Initial Environmental Examination

May 2022

Timor-Leste: Dili West Water Supply Project

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

ABBREVIATIONS

ACMs - Asbestos Containing Materials
ADB - Asian Development Bank
ANAS - National Agency for Water and Sanitation
ANLA - National Agency for Environmental Licensing
ANPM - National Agency for Petroleum and Minerals
ASC - Aldeia and Suco Council
BTL - Be'e Timor-Leste S.A.
CEMP - Site-specific Construction EMP
DED - Detailed Engineering Design
DAP - Department for Protected Areas
DFAT - Australian Department of Foreign Affairs and Trade
DMA - District Metering Areas
DWWSP - Dili West Water Supply Project
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 - Fecal Sludge Treatment Plant
GRM - Grievance Redress Mechanism
IEE - Initial Environmental Examination
IFC - International Finance Corporation
MPW - Ministry of Public Works
PA - Package Area
PD - Project Document
PDC - Project Design Consultant
PMC - Project Management Consultant
PMU - Project Management Unit
SEA - Superior Environmental Authority
SEIS - Simplified Environmental Impact Statement
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
WWTP - Wastewater Treatment Plant

GLOSSARY

Suco	- an administrative sub-division equivalent of a village
aldeia	- equivalent of a hamlet or community

WEIGHTS AND MEASURES

^oC	- Celsius/centigrade
masl	- meter above sea level
dBA	- decibel audible
ha	- hectare/s
km	- kilometer/s
km^2	- square kilometer/s
lps	- liters per second
m	- meter/s
m^3	- cubic meter/s
mg/l	- milligram/s per liter
mm	- millimeter/s
$\mu g/m^3$	- microgram/s per cubic meter

NOTE

In this report, "$" refers to US dollars.

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EXECUTIVE SUMMARY

Introduction

1. The Dili West Water Supply Project will support the Government of Timor-Leste to provide safe, reliable, and affordable water supply and sanitation to 199,000 people in the west zone of Dili Capital, by (i) the construction of new and capacity increase of existing facilities for water supply services and (ii) strengthening the regulatory and institutional capacity of both the Ministry of Public Works (MPW) and the newly established state-owned water utility, Bee Timor-Leste (BTL), in service delivery, planning, financial management, and operation and maintenance.

2. The project is aligned with the government's objective to connect all households in Dili to the water supply network of drinking water quality by 2030, by reducing leakage, installing water meters and establishing a billing system.

3. Based on the 2016 TA 8750-TIM: Urban Services Improvement Sector Project, Dili Urban Metropolitan Water Supply Master Plan 2016-2039 (Final Master Plan Report), the water supply system covered 50% of the Dili city population, but only 30% had legal connections, of which 20% were paying clients (1,68% of Dili population), covering only 3% of operational costs of the system. This meant 70 to 95% losses of produced water in the system, mostly illegal connections, making the water non-potable, forcing the population to revert to bottled water for drinking and private boreholes for other water needs.

4. The estimated population of the project area is 171,000 (current), expected to increase to 199,000 by 2030 and 260,000 by 2050. The lack of clean water supply and the resulting hygiene to this growing population has incalculable, but avoidable, social and economic costs, such as ill health and child mortality related sicknesses: lower respiratory infection and diarrheal disease. This resulted in the Government carrying out the a Detailed Engineering Design report for the water supply system in Dili, presented as eight construction packages, which can be implemented independently.

5. ADB and the Government agreed to ADB financing (project lending approach) to construct five of these Package Areas (01 - Be'e mos, 02 - Malinamuk, 03 - Central, 05 - Maloa and 08 - Golgota), covering the west zone of Dili, and to extend their support to the institutional and regulatory strengthening of the sector by providing capacity support to BTL and the National Agency for Water and Sanitation. Water supply improvements in the east of Dili are covered by the World Bank supported Dili East Water Distribution Project.

6. This Initial Environmental Examination (IEE) has been carried out during the detailed engineering design (DED) phase and is based on the preliminary DED for the proposed project, in accordance with ADB's Safeguards Policy Statement (2009), and the Government of Timor-Leste environmental requirements and guidelines currently in effect. The IEE and EMPs will be updated with the final DED and any requirements under national environmental compliance before bidding and the updated documents re-disclosed on ADB's website on behalf of the borrower.

The project

7. Within the project area, the water supply infrastructure components are in poor condition and are required to be upgraded or completely substituted. These are the existing and proposed water origins i.e. springs and boreholes, water storage, water treatment facilities, transmission and distribution lines. The Dili-West project will construct two new boreholes and upgrade 11 existing borehole water sources and treatment facilities with a

combined capacity of 49,858 m^3/day, which is sufficient to fulfill the mean daily demand expected in 2050. The project will expand the clean water reservoir capacity to 23,400 m^3 and construct a new distribution system with a total length of 276 kilometers throughout the five package areas.

8. Clean, adequate drinking water is a basic human need and developing drinking water supply facilities has numerous major beneficial impacts to individuals and communities, such as a substantial increase in the quality of life within the project area, increase of local employment generation, skill enhancement, improved health and hygiene and also empowering more women.

Implementation arrangements

9. The Council of Administration of Infrastructure Fund, Ministry of Finance is the executing agency. The Ministry of Public Works is the implementing agency responsible for the overall management, implementation and monitoring of the project and BTL, the newly established state-owned water utility, will manage day-to-day operation at the city level. The overall responsibility for EMP implementation lies with the MPW. The MPW will establish a Project Management Unit based in Dili, responsible for general project implementation with the support of BTL, and consulting support from a Project Management Consultant. The PMU will include focal social and environmental staff.

Environmental impact assessment

10. The project's environment and potential impacts were assessed through the use of an ADB Rapid Environmental Assessment Checklist, followed by the application of an evaluation matrix and impact assessment rating for all components and activities in the Construction Phase of this 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.

11. This project is likely to have negative environmental and social impacts during the construction stage. 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. Potential negative impacts during construction will include temporary noise and air pollution, construction waste generation, increased traffic disruption, limited soil erosion and occupational and community health and safety risks. Some social impacts are more permanent, such as resettlement in Golgota, Malinamuk and Central tank expansions, and are managed under the respective Resettlement Action Plan.

12. The project identified the locally named ''Ai-Hali" (*Ficus sp.*) is particularly important as it was the only protected tree species identified during the survey. This will require a special evaluation procedure before construction starts in the case where any *Ficus sp.* tree requires felling. This procedure is included in the Environmental Management Plan.

13. Package Area 08 Golgota is the only one located within a major part of a Protected Area (Tasitolu). There is no current water supply in the area but other government services (electricity and roads) have been servicing the area since the extreme floods that occurred in April 2021, which has enabled people to establish themselves in the lakes' shorelines instead of relocating elsewhere. In addition, this area is earmarked for a major tourism project called Pelican Paradise, to be started in mid-2022. In addition, due to increasing deforestation and increasing housing development (housing estimated at 50% of the protected area and lakes and green areas at 35%), the areas have unofficially and physically

been transformed into equivalent “Zone of Use” areas, as defined by Decree-Law no. 05/2016 – National Protected Areas System, which allow the installation of services for human use small scale-water distribution infrastructure within the Protected Area.

14. In order to understand operational impacts, the ADB Technical Assistance team is conducting on-going groundwater model analysis. Preliminary results conclude that there will be an impact on groundwater levels if there is uncontrolled increased pumping, either from existing wells or with increased number of wells. The model was run at current pumping rates of 34,904 m^3/day for 50 years and found to be stable and sustainable (Mott MacDonald, 2022). Therefore, aquifer sustainability seems manageable if the future water supply to Dili considers conjunctive use of surface water and groundwater and is constrained to approximately 54,904 m^3/day around 2030, for the whole city. The water demands versus water flow investigation results, suggest that, under these numbers, the current proposed sources may produce enough flow for the requirements of the distribution system while still maintaining a social and environmental use.

15. Therefore, the increase in supply will be obtained from the refurbishment of the distribution network (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.

16. Operational impacts will also include sludge and backwash water generation, and occupational health and safety risks from treatment chemicals which will be managed through operation and maintenance technical training.

17. It is thus concluded that the water supply and sanitation investment project in Dili-West can be categorized as a Category B for environment, as per ADB’s Safeguard Policy Statement, 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 measures commonly used at construction sites by civil works contractors.

National environmental compliance

18. Additionally, the Government has presented a corresponding Project Document for both Dili-East and West (whole city area) for the purpose of Timor-Leste’s official environmental screening process and estimates that the project, as a whole, will be classified as Category B and will present a Simplified Environmental Impact Statement and an Environmental Management Plan, in accordance with the Government of Timor-Leste environmental legislation in effect.

Public consultation

19. In accordance with SPS 2009, during preparation of the IEE meaningful consultation with affected people was undertaken. Two public consultation events in Dili West were undertaken between March and April 2022, covering three Package Areas. Participants included 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.

20. The stakeholders presented their concerns, suggestions and recommendations for the project implementation, focusing mainly on issues such as land and property, acceleration of the project implementation, project area coverage, 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.

21. The team confirmed the expectations and concerns of the stakeholders and concluded that there is very little risk of any water conflicts or impacts felt by the community during implementation and operation of the future system, if the distribution system is constructed within the short term, is functioning properly and illegal connections are reduced.

Grievance redress

22. The overall responsibility for establishing a functioning grievance redress mechanism is with BTL, with support from the Project Management Consultant's environmental and social safeguard specialists. Every grievance shall be registered by the BTL with a careful documentation process during construction of the project. The MPW will also be involved in complaints resolution and will establish a good network with the chefe suco and aldeia for cultural facilitation purposes.

1 INTRODUCTION

1.1 Project description

1. The Dili West Water Supply Project (DWWSP) will support the Government of Timor-Leste to provide safe, reliable, and affordable water supply and sanitation to 199,000 people in the west zone of Dili, the capital and largest city of Timor-Leste. It will (i) finance the construction of new and capacity increase of existing facilities for water supply services and (ii) strengthen the regulatory and institutional capacity of both the Ministry of Public Works (MPW) and the newly established state-owned water utility, Bee Timor-Leste (BTL), in service delivery, planning, financial management, and operation and maintenance (O&M).

2. The Council of Administration of Infrastructure Fund, Ministry of Finance is the executing agency. The Ministry of Public Works is the implementing agency responsible for the overall management, implementation and monitoring of the project.

3. The impact of the project is aligned with the government's objective to connect all households in Dili to the water supply network by 2030. The water supply system should be improved to reduce leakages, install water meters and establish a billing system. The water provided should be of drinking water quality. (Government of Timor-Leste. 2011. Timor-Leste Strategic Development Plan (2011–2030). Dili).

4. The project will provide access to water supply services in the west zone of Dili to at least 199,000 people (50% of whom are women). The access should be uninterrupted with a minimum pressure of 3 meters water column and meeting national drinking water quality standards. The amount of water that does not generate revenue (non-revenue water; losses, unauthorized and unbilled consumption) is reduced to maximal 20% of the amount of water supplied to the system.

5. The expansion of the water supply system is required to ensure that sufficient water of drinking water quality can be provided continuously and at acceptable pressure to the all population of the project area.

6. Currently there are three surface water intakes and nine groundwater deep wells with an installed capacity of 26,300 m^3/day. The produced water is non-potable water and the supply is intermittently and at low pressure. The current infrastructure is inadequate to achieve the government's development goals.

7. The project will construct new and upgrade water sources and treatment facilities with a combined capacity of 49,858 m^3/day, which is sufficient to fulfill the expected mean daily demand in 2050. The project will expand the clean water reservoir capacity to 23,400 m^3 and construct a new distribution system with a total length of 276 kilometers.

8. The distribution system will include several isolation valves, pressure relief valves, and bulk water meters to form five isolated pressure zones and a total of 19 district metering areas (DMA's), which is essential in effective pressure and leakage management of the system.

1.2 Purpose and Scope of the Initial Environmental Examination

9. This Initial Environmental Examination (IEE) is the preliminary environmental evaluation for the DWWSP, based on the preliminary Detailed Engineering Design (DED), in accordance with ADB's Safeguards Policy Statement (SPS) 2009, and the Government of Timor-Leste environmental requirements and guidelines currently in effect. The objective 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.

10. The IEE covers the 3 Outputs under the project (Output 1: Water supply and sanitation infrastructure improved; Output 2: Institutional effectiveness improved; and Output 3: Regulatory environment improved). All mitigation measures and monitoring under this IEE has been compiled under five separate Environmental Management Plans (EMP), one for each procurement package.

11. The IEE report (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.

12. The evaluation of the specific environmental conditions for Dili city was based on short field visits to the Project Package Areas (PA) Components, between February and March 2022, with a more in-depth site visit in PA08 - Golgota on the 11th of March 2022. The visits included photographs of the surrounding conditions of all proposed project components defined at the time and the team applied the ADB Rapid Environmental Assessment (REA) checklist for the Water Sector (see Appendix 1) to help survey the preliminary environmental conditions.

13. The field work was complemented with a desktop review of publicly available secondary information on the project areas. This included the Dili Drainage Infrastructure Upgrading Project (Draft Version March 2022), the Tibar Port Environmental Impact Assessment (2017), The Pelican Paradise Environmental Impact Assessment (2018) and the ADB Nicolau Lobato Environmental Impact Assessment 2021 and additional bibliography. The description of the environmental conditions in each of the project areas in Dili is described in Chapter 5 which presents the field work and desk top reviews. Primary environmental analysis will take place before the end of the Technical Assistance phase and will be included subsequent updated versions of this IEE and the corresponding EMPs.

14. The Technical Assistance team involved and collaborated with several local and national level institutions that supported the study, in particular during the field study, data collection and public consultations:

(i) BTL: Mr. Aleixo dos Santos (Director of Engineering and Investment), Hipólito Ximenes and Carlito Amaral (Environment and Quality Control Department);
(ii) Ministry of Agriculture and Fisheries: Chief of Department of Protected Areas (Mr. Pedro Pinto) and technicians Fernando Santana and Luis Mendes;
(iii) Local authorities: Chief of Suco[1] Comoro (Eurico da Costa), Chief of Suco Madohi (Bernardino de Cristo Ferreira), Chief of Suco Manleuana (Jacob Tilman Soares), Chief of Suco Bairro Pité (João da Costa Belo), Chief of Suco Vila Verde (Abdul Mancoli Arranhada), Chief of Suco Kampung Alor (Alcina C. dos Santos), Chief of Suco Fatuhada (Marcelino Soares), Chief of Suco Bebonuk (Serafim Aniceto), Chief of Suco Colmera (Armenio da Silva), Chief of Suco Motael (Luis Antonio Viegas), Chief of Suco Tibar (Marcelino Lemos) and Chief of Suco Dare (Gil de Araujo);

[1] Suco is an administrative sub-division equivalent to a village.

(iv) Local Cultural Leaders: Lia Nain Comoro (Abilio da Costa Marçal) and Lia Nain Madohi (Julião Guterres);
(v) A special mention to Mr. Plácido Marçal (Chefe de Aldeia 12 de Outubro Tasitolu, for his invaluable support in the Tasitolu site visit and to all Chiefs of Aldeia and Delegates from their respective Sucos for their participation in the Public Consultations.

15. The DWWSP environmental assessment shows it is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. 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 simple mitigation measures can be designed which are commonly used at construction sites and known to civil works contractors.

16. While PAs 01, 02, 03 and 05 are located within urban area of the city, PA 08 Golgota is located within a major part of the Tasitolu Protected Area. While there is no current water supply in the area, other services (electricity and roads) have been servicing the area since the extreme floods that occurred in 2021, which has been helping people establish themselves in the area instead of relocating elsewhere. The Ministry of Agriculture and Fisheries has been working with the Tasitolu community on the reforestation of the protected area, most of the areas have been transformed by urban land use activities i.e. informal housing areas and while still within the protected area boundary, given the characteristics of the of the current lake shorelines and hillside areas, have physically been transformed into equivalent “Zone of Use” areas, as defined in Decree-Law no. 05/2016 – National Protected Areas System. This allows infrastructure construction for installation of services for human use and the use of natural resources i.e. springs, pipes and small scale-water distribution infrastructure within the Protected Area.

17. The DWWSP is Category B for environmental safeguards, in accordance with ADB SPS 2009. For the national licensing process, Be'e Timor-Leste S.A (BTL) will present the required Project Document (for official environmental screening purposes) and, if classified as "B" nationally, a Simplified Environmental Impact Statement (SEIS) and an Environmental Management Plan (EMP), in accordance with the Government of Timor-Leste environmental legislation will be required.

1.3 Details of Proponent and Consultant that prepared the Report

18. The Ministry of Public Works (MPW) is responsible for planning, implementation, regulation, and monitoring of water supply and sanitation and supports the water and sanitation facilities in municipalities, these operated locally together with the BTL office.

19. The project proponent and representative details are the following:

Ministry of Public Works (MPW)
Mr. Abel da Silva Pires, Minister
MPW Corporate Services Building
Avenida 20 de Maio, Caicoli, Dili, Timor-Leste
Be'e Timor-Leste (BTL S.A.)
Mr. Carlos Freitas, CEO
BTL Office, Avenida 20 de Maio, Caicoli, Dili, Timor-Leste

20. The MPW, on behalf of the Government of the Democratic Republic of Timor-Leste, contracted the consortium Dong Sung Engineering Co. Ltd with KUNHWA Engineering & Consulting Co. Ltd to prepare the “Detailed Engineering Design for the Dili Water Supply Project”, financed by the Infrastructure Fund of the Government of Democratic Republic of

Timor-Leste. OASIS – Sustainable Projects is the Consultant subcontracted by the project preparation firm, Mott Macdonald and responsible for preparing the IEE and EMP reports.

1.4 Due diligence document updates

21. The IEE and EMPs will be updated with the final DED and any national environmental compliance requirements before bidding. During project implementation the IEE and EMPs will also be updated in order to accommodate any project contact variations, corrective actions, project scope changes or other changes affecting due diligence requirements. Updated IEE and EMPs will be disclosed on ADB's website, on behalf of the borrower, as a minimum.

2 POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

2.1 The ADB Environmental Process

2.1.1 ADB Safeguard Policy Statement

22. The ADB Safeguard Policy Statement (2009) (SPS 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.

23. ADB SPS 2009 requires borrowers to meet a set of requirements (Safeguards Requirements 1) 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. The overall responsibility for EMP implementation lies with the MPW, which will be required to comply with ADB's SPS 2009 requirements, summarized as follows:

a) **Screening and Categorization:** Projects are screened for their expected environmental impacts, and assigned to a specific category[2]. Categorization must be based on the most environmental sensitive component.
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 project activities and respective impacts. Environmental impacts and risks are then analyzed for all relevant stages of the project cycle, including design and planning stage, construction, operation, and decommissioning.
c) **Environmental Planning and Management:** The environmental management plan (EMP) describes and addresses the potential impacts and risks identified by the environmental assessment. 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, and cost estimates.
d) **Public Information Disclosure:** The Project owner (MPW), shall submit for disclosure a final draft IEE and EMPs 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. Due diligence documents will be disclosed on ADB's website, on behalf of the borrower, as a minimum and disclosure will take place on MPW or other website or through paper copies in the MPW office.
e) **Consultation and Participation**: The MPW i.e. the Project Management Unit (PMU) with support from BTL, and the Project Management Consultants shall

[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.

carry out meaningful consultation[3] 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 shall establish a mechanism to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance, scaled to the risks and adverse impacts of the project.

g) **Monitoring and Reporting:** MPW, through 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, as well as from any non-compliances detected in any site visits, review meetings and/or missions.

h) **Unanticipated Environmental Impacts:** Where unanticipated environmental impacts become apparent during project implementation, MPW and the PMU shall update or prepare a further 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 MPW 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/World Bank Group's Environmental Health and Safety (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 MPW and the PMU shall ensure that all workers[4] are provided with a safe and healthy working environment, taking into account internationally recognized standards such as i.e. IFC EHS guidelines, to identify risks inherent to the sector and specific classes of hazards in the project 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 IFC EHS Guidelines and national COVID-19 requirements.

k) **Community Health and Safety:** the MPW 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 project, 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 MPW 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 project's potential impacts on these resources assessed using field-based

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[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.

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

m) **Bidding and Contract Documents:** the MPW and the PMU shall ensure the IEE, SEIS and EMP are included in bidding and contract documents and verified by the MPW, ensuring that these include specific provisions requiring contractors to (i) comply with all other regulatory conditions required by the Government of Timor-Leste and ADB[5] and (ii) to submit to MPW/PMU, for review and approval, a site-specific construction environmental management plan (CEMP)[6]. No works can commence prior to approval of the CEMP; a copy of the EMP and approved CEMP 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 and CEMP will constitute a failure in compliance and shall require corrective actions from the contractor.

n) **Conditions for Award of Contract and Commencement of Work:** MPW shall not award any Works contract until: (i) relevant EMP provisions are incorporated into the Works contract and the CEMP has been prepared by the contractor and subsequently approved by the PMU; and (ii) the IEE and EMPs are updated to reflect the Project's detailed design and any conditions resulting from the domestic environmental compliance license, and the PMU has subsequently obtained MPW and ADB's clearance of the IEE and corresponding EMPs. Works cannot commence without the domestic environmental license having been secured.

2.1.2 Project Category under ADB SPS 2009

24. All projects funded by ADB must comply with its 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.

25. Environmental assessment has been conducted for the DWWSP based on: (i) Preliminary Detailed Engineering Designs; and (ii) most likely environmentally sensitive components. The environmental assessment used ADB's rapid environmental assessment (REA) checklist (see Appendix 1) and the field review during the project. The environmental assessment of the DWWSP 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.

26. Therefore, under the ADB SPS 2009, the DWWSP is classified as Category B for environment and this initial environmental examination (IEE) report has been prepared based on its requirements. However, Environmental Assessment beyond the IEE will have to take into account the result from the screening process under the Timor-Leste legislation. The IEE and EMPs may be updated and re-disclosed again on ADB's website, on behalf of

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[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] CEMP 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 CEMP; and (iv) budget for CEMP implementation.

the borrower, if deemed necessary upon final DED and receipt of the national environmental license.

2.2 GOVERNMENT ENVIRONMENTAL RULES AND REGULATIONS

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

27. 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.

28. 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.

2.2.2 Decree Law No. 5/2011 – Environmental Licensing

29. 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.

30. 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.

31. 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)[7], prior to implementation.

32. 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 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

[7] The National Authority for Environmental Licensing (ANLA) is responsible for the: (i) review of applications for Environmental Licensing; (ii) Screening approval for Project Categorisation; (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.

ANLA determines and duly justifies the category of a proposed project based on the most sensitive environmental component.

33. 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.

34. 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/chose, 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.

35. It 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.

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

	Category A Threshold (EIA required)	**Category B Threshold (IEE required)**
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, marines 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

36. Figure 1 explains 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 [15 days], totaling 95 working days.

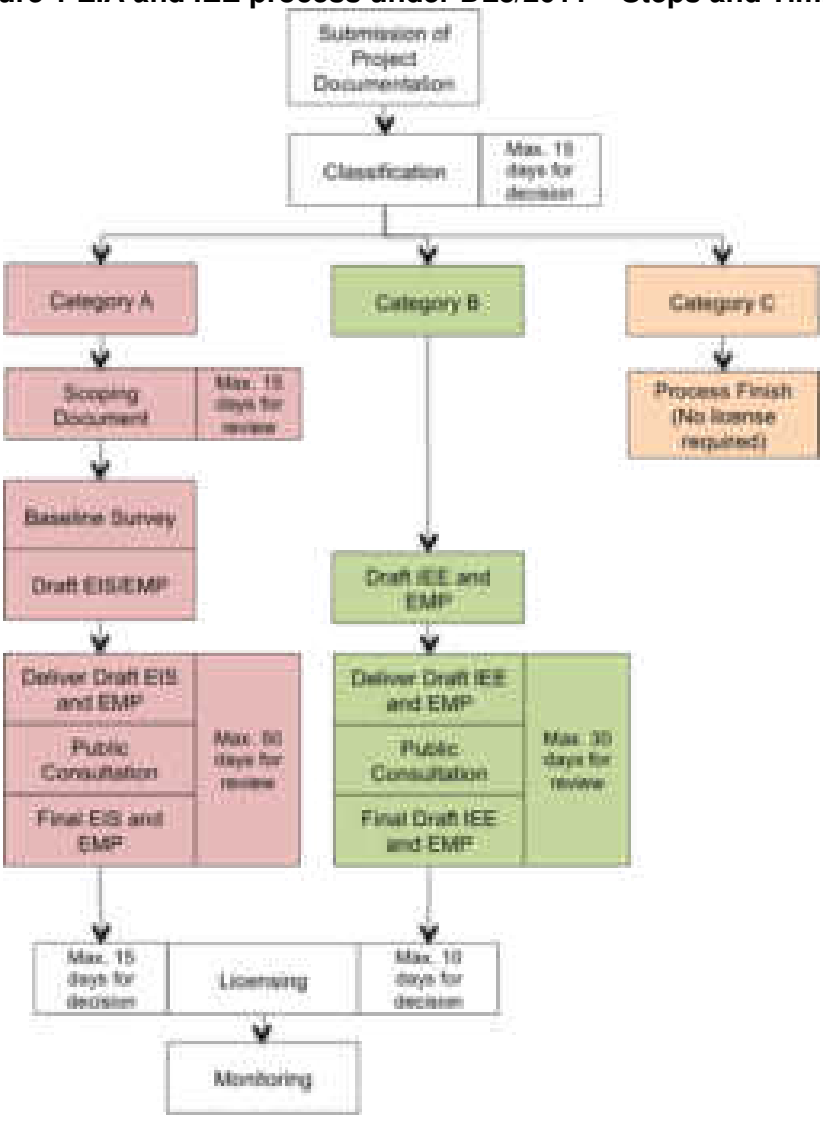
37. For Category B projects (IEE), the process does not include step ii) SD and step iii) Simplified Environmental Impact Statement (SEIS) has a turnaround requirement of 30 days review, bringing the process to a Total of 55 workdays.

38. It is important to understand that 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.

39. 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:

- Ministerial Diploma no. 44/2017, of 2nd August - Regulation on Impact and Benefits Agreement;
- 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;
- 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;
- Ministerial Diploma no. 47/2017, of 2nd August - Regulation on the Public Participation Procedures and Requirements During the Environmental Assessment Process.

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



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

40. It is the proponent's understanding that the classification of the project component for Dili City falls under a Category B, even though the water distribution area in PA08 Golgota is located within the Tasitolu Protected Area.

41. This is because PA08 is subject to significant urban pressures over the past 20 years, which has led to an estimated 60% coverage of the protected area with informal urban housing areas that discharge wastewater and solid waste into the lakes, while increasing deforestation on the lakes hillsides for firewood and other uses. The current land use in and around the lakes is of a "brownfield" nature and the temporary impacts of the pipe laying and operation are estimated as being much less than the current, uncontrolled urban expansion pressures.

42. In addition, this Protected Area is set to initiate the implementation of the "Pelican Paradise" Hospitality Project (see Figure 16) which will cover the current protected area boundary. This project already has the Environmental License (2021), signed Investment agreement with Government (January 2022).

43. Regarding the other Packages Areas, these are rehabilitation of the water network i.e. a brownfield project, with pre-existing pipe alignments and zones in an largely urban setting, in areas that have undergone significant land use change since their installation nearly 40 years ago. This means the new intervention is less significant than in a green field site, and is of temporary duration.

44. This assumption of categorization 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 Capitals Water Supply Project for Manatuto and Pante Macassar 2014 and more recently Category "B" classifications for the Baucau, Same, Los Palos and Viqueque. While these projects are not of similar nature to the Dili project, the scale of pipeline dimension and length, as well as water sourcing and borehole capacity is similarly higher than the legal thresholds, which legitimizes the assumption that the Regulator has reviewed the water sourcing analysis and agreed on its sustainability in the long term, thus lowering the impact of the project. Thus, with a similar evaluation, the resulting screening exercise and categorization for the Dili project results in a Category B, as follows:

Table 2 Estimated Environmental Classification for Dili - West Project Components

Proposed Components	Proposed Capacity	Estimated Classification	Included in XII.[a.] Location Factors
PA 01 - Be'e mos			
Distribution Pipes (Upgrading)			
Raw Water (Primary Transmission)	7,059m	B[(2)]	Yes[(1)]
Distribution (Secondary)	25,840m	B[(2)]	Yes[(1)]
Surface Water Sources			
Be'e mos Spring (Existing)	118 L/sec[(1)] 3,723,000 m^3/year	B[(2)]	No
PA 02 - Malinamuk			
Distribution Pipes (Upgrading)			
Raw Water (Primary Transmission)	2,282m	B[(2)]	No
Distribution (Secondary)	81,900m	B[(2)]	No
Groundwater Sources			
Borehole Comoro E 04 (existing)	6,3 lps (18 h)	B[(2)]	No
Borehole 45 (existing)	48.3 lps (18h)	B[(2)]	No
Borehole 46 (existing)	20 lps (18h)	B[(2)]	No
New Borehole	57,8 lps (18h)	B[(2)]	No
PA 03 - Central			
Distribution Pipes (Upgrading)			
Raw Water (Primary Transmission)	7,030m	B[(2)]	No
Distribution (Secondary)	164,152m	B[(2)]	No

Proposed Components	Proposed Capacity	Estimated Classification	Included in XII.[a.] Location Factors
Groundwater Sources			
Borehole 5, 6, 8, 9 and 10 (existing)	194 lps (18h)	B[(2)]	No
New Borehole	57,8 lps (18h)	B[(2)]	No
PA 05 - Maloa			
Distribution Pipes (Upgrading)			
Raw Water (Primary Transmission)	561m	B[(2)]	No
Distribution (Secondary)	4,200m	B[(2)]	No
Surface Water Sources			
Maloa Spring (Existing)	11,6 L/sec[(1)] 365,000 m^3/year	B[(2)]	No
PA 08 - Golgota			
Distribution Pipes (Upgrading)			
Raw Water (Primary Transmission)	1,207m	B[(2)]	No
Distribution (Secondary)	23,060m	B[(2)]	No
Groundwater Sources			
Borehole 1, 2 and 3 (existing)	61,8 lps (18h)	B[(2)]	No

a. Annex 1 (number XII) - Category A of DL05/2011 - Environmental Licensing and represents criteria that can place projects in Category A.

(1) New Project components (pipe laying) within periphery of Tasitolu Lakes, within Tasitolu Protected Area. This Protected Area has suffered tremendous urban pressures (land use change, direct pollution to lake and deforestation in hillsides) over the past 20 years, with current estimated area coverage with ecological/sensitive green use areas only at 15%. The current land use in and around the lakes is equivalent more to a "Zone of Use" (under Decree-Law no. 05/2016 – National System for Protected Areas, which allows infrastructure rehabilitation for installation of services for human use of natural resources i.e. water distribution) than that of an active Protected Area. Currently more of a "brownfield" nature and the temporary impacts of the pipe laying and operation are estimated as being much less than the current urban expansion pressures. Ultimately requires Environmental Regulator approval of Category B classification.

(2) As in previous ANLA attributed Category B Licenses to similar-scaled water source volumes and length of distribution network such as MPW projects in Pante Macassar and Manatuto and 4 Eastern Cities

45. The proposed system in Dili-West 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 or environmental 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 active today).

46. Currently, the Dili water distribution system has evolved around these established spring systems, particularly in regard to Be'e mos and Maloa 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 peri-urban expansion areas.

47. While both water sources are not covered by the present project (i.e. Be'e mos intake to water treatment plant (WTP) transmission will be covered by an Australian Department of Foreign Affairs and Trade (DFAT) support Assistance while Maloa Intake is operational and will not be upgraded), based on the extension of proposed water extraction and the nature of the proposed rehabilitation works for Be'e mos and Maloa WTPs, the land-use of almost all areas will remain as urban, and 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.

48. The Protected Areas legislation itself provides some flexibility within the Protected Area management to accommodate for such situations. Article 32 of DL05/2016 –

Protected Areas allows for some areas to be identified in protected areas or adjoining areas, named as “Land Use Areas”, where infrastructure construction is allowed for access and management support of the area, for installation of services for human use i.e. water distribution networks.

49. With an almost complete IEE process and preliminary Detailed Engineering Designs (DEDs), a Project Document has been delivered to the Timor-Leste Environmental Regulator (ANLA) to initiate the Domestic Environmental Licensing process. The tentative plan, based on this delivery and the timeframes under Decree-Law 5/2011, and provided there are no delays from the part of the ANLA, is below; this plan may be subject to change:

	Tentative Date:
ANLA Classification (Estimated Category "B")	31 May 2022
BTL Drafting of SEIS/EMP for Dili city	31 October 2022
Delivery of Draft Simplified EIS/EMP to ANLA for review (30 w/days)	03 November 2022
Public Consultation of draft SEIS/EMP	19 December 2022
Delivery of reviewed Draft SEIS/EMP to ANLA	20 January 2023
Deadline for ANLA comments	14 February 2022
Estimated time for SSE to decide on License (10 w/days)	28 February 2023

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

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

Table 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), 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.
DL No. 5/2016 – National System for Protected Areas	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.	Relevant to project components i.e. water sources and/or distribution systems to be established within Tasitolu Protected area. Requires request for classification of these areas as Land Use under Protected Area Management plan, to Municipal and government entity responsible for Protected Areas.

Policy/Law/ Guideline	Relevant Provisions	Applicability
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 Rights of Way (ROW). EMP implementation is the overall measure to mitigate adverse impacts.
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 1.a) discharge polluted waters i.e., fecal 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 and construction ROW. 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 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 / decentralized sewer systems.	Relevant to the Proponent responsibility for implementation of the project in the urban development of the city.

Policy/Law/ Guideline	Relevant Provisions	Applicability
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 meter 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 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.
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 Resettlement Action Plan are the overall measures to mitigate adverse impacts.
Decree-Law No. 8/2021 of 30 June - Legal Regime Soil Classification and Qualification	Establishes the soil classification and qualification criteria and the rural and urban soil qualification categories, applicable to the entire national territory and structures the form of zoning of the territory, through the definition and implementation of the land regime, within the scope of planning instruments at the municipal level, a central instrument for the pursuit of the model of spatial organization intended when defining the discipline of occupation, use and transformation of the soil. More importantly, it defines soil qualification, with respect to its classification, the content of its use, by reference to the potential for development of the territory, defining the respective dominant uses, the admissibility and restriction of use, through rules for occupation, use and transformation of the soils.	Relevant to Urban areas, definition or land use classification and definition of expansion areas from urban and rural boundaries.
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	Provides basis for Dili Municipality, through BTL, to monitor the environmental performance of the project.

Policy/Law/ Guideline	Relevant Provisions	Applicability
	religious sites; and/or (v) monitor project activities within their jurisdictions.	
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, lead 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 projects to manage generated solid wastes accordingly.

2.2.5 Pollution Control Standards in Timor-Leste

51. In regard to pollution prevention and control technologies and practices, the Government of Timor-Leste has yet to implement their National Standards (for Air, Water, Noise, etc) and therefore, under the legal requirements of the Base Law for Environment, these minimum requirements are safeguarded by the use of World Health Organization (WHO) guidelines and, where non-existent, the IFC EHS Guidelines are usually referred to as international good practice, consistent with ADB SPS 2009. The Key environmental quality standards applied are listed and presented in Appendix 9.

3 DESCRIPTION OF THE PROJECT

52. Dili Municipality and the city of Dili in particular has attracted an increasing population due to its strategic location on the North of the country's coast, at the centre of the East to West (Indonesian Border) and the North to South Coast main transport axes. Because of this strategic location, the city has grown economically and physically, up to a quarter of the country's total population and will tend to grow further in the near future. Dili currently plays a central role in Timor-Leste's economy as the international gateway for commerce and travel.

53. There is a need for extensive adaptation to cater for such a demanding population and urbanization increase, which highlights the need for the DWWSP, encompassed of a number of existing and new water sources and distribution alignments to cater for the increase water demands.

54. This chapter provides descriptions of the water sourcing, treatment, storage and supply for DWSSP. The existing features, gaps and proposed water sources, upgrading of and/or new construction of conveyance, treatment and distribution are explained in this section, including the technical designs and criteria used. All relevant maps for the DWWSP are attached in Appendix 3.

