreated wastewater and the accumulation of treated sludge in the open space
Traffic Management		Heavy load trucks mobilization and construction sites without barriers, signages and velocity limit will cause accident towards the affected community	
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	Accidents and even mortality for worst scenario towards the workforces without utilizing proper PPE	Health hazards due to chlorine exposure

14.8 Opportunity for Public Consultation, and Who have We Talked to About the Project?

The Public Consultation followed by the ADB's Safeguard Policy was previously conducted in October 10, 2020 in the Assembly Room – Viqueque Administration Office. The event was participated by local government agencies and authorities (Chief of Suco and Village), and representative members of the communities within the project area. In addition, 4 other Public Consultations, carried out under the social component in Suco Carabalu (12th December 2020), Suco Loihuno (12th December 2020), Suco Uma Quic (13th December 2020) and Suco Uma Uain Craic (13th December 2020). All PCs registered a significant attendance especially with a strong female participation. After the non-technical presentation of the project, the floor was given to the attendees to discuss water supply and sanitation issues related to the project.

If required by ANLA, the next Public Consultation will be conducted to support the IEE procedure for Category B projects, under Decree-Law No. 5/2011 and all the interested stakeholders' concerns and inputs will be recorded, registered and assessed in the next draft of IEE.

14.9 Conclusions for Now

The impact assessment in this SEIS/EMP exercise concludes that negative but temporary impacts may be generated by the project, predominantly during the construction phases. The affected community will have to suffer temporary disturbances and interference from the project activities but mitigation measures are established for the Contractor to be in compliance with and reduce these impacts. The overall positive or beneficial impacts will likely occur during the Operation and Maintenance phase as the socioeconomic sector will grow significantly, for instance the livelihood of the community will be improved, and secured health and hygiene will be guaranteed.

15 NON-TECHNICAL SUMMARY IN TETUM

Resumo Não Technical

Introdusaun

Projeto ne'e conitnuasaun husi ADB Second District Capitals Water Supply Project nebe'e maka la atinji ho suceso iha fase dahuluk no tamba ida ne'e agora iha obrigasaun halo foun relasaun ho nia dezenho inklui extende nia area nebe'e sei toma konta husi Kompania Engidro no Aguas de Portugal. Nia objetivo atu hadia abastecimento be'e nian no servico de saneamento ba comunidade Viqueque vila, rehabilitasaun ba infraestrutura nebe agora iha kondisaun att nia laran, no encouraga atu fornece treinamento tecnico nian ba membro parte interesada sira hodi nafatin mantain sustentabilidade ba facilidade sira iha futuro.

Parte husi dezenho ne maka halo dokumentus relevante baseia ba mandato Decreto Lei no. 5/2011 kona ba lisensiamentu ambiental. Hanesan fase dahuluk molok atu categoriza projeto ne'e, Ministerio Obras Publica rekohese ona sira nia knaar atu monta Projeto Dokumentus nian (Project Document) hanesan documento de escopo ba Autoridade Nasional ba Licenciamentu Ambiental (ANLA) atu konsidera no categoriza projeto ne'e tama ba regulamento lisensa ambiental nian.

Projeto Dokumentus agora nian prepara ona husi Engidro / Aguas de Portugal / OASIS atu continua prosesu Lisensa Ambiental tuir Regulamento Ambiental nian baseia ba Lei Ambiental nebe'e maka afeita iha Timor-Leste. Preparasaun ba halo relatorio dokumentus ne'e baseia ba informasaun husi Consultor Ambiental durante encontro preliminares hamutuk ho proponente sira, no halo visita ba area projeto hanesan etapa primeiro atu prepara ba Procedimento Lisensa Ambiental nian.

Projeto ne'e tama iha Categoria saida tuir Decreto Lei 5/2011?

Projeto refere tama ba Decreto Lei no. 5/2011 - Licenciamentu Ambiental, nebe'e projeto hotu relasaun ho setor publico no privado iha ekspektasaun bele hetan impacto significante ba ambiental, tenkeser aplika ba Lisensa Ambiental.

Projeto abastecimento be'e no saneamento ba Capital Municipio 4 ba Viqueque tama ba Kategori B hanesan deklarasaun iha karta husi ANLA (Ref. No: 99/ANLA/SEA/MCAE/III/2021) publica iha dia 18 de Marsu 2021. Categorizasaun desidi ona baseia ba escala, localizasaun, acitividade no impakto ambiental ba projeto refere. Aumenta mos katak, projeto ne'e tensor liu husi prosesu Ejame Ambiental Dahuluk (Initial Environmental Examination (IEE)) liu husi prepara dokumentus ba Deklarasaun Impacto Ambiental Simplifikada (DIAS) (Simplified Environmental Impact Statement (SEIS)) no Plano Gestau Ambiental (PGA) (Environmental Management Plan (EMP))

Saida maka Prosesu IEE?

IEE hanesan prosesu nebe'e regula husi Legislasau Timor-Leste tuir Decreto Lei no. 5/2011 - Licenciamentu Ambiental, no supporta husi Diploma Ministerial ba avaliasaun projeto publico no privado.

Depois de estabelese kategori nebe'e los, IEE tensor tuir prosesu ho nia etapa sira nebe maka temi tuir mai ne'e:

- Analisasaun linha de base no Avaliasaun Impacto Ambiental – informasaun ida ne'e uja ona atu comprende impacto potencial ambiental causa husi projeto (direita ou indereita), no informa ba equipa dezenho nebe'e proposta desenvolvimento atu minimiza impacto negativo nebe significante;
- Wainhira impacto negativo nebe significante labele minimiza tuir mudansa ba dezenho, maka medidas seluk bele uja atu hamenus impacto sirane. Monitorizasaun bele mos considera atu determina impacto durante fase construsaun hodi identifica karik medidas nebe aplika ona suficiente no apropriado.
- Depois de IEE completo, dokumentus SEIS no EMP submete ba Regulador Ambiental hodi hakat ba etapa Consultasaun Publico.
- Depois de Consultasaun Publico, proponente sira sei foti comentario husi Consultasaun Publico ne'e, no halo revisaun e completa dokumentus SEIS/EMP e ikus liu haruka nia versaun final ba ANLA hodi desidi lisensiamentu ambiental.

Objetivo no Strutura husi Dokumentus Deklarasaun Impacto Ambiental Simplifikada (DIAS)

Dokumentus DIAS/SEIS nebe fornece informasaun kona ba linha de base husi kondisaun Ambiental nebe ejisiti ba projeto no area nebe haleu projeto refere.

Dokumentus DIAS composto husi capitulo nebe diferenti no fornece informasaun hanesan tuir maine:

- Proponente Projeto; Consultor nebe'e prepara IEE; Estrutura Legal;
- Deskrisaun husi Projeto no Ambiente; Alternativa;
- Impacto, Medidas de Mitigasaun no Monitoramento;
- Consultasaun Publico;
- Qestaun nebe mosu iha dokumentus DIAS/SEIS;
- Conclusaun no Rekomendasun.

Deskrisaun kona ba Socio Economico no Ambiente husi area de Projeto

Projeto ne lokaliza iha Municipio Viqueque, cobre Suco balu hanesan Loihuno, Caraubalu, Uma Uain Kraik no Uma Uain Quic. Populasaun husi Suco ne'e hanesan receptor primeiro nebe simu abastecimento be'e husi projeto ne'e, no iha 2015 total husi uma kain hamutuk 2,315, tamba ida ne'e qualidade be'e husi be'e matan Loihuno I tensor tau hanesan focus principal ba nia tratamento, tamba resultado hatudu katak iha contaminasaun husi bacteria tamba causa husi atividade oin-oin besik ba fontes be'e matan no menus protesasaun husi BTL Viqueque durante operasaun de atividade.

Be'e matan Loihuno I lokaliza iha Foho hun husi area protejido Foho Builo iha Suco Loihuno, parte norte husi projeto refere no haleu ho Foho Mundo Perdido. Formasaun Geologica iha area Loihuno no Foho Mundo Perdido ass ho calcario fraturado no raihenek e fatuk mean. Muda fali ba parte Soul husi Loihunno ba to'o Viqueque besik area foho nebe'e composto husi Formasaun Calcarior Baucau no Formasaun Fatuk Mean Bobonaro iha parte leste 2/3 husi Viqueque, nebe'e bele implica ba rai monu iha area parte balun.

Tecnicalmente, Foho Builo tama oituan ba fronteira 15 Km no patrimoniis culturais balun iha area projeto, nebe identifica durante estudo caraterizasaun Ambiental, maibe bele conclui katak area protejido Foho Builo sei kona problema nebe causa husi atividade no sub-componentes projeto.

Deskrisaun ba Projeto no Afetado Ambiente

Saida maka Projeto ne'e?

Projeto refere iha ekspektasaun atu produs objetivo balun hanesan esplikasuan iha kraik ne'e:

- Atu rehabilita no haluan abastecimento sistema be'e urbano capital Municipio Viqueque nian hodi nune bele cobre volume be'e nebe'e sei persija to'o 2040;
- Estabelese tomak funsaun abastecimento be'e no sintina 4 (hat) iha area publico;
- Influensa no fasilita uma kain sira ho sintina nebe maka diak no diak liu tan fasilita ba sira nebe maka hela iha cidade Capital Viqueque no;
- Estabelese fatin prosesa tahu foer (FSTP) no facilidade soe sintina foer iha fronteira diametro 15 Km nia laran.

Projeto Abastecimento Be'e no Saneamento Capital Municipio Viqueque sei entrega ba Governo Timor-Leste liu husi Asian Development Bank (ADB) no Be'e Timor-Leste, E.P. hanesan proponente nebe sei toma konta tomak responsabilidade ba pre-construsaun to'o iha fase operasaun projeto nian. Projeto ne'e ekspekta atu komesa nia operasaun iha 2022.

Deskrisaun badak kona ba Natureza, Dimensaun no Lokalizaun ba Projeto ne'e

Projeto Abastecimento Be'e no Saneamento Capital Municipal Viqueque lokaliza iha area urbano Capital Municipio Viqueque, Posto Administrativo Viqueque, Municipio Viqueque, no fronteira ho Posto Administrativo Ossu iha parte norte, besik ba Posto Administrativo Uatulari no Uatucarbau iha parte leste, fronteira ho Posto Administrativo Lacluta husi parte weste, no parte soul fronteira ho Tasi Timor.

Escopo projeto nian inclui area sira hotu nebe'e persija implementa Abstrasaun, Tratamento no Distribuisaun Be'e ba Consumu Humanu, nune mos fornece dezenho no solusaun ba infrastrutura Saneamento iha urbano area diametro 15 Km ba Capital Municipio Viqueque.

Distribuisaun sistema be'e no ekspansaun futuro nian ba area uma kain foun sira iha Capital Municipio Viqueque desidi atu fornece ba Suco 3, hanesan tuir mai ne'e:

- Suco Loihunu, inclui Sistema Be'e Matan Loihunu I, II, no III no la inclui sistema distribuisaun nebe ejiste.
- Suco Carabalu: hanesan parte kiik husi area Weste ba Suco ne'e, tama ba 1/2 rede proposta abastecimento be'e;
- Suco Uma Uain Craic: hanesan parte kiik husi area Weste ba Suco ne'e, tama ba 1/3 rede proposta abastecimento be'e;
- Suco Uma Quic: hanesan parte kiik husi area Norteleste ba Suco ne'e, tama ba 1/6 rede proposta abastecimento be'e.

Sintina Publico 4 nebe'e determina atu hari'i iha area projeto 15 Km nia laran no fatin prosesa tahu foer (FSTP) atu implementa iha Suco Maluru, iha parte ikus ba Zona I, ho distansia 450 m husi comunidade sira nia hela fatin no 350 m husi mota. Area nebe'e proposta ona categoria hanesan rai tetuk no lokaliza iha rai mamuk no status rai ne'e estado nian, tuir informsaun hetan husi BTL Viqueque.

Nusa maka ita persija projeto ne'e?

Projeto ne'e sei contribui atu hasae qualidade moris comunidade local iha setor saude no higiene particularmente ba fetu sira. Hadia fetu sira nia saude sei hamenus numero ema mate, no iha balansu da familia no level individual nian. Iha parte seluk, sei hadia mos economia no aumenta tan comunidade sira nia pensamento tamba projeto ne'e sei cria oportunidade servisu wainhira projeto ne'e implementa ona.

Saida deit maka projetu nia impaktu?

Implementasaun ba projetu asosia tuir sirkulu nebe komprende husi faze 4, hahu husi atividade dezenu, vizaun atu priense nesesidade projetu nian. Faze tuir mai maka faze atividade konstruksaun nian, tuir operasaun no manutensaun ba fasilidade nian no faze desmantelamentu.

Possibilidade impaktu negative hotu asosia ho atividade idak-idak identifika ona no halo ona diskusuan iha DIAS no PGA. Bazeia ba atividade sira nebe identifika ona, possibilidade impaktu sira maka hanesan alista ona iha kraik ne'e konsidera signifika no faze ba medidas mitigasaun ba kada impaktu nebe'e elabora ona iha PGA presija atu halo medidas mitigasaun iha kampu. Potensial impaktu signifika maka hanesan tuir mai:

Posibilidade impaktu	Pre-Konstruksaun	Konstruksaun	Operasaun no Manutensaun
Kualidade be'e	<ul style="list-style-type: none"> • Poluisaun be'e tamba la iha protesausn nebe'e adekuaudu • Furu/Posu BTL nian nebe'e maran no posu privadu nebe halo extrasausn liu limite 	Tahu'u eskoamentu no lixu maran la iha nia fatin final sei halo kontaminasuan ba be'e rai laran	Espansaun uma nian iha area leten/upstream ho fasilidade sintiina nebe la adekuaudu bele halo be'e la diak iha be'e matan
Barullu		Aumenta iha nivel barullu husi atividade konstruksaun liu-liu afeta ba comunidade nebe'e hela besik area konstruksaun	

Kualidade anin		Aumenta konsentrasaun rai rahun	
Sosiu ekonomia	Konflitu entre komunidadu kona ba be'e	Kria servisu ba komunidadu lokal no aumenta abilidade	Aumenta kualidade iha setor saude no higiene tamba hamenus mate no moras iha komunidadu nebe infeta husi be'e
Iss	Dejignasaun iha zona tampaun nebe'e la adekuaudu iha area FSTP nian	Lixu organiku husi material sira konstruksaun nian la iha tratamentu nebe'e diak no iha nia fatin final ba lixu, sei hamenus dois	Manutensaun nebe la regular. i.e hamos no trata tahu nebe'e rai iha fatin ne'ebe nakloke ba tempu balun
Rai	Kontaminasaun ba rai tamba dezenhu nebe'e la adekuaudu, kria/ hasa'e volume foer nebe'e la iha tratamentu	Tahu bele kauza ou hasae volume husi foer maran. i.e. despojos,, material. Bele lori possibilidade ba kontaminasaun rai nebe'e bele dada peeste no sai hanesan vetores ba insektu sira no bele sai mos hanesan portadores ba moras iha impaktu visual	Poluisaun rai kauza husi: <ul style="list-style-type: none"> • Dezenhu ba sintina kada uma kain nian la tuir padraun BTL • Fatin ikus husi be'e foer no akumulasaun husi tahu/foer nebe trata ona iha fatin nebe'e nakloke
Gestaun trafiku		Mobilizasaun ba kamaun nebe'e boot no area konstruksaun la iha meta no limite ba velocidade bele kauza asidente ba komunidadu afetadu	
Okupasaun saude no seguransa	Perigu ba saude ameasa husi dezenhu nebe'e la adekuaudu ou fasilidade/ armazen ba klorin no sasan kimiku seluk nebe perigu	Asidente no mortalidade iha servisu nain sira tamba la uja ekipamentu seguransa nian	Perigu ba saude kauza husi expozisaun klorin

Oportunidade ba konsulta publika no ho se deit maka ita koalia ona kona ba projetu refere?