3.1 Existing condition and need for the Project

55. In 2016, the water supply system was used by approximately 50% of the population living in Dili, of which about 30% had a legal connection and the remaining 20% obtained water through illegal connections. Of the legal connections around 30% were billed, which corresponds to 89% of the Dili population. Of those billed, only 20% paid their water bill (1.68% of the Dili population). Sales revenues only covered about 3% of the operational costs of the Dili's water supply system. (Seureca/Veolia. 2017. TA 8750-TIM: Urban Services Improvement Sector Project, Dili Urban Metropolitan Water Supply Master Plan 2016-2039 (Final master Plan Report). Dili.)

56. In 2016, the volume of water lost through physical leakage and illegal connections varied over time from 70 to 95% of the volume produced, according to a JICA study in 2016. This is likely to be even higher if the supply is continuously and at acceptable pressure levels. (Japan International Cooperation Agency. 2016. The project for study on Dili urban master plan in the Democratic Republic of Timor-Leste (final report). Dili).

57. Consequently, the piped water is non-potable and is only available on an intermittent basis, typically, no more than 6 hours a day, and, generally, at inadequate operating pressure of less than 3 m.

58. A 2022 household socio-economic survey (Mott Macdonald, 2022) of the west zone of Dili (the project area) showed that the situation has not changed over the past six years: only a quarter (25.9%) of the surveyed population has a legal connection to the water supply system, of which more than half (55.8%) do not have a water meter. About half (48.5%) of the connected household receive water less than two hours a day, and only a very small number (2.4%) have continuous water supply. The majority (80.1%) of the households that are not connected claim that the existing water supply system is not available in their area while a small portion (3.8%) decided not to connect because of the poor water quality being supplied.

59. The survey also showed that the majority of the population depends on the purchase of bottled water for their drinking water needs, and private boreholes for other water needs.

60. Dili plays a central role in Timor-Leste's economy as the international gateway for commerce and travel. In 2018, Dili accounted for around 84% of all people in formal employment and contributed around 90% of the country's overall gross domestic product. Dili also accounts for most of the country's financial activity.

61. Based on the population data from the National census carried out in 2015, it is estimated that the current population of the project area is 171,000. This figure is expected to increase to 199,000 by 2030 and 260,000 by 2050. (DongSung/Kunhwa Engineering JV. 2021. Consulting Services for DED for Dili Urban Water Supply (Draft Final report). Dili.) The lack of clean water to the growing number of Dili's population imposes incalculable, but fully avoidable, social and economic costs on the Timorese people. Sickness, ill health, poor child development, and the two most significant causes of infant and child mortality in Timor-Leste: lower respiratory infection and diarrheal disease; are directly related to a lack of water supply and poor hygiene. (Government of Timor-Leste. 2011. Timor-Leste Strategic Development Plan (2011–2030). Dili.)

62. To address the problem of insufficient supply of potable water, the Government of Timor-Leste prepared a master plan for Water Supply System development in Dili in 2017. (Seureca/Veolia. 2017. TA 8750-TIM: Urban Services Improvement Sector Project, Dili Urban Metropolitan Water Supply Master Plan 2016-2039 (Final master Plan Report). Dili.)

63. This resulted in a draft Detailed Engineering Design report for the water supply system in Dili, including designs for eight sub-projects. These sub-projects were presented as construction packages which can be implemented independently. (DongSung/Kunhwa Engineering JV. 2021. Consulting Services for DED for Dili Urban Water Supply (Draft Final report). Dili.) ADB and the government agreed to ADB financing to construct the packages for PA 01 - Be'e mos, 02 - Malinamuk, 03 - Central, 05 - Maloa and 08 - Golgota, covering the western side of Dili (see Figure 1).

Figure 1 Coverage Area Short Term - Package Areas and DMAs

Source: Dongsung Engineering, 26 January 2022

3.2 Overview of the Project

64. Dili city is located in Dili Municipality, Timor-Leste, a central location of the North coast of the island. It is located within the Dili City alluvial plane region and the Dili Hillside Mountain area, ranging altitudes between 0 masl (meters above mean sea level) (at the Dili coast) and 413 masl, height of Mount Coulou. The city has a tropical monsoon and savannah climate heavily influenced by a Wet season (November to May) with an average annual rainfall of about 825 mm (National Directorate for Meteorology and Geophysics, 2020).

Figure 2 Location of Project Area (Dili West) and Remaining City (Dili East)

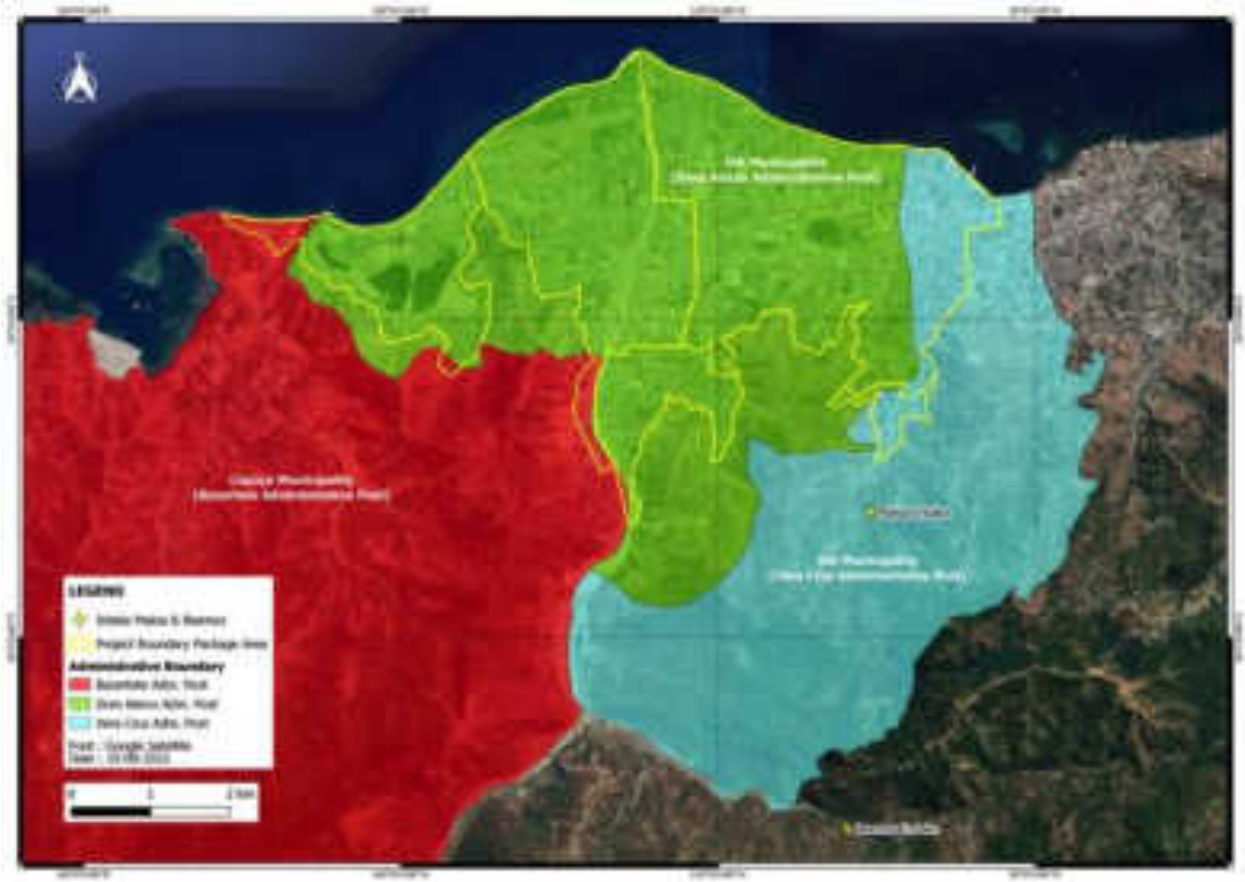
65. The DWWSP area is bordered by the Wetar Straight Sea to the north, is bordered to the West by the Dili East Water Distribution Project (World Bank support), from Dili Port running south to the corner of Rua D Fernando and Rua Jacinto Candido, then running West up to the corner with Estrada de Balide, turning again South up to the foothill of the mountain range (from its midrange section in Suco Caicoli). It then follows Westwards along the foothill towards the Comoro Riverbed, following on North-westwards to the foothill of the range that separates Comoro (airport area) from the Tasitolu Area. The boundary goes on to follow Southwest along the Tasitolu Watershed (in the Dili-Liquiça Road), running parallel to the Lakes and surrounding foothills up to its Western most reach at Dili Rock, boundary of Suco Madohi and Suco Comoro.

66. The DWWSP area boundary also extends into Suco Tibar, Liquisa Municipality, due to supply requirements contingencies. Such areas include: a) a smaller watershed in Aldeia Fatunia, at the most Western Tip of PA 08 - Golgota, or b) the most Southern tip of PA 02 - Malinamuk, along the Comoro West riverbank in Beduco area, Aldeia Turleu.

67. The DWWSP thus covers a large portion of the Dili Urban area, approximately 24 km^2 that includes the Dom Aleixo and Vera Cruz Administrative Posts, as well as the Bazartete Administrative Post, with the Sucos respective to the PAs under the project.

68. The project scope includes all the areas that will be required to implement the abstraction, treatment and distribution of water for human consumption, within the Package Areas and Pressure Zones for Dili West, as per the Draft Detailed Engineering Design Report for the DWWSP (Dongsung 2021).

Figure 3 Project Package Areas and Administrative Posts in Liquiça and Dili Municipalities

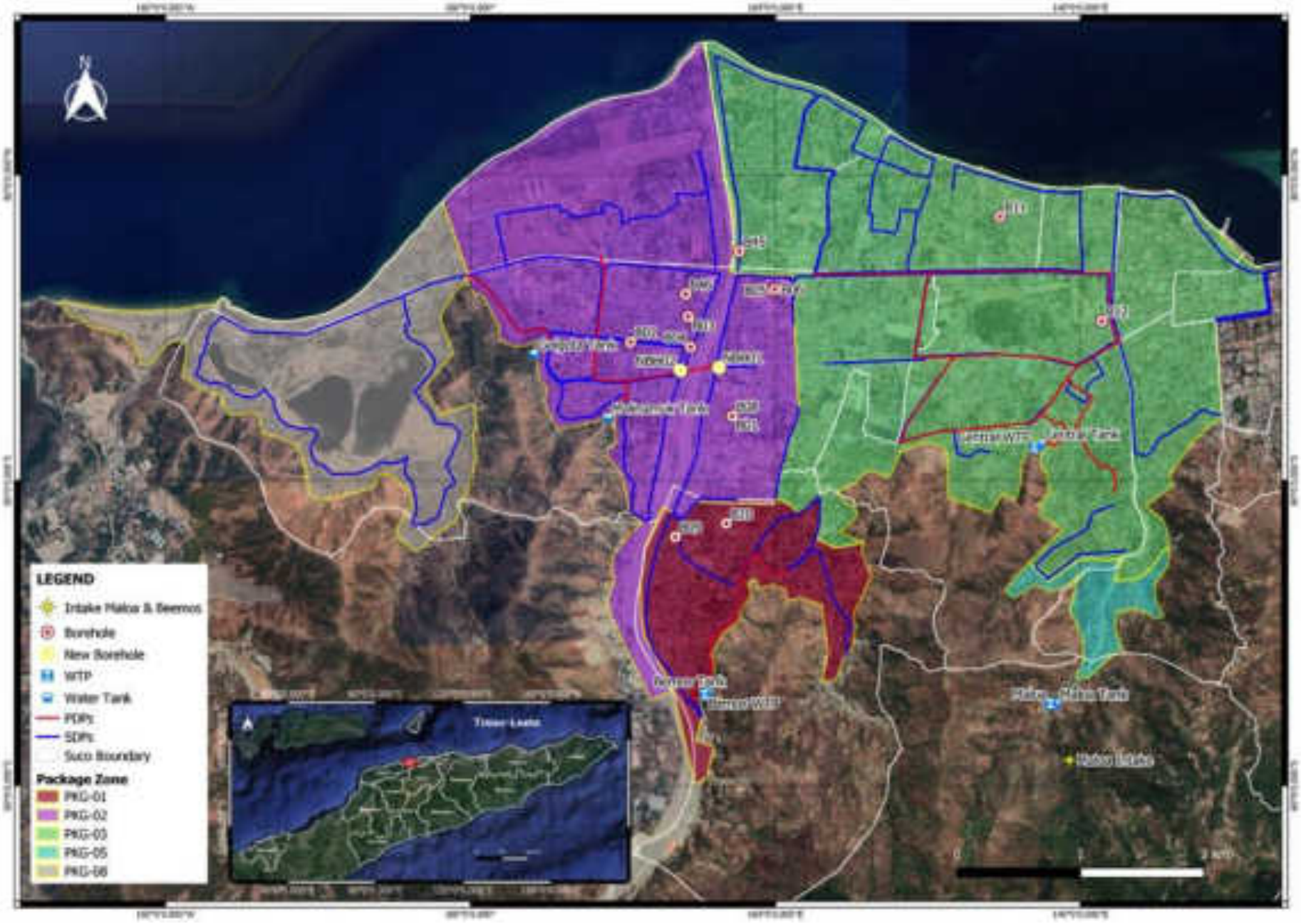


69. The project area around Dili-West encompasses the following (note: Suco coverage per PAs are approximations only):

- Package Area 01 - Be'e mos:
  Suco Maleuana - represents 30% PA01 Suco coverage (but includes a part or the whole of the entire nine Aldeias in the Suco), the urban area of the Manleu Watershed and the Right Bank of the Comoro river Area;
- Package Area 02 - Malinamuk:
  Suco Comoro - represents 60% PA02 Suco coverage (includes a part or the whole of seven of the total 14 Aldeias in the Suco), the urban area on the left and right banks of the Comoro River area;
  Suco Madohi - represents 45% PA02 Suco coverage (the whole of 8 of the total 9 Aldeias in the Suco), namely the urban area of the International Airport and Northern Coast between Comoro River and the PA02 Western border;
  Suco Tibar (Liquisa Municipality) - represents 5% PA02 Suco coverage (includes a part of 1 Aldeia in the Suco), the urban area on the Left lower Bank of the Comoro river;

- Package Area 03 - Central:
  Suco Comoro - represents 10% PA03 Suco coverage (includes a part or the whole of 7 of the total 14 Aldeias in the Suco), all in urban area.
  Suco Bebonuk - represents 15% PA03 Suco coverage (includes all 5 Aldeias in the Suco), namely the urban area on the Right Higher Bank of the Comoro river, and the urban area between the Avenida Nicolau Lobato and the Northern Coast;
  Suco Fatuhada - represents 15% PA03 Suco coverage (includes all 5 Aldeias in the Suco), the urban area between the Avenida Nicolau Lobato and the Northern Coast;
  Suco Kampung Alor - represents 5% PA03 Suco coverage (includes all 3 Aldeias in the Suco), the urban area between the Avenida Nicolau Lobato and the Northern Coast;
  Suco Motael - represents 7% PA03 Suco coverage (includes all 5 Aldeias in the Suco), the urban area between the Northern Coast, part of Dili Port and the urban area southwards up to Maloa River Bridge no.4;
  Suco Colmera - represents 3% PA03 Suco coverage (includes a part of the total 2 Aldeias in the Suco), the urban area between the Dili Port and Bay up to the Government Palace and the urban area southwards up to Avenida 20 de Maio and up to Dili cathedral, to the West of the Suco boundary;
  Suco Vila Verde - represents 10% PA03 Suco coverage (includes a part or the whole of all 9 Aldeias in the Suco), the urban area between Suco Motael and Colmera southern borders and the urban area southwards along the Maloa River Right Bank up to the foothill of Aldeia Mate Moris and due South (still along Maloa Right River Bank) up to the PA 05 - Maloa North boundary;
  Suco Bairro Pité - represents 35% PA03 Suco coverage (includes a part or the whole of all 9 Aldeias in the Suco), the urban area between Suco Motael and Colmera southern borders and the urban area southwards along the Maloa River Right Bank up to the foothill of Aldeia Mate Moris and due South (still along Maloa Right River Bank) up to the PA 05 - Maloa North boundary;
- Package Area 05 - Maloa:
  Suco Vila Verde - represents 80% PA05 Suco coverage (includes a part of 1 of the 9 Aldeias in the Suco), the urban area along the upper Maloa Right and Left River Banks, up to the foothill of the Maloa river upper watershed;
  Suco Bairro Pité - represents 15% PA05 Suco coverage (includes a part or the whole of 2 of 9 Aldeias in the Suco), the urban area between the Maloa River Left Bank and due West up to the foothill at Aldeia Niken;
  Suco Dare - represents 5% PA05 Suco coverage (includes a part or the whole of 2 of 11 Aldeias in the Suco), the urban area on the Right and Left Higher Banks of the Comoro river, and the Primary Pipe ROW up to the proposed Maloa WTP.

Figure 4 Dili West - Project Scope and Components



3.2.1 Water Components

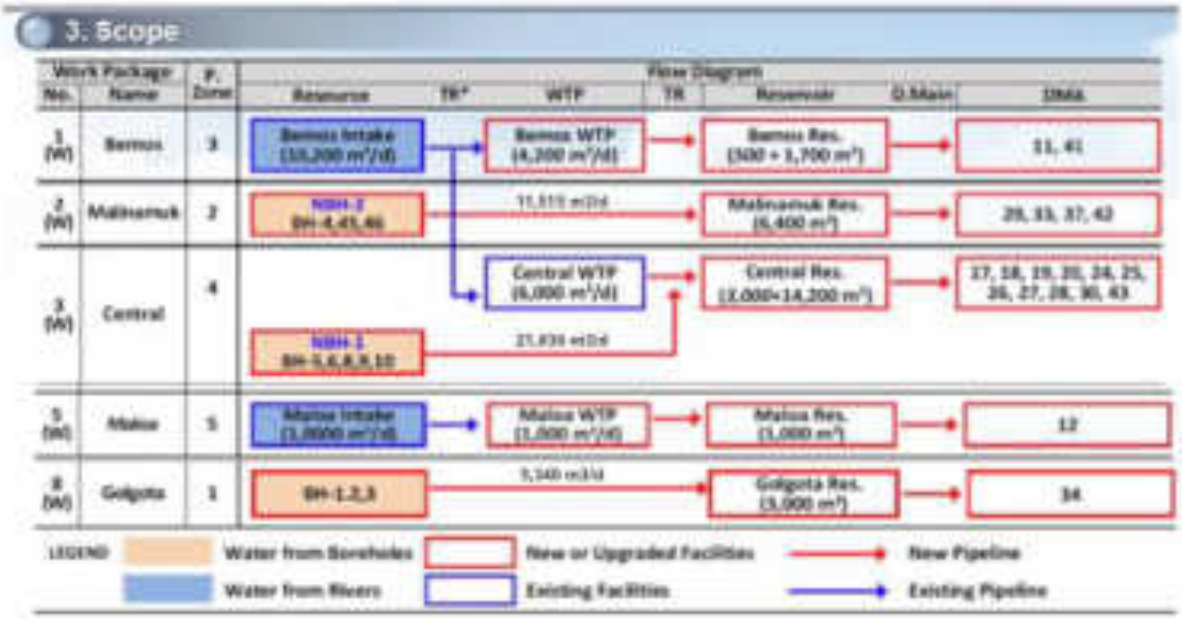
3.2.1.1 Availability of Water Sources

70. The overall condition of the water system in Dili is poor: intermittent availability with low pressure, many illegal connections and massive physical losses. The percentage of volume of water lost and/or illegally lost varies from 70 to 95% of the volume produced, according to a JICA study in 2016 (JICA, 2016).

71. The main water resources in Dili are the Comoro River and its tributaries, and the Dili aquifer, mainly recharged by the Comoro River. Various reports have been produced to confirm the sustainable yield of the groundwater and surface water resources.

72. The current actual capacity of the water abstraction system in the project area is about 18.000 m^3/day groundwater from nine boreholes and 8,000 m^3/day surface water from three surface water treatment plants. These data are based on information from the 2015 master plan and the 2021 DED report. The existing and planned water flows are in Figure 5.

Figure 5 Project Water Flow Diagram



73. Once the DWWSP is completed the installed capacity for the Western part of the city system is increased to 38,700 m^3/day groundwater from 13 boreholes and 11,200 m^3/day surface water, by rehabilitating nine, commissioning two existing but not operational boreholes, drilling two new boreholes, and constructing two water treatment plants.

74. The water balances for the whole city of Dili (West and East zones combined) over the following 30 years is in Table 4.

Table 4 Water Balance

	Without project	With Project					
Year	2020	2025	2030	2035	2040	2045	2050
Population	260,289	283,784	296,072	299,691	327,200	355,062	382,924
Mean daily demand projection (m3/day)	41,996	45,783	47,768	48,351	52,788	57,285	61,781
Supply projections							
Groundwater (m3/day)	34,904	34,904	54,904	54,904	54,904	54,904	54,904
Surface water (m3/day)	8,680	8,680	11,074	11,074	11,074	11,074	11,074
Total (m3/day)	43,584	43,584	65,978	65,978	65,978	65,978	65,978

75. The demand is calculated be using the population figures, the domestic demand and non-domestic demand projections of the preliminary DED report, resulting in a mean daily demand. No leakage projections are included in the projections, since leakage is not a "demand," but a supply issue. When the supply is insufficient to cover the demand, one will need to improve the supply by either adding abstraction or reducing leaks.

76. The general conclusion is that the groundwater supply is sufficient to meet the projected demand of 2050. The results of the TA numerical groundwater model, developed during project processing, demonstrate that sufficient groundwater is available to meet the projected demand of 2050. The project includes assistance to the government for (i) further data collection and refinement of the projections; and (ii) developing investment plans to ensure sufficient supply to meet the increasing demand up to project horizon.

3.2.2 Detailed Design Description

3.2.2.1 General Design Consideration

77. The project is divided into 5 investment packages, which coincide with "pressure zones." These pressure zones are fed by a single reservoir, creating areas of equal pressure. Where necessary pressure reducing valves will be installed. The "source pumps" fill up the tank to a certain level, after which the pumps shut off. The water flows from the reservoir to the distribution area by gravity. This "fill and draw" system requires lower operational skills than other systems.

78. Depending on the system, these "source pumps" are the submersible pumps of the boreholes, the bulk water pumps at the surface water treatment facility, specially placed booster pumps, or a combination of those.

79. These pressure zones consist of one or several District Metering Areas (DMAs). The supply to each DMA is measured by a bulk water meter, facilitating effective water distribution management.

80. Improving the surface water intakes, although damaged in the 2021 floods, is not part of the scope of the project. These will be repaired by the government of Timor Leste with support from the Australian Government.

81. Improvement of the groundwater abstraction is part of the scope of the project. As much as possible the existing boreholes will be re-developed, meaning the will be cleaned and surged. The DED assessed the possible safe yield increase by re-development to be about 25% on average. Also, two drilled and installed, but not yet commissioned boreholes are integrated in the Project design, while two new boreholes will be drilled, equipped and commissioned to supplement the groundwater supply.

82. The limiting factor to supplying continuous potable water to the population of Dili is not as much a limited quantity of available raw water, but the absence of proper treatment and a functioning distribution system.

83. The WTP and reservoirs are old, dilapidated, in poor condition and difficult to maintain. The condition, age, and materials of the underground pipework are mostly unknown. This combined with high physical losses, made BTL decide for full replacement of the complete distribution pipe network and demolish or redeploy existing facilities and replace with all new more reliable facilities of greater capacity, except for:

- pipe network constructed in five areas financed by ADB (2008-2015);
- existing Be'e mos reservoir and Central reservoir, built by JICA (2010-2011).

84. Where required, new reservoirs will be built to augment the storage capacity of the distribution system to accommodate the fluctuations between the increased daily demand and supply, and to increate chemical contact time to provide the required disinfection levels.
85. The design horizon for the project is 2050. This means that the infrastructure is designed to supply the water supply demand projected in 2050. The design flow is calculated based on the following demand projections:

- the mean daily demand is calculated by multiplying the projected population by the agreed per capita daily demand of 120 liters, added by the projected non-domestic demand. The mean daily demand is used to calculate annual water balances.
- the capacity of facilities upstream of reservoirs, such as boreholes, intakes, transmission mains and surface water treatment plants are designed based on peak daily demand, estimated to be 20% higher than mean daily demand.
- the capacity of the reservoirs is based on a retention time of at least 12 hours.
- the capacity of facilities downstream of reservoir, such as distribution network and service connections are designed based peak hourly demand, estimated to be 50% higher than the peak daily demand.

3.2.2.1.1 Rehabilitation of the Transmission and Distribution Mains

86. BTL, as the project proponent, preferred the progressive and full replacement of distribution pipe network, given a long-term detection/measurement campaign is required to identify defective pipelines under the low reliability of the existing pipe network. Thus, it is more advantageous to develop a new reliable pipe network.

87. 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.

88. In the water supply area of the Dili urban area, various pipe materials are currently being used and this situation brings difficulties in operation and maintenance of pipeline facilities, particularly storage for maintenance purposes. Therefore, the DED consultant recommended to simplify the pipe material into one or two types and/or dimensions and standardize the specifications of fittings and connection to ensure the unity and convenience of maintenance and facilitate storage management. Therefore, BTL decided to apply ductlile cast iron pipe (DCIP) for pipe diameters greater than 80mm and high density poly ethylene (HDPE) for pipe diameters less than 80mm.

Figure 9 Laying of Transmission and Distribution Lines Along a Road (Source: Dongsung Engineering, 2022)

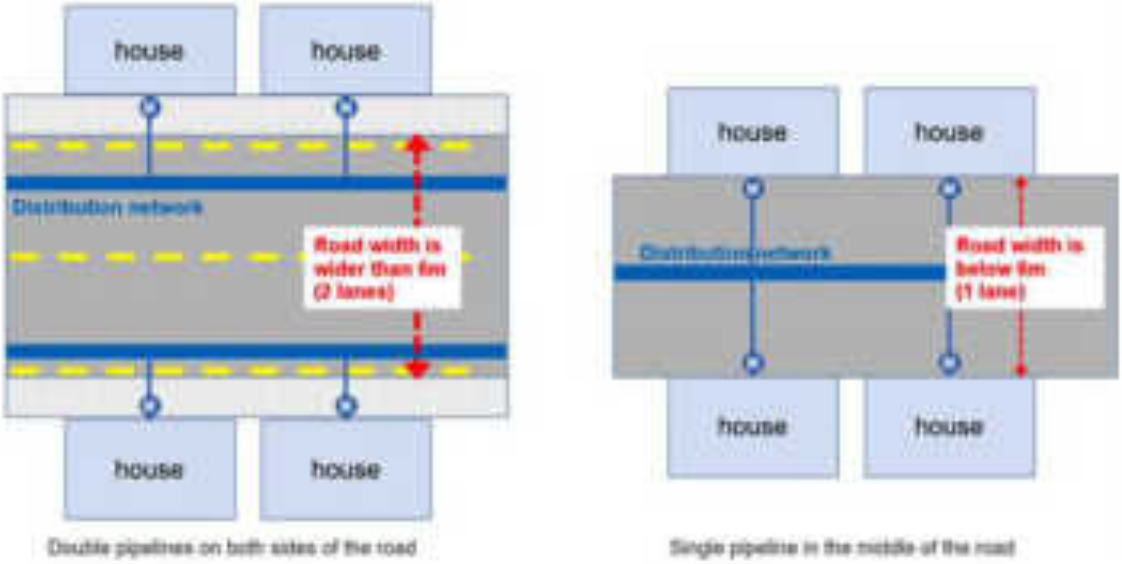
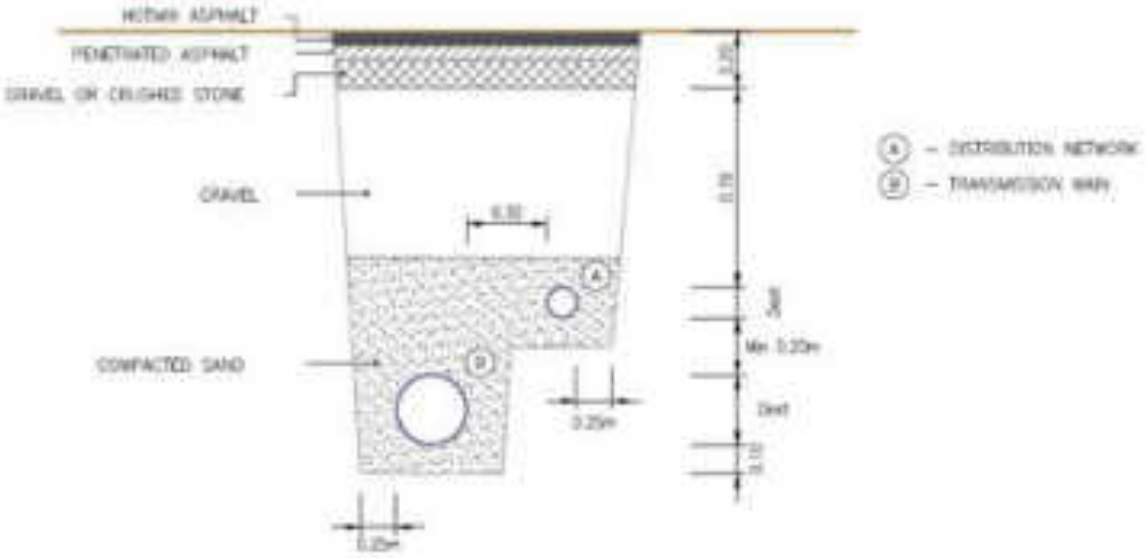


Figure 10 Typical Double Trench Transmission Mains Service



89. Regarding 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.

90. 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.

3.2.2.2 Package Area 01 - Be'e mos pressure zone

A. <u>Existing System Layout</u>

91. The Be'e mos zone is supplied through a water intake, situated about 7 kilometers upstream of the surface Water Treatment Plant (WTP). The intake capacity was measured in 2015 and again in 2020, with following results:

Table 5 Water Sources Be'e mos

Intake	Flow Rate, m^3/d		
	Master Plan (2015)	Survey Result (2020)	
	Ave	Min	Max
Be'e mos Intake	10,200	7,698	10,959

92. It supplies 4,200 m^3/day of raw surface water to the Be'e mos WTP. The intake and 300 mm nominal diameter transmission line to the WTP was seriously damaged during the flooding on April 2021. The restoration of damaged pipelines is being prepared through a DFAT project.

93. The Be'e mos WTP is composed of compact steel structures with four parallel treatment systems with a total capacity of 2,000 m^3/day. Some of the water supplied from the intake bypasses the WTP and untreated water flows directly into the distribution system. The WTP is in reasonably good condition.

94. From the WTP the water is pumped into two existing clean water reservoirs with respective volumes of 1,000 and 500 m^3. From the clean water reservoirs, the water flows by gravity to the distribution area.

95. From the projected water demand it is obvious that currently the system's intake and treatment capacity is insufficient to meet the demand, which, together with the condition, age and materials of the distribution network are unknown, and the physical losses are high, make a very challenging situation to face.

B. Proposed works

96. The Be'e mos WTP will be replaced with a new plant with a capacity of 4,200 m^3/d. The treatment will be a chemical-physical treatment process, consisting of coagulation, flocculation, sedimentation and filtration and disinfection. The sediments will be treated in a sludge thickener and dehydrator.

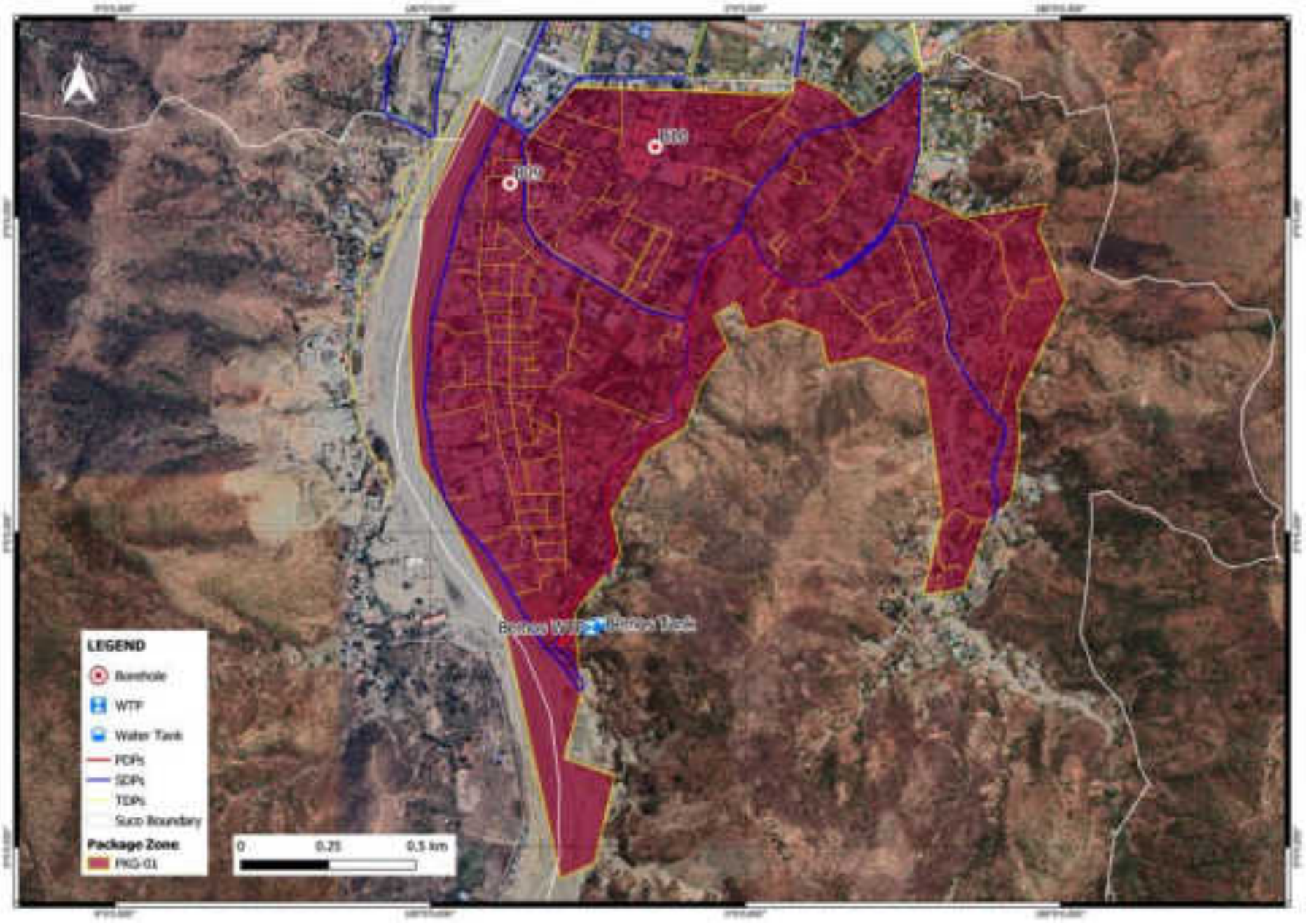
97. The following major structures will be built: flowmeter chamber, receiving well, coagulation and flocculation basins, sedimentation basin, rapid filtration basin, drained water basin, sludge thickener and dehydrator (Table 6).

Table 6 Proposed Works for PA 01 Be'e mos

Works	Added by project	Total	Comment
Surface Water intake	none	10,200 m^3/d	Existing intake needs repair. BTL and DFAT
Boreholes	none	none	
Raw water transmission	none	7,059 m	Length of 5,472 m needs capacity increase
Surface Water treatment	4,200 m^3/d		Existing WTP to be dismantled. BTL
Reservoir & disinfection	2,200 m^3	2,700 m^3	On site of existing Water Treatment Plant. Existing reservoir of 1,000 m^3 to be demolished; 500 m^3 to be retained
Distribution lines (km)	25,840 m	25,840 m	Complete network replacement
Service connections (no)	None	-	Estimated 3,000 required by 2030 Needs to be included in project
Investment costs	$18,899,082		

98. The existing water treatment plant will be dismantled and relocated to Maloa WTP and Nahaek WTP each with a 1,000 m^3/d treatment capacity. The dismantling and relocation is not included in the scope of works of this project.

Figure 6 PA 01 Be'e mos Proposed Works



99. The reservoir capacity at the treatment site will be expanded from 1.500 m^3 to 2.700 m^3 to accommodate the fluctuations between the increased supply and demand. The 1,000 m^3 reservoir needs to be demolished to make space for the WTP expansion. The new reservoir will have a capacity of 2,200 m^3.

100. Following treatment and storage, the clean water will flow by gravity into the distribution network. The full distribution network needs to be replaced. The total length of primary, secondary and tertiary distribution pipes is about 26 km, with nominal diameter varying from 315 to 63 mm.

3.2.2.3 Package Area 02 - Malinamuk pressure zone

A. Existing System Layout

101. The Malinamuk zone is supplied by a single deep well, referred to as Borehole No. 4 (BH04) or Comoro E. The installed pump capacity and the assessed safe yield are as follows, in accordance with the draft Due Diligence Report (Mott MacDonald 2022), still to be finalized at the time of writing this IEE.

Table 7 Malinamuk Water Sources

Well no.	Name	Pump capacity	Safe yield		Current status
			DNSA '19	ADB '16	
04	Comoro E	0.5 m^3/min 102 mH	11.0 l/s	7.8 l/s	Pump is running is within the acceptable efficiency range
45		2.9 m^3/min 108 mH			Not operational
46		1.2 m^3/min 118 mH			Not operational

102. The preliminary DED assumed a somewhat lower production of 546 m^3/day. It is not clear how this figure was derived, but it is on the lower side of the safe yield measurements, assuming an average operation of 18 hours per day.

103. To augment the supply of raw water, the Government of Timor-Leste has recently installed two new boreholes: BH45 and BH46. These are not yet operational. When operational, the preliminary DED estimates their combined capacity to be 5,832 m^3/day. This seems to be on the higher side since these pumps will not run continuously.

104. From the boreholes, the untreated raw water is pumped directly into the distribution system and into the existing reservoir of 1,000 m^3. The condition, age and materials of the distribution network are unknown, and the physical losses are high.

105. From the projected water demand it is obvious that already now the system's borehole and storage capacity is insufficient to meet the demand.

B. Proposed Works

106. The existing borehole BH04 needs to be redeveloped and BH45 and BH46 need to be connected to the transmission main. The expected supply capacity is 6,515 m^3/day, requiring the drilling, installation and commissioning of an additional borehole with a capacity of 5,000 m^3/day.

107. A new transmission pipe will be laid, connecting the boreholes directly with the reservoir. The old reservoir will be demolished and on the same site a new concrete reservoir with a volume of 6,400 m^3 will be built. Facilities and equipment for chemical storage and dosing for proper disinfection of the raw water are planned and included.

108. Following treatment and storage, the clean water will flow by gravity into the distribution network. The full distribution network needs to be replaced. The total length of

primary, secondary and tertiary distribution pipes is about 82 km, with nominal diameter varying from 600 to 63 mm.

Figure 7 PA 02 Malinamuk Proposed Works

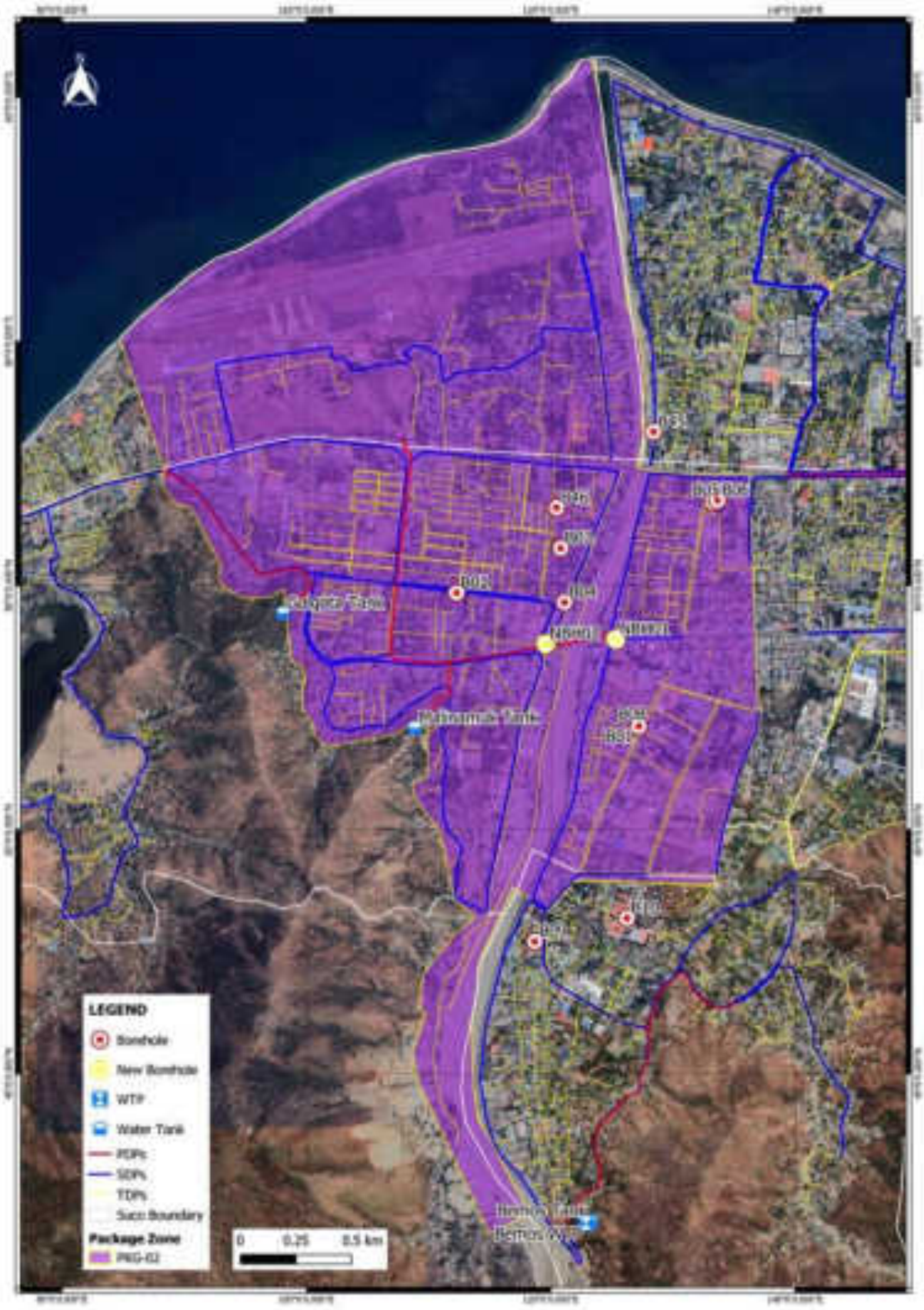


Table 8 Proposed Works for PA02 Malinamuk

Works	Added by project	Total	Comment
Surface Water intake	none	none	
Boreholes	1 developed (136 m^3/d) 2 connected (5,832 m^3/d) 1 new (5,000 m^3/d)	4, delivering 11,515 m^3/d	It is assumed that redevelopment increases capacity of existing boreholes by 25% (increase from 546 to m^3/day to 682 m^3/day)
Raw water transmission	2,282 m	2,282 m	From wells to reservoir
Surface Water treatment	none	none	
Reservoir & disinfection	6,400 m^3	6,400 m^3	On site of existing reservoir of 1,000 m^3 which will be demolished
Distribution lines (km)	81,900 m	81,900 m	
Service connections (no)	None		Estimated 6,800 required by 2030 Needs to be included in project
Investment costs	$21,883,133		

3.2.2.4 Package Area 03 - Central pressure zone

A. <u>Existing System Layout</u>

109. The Central zone is supplied through both a surface water intake, situated about 7 kilometers upstream of the Be'e mos WTP, and five deep wells: borehole numbers 05, 06, 08, 09 and 10.

110. From the intake the water is transferred to the Be'e mos WTP through a 7 km long 300 mm diameter transmission pipe, and from there to the Central WTP through a 5.2 km 300 mm diameter long transmission pipe.

111. The intake capacity was measured in 2015 and again in 2020, with following results:

Table 9 Be'e mos Intake Productivity Measurement

Intake	Flow Rate, m3/d		
	Master Plan (2015)	Survey Result (2020)	
	Ave	Min	Max
Be'e mos Intake	10,200	7,698	10,959

112. The installed pump capacity and the assessed safe yield for the sources in this PA is as follows:

Table 10 Proposed Water Sources for PA03 - Central

Well no.	Name	Pump cap	Safe yield		
			DNSA '19	ADB '16	
05	Comoro B1	3.6 m^3/min 98 mH	45.0 l/s	47.5 l/s	Pump is running below the acceptable efficiency range
06	Comoro B2	1.5 m^3/min 99 mH	20.0 l/s	19.2 l/s	Pump is running is within the acceptable efficiency range
08	Comoro A_G	3.6 m^3/min 126 mH	No data	No data	
09	Manleuana Asgor	2.2 m^3/min 124 mH	No data	No data	
10	Manleuana Merkadu	1.0 m^3/min 124 mH	No data	No data	

113. 6,000 m^3/day of raw surface water is supplied to the Central WTP. From the WTP the water is pumped into the existing clean water reservoirs with a volume of 3,000 m^3.

114. The preliminary DED assumed a production of 13.464 m^3/day, which is close to pump capacity of the wells combined. Although it is not clear how this was derived, considering the lack of data, it is within the acceptable pump capacity efficiency range.

Figure 8 PA 03 Central Proposed Works

115. By combining surface and groundwater, the total available supply is 19,464 m^3/day. From the projected water demand it is obvious that the system's intake and treatment capacity is insufficient to meet the demand.

116. From the boreholes, the untreated raw water is pumped directly into the distribution system and into the clean water reservoir at the Central WTP site. From the clean water reservoir, the water flows by gravity to the distribution area. The condition, age and materials of the distribution network are unknown, and the physical losses are high.

B. Proposed works

117. The existing boreholes BH05, BH06, BH08, BH09 and BH10 need to be redeveloped, and are expected to increase the groundwater supply capacity to 16,830 m^3/day; the surface water capacity remains the same at 6,000 m^3/day. This requires the drilling, installation and commissioning of an additional borehole with a capacity of 5,000 m^3/day to bring the total supply capacity to 27,830 m^3/day.

118. A new transmission pipe will be laid, connecting the boreholes directly with the reservoir. The old reservoir will be demolished and on the same site a new concrete reservoir with a volume of 17,200 m^3 will be built. Facilities and equipment for chemical storage and dosing for proper disinfection of the raw ground water are included in the Project.

119. Following treatment and storage, the clean water will flow by gravity into the distribution network. The full distribution network needs to be replaced. The total length of primary, secondary and tertiary distribution pipes is about 164 km, with nominal diameter varying from 315 to 63 mm.

Table 11 Proposed Works for PA03 Central

Works	Added by project	Total	Comment
Surface Water intake	none	none	Be'e mos intake
Boreholes	5 developed BH05, BH06, BH08, BH09, BH10 (3,366 m^3/d) 1 new (5,000 m^3/d)	6, delivering 21,830 m^3/d	It is assumed that redevelopment increases capacity of existing boreholes by 25% (increase from 13,464 to 16,830 m^3/d)
Raw water transmission	7,030 m	7,030 m	From wells to reservoir
Surface Water treatment	none	6,000 m^3/d	Existing WTP
Reservoir & disinfection	17,200 m^3	17,200 m^3	On site of existing WTP
Distribution lines (km)	164,152 m	164,152 m	
Service connections (no)	None		Estimated 20,400 required by 2030 Needs to be included in project
Investment costs	$49,793,206.35		

3.2.2.5 Package Area 05 - Maloa pressure zone

A. Existing System Layout

120. The Maloa zone is supplied through a water intake, situated about 600 meters upstream of the surface Maloa WTP. The intake capacity was measured in 2015 and again in 2020, with following results:

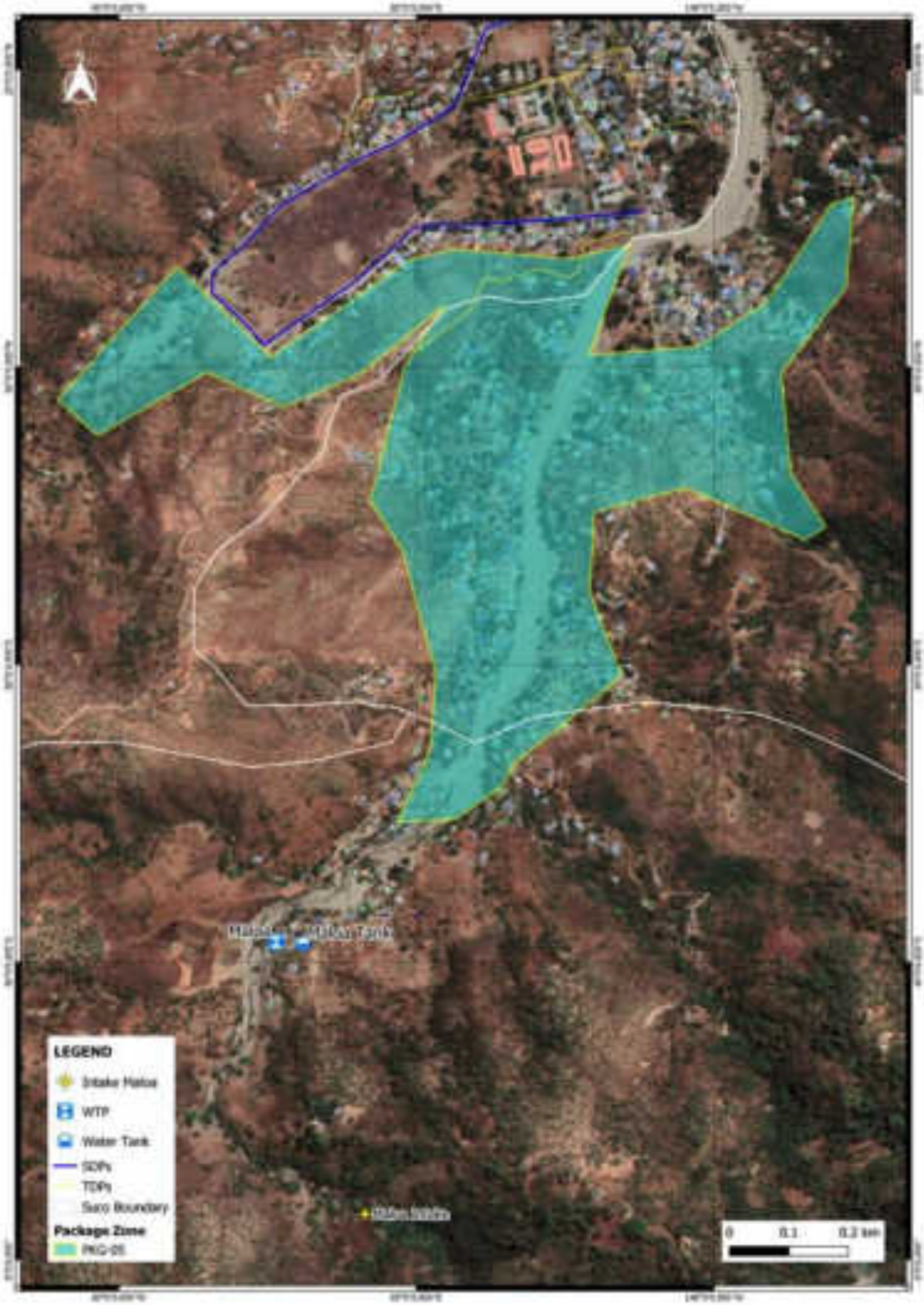
Table 12 Maloa Intake Productivity

Intake	Flow Rate, m3/d		
	Master Plan (2015)	**Survey Result (2020)**	
	Ave	Min	Max
Maloa Intake	1,032	627	922

121. From the intake the raw surface water is transferred to the Maloa reservoir through a 561 meter long 150 mm diameter transmission pipe, with design capacity of 1,000 m^3/day.

122. From the reservoir the raw water flows directly into the distribution system without any treatment.

Figure 9 PA05 Maloa Proposed Works



123. The projected water demand data shows that intake capacity is sufficient to provide the Maloa pressure zone with potable water, provided a treatment plant is built.

124. The condition, age and materials of the distribution network are unknown, and the physical losses are high.

B. Proposed works

125. The Maloa WTP will be constructed with a capacity of 1,000 m^3/d. The treatment will be a chemical-physical treatment process, consisting of coagulation, flocculation, sedimentation and filtration and disinfection. Since the flow is too small, the sediments will not be treated but discharged directly in the river downstream of the WTP.

126. The new facilities to be constructed are the flow meter chamber, receiving well and coagulation basin. The other facilities will be transferred from Be'e mos WTP and installed on site: pre-sedimentation, flocculation, sedimentation and sand filter basin.

127. The reservoir capacity at the treatment site will be expanded to 700 m^3 to accommodate the fluctuations between the increased supply and demand. This reservoir will be constructed on the site of the existing reservoir. Following treatment and storage, the clean water will flow by gravity into the distribution network.

128. The full distribution network needs to be replaced. The total length of primary, secondary and tertiary distribution pipes is about 4 km, with nominal diameter varying from 225 to 63 mm.

Table 13 Proposed Works for PA05 Maloa

Works	Added by project	Total	Comment
Surface Water intake	none	1,000 m^3/d	
Boreholes	none	none	
Raw water transmission	none	561 m	Existing and in acceptable condition
Surface Water treatment	1,000 m^3/d	1,000 m^3/d	No existing WTP. Part of treatment facilities of dismantled Be'e mos to be transferred here
Reservoir & disinfection	700 m^3	700 m^3	On site of existing Water Treatment Plant
Distribution lines (km)	4,200 m	4,200 m	Complete replacement
Service connections (no)	None	?	Estimated 725 required by 2030 Needs to be included in project
Investment costs	$7,806,475		

3.2.2.6 Package Area 08 - Golgota pressure zone

A. Existing System Layout

129. The Golgota zone does not have existing water sources within its boundaries but is supplied by three deep wells: Borehole Nos. 1 (BH04), 2 (BH02) and 3 (BH03). The installed pump capacity and the assessed safe yield is as follows.

Table 14 Water Sources that supply PA08 Golgota

Well no.	Name	Pump cap	Safe yield		Comment
			DNSA '19	ADB '16	
01	Comoro A	0.7 m3/min 103 mH	35.0 l/s	47.2 l/s	Pump is running far above the acceptable efficiency range
02	Comoro C	1.1 m3/min 97 mH	12.0 l/s	14.4 l/s	Pump is running below the acceptable efficiency range
03	Comoro D	2.0 m3/min 94 mH	27.0 l/s	26.4 l/s	Pump is running within the acceptable efficiency range

130. The preliminary DED assumed a lower production of 4,272 m^3/day. It is not clear how this figure was derived, but it is on the lower side of the safe yield measurements, assuming an average operation of 18 hours per day.

Figure 10 PA 08 Golgota Proposed Works

131. The current supply estimates are sufficient to meet future demand projections but the storage capacity is insufficient.

132. From the boreholes, the untreated raw water is pumped directly into the distribution system and into the reservoir. The condition, age and materials of the distribution network are unknown, and the physical losses are high.

B. Proposed works

133. The existing boreholes BH01, BH02 and BH03 will be redeveloped. The expected supply capacity is 5,340 m^3/day, which is sufficient to match the projected future demand.

134. A new transmission pipe will be laid, connecting the boreholes directly and only with the reservoir. The old reservoir will be demolished and on the same site a new concrete reservoir with a volume of 3,000 m^3 will be built.

135. Facilities and equipment for chemical storage and dosing for proper disinfection of the raw water are included. Following the treatment and storage, the clean water will flow by gravity into the distribution network.

136. The full distribution network needs to be replaced. The total length of primary, secondary and tertiary distribution pipes is about 23 km, with nominal diameter varying from 315 to 63 mm.

Table 15 Proposed Works for PA08 Golgota

Works	Added by project	Total	Comment
Surface Water intake	none	none	
Boreholes	3 developed BHo1, BH02, BH03 (1,068 m^3/d)	3 delivering 5,340 m^3/d	It is assumed that redevelopment increases capacity of existing boreholes by 25% (increase from 4272 to 5,340 m^3/d)
Raw water transmission	1,207 m	1,207 m	From wells to reservoir
Surface Water treatment	none	none	
Reservoir & disinfection	3,000 m3	3,000 m3	On site of existing reservoir of 1,000 m3 which will be demolished
Distribution lines (km)	23,060 m	23,060 m	Complete replacement
Service connections (no)	None	?	Estimated 6,800 required by 2030. Needs to be included in project
Investment costs	$7,806,475		

3.2.3 Water Quality

137. The project has a recent history of water quality test results, carried out recently by the DED consultant to the project Intakes, including Be'e mos and Maloa, during dry and wet seasons. The DED consultant only performed surface water quality sampling in 2021, due to delays on borehole assessment and thus the wet season water quality is assessed based on previous studies on Dili water quality, the Dili Groundwater Feasibility Study carried out in 2019 under the auspices of the Government (Government of Timor-Leste, 2020).

138. This Government of Timor-Leste (2020) study analyzed groundwater samples from 10 pumping wells in Dili, of which B06, B09, B10, B39 are in Comoro Area, which is part of the Dili-West project (see Appendix 8).

139. The study also refers that Groundwater quality analysis have been done since the year 2000 by DNSA laboratory (now BTL), with records available for 12 pumping wells in their database, specifically for B02, B04, B08, B10, and B39 of Comoro Area.

140. Conclusions on these surveys were the following:

- Preliminary DED tests shows that there is bacteriological contamination (total coliforms and E.Coli) in the intake water sources, during both seasons, particularly Maloa in the dry season, while turbidity is within legal thresholds during dry season but increases substantially in the wet season, for both intakes;
- Groundwater testing data showed there is continued contamination of E. Coli in B05 and B10 and Total Coliforms was TNC (Too Numerous to Count) for every borehole tested;
- In general, except for biological contamination, groundwater quality parameters from wells of the Comoro Area have been within National and WHO Standards.

141. These water results show that surface water turbidity is mainly related to rainfall. In addition, high levels of E. coli are commonly detected in high turbidity raw water, which suggests there is animal or human waste being discharged into the waterways upstream of the intakes. This is also viewed in groundwater results, suggesting that the household and other sanitation systems in Dili are not working and may be contaminating the underground aquifer.

142. Therefore, this situation supports the decision to implement the recommended design of the WTP and reservoir system with a disinfection process capable of completely removing coliforms, along with measures for raw water with high turbidity, especially in the rainy season.

143. The Government's 2020 groundwater study also investigated the issue of saltwater intrusion in the Dili aquifer. It clarifies that the Government has established four (4) monitoring wells, DM1 to DM4, at depths up to 140m, in 2011-2012, to study the salinization impacts in Dili Metropolitan Area. DM1 is located close to Comoro river mouth while DM2 and DM3 are located 1,800m and 3,400m upstream of Comoro River. DM4 is located close to shoreline near Dili harbor.

144. The study identified that the area around Comoro River mount, where DM1 is located, is periodically affected by saltwater intrusion but no impact during wet season when there is runoff or underflow in Comoro River. However, water quality test results indicate that the area around DM4 suffers from salinization the whole year round.

145. Additionally, the study also performed an analysis of safe yield extraction, including the Comoro Area, comparing dry and wet season data, and the possibility of how it may affect salinity intrusion in the area.

146. The Government's 2020 groundwater study recommended safe yield during dry season, for Comoro, set at 57,000 m^3/day, which is 50% of the total Dry Season safe yield; it was concluded that the total discharged rate of wells in Comoro Area could be lifted from 13,333 m^3/day up to 57,000m3/day without major risk of unbalancing the system and provoking salinity intrusion, given that this extraction rate has a 50% safety buffer. The study also concluded that the possibility of saltwater intrusion is likely to be more in the East Area than in Comoro Area, thus suggesting a saltwater intrusion-monitoring program to be installed in the East Area, especially the area near the shoreline.

147. Currently, the ADB Technical Assistance team is also in the process of building an in-depth groundwater model with calibration against historical well test data and water levels, to reconfirm the sustainable yield of the Dili Aquifer estimated by Government of Timor-Leste (2020). The TA analysis of the historical data for water production and groundwater levels has led the team to conclude that, to date, the water use from the aquifer is stable and sustainable, showing a production rate for 2019 of about 30,000 m^3/day, amounting to 10,950,000 m^3 for the year. In fact, since the restoration of water supplies around 2002 the groundwater extraction from the aquifer has been continuous and sustainable, where in all studied areas the groundwater level falls in the dry season due to lack of recharge from the rivers but recovers about January-February during the wet season.

148. During the time of monitoring data that are available from 2016 to 2019, the groundwater levels were stable at Comoro River area between 7.2m and 22.16 m above mean sea level. At the Dili Central area, two of the four monitoring wells are artesian (water above sea level).

149. The TA team thus concluded that, historically and for now, and although the analysis contains several data errors from transcription, saltwater intrusion could be prevented if the groundwater level is kept above sea level. For the future water supply, which is estimated to need around 74,131 m^3/d for the entire city, it is highly likely that it will be possible to avoid this saline intrusion risk due to the amount of storage in the aquifers with water levels well above sea level and the ability of the rivers to replace water used for supply, over a short period of time.

150. The on-going groundwater model analysis preliminary results conclude that there will be impact on groundwater levels if there is uncontrolled increased pumping, either from existing wells or with increased number of wells.

151. The model was run at current pumping rates of 34,904 m^3/day for 50 years and found to be stable and sustainable with a variation in groundwater levels of about 5 - 15 m between seasons (Mott MacDonald, 2022). Examination of the water level in layer 5 (Dili Alluvial Aquifer) showed that an increase of 20,000 m^3/d was the limit of sustainable pumping and further increases would lower the groundwater levels to sea level. This would most likely result in a significant risk of sea water intrusion, particularly in the low-lying areas with shallow groundwater levels between the Comoro wells and the sea, near to the airport (Dili-West Project Area).

152. The future water supply to Dili will need to consider conjunctive use of surface water and groundwater with the latter constrained to about 54,904 m^3/day around 2030.

153. Groundwater level monitoring should be carried out at proposed new locations from the Pre-Feasibility Groundwater report and revisions made to the model at 4-year intervals to adjust pumping rates in-line with revised predictions. The model should indicate if there is a risk of saltwater intrusion due to lowering of groundwater levels and possible sea level rise due to climate change.

4 ALTERNATIVES ANALYSIS

4.1 'Without-project' or 'do-nothing' Alternative'

154. The citizens of Dili 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 project area and exposing the surroundings to environmental problems.

155. The existing water supply in the project area is intermittent, not able to meet the increasing demands of the increasing population of Dili. 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.

156. 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 Dili City, hindering further social and economic development of the municipality and, indirectly, the Government of Timor-Leste's commitment to Sustainable Development Goal SDG-6 to increase the percentage of the population with access to sustainable, safe drinking water and basic sanitation.

157. 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 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.

4.2 Design Alternative

158. The proposed project has been designed as a mixed gravity and pumping 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 pressure differences and proximity. However, all subsystems can be operated independently as they are also inter-linked, where possible, and water from neighboring subsystems can be supplied to another adjacent subsystem in case of maintenance and other unforeseen events.

4.2.1 Water Source Alternatives

159. The Dili Metropolitan Area Water Supply Master Plan (Seureca, 2017) identified additional solutions for surface and groundwater increase, as they concluded that more water resources would have to be mobilized during the next two decades, even though the improvement of the efficiency of the distribution system will enable to supply much more customers.

160. Groundwater use has been considered with care, given that the Dili aquifer is split between Comoro and East areas, with varying productivities. The master plan (Seureca,

2017) chose for a phased approach to groundwater use, based on available data at the time, choosing to exclude it in the long-term strategy with the premise to protect groundwater resources from depletion of confined aquifers and seawater intrusion.

161. However, more recently, the conclusion from the Dili Ground Water Feasibility Study (Government of Timor-Leste, 2020) was that groundwater resource in the Comoro area could be developed as an emergency and as an alternative water source. Moreover, BTL has chosen to maintain the existing boreholes and open new boreholes in the long-term, as back-up facilities in case of unpredictable emergency such as breakdown of water supply facilities.

162. In order to follow this decision, especially for the Comoro Area, the project followed the study's suggestion of opening two groundwater wells with the targeted depth of 100m+, taking into account that the estimated extraction rate of 0.4 MCM/month for Comoro was considerably lower than the estimated safe yield of 3.417 MCM/month (dry season). Thus, these proposed boreholes, together with the existing borehole field in Comoro, can fill in the water gap up to a preventive buffer extraction rate of 50% of the sustainable yield value (dry season) i.e. 1.71 MCM/month (dry season) without risking source depletion, especially when used for phased development while awaiting further long-term water resource options.

163. For the long term phase of the master plan, Off-stream surface water storage was reviewed to supplement dry-season water shortages, but concluded as not feasible as a short-to-medium alternative within the Comoro catchment due to physical constraints (absence of low-gradient land) or that the base flow in the mid-reaches of the Comoro River will be insufficient to secure the water supply during dry years.

164. Inter-basin water transfer in the Comoro and Gleno mid-catchments was also reviewed and regarded as the most appropriate long-term solution to secure the water supply of Dili, consisting of a justified 1 of 2 possible dam structures, where Gleno River Dam was identified as the preferred water supply option, while the 2nd (Comoro River Dam) would be more targeted for i.e. power production than required for water supply.

165. The study based its analysis on the initial concept that water from the Gleno impoundment would be transferred, by gravity, to the Comoro catchment, at an elevation lower by about 140 m (hence the interest for hydropower production) and a long tunnel would connect the two catchments which are separated by a 460-meter ridge.

166. The underlying principal was that these resources eclipse, in volume, the combined surface and groundwater resources of the Lower Comoro / Dili area.

167. Desalination was another potential resource analyzed in the 2017 master plan, unlimited in terms of availability as a supplementary source that could be mobilized faster. Despite having the benefits of higher speed of implementation and feasible phased response in accordance to demand growth, as well as higher resilience to climate change and almost unlimited availability, its high operation and maintenance costs were a deterrent to place desalinization as a short-term option, relegating it to a long-term option if the inter-basin transfer system was found unfeasible.

4.2.2 Distribution System Alternatives

168. From the 2017 master plan to the recent 2022 Draft DED Report, the ultimate conclusion is that about 70% of the water is lost due to leakage, due the critically poor condition of the network, while rehabilitation projects carried out in recent years in Dili have shown that service improvements could be achieved, but not in a sustainable manner.

169. Given that the comparison and decision between repair and replacement should always be made based on pipe leakage record, and most of the pipes are affected by several leaks, replacement has become the obvious and only serious option.

170. Adopting a selective replacement strategy would require identifying the most defective pipes, through a comprehensive and lengthy measurement campaign, which would be hindered by the very limited knowledge of the layout and characteristics of the existing network, impacting on the reliability of its findings and disabling any option of building any model with the level of accuracy required for making informed decisions.

171. The development of a completely new network will provide: a) opportunity to build up a complete and reliable GIS, inclusively for hydraulic modeling purposes, support to day-to-day management of the network and future development planning and b) will allow for the development a new customer database, replacing old connections with new ones and interconnecting the database and GIS under an integrated management tool.

5 DESCRIPTION OF THE ENVIRONMENT[8]

5.1 Physical Environment

5.1.1 Topography

172. Dili city is located in the North coast of Timor-Leste, in Dili Municipality. The city faces the Ombai Strait and is mostly located in the flatland (alluvial platform), with about two kilometers as the longest distance from the coast to the foot of surrounding mountains. The mountain system that surrounds the alluvial platform has steep slopes with ascent of over 20 degrees from the foot of the mountains adjacent to the urbanized areas, reaching an average 400 m altitude, with its main peaks in Mount Coulou (413 m), Mount Fatocama (379 m) and Mount Manometa (296 m).

5.1.2 Climate

173. Dili municipality has a tropical monsoon and savannah characterized with two distinct seasons, dry and wet season. Based on the historic data recorded in Dili International Airport between 2003 and 2020 Dili received an average annual rainfall of 908 mm/year (National Directorate for Meteorology and Geophysics, 2020). The wet season runs from November-May, with rainfall ranging between 65 mm – 160 mm whereas, dry season is established from June to October with average rainfall less than 30 mm/month.

174. Dili generally has a temperate climate where temperature ranges from 20^{o}C to 32.5^{o}C. The coldest temperatures are experienced from July to September and the hottest from October to December (25oC to 28oC) (Climate Change, Seeds of Life, 2012).

5.1.2.1 Climate Change Projection and Risks

175. 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. A climate risk vulnerability assessment was undertaken during project preparation.

176. Baseline data[9] suggest that from 2000 - 2050, there will be an estimated of 5.5 % decrease in average annual rainfall (908 mm to 858 mm) and a 4.56% increase in average annual temperature (27 °C to 28.30 °C) in Dili Municipality i.e. Suco Comoro (Government of Timor-Leste, 2010).

177. With the intensity of rainfall expected to increase in Dili, with larger increases in extreme rainfall towards the end of the century, it is most likely that tropical cyclones will increase in frequency under warmer conditions, impact water supply system functioning and create a risk of acute damage to all system components.

178. Sea level rise is expected to continue globally over the twenty first century, with significant impact to Dili coastal flooding at the median level rise of 0.3m (Mott Macdonald, 2022).

179. Given this scenario, the major climate risks to the project are identified as water availability due to drought, flooding, and landslides, as well as increased reduction in river levels during the dry season that can affect intakes through sedimentation and low availability.

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[8] For easeness of review and reading, a selection of relevant maps has been attached in Appendix 3 with higher resolution and larger size.

[9] IPCC4 CSIRO A2A Projection for 2050 (Government of Timor-Leste, 2010) and considering WORDLCLIM rainfall and temperature dataset from 1950 to 2000 with approximately 5km spatial resolution (Hijmans et al, 2005)

5.1.3 Geology

180. The areas surrounding the city of Dili has geo-formation units that belong to the Aileu formation (National Ecological Gap Assessment for Timor-Leste 2010, 2010), composed mostly of weakly metamorphosed pelites and psammites with local occurrences of carbonate and igneous bodies of the Permian to Jurassic age (Barber and Audley-Charles, 1976; Barber and others, 1977; Berry and Grady, 1981; Berry and McDougall, 1986; Harris, 1991; Prasetyadi and Harris, 1996).

181. However, the urban areas of the city, where the project mostly lies, is within the Dili alluvial plain, which is recharged by the four existing rivers: Comoro, Maloa, Kuluhun and Santana System, which drain a total of 277 km^2.

182. The National Risk Assessment and Mapping in Timor-Leste (United Nations Development Programme-UNDP, 2013) conducted a study on national landslide susceptibility and as might be expected, the most susceptible areas of the project is on the slopes of the hills where the intakes and other components are located and, further west, the Manleuana area, while the Dili flat alluvial zone does not present a high risk of landslides.

5.1.4 Water Resources and Hydrology

183. 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.

184. These watersheds produce an estimated 22,300 million m^3 of water per year (mm^3/yr), with a total internal renewable water resource of 8,215 mm^3/yr or 6,932 mm^3/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.

185. 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.

186. 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 in the Project Area

A. Surface and Groundwater

187. The hydrological system in Dili West falls into the Comoro River Watershed (Catchment area 211Km2), considered a Very High Priority [Red – critically degraded] (JICA, 2017) see Figure 12 13, composed of several secondary water body elements (rivers and streams) draining southwards through several Sucos from Ermera (Railaco) and Aileu (Laulara) Municipalities towards Dili at the coast (ADB, 2016), Figure 12.

188. The main river, Comoro, is located in the centre of the city and runs southwards upstream through a network of smaller river up to its source, while the other two rivers relevant

to the project are the Rivers Manleuana (4,16Km^2 catchment) and Maloa (20,42Km^2 catchment), each with its own watershed draining into the urban area of the city.

189. The Project Area of Dili-West city is supplied with water mainly from the Be'e mos intake (that starts in Aileu - Laulara as one of the two main Comoro river branches), and the Maloa River intake.