Konsulta publika halao'o husi ADB prosesu IEE, realiza ona iha outubru 10, 2020 iha Sede Administratsaun munisipiu Viqueque. Eventu ne'e partisipa husi autoridade lokal (chefe suco, chefe aldeia), no reprezentante husi komunidadu iha area projetu. Konsulta publika 4 seluk nebe'e hala'o husi komponente sosial iha suku Caraubalu (12th Dec 2020), Suku Loihuno (12th Dec, 2020), Suku Uma Quic (13th Dec, 2020) no Suku uma wain kraik (13th Dec, 2020). Konsulta publika hotu rejistu no hetan partisupasaun masimu husi feto. Depois de aprejentasaun ba rezumu non-tekniku ba projetu nian, diskusaun tomak fo ba partisipante sira atu halo diskusaun kona ba abastesementu be'e noo problema sintina balun nebe;e relasiona ho projetu no duvidas, komentariu balunn nebe maka rejistu o kna ba ambiente, hatudu katak autoridade lokal no komunidadu sira hatene onna kona ba impaktu projetu nian no ho rejultadu nebe'e positivu.

Projetu ne'e sei tuir prosedur husi IEE ba kategoria B iha dekretu lei no 5/2011 no preokupasaun interesante husi autoridade lokal no komentariu hotu sei akapta, rejistu no asesu iha prosesu iha faze implementasaun projetu tuir mai.

Konkluzan

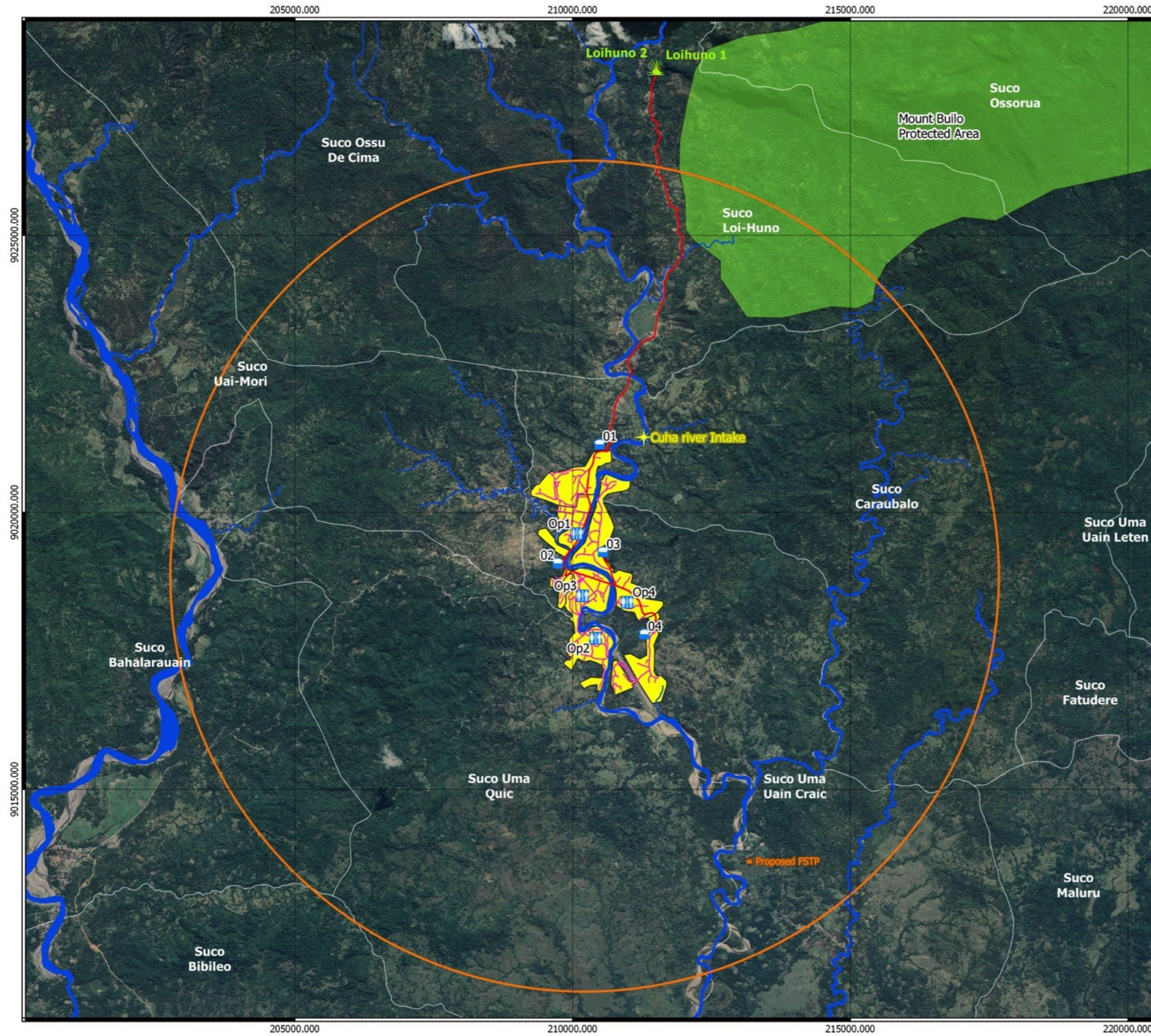
Impaktu iha DIAS/PGA konklui katak impaktu negativu maibe ho durasaun tempu nebe'e badak nebe bele jeneralija husi projetu durante faze konstruksaun. Komunidade afetadu sei sofre temporaria husi disturbasaun atividade sira projetu nian maibe medidas mitigasaun sei estabese ba kontrator atu aplika no hamenus impaktu sira nne'e. Ba impaktu positivu sira hotu ou impaktu benefisial sei akontese durante faze operasaun no manutensaun, hanesan setor sosiu ekonomi sei sai boot, hoo neneik komunidade lokal nia moris sei sai diak liu no seguru noo mos saude no seguransa sei garantia.

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APPENDIX I. General Location of the Project



Project Scope and Components of Viqueque Capital Municipality

0.000 90000.000 180000.000 270000.000

9025000.000 9020000.000 9015000.000

LEGEND

	01. Main Tank		Cuha River Intake
	02. West Tank		Spring
	03. North East Tank		15 km Boundary
	04. South East Tank		Transmission Mains
	Op1. PT.BNCTL		Distribution Pipes
	Op2. PT.Suco Uma Quic		Rivers
	Op3. PT.Footbal Field		Proposed FSTP
	Op4. PT.New Market		Protected Area
			Proposed Distribution Area
			Suco Boundary

0 1 2 km

CONSULTANT
AdP Timor-Leste
ÁGUAS DE PORTUGAL - TIMOR LESTE UNIPessoal Lda.

CLIENT
BEE TIMOR-LESTE, EMPRESA PÚBLICA S.T.L., E.P.

PROJECT DESIGNATION
Project Scope and Components

SCALES 1 : 62 750	DATE February 2022
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APPENDIX 2. Environmental License ADB 0258-TIM – 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:	20 th 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:	07 th 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 Identified 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 of August 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

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Schedule

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Notes

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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.
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- 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

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- 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 Identified 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 of August 2014

Approved by:



Numinando Soares Martins "BURAS"
Secretary of State for Environment

APPENDIX 4. Transcribed 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 maintain all the features as before in terms of the measurements of the reservatory and all the documents that will deliver to the government 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 BTL to understand well in terms of operating the system under supervision of the Contractor. Thus, the BTL 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 proposed 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 illegally connected without BTL 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 BTL 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 accommodate 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 another 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

APPENDIX 5. Water Quality Records (2000-2014) – Viqueque (incomplete)

District : Viqueque

Town : Viqueque

Tested by: Alvaro Godinho, technician, OWS laboratory

No.	Sampling Point	Date		pH	Temp.	R.Cl ₂	Cond.	TDS	Salinity	Turbidity	NH ₃ -N	Fluoride	Alkalinity	Hardness	NO ₃ -N	NO ₂ -N	Fe	Mn	T.Coli	G. Bacteria
		sample	test		(°C)	(mg/L)	(µ S/cm)	(mg/L)	(‰)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU
WHO Guideline Value				6.5-8.5	NS	0.5	NS	1000	NS	5.00	NS	1.50	NS	200	10.00	0.913	0.30	0.3	0	0
1	Loi Huno, intake	04/mai/00	05/mai/00	8.2	20.5	NT	457	221	0.2	1.05	0.2	1.07	239	NT	0.0	0.001	0.01	0.2	<30	<30
2	Break Pressure Tank	04/mai/00	05/mai/00	7.4	27.9	NT	551	267	0.3	0.53	ND	0.98	265	NT	0.0	0.003	0.00	NT	3	3
3	RSUD Viqueque, Hospital	04/mai/00	05/mai/00	7.7	28.1	NT	559	253	0.3	0.25	ND	1.12	NT	NT	0.0	0.003	0.01	NT	20	10
4	Beloi 1,PT	04/mai/00	05/mai/00	7.8	27.9	NT	548	265	0.3	0.21	ND	1.02	NT	NT	0.1	0.003	0.01	NT	10	10
5	Boramatan 3	04/mai/00	05/mai/00	7.6	27.8	NT	568	276	0.3	0.34	ND	1.16	NT	NT	0.1	0.002	0.00	NT	10	10
6	Beobe Area	04/mai/00	05/mai/00	7.7	27.9	NT	533	268	0.3	0.51	ND	1.18	NT	NT	0.1	0.003	0.01	NT	3	3
8	Beloi 3	04/mai/00	05/mai/00	7.6	26.3	NT	544	269	0.3	0.60	ND	1.10	NT	NT	0.1	0.002	0.00	NT	20	20
9	Aulatar, PT	04/mai/00	05/mai/00	7.5	27.1	NT	552	268	0.3	0.26	ND	1.24	331	NT	0.0	0.002	0.01	NT	10	10
10	Carabaro H.No.221	04/mai/00	05/mai/00	7.6	26.5	NT	548	265	0.3	1.45	ND	1.08	372	NT	0.1	0.003	0.01	0.2	3	3
11	Kabira, Boramatan 2	04/mai/00	05/mai/00	7.4	27.5	NT	545	264	0.3	1.68	ND	1.28	NT	NT	0.0	0.003	0.02	0.2	3	3

Legend:

ND: not detectable

NT: not tested

NS: not set

CFU: colony formed unit

-: 0-3

±: 3-10

+: 10-20

++: 20-30

+++: more than 30

Suggestions

Boil water before drinking

District : Viqueque

Town : Viqueque

Sampling Date :25/September/2001

Sampled by :Isak da Cruz DWSS Viqueque

Testing Date :26/September/2001

Tested by :Miguel Quintao WSS Laboratory

Received by :X.Wang

No	Sampling Point	Time		pH	Temp. (°C)	Cond. (µS/cm)	TDS (mg/L)	Salinity (‰)	Turbid. (NTU)	Hardness (mg/l)	Alkalinity (mg/l)	T.Coliform CFU	E.Coli CFU
		sample	test										
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake	16:05	15:37	7.9	25.1	524	254	0.3	0.6	370	272	TNC	4
VQ-2	Break Pressure Tank	16:17	15:39	7.9	24.9	526	255	0.3	0.4	NT	NT	TNC	6
VQ-3	RSUD Viqueque	16:50	15:40	7.9	25.0	524	254	0.3	0.5	NT	NT	TNC	0
VQ-4	Beloi 1,PT	17:20	15:52	8.1	24.7	519	252	0.2	0.5	NT	NT	TNC	0
VQ-5	Boramatan 3	17:14	15:53	8.0	24.9	526	255	0.3	0.6	NT	NT	TNC	0
VQ-6	Bahafou PT	16:59	15:54	7.8	24.9	527	255	0.3	0.6	NT	NT	72	0
VQ-7	Beloi 3	16:48	16:02	7.9	25.0	529	256	0.3	0.5	NT	NT	TNC	2
VQ-8	Aulatar, PT	16:37	16:03	7.9	24.8	527	255	0.3	0.4	NT	NT	TNC	0
VQ-9	Carabaro H.No.261	17:06	16:04	7.9	25.0	528	256	0.3	0.3	NT	NT	88.0	2
VQ-10	Kabira, Boramatan 2	17:09	16:15	7.9	25.4	528	256	0.3	0.6	NT	NT	TNC	0
VQ-11	LoiHuno Spring	16:03	16:16	8.0	25.3	524	254	0.3	0.5	NT	NT	TNC	0

Legend:

(ND) : not detectable (NT) : not tested (NS) : not set (CFU) : colony formed unit (TNC) : Too numerous to count
 For Paper Slip (-) : 0 - 3 (±) : 3 - 10 (+) : 10 - 20 (++) : 20 - 30 (+++) : more than 30

Weather Report: Sunny / Cloudy / Rain

Recommendation

Boil water before drinking

District : Viqueque

Town : Viqueque

Sampled and tested by: Mario Soares, WSS laboratory and T.ISHIHARA, JICA Study Team

No.	Sampling Point	Date		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Alkali.	Hdns.	Ca-Hdns	NH ₃ -N	NO ₃ -N	NO ₂ -N	Fe	Fluoride	Mn	SO ₄ ²⁻	R.Cl ₂	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU
Timor Loro sa'e Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	NS	200	NS	NS	10.0	0.913	1.50	1.50	0.5	250	0.5	0	0
VQ-1	Loi Huno, intake	02/nov/00	03/nov/00	8.6	27.6	493	238	0.2	11.2	254	262	160	ND	ND	0.005	0.01	1.24	0.5	30	NT	TNC	TNC
VQ-2	Break Pressure Tank	No water		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VQ-3	RSUD Viqueque	02/nov/00	03/nov/00	8.0	31.8	561	272	0.3	0.3	NT	NT	NT	ND	NT	NT	NT	1.26	NT	NT	NT	75	0
VQ-4	Beloi 1,PT	02/nov/00	03/nov/00	8.2	30.6	556	269	0.3	0.3	288	278	184	ND	ND	0.006	0.01	1.10	0.3	29	NT	TNC	12
VQ-5	Boramatan 3	02/nov/00	03/nov/00	7.9	34.9	563	273	0.3	2.1	NT	NT	NT	ND	NT	NT	NT	0.91	NT	NT	NT	TNC	76
VQ-6	Bahafu PT	02/nov/00	03/nov/00	8.0	32.1	560	272	0.3	0.7	250	304	201	ND	ND	0.007	ND	1.14	0.3	30	NT	TNC	28
VQ-7	Beloi 3	02/nov/00	03/nov/00	8.0	30.8	560	271	0.3	0.5	292	296	200	ND	ND	0.005	0.01	1.31	0.1	30	NT	95	38
VQ-8	Aulatar, PT	02/nov/00	03/nov/00	7.9	31.4	560	271	0.3	0.5	288	290	198	0.1	ND	0.005	0.01	0.85	0.2	29	NT	60	32
VQ-9	Carabaro H.No.261	02/nov/00	03/nov/00	7.8	31.0	565	274	0.3	0.3	278	276	198	ND	0.1	0.005	0.01	1.17	0.2	29	NT	TNC	4
VQ-10	Kabira, Boramatan 2	02/nov/00	03/nov/00	7.8	32.4	566	274	0.3	2.0	NT	NT	NT	ND	NT	NT	NT	1.21	NT	NT	NT	TNC	6

Legend:

ND: not detectable

NT: not tested

NS: not set

CFU: colony formed unit

TNC: too numerous to count

Recommendation

Boil water before drinking

District : Viqueque

Town : Viqueque

sampled by : Izac Da Cruz,DVWSViqueque,Tesed by: Alvaro Godinho,Mario Soares,WSS Laboratory

No.	Sampling Point	Date		pH	Temp.	Cond.	TDS	Salinity	Turbid.	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	CFU	CFU
Timor Loro sa'e Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	0	0
VQ-1	Loi Huno, intake	07/jan/01	09/jan/01	8.0	24.4	561	272	0.3	0.3	0	0
VQ-2	Break Pressure Tank	07/jan/01	09/jan/01	8.3	25.0	559	271	0.3	0.4	60	0
VQ-3	RSUD Viqueque	07/jan/01	09/jan/01	8.4	24.9	554	263	0.3	0.3	0	0
VQ-4	Beloi 1,PT	07/jan/01	09/jan/01	8.4	24.9	555	269	0.3	0.4	25	0
VQ-5	Boramatan 3	07/jan/01	09/jan/01	8.4	25.0	558	271	0.3	0.5	0	0
VQ-6	Bahafou PT	07/jan/01	09/jan/01	8.4	24.7	458	222	0.3	1.0	75	0
VQ-7	Beloi 3	07/jan/01	09/jan/01	8.6	25.0	557	270	0.3	0.3	TNC	20
VQ-8	Aulatar, PT	07/jan/01	09/jan/01	8.4	24.8	556	269	0.3	0.5	TNC	30
VQ-9	Carabaro H.No.261	07/jan/01	09/jan/01	8.4	24.6	558	270	0.3	0.3	15	0
VQ-10	Kabira, Boramatan 2	07/jan/01	09/jan/01	8.4	24.6	552	268	0.3	0.4	0	0

Legend:

ND: not detectable

NT: not tested

NS: not set

CFU: colony formed unit

TNC:Too numerous to count

Recommendation

Boil water before drinking

District : Viqueque

Town : Viqueque

Sample by Isac Da cruz DWSS Viqueque Tested by Alvaro G, Mario Soares WSS Laboratory

No.	Sampling Point	Date		pH	Temp.	Cond.	TDS	Salinity	Turbid.	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	CFU	CFU
Timor Loro sa'e Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	0	0
VQ-1	Loi Huno, intake	31/jan/01	02/fev/01	8.2	26.7	553	268	0.3	0.4	TNC	0
VQ-2	Break Pressure Tank	31/jan/01	02/fev/01	8.2	25.8	553	268	0.3	0.4	25	0
VQ-3	RSUD Viqueque	31/jan/01	02/fev/01	8.2	26.8	550	266	0.3	0.8	15	0
VQ-4	Beloi 1,PT	31/jan/01	02/fev/01	8.2	25.6	550	267	0.3	0.7	60	0
VQ-5	Boramatan 3	31/jan/01	02/fev/01	8.2	25.2	555	269	0.3	0.6	10	0
VQ-6	Bahafou PT	31/jan/01	02/fev/01	8.2	25.4	553	268	0.3	0.5	0	0
VQ-7	Beloi 3	31/jan/01	02/fev/01	8.2	25.1	554	269	0.3	0.7	30	0
VQ-8	Aulatar, PT	31/jan/01	02/fev/01	8.2	25.3	553	268	0.3	0.6	55	0
VQ-9	Carabaro H.No.261	31/jan/01	02/fev/01	8.2	25.4	551	267	0.3	0.8	TNC	0
VQ-10	Kabira, Boramatan 2	31/jan/01	02/fev/01	8.2	25.5	555	269	0.3	0.7	0	0

Legend:

ND: not detectable

NT: not tested

NS: not set

CFU: colony formed unit;

TNC: Too numerous to count

Recommendation

Boil water before drinking

District : Viqueque

Town : Viqueque

Sample by Isac Da cruz DWSS Viqueque Tested by Alvaro G, Mario Soares WSS Laboratory

No.	Sampling Point	Date		pH	Temp.	Cond.	TDS	Salinity	Turbid.	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	CFU	CFU
Timor Loro sa'e Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	0	0
VQ-1	Loi Huno, intake	21/fev/01	22/fev/01	8.1	28.0	260	271	3.0	0.5	TNC	12
VQ-2	Break Pressure Tank	21/fev/01	22/fev/01	8.1	27.6	553	268	0.3	0.2	TNC	2
VQ-3	RSUD Viqueque	21/fev/01	22/fev/01	8.2	27.6	551	267	0.3	0.3	TNC	2
VQ-4	Beloi 1,PT	21/fev/01	22/fev/01	8.3	27.2	551	267	0.3	0.5	TNC	94
VQ-5	Boramatan 3	21/fev/01	22/fev/01	8.2	27.4	554	269	0.3	0.8	15	8
VQ-6	Bahafou PT	21/fev/01	22/fev/01	8.2	27.1	554	268	0.3	0.3	5	0
VQ-7	Beloi 3	21/fev/01	22/fev/01	8.1	27.3	558	271	0.3	0.4	TNC	70
VQ-8	Aulatar, PT	21/fev/01	22/fev/01	8.3	27.3	554	268	0.3	0.4	80	32
VQ-9	Carabaro H.No.261	21/fev/01	22/fev/01	8.2	27.2	551	267	0.3	2.0	0	0
VQ-10	Kabira, Boramatan 2	21/fev/01	22/fev/01	8.1	27.1	558	270	0.3	0.5	0	2

Legend:

ND: not detectable

NT: not tested

NS: not set

CFU: colony formed unit

TNC: Too numerous to count

Recommendation

Boil water before drinking

District : Viqueque
Town : Viqueque

Sampling Date : 22-May-2001

Sampled by : Isak da Cruz DWSS Viqueque

Testing Date : 25-May-2001

Tested by : Mario Soares WSS Laboratory

Received by : Alvaro Godinho

No	Sampling Point	Time		pH	Temp. (°C)	Cond. (µS/cm)	TDS (mg/L)	Salinity (‰)	Turbid. (NTU)	Hardness (mg/l)	Ca.Hardness (mg/l)	T.Coli CFU	E.Coli CFU
		sample	test										
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake	10:20	09:45	8.3	20.6	577	280	0.3	0.7	290	NT	60	2
VQ-2	Break Pressure Tank	10:15	09:46	8.2	20.3	561	272	0.3	0.5	NT	NT	10	2
VQ-3	RSUD Viqueque	08:25	09:47	8.2	20.0	570	276	0.3	1.2	NT	NT	70	0
VQ-4	Beloi 1,PT	09:20	10:06	8.3	19.6	561	272	0.3	0.5	NT	NT	5	4
VQ-5	Boramatan 3	08:36	10:07	8.2	19.5	561	272	0.3	0.8	NT	NT	65	0
VQ-6	Bahafbu PT	08:57	10:08	8.1	19.2	564	274	0.3	0.6	NT	NT	25	0
VQ-7	Beloi 3	08:10	10:25	8.1	19.1	564	274	0.3	1.1	NT	NT	5	0
VQ-8	Aulatar, PT	09:59	10:26	8.2	19.4	564	274	0.3	0.7	NT	NT	30	0
VQ-9	Carabaro H.No.261	09:05	10:27	8.3	19.9	561	272	0.3	1.3	NT	NT	5	0
VQ-10	Kabira, Boramatan 2	08:41	10:45	8.2	19.9	564	274	0.3	0.6	NT	NT	65	4
VQ-11	Loihuno Spring	10:20	10:46	8.1	20.9	566	274	0.3	0.4	NT	NT	25	0

Legend:

ND: not detectable

NT: not tested

NS: not set

CFU: colony formed unit

TNC: Too numerous to count

For Paper Slip

(-) : 0 - 3

(±) : 3 - 10

(+) : 10 - 20

(++) : 20 - 30

(+++) : More Than 30

Recommendation

Boil water before drinking

District : Viqueque
Town : Viqueque

Sampling Date :25/06/01

Sampled by :Isak da Cruz. DWSS Viqueque

Testing Date :25/06/01

Tested by :Miguel Quintao & Mario Soares WSS Laboratory

Received by :Mario Soares

No	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	T.Coliform	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	CFU	CFU
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake	06:05	15:03	8.3	26.1	570	277	0.3	0.7	2690	195	<30	<30
VQ-2	Break Pressure Tank	06:15	15:07	8.3	26.1	571	277	0.3	0.9	NT	NT	<30	<30
VQ-3	RSUD Viqueque	06:55	15:09	8.3	26.0	566	274	0.3	0.7	NT	NT	<30	<30
VQ-4	Beloi 1,PT	07:45	15:14	8.2	26.1	563	273	0.3	0.8	NT	NT	<30	<30
VQ-5	Boramatan 3	07:09	15:16	8.2	26.1	570	276	0.3	0.7	NT	NT	<30	20.0
VQ-6	Bahafu PT	06:15	16:12	8.2	26.2	568	275	0.3	1.0	NT	NT	<30	<30
VQ-7	Beloi 3	07:30	16:13	8.3	26.0	564	274	0.3	1.0	NT	NT	<30	<30
VQ-8	Aulatar, PT	07:25	16:14	8.2	26.0	566	275	0.3	0.7	NT	NT	<30	<30
VQ-9	Carabaro H.No.261	No Sample		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VQ-10	Kabira, Boramatan 2	07:40	16:30	8.2	26.0	571	277	0.3	0.5	NT	NT	<30	<30
VQ-11	LoiHuno Spring	07:54	16:31	8.2	26.1	568	275	0.3	1.0	NT	NT	20.0	20.0

Legend:

(ND) : not detectable (NT) : not tested (NS) : not set (CFU) : colony formed unit (TNC) : Too numerous to count
 For Paper Slip (-) : 0 - 3 (±) : 3 - 10 (+) : 10 - 20 (++) : 20 - 30 (+++) : more than 30

Weather Report : Sunny / Cloudy / Rain

Recommendation

Boil water before drinking

District : Viqueque

Town : Viqueque

Sampling Date : 22/07/2001

Testing Date : 27/07/2001

Received by : Mario Soares

Sampled by : Isak da Cruz DWSS Viqueque

Tested by : Miguel Quintao & Mario Soares WSS Laboratory

No	Sampling Point	Time		pH	Temp. (°C)	Cond. (µS/cm)	TDS (mg/L)	Salinity (‰)	Turbid. (NTU)	Hardness (mg/l)	Alkalinity (mg/l)	T.Coliform CFU	E.Coli CFU
		sample	test										
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake	15:07	10:08	8.4	12.0	425	205	0.2	2.1	260	286	NT	NT
VQ-2	Break Pressure Tank	15:11	10:11	8.4	8.7	568	275	0.3	2.1	NT	NT	NT	NT
VQ-3	RSUD Viqueque	15:54	10:14	8.4	10.1	558	270	0.3	0.8	NT	NT	NT	NT
VQ-4	Beloi 1,PT	15:41	10:17	8.5	13.5	538	261	0.3	1.9	NT	NT	NT	NT
VQ-5	Boramatan 3	16:01	10:20	8.4	11.6	559	271	0.3	0.7	NT	NT	NT	NT
VQ-6	Bahafu PT	16:04	10:24	8.3	12.9	557	270	0.3	0.7	NT	NT	NT	NT
VQ-7	Beloi 3	16:07	10:26	8.2	13.6	557	270	0.3	1.1	NT	NT	NT	NT
VQ-8	Aulatar, PT	15:29	10:28	8.3	13.8	552	267	0.3	0.7	NT	NT	NT	NT
VQ-9	Carabaro H.No.261	No Sample		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VQ-10	Kabira, Boramatan 2	16:11	10:30	8.2	12.6	571	277	0.3	1.1	NT	NT	NT	NT

Legend:

(ND) : not detectable (NT) : not tested (NS) : not set (CFU) : colony formed unit (TNC) : Too numerous to count

For Paper Slip (-) : 0 - 3 (±) : 3 - 10 (+) : 10 - 20 (++) : 20 - 30 (+++) : more than 30

Weather Report : Sunny Cloudy Rain

Recommendation

Boil water before drinking

District : Viqueque

Sampling Date :23/ 08/ 2001

Sampled by : Isak Da Crus DWSS Viqueque

Town : Viqueque

Testing Date :24 / 08/ 2001

Tested by : Mario Soares WSS Laboratory

Received by : Mario Soares

No	Sampling Point	Time		pH	Temp. (°C)	Cond. (µS/cm)	TDS (mg/L)	Salinity (‰)	Turbid. (NTU)	Hardness (mg/l)	Alkalinity (mg/l)	T.Coliform CFU	E.Coli CFU
		sample	test										
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake	04:44	15:50	8.1	23.8	657	320	0.3	0.6	280	246	14	0
VQ-2	Break Pressure Tank	04:37	15:52	7.9	23.3	508	246	0.2	0.5	NT	NT	2	0
VQ-3	RSUD Viqueque	05:23	16:04	8.0	23.4	506	245	0.2	0.5	NT	NT	6	0
VQ-4	Beloi 1,PT	05:53	16:05	7.9	23.7	504	244	0.2	0.6	NT	NT	2	0
VQ-5	Boramatan 3	05:32	16:06	7.9	24.1	504	244	0.2	0.8	NT	NT	8	0
VQ-6	Bahafou PT	05:41	16:22	7.9	23.3	504	244	0.2	0.6	NT	NT	4	0
VQ-7	Beloi 3	05:20	16:23	7.9	24.0	503	243	0.2	0.6	NT	NT	22	2
VQ-8	Aulatar, PT	05:12	16:24	7.8	24.0	503	244	0.2	0.5	NT	NT	48	0
VQ-9	Carabaro H.No.261	No Sample		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VQ-10	Kabira, Boramatan 2	05:35	16:38	7.9	24.0	503	243	0.2	0.8	NT	NT	0	0
VQ-11	Loi huno Spring	04:45	15:51	8.0	24.1	500	242	0.2	0.7	292	246	54	0

Legend:

(ND) : not detectable (NT) : not tested (NS) : not set (CFU) : colony formed unit, (TNC) : Too numerous to count
 For Paper Slip (-) : 0 - 3 (±) : 3 - 10 (+) : 10 - 20 (++) : 20 - 30 (+++) : more than 30
 Weather Report : Sunny Cloudy Rain

Recommendation

Boil water before drinking

District : Viqueque

Sampling Date : 16 / October / 2001

Sampled by : Isak da Cruz DWSS Viqueque

Town : Viqueque

Testing Date : 17 / October / 2001

Tested by : Miguel Quintao & Mario Soares WSS Laboratory

Received by : Mario Soares

No	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	Amonia	Nitrate	Nitrite	Fe	Mn	Fluoride	Sulfate	T.Coli	E.Coli	
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	CFU	CFU	
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	1.5	10	1	0.3	0.5	1.5	250	0	0	
VQ-1	Loi Huno, intake	09:27	16:39	8.2	25.4	519	251	0.2	0.5	364	2668	ND	ND	0.007	0.01	NT	1.09	26	TNC	34	
VQ-2	Break Pressure Tank	09:20	16:40	8.1	24.7	527	255	0.3	1.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	206	18	
VQ-3	RSUD Viqueque	15:49	16:41	8.2	24.6	519	251	0.2	1.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	64	0	
VQ-4	Beloi 1,PT	15:30	16:50	8.3	24.8	521	252	0.2	0.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	2	
VQ-5	Boramatan 3	15:56	16:51	8.2	24.6	525	254	0.3	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	0	
VQ-6	Bahabu PT	16:06	17:00	8.2	24.6	526	255	0.3	1.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	0	
VQ-7	Beloi 3	15:32	17:01	8.2	25.6	526	256	0.3	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	0	
VQ-8	Aulatar, PT	16:45	17:02	8.2	24.7	525	254	0.3	1.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	4	
VQ-9	Carabaro H.No.261	No Sample		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VQ-10	Kabira, Boramatan 2	16:01	17:03	8.2	24.7	526	255	0.3	0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	64	2	
VQ-11	LoiHuno Spring	09:30	17:06	8.2	25.1	523	253	0.3	0.8	432	271	NT	NT	NT	NT	NT	NT	NT	TNC	24	

Legend:

(ND) : not detectable (NT) : not tested (NS) : not set (CFU) : colony formed uni (TNC) : Too numerous to col

For Paper Slip (-) : 0 - 3 (±) : 3 - 10 (+) : 10 - 20 (++) : 20 - 3 (+++) : more than

Weather Report : Sunny Cloudy Rain

Recommendation

Boil water before drinking

District : Viqueque

Town : Viqueque

Sampling Date :22/11/2001

Testing Date :23/11/2001

Received by :Miguel Quintao

Sample by : Isak da Crus DWSS Viqueque

Tested by : Miguel Quintao and Mario Soares WSS Laboratory

No	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	CFU	CFU
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake	11:16	15:16	8.1	24.4	526	255	0.3	0.6	310	285	TNC	6
VQ-2	Break Pressure Tank	11:25	15:17	8.0	23.7	525	254	0.3	0.5	NT	NT	TNC	4
VQ-3	RSUD Viqueque	12:15	15:18	8.0	24.4	527	255	0.3	0.4	NT	NT	TNC	16
VQ-4	Beloi 1,PT	12:01	15:29	8.0	24.9	527	255	0.3	0.8	NT	NT	TNC	18
VQ-5	Boramatan 3	12:20	15:30	7.9	24.8	527	255	0.3	0.7	NT	NT	TNC	4
VQ-6	Bahafou PT	12:25	15:31	8.0	24.6	526	255	0.3	4.2	NT	NT	TNC	20
VQ-7	Beloi 3	12:05	15:40	8.0	24.9	527	255	0.3	1.6	NT	NT	TNC	10
VQ-8	Aulatar, PT	11:50	15:41	8.0	24.9	525	254	0.3	1.0	NT	NT	TNC	18
VQ-9	Carabaro H.No.261	No Sample		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VQ-10	Kabira, Boramatan 2	12:10	15:42	8.0	24.7	528	256	0.3	3.4	NT	NT	TNC	2
VQ-11	LoiHuno Spring	11:15	15:50	8.1	24.8	523	253	0.3	0.8	345	315	TNC	4

Legend:

(ND) : not detectable (NT) : not tested (NS) : not set (CFU) : colony formed unit (TNC) : Too numerous to count
 For Paper Slip (-) : 0 - 3 (±) : 3 - 10 (+) : 10 - 20 (++) : 20 - 30 (+++) : more than 30

Weather Report :

Sunny Cloudy Rain

Recommendation

Boil water before drinking

District : Viqueque

Sampling Date : 24/01/2002

Sample by : Marito da Costa DWSS Viqueque

Town : Viqueque

Testing Date : 25/01/2002

Tested by : Miguel Quintao WSS Laboratory

Received by : Miguel Quintao WSS Laboratory

No	Sampling Point	Time		pH	Temp. (°C)	Cond. (µS/cm)	TDS (mg/L)	Salinity (‰)	Turbid. (NTU)	Hardness (mg/l)	Alkalinity (mg/l)	T.Coli CFU	E.Coli CFU
		sample	test										
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake	05:51	10:04	8.0	25.0	527	255	0.3	0.6	225	315	TNC	66
VQ-2	Break Pressure Tank	05:40	10:05	8.0	25.0	527	255	0.3	0.6	NT	NT	TNC	TNC
VQ-3	RSUD Viqueque	05:10	10:06	8.1	25.2	497	240	0.2	0.5	NT	NT	TNC	36
VQ-4	Beloi 1,PT	05:17	10:20	8.1	25.3	499	241	0.2	0.7	NT	NT	TNC	4
VQ-5	Boramatan 3	04:56	10:21	8.1	25.2	527	255	0.3	0.4	NT	NT	TNC	12
VQ-6	Bahafou PT	04:50	10:22	7.9	25.0	528	256	0.3	0.7	NT	NT	38	4
VQ-7	Beloi 3	05:13	10:26	8.0	25.0	527	255	0.3	0.6	NT	NT	TNC	4
VQ-8	Aulatar, PT	05:23	10:27	8.0	25.1	525	255	0.3	0.8	NT	NT	TNC	14
VQ-9	Carabaro H.No.261	No Water		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VQ-10	Kabira, Boramatan 2	04:44	10:28	8.0	24.9	527	255	0.3	0.4	NT	NT	TNC	TNC
VQ-11	LoiHuno Spring	05:53	00:00	8.0	25.0	527	255	0.3	0.5	225	325	TNC	8

Legend:

(ND) : not detectable

(NT) : not tested

(NS) : not set

(CFU) : colony formed unit;

(TNC) : Too numerous to count

Weather Report : Sunny Cloudy Rain

Inspected by :

Recommendation

Boil water before drinking

Mario Soares Laboratory Manager

District : Viqueque

Sampling Date : 24/02/2002

Sample by : Marito da Costa DWSS Viqueque

Town : Viqueque

Testing Date : 26/02/2002

Tested by : Mario Soares WSS Laboratory

Received by : Miguel Quintao

No	Sampling Point	Time		pH	Temp. (°C)	Cond. (µS/cm)	TDS (mg/L)	Salinity (‰)	Turbid. (NTU)	Hardness (mg/l)	Alkalinity (mg/l)	T.Coli CFU	E.Coli CFU
		sample	test										
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake		10:39	8.1	26.1	537	260	0.3	0.7	NT	NT	TNC	0
VQ-2	Break Pressure Tank		10:40	8.1	25.6	525	254	0.3	0.6	NT	NT	TNC	0
VQ-3	RSUD Viqueque		10:41	8.0	25.3	518	251	0.2	0.6	NT	NT	24	2
VQ-4	Beloi 1,PT		10:50	8.2	25.2	518	251	0.2	0.4	NT	NT	TNC	2
VQ-5	Boramatan 3		10:51	8.2	25.3	526	255	0.3	0.3	NT	NT	TNC	TNC
VQ-6	Bahafou PT		10:52	8.2	24.3	525	255	0.3	4.1	NT	NT	40	4
VQ-7	Beloi 3		11:10	8.1	24.9	526	255	0.3	0.8	NT	NT	70	2
VQ-8	Aulatar, PT		11:11	8.1	24.5	525	254	0.3	0.5	NT	NT	TNC	14
VQ-9	Carabaro H.No.261		11:12	8.2	25.0	527	255	0.3	0.5	NT	NT	TNC	12
VQ-10	Kabira, Boramatan 2		11:20	8.2	24.8	528	256	0.3	0.6	NT	NT	TNC	12
VQ-11	LoiHuno Spring		11:21	8.0	25.4	526	255	0.3	0.4	NT	NT	38	6

Legend:

(ND) : not detectable

(NT) : not tested

(NS) : not set

(CFU) : colony formed unit;

(TNC) : Too numerous to count

Weather Report : Sunny Cloudy Rain

Inspected by :

Recommendation

Boil water before drinking

Mario Soares Laboratory Manager

District : Viqueque

Sampling Date : 24/04/2002

Sample by : Marito da Costa DWSS Viqueque

Town : Viqueque

Testing Date : 25 - 04 - 2002

Tested by : Miguel Quintao WSS Laboratory

Received by : Mario Soares

No	Sampling Point	Time		pH	Temp. (°C)	Cond. (µS/cm)	TDS (mg/L)	Salinity (‰)	Turbid. (NTU)	Hardness (mg/l)	Alkalinity (mg/l)	T.Coli CFU	E.Coli CFU
		sample	test										
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake	16:15	09:45	8.5	28.5	164	78	0.1	0.7	255		18	0
VQ-2	Break Pressure Tank	16:35	09:46	7.7	28.1	352	170	0.2	0.8	NT	NT	4	4
VQ-3	RSUD Viqueque	06:15	09:50	7.6	28.4	441	213	0.2	0.7	NT	NT	40	2
VQ-4	Beloi 1,PT	06:10	09:51	7.5	28.1	420	203	0.2	1.1	NT	NT	4	0
VQ-5	Boramatan 3	06:25	10:00	7.5	28.0	459	222	0.2	0.8	NT	NT	0	0
VQ-6	Bahafou PT	06:20	10:01	7.3	27.7	443	214	0.2	0.6	NT	NT	14	0
VQ-7	Beloi 3	06:00	10:09	7.4	26.7	172	82	0.1	0.5	NT	NT	6	0
VQ-8	Aulatar, PT	06:30	10:16	7.3	26.5		120	0.1	0.8	NT	NT	32	0
VQ-9	Carabaro H.No.261	06:35	10:10	7.6	26.2	401	194	0.2	0.9	NT	NT	0	0
VQ-10	Kabira, Boramatan 2	06:40	10:17	7.3	26.3	128	61	0.1	0.5	NT	NT	6	0
VQ-11	LoiHuno Spring	16:17	10:25	6.9	26.2	62	29	0.0	0.5	350	245	30	2

Legend:

(ND) : not detectable

(NT) : not tested

(NS) : not set

(CFU) : colony formed unit;

(TNC) : Too numerous to count

Weather Report : Sunny Cloudy Rain

Inspected by :

Recommendation

Boil water before drinking

Mario Soares Laboratory Manager

District : Viqueque

Sampling Date : 30 - 03 - 2003

Sample by : Marito da costa D wss Viqueque

Town : Viqueque

Testing Date : 31 - 03 - 2003

Tested by : Miguel Quintao Wss Laboratory

Received by : Miguel Quintao

No	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	CFU	CFU
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake	10:15	10:15	8.2	29.0	450	200	0.1	0.3	340	250	TNC	0
VQ-2	Break Pressure Tank	03:25	10:16	8.1	29.1	450	215	0.1	0.6	NT	NT	TNC	0
VQ-3	RSUD Viqueque	03:45	10:25	8.1	29.5	415	220	0.1	0.3	NT	NT	TNC	6
VQ-4	Beloi 1,PT	04:20	10:26	8.2	29.5	407	240	0.2	0.7	NT	NT	86	8
VQ-5	Boramatan 3	03:52	10:27	8.3	29.4	407	250	0.2	1.2	NT	NT	TNC	0
VQ-6	Bahafu PT	04:11	10:33	8.4	29.0	408	240	0.2	1.1	NT	NT	TNC	6
VQ-7	Beloi 3	04:25	10:34	8.1	29.1	450	240	0.2	0.7	NT	NT	70	2
VQ-8	Aulatar, PT	04:30	10:35	8.1	29.8	420	240	0.2	0.8	NT	NT	76	0
VQ-9	Carabaro H.No.261	04:19	10:38	8.1	28.5	415	210	0.2	0.6	NT	NT	TNC	12
VQ-10	Kabira, Boramatan 2	04:15	10:39	8.1	29.5	410	220	0.1	0.5	NT	NT	TNC	0
VQ-11	LoiHuno Spring	03:17	10:40	8.1	29.1	407	240	0.2	0.7	450	315	TNC	4

Legend:

(ND) : not detectable

(NT) : not tested

(NS) : not set

(CFU) : colony formed unit

(TNC) : Too numerous to count

Weather Report : Sunny Cloudy Rain

Inspected by :

Recommendation

Boil water before drinking

Laboratory Officer DNAS

District : Viqueque

Sampling Date :19 - 12 - 2005

Sample by : Marito da costa D wss Viqueque

Town : Viqueque

Testing Date :20 - 12 - 2005

Tested by :Mario Soares & Rui Manuel Pinto Belo Laboratory

Received by : Mario Soares

No	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	T.Coli	E.Coli
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	1.2	200	NS	0	0
VQ-1	Loi Huno, intake	15.45	13.57	8.7	29.2	7.19	2,6	ND	0.6	NT	NT	12	26
VQ-2	Break Pressure Tank	15.30	13.58	8.4	29.1	0.22	ND	ND	1.0	NT	NT	TNC	TNC
VQ-3	RSUD Viqueque	13.40	13.59	7.6	29.0	0.17	ND	ND	0.6	NT	NT	TNC	TNC
VQ-4	Beloi 1,PT	14.21	14.10	8.5	29.0	0.17	ND	ND	0.5	NT	NT	TNC	TNC
VQ-5	Boramatan 3	13.48	14.11	8.6	29.0	0.18	ND	ND	0.5	NT	NT	TNC	TNC
VQ-6	Bahafou PT	13.55	14.12	8.7	29.1	138	69	0.1	0.5	NT	NT	TNC	94
VQ-7	Beloi 3	14.16	14.20	8.6	28.9	946	464	0.5	0.5	NT	NT	74	78
VQ-8	Aulatar, PT	14.39	14.21	7.5	29.1	111	52,3	ND	0.5	NT	NT	TNC	80
VQ-9	Carabaro H.No.261	14.10	14.22	7.6	29.3	609	296	0.3	0.5	NT	NT	TNC	8
VQ-10	Kabira, Boramatan 2	14.05	14.34	8.4	29.0	1060	490	0.5	0.5	NT	NT	78	58
VQ-11	LoiHuno Spring	15.50	14.35	8.5	29.7	1060	474	0.5	0.5	NT	NT	TNC	92

Legend:

(ND) : not detectable

(NT) : not tested

(NS) : not set

(CFU) : colony formed unit;