Figure 11 Important Watersheds in Timor-Leste (JICA 2017)

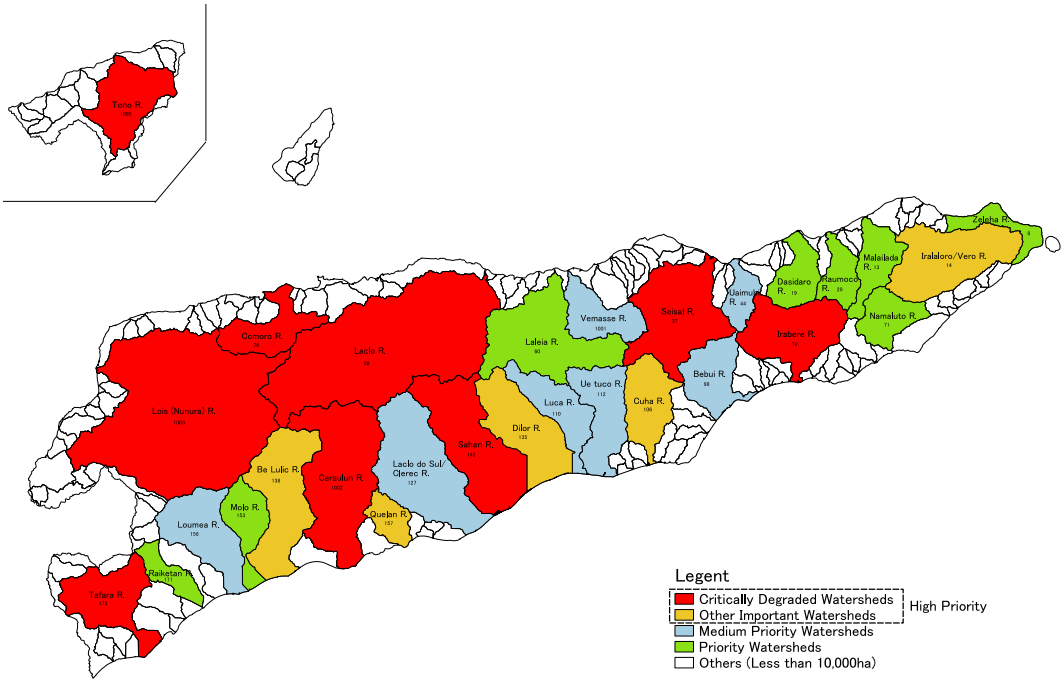


Figure 12 River and Spring System in Dili West Project Area

190. These two sources are the only two year-round consistent surface water sources for water distribution purpose in the project area, used mostly for water distribution for the city (when this is working) and its overflow serves the closer population from up to mid-stream regarding their everyday life chores i.e. washing, water sourcing, etc.

191. In addition, the city is endowed with a very productive groundwater aquifer (see 3.2.1), from which BTL draws a large portion of its water needs for the existing (and still functioning) water distribution system components, through a system of 13 boreholes in the Dili-West area. On the other hand, the majority of the Dili population draws untreated groundwater through private boreholes for everyday consumption or, on the other hand, to sell as water for consumption after treatment, in the case of the estimated seven large scale, properly licensed, "gallon" water production companies, in Dili city.

B. Water Quality

192. Several water quality studies have been carried since, for water sources in Dili, particularly those used for the Water Distribution system since 2000 up to 2019, during the Water master plan (Seureca, 2017), the Groundwater Feasibility Assessment (Government of Timor-Leste, 2020) and the Draft (Preliminary) DED Report for the DUSWP (Dongsung, 2022). These have been evaluated and assessed in 3.2.3.

Figure 13 Geomorphological Map of Dili and BTL boreholes in Dili - West (Government of Timor-Leste 2020, Dongsung 2022)

193. Throughout the years, the overall quality of the sources have indicated that, in general, most of the indicators are within the World Health Organization (WHO) limits for water consumption use of the water, and now also in accordance with the National

Legislation for Water Quality for Human Consumption, despite several occurrences of higher level turbidity in certain cases, that is thought to be attributed to the rainy season or other.

194. 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 in the upstream reaches above the intakes, or the bad condition of the current sanitation situation of dwellings and buildings in the urban reaches of the city, including the expansion areas in the hillsides of the city, with the consequent contamination of the water sources.

5.1.5 Air Quality

195. Industrial development in Dili is limited to very few small-scale industries, and therefore air pollution from industrial activity may be considered negligible. In the dry season, dust generated from unpaved roads and road construction sites may affect air quality, as well as regular smoke caused by garbage burning performed everywhere in the residential areas, every early morning or late afternoon.

196. At present there are no air quality monitoring stations in Dili or Timor so Ambient air quality in Timor is monitored infrequently by the National Directorate for Pollution Control (DNCP), based on primary data collection in air quality testing from EIA and, when requested, from SEIS project baseline studies, which are under the repository of the National Agency for Environmental Licensing (ANLA).

197. More recent projects in Dili that have publicly available air quality, noise and/or other baseline data in their EIS are the New Airport Expansion Project (2021), the Dili Drainage Infrastructure Upgrading Project (DDIUP) (2022), the Pelican Paradise EIA (2017) or the Tibar Bay Port EIA (2017).

198. The DDUIP EIA (2020) seems to be the most representative of the studies for Dili city as it used remote sensing for air quality baseline characterization in the Dili city area during 11 years, regarding PM10 levels, pollutant considered to be more relevant to the drainage project typology and location, and, similarly, for the construction of Water Distribution systems such as the present project.

199. The remote sensing used optical density monthly average measurements from 2008 to 2019 by NASA TERRA and AQUA satellites to estimate monthly and annual PM10 background concentration at ground level within the Dili project site, calibrated with on-site PM10 measurements from the above-mentioned EIAs.

200. In Timor-Leste there is no current legislation regulating air quality, therefore the DDIUP study considered the values stipulated for PM10 by the WHO. The results indicated that Dili typical annual PM10 concentration over 11 years (2008 to 2019 – until March), were compliant with the annual interim limit/target values stipulated by the WHO (1, 2 and 3; 70 µg·m-3, 50 µg·m-3, 30 µg·m-3, respectively), although the typical annual background value tended to be higher than the WHO annual reference value (20 µg·m-3), which, being already quite rigorous, will require future planned activities to focus on effective mitigation measures, especially during construction, to minimize air quality impacts to sensitive receptors e.g. housing areas, hospitals schools.

5.1.6 Noise

201. The DDIUP (2022) study also carried out a noise baseline campaign with nine measuring points during the daytime (six of which are within the Dili-West project), in a project area with mainly urban characteristics (Dili urban area), where residential, commercial and industrial areas predominate.

202. Due to the absence of specific noise legislation from mobile sources (such as road traffic noise), the study adopted the guidelines established by the WHO (according to article 67 of the DL 26/2012 - Base Law for Environment). The study concluded that in places near existing roads, the main source of noise present was road traffic and the movement of people and goods in commercial areas. Comparing the values recorded and the values stipulated by WHO, they inferred that the sound levels recorded were high, but in no case exceeded the limits set by WHO for mixed areas (residential, commercial and traffic areas), with a typical decrease in traffic volumes in the night-time. Thus, in places where the acoustic environment is mainly determined by vehicle traffic and people, noise values are expected to lower substantially at night within the project area.

203. The study also focused on a third area (in terms of environmental noise), essentially residential areas within the urban area of Dili, but away from the main noise sources and concluded that because of their distance from relevant noise sources, daytime LAeq values are close to or slightly below the admissible 55 dB (A) of the WHO (2005).

204. The DWWSP involves construction activity, some of which are naturally noisy i.e. pneumatic hammers and excavation work. Given the noise sensitivity in the various project areas does not go over but is very close to the legal thresholds in most of them, there is a risk that the project activities may have minor negative impacts, particularly in the vicinity of the work site, access roads and construction sites and thus, mitigation measures will be implemented by the contractor during construction.

5.2 Biological Profile

205. 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 (Government of Timor-Leste, 2010), many of which are threatened with extinction by IUCN.

206. Additionally, according to NEGA (2010), Timor-Leste is also part of the Coral Triangle, harboring 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."

207. 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.

5.2.1 Flora, Fauna and Protected Areas

5.2.1.1 Protected Areas, National Parks or sensitive ecological areas

208. Timor-Leste has a total of 49 declared Protected Areas 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, Jaco Island Marine Park, the Lake Iralalaru Park, and the community led marine protected area in vicinity of Com Village.

209. Dili contains the Tasitolu Lakes Protected Area, to the East of the city, covering a total land area of 3.78 km2 and Cristo Rei and Hinterland Protected Area, to the West, covering a total land area of 3.78 km2. This is the only Protected Area and/or Key Biodiversity Areas within the Dili-West project limit as confirmed by IBAT[10] screening, as shown in the figure below; Suco Madohi lies within it, in the form of a strip along the coast, from East to West, up to Dili Rock and 100m inward, while Suco Comoro encompasses the entire Protected Area.

210. PA08 - Golgota is the only PA that lies within its borders, encompassing 90% of the Tasitolu Protected Area. The Technical Assistance team has used Protected Area information procured from the General Director for Forestry for other recent projects, specifically updated GIS documentation on the National Protected Areas Borders (GDF2019). This updated GIS data has made it possible to define the areas of the project that may be in and out of the Protected Area.

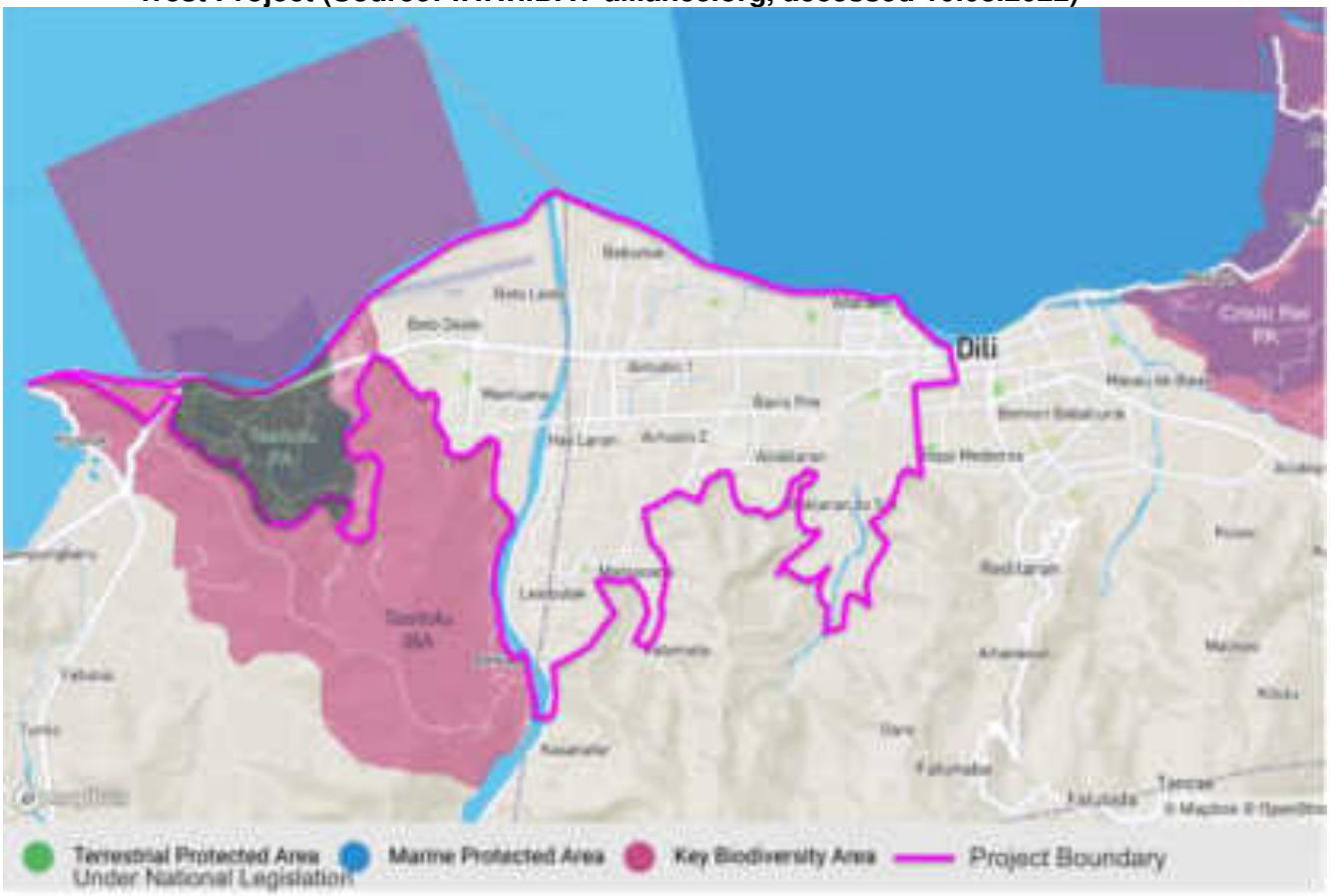
211. In addition, due to the particular sensitivity of the Tasitolu Protected Area, the Technical Assistance team carried out a Site Survey (Appendix 13) to determine the current status of the area, for further impact analysis with the proposed pipe laying.

212. While the Tasitolu lake areas have a defined boundary and are declared as a protected area, under Timorese legislation, the hillsides of the area are the ones that include the last remaining patches of shrubs and trees due to the high pressure of urbanization within this area. This protected area has suffered major urban pressure and land use.

213. There are attempts of reforestation in patches of the protected area from the National Directorate for Protected Areas but these are being pushed aside for housing development in the hillsides. Some small patches of mangroves still exist within the lake shoreline, however it is evident that these are being degraded through exploration for firewood.

[10] www.IBAT-alliance.org

Figure 14 IBAT mapping of Protected Areas and Key Biodiversity Areas near DWWSP - West Project (Source: www.IBAT-alliance.org, accessed 10.03.2022)



214. Urban expansion is spreading towards the lake shoreline and hillsides from the adjacent housing expansion and the terrestrial cover is composed of brush and some trees, which are scarcer in the hillsides. Urbanization is the dominant land use in the Protected Area (see Figure 15), as almost all available areas are used for housing, currently using up an estimated 50% of the available space within the Protected Area, while the green spaces (without the lake surface accounted for) represent 20%. The expansion into the southeast watershed area in particular is relevant to the project, where there are a mix of housing and upstream agriculture activities, as well as some small-scale activities in the upper hillsides that already show signs of erosion, which, together with the deforestation, are impacting the lower areas of the drainage plain with sedimentation problems.

Figure 15 Current Land Utilization in Tasitolu Protected Area (2022)

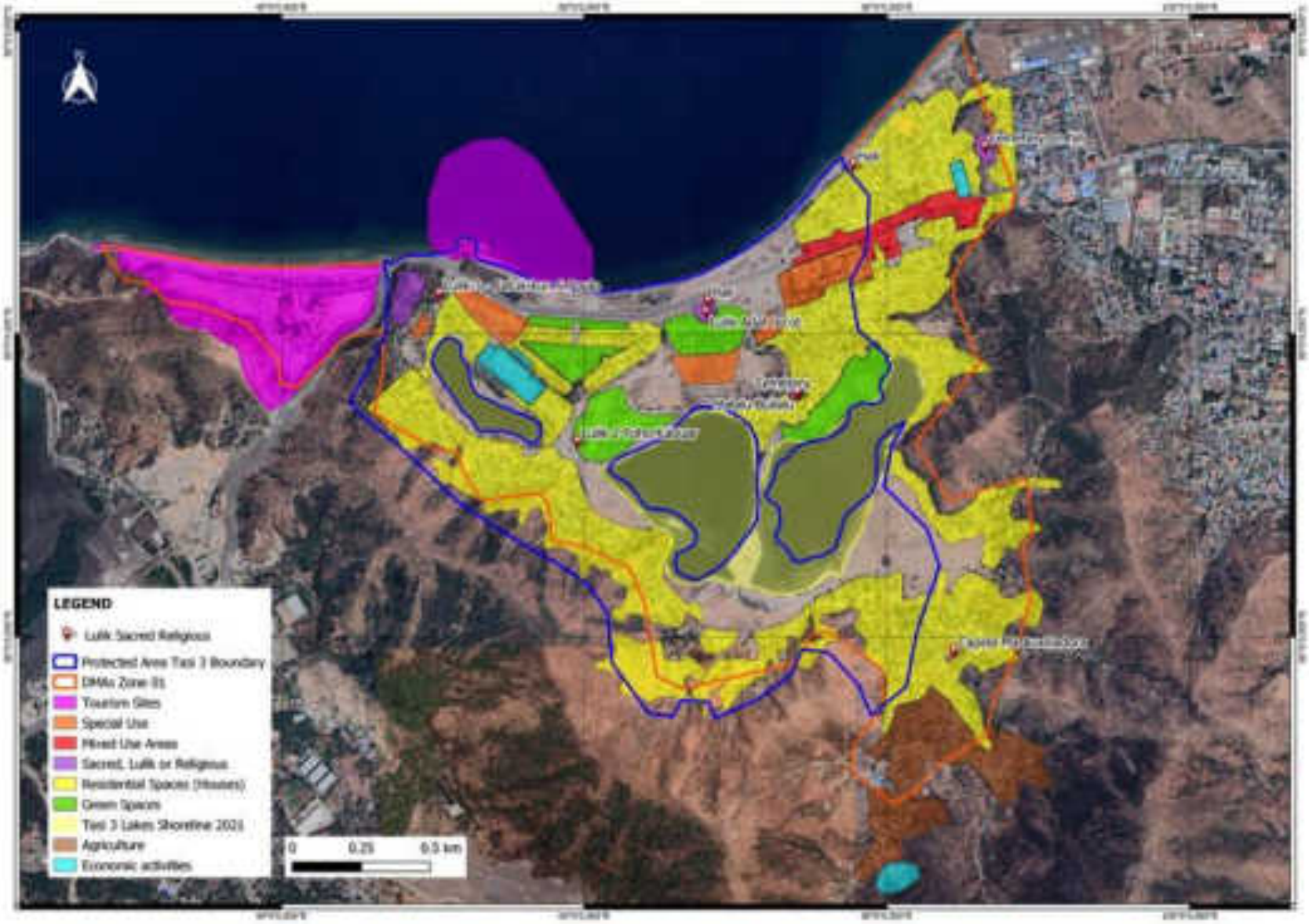
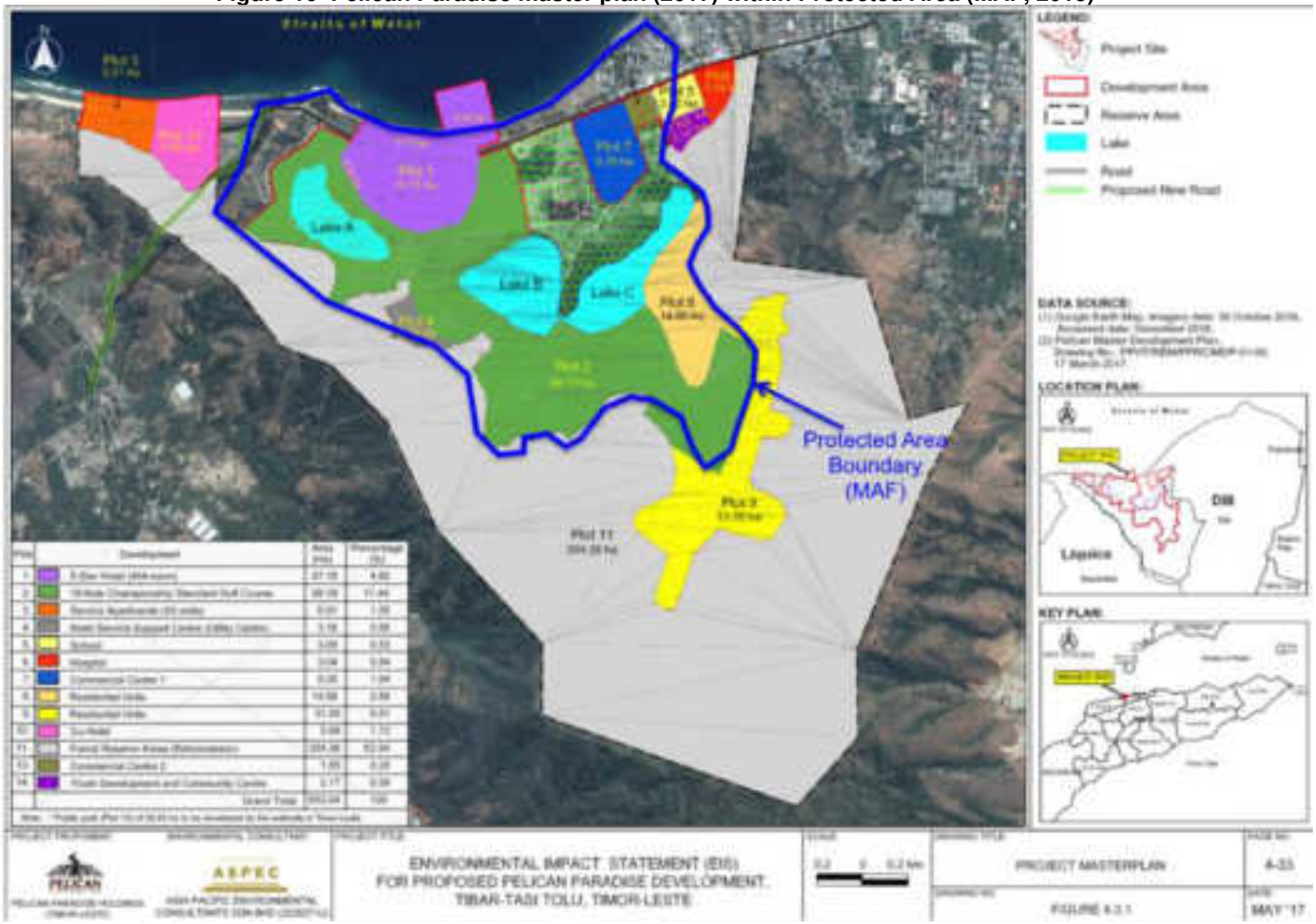


Figure 16 Pelican Paradise master plan (2017) within Protected Area (MAF, 2018)



215. It is important to note that the housing areas and buildings around the lake do not have a centralized wastewater collection and treatment. Instead, the following wastewater discharge methods are used: a) Direct discharge to a hole in the ground; b) discharge to a permeable septic tank; or c) discharge to an impermeable septic tank or box, for a later withdrawal by service tanker and taking the wastewater to the neighboring Tibar waste water treatment plant. From observation in the field, a) and b) are the main domestic wastewater approaches used.

216. Dwellings around the lakes discharge their wastewater directly into the lake, either by a direct pipe or through the ground, through the permeable septic tanks used.

217. Solid waste management is not well developed; many cement box-like structures for collection of the waste are used for burning the waste if there is no collection from the Municipality. The waste, burnt and/or unburnt, ends up in the lakes due to surface runoff during rainfall events or because of the locations of these boxes, some of which are close to or on the lake shoreline itself.

218. Since 2004 the Tasitolu area has been an investment target for Pelican Paradise, a hotel resort, which has had multiple investment licenses (the most recent in January 2021), an Environmental License renewed in 2020. Figure 16 shows the Pelican Paradise development within the Tasitolu Protected Area. Additional details on the development are available from on-line news publications.[11]

219. The environmental features such as flora and fauna within the project area of influence, including the Tasitolu protected area are reflected in the following sections.

5.2.1.2 Flora and Forests

220. 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).

221. 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. Altogether, the area of sparse forest is almost 1.8 times the size of the area of dense forest. Between municipalities, 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 municipalities. The last major stretches of old primary forest are mainly located in the Tutuala sub-municipality of Lautem.

222. 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 (Government of Timor-Leste, 2015). 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.

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[11] 1) Pelican Paradise Environmental License Renewal: http://www.tatoli.tl/2021/01/22/pelican-paradise-renova-ona-lisensa-ambiental/ 2) Pelican Paradise and Government TL sign new special investment agreement: http://www.tatoli.tl/2022/01/03/governu-no-pelican-paradise-selebra-akordu-investimentu-espesial/ 3) 2nd Launch of the Pelican Paradise Project: http://www.tatoli.tl/2022/02/22/governu-hatuur-fatuk-dahuluk-projetu-pelican-paradise-iha-fulan-abril/

5.2.1.2.1 Flora and Forests around and in the Project Area

223. Despite the wide selection of tree species, their dispersion, quantity and Dili city's urban setting and exposure to human activities have made it quite unsuitable for natural terrestrial vegetation and wildlife habitats.

224. A general visit and quick survey of the vegetation throughout the Project Area concluded, within PAs 01, 02, 03 and 05, the tree species and vegetation were limited and dispersed throughout the urban city area, with most of them occurring in private land or within gardens.

225. Beach, forest and coastal strand habitats are found along the coast, such as in the areas of Comoro Beach (North of the Airport area) and in Areia Branca (Metiaut) but the effects of on-going shifting subsistence agriculture and housing construction in the reduction of the number of trees in and around Dili has dramatically increased the threat of erosion during the now more often than ever torrential rainfall, impacting road and other infrastructure such as i.e. Drainage. The threat of continued deforestation to support unsustainable shifting agriculture and the search for firewood as cooking fuel are a reality within the city's boundaries.

226. The lowland city area still presents a small representation of vegetative coverage but it is currently dispersed in parks, roadside shading, household gardens and a few undeveloped urban landscapes or small and diminishing agricultural patches (i.e. Kankung) bordered by tree lines such as the areas of Beto and Caicoli.

227. Urban pressure has taken its toll regarding ecosystem availability within the city. In most of the city, the natural vegetation is being substituted either by introduced, aesthetic species for urban landscaping or being felled down due to be cleared for construction, industry or housing and therefore these areas are now generally constructed on and/or barren with weeds, grasses or bare soil awaiting construction.

228. Throughout the city (mainly in the urban PAs 01, 02, 03 and 05) as well as the low lying surrounding hillsides, the terrestrial flora ranges through a mix of shrubs, ferns and weeds, and a few agricultural crops, such as palm trees (*Arecaceae spp.*), screwpine (*Pandanus utilis*), hazel stericula (*Stericula foetida*), leucaena (*Leucaena Leguminosae*), burgundy leea (*Leea guinensis*), fig tree (*Ficus moriciae*), etc. A few endemic trees are defined to exist, sparsely distributed within the project area, teak, eucalyptus, coconut, palm and/or mango trees, amongst several others, in the city and throughout in the hillsides surrounding the urban area, although there are already signs of the "Siam weed" invasive shrub (*Chromolaena odorata*), particularly where native vegetation clearing is present.

229. "Ai-Hali" (*Ficus sp.*) is particularly important as it was the only protected tree species[12] identified during the survey, along the pavements of city roads in or within the proposed project alignments, in varying distances from the proposed water ROWs. The team has earmarked them as sensitive species that, if occurring in any ROW under construction, will require EMP mitigation measures during the construction phase.

230. The most significant sensitive area within the determined project area border is the Tasitolu lakes protected area, where PZ 08 - Golgota lies, although it does not currently hold a particular rich variety of vegetation in its ecosystem.

231. The Tasitolu lagoons are identified as a saline coastal wetland that functions as a natural catchment and retardation basin for rainwater runoff. The edges of the lagoons host

[12] Ficus sp. as a whole is a national protection requirement under Timor-Leste legislation.

scarce but still existing mangrove (protected species) and salt tolerant vegetative species, making it a prominent site for hosting migratory water birds that travel the Wallacea stretch, flying in from Australia.

232. Along its hillsides the protected area holds remnants of Secondary re-growth forest, which is typical of the regions vegetation (*Uvaria rufa, Zizyphus mauritania, Calotropis gigantean, Acacia leucophloea, Peltophorum pterocarpum, Maranthes corymbose, Corypha utan*), with (medium to) low density of short sized trees, mainly due to poor soils but also to grazing by domestic animals and firewood collecting. Acacia trees (different tree species within *Fabaceae* family) and some Eucalyptus savannah (*Eucalyptus alba*) prevails in the hillside area, although (a very) low density of short sized Eucalyptus trees vegetation type, quite dry, very low presence of other tree species and shrubs occur.

5.2.1.3 Fauna

233. The 5th UNCBD Report (Government of Timor-Leste, 2015) indicates that 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.

234. The country hosts 262 bird species and 39 of them are threatened or restricted range species eight of which are endemic to Timor-Leste (Government of Timor-Leste, 2010). Realizing the importance of conserving the birds to maintain the ecosystem services that the species are offering, the country has determined Important Bird Areas (IBA) with a cumulative land area of 1,852 km2 across the municipalities in Timor (Trainor, 2007). The 5th National Report to the UNCBD (G-RDTL, 2015) states that these 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 on offshore islands (Atauro and Jaco islands), covering approximately 12.5% of Timor-Leste's total land area, supporting populations of both restricted-range birds of the Timor and Wetar endemic bird area, as well as globally threatened bird species.

235. The country also has a rich, highly endemic, oceanic island terrestrial fauna that also consists of 60 mammals, including 24 non-flying mammals, of which two of these are the timor shrew (*Crocidura tenuis*) and timor rat (*Rattus timorensis*), but overall dominated by 31 bat species and 40 reptile (15 lizard and 15 snake) species.

5.2.1.3.1 Fauna around and in the Project Area

236. Similar to the vegetation situation, Dili city's urban setting and exposure to human activities have made it quite unsuitable for natural terrestrial wildlife specimens and habitats.

237. Given the high pace of urban development within the city, the terrestrial fauna known to occur in and around the Project area (PAs 01, 02, 03 and 05) are almost all domesticated animals such as i.e. dogs, goats, pigs, cattle, chickens. However, in the still remaining small patches of green vegetation and wetlands such as i.e. Caicoli, or Beto Tasi, there is a resident wild fauna that still occurs within the city i.e. Frogs, toads and lizards, a variety of small snakes, bats and, in some areas, Monkeys, squirrels and other forest- dwelling mammals that either have been enclosed due to the urban encroachment of their existing habitat or, on the other hand, may have freed themselves from captivity due to illegal poaching and transport/selling of wild animals from the Municipalities to Dili.

238. Of note are the Tasitolu wetlands, which still constitute an important bird habitat with hundreds of migratory birds arriving from the Northern hemisphere during the northern winter, coinciding with an IBA (TL13, Tasitolu), identified in 2007 by BirdLife International. It is extremely important for avifauna such as migratory shorebird species that travel along the East Asian-Australasian Flyway in their thousands through Timor-Leste every year, staying for weeks or the entire winter period in locations such as "the three lakes."

239. However, secondary data from. Pelican Paradise EIA (2017) notes that the diversity and richness of birds within the Tasitolu area has been moderate. Nonetheless, species such as the white-breasted woodswallow (*Artamus leucorynchus*), the pallid cuckoo (*Cacomantis pallidus*), the zebra finch (*Taeniopygia guttata*) and pied bush chat (*Saxicola caprata*) were spotted at the time of the Pelican Paradise EIA study.

240. It is important to highlight the timor sparrow (*Lonchura fuscata*), an endemic species of Timor and surrounding small islands, that occurs at project study areas and lists as Near Threatened by International Union for Conservation of Nature (IUCN); being the only bird species with moderate to high conservation value. This species was one of the reasons why Tasitolu was designated as an IBA for Birdlife International.

241. There are a few other areas such as the beach front along the Dili coastline and Areia Branca Bay that may fit the description of the feeding ground requirements of these highly specialized birds, (Advisian, 2017) where they can forage for food such as crustaceans, mollusks or marine worms and which may lead to the infrequent visit of said avifauna individuals to the busy Northern City Coast and beach areas.

242. Additionally, above the project's Northern boundary, up to 3Km off-shore there is a most important migratory pathway parallel to the Dili Coastline, important for migrating species of marine macro fauna such as cetaceans (whales and dolphins), turtles, dugongs, manta rays and whale sharks (G-RDTL, 2012) with migratory timeframes between the months of late October, November and early December.

243. Equally important is the sporadic and infrequent presence, within the marine and intertidal zones parallel to the project area, of the saltwater crocodile (*Crocodylus porosus*), Timor-Leste's largest predator and living crocodilian, with rare individuals confirmed at lengths of up to and/or over 6 meters (20 ft) and a population which has increased significantly in Timor-Leste since its independence in 2002 (Brakhane, Xavier, Gusmão, & Fukuda, 2018).

5.2.1.4 Coastal Resources

244. Timor-Leste's approximately 700 km of coastline contains many coastal and marine resources including fish, sea grasses, seaweeds, coral reefs, mangrove forests and pristine beaches 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 costal 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.

245. Timor-Leste's coastal zone and its habitats are subject to a high degree of human dependency and impact on their 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.

246. As part of the Coral Triangle Timor-Leste has rich marine fauna, since it is estimated the Coral Triangle harbors "...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).

247. This enormous marine resource places fish 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.

5.2.1.4.1 Coastal Resources in and around the Project Area

248. Above the project's Northern boundary, the marine ecology is composed mostly of fringing reefs that form an almost continuous strip along the coast adjacent to the project, where the most bio diverse areas are located in the Tasitolu marine area (to the West) or the Areia Branca and Cristo- Rei beaches (to the East of the city area). Tasitolu is relevant to the project, as well as the northern strip of coast and has historically been important for small-scale fishing activities that are evident in the sea bordering Dili, which serve as an additional source of food for the communities, as well as for recreational purposes.

249. Equally important are coastal tourism and socioeconomic values adjacent to the project area. In Dili, popular coastal ecotourism would the Cristo Rei Bay area, where Areia Branca is located, followed by Dolok Oan and Tasitolu beach, which is within the PA08 - Golgota.

250. However, the Northern coast of Dili, particularly from the Dili Port to the mouth of Comoro River (PA03 - central) has been strategic to small scaled commercial activities, that occupy the coastal beach areas for business, including grilled fish market at the front the Ministry of Foreign Affairs Fresh, Coconut vendors in Motael or Pertamina and fish markets in Bebonuk or Tasitolu. While these coastal beach areas have also been used as parking for the artisanal fishermen in Dili, Tasitolu is turning into an important coastal resource given the migration of the Tibar fishermen to Tasitolu, due to the ongoing construction of the Tibar Bay Port project.

5.3 Socio-Economic and Cultural Environment

5.3.1 Economic Development

251. Dili Urban Master Plan (JICA, 2016) explains that Dili has developed as an urban center from the 1950s, during Portuguese time, through a planned expansion in the Motael, Colmera, Vila Verde and Bairro Pité Sucos to an urban sprawl during the 1990s, in Indonesian times, from suburban land subdivisions, in Suco Comoro to informal/unplanned settlements in East Dili, such as Becora, Kampung Alor and Fatuhada. Following independence, urbanization progressed into an in-fill development on vacant land or abandoned properties, with consequent population density increase.

252. The urban structure of Dili is shaped by the surrounding geographical features including, the narrow plain between the mountains to the south and the Banda Sea; the rivers transecting this plain that are often subject to flooding during the wet season; the national highways emanating from Dili to the Tibar Port and the Dili International Airport; and a newer urban core with commercial and business functions along the national highway toward the western side of the study area, centered on the Timor Plaza development (JICA et al. 2016).

253. Industries, Services and agriculture development. Human interaction within this setting results in several land-uses in the country such as urban, agricultural, forestry, settlements, industrial and dry lands land use. The mountainous terrain prevents generalized agricultural and industrial uses in many areas, and the lower and flatter areas such as Dili city are preferred for urban sprawl, while in others agriculture prevails.

254. In the 2015 Census, in the municipality of Dili, the population considered to be of economically active age (people aged 10 or over) was 211,574 people, with employment at 35.1% of the working- age population, unemployment at 4.2% and 60.8% economically inactive (domestic workers, students, retirees, incapacitated for work).

255. The predominant form of livelihood for households with employed members in the project area (Dili city) were services, be it in Government or Private Sector.

Figure 17 Dili - Distribution of employed population (10+ years) by sector of activity (source: Census 2015)

Sector	Total	Men (%)	Women (%)
Government	22,354 (30.2%)	67.1	32.9
State-owned companies	6,713 (9.1%)	67.1	32.9
Private companies, businesses or agriculture	10,352 (14.0%)	74.0	26.0
Self-employed farmer	15,591 (21.0%)	57.2	42.8
Other activities on own account	10,720 (14.5%)	51.4	48.6
Non-governmental or non-profit organizations	2,936 (4.0%)	68.4	31.6
Embassies and Bilateral Cooperation Institutions	401 (0.5%)	68.6	31.4
United Nations and Specialized International Organizations	260 (0.4%)	60.4	39.6
Others	4,748 (6.4%)	58.5	41.5
Total	74,077 (100%)	63.2	36.8

256. The data shows the enormous importance of the Government and state companies on the services sector of the employed population (39.1%), private sector at a very low (14.1%) (showing a weakness in the economy of Dili), and international organizations and local NGOs coming at the end with 0.9% and 4.0%, respectfully. Self-employment in agriculture (21.0%) and other sectors (14.5%) totaled 35.5%, which, together with employment in undefined sectors (6.4%), totals 41.9% of employment, most of it informal in nature.