(TNC) : Too numerous to count

Weather Report :

Sunny

Cloudy

Rain

Inspected by :

District : Viqueque
Town : Viqueque

Sampling Date : 23/02/2006

Sample by : Marito da Costa SAS Viqueque

Testing Date : 24/02/2006

Tested by : Mario Soares

Received by : Mario Soares

No	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	CFU	CFU
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
VQ-1	Loi Huno, intake	10.31	16.16	9.5	28.7	642	ND	0.5	0.5	NT	NT	5	0
VQ-2	Break Pressure Tank	10.38	16.17	9.3	27.6	643	ND	0.1	0.2	NT	NT	TNC	2
VQ-3	RSUD Viqueque	9.35	16.18	9.8	29.8	641	ND	0.1	0.3	NT	NT	TNC	0
VQ-4	Beloi 1,SAS	11.00	16.29	10.0	27.8	547	ND	0.5	0.3	NT	NT	18	0
VQ-5	Boramatan market	9.40	16.30	9.7	29.5	639	32	0.1	0.3	NT	NT	TNC	0
VQ-6	Bahafou PT	9.55	16.31	9.7	29.3	639	32	0.2	0.4	NT	NT	TNC	8
VQ-7	Beloi 3	9.00	16.40	8.6	28.0	550	275	0.5	0.2	NT	NT	4	0
VQ-8	Aulatar, PT	10.55	16.41	9.6	29.3	642	321	0.1	0.4	NT	NT	72	0
VQ-9	Carabaro H.No.261	9.50	16.42	9.6	29.6	646	323	0.2	0.5	NT	NT	20	0
VQ-10	Kabira, Boramatan 2	9.46	16.47	9.7	29.9	647	324	0.1	0.3	NT	NT	TNC	0
VQ-11	Loi-Huno Spring	10.21	16.48	9.5	28.6	644	322	0.1	0.2	NT	NT	TNC	3

Legend:

(ND) : not detectable

(NT) : not tested

(NS) : not set

(CFU) : colony formed unit

(TNC) : Too numerous to count

Weather Report :

Sunny

Cloudy

Rain

Inspected by :

Recommendation :

Boil water before drinking

Mario Soares Laboratory Manager

District : Viqueque

Town : Viqueque

Sampling Date : 23/09/2008

Testing Date : 23/09/2008

Received by : Mario Soares

Sample by : Alvaro Ximenes

Tested by : Alvaro Ximenes

No	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	R.Chlorine	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/L)	CFU	CFU
WHO/East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0.5	0	0
VQ-1	Loi Huno, intake	8.48	-	8.4	26.7	562	272	0.3	1.3	NT	NT	NT	0	0
VQ-2	Break Pressure Tank	8.53	-	8.5	26.4	565	274	0.3	2.4	NT	NT	NT	0	0
VQ-3	RSUD Viqueque	9.13	-	8.3	26.7	494	247	0.3	2.0	NT	NT	0.4	0	0
VQ-4	Beloi 1,SAS	9.24	-	8.2	27.0	540	270	0.3	7.0	NT	NT	0.4	0	0
VQ-5	Boramatan market	10.03	-	7.9	28.2	547	273	0.3	1.0	NT	NT	0.3	0	0
VQ-6	Bahafou PT	10.13	-	8.1	28.3	540	270	0.3	1.1	NT	NT		0	0
VQ-7	Beloi 3													
VQ-8	Aulatar, PT													
VQ-9	Caraubalo H.No.261													
VQ-10	Kabira, Boramatan 2													
VQ-11	Loi-Huno Spring													

Legend:

(ND) : not detectable

(NT) : not tested

(NS) : not set

(CFU) : colony formed unit

(TNC) : Too numerous to count

Weather Report : Sunny Cloudy Rain

Inspected by :

Recommendation : Boil water before drinking

Mario Soares Laboratory Manager

Source - District Capitals Water Supply and Sanitation Master Plan - Baucau, Lospalos, Same and Viqueque

Appendix C

Water quality test results

Cycle 1 tests May 2014

		Town	VIQUEQUE	VIQUEQUE	VIQUEQUE	VIQUEQUE	VIQUEQUE	VIQUEQUE	VIQUEQUE
		Date	11-May-14	11-May-14	11-May-14	11-May-14	11-May-14	11-May-14	11-May-14
		Location	LOIHUNO/BPT	BOROMATAN A WELL	BOROMATAN B WELL	DISTRIBUSI/SAS OFFICE	DISTRIBUSI/OLOBAI PT	DISTRIBUSI/KAVIRA OAN	BELOI DISTRIBUSI/TAP WATER
References and parameters	Units	WHO/TL Guideline	Sample Reference 4217	Sample Reference 4218	Sample Reference 4219	Sample Reference 4220	Sample Reference 4221	Sample Reference 4222	Sample Reference 4223
Physical tests									
pH	-	6.5 - 8.5	8.0	8.0	7.4	8.1	8.3	7.7	7.8
E. Conductivity	µs/cm	NS	615	615	1104	599	597	606	622
TSS	mg/L	NS	0.01	0.01	0.01	0.01	0.01	0.01	0.01
TDS	mg/L	1000	308	308	552	300	298	303	311
Salinity	%	NS	0.3	0.4	0.5	0.3	0.3	0.3	0.3
Temperature	oC	NS	28.2	28.2	30.1	29.5	26.6	30.6	29.6
Turbidity	NTU	5	0.2	0.2	0.4	0.5	0.5	0.2	1.7
Chemical tests									
NH3-N	mg/L	1.5	0.3	0.4	0.5	0.3	0.3	0.2	0.4
NO3-N	mg/L	10 (as NO3-N)	ND	0.1	0.2	ND	ND	ND	0.1
NO2-N	mg/L	1 (as NO2-N)	0.004	0.003	0.005	0.005	0.004	0.004	0.003
Iron (Fe)	mg/L	0.3	ND	ND	0.1	ND	ND	0.03	0.1
Manganese (Mn)	mg/L	0.5	ND	ND	ND	ND	ND	ND	ND
Fluoride	mg/L	1.5	0.9	0.2	0.1	0.9	0.9	0.8	0.70
Free chlorine	mg/L	0.5	ND	ND	ND	ND	ND	ND	ND
Ca hardness	mg/L	NS	225	235	240	215	180	180	210
Arsenic	mg/L	0.01	ND	ND	ND	ND	ND	ND	ND
T. Hardness (*)	mg/L	200	210	200	205	200	210	205	220
Total alkalinity	mg/L	NS	200	210	200	200	200	200	200
Sulphate (SO4 2-)	mg/L	250	25	24	48	26	26	2	24
Bacteriological test									
Total coliform	CFU/100 mL	0	0	0	0	0	2	2	0
E. Coli	CFU/100 mL	0	0	0	0	0	0	0	0

Legend:

ND: not detectable; NT: not tested; NS: not set; CFU: colony formed unit; TNC: Too numerous to count; FAC: free available chlorine

(*) - The values for total hardness should be higher than Ca hardness

Non compliant

Serious non compliance/health risk



APPENDIX 6. VIQUEQUE BORE INVESTIGATION RESULTS

THE NORTHERN TERRITORY OF AUSTRALIA <i>Control of Waters Act</i> FINAL STATEMENT OF BORE																									
Name of Owner : ADP TIMOR LESTE / DNSA					Registration No : 429																				
Name of Bore : BORE INVESTIGATION VIQUEQUE - 1					Index/Map No :																				
Intended Use :					Advice No :																				
Location : MUNICIPIO OFFICE (VIQUEQUE REGION)					Permit No :																				
From		To		Particulars of Strata			Name of Contractor : H2O1 PUMP & POWER																		
0		3		Top Soil			Name of Driller : Fernando De Jesus																		
3		4		Grey Clay Mix Brown Clay			Date Commenced : 29/07/2020																		
4		6		River Rocks Mix Brown Clay			Date Completed : 30/07/2020																		
6		12		Grey Clay Only			Depth Drilled : 32 (m)																		
12		18		Hard Grey Clay Only			Completion Depth : 29 (m)																		
18		21		Hard Blue Clay Only*			METHOD OF DRILLING																		
21		23		Blue Clay Only			<input checked="" type="checkbox"/> Rot <input type="checkbox"/> Rev. Cir. <input type="checkbox"/> Cable <input type="checkbox"/> Other																		
23		29		Hard Red Clay Only			HOLE DIAMETER																		
269		32		Hard Red Clay Mix Mud Stone			DRILLING FLUID																		
				DRY HOLE			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>From</th> <th>To</th> <th>Diameter</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4.2</td> <td>12½"</td> <td>Ausgel</td> </tr> <tr> <td>4.2</td> <td>32</td> <td>8½"</td> <td>CR-650</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Liquipol</td> </tr> </tbody> </table>			From	To	Diameter	Type	0	4.2	12½"	Ausgel	4.2	32	8½"	CR-650				Liquipol
From	To	Diameter	Type																						
0	4.2	12½"	Ausgel																						
4.2	32	8½"	CR-650																						
			Liquipol																						
PARTICULARS of CASING				PARTICULARS of PERFORATIONS or SCREEN STRINGS																					
From	To	Diam (ID)	Type	From	To	Diam (ID)	Aperture	Type																	
+0.50	4	10"	BLACK STEEL	4	6	6"	2 mm	UPVC Machine Slotted																	
6	25	6"	UPVC	25	29	6"	2 mm	UPVC Machine Slotted																	
Casing Suspended <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				Top of Packer set at : (m)																					
Method :				Length of Packer : (m)																					
Height of Casing above GL : 0.5 (m)				Method of Packer Connection :																					
CEMENTING / GRAVEL PACKING				WATER BEARING BEDS																					
From	To	Type	Depth (m)	Yield (L/s)	SWL (m)	Duration (hr)	Quality	EC	ph	Bottle No															
0	2	Cement Grouted																							
2	3	Bentonite Seal																							
3	29	Gravels Pack																							
STRATA and WATER SAMPLES																									
<input type="checkbox"/> Have been <input type="checkbox"/> Will be				Completion Yield : (L/S) Method : Airlifting Duration : 6 (hr)																					
Left at :				Completion SWL from GL : (m) Depth of lift : 29 (m)																					

THE NORTHERN TERRITORY OF AUSTRALIA
Control of Waters Act
FINAL STATEMENT OF BORE

Name of Owner : ADP TIMOR LESTE / DNSA		Registration No : 430
Name of Bore : BORE INVESTIGATION VIQUQUE - 2		Index/Map No :
Intended Use :		Advice No :
Location : SUCO OFFICE CARAU BALU (VIQUQUE REGION)		Permit No :

		Particulars of Strata	Name of Contractor : H2O1 PUMP & POWER
From	To		Name of Driller : Fernando De Jesus
0	4	Drilling River Rocks	Date Commenced : 31/07/2020
4	5	Brown Clay Only	Date Completed : 1/08/2020
5	25	Hard Grey Clay Only	Depth Drilled : 25 (m)
DRY HOLE			Completion Depth : 25 (m)
METHOD OF DRILLING			
<input checked="" type="checkbox"/> Rot <input type="checkbox"/> Rev. Cir. <input type="checkbox"/> Cable <input type="checkbox"/> Other			
HOLE DIAMETER			DRILLING FLUID
From	To	Diameter	Type
0	4.2	12¼"	Ausgel
4.2	25	8½"	CR-650
			Liquipol

PARTICULARS of CASING				PARTICULARS of PERFORATIONS or SCREEN STRINGS				
From	To	Diam (ID)	Type	From	To	Diam (ID)	Aperture	Type
0	4	12"	GYPSET					

Casing Suspended <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Top of Packer set at : _____ (m)
Method :	Length of Packer : _____ (m)
Hight of Casing above GL : _____ (m)	Method of Packer Connection :

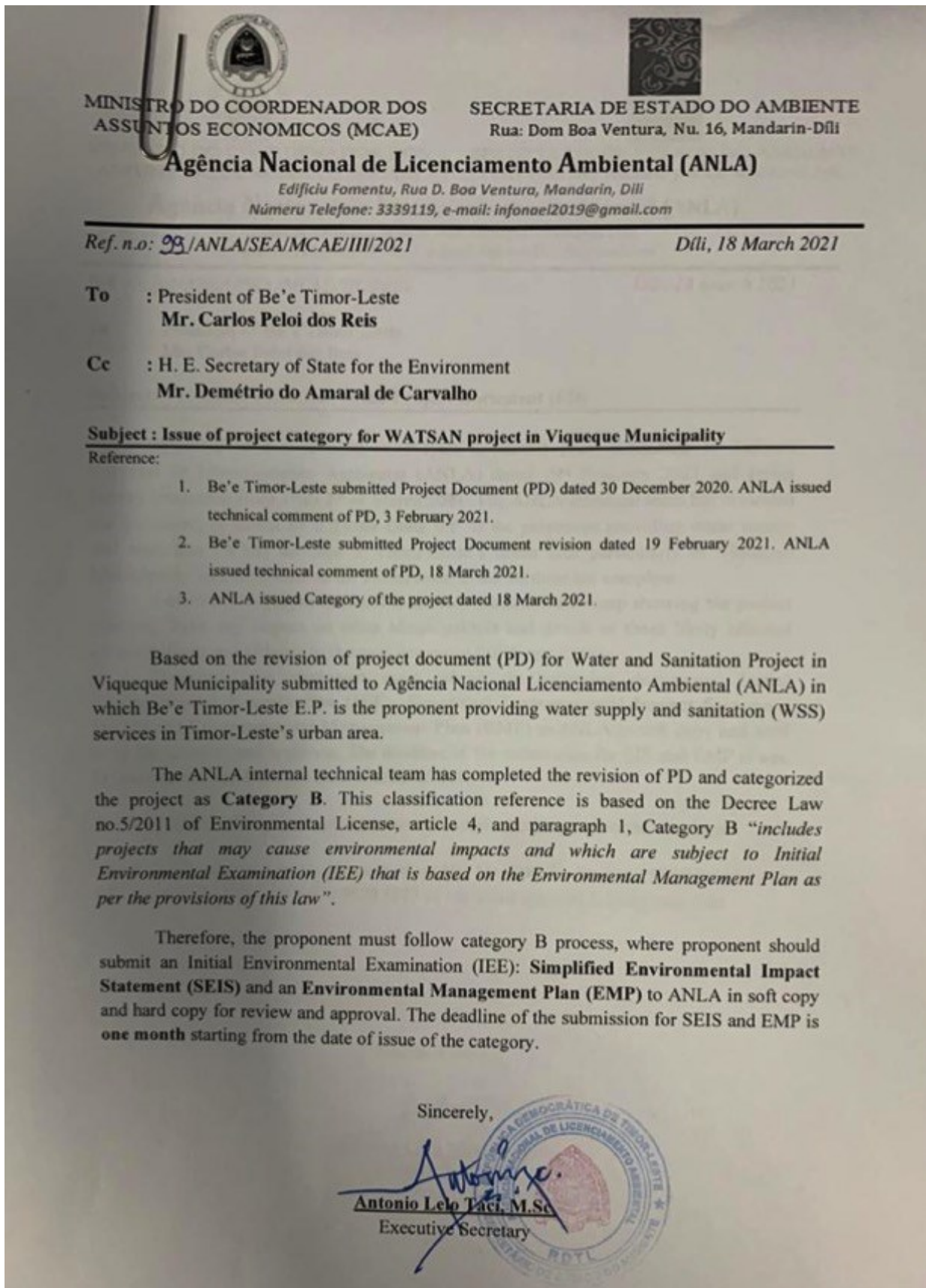
CEMENTING / GRAVEL PACKING			WATER BEARING BEDS								
From	To	Type	Depth (m)		Yield (L/s)	SWL (m)	Duration (hr)	Quality	EC	ph	Bottle No
			From	To							

STRATA and WATER SAMPLES		Completion Yield : _____ (L/S)	Method : _____	Duration : _____ (hr)
<input type="checkbox"/> Have been	<input type="checkbox"/> Will be	Completion SWL from GL : _____ (m)	Depth of lift : _____ (m)	
Left at :				

THE NORTHERN TERRITORY OF AUSTRALIA Control of Waters Act FINAL STATEMENT OF BORE													
Name of Owner : ADP TIMOR LESTE / DNSA					Registration No : 431								
Name of Bore : BORE INVESTIGATION VIQUQUE - 3					Index/Map No :								
Intended Use :					Advice No :								
Location : WELABETY (VIQUQUE REGION)					Permit No :								
From		To		Particulars of Strata		Name of Contractor : PUMP & POWER							
0		3		Top Soil		Name of Driller : Fernando De Jesus							
3		4		River Rocks		Date Commenced : 2/08/2020							
4		14		Drilling Grey Clay		Date Completed : 3/08/2020							
15		22		Hard Grey Clay		Depth Drilled : 37 (m)							
22		37		Hard Mud Stone		Completion Depth : 37 (m)							
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p style="text-align: center;">DRY HOLE</p> </div> <div style="width: 50%;"> <p style="text-align: center;">METHOD OF DRILLING</p> <p> <input checked="" type="checkbox"/> Rot <input type="checkbox"/> Rev. Cir. <input type="checkbox"/> Cable <input type="checkbox"/> Other </p> </div> </div>													
HOLE DIAMETER				DRILLING FLUID									
From		To		Diameter		Type							
0		4.2		12 1/4"		Ausgel							
4.2		37		8 1/2"		CR-650							
						Liquipol							
PARTICULARS of CASING					PARTICULARS of PERFORATIONS or SCREEN STRINGS								
From		To		Diam (ID)	Type	From		To		Diam (ID)	Aperture	Type	
0		4		12"	GYPSET								
Casing Suspended <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Top of Packer set at : (m)								
Method :					Length of Packer : (m)								
Height of Casing above GL : (m)					Method of Packer Connection :								
CEMENTING / GRAVEL PACKING					WATER BEARING BEDS								
From		To		Type	Depth (m)		Yield (L/s)	SWL (m)	Duration (hr)	Quality	EC	ph	Bottle No
					From To								
STRATA and WATER SAMPLES <input type="checkbox"/> Have been <input type="checkbox"/> Will be					Completion Yield : (L/S) Method : Duration : (hr)								
Left at :					Completion SWL from GL : (m) Depth of lift : (m)								

THE NORTHERN TERRITORY OF AUSTRALIA Control of Waters Act FINAL STATEMENT OF BORE																					
Name of Owner : ADP TIMOR LESTE / DNSA					Registration No : 432																
Name of Bore : BORE INVESTIGATION VIQUQUE - 4					Index/Map No :																
Intended Use :					Advice No :																
Location : FATU HADAN (VIQUQUE REGION)					Permit No :																
From		To		Particulars of Strata		Name of Contractor : H2O PUMP & POWER															
0		3		Top Soil		Name of Driller : Fernando De Jesus															
3		4		River Rocks		Date Commenced : 4/08/2020															
4		14		Drilling Grey Clay		Date Completed : 5/08/2020															
15		22		Hard Grey Clay		Depth Drilled : 32 (m)															
22		37		Hard Mud Stone		Completion Depth : 32 (m)															
DRY HOLE																					
METHOD OF DRILLING																					
<input checked="" type="checkbox"/> Rot <input type="checkbox"/> Rev. Cir. <input type="checkbox"/> Cable <input type="checkbox"/> Other																					
HOLE DIAMETER					DRILLING FLUID																
From		To		Diameter		Type															
0		4.2		12¼"		Ausgel															
4.2		32		8½"		CR-650															
						Liquipol															
PARTICULARS of CASING					PARTICULARS of PERFORATIONS or SCREEN STRINGS																
From		To		Diam (ID)		Type															
0		4		12"		GYPSET															
Casing Suspended <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Top of Packer set at : (m)																
Method :					Length of Packer : (m)																
Height of Casing above GL : (m)					Method of Packer Connection :																
CEMENTING / GRAVEL PACKING					WATER BEARING BEDS																
From		To		Type		Depth (m)		Yield (L/s)		SWL (m)		Duration (hr)		Quality		EC		ph		Bottle No	
						From		To													
STRATA and WATER SAMPLES																					
<input type="checkbox"/> Have been <input type="checkbox"/> Will be					Completion Yield : (L/S) Method : Duration : (hr)																
Left at :					Completion SWL from GL : (m) Depth of lift : (m)																

APPENDIX 7. ENVIRONMENTAL CATEGORIZATION FROM ANLA



APPENDIX 8. VIQUEQUE PUBLIC CONSULTATION MEETING NOTES (10TH OCTOBER 2020)

Public Consultation Notes

“Water Supply and Sanitation Investment Project”

- **I. Summary of Public Consultation Agenda**

- **Meeting Details**

- Detail : 10th October 2020

- Time : 2.00 PM to 6.00PM

- Location : Viqueque Municipality Meeting Centre, Municipio Lautem

- **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:
 - General Vision of the Urban Water Cycle (Presented by Gaudencia, AdP Technical Engineer)
 - General Vision of the Work for the Project (Presented by Gaudencia, AdP Technical Engineer)
 - Water Component (Presented by Sandra Gusmao, AdP Technical Engineer)
 - Sanitation Component (Presented by Sandra Gusmao, AdP Technical Engineer)
 - Environmental Component (Presented by Maria Helena, OASIS National Environmental Technician)
 - 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.

- **Questions, Recommendation, Reclamations, Responds and Discussion (Q&A session)**

- a. **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 maintain all the features as before in terms of the measurements of the reservatory and all the documents that will deliver to the government entity will include tank measures in which will be the same as in the construction phase.

- **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 BTL to understand well in terms of operating the system under supervision of the Contractor. Thus, the BTL 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 proposed reservoirs.

- **Representative from Ministry of Public Works**

- Recommendation:

According to him, it will be better if this project uses the existing source (Koha river) by making an abstraction and treatment and then distribute to the community. He concerns that if they continue do the borewell then they will spend a lot of money to do the work but they will not get any results at the end. He recommends 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, buried under the ground to avoid the community from illegal connection. Water that supplies through the main and secondary pipelines cannot be illegally connected without BTL authorization.

- Recommendation 3:

He recommends to change the old pipes with the new one because according to him if continue maintain 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:

Recommendation 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 received a lot of information regarding the illegal connection from BTL 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 access the water for 24 hour.

- **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 has no right to answer that question.

• **Alcino Pinto – Uma Uain Quic Local Community**

❑ Recommendation:

Recommends to AdP to create adequate toilet for peoples with disabilities iha 3 sucos that covers by the WATSAN project.

❑ Consultant's Clarification:

Noted.

• **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 decentralization 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 recommends to collaborate in order to get water from another place.

• **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 accommodate the population needs till 2040.

• **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 another 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

----- END OF NOTES -----

APPENDIX 9. SELECTED PHOTOGRAPHS OF THE PUBLIC CONSULTATION FOR VIQUEQUE (10TH OCTOBER 2020)

View of Participants in Public Consultation



Public Consultation led by Municipality Administrator (Centre), BTL Director (left) and ADP-TL Director (right)



Oasis National Staff presenting Environmental Issues and Mitigation Measures



Chefe de Suco Uma Uain Craic requesting clarifications



MPW PMU technician clarifying questions to stakeholders.



Coordinator for CVTL-Viqueque requesting clarifications



**APPENDIX 10. ATTENDANCE SHEET OF THE STAKEHOLDERS DURING
PUBLIC CONSULTATION**



MINISTÉRIO DAS OBRAS PÚBLICAS
 DIRECÇÃO GERAL ÁGUA E SANEAMENTO (DGAS)
 Rua: Avenida 20 de Maio - Calcoi, Caixa postal No 17, Tel. 3317157, 3317156 - Dili

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

LISTA PREZENZA
 MUNICIPIO VIQUEQUE

NO	NARAN	SEXO		INSTITUISAUN/POZISAUN	SUCCO/ALDEIA	NO CONTACTO	ASSINATURA
		F	M				
1			<input checked="" type="checkbox"/>				
2	Leopoldo H.		<input checked="" type="checkbox"/>	MAE	XIS		
3	Marta da Costa		<input checked="" type="checkbox"/>	MAE	Carau lada	7700908	
4							
5	Fernanda Soares Pinto		<input checked="" type="checkbox"/>	AGRICULTOR	KARACABA	75306273	
6	Celestino F. da Silva		<input checked="" type="checkbox"/>	SMAR	SSCOVAA	77933207	
7	Esperança de Carvalho		<input checked="" type="checkbox"/>	MAE/PAIS	-	78385148	

8	Athilio Ferreira	M	Sotopre	Carauhalo	71343821	ffuel
9	Jamiz Amaral da Costa	M	Josaria Cui.lda	Pranulal/Carauhalo	75664169	Diming
10	Mariane Sobrado	M	Escola CAFE	Mauulal	77775367	
11	Celestino Alves	M	Komusladu	Bromosa	77777702	Chau
12	Augusto Soares	M	Xefe Aldeia	Messa	76049855	Protop
13	Salvador Soares	M	Xefe Aldeia	Fato Madua	76225329	Simoni
14	Gabino Miguel	M	Chefe Aldeia	Fahi B.ere	77497609	Samoy
15	Regues Soares	M	Natural	Uuin crax	77324028	BT
16	Manuel Abalo da Costa	M	Chefe Aldeia	Bua Nuac	77528872	
17	Julio Sarmento	M	Xefe Aldeia	Baha B.unc	75638376	Haroy
18	Alexandriano do Carmo	M	Chefe Aldeia	Ad.ferai	78662461	Alvora
19	FRANCISCO PINTO	M	CHefe ALDEIA	BAHIA FOU	76347480	Thury
20	Rui Pedro Soares Viana	M	CHefe ALDEIA	NHE - BODRE	76865414	
21	Rosendo dos Santos	M	ESG A DE S.ING	Carauhalo	77449063	
22	Vitorino D. Purseino	M	BOVINFERIAS	Carauhalo	77996343	

23	Natalino Pires	PM	RH 70	Caravela	73465562	
24	Demétrio S. Simões	M	chf Aldemir	Sim Lari	778222315	
25	Paulino Souza	M	Rep: Aldemir	Caravela	77086882	
26	José de Góe	M	XEF Aldemir	Duda cari	77388208	
27	Cosilde Gomes Soares	M	SMDP	Caravela	77863576	
28	João Pires	M	NAT	Caravela	78066139	
29	Rogério Augusto	M	Coord. Est. Marinha	Caravela	77622085	
30	Tairine F. Gonçalves	M	Antigo com. S.	Uma-Rick	—	
31	Leão Soares	M	chefe alheia	bars lein	77414282	
32	Hammerlito Romel	M	Xefe SICO	Uma Quic	78066138	
33	Francisco Pires Amarel	M	Xefe Aldeia	Raizurama	78652098	
34	Ambrúcio Soares Pires	M	XEF ALDEIA	cabina oan	75708600	
35	Tullião Menezes	M	— NAT	Uabulo	77284011	
36	José da Costa	M	Igreja União Cristã	Caravela	75734830	
37	Basílio Carvalho	M	RTTL-EP/Forçista	—	77091040	
38	Matheus Ramos Pereira		TRM Provedor	—	77305892	

39	Francisco Carlos da Silva	✓	Comunidade	Caravelas	748558855	<i>[Signature]</i>
40	Leomardo Goreia Almeida		Calicia - Ocu	Caravelas	70244956	<i>[Signature]</i>
41	Serena M. da Silva	✓	CVTL F. VITE	Maratona	77294446	<i>[Signature]</i>
42	Flávia da Costa		Lama-redonda	Comunidade	77065550	<i>[Signature]</i>
43	GUILHERMO G. S		SMAA - OSM	-	77582009	<i>[Signature]</i>
44	Domingos dos Reis Raptist	✓	Comunidade	Manoelot	77293202	<i>[Signature]</i>
45	12ae Salsinha Soares	✓	depe Alcin	Manoelot	77180162	<i>[Signature]</i>
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APPENDIX II. SPOIL MANAGEMENT PLAN

A. Spoil Management Plan

The SMP is to describe how the contractor will manage the generated spoil and reuse related to design and construction activities. This is an integral part of EM.

I. Objectives of SMP:

- i. To minimize spoil generation
- ii. To maximize beneficial reuse of spoil from construction activities in accordance with spoil management hierarchy
- iii. To minimize environmental impacts on resident and other receivers
- iv. Minimize and/or avoid any further site contamination of land, water and soil

2. Structure of SMP:

Section 1: Introduction of SMP

Section 2: Legal and other requirements

Section 3: Roles and responsibilities

Section 4: Identification and assessment of spoil aspects and impacts

Section 5: Spoil volumes, characteristics and minimization

Section 6: Spoil reuses opportunities, identification and assessment

Section 7: On site spoil management approach

Section 8: Spoil transportation methodology

Section 9: Monitoring, Reporting, Review, and Improvements

3. Aspects and Potential Impacts:

Aspects	Potential Impacts
Air Quality	Airborne dust generation due to wind
Sedimentation	Sediment laden site runoff from spoil stockpiles and spillage of spoil from truck on roads
Surface and Groundwater	Contamination of water quality
Noise	Temporary duration associated with spoil handling, haulage and storage
Traffic	Associated with spoil haulage
Land Use	Spoil being transported to a receivable site that doesn't have a permission for disposal

4. Identification of Possible Safe Disposal Sites for Spoil. Those spoils which can't be reuse shall be properly disposed in designated areas; such disposal areas should be identified in project locations. Such disposal areas should be safe from environmental aspects and there should be any legal and resettlement related issues. Such areas need to be identified and prior client approval should be obtained to use it as spoil disposal area. The local administration must be consulted and if required permission should be obtained from them.

B. Spoil Volumes, Characteristics and Minimization

- a. **Spoil Volume Calculations.** Estimate the volumes of spoils produced from each of the construction sites.
- b. **Characterization of Spoil.** Based on the type of spoil (sand, stone, mix materials, reusable materials).
- c. **Adopt Spoil Reduce, Reuse Opportunities.** An overview of the assessment methodology to be used:
 - i. Consideration of likely spoil characteristics
 - ii. Identification of possible reuse sites
 - iii. Screening of possible reuse opportunities

C. Storage and Stock Piling

1. **Stockpiling.** Spoils shall be stockpiled at locations at least 300 m away from water courses and covered.
2. **Transportation and Haulage Route.** Based on the above, the contractor will have to prepare a transport and route plan, and submit it to the consultant for review and approval.