257. **Infrastructure**. The current road network in Dili Metropolitan Area is composed of primary roads (or "protocol roads", usually have up to four lanes), secondary (paved 2 way roads) and tertiary roads (unpaved). the project area itself is traversed by between 4 to 6 main protocol roads, of which Avenida de Portugal (north, along the coast), Avenida Presidente Nicolau Lobato (Centre), and Avenida de Hudi Laran (South), all run from east to west and are connected to the secondary roads connecting the inner city formal areas. The various informal areas of the project area are reached by the tertiary road network.

258. The condition of road congestion in Dili metropolitan area is not yet serious, because the current number of vehicles in Dili is still relatively manageable but road capacity in the east-west direction is becoming limited. Therefore, traffic congestion is a matter of concern in the future.

259. **Transportation**. Public transportation in Dili is served by a fleet of small [12 persons] buses, while for travelling to rural and urban destination outside the Municipality there are three bus terminals in the city.

260. Dili Municipality also has the Nicolau Lobato International Airport, in the north of PA02, which is currently under review for expansion and re-functioning under a multi-donor support program, of which ADB is a part.

261. Dili has a working maritime port in the area of Suco Motael (PA 03 - Central), which receives all maritime commercial import and export goods into Timor-Leste, as well as has a berth for passenger ships that connect the capital to the Municipality of Ataúro and the special region of Oecusse (Timorese enclave).

262. A new port is currently under construction at Tibar Bay and when operational, it will become the main international port servicing Timor-Leste and the Dili port will primarily be used for passenger vessels.

263. **Land use**. The Dili Urban Master Plan (JICA, 2016) and recent fieldwork has concluded that the built up area of Dili city corresponds to 69.1% of the Dili area, between the coast and the foothills.

Table 16 Land use in Dili (JICA 2016)

Class	Sub-class	Characterization	Area	
			ha	%
Built-up Area	Residential, commercial, services and industry	Correspond to the built-up areas, including housing areas, equipment and services in the study area, as well as commercial (such as Dili Plaza and industrial areas.	2.454,6	69,1
Infrastructures and Equipment	Transportation facilities	It refers to the area occupied by the international airport Presidente Nicolau Lobato, located in the west of the study area.	40,3	1,1
Agricultural, forestry and natural areas	Agricultural, forestry, park and recreation areas and natural grass	It corresponds to existing agricultural patches, as well as areas of the territory occupied by forest stands, including other green areas such as parks and gardens. It also includes areas occupied with shrub and sub-shrub vegetation. This subclass is present particularly in the southern and eastern areas of the study area.	697,9	19,6
Water bodies	Rivers	Includes all water lines present in the study area such as such as Comoro River, Kuluhun River, Manleuana River, Santana River, Becora River.	118,2	3,3
	Ocean	It refers to the area occupied by the Pacific Ocean in the northern part of the study area.	241,2	6,8
TOTAL:			3.552,1	100

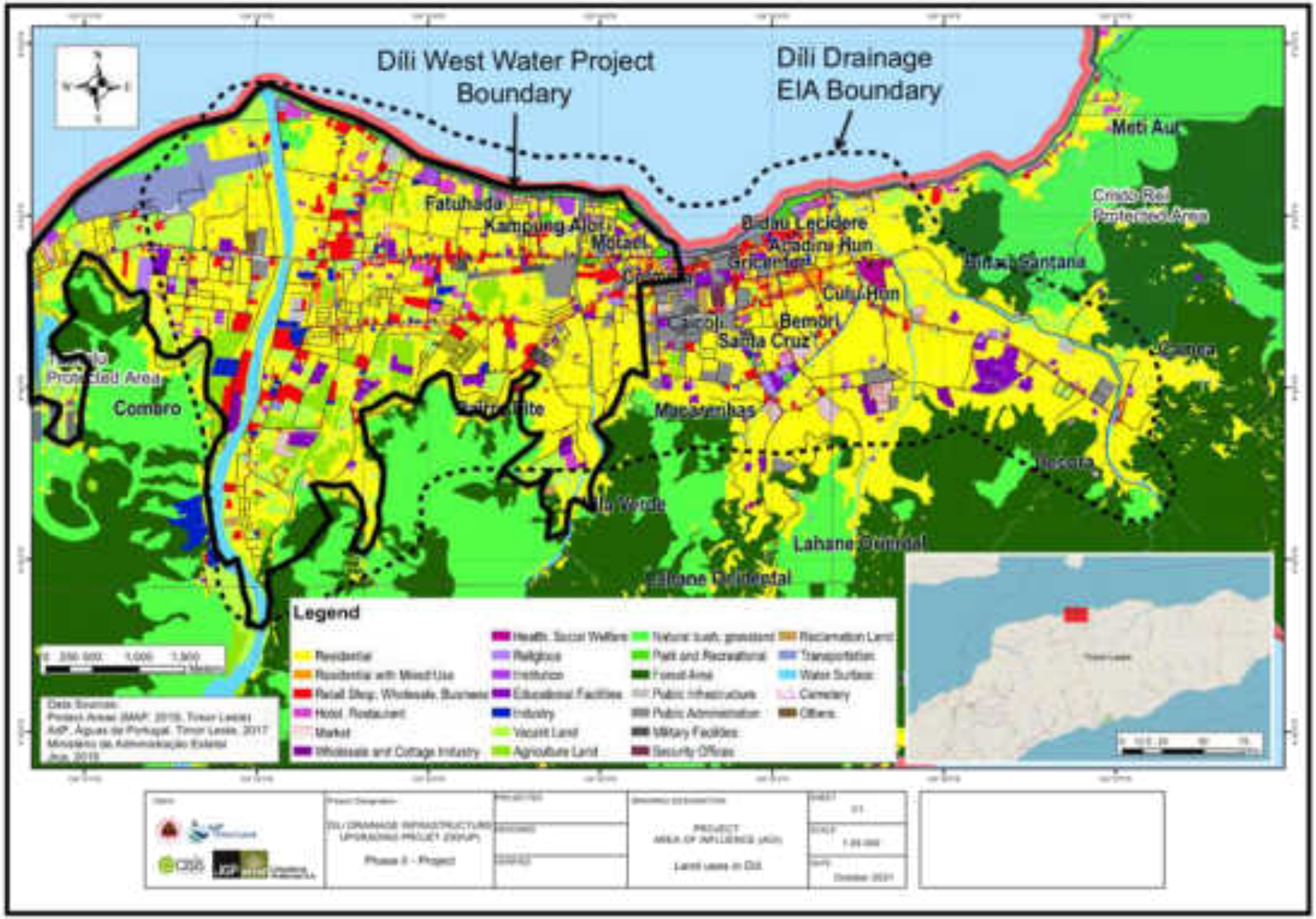
264. The residential uses predominate in almost the entire city area except the central area, where public services and government institutions, port infrastructures are concentrated, as well as commercial and service activities.

265. The commercial areas are distributed throughout the city, along the main roads, but with greater concentration in the western zone, where one of the main commercial areas is located (Timor Plaza), in the relative proximity of the airport (which occupies about 40 ha of the study area).

266. A second class most representative in the study area is related to agricultural, forest, parks and nature area with about 697.9 ha (totaling about 19.6% of the city area). Of note is the distribution of agricultural areas throughout the western zone and the scarce occurrence of free land. The vast majority of agricultural areas are occupied by kankung culture, including on the water lines**.**

267. **Power sources and transmission**. Electricity supply in Timor-Leste is provided by the Hera power plant (North Coast) and Betano power plant (south coast), powered by diesel generators, with a combined capacity of 256 megawatts (MW) (JICA et al. 2016). Energy production has increased considerably in Dili since these power plants have come online, to follow client consumption increase, which in 6 years (2013 to 2018), increased from 97,457 (x103 kWh) to 215,681,146 (x103 kWh) ("Dili in Numbers", DGE, 2018).

Figure 18 Land Use in Dili (Source: DDIUP, 2021, based on JICA 2016)



268. **Mineral development**. The mineral resources in Dili are primarily sourced from the Comoro River. Private companies, licensed by the National Authority for Petroleum and Minerals, extract sand and stone for construction from earmarked locations, while crushed aggregates are usually purchased from approximately five larger scale sand and gravel quarries along the Comoro River.

269. **Tourism facilities**. Timor-Leste, like any other Coral Triangle country, has a high value for eco-tourism although the sector is not yet fully developed in the country. The country's potential of ecotourism is proven with the diving activities including snorkeling, and big-game fishing or observing marine mega fauna along the coast (ADB, 2014).

270. The Government of Timor-Leste has approved a national tourism policy that targets 2030 as the year the country will have a tourism sector that significantly contributes to employment across the country, is economically, socially and environmentally sustainable, helps promote a positive image of Timor-Leste overseas and is an industry that people wish to work in.

271. The Ministry of Tourism's "Geotourism Map for Dili Municipality" (2019) identifies 58 tourist attractions in Dili Municipality. Of particular importance are popular coastal ecotourism sites such as the Cristo Rei Bay area, where Areia Branca Beach is located, followed by Dolok Oan and Tasitolu beach, the latter the only one to fall within the Dili-West Project Area.

5.3.2 Social and Cultural Resources

272. **Population and Communities**. The project is situated in Dili city and its population was projected, in 2015 (General Directorate of Statistics, 2015) to be at 262,351 persons, with the population of Dom Aleixo Administrative Post at 130,095 persons and Vera Cruz Administrative Post at 36,574 persons.

273. **Health Facilities**. Ministry of Health data (2019) indicates that the municipality of Dili has 47 public health facilities and eight private facilities. Public facilities included one hospital, six health centers 22 health posts and 18 integrated health services for communities.

274. Health personnel in 2019 totaled 426 people, including 137 doctors, 122 nurses and 99 midwives (DGE, 2018), of which the doctor ration per 1000 inhabitants was 0.88.

275. **Education Facilities**. In 2018, basic education had 130 schools, 1,754 teachers and 62,980 students and secondary education had 55 schools, 1214 teachers and a total of 52,834 students while professional technician education had 4,723 students, taught by 433 teachers in nine facilities (DGE, 2018).

276. **Physical or Cultural Heritage**. Despite being a 95% Catholic country, there is a significant 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 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.

277. Dili 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.

Figure 19 -Dili West - Cultural sites within General Project Area

278. In regards to Springs, water Sources and others, 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 Na'in will then start to pray whilst presenting the offerings to God, Ancestors and Sacred Objects.

279. 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 behavior or protection of cultural locations. Tara Bandu itself also provides for mediation of land disputes.

280. Dili City has numerous physical or immobile material objects that are registered and conserved by the Secretary of State of Arts and Culture[13] and are widely known by their heritage value, that are protected not only by the State but also by the community itself.

281. Therefore, the team made sure that the referred features were identified as much as possible, within the PAs, based on knowledge from previous projects in Dili, given the large area of the project. Information was also collected with help from the local authorities for the site identification to be more efficient and accurate (see Appendix 3, plates 3.6 to 3.6.1.4 for more detailed information per section of the Dili-West Project Area). All locations are within 10m to 20m of one of the borders of the project components or road alignments (see Appendix 7) and Figure 19 for cultural heritage sites listed by the team. All cultural heritage sites within the ROW will be verified during project implementation as pre-approval may be required from the National Culture Directorate and the Lia Nain of the area, regarding protection during the Construction Phase.

282. While the team did not identify any unique landscape sites within the project area, the Secretariat of State for Art and Culture request to include certain tree species i.e. Ai-Hali or *Ficus sp*. in this category, given its religious and/or cultural significance to the Timorese Culture. The presence of the Ai-hali trees along various of the proposed infrastructures and its double national classification as "protected" and "unique landscape" will require evaluation from the constructor before construction starts, meaning an additional approval may be required from the Secretariat of State for Art and Culture in situations where these tree specimens may require felling.

283. Current use of lands and resources for traditional purposes by indigenous peoples. Tara bandu also 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 such as Jaco Island and its surrounding reef, 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.

5.4 Site-Specific Environmental & Social Features

284. Table 17 summarizes site-specific conditions of the main component locations/sites/alignments that the project identifies as most significant for this analysis.

[13] The team has had previous data regarding to the cultural and heritage sites in Dili city, from the National Department of Cultural Patrimony, Secretary of State of Arts and Culture, collected during the Dili Drainage EIA (2021).

Table 17 Project Site Environmental and Social Features

Components	Site Salient Features	Site Photographs
1. PA 01 - Be'e mos		
1.1. Be'e mos WTP and Tank		
• WTP Be'e mos is located midway up a terraced hillside, 300m northeast of the Dili-Aileu National road, on the Eastern bank of the Comoro River. • Fenced and managed by the BTL, receives and treats the bulk of the water from the Be'e mos spring and distributes to the Dili distribution system. Includes an effluent discharge from the filters that drains to Comoro River. • Current Land use around the WTP border is sparse peri-urban housing area to north and west, surrounded by predominant dense natural vegetation (bushes and infrequent trees) i.e. Black Locust (*Robinia pseudoacacia L.*), especially on the hillside on its western side although no sensitive/protected tree or vegetation species were identified in this area. Inside WTP border is predominantly Special use i.e. WTP use only, with common vegetation species (banana, jack fruit, mango and Jerusalem date trees), and some disperse trees i.e. beefwood (*Casuarina cunninghamiana).* • Hillside (estimated incline = 20 to 30%), will be partially excavated (eastwards) for new tank expansion, will require engineered stabilization measures.		

Be'e mos WTP and Tank (panoramic view)

Gate and access to WTP

Tank and Vegetation (Northeast view)

Backwash Effluent drain

Southeast view of hillside

Components	Site Salient Features	Site Photographs

2. PA 02 - Malinamuk

2.1. Malinamuk Tank

- Malinamuk tank is located at the top of a hillside with a dedicated 250m access road that connects it to Aldeia 30 de Agostu.
- Fenced and managed by the BTL, receives the bulk of the water from the BH04 (Comoro E) borehole and distributes to the Dili distribution system.
- Current land use is predominantly Special Use i.e. water distribution Infrastructure. Inside the tank area the local staff have planted common food species (cassava, potato, papaya, pumpkin, etc) for personal consumption, with some specimens of common bushes and trees i.e. Black Locust (*Robinia pseudoacacia L.*).
- Land use is predominantly housing to the Northwest and Southwest of the current tank boundary. The latter includes affected houses currently under review for compensation. This area also includes a telecommunication tower that is in process of relocation due to the project.
- The expansion zone includes an unsealed road that runs south along the current east tank wall and beyond the house to be compensated there is an open area with grassland and common Bellyache bush (*Jatropha gossypiifolia L.*). NW hillside of expansion area will require engineered stabilization measures.

Road access to Malinamuk tank

Entrance to tank area

Tank area inside bounded area.

Vegetation inside tank fenced area. Proposed expansion to South

Access road to expansion area, along existing tank east wall

Expansion area at back of current tank (SE corner to north view)

SE corner of expansion area (south view)

Expansion area at back of current tank (SE corner to NE view)

Components	Site Salient Features	Site Photographs

2.2. New Boreholes NBH-01 and NBH-02

- The new boreholes will be located under the CPLP bridge, where NBH-01 is in Aldeia Fomento I, Suco Comoro and NBH-02 is in Aldeia 20 de Setembro, Suco Bebonuk.
- Current land use is predominantly Special Use i.e. public domain, due to the bridge infrastructure. Land where the new boreholes will be drilled is unused, unoccupied and belongs to the Government of Timor-Leste. There are therefore no resettlement impacts in these two locations.
- There is no significant terrestrial vegetation as the area is within the urban centre of the city therefore only bushes and grasses.

Access area to NBH-01 (urban area, public domain)

Access area to NBH-02 (urban area, public domain)

Location of new boreholes under the CPLP Bridge

Components	Site Salient Features	Site Photographs

2.3. GolgotaTank

- Golgota tank is located at the top of a hillside with a dedicated 200m access road that connects it to Aldeia 4 de Setembro and the ring road around Malinamuk that goes from the Inori Bridge to the boundary with PA08 - Golgota.
- Fenced and managed by the BTL, receives the bulk of the water from the BH01, 02 and 03 (Comoro A, C and D) boreholes and distributes to the Dili distribution system.
- Current Land use is predominantly special use i.e. water distribution infrastructure. Inside the tank area very little vegetation, with one species of beefwood (*Casuarina cunninghamiana)*. Surrounding hillside areas (S, W and N) is filled with specimens of common bushes and trees, with predominance of black locust (*Robinia pseudoacacia L.*).
- Hillside (estimated incline = +45%), will be extensively excavated (westwards) for new tank expansion, will require substantial engineered stabilization measures, spoil management system and EHS measures.

Entrance to Malinamuk tank (NW view)

Vegetation around the tank area (NE corner of current tank wall - SW view). Steep ravine to left of photo (+45% incline)

SE Wall of current tank wall. Includes a local pathway that requires reconstruction for passage.

Proposed expansion to west hillside at back of current tank (S corner to N view)

Components	Site Salient Features	Site Photographs

3. PA 03 - Central

3.1. Central WTP and Reservoir

- Central WTP is located at the top of a hillside with a dedicated access road that connects it to Aldeia Fuslam.
- Fenced and managed by the BTL, receives the bulk of the water from the Be'e mos Intake and five deep wells: boreholes nos. 05, 06, 08, 09 and 10 and distributes to the Dili distribution system.
- Current Land use is predominantly special use i.e. water distribution Infrastructure. Inside the WTP area (Southern Area, to demolish) there are specimens of common bushes and trees i.e. Black Locust (*Robinia pseudoacacia L.*) and Caribbean royal palm (*Roystonea oleracea*).
- Land use is predominantly housing to the west, south and east south WTP boundary. The south expansion area is a relatively flat hilltop that includes affected houses and a telecommunication tower currently under review for compensation and relocation. However, expansion area from current south boundary (to demolish) has steep hillsides (estimated incline = +45%). The expansion area that will be extensively excavated (southwards) will require substantial engineered stabilization measures to west and east and EHS measures to prevent landslide or similar accident prevention to house downstream, as well as spoil management system.
- Resettlement area for housing (option) is earmarked for area 200m south uphill, in a hilltop area with difficult access and with mostly white eucalyptus trees (*Eucalyptus alba*) as existing vegetation.

Central WTP (North View)

Central current reservoir

Vegetation at back of WTP (planned expansion southwards)

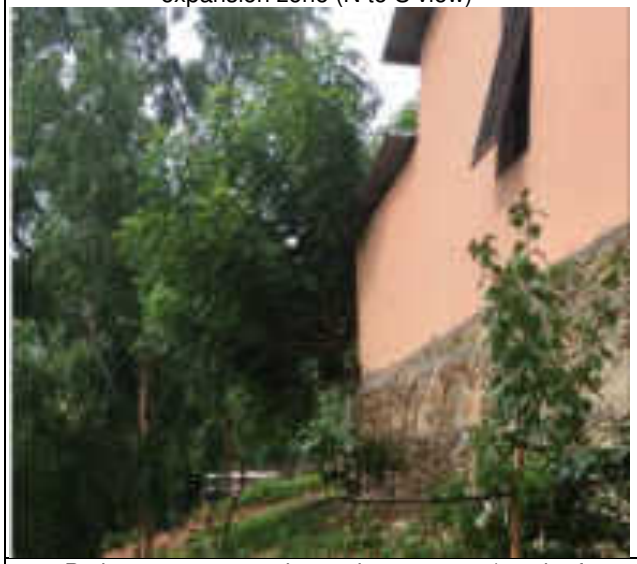
Transmission lines leaving Central WTP (NE view)

Illegal connections at entrance, into the WTP installations (recently cut-off by BTL)

Components	Site Salient Features	Site Photographs
East WTP border, parallel to south expansion area with non-affected households, with downhill EHS risks (W to E view) 	West WTP border and start of south expansion area with affected households (N to S view) 	South expansion with open area (west to east view) 
South expansion with open area (east to west view) 	South expansion with affected households in central area (east to west view) 	

Components	Site Salient Features	Site Photographs

Affected household (example) along East border of expansion zone (N to S view)



Affected household (example) at south border of expansion zone (n to s view)

Upper pathway to proposed resettlement area (south of expansion area) (N to S view)

Pathway to proposed resettlement area (south of expansion area) (S to N view)

View of proposed resettlement area -top of hill (250m south of expansion area) (S to N view)

Components	Site Salient Features	Site Photographs
4. PA 05 - Maloa		
4.1. Maloa WTP and Reservoir		

- The initial access road is currently along the maloa riverbed during 1.0 Km, from Aldeia Timor Cmanec to the border with Aldeia Lemorana. The road is still broken for another 150m, overtopped by the river bank degradation. At this point the transmission line that runs downstream traverses the river aboveground, on the riverbed, at risk from extreme flood events. The road then inflects right upstream, parallel to the river, up to the top of the hillside at the end of a dedicated access road in Aldeia Lemorana, where Maloa Reservoir is located. This access road has various points of erosion occurrences and road damage which impacts on the transmission line that follows it.
- Fenced and managed by the BTL, together with the adjacent community, it receives the bulk of the water from the Maloa intake and distributes to the downstream Dili system.
- Current land use is predominantly special use i.e. water distribution infrastructure. Inside the untreated and maintained reservoir area there are common ground and bush species, with the appearance of invasive Siam Weed (*Cromolaena Odorata*).
- Land use surrounding the reservoir is predominantly residential to west, north and east, with small parched agriculture and fruit trees such as cassava, banana, papaya, breadfruit and others. The SE hillside (area for expansion of new tank and WTP) is a green space, with some houses further to the SE and NE.
- The NE expansion includes one affected house, under review for compensation and relocation, while the Southeast Expansion area is towards the SE hillside with approx. 45% inclination, which levels at the top and has an affected house, currently also under review for compensation and relocation. However, the SE expansion area into the hillside be extensively excavated and will require substantial engineered stabilization measures to prevent landslide or similar accident prevention, as well as spoil management system to avoid excessive sedimentation or amenity disruption in the area.

Current access to Maloa WTP (down to upstream Maloa River access, broken road) - N to S view

Existing secondary pipe (east riverbank) - W to E view

Transmission main traversing Maloa river (East to West Bank) - S to N view

Components	Site Salient Features	Site Photographs

Access road to WTP area - condition of road - N to S view

Transmission pipe under access road to WTP and tank - N to S view

Access road to WTP and tank - N to S view

Illegal connections at transmission pipe

Entrance to existing reservoir N to S view

Maloa reservoir (current) W to E view

Components	Site Salient Features	Site Photographs
Maloa reservoir component (S to N view) 	Maloa reservoir view of top cover (N to S view) 	Maloa reservoir northwest wall and affected house (N to S view) 
Existing effluent discharge (sedimentation, etc) directly to maloa river (N to S view) 		

Components	Site Salient Features	Site Photographs
5. PA 08 - Golgota		
3.1. Distribution System in Tasitolu		

- PA Golgota or Tasitolu does not have water sources within its boundaries, it is only supplied by wells that pump the water into Golgota Tank from PA02 Malinamuk., which then supply the distribution network. Thus, PA08 Golgota will only have water distribution within its boundaries, under existing road alignment. No resettlement is expected.
- PA 08 Golgota has a proposed area of 344 Ha, but 75% of it is part of the Tasitolu Protected Area, a wetland system composed of 3 saline lakes (that interact hydrologically with the coastal area), and the adjacent hillsides. It is also part of the Tasitolu Important Bird Area (IBA), which extends 6Km from the coast inland to the Comoro river.
- While this has been extensively discussed in Chapter 5.2, a few note worthy notes on fauna and flora for this area: Lakes with minor patches of Protected Mangroves, while hillsides with Secondary re-growth forest species (*Uvaria rufa, Zizyphus mauritania, Calotropis gigantean, Acacia leucophloea, Peltophorum pterocarpum, Maranthes corymbose, Corypha utan*, etc), and some eucalyptus savannah (*Eucalyptus al*ba) although at a very low presence. Regarding fauna, besides several common fish species inhabiting the lake, annual migrating avifauna is the primary ecological amenity, due to the lakes' characteristics (White-breasted Woodswallow (*Artamus leucorynchus*), the Pallid Cuckoo (*Cacomantis pallidus*), the zebra finch (*Taeniopygia guttata*), pied bush chat (*Saxicola caprata*), the far eastern curlew and the Timor sparrow (*Lonchura fuscata*), the latter an endangered and protected species.
- The remaining 25% of land utilization represents a strip of urban land utilization from the north to the south end of the Tasitolu watershed, from established formal neighborhoods in the Northeast zone of the PA to informal settlements and housing between the protected area east boundary (shoreline) and the hillside, and an agricultural area at the Southern most area of the PA.
- Although a protected area (for ecological and cultural issues), the past 18 years have seen a constant ecological degradation of Tasitolu protected area due to it being in the path of the west urban expansion corridor of the city and also because of lack of legal enforcement from the government, regarding informal settlements in its available land areas. This has been extensively discussed in Chapter 5.2. Given these pressures, with the population under the Census 2015, in the area, at an already estimated 14,000, with 2,300 households spread throughout the protected area, expansion in the past 7 years has shifter estimated land utilization percentages of use to the following:
  - 20% - green spaces - lakes surface and small low density trees and vegetation.
  - 2% mixed use areas - services, business and commerce building, in the northeast zone and along the main east to west national road.
  - 10% urban requalification - mostly agriculture and undifferentiated spaces in the upper watershed.
  - 50% urban residential - dwelling areas along secondary roads around the lake and expanding to hillsides and upper watershed.
  - 3% special use spaces - includes schools, government buildings, etc.
  - 2% culture/heritage - includes sacred houses (adat), religious infrastructure, cemeteries and others.
- The lake areas include ring road around the shoreline of the 3 lakes, with housing areas within the lakes maximum floodplain level, which has pushed residents to construct houses in the hillsides, with deforestation and high sedimentation impacting on the lakes increasing siltation level.
- Poor sanitation is paramount around the lakes, with bathroom and other wastewater being discharged directly to the lake or through permeable septic tanks, while solid waste is collected in cement boxes close to or at the lake shoreline, that overflow due to limited capacity. Both contaminate the lake directly.
- The area has been recently serviced with electricity, roads and water tanks due to the floods in 2021, which have established the people in the area instead of relocating elsewhere.
- There are 9 Sacred and/or religious sites within the PA08 area.

Components	Site Salient Features	Site Photographs

General view of Tasitolu lakes. Lake 1 in front (W to E view)

View of Tasitolu lakes 2 and 3 (W to E view)

View of Tasitolu lake 2 - urban pressure and construction in hillsides (N to S view)

Components	Site Salient Features	Site Photographs

CURRENT LAND UTILISATION

Special use area: school EBF 12 de Outubro - central north area (N to S View)

Special use area: FFDTL Military Compound - NE formal area (N to S view)

Main roadside market - NE mixed use area (W to E view)

NE mixed use - commercial area (W to E view)

Formal housing area (Aldeia Terra Santa - NE) north of main road (S to N view)

Formal housing area south of main road (Aldeia 12 de Outubro) (S to N view)

Components	Site Salient Features	Site Photographs
Protected area informal housing area east of Lake 1 (S to N view) 	Protected area informal housing area south east of lake 1 (SW to NE view) 	Road disposition in the protected area informal housing area downstream entrance to SE watershed (S to N view) 
Road disposition in the protected area informal housing area downstream entrance to SE watershed (W to E view) 	Drainage channel (1 of 3) conditions in SE watershed housing area (S to N view) 	Drainage channel (1 of 3) conditions in SE watershed housing area (N to S view) 

Components	Site Salient Features	Site Photographs
Local extractive activities in upstream hillside areas (SE) (N to S view) 	Agricultural activity in SE upper watershed area (N to S view) 	Road and dwelling disposition in the protected area informal Housing along south Lake shoreline (W to E view) 
Dwelling disposition in the Protected area informal housing along south lake shoreline (N to S view) Lake to North 	Road and dwelling disposition in the protected area informal housing along south lake 2 shoreline (W to E view) 	Road and dwelling disposition in the protected area informal housing along south lake 2 shoreline (W to E view). Maximum flood line at foothill 

Components	Site Salient Features	Site Photographs
Dwelling expansion to hillsides in the protected area informal housing along south Lake 2 shoreline (E to W view) 	Road and dwelling disposition in the protected area informal housing along SW Lake 2 shoreline (W to E view). Road within floodplain level 	Dwelling disposition in the protected area informal housing along SW Lake 2 shoreline (W to E view) 
Dwelling disposition in the protected area informal Housing along SW Lake 2 shoreline (NW to SE view) 	Dwelling disposition in the protected area informal housing along W Lake 3 shoreline (W to E view). Flood line at motorcycle location 	Dwelling disposition in the protected area informal housing along W Lake 3 shoreline (NW to SE view) 

Components	Site Salient Features	Site Photographs

SANITATION CONDITIONS

Water collected daily from other PAs and transported to PA 08 (Formal Housing Areas)

Wastewater directly into ground and/or porous septic tanks

Dwellings with direct sanitation pipes to the lake (Lake 1, W to E view)

Septic tanks (permeable and impermeable) draining to groundwater and lake system

Solid waste recipients on lake shoreline (1)

Solid waste recipients on lake shoreline (2)

Components	Site Salient Features	Site Photographs

Selected Culture and Heritage Sites in PA08

Uma Adat Malalu Builalu (sacred house)

Fatin Lulik João Paulo II (location of human remains)

Lulik Hill (Foho Kabuar)
Centre of the Lakes

Uma Adat Bo'ot (sacred house)

Local cemetery
(next to Malalu Builalu)

Igreja N.Senhora das Graças

Components	Site Salient Features	Site Photographs
Capela Maria Auxiliadora (SE Watershed Area) 	Cemetery on hill (Suco Madohi, Aldeia Terra Santa) 	Ai-Hali (Ficus Sp. Indian Banyan or "Fig-tree") sacred and protected species (example in formal housing area) 

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6 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 Overview of Impacts

285. The Water Supply and Sanitation Investment Project is expected to produce numerous beneficial and negative impacts towards the environmental and social aspects due to various project activities.

286. A characterization study of existing components and sensitive areas was conducted during the site visit to PAs 01, 02, 03 and 05 (27 February 2022) and to PA08 (9 March 2022) 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.

287. The potential impacts and mitigation measures assessment were assessed within the project IEE, based on each of the project components (where relevant),: 1) water sourcing; 2) treatment and storage; and 3) distribution network; 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 Rapid Environmental Assessment checklist (see Appendix 1).

288. 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.

289. An environmental management plan (EMP) has been developed (see Chapter 9) to provide mitigation measures to help control and/or reduce all negative impacts to acceptable levels, presented in the form of an EMP matrix, to be used by BTL (for monitoring purposes) and the Contractor (for management) prior, during and post-construction activities. The five EMPs for this project are provided as separate documents, one for each procurement package.

6.2 Impact Analysis

290. An Impact evaluation was carried out for all project components and activities by applying an evaluation matrix (see example in

291. Table 19) 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.

292. “S(+/-)” denotes a positive/negative significant impact whereas “MS(+/-)” represents moderate significance and “IS(+/-)” is insignificant. Priority is given to significant negative impacts, as emphasized in the EMPs.

293. These classifications are the result of the product between “Scale of Present Condition” and “Scale of Impact”, based on the criteria in Table 18, 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 18 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

294. 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).

295. Table 19 presents the matrix for the assessment of impacts based on the values for the scale of importance and the scale of impact.

Table 19 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

6.2.1 OVERALL BENEFICIAL (POSITIVE) IMPACTS

296. 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.

297. **C3.2.1. Local Employment Generation**. This project will directly generate employment opportunities to 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.

298. **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.

299. **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. Regular maintenance of the project’s components will provide continuous benefits to the local people (S+ = Positive Significant).

300. **O3.1.2. Women’s Empowerment.** Women play an important role in the family: they manage the household, bear children and expect to live a healthy menstrual cycle and contribute to the household income through paid employment or business ownership.

Having good access to improved water and sanitation will result in a significant health improvement, reduce mortality and will lead to a more advanced economical condition in the household daily life (S+ = Positive Significant).

6.2.2 IMPACTS IN DESIGN/PRE-CONSTRUCTION PHASE

301. 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 project components and receptors was conducted during site visits (27 February 2022 and 9 March 2022) for the preliminary design, aiming to identify specific protected biodiversity, sacred sites, water usage, land status, and competing activities downstream and upstream.

6.2.2.1 PC1. Water Sources

PC1.1. Location and Sensitive/Protected Areas and/or Species

1.1.1. Nuisance to the biodiversity (flora, fauna, water ecosystem)

302. The PA08 - Golgota (Tasitolu) is the only PA that includes or is close to a protected area.

303. The environmental assessment of the trenching and piping components, without taking into account locational factors, shows that it is not likely they 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 (S- = Negative Significant).

304. As stated in Chapter 5.2.1.1, the Department of Protected Areas (DAP) has clarified that, essentially the protected area has unofficially become “Zone of Use” area as defined in Decree-Law no. 05/2016 – National Protected Areas System (which allows infrastructure construction for installation of services for human use and the use of natural resources i.e. springs, pipes and small scale-water distribution infrastructure within the protected area).

305. It is important to apply more stringent forms of implementing the mitigation measures identified that may prevent and manage the activities of the project when working in the ROW for the construction of the pipe infrastructure.

1.1.1.1. Contractor Improved Awareness with Sensitive and/or Protected Areas or Species

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

a) 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;

b) 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 bet 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 DAP.

c) A detailed layout of vegetation clearing will be presented by the contractor before it is carried out. 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.

1.1.1.2. Tree protection and/or felling procedures

307. The contractor to carry out pre-construction visits to ROW alignments for identification, counting and approval of all common species trees proposed for felling.

308. Contractor to review as follows:

a) *Common Trees*

- 1) Check if Tree requires felling.
- 2) If not, protect during construction.
- 3) If felling is required, seek approvals from General Directorate for Forestry (Department of Protected Areas) and define compensation measures, such as Replanting "1-for-1 to 10" (each common species tree felled) in areas requiring reforestation.
- These substitution compensation tree numbers will be coordinated between BTL and DAP and replanting numbers to be included in Hillsides in Tasitolu Reforestation, watersheds or soil conservation and management programs, focused primarily in priority protection areas.
- If a protected/endangered tree is identified and requires felling, if under special circumstances and technically justified, DAP must approve the felling and guarantee that the planting of the same tree species (at a quantity to be determined) will be conducted at a pre-defined and approved site.
- For protected species such as i.e. "Ai-Hali", contractor must secure required approvals and/or agreements from the cultural leader or Lia-nain, SEAC, DAP regarding approval for felling.
- Compensation measures for these species will vary, but, as per National Directorate for Biodiversity guidance, replanting will require more effort from proponent, at a scale between 20 and 100 "-for-1" (each protected species tree felled), to be replanted in the above-mentioned priority areas.

PC1.2. Use of Water Sources (boreholes)

1.2.1. Available Water for all users

309. Consumers in Dili 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 Dili consumer (S- = Negative Significant).

310. Production yield of the sources (Be'e mos and Maloa Intakes and proposed boreholes) has and is still being assessed. However, the TA Groundwater modeling (Mott Macdonald, 2022) preliminary results conclude that in the operational phase, there may be some impact on groundwater levels if there is uncontrolled increased pumping, either from existing wells or with increased number of wells. Therefore, aquifer sustainability seems

manageable if the future water supply to Dili considers conjunctive use of surface water and groundwater is constrained to about 54,904 m^3/d around 2030, for the whole city. The water demands versus water flow investigation results, suggest that, under these numbers, and pending a long term monitoring program, the current proposed sources may produce enough flow for the requirements of the distribution system for the bigger part of the dry season while still maintaining a social and environmental use.

311. Therefore, the increase in supply will be obtained from the refurbishment of the distribution network (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.

312. However, if the dry season river flow depletes naturally, to guarantee the distribution system maintains service to Dili-West consumers throughout its lifetime, it is necessary that a Monitoring system is put in place to monitor daily flow in all operational spring sources and help estimate water production variability and decreases that may require other sources i.e. boreholes to come online to support the water distribution, especially in the dry season. These borehole systems must also be limited to a defined number of hours i.e. 18 hours and have a well monitoring program to be able to allow the aquifer to recharge and track aquifer performance.

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

313. The issue of water sharing with source area communities, has been raised by local authorities during the public consultation i.e. PC05 - Maloa. This, together with a mixed urban/rural setting that has several different water consumptions beyond human consumption alone, 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).

314. As seen in 1.2.1. preliminary numbers identify that the Be'e mos and Maloa Rivers are currently productive, being able to support the current water demand and the 2040 horizon year demand numbers.

315. Nevertheless, water resource is one of the major public assets, which is a vital need for human wellbeing, animals, plants, environment and ecosystems and can be the difference between life and death, and between bounty and poverty. Therefore, proper planning and management of water is crucial.

316. For Dili, mitigation measures must be: a) the definition of a sustainable water balance and feasible/fair environmental a flow for shared sources that 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

317. Several national laws such as the Cultural Framework and Base Law for Environment, , as well as the requirements of the ADB's SPS 2009 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 localized cultural customs applied by the

community, aiming at the natural preservation, sustainability of the natural elements and social balance.

318. It is important to understand that almost all springs and river intakes, new and currently in use i.e. Be'e mos and Maloa are and have always been involved in and have a spiritual importance to the community, under cultural/animistic protection (MS- = Negative Moderately Significant).

319. 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. conduct 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.

320. Project activities during the construction phase will be monitored by assigned personnel from the Culture Department. If required, the river intakes will be demarcated with tapes to limit construction works outside the area and restrict access to the sources unless authorized by relevant authority.

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

PC 1.3. Protection of the water source for distribution purposes

1.3.1. BTL borehole over extraction

322. There may be the risk of the BTL boreholes and adjacent private wells drying up due to over extraction for the purpose of the distribution network boreholes.

1.3.1.1. BTL Protection Area

323. In areas where the project has been successful in testing and sourcing water for the system i.e. borehole areas, dwellers in the immediate area may now be prepared to drill private boreholes in their land now that they know there is available water where before there was none, which may diminish the available water yield for distribution and hinder the Government's investment and considerable budget for the project's water sourcing, treatment and distribution (S- = Negative Significant).

324. It is important that MPW and BTL initiate land use planning reclassification of the area around and upstream of the boreholes as "no abstraction" zones and implement water resource management regulations to manage these areas and guarantee the present investment.

6.2.2.2 PC2. Water Treatment and Storage

PC 2.1. New Disinfectant and Storage Systems

325. The storage and treatment of the water predicted activities encompasses generalized impacts, especially those related to the water distribution network i.e. minor civil construction works of water reservoirs. However, there are a few design phase impacts and mitigation measures worth noting for this project component.

326. 2.1.1. Insufficient treated water due to poor infrastructure and lesser capacity of the water tanks.

327. In general, the upgrade of the design of new treatment plants and storage facilities that apply a disinfection or chlorination or calgon 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).

6.2.2.3 PC3. Water Distribution Network

PC 3.1. Identification of Cultural Heritage and Biodiversity Areas

3.1.1. Impairment of Cultural heritage properties

328. Cultural heritage refers to sites, structures and remains of archaeological, historical, religious, cultural and aesthetic value. Its identification and examination is 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 during the field visits in the detailed design phase, which are within <20m from and may be impacted by the construction activities, if precautions are not taken (S- = Negative Significant)

329. 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 license /authorization for intervention in the area. In case a new cultural/historical heritage site is identified during the construction, the contractor will notify BTL and follow the same procedure regarding these sites.

PC 3.2. Project Preparation for Health & Safety

3.2.1. Risk to Health and Safety of Workers – General

3.2.1.1. Health & Safety Plan

330. 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.

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

332. 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. A suitably qualified EHS staff member must be engaged by the contractor.

333. 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 including toolbox talks on equipment operation and task safety;

b. Provide PPE and ensure its 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 response plan (procedures for responding to emergencies including accident, fire in worker camps, chemical or fuel spillages and other emergencies the contractor envisages) and collection of all contacts in Dili related to accident response;
g. Ensure safe working conditions e.g. install cautionary signage and safety instructions throughout construction site, ensure moving equipment is outfitted with audible backup alarms;
h. Construction site free of drugs and alcohol;
i. COVID-19 prevention and response (as per C3.3.7 and Appendix 11);
j. Ensure Material Safety Data Sheets for all chemicals are retained on site and the advice on environmental and personal health protection measures on the sheets followed. Good practice guidance from international sources on chemicals handling and management include: UK Health and Safety Executive; Control of Substances Hazardous to Health guidance: https://www.hse.gov.uk/coshh/ and a simple information on chemicals handling is available: https://www.hse.gov.uk/pubns/chemicals-poster.htm

334. 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. EHS Manuals and documentation in Tetum

335. 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.

336. 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).

337. 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

338. While the volume of vehicles that will be operated from the simultaneous construction sites at project component sites may not be very large, the condition and characteristics of the roads in Dili 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 may also be subject to risk from excavations and/or trenches required for project construction, particularly

in crowded urban areas. Communities are also a potential actor in the spreading of communicable diseases (S- = Negative Significant).

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

340. 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 high visibility barriers to restrict access to the active construction areas 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 the EMP).

6.2.2.4 PC4. Sanitation General

PC 4.1. Improvement of Water Distribution

4.1.1. Increase of groundwater pollution from poor sanitation in Dili city

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

342. Dili will thus require the expedited implementation of the Millennium Challenge Corporation financed Dili sanitation project to follow up on this issue. 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/implement existing construction standards or construct their new septic tanks in the households according to the standards provided by the BTL/MPW, if/when waiting for connection with the centralized wastewater collection system.

6.2.3 IMPACTS IN THE CONSTRUCTION PHASE

343. Construction activities will likely produce minor 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. Potential negative impacts will include temporary noise and air pollution, construction waste generation, increased traffic disruption, limited soil erosion and occupational and community health and safety risks.

344. These are all general impacts of construction in urban areas, but 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 Dili city, in order to prevent negative impacts, and are all established in the EMP.

345. 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.

6.2.3.1 C1. Water Sources

C1.1. Inadequate protection of bore structures during rehabilitation

1.1.1. Bore overflow to cause erosion

346. The boreholes 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).

347. It is important that the bore well has adequate land for perimeter fencing and connects to a temporary drainage that drains the overflow correctly, thus avoiding any unnecessary erosion or impact to adjacent communities.

1.1.2. Socio-Cultural Impact

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

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

6.2.3.2 C2. Water Treatment and Storage

C2.1. Upgrading activities to Water Treatment and Storage

2.1.1. Worker exposure to disinfection chemicals during installation

350. 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).

351. 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 authorized persons.

6.2.3.3 C3. Water Distribution

C3.1. Induction of Contractor

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

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

353. Therefore, after selection of the Contractor, BTL and the PMU will meet the Contractor's EHS responsible staff prior to contract commencement and on-site to explain and confirm understanding of the EMP conditions including the required plans and mitigation measures e.g. COVID-19 prevention, health and safety, emergency response. 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 and the contractor’s site specific construction EMP (CEMP).

C3.2. Construction Activities – Macro Benefits

354. See 5.2.1. Overall Beneficial Benefits

C3.3. Construction Campsite

3.3.1. Campsite Location, Community and Landslide Risk

355. 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).

356. A base camp and work site camps sites are proposed to be established in central locations, 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. Preferably in Government land will be used, or if private land is used, it should have relevant permissions. 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.

357. 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

358. 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).

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

360. Use of portable toilets is preferable. If latrines are used, 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 and construction may compete with Community Sources

361. While some water distribution exists currently in Dili, the campsite may require to be established in an area where the distribution system is very poor or does not exist yet. The community, under these conditions, may experience shortages in drinking water supply during the dry season and thus sourcing water for the campsite locally from BTL distribution systems may create conflict with the adjacent community. Construction works may also require a water supply. (MS- = Moderate Negative Significant).

362. The campsite should establish a water tank large enough to provide for the campsite requirements, to be filled with water purchased from BTL or from authorized water sources. Also, purchasing sufficient potable water supply in the form of water liter 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. Water for construction should be obtained from authorized sources following approval from BTL or other relevant authorities.

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

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

364. 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. Good International Practice guidance on handling hazardous materials can be sourced from: IFC EHS Guidelines Hazardous Materials Management available:
https://www.ifc.org/wps/wcm/connect/90231ba8-5bb3-40f4-9255-eaf723d89c32/1-5%2BHazardous%2BMaterials%2BManagement.pdf?MOD=AJPERES&CVID=nPtgwml

365. 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.

366. Asbestos Register: Before physical works starts on any existing structures (such as WTP, reservoirs, any visible pipe network), the Contractor, in conjunction with BTL will visually survey the structures for asbestos containing materials (ACM). Any potential sites containing ACM will be recorded in an Asbestos Register, to be held by BTL. The Asbestos Register will contain the following information:

- Date asbestos was identified
- Specific location (within the structure surveyed)
- Detailed description of material (including surface treatment, color, purpose e.g. flooring)
- Bonded or Unbonded?
- Condition of material (friable, good condition, loose pieces)
- Likelihood of disturbing the material? (e.g. during maintenance or using the building)

367. An example of an asbestos register is provided in Appendix 12.

368. **Asbestos Management**: When identified in the Asbestos Register if ACM cannot be avoided or if ACM is discovered during construction the following measures will be implemented.

369. ACMs 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. The contractor must coordinate with the National Directorate for Pollution Control on solution for deposition of these materials. The CEMP must include ACM mitigation measures as described below as a minimum, to detail how to identify, remove, and safely dispose of ACMs. When ACMs are identified:

1) First confirm ACM status. Send a carefully extracted and properly wrapped sample to an approved laboratory for testing. If a laboratory is not available, the assumption must be that the material is ACM.
2) Cordon off the area, control access, and provide clear signage of the ACM risk.
3) Provide all staff with correct PPE:
   - Clothing - personal protective clothing to prevent skin contact and cover hair/ long sleeve + disposable.
   - Respirator - minimum P3 respirator, or N95 Dust mask.
   - Goggles, gloves and safety boots.
4) Identify, mark, delineate the ACM that will be removed and do-not mix ACM with non ACMs.
5) Avoid cutting or breaking ACMs if possible. If cutting is required use duct tape and wet the material with a water spray to reduce the risk of dust generation.
6) Make sure all asbestos material has been removed. Ensure the site is free of dust and debris which may contain asbestos e.g. wash with wet cloths and dispose of the cloths as ACM.
7) Removed asbestos must be contained, double wrapped and sealed, and placed into removal bags or bins and labeled. Use only durable container: double bag polythene, drum or bin.
8) Asbestos waste should not be disposed of with other wastes. In countries where asbestos use is regulated, there will be special or hazardous waste disposal facilities. If special facilities are unavailable, asbestos waste should be sealed in double lined bags and disposed of at a secured waste site and kept separate from other types of waste. Work with the local government to identify a suitable and safe site and ensure that a record is kept of the location. If Asbestos is properly contained, buried, and remains undisturbed it will remain safe and pose no further environmental or health risk.
9) Update the Asbestos Register to show the ACM has been removed.
10) Decontaminate equipment after use. A dedicated decontamination area is required close to the work area, separating the contaminated and clean materials and equipment. The contaminated area should have provision of storage of contaminated clothing and footwear in a labeled container. A shower or washing facilities are required for all personnel involved in ACM removal.

370. As there are no direct guidelines under Timor laws and regulations on ACMs refer to international standards and guidelines:

- US Environmental Protection Agency, Asbestos page: http://www.epa.gov/asbestos
- WHO Occupational health publications, asbestos: http://www.who.int/occupational_health/publications/asbestosrelateddiseases.pdf
- ADB's Good practice guidance for the management and control of asbestos: https://www.adb.org/publications/good-practice-management-control-asbestos

- East Timor Transition Administration, in cooperation with AusAid "Guidelines on Maintenance, Handling and Disposal of Asbestos Materials and Asbestos Waste" September 2000.

371. 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 when hauling loose materials e.g. aggregates and sand.

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

372. 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. Good waste management will also prevent issues arising such as blocked drains or water/soil pollution from improper disposal or indiscriminate dumping (MS- = Moderate Negative Significant).

373. For domestic type non-hazardous waste, minimization 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.

374. Proper disposal of solid waste to authorized dump sites/landfills, referred and identified by the BTL or National Directorate for Pollution Control will ensure that waste is not disposed in random areas of the city where it may have implications to local communities.

375. For construction and demolition type inert waste, the contractor will apply the waste hierarchy with a preference for reusing waste where possible, then recycling and finally disposal as a last resort. The Contractor will also set out how demolition waste will be managed as part of a spoil and demolition waste management plan in the CEMP.

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

376. 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).

377. 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 (see Appendix 2 for more details) 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 Health and Safety 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 washbasins 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.
- Regularly 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

378. 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).

379. The Contractor will source all materials from licensed companies/suppliers under the National Authority for Petroleum and Minerals Authority (ANPM), under MPW supervision. The MPW weekly supervision will allow regulating the source of the materials and the identification of the quarries and/or or rivers (sand extraction) and allow authorities to monitor and ensure the source, quality and good condition of the extraction sites, while ensuring that extraction activities will not have social or ecological disturbances, and the quantities of extracted sand and stone conform to the project specifications, which will also reduce the generation of spoils in the construction site.

380. In such instance where additional sand and stone will be required, it should be based on technical reasoning, intended solely for the development of the project components.

C3.5. Construction Work: all Infrastructure (Boreholes / Tank / WTP / Water pipes)

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

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

382. Defined rules regarding ensuring that all equipment and vehicles are in good condition prior to operation minimizes the likelihood of leaks and accidental spills. Prohibiting equipment and vehicle use with leaks and causing spills prevents the accumulation of toxic

contaminants, and minimizes the probability of fires, thereby maintaining a safe environment for wildlife, workers and local communities.

383. Maintenance and repair of vehicles such as washing, repairing leaks, changing parts etc. should be done in the central base campsite, confined within a designated area. This area should have a concrete surface or lined with an impermeable surface (ex. plastic) with closed drainage preventing contaminated wastewater escape. Any contaminated wastewater will be treated and hydrocarbons removed prior to discharge.

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

384. Construction sites, especially those with trenching or in high incline areas, have a high risk for high impact accidents for workers and the community (S- = Negative Significant).

385. Providing engineering procedures and equipment to avoid landslides and/or rock-falling in areas where downhill houses and/or persons can be affected or are at risk of being struck by loose materials. This is extremely pertinent in the larger excavations in the WTPs and reservoir extensions.

386. Training sessions and daily construction preparation sessions with the equipment operators regarding construction plan and sensitive areas that require attention and mitigation measures.

387. Identifying, defining and supplying no entry zones with clear and robust deterrent materials to avoid entrance of unauthorized persons into dangerous areas.

388. Vivid and readable Warning signs maintained on sites of construction, and will inform public of danger sites and caution to take precautions. 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 nighttime. 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

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

390. All stockpiles to be situated within the campsite or designated areas on-site, where possible, it should be stored in the campsite, otherwise utilized at once when stored on-site. Identify stockyard areas in consultation with local administration, if not in base camp.

391. 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.

392. 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.

393. The contractor will develop a Spoil and Demolition Waste Management Plan. An example is provided in the EMP for the contractor, and will set out how the contractor will reduce and manage spoil and demolition waste.

394. Contractor should have a list of contacts of ongoing construction projects from Government (BTL or other), managed together with BTL staff, to identify "in loco" possible reutilization of clean spoil and will explore for options of delivery of clean spoil or material or extra materials to existing commercial/companies quarries for re-treatment and reuse as in-filling materials. No communities will be given excavated spoil unless it is tested in a laboratory for contaminants and has regulatory and community approval.

395. Final disposal of all spoil must be done under Government decision and approved sites. However, uncontaminated soils CANNOT be disposed: a) on agriculturally productive land; b) within 50m of a water course, including stream, river or irrigation channel; c) on sloped land; d) within 50 m of cultural heritage sites; and e) within 100 m of any other culturally or ecologically sensitive feature.

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

396. 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).

397. 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.

398. Excavations, cuttings and fillings will be carried out in a manner to reduce soil erosion and avoid material falling (see also 3.5.2.).

399. 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.

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

400. 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).

401. 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

402. No major air quality concerns are projected to occur during the project implementation during distribution network trenching as the planned works require small scale and not much equipment. While confined excavation is not planned to be undertaken, larger scale construction i.e. hillside expansion and excavations may result in a significant increase in particulates matter in the area, which can affect the respiratory and eye systems (S- = Negative Significant).

403. The contractor must apply air quality and dust management 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 Grievance Redress Mechanism (GRM) complaint require immediate dust suppression), especially required frequently during dry season or near residential and built-up areas. Covering stockpiles will protect them from wind and will contain light particulates to the surface. Minimizing 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

404. 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. However, the project has the PA08 - Golgota Distribution Pipeline trenching activities within the Tasitolu Protected Area (see PC1.1.1. and PC 3.1.1.), as well as the PA 05 - Maloa access River traversing and access, and should other areas be encountered during the construction activities, the contractors must establish a Sensitive Areas Management Plan to make sure no impacts occur in this regard (S- = Negative Significant), vegetation and trees removal are avoided and no fauna is destroyed.

405. However, if some of the construction works must forcefully remove roadside trees under the supervision of the Department for Protected Areas (DAP) 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 camp site 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

406. 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.

407. 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 methods which require small-scale excavation, conducted in the road ROW, not requiring land from private owners.

408. 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).

409. 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. Regular communication between the project and the affected people is needed, including advance warning and issuing a construction schedule to allow people to plan their activities.

3.5.8.2. Reducing impact on Cultural Sites

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

411. Constructor must follow the precautionary measures and rules in the Construction Protection License (see PC 0.5.2) and his/her own Health and Safety Plan (see PC3.2.1) for each site, and apply measures in PC1.2.3.2 and PC3.1.1.1, in order to avoid any impact and/or degradation of these sites.

C3.6. Construction Work Front: all Infrastructure (Inlet / Tank / WTP / Water pipes / FSTP)

3.6.1. Site clean-up and rehabilitation of locations

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

413. 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. Proper coordination with: 1) other construction projects for reutilization of clean spoils where mass load are needed; or 2) local authorities for definition of appropriate dumping sites. When the deposition site is identified the result must be an evenly spread spoil mass in natural looking manner and left in a stable state.

414. 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.

6.2.3.4 C4. Sanitation

All construction activities for this component are reflected in 6.2.3.3. C3. water distribution.

6.2.4 IMPACTS IN THE OPERATION AND MAINTENANCE PHASE

415. 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.

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

6.2.4.1 O1. Water Sources

O1.1. Protection of the Water Source Quality

417. The existing condition in most of the water sources in Dili, is that they are not well protected from human activities i.e. improper sanitary infrastructure, as previously cited in Chapter 3.2.3. and other pollutant sources.

418. 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 BTL to be duly consistent on implementing programs as mentioned below as part of mitigating such impacts.

1.1.1. Declining Water Source Quality

419. As the population number ascends, there will be more houses built adjacent to where the water sources are located (upstream of boreholes, intakes or aquifer systems) 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

420. 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

421. Community in the Municipality either in the urban, semi-urban, or rural areas, particularly the low-income families, 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.

422. Improving the existing and future private sanitary facility is part of the Dili Sanitation Upgrading Project (by Millennium Challenge Corporation and BTL), while Watershed and/or aquifer protection program aiming to conserve the underground water volume and its quality, should be done together with ANAS.

423. The program that can be offered and applied for this, serves to promote the BTL septic tank design template with the community in a comprehensive way, while waiting for the implementation of the centralized sanitation system, but also to mainly focus on the community surrounding the water source and other upstream watershed areas.

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

424. 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.

6.2.4.2 O2. Water Treatment and Proposed Storage

O2.1 Mishandling of Chlorine

425. Water quality tests on Dili water sources have shown that some intakes and boreholes 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, the whole system will be designed and constructed with treatment facility i.e. disinfection type in WTP Be'e mos and Maloa.

426. 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

427. When it comes to mishandling of hazardous substances, the impact will directly on the workers. Chlorine, hypochlorous acid and hypochlorite ion exposures can result in irritation of the esophagus, a burning sensation in the mouth and throat, and spontaneous vomiting. A significant loss of containment could also affect nearby members of the public.

2.1.1.1. Ensure Proper Storage and Handling Practices for Chemicals

428. Chemicals should be stored in a temperature controlled building, avoiding sun exposure, in order to maintain the chemical composition in its original state, and reducing fire and explosion risk. Obtain and hold a copy of the Material Safety Data Sheet for all chemicals used, following their advice on storage, handling and disposal.

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

429. 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

430. Workers or operators are obligated to use PPE as part of EHS procedures during working hours. Facemasks, safety boots & jackets, gloves and goggles are examples of equipment that workers must wear to protect themselves from any undesirable accidents.
431. 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.

O2.2. Backwash Effluent from WTP/Tank installations

432. Wastewater generated from sedimentation basin and back washing from sand filtration basin from existing water treatment plants i.e. Central WTP and Be'e mos WTP, is discharged directly outside of plant without treatment.

2.2.1 Effluent discharge Directly into Environment

433. MPW and BTL are currently working together with the Millennium Challenge Corporation in carrying out the feasibility study to implement a sanitation (wastewater) centralized collection and treatment system that covers a substantial part of the Dili-West Water Supply Project Area, which is planned to be delivered and start commission in 2027.
434. However, given there is no current centralized wastewater collection system in the Dili area, the discharge of this untreated water is and will be done into the existing drainage lines (natural or constructed) until the future collection system comes online, which can prompt erosion and higher sedimentation occurrences and impact downstream communities or the environment (S- = Negative Significant).

2.2.1.1. Ensure Minimal effluent quality and discharge rate into natural recipient or drainage

435. Generated wastewater from WTPs must be collected and treated to reduce discharge outside of plant and return the supernatant water to gauging well for treatment as a recovery, reducing the volume of effluent to the environment considerably. While this is technically feasible for Central and Be'e mos WTP, the future Maloa WTP is not planned to have sludge treatment, thus will discharge untreated effluent to the final environmental recipient.

436. Therefore, the WTP operators must not apply batch discharges (discharge the effluent all at once) but slowly discharge residuals to allow for dilution into the receiving receptor and minimize the impacts of the pollutant discharge. The receptor must be established natural or constructed and well maintained drainage channels.

437. Nevertheless, all treated effluent must be tested regularly to demonstrate the WTP complies with national water quality standards at all times, especially before planned increases in discharge volume.

2.2.2 Backwash Treated Sludge will use up valuable landfill void space

438. Tibar landfill life expectancy is estimated at 10 years for urban waste, from 2025. This remaining capacity would preferably be used by non-recyclable wastes therefore using valuable and limited void space as a last resort. The landfilling of WTP sludge will thus put pressure and impact on the infrastructure availability in the long-term (S- = Negative Significant)

2.2.2.1. Apply Sludge to other Uses (recycling, etc)

439. International best practice for sludge from WTPs strives to diminish the impacts from these actions and reuse/recycling to these materials, when they are not contaminated (chemically or microbiologically).
440. Options such as composting or land reclamation (if composition is inert) should be considered so that the pressure on the environment and Tibar landfill void space can be reduced. As a note, Tibar landfill will have a composting plant for organic waste in the future.

441. BTL should endeavor to look for alternatives for the backwash sludge from the WTPs, after analyzing its composition of sludge and determining that it is safe for reuse. During the finalization of sludge management options, BTL will consider the potential handling and transport risks associated with sludge and will ensure correct measures are

taken to protect the environment and human health, including the use of personal protective equipment and appropriate vehicles to fully contain the sludge and avoid leakage during transport.

2.2.2.2. Treated Sludge is deposited in approved location i.e. Tibar Landfill, as last resort

442. As Tibar landfill is planned to receive urban equivalent solid waste only, BTL must ensure that WTP sludge conforms to this classification. Therefore, BTL must confirm with Municipality of Dili that their sludge can be deposited in the landfill. After authorization, BTL will be required to pay a landfilling fee per ton of sludge to be landfilled. BTL to transport sludge to landfill and receive proof of deposition.

6.2.4.3 O3. Proposed Distribution Network

O3.1. Sound Operation of Clean Water Distribution System

3.1.1. Improved Health and Hygiene

443. 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

444. 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.

O3.2. Drinking Water Supply System

445. 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-incompliance of O&M manual.

446. Nevertheless, this phase will not anticipate any illegal connections in the sources and other locations because mitigation measures are already established in the design phase, in terms of water source protection of the rehabilitated intakes and boreholes area, and additionally water pipelines are designed to be implemented underground, along the road ROW. However, impacts for consideration in the EMP particularly regarding the water delivery system, are described below along with their mitigation measures.

3.2.1. Delivery of Unsafe Water

447. 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.

448. 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

449. 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

450. The water quality control program 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

451. The ANAS, as the responsible regulator, 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 effluent discharge and monthly in all sampling points defined in the water quality control program.

3.2.2. Detection and Repair of Leaks and Pipe Bursts

452. 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- = moderately negative significant).

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

453. 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

454. 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 odor problems. Water 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

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

6.2.5 DECOMMISSIONING PHASE

456. 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.

6.3 EHS risks, impacts and contractor expectations summary

457. Based on the environmental impact assessment above for the project, the following is a summary of the key Environmental Health and Safety (EHS) risks, impacts and expectations on contractors to manage the risks and impacts. The expectations set out for the contractor match the requirements in the EMP. It is recommended that this table in included in the bidding documentation.

Table 20 EHS Risk, Impact and Expectation Summary

EHS Issue	Risk	Impact	Expectation on contractor
1. Managing labor and working conditions	Labour standards are not maintained and equal opportunities are not given to local workers and women.	Non-compliance with national laws, and inequalities in employment opportunities and conditions.	The contractor will comply with all national labor standards and all labor requirements set out in the EMP attached to the bidding documents.
2. Environmental protection	Air and water pollution, soil erosion, soil contamination and noise generation.	Deterioration in local environmental quality.	The contractor will not cause significant or long term deterioration of the natural environment.
3. Health and safety on site	Accidents or incidents from working around traffic, in trench excavations and general construction.	Life changing health impact or fatality on site, within the work force.	The contractor will maintain a safe and secure working environment for all workers / staff.
4. Community health and safety	Accidents involving the community on construction sites and during pipe network installation.	Life changing health impact or fatality within the community.	The contactor will maintain a safe environment for the communities living and working around the project site(s).
5. Hazardous materials management	Loss of containment of hazardous chemicals and exposure to asbestos.	Long term health impacts from chemical and fiber exposure and localized environmental deterioration.	The contractor will ensure hazardous materials are managed to prevent injury to humans or impact on the natural environment through controlled release or uncontrolled loss of containment.
6. Resource efficiency	Inefficient use of local and imported materials and poor waste segregation/recycling.	Generation of waste in a location without high standards of waste treatment and disposal facilities.	The contractor will use resources efficiently to reduce waste generation and resource inputs. All wastes will be managed according to the waste hierarchy.
7. Pollution prevention and management	Fuel and lubricants spill, and pollution from construction drainage.	Deterioration in local environmental quality.	The contractor will not cause pollution of the natural environment. Pollution risks will be managed through the contractor's emergency plans which the contractor will provide in response to this EMP. Ground works will be undertaken in the dry season where possible.
8. Flora	Removal of or	Relationship with local	The contractor will not

	conservation /cultural heritage	damage to culturally significant trees without prior permission.	community breaks down and project is hindered.	remove any tree without authorization and without cultural leadership approval if the tree is culturally significant. The contractor ensures that all trees which are not planned for removal will be protected from accidental damage.

7 INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

7.1 Consultation and Participation under the IEE process

458. 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.

459. The Technical Assistance team carried out four Public Consultation activities covering all five PAs during the due diligence phase. Details of the meetings can be seen in Appendix 4 to Appendix 6:

- PA 01 - Be'e mos (held in Suco Manleuana Headquarters on the 4th March 2022);
- PA 02 - Malinamuk and PA 08 - Golgota (held in Suco Comoro Headquarters on the 21st March 2022);
- PA 03 - Central (held in Salaun Formosa on the 7th April 2022); and
- PA 05 - Maloa (held in Salaun UNIO on the 7th April 2022).

7.1.1 Results from the Public Consultations held to date

460. Local government agencies and authorities (Chief of Suco and Village), and representative members of the communities within the project area participated in the consultations, 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 design and construction phase.

461. The stakeholders presented their concerns, suggestions and recommendations for the project implementation, focusing mainly on issues such as acceleration of the Project Implementation, environmental impacts during construction, corridor of impact and compensation for unplanned losses, Project Area, current water distribution system that does not serve all the city areas, misuse by consumers (i.e. illegal connections and direct impact on water availability in the distribution system) and structural preservation of cultural and religious assets within the project area.

462. In general, during the consultation, no issues of significant environmental or social concerns 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 do not want household water uncertainties in the future. However, stakeholders raised their concern about the sustainable extraction of the groundwater and the reliability and the integrity of this project. This IEE has therefore recommended that future monitoring of the aquifer is maintained during implementation and the distribution system reconstruction and reduction in illegal connections will support the long term reliability of the water supply.

Figure 20 PA Be'e mos public consultation; participation of the local leadership and other stakeholders

Figure 21 PA Malinamuk and PA Golgota public consultation; participation of the local leadership and other stakeholders

7.2 Consultation in upcoming Project Phases

7.2.1 Consultation during the SEIS/EMP Domestic process

463. As required by the national environmental licensing law, the PDC, together with the MPW and PMU, will conduct 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 project; (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 Construction 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.

7.2.2 Consultation during Construction

464. Prior to the start of construction, the contractor, MPW and the Project Management Consultant (PMC) 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 MPW 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. Consultations may also be conducted throughout project implementation in case of any project changes and variations, and due to any major grievance issues and corrective action plans.

465. 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 MPW and PMC 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.

7.3 Information Disclosure

466. All IEE and EMPs versions will be disclosed on ADB's website, on behalf of the borrower, as a minimum. The PMU/BTL will ensure that the Executive Summaries of the IEE and SEIS, and the EMP Mitigation Measures table will be translated into Tetum (local language) and distributed to the Chefe de Suco and one copy to each of the Chiefs of Aldeia, for local public access to information, creating wider public awareness. As MPW does not have an active website, additional copies will be made available to the public, on request.

467. An electronic version of the IEE/SEIS/EMP in English and translations as above in Tetum will be placed in a website indicated by the MPW (ADB, Consultant or other) and the stakeholders will be made aware of the grievance register and redress mechanism. IEE and EMPs will also be updated in order to accommodate any project contact variations, corrective actions, project scope changes or other changes affecting due diligence requirements which may include issues raised during consultations.

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

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

8 GRIEVANCE REDRESS MECHANISM

470. The Grievance Redress Mechanism's (GRM) main objective is to provide a transparent mechanism for the stakeholders and public to voice their social and environmental concerns or issues linked to the project, arising during the pre-construction, construction and development of the project, with the objective of ensuring that concerns and potential conflicts can be satisfactorily addressed.

471. Affected Persons (APs) are entitled to lodge a grievance regarding any aspect of the preparation and implementation of the project. The objective of the GRM is to provide a structured process for receiving, assessing and resolving complaints that is accessible, prompt, fair, guided by laws and local custom, and free of charge. Information about the GRM will be communicated to APs and other stakeholders through public consultations and institutional strengthening conducted during project implementation.

472. The function of GRM is to receive, evaluate and facilitate resolution of affected persons' concerns, complaints, and grievances related to social, environmental and other concerns on the project in a form of forum which can be accessible to other related parties with a provision of complaint registry form (Appendix 2) by the contractor as described below on the grievance procedure.

473. The proposed mechanism for grievance redress of environmental and social matters in construction and operation of the project's infrastructure subcomponents uses existing Suco ("village") and Aldeia ("Hamlet") administrative structures (affected persons/ village committees/ village groups), any of which can be complainants. This benefits the project itself and also the affected persons and stakeholders as the project can resolve any relative disputes before they escalate to a higher level, helping build trust and confidence to the related community members, create productive relationships between the parties and help avoid project delays and increase in cost, thus improving the quality of the work. Affected persons will also benefit from eased and facilitated access to information and provide an effective way to report their grievances and complaints.

474. Every grievance shall be registered by the PMU under a carefully documented process. The BTL will also be involved in the clients' complaints and establish a good network with the chefe de suco and aldeia for cultural facilitation purposes.

8.1 Grievance Redress Mechanism

475. Grievance regarding the process can be redressed up to 4 levels, during the construction, and Operation of the project, following the process in Figure 22.

476. At each level of the GRM, written records shall be maintained in a case file that includes (i) a description of the complaint and date received; (ii) contact details of the AP lodging the grievance, iii) memos of meetings and consultations, iv) the agreed resolution or decision to refer to the next level. PMU/BTL is responsible for recording all the complaints for the project, at all levels, with support from PMC as needed; this will form the Complaints Register. A sample Complaints / GRM Form is provided in Appendix 2.

477. For level 1 the GRM access points are varied to allow maximum access for Affected People, including the aldeia chief, the suco chief, a construction site supervisor, a contractor engineer, or a city project coordinator, or direct to the PMU/BTL.

478. The Aldeia and Suco Council (ASC) will receive copies of all complaints on environmental and social safeguards issues during the works. Each GRM access point will

need to record any complaints and inform ASC and BTL. For verbal complaints the access point representative must make a written record for the Complaints Register.

479. The Project Management Consultant environmental and/or social safeguards specialists will contribute to the GRM with technical support to solve the grievance, if required, and after will agree with the Contractor on the necessary action and reasonable timeframe for correction/response to the grievance, in collaboration with ASC and PMU/BTL.

480. The contractor's responsibilities under the GRM include, identifying a staff member that is management level and whom, due to the nature of his/her function, will always be available on site and people shall be informed of his/her presence. The contractor may also be central to finding solutions to any construction related complaints. The contractor is required to raise any grievances lodged directly with their firm or staff immediately to BTL for recording.

481. An example GRM complaint recording form which will form the complaint Register is provided in Appendix 2. The resolution to the complaint will also be recorded.

Figure 22 - Grievance Redress Procedure for the Project

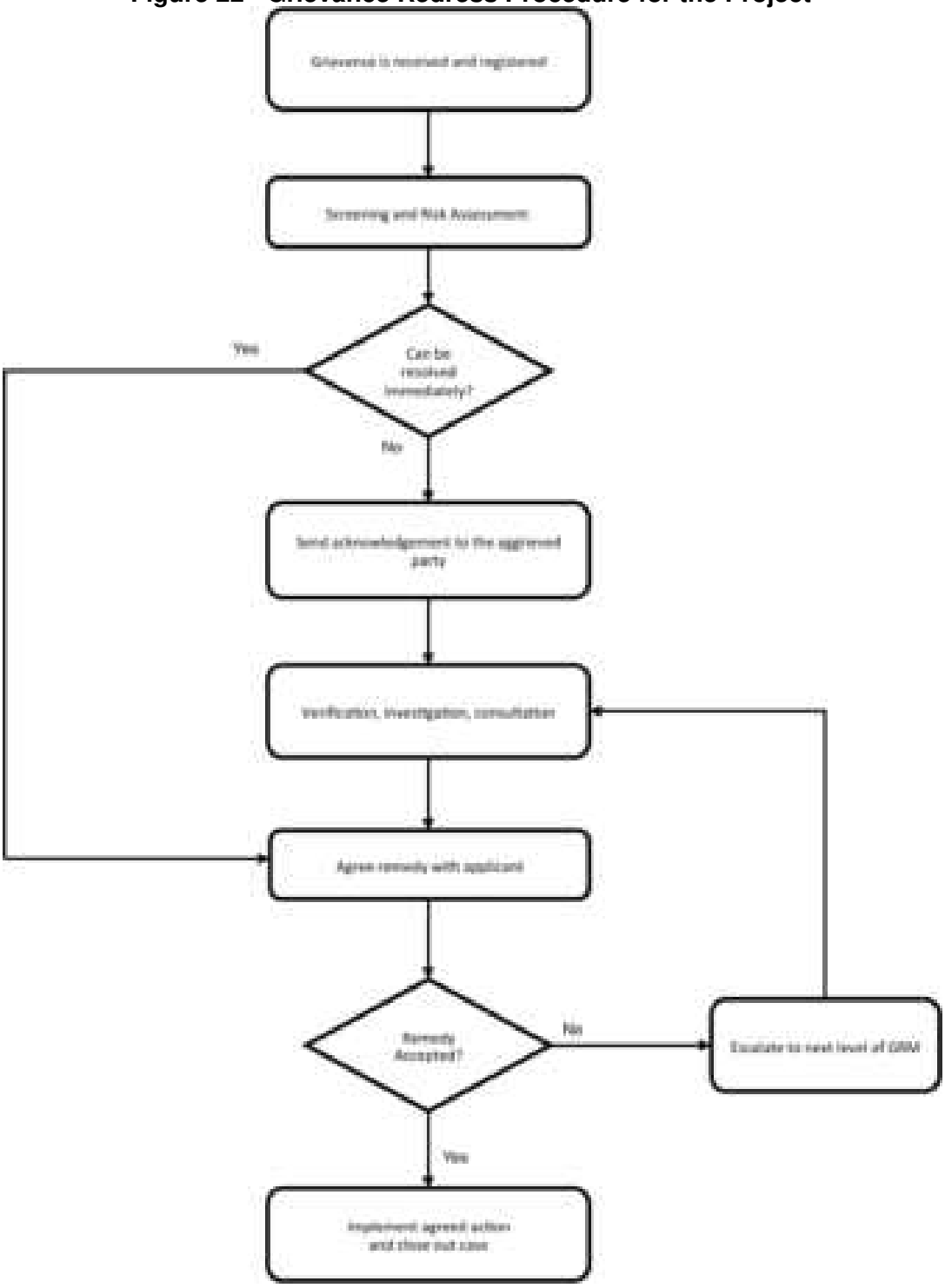

Table 21 Steps in the Grievance Redress Mechanism

Steps, Actions and Levels of Intervention				Duration
▼	COMMUNITY			
1	Level 1 of the GRM includes the Aldeia and Suco Council (ASC) - An AP (complainant) may present a complaint to any of the following: the aldeia chief, the suco chief, a construction site supervisor, a contractor engineer, or a city project coordinator. Multiple points of entry for grievances are provided to ensure accessibility. The details of the complaint shall be recorded on a grievance form either by the AP or by the person receiving their representation; in case the AP is unable to fill out the grievance form due to low literacy, physical impairment or for any other reason assistance must be provided. Irrespective of who receives a grievance, the grievance form shall be submitted to the ASC to coordinate the investigation, assessment and resolution. If the grievance cannot be resolved by the ASC within 2 working days, the ASC shall refer the case to the next level of the GRM. PMU/BTL will obtain records of all complaints from ASC to form the Project Complaint Register, and will support the ASC in determining the relevance of the complaint to the project activities.			2 days
	▼	PROJECT		
2		Level 2 of the GRM is a Project Grievance Committee (PGC) chaired by BTL PMU, The PGC will consider the case and seek a resolution in consultation with the AP and the ASC. If the grievance cannot be resolved by the PGC within 10 working days, then PGC shall refer it to the next level of the GRM.		Further 10 days
		▼	CITY	
3			Level 3 of the GRM is the Grievance Redress Committee (GRC) chaired by Dili City MPW, with members from relevant government departments and representative(s) of a civil society organization, which is established by Dili City authority. The GRC will consider the case and seek resolution in consultation with the AP and the ASC. If the grievance cannot be resolved by the GRC within 10 working days, then GRC shall refer it to the next level of the GRM.	Further 10 days
			▼	NATIONAL
4				Level 4 of the GRM is the court of law. The court will register the case and provide a final decision which is binding to all parties	Open, but further 20 days
Note: The shown days per step should be understood as a maximum duration.					