APPENDIX 12. MEETING NOTES – NATIONAL DEPARTMENT OF CULTURAL PATRIMONY, SECRETARY OF STATE FOR ART AND CULTURE (SEAC) ON THE 7TH & 22ND SEPTEMBER 2020

Meeting Notes

“Water Supply and Sanitation Investment Project”

Venue	Secretary of State for Arts and Culture Main Office, Pantai Kelapa
Date	September 7, 2020
Time	9.45 – 11.00
Interviewer	Maria Helena A. de Jesus
Sources/Participants	<ul style="list-style-type: none"> • Irene dos Reis Goncalves (Chief Department of Archeology) • Ilisio do Carmo (Personnel staff) • Eustorgio da Silva (Personnel staff, Archeologist) • Joaquina Lopes (Personnel staff) • Leandro Aristides (Personnel staff, Archeologist) • Chris (Personnel staff, Engineer) • Carlos (Personnel staff, Engineer)

Ms. Maria Helena (National Environmental Technician) on behalf of OASIS conveyed the objective of the meeting; to request cultural heritage sites data in all 4 Municipals in a form of shapefile/kmz files in adherence to a request letter sent from the Ministry of Public Works (MPW) with a reference number 172/C50605/Gab.DGAS/MOP/VII/2020. This aiming to identify whether or not the sites are located adjacent to the project components and how they will impact on the related sites. Ms. Maria Helena also stated that the Environmental team from OASIS has identified several cultural, touristic and historical sites during the field visit in 4 Municipals. Hence, adjusting the data prepared from the National Directorate of Cultural Patrimony would be very beneficial in order to complete the information for subsequent mapping and analysis of environmental and social impacts.

Mrs. Irene Goncalves, Mr. Ilisio do Carmo and Mr. Leandro Aristides expressed gratitude and explained briefly on each of the personnel's roles who participated on the meeting. They are willing to share what the team requested, although some of the data are still confidential and cannot be publicized in order to avoid any interested parties in taking advantage of the assets. They highlighted the importance of their involvement in various projects and reminded us to invite the delegated person from the mentioned department to have a joint site visit whenever if necessary. The objective of the statement is to gain additional insights as inputs particularly for the Department of Archeology. Thus, the Chief Department and colleagues would like to know the location and total of the sites that the OASIS team had identified.

Ms. Maria Helena intervined that the site visits that the OASIS team had conducted was to characterize the environmental condition in the project area and had collaborated with local authority and Municipal Cultural center to gain the needed information. At the current moment, the OASIS team only needs the said description of the data, photographs, and kmz or shapefiles of the cultural heritage sites within the 15 km radius of the project area. The OASIS team for WATSAN project considers the existence of Secretary of State for Arts and Culture and will need the presence of their participation during the Public Consultation in all 4 Municipalities which will be conducted very soon within this September post submitting the IEE documents to ANLA. And the OASIS team is ready to do a presentation in regards to the related project's sensitive and cultural sites cumulated during the last site visit, if needed.

Mrs. Irene, Mr. Ilisio, Mr. Leandro and Ms. Maria Helena agreed and confirmed that OASIS team will do a presentation on Thursday, September 9 at 3 o'clock in the afternoon.

Venue	Secretary of State for Arts and Culture, Pantai Kelapa
Date	September 22, 2020
Time	9.00 – 10.00
Interviewer	Maria Helena A. de Jesus
Sources/Participants	<ol style="list-style-type: none"> 1. Irene Goncalves dos Reis (Chief of Department of Archeology) 2. Maria Isabel Alves do Rego (Architecture) 3. Eugenio de J. Sarmento (Chief of Department of Architectonic) 4. Octaviano Mota (Engineer) 5. Lisandro Manuel (Engineer) 6. Jose P. de S. Garcia (Staff) 7. Romeu Soares da Silva (Staff) 8. Elisio do Carmo (Staff/Technician)

The objective of the meeting is to provide information of the cultural, touristic, sacred, and other heritage sites identified by the OASIS team in a form of power point presentation, which included photographic documentation, coordinate locations list, and

mapping presentation. This meeting is to comply the National Department of Cultural Patrimony agreement with the OASIS team which was represented by the National Environmental Technician, Maria Helena, during a meeting conducted on the 7th of September 2020 and in relevance with MPW request letter No. 172/C50605/Gab.DGAS/MOP/VII/2020 aiming to receive data of location and description of the patrimony cultural in the associated 4 Municipalities.

The meeting was attended by 8 participants coming from the Secretary of Arts and Culture and was commenced with a presentation from Maria Helena regarding to the Cultural Patrimony sites that was defined or identified by the OASIS team during a site visit for the Preliminary Design phase.

Post the presentation is the discussion session composed of questions and recommendations from the Secretary of Arts and Culture party and answers were provided by Maria Helena. The discussion session is described below:

1. **Q:** During the replacement of the pipe, what is the type of the pipe would your consultant recommend on implanting? (Octaviano Mota)
A: For transmission lines, the selected material would be HPDE and Ductile Iron. Meanwhile, the distribution network will be using HDPE
2. **Q:** In this project that you are referring to, will it give a direct or indirect impact towards the cultural objects? And how do you plan to mitigate? (Elisio do Carmo)
A: The impact would mostly be direct coming from various construction activities, although the duration will be temporary. The mitigation would be in compliance with the Decree Law No. 33/2017 by not interfering the 50 m radius of each object located adjacent to the distribution alignments or any other project components.
3. Request from Chief of Department, **Mrs. Irene:** Sharing the kmz files of distribution lines in order for them to inform us for additional information of the cultural patrimony object or other historical sites.
4. Suggestion from **Mr. Jose Garcia:** If possible, the cultural sites that have been identified should also be described with their historical background
Respond: It is not part of our scope of work
5. Comment from **Mr. Octaviano Mota:** The magnitude of the impacts towards the cultural objects won't be strong comparing to the Drainage (DDIUP) project for Dili

APPENDIX 13. ATTENDANCE SHEET - SEAC









ATTENDANCE SHEET
 MEETING AT THE STATE SECRETARY OF ARTS AND CULTURE, TIMOR-LESTE
 FOR
 "CONSULTING SERVICES FOR DETAILED ENGINEERING DESIGN OF TIMOR - LESTE FOUR MUNICIPAL CAPITALS
 WATER SUPPLY & SANITATION PROJECT"

Tuesday, 22nd of September 2020
 Dili, Timor-Leste

No.	Naran	Instituisaun	Posisaun	No. Kontaktu	Asinatura
1	Srene Gonçalves dos Reis	SEAC / DNRC	Eng. Depart. KE	993 999 35	<i>[Signature]</i>
2	Maria Isabel Alves do Rego	SEAC / SEAC	Arquiteta	713 2215	<i>[Signature]</i>
3	Fernando de J. Somenza	SEAC	Dept. Departamento	-	
4					
5	Octaviano Noh	SEAC / DATE	Engineer	99674555	<i>[Signature]</i>
6	Lirando Manuel	SEAC / DEAC	Engineer	77388998	<i>[Signature]</i>
7	Jose P. de S. Sereia	SEAC / DPRE	Stapp	99592613	<i>[Signature]</i>
8	Rommel Soares da Silva	SEAC / DPRE	Stapp	95332636	R
9	Elisio do Carmo	SEAC / DPRE	Stapp	99316522	<i>[Signature]</i>

ATTENDANCE SHEET
MEETING AT THE STATE SECRETARY OF ARTS AND CULTURE, TIMOR-LESTE
FOR
"CONSULTING SERVICES FOR DETAILED ENGINEERING DESIGN OF TIMOR - LESTE FOUR MUNICIPAL CAPITALS
WATER SUPPLY & SANITATION PROJECT"

Monday, 7th of September 2020
 Dili, Timor-Leste

No.	Naran	Instituisaun	Pozisaun	No. Kontaktu	Asinatura
1	Isene Gonçalves dos Reis	SEAC / DNR	Key Depart. AE	77399935	
2	Sandra A. B. A. B.	SEAC / DNR	Staff	7566888	
3					
4	Joaquina Lopes	SEAC / DNR	staff	77269330	
5	Estevão Neto	SEAC / DNR	Engineer	-	
6	Eustorgio DA S.P. LOPES	SEAC / DNR	Staff	-	
7	Cristóvão C.C. Carvalho	SEAC /		-	
8	Natalia de Jesus A. Xavier	SEAC / DNR	Staff	-	
9	Elisio S. Carmo	SEAC / DNR	Staff	-	

**APPENDIX 14. VIQUEQUE – PROPOSED WATER SUPPLY SYSTEM – GENERAL
PLAN**

**APPENDIX 15. VIQUEQUE SOCIAL PUBLIC CONSULTATIONS -
LIST OF PARTICIPANTS (SUCO LOIHUNU, CARAUBALO, UMA
QUIC AND UMA UAIN CRAIC)**



**MINISTÉRIO DAS OBRAS PÚBLICAS
DIRECÇÃO GERAL ÁGUA E SANEAMENTO (DGAS)**

Rua: Avenida 29 de Maio - Colaco, Caixa postal No 17, Tel. 3317157, 3317156 - DIL

"Consulta Pública de Desenvolvimento Projeto Abastecimento Be'e Mos no Saneamento Iha Capital Municipio"
 Dia: de Dezembro de 2020
LISTA PREZENZA
 Suco Loihuno - Municipio Viqueque

NO	NARAN	SEXO		INSTITUISAUN/POZISAUN	ALDEIA	NO CONTACTO	ASSINATURA
		F	M				
1	Luquel de Aofa Lela	✓		Xefe Suco	Santuis	98066116	<i>[Signature]</i>
2	Jusinal da Cora	✓		Xefe Aldeia	ha lar-oli	99423291	<i>[Signature]</i>
3	Ervimo da Cora G.	✓		Xefe Aldeia	Uala lan	99263889	<i>[Signature]</i>
4	Adilino de Barvalho	✓		Xefe Aldeia	Paibulale	99030032	<i>[Signature]</i>
5	Francisco Alves Guarnio	✓		Xef Aldeia	Uai-luda	99157340	<i>[Signature]</i>
6	Filomenus De. galeira	✓			Uala-uqa	99999898	<i>[Signature]</i>



7	Regata Amnia castro	2		Comunidade	Samaliu		Quero
8	Daniel da casa Lourenç	1	-	Delegado	Uai-Hada		Benf.
9	Antonia Soares		-	-	Samaliu		Benf.
10	Joãozinho D.R.N.C. Pereira		✓	Comunidade	Samaliu		Benf.
11	Doçrio de Jesus	-		Comunidade	Samaliu		Benf.
12	Outimiana de Fatima	✓		Comunidade	Uala-Ual		Benf.
13	Turita de Araújo	✓		Comunidade	Uia-Uaioli		Benf.
14	Maria Assunção de Costa Amara	✓		Comunidade	Samaliu		Benf.
15	Delshino da Costa G.	✓		Delegado	Castelo da		Benf.
16	Leis dos Reis	✓		Samaliu	Laue		Benf.
17	Reisa de Jesus	✓		Comunidade	Ualaura		Benf.
18	Priscilla M. Abi	✓		Comunidade	Caia Uale		Benf.
19	Fina e.P. Pereira	✓		Comunidade	Uai-hada		Benf.
20	Jurita da casa, G.	✓		Comunidade	Uala-Ual		Benf.
21	Tomaz-o. Gomes	✓		Comunidade	Uala-Ual		Benf.

22	Carvalho J. da CS Sacramento	✓	Komunidade	Samará	73375789	<i>[Signature]</i>
23	Aida DO ROSARIO C. A.	✓	Delegada	Liaurai-ti	77192164	<i>[Signature]</i>
24	Jurita da Costa R	✓	Delegada	Uala-Uau	78427239	<i>[Signature]</i>
25	Madalena da Costa	✓	Delegado	Lia-ori-ti	79808876	<i>[Signature]</i>
26	Madalena da Costa.	✓	Dele-gata.	cai-loto-ti	77340893	<i>[Signature]</i>
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**MINISTÉRIO DAS OBRAS PÚBLICAS
DIRECÇÃO GERAL ÁGUA E SANEAMENTO (DGAS)**

Rua: Avenida 20 de Maio - Colóca, Caixa postal No 17, Tel. 3317157, 3317156 - 1011

"Consulta Pública ba Desenvolvimento Projeto Abastecimento Be'e Mos no Saneamento Iha Capital Municipio"
Dia: 12 de Dezembro de 2020
LISTA PREZENZA
Suco Caraubalo - Municipio Viqueque

NO	NARAN	SEXO		INSTITUISAUN/POZISAUN	ALDEIA	NO CONTACTO	ASSINATURA
		F	M				
1	Frao Druo		M	Cuelbofoe	Kumelata	98066139	
2	Makilia S. Sgatssoeas		M	Beneba Fou	Banunon	95908535	
3	Filomena S. Amara			Junakhe Eto.	Cabira oan	95357900	
4	Otope Juviz Guleris.			Delgado.	Sira. Loi	928545	
5	Bendita Annara			Partisipantis	Messa	95385189	
6	Taura D.C. Brauon			Partisipantis	Wessa	95254925	



7	Remuinda F. Soares	✓	Delega da	name - hat	78099178	Rain
8	E Brincio Soares	✓	Ofete Delegada	76222401	76222401	Paula
9	Paulina Pires		Delegada	WESSA	76482370	Pump
10	Maria Larra Soares	✓	-11-	Mamutak	99662616	Paula
11	Florencia Amaral	✓	-11-	-11-	78563302	Franco
12	FEDSINA Barros			Cabiraom	77495398	Franco
13	Filomena S. Miquel	✓	-11-	-11-		Franco
14	Palmina da Costa	✓	-11-	Cabiraom		Rosa
15	ROSA DA SILVA	✓	-	MANE-144	76303648	Rosa
16	JENNIFER OLIVEIRA	✓	=	MANE-HAT		Rosa
17	Selwinda Paugel	✓	=	MANE-HAT	96456594	Silva
18	JULIETH GUTERREIS	✓	-	CABIRADON		Emm
19	maria dos santos	✓	Remunidade	Cabiraom	75405223	Paula
20	Duarte Vieira	✓	-	lug about		
21	Japonica	✓		Cabiraom		Paula



22	YUNY BARRIS		M	conselho sub	lame-daran	755224654	
23	Martinho Soares		M	participantes	WESSA	— -1-	
24	MA2001		M	—	ALL	—	
25	Joovina Soares	F		Delegada	Hos. about	76487730	
26	Paulingos piadade		M	comunidade	—	—	
27	Celma de oliveira	F		comunidade	Hos. about	—	
28	Floriana silva da cruz	F		comunidade	Hos. about	76129771	
29	Julmira pinto da silva	F		comunidade	Hos. about	75422051	
30	Marciana Freitas	F		—	Sira. lani	—	
31	Sidemia D.C. Ruas	F		—	Sira. lani	77961148	
32	Infinha A. Moiz	F		—	Hos. about	—	
33	Onopris B. Da. S. Rangel	F		~ 11 ~	Mane. Hact	764866390	
34	Deonesia F. P. Guterres	F		—	Sira-lani	—	
35	Adelia A. Guterres	F		Participante	Mane-Hact	78494934	
36	Isolina A. Miranda da silva	F		—	Doramahan	73442817	
37	Dejiana Pinto	F		—	—	—	