482. If the grievance requires local mediation, BTL and contractor representatives should consult quickly with local ASC in the area of related grievance and the affected stakeholder/person to arrive at a conclusion on the correction of the grievance. BTL must follow up on the corrective measure, within the agreed timeframe.

483. If the contractor has not taken any satisfactory corrective action within the defined timeframe, BTL will elevate the Grievance to the PGC.

484. If satisfactory corrective action is yet to be carried out within the defined timeframe, BTL will elevate the grievance to the GRC and take action in accordance to environmental/social legal and contractual clauses in effect.

485. If the Grievance cannot be solved at the GRC level, the case will be referred to the court of law to adjudicate the matter.

486. Complainants can also file a direct complaint to BTL, under their official Department for Client Support (Address: BTL, Caicoli, Dili; Telephone: 331 71 57), who will follow up directly with the project. This BTL Department for Client Support is the official grievance redress representative for water supply purposes, when the operation phase of the project comes online.

487. If a resolution is not found, affected people should be encouraged to contact the i) ADB Timor-Leste Resident Mission or ii) the Southeast Asia Department of ADB in Manila. Finally the Accountability Mechanism of the ADB can be used. The Affected Person should contact the Complaints Receiving Officer of the ADB via the following addresses:

- Complaints Receiving Officer, Accountability Mechanism, Asian Development Bank
- ADB Headquarters, 6 ADB Avenue, Mandaluyong City 1550, Metro Manila, Philippines
- (+632) 632-4444 loc. 70309
- (+632) 636 2086
- amcro@adb.org
- Instructions available here: http://www.adb.org/site/accountability-mechanism/how-file-complaint.

488. ADB Special Mission or Judicial System. If the complainant is still unsatisfied, the PMU/EA will inform ADB to convene a special mission to attempt a resolution prior to use of the Timor-Leste judicial system.

489. The project's GRM should not impede access to the country's jurisdiction or administrative remedies. Accessing the country's legal system and GRM can be done at the same time. If efforts to resolve disputes using the grievance procedures remain unresolved or unsatisfactory, the AP has the right to directly discuss his/her concern/complaint with ADB.

9 ENVIRONMENTAL MANAGEMENT PLAN

490. The environmental management plan (EMP) ensures all the project activities are in compliance with technical designs, environmental legislation (Government of Timor-Leste, 2010) and guidelines applicable in Timor-Leste and within the ADB SPS 2009. The activities shall be undertaken responsibly without decrementing or jeopardizing the environment and social aspects. Objectives of the EMP are:

- To provide a feasible and practical working tool to enable the measurement and monitoring of environmental performance on-site;
- To guide and control the implementation of findings and recommendations of the environmental assessment conducted for the project;
- Detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- To ensure that safety recommendations are complied with.

491. The EMP is based on the type, extent and duration of the identified environmental impacts for Dili-West project, and has been prepared following best practice and by reference to the ADB Safeguard Policy Statement (2009). It includes detailed requirements for:

- Mitigation and monitoring measures;
- Institutional arrangements and project responsibilities;
- EMP budget for implementation;
- Institutional strengthening and technical training requirements;
- Public consultation and information disclosure;
- GRM including timescale and responsibilities.

492. A detailed EMP is provided for the project in a separate document (one for each Package Area), where the detailed mitigation measures are included per each of the activities and Project Phases. The EMPs will also be subject to updates: i) The EMPs will be re-checked upon final DED and prior to bidding in case of any final adjustments to be made and re-disclosed, before the EMPs are part of the bidding packages; ii) any additional points not covered that may potentially come out of the national environmental licensing process, will be updated into the EMPs and site specific construction EMPs before contract award as per the project loan agreement.

493. The overall responsibility for EMP implementation lies with the Ministry of Public Works (MPW). The MPW will establish a Project Management Unit (PMU) based in Dili, responsible for general project implementation with the support of BTL and a Project Management Consultant (PMC) which will include environmental safeguards specialist. The PMU will include qualified environmental and social safeguards focal staff, appointed by MPW.

494. The costs for the EMP implementation (in general, typified, for all five areas) are summarized in Table 22 for the construction period (7 years Q3 2023 to Q3 2030):

Table 22 EMP Estimated Cost for 5 Package Areas

Item	Details	Stages	Cost ($) 7 years	Budget source:
A. Mitigation Measures	Culture - Cultural "Opening" of project components and sensitive areas	Construction	$25,000	Contractor
	Contractor's EHS Officer		$630,000	
	Subtotal (A)		**$655,000**	
B. Environmental Monitoring Measures	Air Quality	Construction	$154,500	Contractor
	Water Quality		$52,500	
	Noise		$196,500.	
	Subtotal (B)		**$403,500**	
C. Institutional strengthening and technical training	EMP Development and Implementation	Before and during Construction	$10,000	PSC
	Affected People Training		$75,000	
	Consultation with Affected People		$75,000	
	Grievance Redress Mechanism		$20,000	
	Environmental Protection		$5,000	
	Environmental Monitoring		$5,000	
	WTP Operation and Maintenance	Once, prior to Operation	$12,600	
	Subtotal (C)		**$202,600**	
TOTAL (A+B+C)			**$1,261,100**	

495. Most training costs are operational, and do not include organization costs such as trainer fees. Costs in this table are the sum of all training for all five Package Areas and can be found broken down in each Package Area EMP.

496. A summary of the key responsibilities for environmental safeguards is in Table 23; note that the project EMPs provide more detail on roles and responsibilities, serving as guidance during project implementation:

Table 23 EMP general roles and responsibilities

Role	Abbreviation	Location	Summary of Functions
Project Management Unit with BTL support	PMU/BTL	Dili	Responsible for general project implementation and EMP implementation and reporting including semi-annual environmental monitoring reports (SEMR); Clearance of environmental due diligence documents; Ensuring compliance with national environmental requirements and ensuring the project and contractors secure any additional required cultural and environmental approvals and permits (as required); Approval of the CEMP; Grievance Redress Mechanism.
Project Management Consultants	PMC	Dili	Project final design and implementation, support and capacity development; Engineering supervision for all construction and reporting; Environmental safeguards trainings; Training to be provided by the PMC to contractors on EMP requirements; Updating of environmental safeguards due diligence documentation under implementation; Review of the CEMP for approval by the PMU; Review of monthly contractor monitoring reports; Monitoring EMPs and site specific construction EMP implementation; Defining and monitoring corrective actions for

Role	Abbreviation	Location	Summary of Functions
			environmental safeguards as needed; Conducting any additional environmental impact assessments and preparing new or updated environmental due diligence reports in case of any project variations; Supporting contractors to update their CEMPs in case of any project variations; Supporting the PMU with the environmental safeguards inputs for the quarterly progress reports to ADB, as well as for the SEMR to ADB, and any audit requirements and the final project completion report; Translation of IEE and SEIS Executive Summaries and the respective EMP mitigation measures tables (including in case of updates due to any project variations).
Project Design Consultants	PDC	Dili	Prepare and finalize PD, SEIS and EMP Reports based on the IEEs and EMPs, to support the PMU's domestic Licensing responsibilities.
Contractor and respective Environmental, Health and Safety Officer	Contractor / EHS officer	Dili	Preparation of the CEMP and required plans for approval of the PMU (also updated versions in case of project variations); Securing any national cultural and environmental approvals and permits prior to construction and in cases of project variations; Mitigation measures implementation and reporting, capacity building and training; Monthly reporting to the PMC/PMU; Implementation and reporting of environmental safeguards corrective action measures.
Local and National Authorities	ANLA / Chefes Suco and Aldeia	Dili	Review, comment, approve and monitor the SEIS and EMP compliance and implementation; Supervise Contractor employment mechanism, community awareness programs and Grievance Redress Mechanism.
Asian Development Bank	ADB		Review and clear IEE/EMPs and any further updated environmental due diligence in case of any project variations, bid documents, and SEMRs and any resulting corrective action plans; Conduct review missions; Provide guidance on ADB SPS environmental safeguards implementation as and when required; Due diligence documents disclosure on ADB's website on behalf of the borrower.

10 CONCLUSION AND RECOMMENDATIONS

497. This IEE study was carried out at the DED phase of the project, where primary and secondary data have been used to assess the potential environmental impacts in a comprehensive manner and the preliminary DED documents are used. This report provides a picture of all potential environmental impacts associated with the Project and recommended suitable mitigation and monitoring measures. This IEE will be updated as required with the final DED before bidding, and the documents will be redisclosed on the ADB website on behalf of the borrower.

498. Assessment of the project characteristic and details with the existing conditions revealed that, although the project traverses a substantial number of residences, buildings and other infrastructure along its route, the proposed works and its impacts will be very temporary and short term.

499. PA08 – Golgota includes an area of protected status, which has been transformed into equivalent "Zone of Use" area, as defined by Decree-Law no. 05/2016 – National Protected Areas System, which allow the installation of services for human use small scale-water distribution infrastructure within the protected area. This IEE includes a thorough assessment of the environmental resources in this area (Chapter 5) and identification of impacts and appropriate mitigation measures (Chapter 6). This IEE concludes that there are no specific project related environmental concerns for this area, which are not able to be managed by the environmental management plan for PA08.

500. It is recommended that the implementation team ensure they keep up to date with the construction schedule for private sector development in PA08 to ensure any potential cumulative impacts or construction scheduling challenges are managed, and that government advice is sought on this development, if it is expected to affect the DWWSP.

501. The EMPs for each Package Area (already prepared as separate documents so as to be able to go as part of the bidding documents, subject to a final round of updating once the domestic environmental license has been secured, and any other final DED changes), if implemented as directed, will mitigate impacts on the natural environment and affected people to an acceptable level. The extent of adverse impacts during construction is expected to be local, confined within the projects' main areas of influence, which includes temporary noise and air pollution, waste generation, traffic disruption, soil erosion and occupational and community health and safety risks. 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.

502. 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). 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.

503. The on-going groundwater model analysis preliminary results conclude that in the operational phase, there may be some impact on groundwater levels if there is uncontrolled increased pumping, either from existing wells or with increased number of wells. The TA groundwater model concluded that an increase of 20,000 m^3/d in the operational phase, in the whole city, was the limit of sustainable pumping and further increases would lower the groundwater levels to sea level, with significant risk of sea water intrusion inclusively in some areas of the Dili-West project area.

504. It is recommended that the future water supply to Dili will need to consider conjunctive use of surface water and groundwater, with the latter constrained to about

54,904 m^3/d around 2030. Thus Groundwater level monitoring should be carried out at proposed new and revisions made to the model at four year intervals to adjust pumping rates in-line with revised predictions. The model should indicate if there is a risk of saltwater intrusion due to lowering of groundwater levels and possible sea level rise due to climate change.

505. Also, 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 Directives.

506. Some impacts in particular in the operation phase require BTL to find a solution for reuse of waste along the various project components, such as spoil or the resulting sludge from the WTP backwash treatment, as an alternative for final deposition in Tibar Landfill, because this Landfill project is currently being rehabilitated for urban equivalent wastes only and may not accept construction waste to fill in its available void space.

507. The remaining mitigation measures, integral to socially and environmentally responsible construction practices, are commonly used at construction sites and are well known to civil works contractors, hence, will not be difficult to implement.

508. The key parties for mitigation measure implementation are the construction contractors and the BTL. Support will be given to them by a comprehensive institutional strengthening and technical training plan, to be delivered by the Project Management Consultant team. The implementation of the EMP will be closely monitored and reported on by the relevant stakeholders in the project. The project's semi-annual environmental monitoring reports will document and disclose the EMP monitoring results, Grievance Redress Mechanism, any grievances with time bound resolutions, corrective measures and corresponding corrective action plans to be adhered to by the contractor(s).

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11 APPENDICES

Appendix 1 Rapid Environmental Assessment Checklist and Preliminary Climate Risk Screening Checklist

Rapid Environmental Assessment (REA) Checklist

Screening Questions	Yes	No	Remarks
A. project Siting ▪ Is the project area…			
▪ Densely populated?	x		The project sites, in particular the water supply delivery network in the district metered areas (DMAs) will be constructed in the capital city which is a relatively densely populated city of low to medium rise commercial and residential buildings.
▪ Heavy with development activities?		x	It is anticipated that some construction work from commercial or infrastructure development is on-going around the project locations, such as future piped sanitation collection systems construction in the city, under the Government and other development partner programs. The extent that the project will contribute to existing development impacts will be assessed during the project preparation phase.
▪ Adjacent to or within any environmentally sensitive areas?	x		
• Cultural heritage site	x		Dili has places of worship, heritage buildings and sacred trees spread throughout the urban area, many in the road curbside. Some of these sites may be located within the project area; during the project preparation phase, the locations will be identified and mitigation measures to ensure access to and protection of the sites will be integrated into the environmental management plans (EMPs).
• Protected Area	x		Tasitolu protected area includes three saline coastal lakes with a proposed area of 379 ha located in Golgota zone. The protected area boundary overlaps with existing and newly urbanized areas in the city. Therefore, it is unlikely that this area can be or will be affected by the project activities planned, given the existing urbanization within the protected area. This will be confirmed during the project preparation phase. The domestic environmental regulator (ANLA) has already confirmed that the project will not negatively impact this area.

Screening Questions	Yes	No	Remarks
• Wetland	x		Tasitolu lakes (see above for details) are the most significant wetlands located nearby the project area. The lakes have significant existing areas of urbanization around them. It is unlikely that this area can be or will be affected by the project activities planned. This will be confirmed during the project preparation phase.
• Mangrove	x		The edges of the Tasitolu lakes host some mangrove and salt tolerant vegetative species. In the remaining physical project area and its area of influence, no mangroves are known to be present. This will be confirmed during the project preparation phase.
• Estuarine		x	The project interventions will be within the Comoro river catchment; the Comoro river estuary empties into the Wetar Straits. No impacts are anticipated in the estuarine environment because the project interventions will have limited interactions with surface water bodies. The estuary sensitivity and potential impacts on it will be confirmed during the project preparation phase.
• Buffer zone of protected area		x	No buffer zones have yet been defined officially under the current Timor-Leste protected areas legislation, including for Tasitolu lakes protected area. This will be confirmed during the project preparation phase.
• Special area for protecting biodiversity	x		See 'Protected area' response above regarding Tasitolu lakes. In the remaining physical project area and its area of influence, no other special areas for protecting biodiversity are known to be present. This will be confirmed during the project preparation phase.
• Bay		x	Dili is located on the coast, in the Wetar Straight. The project is not anticipated to have an impact on the bay environment given the nature and scope of the project interventions. This will be confirmed during the project preparation phase.
B. Potential Environmental Impacts ▪ Will the project cause…			

Screening Questions	Yes	No	Remarks
▪ impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.	x		Sanitation: The project is likely to result in increased wastewater, burdening the existing sanitation systems. However, the Millennium Challenge Corporation support program to the Timor-Leste Government to be implemented in parallel will develop the sanitation systems in Dili. Wastewater associated with construction workers will be managed through the EMPs, including measures to ensure adequate wastewater collection and treatment and the appointment of a contractor environment health and safety (EHS) officer to oversee the measures. Waste: The construction phase of the project will generate waste, e.g., spoil and construction materials, which may include hazardous materials such as used oils. The safe storage, transport and disposal of these materials will be addressed in the EMPs; this will include reuse of inert materials. The project will also generate waste from dismantling reservoirs and water treatment plant (WTP) infrastructure. Where possible, the client expects some of the WTP components to be reused in a new WTP. This will reduce waste generation. The Tibar landfill, currently under upgrading, will be used for household/ municipal type waste disposal; for other wastes Dili Municipality will be consulted on an appropriate disposal site. The EMPs will specify adherence to the Waste Hierarchy for waste prevention, and sound waste management practices. Other services: The design will ensure that network routing avoids existing services to the extent possible. The water supply pipes will be laid adjacent to the existing network (to be fully replaced). The old pipes will be removed, ensuring continuity of service. Where service interruption is likely the EMPs will specify early warning to the community and working with service providers to smoothly restore services.
▪ deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		x	The Dili area is already developed and urbanized. Any further developments e.g., urban, commercial or industrial activities, which may occur, will not be induced by the project.

Screening Questions	Yes	No	Remarks
▪ degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		x	The project will not further degrade land or ecosystems; the project interventions will be implemented in existing disturbed or developed areas. This will be confirmed in the initial environmental examination (IEE) during the project preparation phase.
▪ dislocation or involuntary resettlement of people?	x		Three sites have been identified and assessed for involuntary resettlement impacts. A total of 25 households, 115 affected people, will be impacted by land acquisition in these locations. 23 households will lose their primary residential structure and will receive a structure in a new location with security of tenure. Two households will lose land and rental income gained from telecom towers. Impacts related to the pipeline are expected to be temporary as works will be limited to the existing right-of-way.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples, or other vulnerable group?	[x]		Women will benefit from reduced time poverty (working long hours in a domestic setting). Women are primary care givers in Timor-Leste; women's unpaid work will be reduced through lower incidence of illness in the family because of the provision of piped safe water. In addition, the piped water will alleviate the need for collecting and treating household water supplies.
▪ degradation of cultural property, and loss of cultural heritage and tourism revenues?		x	Degradation and loss of cultural heritage is not anticipated, however see 'Cultural Heritage Site' question above which notes the presence, and avoidance of any such sites will be considered during the preparation phase and integrated into the EMPs.
▪ occupation of low-lying lands, floodplains, and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		x	The project interventions are not expected to attract or induce squatters or low-income communities. However, this will be reconfirmed during the preparation of the IEE.

Screening Questions	Yes	No	Remarks
▪ water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?	x and [x]		The 'no project' scenario is anticipated to lead to further unauthorized boreholes and illegal network connections, which are the community's way of coping with poor water supply. The project will need to be based on careful design and consideration of the aquifer, informed by existing water resource studies and the Project's planned groundwater modeling study. The project will improve controlled abstraction of ground and surface water, (reducing illegal connections) and reduce physical losses, which may be as high as 70% and improve water resource use efficiency. The project will support improved institutional capacities which will ensure better control and understanding of all abstraction sources.
▪ air pollution due to urban emissions?	x		The project is anticipated to cause traffic issues on the road network. The project area includes a number of major routes including roads around the international airport. Slow moving traffic is a known cause of urban emissions. This is likely to be exacerbated by construction dust, and noticed in a city without major industrial pollution sources i.e., a fairly good air quality baseline. The EMPs will address the issue of traffic and construction scheduling to the extent possible and address construction dust management through good practice measures.

Screening Questions	Yes	No	Remarks
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?	x		The project will include a range of anticipated occupational risks, e.g., from working near water (surface water intakes), from trenches for pipe installation, potentially from asbestos containing materials e.g., pipes, from traffic accidents and from regular construction risks associated with using heavy machinery and tools. The EMPs will set out minimum standards or expectations for the contractor to fulfill, such as Risk Assessments for site specific tasks. These will form part of the contractor's Construction EMPs. The EMPs and bidding documents will also explicitly prohibit the use of asbestos containing materials in construction. The contractor's EHS Officer will be appointed to ensure all the necessary mitigation measures are followed and will specifically be required to address asbestos risk management including handling and disposal requirements.
▪ road blocking and temporary flooding due to land excavation during rainy season?	x		Excavations will be required for pipe installation and for the construction of the WTPs and reservoirs, to a lesser extent. The project may cause temporary road blocking or flooding if significant land exaction takes place during rainy season given the topography of some project sites; also parts of the project area are prone to significant flooding. Careful management of the construction areas will be required to mitigate the project related risk of flooding; this will be addressed in the EMPs.
▪ noise and dust from construction activities?	x		Construction will generate noise, dust and vibration as e.g. trenches for pipes are cut. This will impact on residents and businesses in the project area. Although these impacts cannot be avoided, they can be mitigated to acceptable levels. Mitigation measures based on good construction practices will be addressed in the EMPs.

Screening Questions	Yes	No	Remarks
▪ traffic disturbances due to construction material transport and wastes?	x		The project will cause additional vehicle movements and potential partial road blocks as materials are delivered to the urban sites. Traffic impacts will be managed through mitigation measures in the EMPs and waste prevention at source on all construction sites will be promoted in order to reduce traffic movements resulting from waste management, e.g., the movement of vehicles to empty waste containers and transport waste to the disposal sites.
▪ temporary silt runoff due to construction?	x		Silt run off may occur during excavation and earthworks, particularly given the topography in some project areas. This could increase turbidity in the water bodies receiving the run off. Construction drainage mitigation measures based on good construction practices will be integrated into the EMPs.
▪ hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		x	Notwithstanding the impacts identified in 'air pollution due to urban emissions' above, no specific health hazards are anticipated as a result of the project. Nonetheless there will be public information made available regarding any potential implications should these arise and provisions for this will be reflected in the EMPs.

Screening Questions	Yes	No	Remarks
▪ water depletion and/or degradation?	x		Water depletion: As for 'Water Resource Problems' above, without the project, further unauthorized boreholes and illegal network connections are anticipated, if the Government of Timor-Leste is unable to implement and enforce the strategies of the current Water Resource Policy. While these are not direct responsibilities of the project, there will be an attempt to improve understanding, management, and control of water depletion through an improved network and institutional capacity. Water degradation: the associated increase in wastewater and backwash water may potentially lead to an increase in polluted water which may affect the receiving surface water bodies. The IEE will establish the possible fate of wastewater and the WTP backwash in Dili if it is not technically feasible for this infrastructure to be connected to the future centralized sanitation network, currently under feasibility analysis for investment decision. For all other infrastructure components not covered by the future sanitation system, the project will assess the potential risks from it associated with the project interventions. The IEE will also assess the impacts of backwash water disposal and integrate any required mitigation measures into the EMPs; backwash treatment is planned for the largest project WTP only.
▪ overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization?	x		As for 'Water Resource Problems' above, the uncontrolled use of groundwater through people drilling boreholes for domestic/commercial supply is a risk to salinization. The project is anticipated to improve management of groundwater and will put in monitoring systems to check on gradient of flow to prevent saline intrusion however the final engineering design will need to be considerate of groundwater gradients and salinization.
▪ contamination of surface and ground waters due to improper waste disposal?	x		The project will generate construction waste. Improper waste disposal by the contractors would potentially contribute to surface water contamination. The EMPs will address waste management and integrate mitigation measures for sound storage, transport and options for approved disposal of construction wastes in line with the waste hierarchy.

Screening Questions	Yes	No	Remarks
▪ pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?	X and [x]		In response to 'water depletion and/or degradation' the issue of potential degradation of water through pollution is discussed, particularly with reference to an increase in wastewater. However, the Sanitation investment, currently under preparation, should mitigate a major part of the impact from the wastewater produced. In addition, the project impact will be a positive one in terms of health, as the provision of clean and safe water supply will contribute positively to public health.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		x	In accordance with the aims of Timor-Leste National Employment Strategy 2017–2030 (creating new jobs, increasing opportunities young people entering the labor market and reducing unemployment) it is anticipated that the majority of workers will come from the local area. A social burden from workers is therefore not anticipated.
▪ social conflicts if workers from other regions or countries are hired?	x		As above, the majority of workers are expected to be locally hired. However, some international skilled workers will be needed and workers from other towns maybe hired. To avoid conflict in this regard, mitigation measures will be put in place for prioritization and/or minimum selection percentage in the workforce of local workers with minimum required skillset and then open to other workers. Local authorities should be involved to supervise the process to prevent possible conflicts. Given the coronavirus disease (COVID-19) pandemic, it is possible that any persons working in a dense urban area, close to houses and business may cause local concern, if they are not from the Dili itself. This risk could escalate at any time given the changeable and location specific nature of the virus. The EMPs will include measures to ensure training is provided to workers on this issue, and COVID-19 related prevention of transmission measures are part of the contractor's requirements.

Screening Questions	Yes	No	Remarks
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?	x		The Contractors will use chemicals and fuels, such as diesel for machinery; refueling, although their use is not anticipated to occur within the community (at the project sites). However, for all sites, the EMPs will integrate mitigation measures for sound storage, transport and use of hazardous liquids, ensuring the community is not affected. The Contractor's EHS Officer will be appointed to ensure compliance with IFC EHS guidelines, which will be integrated into the EMPs.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation, and decommissioning?	x		The community could be at risk from unclosed trench excavations, and other construction hazards. Required barriers, lighting and other community safety measures will be addressed in the EMPs mitigation measures, as well as a risk management and emergency response plan.

A Checklist for Preliminary Climate Risk Screening

Screening Questions		Score	Remarks[1]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	1	There is a clear need to account for changing flood risk (including sea-level rise) and intensity of precipitation in the siting and routing of the project infrastructure.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	1	There is a clear need to account for changing flood risk (including sea-level rise) and intensity of precipitation, as well as potential impacts on groundwater and subsequent implications for water resource quality and quantity.
Materials and Maintenance	Would weather, current, and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold	0	No change in materials likely to be needed.

[1] If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

	winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?		
	Would weather, current, and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	1	There may be a need for more regular maintenance to reduce leakage caused by impacts such as flood events. Additional monitoring would also be beneficial to inform this maintenance regime.
Performance of project outputs	Would weather, climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design lifetime?	1	If not accounted for in project design, the project performance could be negatively affected by climate and extreme weather events, and potentially reduce the number of beneficiaries with access to reliable piped water.

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1–4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): Medium

Other Comments: A Climate Risk Vulnerability Assessment will be undertaken for the project.

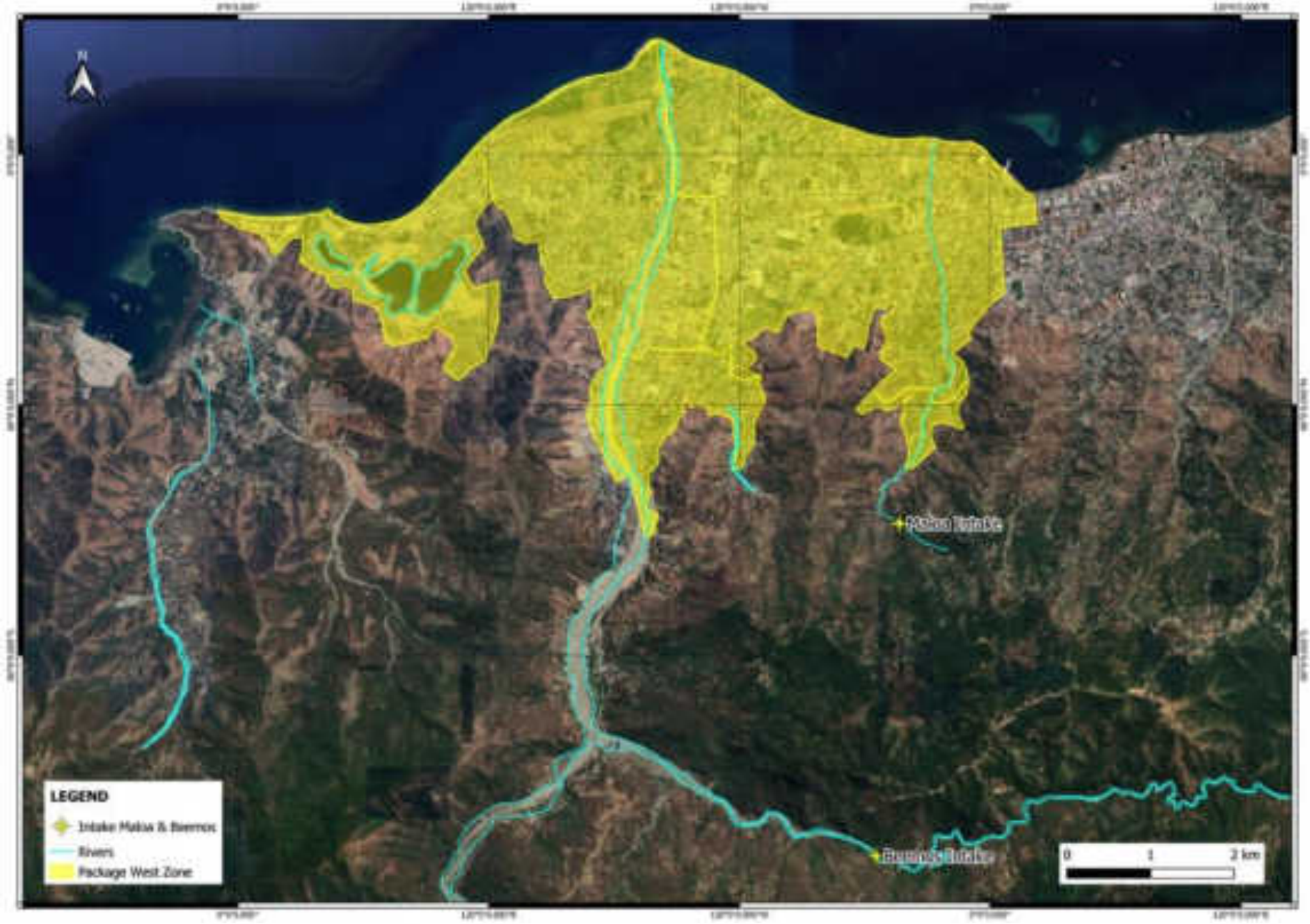
Appendix 2 Sample Grievance Redress Form

BEE TIMOR-LESTE EMPRESA PUBLICA
BTL E.P

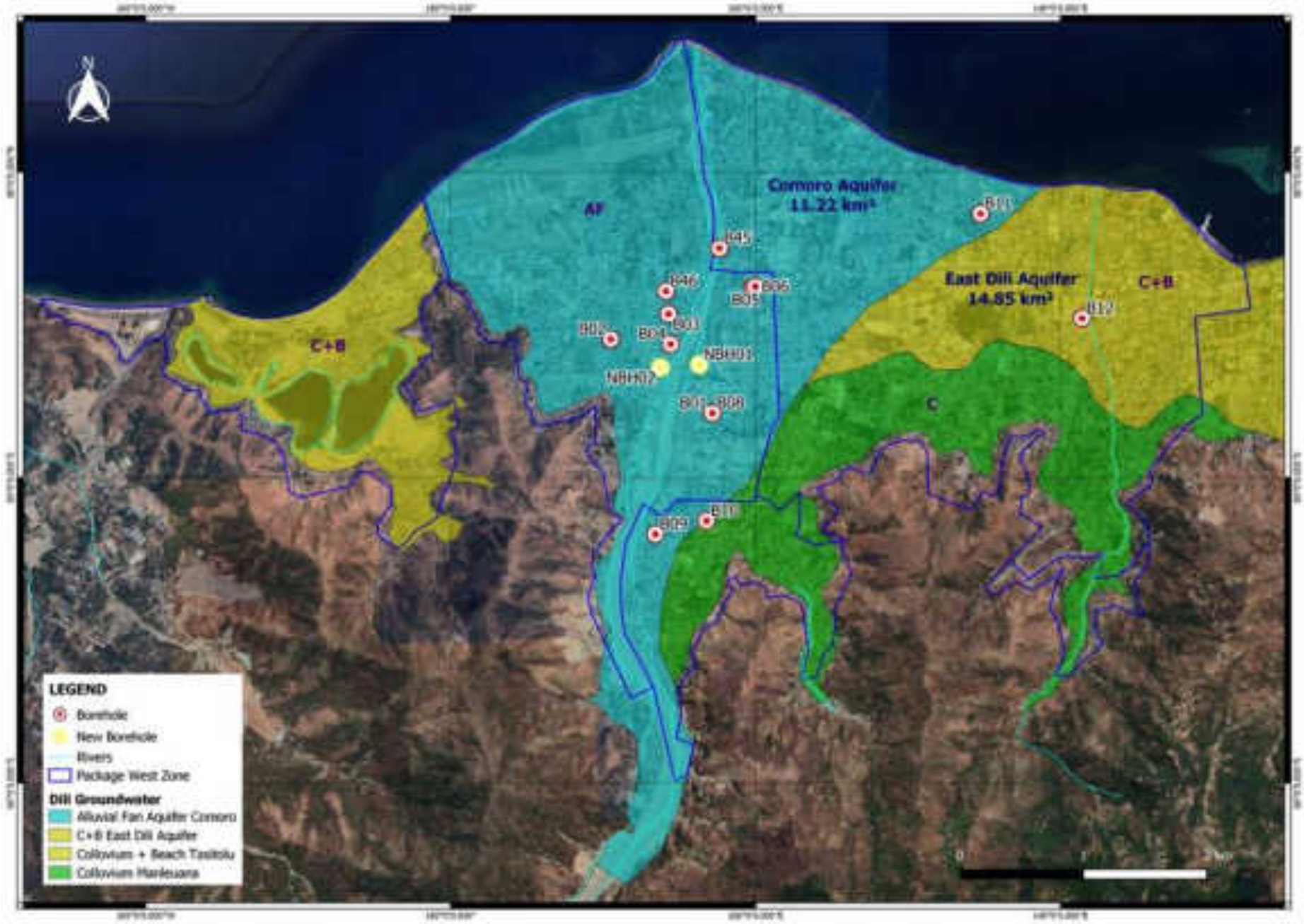
FORMATU KONSEPTUAL BA MEKANISMU REPARASAUN KEIXA CONCEPTUAL TEMPLATE OF GRIEVANCE REDRESS MECHANISM (GRM)				
Numeru Keixa/ Grievance Number				
Naran Rekorda / Name of Recorder				
Data simu / Date Received				
Data Gravado / Date Recorded				
Informasaun Sobre Keixa / Information About Grievance				
Defini Kazu Ou Keixa / Define The Grievance				
Informasaun Sobre Reklamante (karik prontu atu fornese no publika) / Information about the Grievant (if willing to provide)				
Naran / Name				
Numero Telemóvel / Phone Number				
Hela Fatin / Address				
Defini Assaun Immediata e Necessaria/ Define Immediate Action Required				
Assaun Korektivu Corrective Action	Partes Relavante Konsultadas Parties Relevant Consulted	Data Taka Due Date	Responsavel Responsible by	Verifikasaun Assaun Korektivu e Assina Verification Corrective Action and Sign off
Define Long Term Required (If Necessary)				
Assaun Korektivu Corrective Action	Partes Relavante Konsultadas Parties Relevant Consulted	Data Taka Due Date	Responsavel Responsible by	Verifikasaun Assaun Korektivu e Assina Verification Corrective Action and Sign off
Taka ba Keixa ou Reklamasaun / Grievance Closeout				
	DATA/ DATE		**ASSINATURA/ SIGNATURE**	
Data Responde Verbal ba Reklamante/ Date Verbal Response Provide to Grievant				
Data Responde Formal ba Reklamante/ Date Written Response Provide to Grievant				
Konfirma Receivu ba Resposta nian/ Confirm Receipt of Response Konfirma Taka / Confirm Closeout				