38	Domingos O. Almeida		M	Adm. Alim.	Sinalava			
39	Nelcio da Ressurreicão		M	Comunidade	Cabirava	77825158		
40	Fernando Almeida		V	Delegado	Lampelas			
41	Fernando Soares		V	Comunidade	Carmona			
42	Henrique Soares		M		CABIA-OAM	90417022		
43	GONRICO Amador		M	Delegado	Caldeira	76223578		
44	ANTONIO S. BRAGA		M	Comunidade	Cabirava			
45	Imaculada M. Soares		V	118 anos	Caru bato	77622149		
46	Angerica ALVES		V	Delegada	Umuç - Umuç	77319676		
47	Genêta Fito.		V	Comunidade	Amenálen	967808232		
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**MINISTÉRIO DAS OBRAS PÚBLICAS
DIRECÇÃO GERAL AGUA E SANEAMENTO (DGAS)**
Rua: Avenida 20 de Maio - Caeali, Caixa postal No 17, Tel. 3317157, 3317156 - DDI

"Consulta Pública ba Desenvolvimento Projeto Abastecimento Be'e Mos no Saneamento iha Capital Municipio"
Dia: **13** de Dezembro de 2020
LISTA PREZENZA
Suco Uma Quic - Municipio Viqueque

NO	NARAN	SEXO		INSTITUISAUN/POZISAUN	ALDEIA	NO CONTACTO	ASSINATURA
		F	M				
1	Hermanesilio Ranga		✓	Xyfa Bulo	Aidac-Bein	78066138	<i>[Signature]</i>
2	Fernando Kattallo		✓	Liq Nain	Maca-Okan		<i>[Signature]</i>
3	Abilio Soares		✓	Komunidade	Lya		<i>[Signature]</i>
4	Margulina Soares		✓	--/1--	AIND-UNIK	75539006	<i>[Signature]</i>
5	JOAO PAULO GOMES		✓	--/1--	AIDAK-BEIN	75615580	<i>[Signature]</i>
6	Jaime De Jesus		✓	--/1--	AIDAK-BEIN		<i>[Signature]</i>



7	Edward Amarel		✓	Comunidade	Pi-dote Bein		None
8	Jose maria		✓	Comunidade	Pi-dote Bein	75287284	None
9	Aluis Soares		✓	Comunidade	Pi-dote Bein	76537804	Aluis
10	Antonio F. Amarel		✓	Comunidade	Lua		None
11	Marino de Jesus		✓	Kumunidade	Lua	75595402	None
12	Crilio Gomes		✓	Chefe Aldeia	Aldeia-Bein	76413081	None
13	Armando Pereira		✓	Comunidade	Lua		None
14	José M. A. T. Amarel		✓	Comunidade	Lua	77442483	None
15	Noémia A. Baptista		✓	Comunidade	Lua	75503893	None
16	ELIZABETH B. AMARAL		✓	Comunidade	MAROMAR	754416812	None
17	OTILDE DA SILVA FEITAS		✓	-11-	MAROMAR		None
18	Jaqueta Sacramento Baptista		✓	-11-	Lua	75136216	None
19	Balbina Amarel		✓	-11-	Lua		None
20	Antonio Pereira Amarel		✓	MAP/Extensam		75482867	None
21	Salvador Amarel		✓	Comunidade		77280700	None



22	Joana Sacramento	F		Comunidade	Lúa	75532248	<i>[Signature]</i>
23	Ofélia Maria de Fátima	F	-11-11-		-11-	75577055	OMM
24	Codefrado C. Modor Sacramento		-11-11-		aidak-bein	75506472	<i>[Signature]</i>
25	ANTONIO GONZAGA	M	Comunidade		LUA	75576923	And
26	Anamaria G. Amaral	F	-11-		Ai dak-bein	76684248	<i>[Signature]</i>
27	Selestina . Ferreira	F	-1-		-1-		SM
28	Judat de A. Guterres	F	-1-		-1-	78695082	<i>[Signature]</i>
29	Mariana da C. Soares	F	-1-		LUA	76072345	<i>[Signature]</i>
30	JUDITH RAINSEL	F	-1-		Ai dak-bein		<i>[Signature]</i>
31	Luciana dososa Pereira	F	-1-		LUA	76883875	<i>[Signature]</i>
32	Kristina soares	F	-1-		Airawain		<i>[Signature]</i>
33	Joanika Gomes amaral	F	-11-		Aidax-bein	75577151	<i>[Signature]</i>
34	Deonirza Gomes Amaral	F	-11-		Aidax-bein	75503640	<i>[Signature]</i>
35	ZEFERINA P. Soares	F	pregada		aira-uain	75504829	<i>[Signature]</i>
36	Deolinda Soares	F	Comunidade		aira-uain		<i>[Signature]</i>
37	Melicia D. B. Simões Pinho	F	Comunidade		Pinva-uain		<i>[Signature]</i>

38	Trenia da Fátima	F		Comunidade	Lúia	76117193	IA
39	Antônio Gonçalves	M		— 11 —	Lúia	75507101	PA
40	Mariana Samuels	M		— 0 —	Nereu	78208532	PA
41	Jairio Gomes	M		— 12 —	Lúia	—	PA
42	Jovino Amaral	M		— 11 —	Lúia	75578244	PA
43	Eucides Pangel Varela	M		— 11 —	Aida-bein	—	PA
44	Marcelino - Ferreira	M		— 11 —	Lúia	75306493	PA
45	Afonso Gonçalves	M		— 11 —	Maromam	7674286	PA
46	SILVIO Soares	M		— 11 —	Lúia	73086911	PA
47	Angelo Pangel	M		— 11 —	Aida-bein	77056137	PA
48	Domingos de Jesus Viana	M		— 11 —	Lúia	76080412	PA
49	Manuel Xavier	M		— 11 —	Lúia	75259381	PA
50	Luzitania De C. Xavier	F		— 11 —	Lúia	78364918	PA

continuação Suco Uma Guic

38	KitDa Sa costa	F		comunidade	Lua	75497280	Arb
39	Auria Amaral pinho	F		—'—	—'—	76683257	Arb
40	Cirriana Co Po Panaral	F		—'—	—'—	76680473	Arb
41	Vicente Amaral	M		—'—	Madeira	77358444	Arb
42	Graciosa L. e. R. Sa Panaral	F		—'—	M. na oain		Arb
43	Victoria A. Soares	F		—'—	M. na oain		Arb
44	Amaral Amaral	M		—'—	Aldeac Bin	7680900	Arb
45	HONORIO GOMES	M		—'—	Lda	76025656	Arb
46	Mentuda da Silva	F		—'—	Mac. dean		Munich
47	Hemelinda Amaral	F		—'—	Aimauain		Arb
48	Bernadete Sarwante	F		—'—	Lua		Arb
49	Manuana Soares	F		—'—	Mac. dean		Munich
50	Harwinha Inacio	F		—'—	Mac. dean		

Continuação suco Una Guic

22	Jacinta Amoral	F		Komunidade	Aidabrin			Jail
23	Celestina Sacramento Baptista	F		Komunidade de	Aibat-bein	75405652		consis
24	Teresinha Amoral	F		—	Lia	—		Paula
25	Carlota Pangel	F		Komunidade	Aidal-brin	77409562		Paula
26	Francisco Pito Amoral	M		Xefi Aibein	Raihum	98652098		Pito
27	Berardina de Amaris	M		Komunidade	Aidac-Rain	77762329		Paula
28	Balvina de Jesus Nazareth	F		Komunidade	Nareman	—		—
29	Opela Sousa	F		Komunidade	Nareman	—		—
30	PIZANO AMARAL	M		Komunidade	Lia	—		Fancy
31	Mauvel Amoral	M		Komunidade	Luo	—		Paula
32	JAO	M		Komunidade	Luo	77252355		Paula
33								
34								
35								
36								
37								



MINISTÉRIO DAS OBRAS PÚBLICAS
DIRECÇÃO GERAL AGUA E SANEAMENTO (DGAS)

Rua: Avenida 20 de Maio - Caiacó, Caixa postal No 17, Tel. 3317157, 3317158 - DDI

"Consulta Pública ba Desenvolvimento Projeto Abastecimento Be'e Mos no Saneamento Iha Capital Municipio"
Dia: 13 de Dezembro de 2020
LISTA PREZENZA
Suco Uma Uain Craic - Municipio Viqueque

NO	NARAN	SEXO		INSTITUISAUN/POZISAUN	ALDEIA	NO CONTACTO	ASSINATURA
		F	M				
1	ROGERIO SOARES VIANA		M	CHEFE ALDEIA	ME-BORUE	77940659	
2	Juiao Baptista		M	Juventude	Bossa-bein		
3	MARITA		F	Populasaõ	Naeboruk		
4	Joacina Sarmento		F	Populasaõ	Naeboruk	76316084	
5	Sofia De Araujo N		F	Populasaõ	naeboruk	76282620	
6	Joarinha da Piedade A		F	Populasaõ	Bossa-bein	76339922	

7	Filipa Raifas	F	População	Naebaruc	76316084	<i>[Signature]</i>
8	Imaculada - marques	F	População	Bosa-bein	75507975	<i>[Signature]</i>
9	Marta simoes. G.	F	População	Bosa-bein	75700603	<i>[Signature]</i>
10	Aurelia Sacramento	F	População	Bosa-bein	75594000	<i>[Signature]</i>
11	Mariana da Costa Peilias	F	População	Bosa-bein	75486684	<i>[Signature]</i>
12	Maria Soares Trisela	F	População	Bosa-bein	-/-	<i>[Signature]</i>
13	Matalia da Costa Pinto	F	População	Bosa-bein	-/-	<i>[Signature]</i>
14	Mateus Soares	M	População	Náboruc	-/-	<i>[Signature]</i>
15	Aurika, x. Ribeiro	F	População	Naebaruc	75972944	<i>[Signature]</i>
16	MARTINHO Baltazar	M	População	Naebaruc	-/-	<i>[Signature]</i>
17	AVDela, soares	F	População	Naebaruc	-/-	<i>[Signature]</i>
18	Ediana S. A.	F	-/-	-/-	78169442	<i>[Signature]</i>
19	Anabela S-Freitas	F	População População	Bosa-bein	78606176	<i>[Signature]</i>
20	Stela da Costa	F	População	-/-	-	<i>[Signature]</i>
21	MADALENA FREITAS	F	População	-/-	-	<i>[Signature]</i>

22	APRIL A SARPES	F	Populacão	PARAPAC	77001000	Amil
23	ZITA VAIAS	F	Populacão	NAE-BOUVE	75700206	Zita
24	Dominicas Miguel	F	Populacão	Bosabein	7	Douf
25	Martina Freitas	F	Populacão	Bosabein		Mout
26	Maria Madalena M.P. Araujo	F	Populacão	Bosabein	75792043	Mout-
27	Cipriana Sarmentu	F	Populacão	Bosabein		Cout-
28	Leão Soares	M	Populacão	Trasson Lin		Paula
29	Leão Freitas	M	Populacão	Parson Lin		Emery
30	Gr-Melhor Soares	M	Chefe aldeia	Fato-Hedon	75923599	Emery
31	Zaneus Maria Pinto	M	Populacão	Bossa Bon	75699460	Emery
32	AUGUSTO DA SILVA	M	-11-	-11-	75132055	Emery
33	Niguel Soares	M	-11-	Nae-Boouce	77384048	Emery
34	Dominicas Sarmento	H	-11-	Nae-Boouce		Emery
35	Agostinho Amarel	H	-11-	-11-		Emery
36	ANTONIO A. SOARES	M	-11-	-11-	78421902	Emery
37	Manuels. B.S.S.	M	-11-	-11-	70008002	Emery



38	Jose Soares	M	11-11-11	Bosabem	Prof
39	Luciana dos Santos		11-11-11	Nabebruk	Prof
40	Sdestina mihyl		11-11-11	basabem	
41	Veronica T.A.J Pinto	F	11-11-11	Nabebruk	Ward
42	Profina nuris	F	11-11-11	Bosabem	
43	LINDA DE ARAUJO	F	11-11-11	FATUHA DAK	Doc
44	RDFINA FERREIRA	F	11-11-11	FATIUKADAM	Prof
45	Pascoal sarmanto	F	11-11-11	Bosabem	Prof
46	Fenelia.c da.c.g.Pinto	F	11-11-11	Nabebruk	Prof.
47	Manuel Alves	M	11-11-11		
48	Acacio Pinheiro	M	11-11-11	Bosabem	
49	Ilfonso Soares Fátima	M	11-11-11		
50			SMASA (FPA)		

APPENDIX 16. PROPONENT ENDORSEMENT LETTER FOR THE SEIS/EMP

**APPENDIX 17. NO OBJECTION LETTER FOR VIQUEQUE MUNICIPAL
CAPITAL WATER SUPPLY PROJECT COMPONENTS - FSTP**



ADMINISTRAÇÃO
MUNICIPAL DE
VIQUEQUE



OFÍCIO

No. Ref **628**... / A.M. VIQUEQUE / V / 2022

Data : 16 de Maio de 2022

Para : Presidente Conselho Administrasaun Be'e Timor Leste, EP
Eng. Carlos Peloi dos Reis

Cc :1. Secretario Municipiu Viqueque
2. Diretor DNCSRN
3. Diretor SMASA
4. Diretor SMPID
5. Pontu Fokal Meio Ambiente Munisipiu Viqueque
6. Arquivo

Assunto : Nota Konfirmasaun

Exmo Senhor,

Bazeia ba karta husi Gab P.BTL,EP nú.174/Gab.P.BTL,EP/V/2022 datada 10 de Maio de 2022, relasiona ho fatin nebe identifikadu ba lokalizasaun konstrusaun atu estabelese sistema tratamentu Be'e Foer (*FSTP-faecal sludge treatment plant*) iha Kapital Munisipiu Viqueque no atu husu Administrasaun Munisipiu nia opiniaun no autorizasaun konaba area refere.

Tamba ne'e nudar Administrador Munisipiu Viqueque hakarak konfirma katak sei kopera no konkorda liga prosesu lisensiamentu ambiental nian hodi laiha objesaun ba fatin nebe equipa tekniku BTL,EP identifikadu no halo ona assesmentu topografia nian, inklui planu fixu instala ka konstrui FSTP hodi soe lixu solidu ka Be'e Foer nian.

Mak ne deit Ami nia konfirmasaun, ba kolaborasaun no servisu hamutuk la-haluha hato'o Obrigadu wain.


Januario Soares
O Administrador do Município de Viqueque

Administrasaun Municipio de VIQUEQUE
Rua Beloi – Wekeke
Viqueque, Timor-Leste
+670 77311651
Email: januario.soares@municipio.gov.tl