Appendix 3 Maps for DWWSP – Dili West - Description of Environment

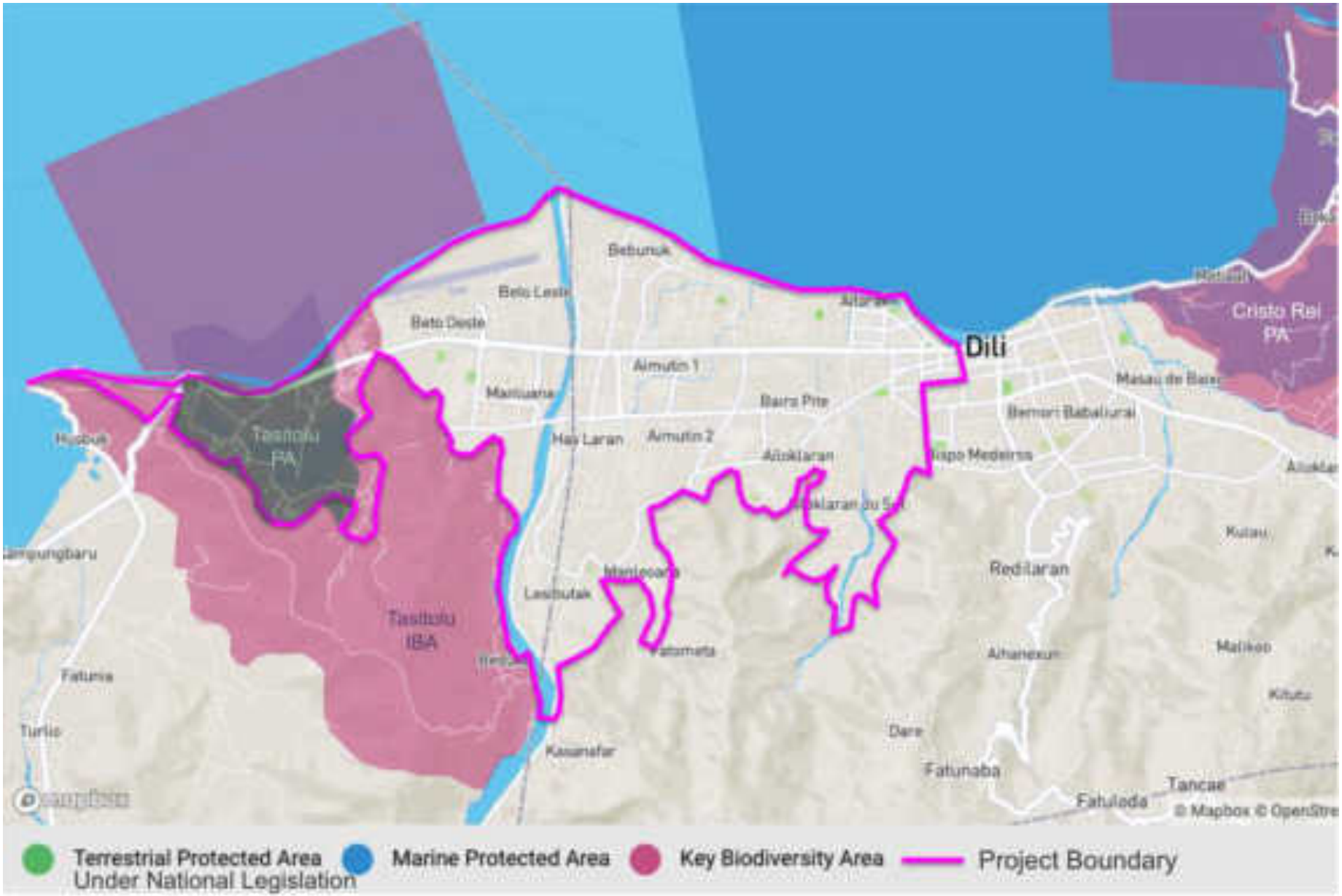
3.1 Figure 12 River and Spring System in Dili West Project Area



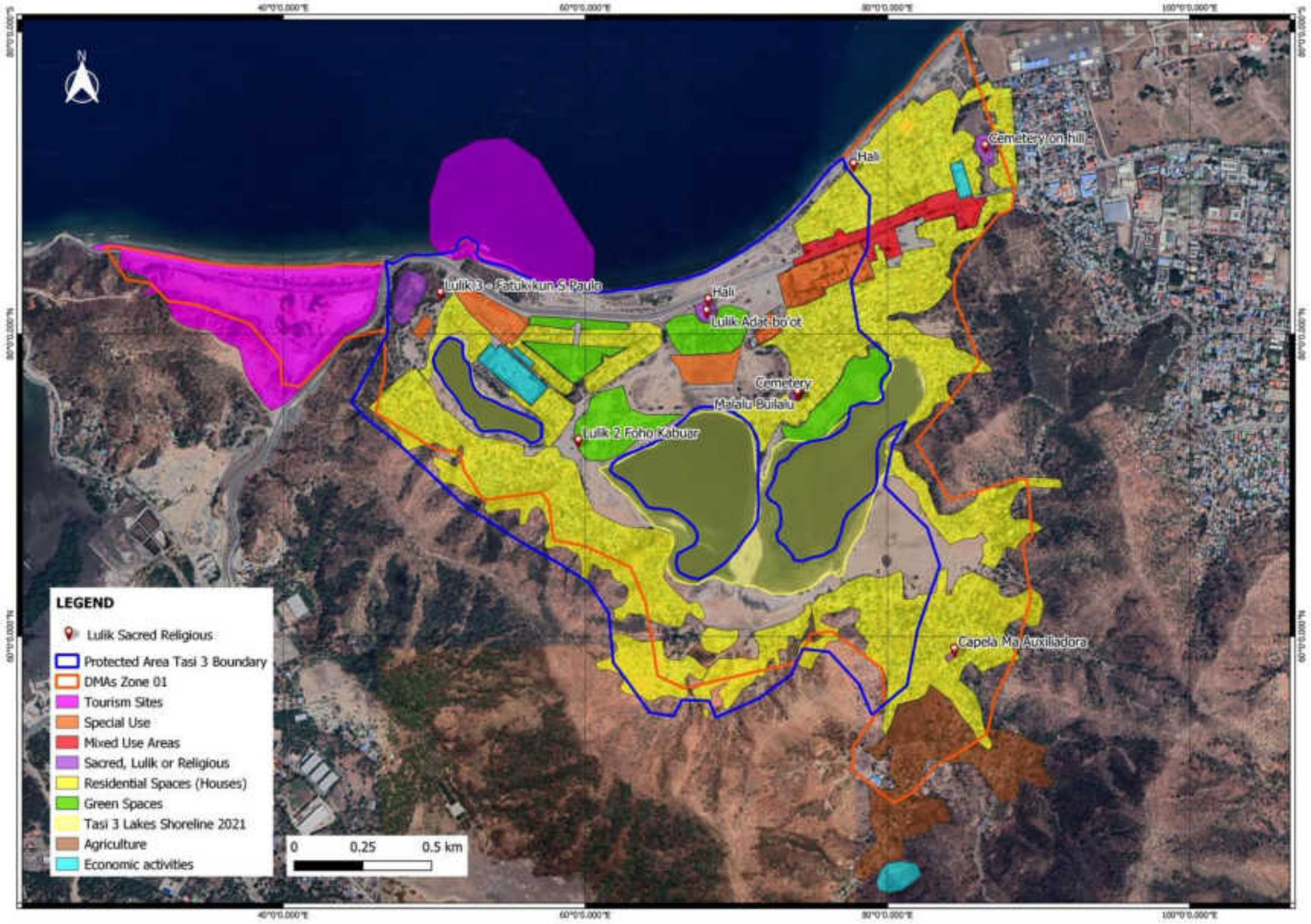
3.2 Figure 13 Geomorphological Map of Dili and BTL boreholes in Dili - West (Government of Timor-Leste 2020, Dongsung 2022)



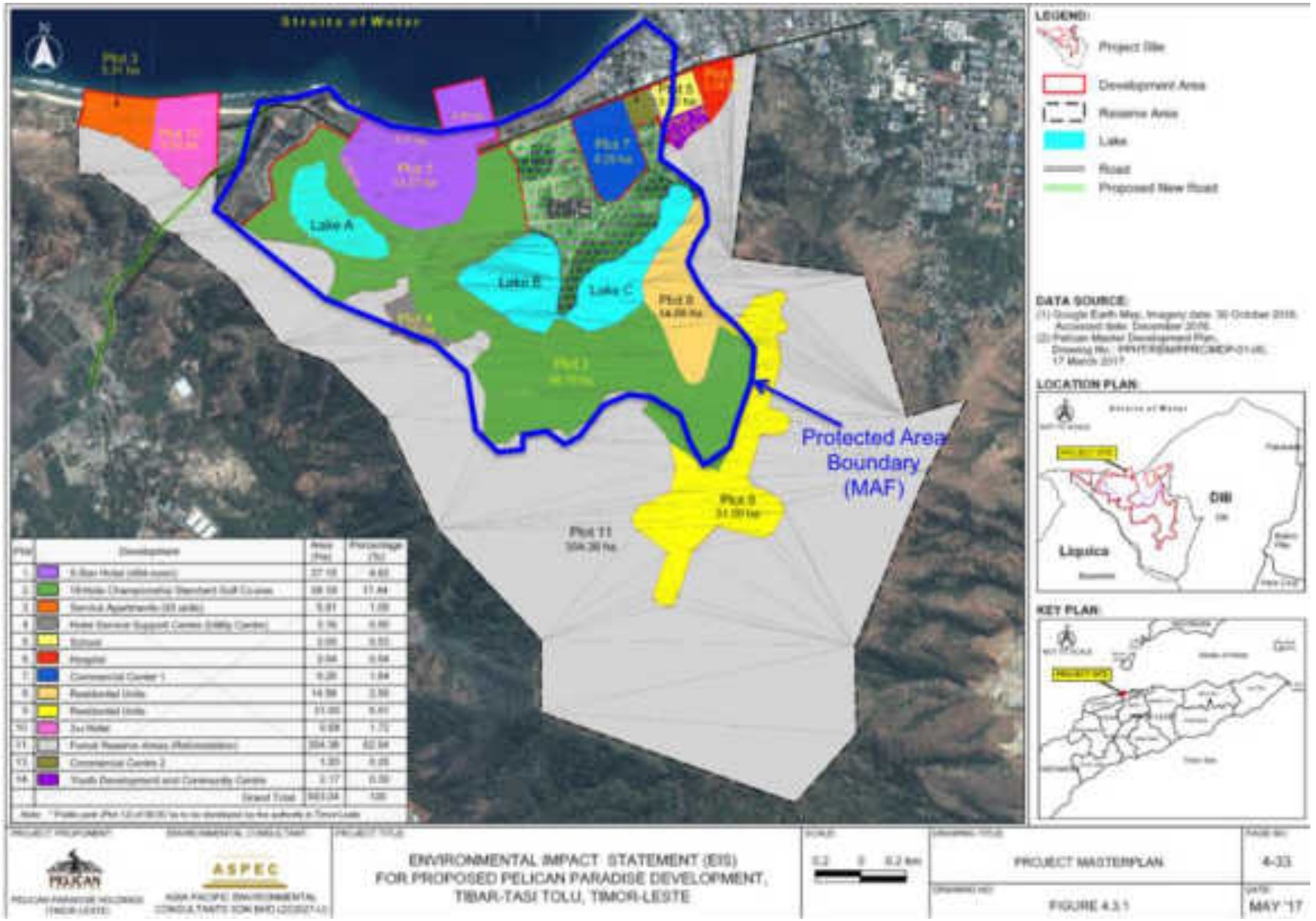
3.3 Figure 14 IBAT mapping of Protected Areas and Key Biodiversity Areas near DWWSP - West Project (Source: www.IBAT-alliance.org, accessed 10.03.2022)



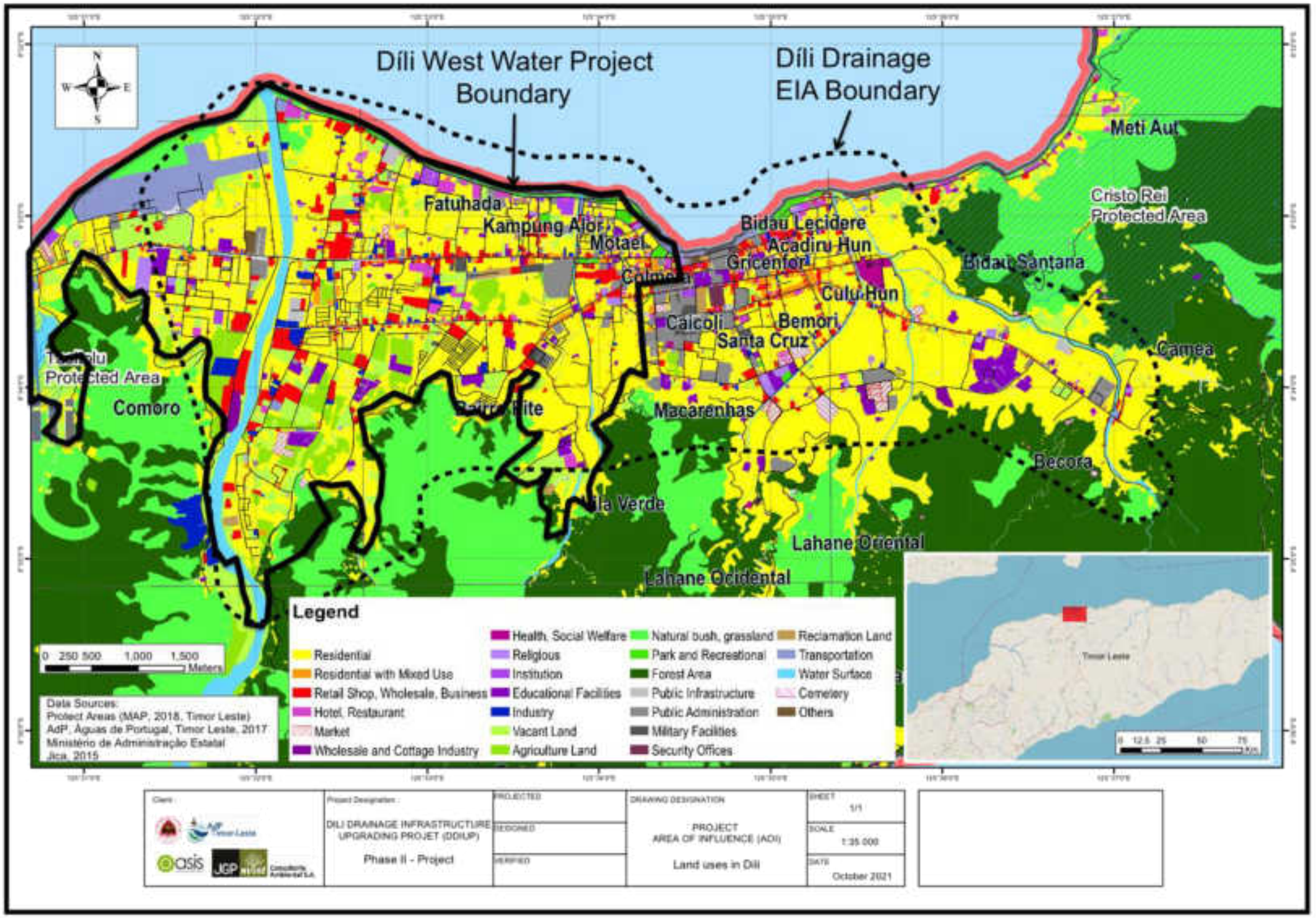
3.4 Figure 15 Current Land Utilization in Tasitolu Protected Area (2022)



3.5 Figure 16 Pelican Paradise master plan (2017) within Protected Area (MAF, 2018)

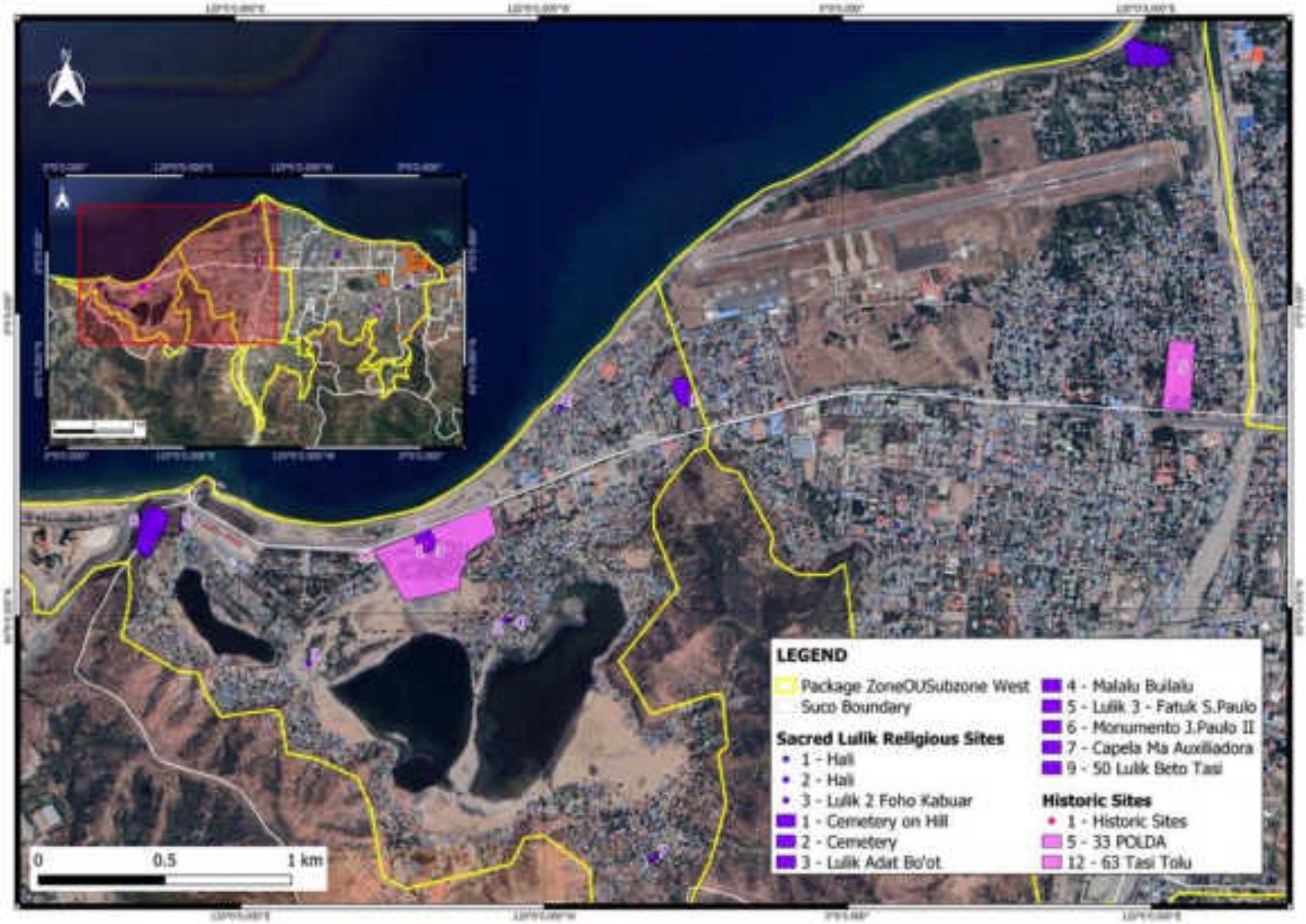


3.6 Figure 18 Land Use in Dili (Source: DDIUP, 2021, based on JICA 2016)

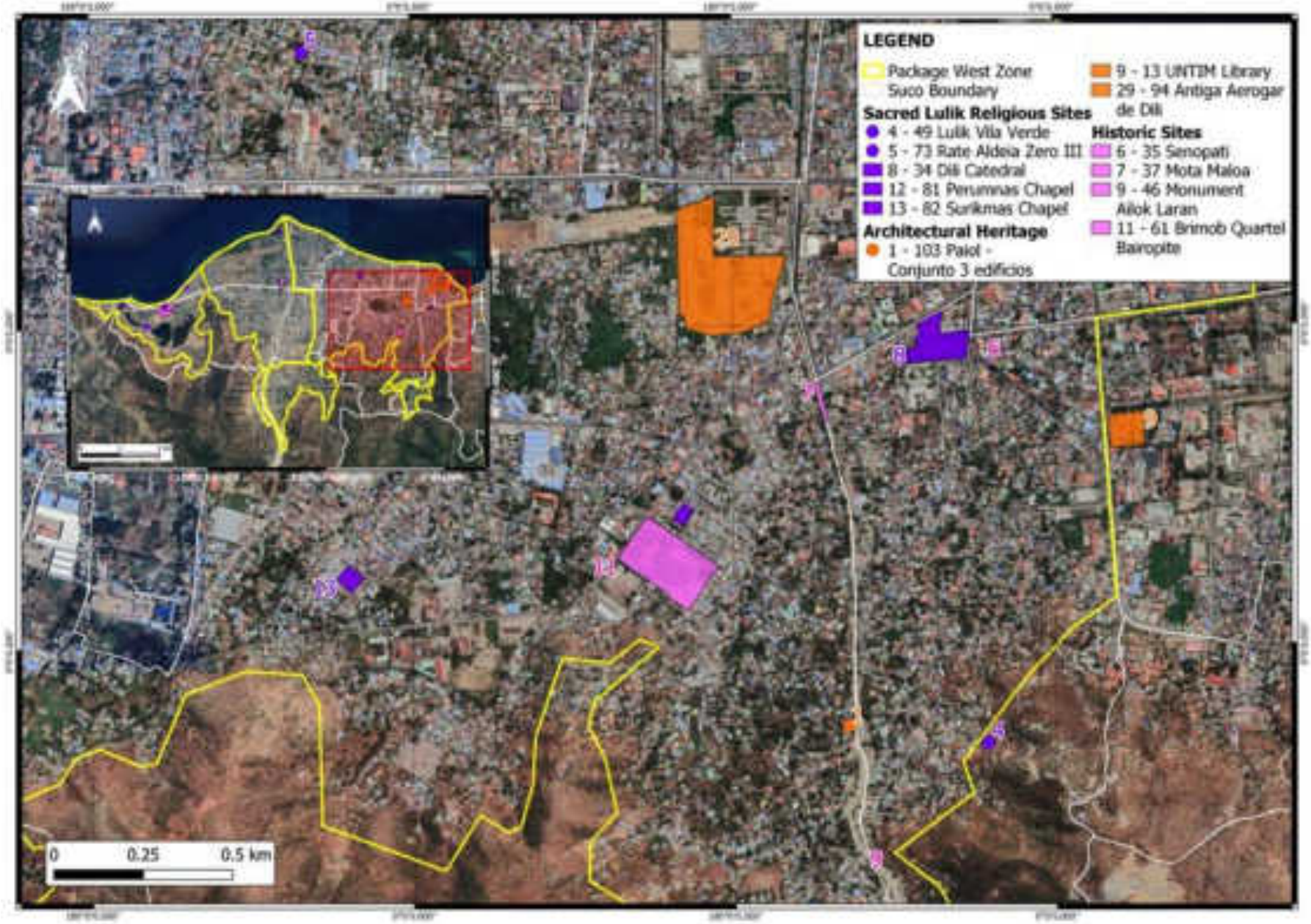


3.7 Figure 19 -Dili West - Cultural sites within General Project Area

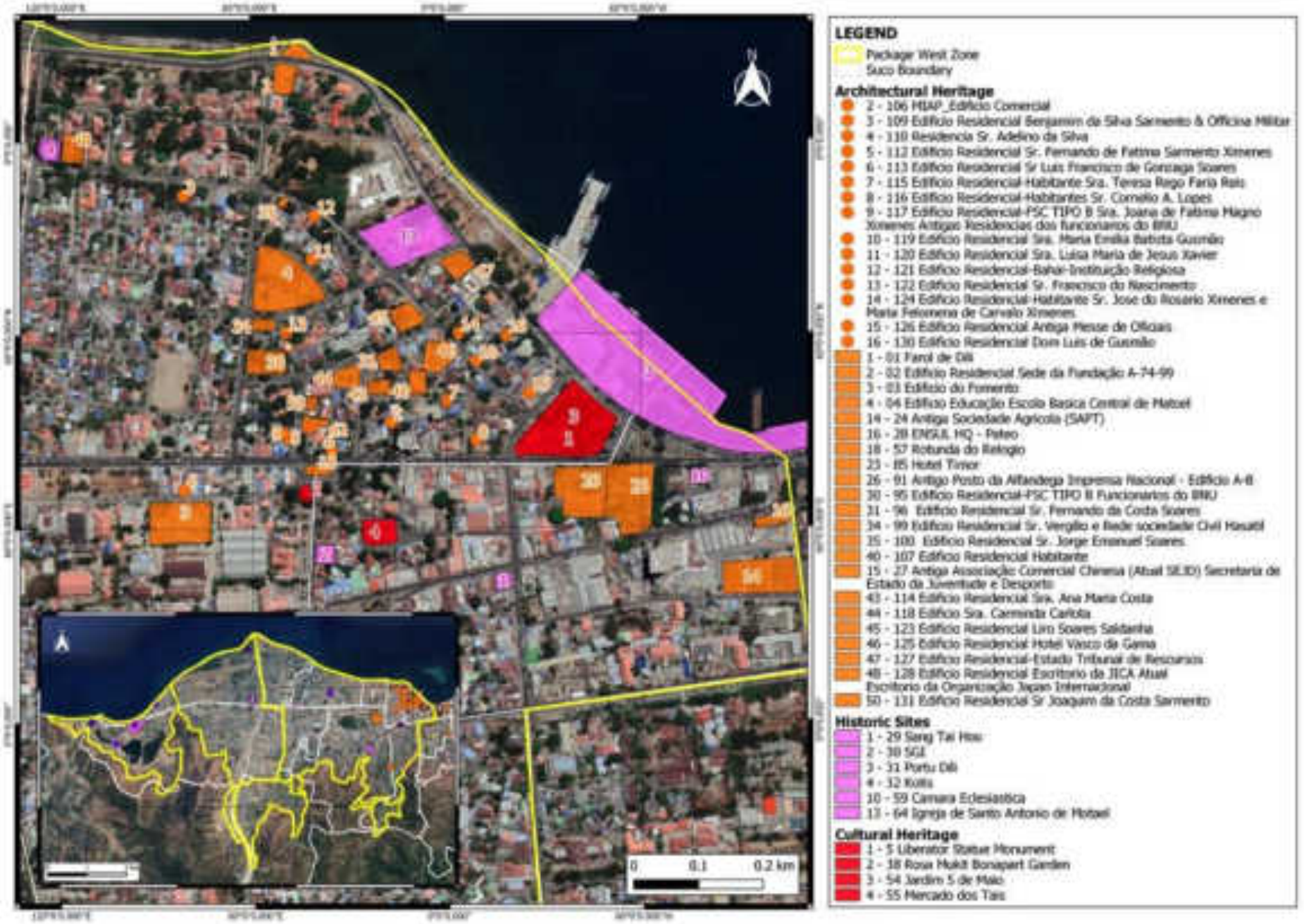
3.7 1 Cultural sites - Dili West Area (North West)



3.7 .2 Cultural sites - Dili West Area (North East)



3.7.3 Cultural sites - Dili West Area (South East Blow Up)



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Appendix 4 Public Consultation Meeting Notes

a) Public Consultation - PA01 Be'e mos (4th March 2022)

PUBLIC CONSULTATION, PA01 - BE'E MOS

MINUTES OF THE MEETING

1. Details and Agenda

Date: 04 March 2022

Time: 09:00 am to 13:00pm

Location: Sede Suco Manleu

Agenda of the Meeting

- Introduction (Chief of Suco Manleu)
- Brief introduction (ANLA Representative)
- Presentation – Environmental Process
- Presentation – Social
- Discussion : Q&A

2. Introduction

2.1. Jacob Tilman Soares (Chief of the Suco)

The water is not working effectively due to inefficient work and unwell controlled from the current government, especially in Suco Manleuana as the center of the water source, always facing big problems in regards to water, another reason is some parts of the community in Manleuna are currently using water pump (Sanyo).

The community in Suco Manleuana are fighting each other as the water is unwell controlled by the Government and we are requesting to BTL to pay attention on this matter, and implement regular monitoring and provide the technician to improve the water system in this area.

Public Consultation and manage those community are currently using the water pump (Sanyo)

2.2. ANLA Representative (Anibal Soares)

The Plan of the Government under the Minister of Public Work will give an explanation regarding this matter and the technician have presented the graph in order to give detail explanation to the community, also, provided the measurement on how to deal with the worst situation during heavy raining and ensure the community with the good long term water supply system. The plan is to install and distribute the water underground with the purpose that water can reach to different Sucos in order to minimize problem within the community. In case, in the future there is a problem, required to identify how many persons are affected and what are the best solutions to solve this problem.

Just to clarify to the community that the Dili Water Supply Project is under the evaluation of Environmental Management Plan, and will have a new design to consider the water distribution to the community with good pipe design to prevent the impact of natural disaster to the project. The monitoring will be responsible by the Korean Consultor, and the contract had been signed in 2019 with the project design.

The event on April 4 had damaged the distribution pipe and no solution provided to the community, and another concern was the water tank had been damaged as well.

From all the information that we gathered, we will have a communication with the authority to observe the problems and concerns arising from the community.

2.3. Sr. Estaquio Tilman (Chefe Aldeia Lemocari)

Provide solution to the community that currently facing the water problems

3. Presentation

3.1. Project Description

3.1.1. Sr. Evaristo De Sousa (Rep. Dongsung Engineering):

Process of the project: this project was supported by the Korean Government to provide help and solve the concerns of water within the Dili Community. There are a lots of people have not access to clean water, and only 30% of them have access with low quantity of water. As we all know, another problem is we have an old distribution pipes that had been used since Indonesian and Portuguese time and we have no idea either the pipes still working properly or not. Another concern is the illegal connection where some of the community using water pump (Sanyo), and another problem is we have a low capacity of water and insufficient reservoir water due to as the year passed by, the population rate keep growing within the community caused not all of them have access to clean water.

This project has 2 zones that will receive financial support from the World Bank, and East Dili and West Dili from the Asian Development Bank (ADB). We all know our government had assigned and trust Dongsung Engineering (KOREA) to solve and address the concern from the community in regards to water, because of the following:

- Mostly all of the people have no access to water, aside from 30% people that currently receiving the good water quality and some of them access to the water that sometimes not working properly.
- Illegal connection through water pump (Sanyo)
- Insufficient water capacity and reservoir
- Only 10% actively pay water bills and the rest are not.
- In 2030, everyone will have a good water quality for 24 hours.
- The large group East and West Dili will ensure and address the problems arising from the community

3.2. Environmental Safeguards and Review

3.2.1. Presentation – Environmental Process: Vasco Andre Lobato Leitao (Rep: Mott MacDonald)

The objective of this presentation is to focus on the Be'e mos area, which will observe the impact or the concerns of the clean water and require the specific environmental information from the community. ADB will financing this project and the implementation of the project is to have the positive result/impact to the community, and will have the good control and monitoring in the environmental part.

In the distribution part will install a water tank on top of the hill with the distribution pipes across every houses with the sufficient water pressure, and that distribution pipes will be installed underground (under the roads) to avoid any damage.

The objective is to explain the general plan regarding the environmental condition and expected impacts in the Be'e mos area and:

- Ensure the project sustainability
- Integrate environmental consideration of this project and in terms of the project decision, based on Timor Leste Legislation and the ADB SPS 2009, for further loan process decision.

3.3. Social Safeguards

3.3.1. Presentation Mrs. Carolina Carlos (Rep: Mott MacDonald)

The presence of ADB team here is to observe the progress of the project itself, in particular the participation of the woman during the project cycle, less to collect information and opinion as part of the project named focus group discussion (FGD). This program has conducted in October last year with more less 20 participants. As we all know that, woman took important responsibility and knowledge in water consumption hence, the participation of woman during the process is needed.

Today, I am here to support our Social Specialist to look at the economy activity in details per household, as one of the main requirement for the needs of local community in terms of the access for the clean water.

The main objective of this meeting is to prepare and organize the clean water project for the future plan, rehabilitate the water tank for the community.

4. Q&A Session

4.1. Sr. Vicente Freitas (Chief Aldeia of Mundo Perdido):

When will the implementation of this project start? As currently, lot of community still access water from the river for domestic use.

4.2. Sr. Staqio Tilman (Chief Aldeia Lemocari)

In line with the project itself, there are two impacts such as Environmental Impact and Social Impact, that can affect the community environment, how to provide solution and in Environmental Impact can lead damage to the plants or community farm (along the ROWs). So:

a) When the process is affect the community area or any construction, how to prevent it?
b) When construct the water tank, where are the water sources comes from?
c) The process will have to coordinate with BTL, to avoid any conflict in case the community is not totally or half access to the clean water
d) The project have to provide solution to the community or respond to the impacts of the project
e) Social and Environmental Impact

4.3. Sr. Carlos Sarmento (Chief Aldeia Badiac)

Our main concern to this project is we would like to request, when implement this project kindly coordinate with the local authority and prepare a monitoring plan control and minimize the illegal connection.

a) For the future collaboration, kindly coordinate with local authority
b) If in the implementation of the project affect to community house, how to solve this kind of issue?

4.4. Sr. Nilton Martins De Oliveira (Rep. Joven):

a) Mr. Nilton de Oliveira, has a common concern with Mr. Carlos Sarmento, where kindly request to BTL to control the illegal connection and monitoring the water tank and construct a reservoir tank to respond to the community needs during the wet season. In this stage, the local authority and local community are not taking into consideration the future plan but they are more prioritize the current situation and looking for solution to avoid and respond to the current situation.
b) The community of Manleu still complains about the access for the clean water
c) We would like to request a responsibility from this project to the community

4.5. Sr. Staqio Tilman (Chief Aldeia Lemocari)

a) Solution: If it possible to reactivate the profile of water emergency response to include the community.

b) Recommendation: We would like to recommend to BTL to construct a new distribution line for everyone to access to the clean water, as many years post independence there is a lot of community that cannot access to the clean water

4.6. Elvino M. Dos Santos (Chief Aldeia Mauc)

a) Lack of monitoring and lot of community did the illegal connection along the distribution line.

4.7. Answers

4.7.1. Mr. Evaristo (Dongsung):

a) According to the calculation of the water resources within the Dili areas, the short-term start from 2027 to 2030 where all the population will access to the clean water and the long-term is up to 2050.
b) Water treatment: According to the plan before 2027 everyone should access to the clean water
c) When the water sources come from Railaku, all the existing wells will not use, it will minimize. We have the water source in the western site, it will accommodate 30 wells to the population
d) Short-term start from 2027 – 2030
e) Long-term start from 2050, will take water from railaku Glenu
f) This project commence with the design, the estimation of three years construction with the expectation that everyone can access to the clean water.
g) With all the distribution of water, only 30% of the population that pay the water services and 10% not. Based on our national strategic plan 2011 to 2030 stated that everyone should access to the clean water, water distribution to each household with the high quality and available for 24 hours. Therefore, throughout this public consultation will help to solve these problem. This project will divide into part two, east and west of Dili and break down again to two parts namely DMA (district meter area), meaning one or two Aldeia will have one DMA, where is more easy to control from the relevant institution. In terms of the implementation of the system for water distribution, Asian Development Bank will support the government financially with the requirement the project will not give a negative impact to the population and provide mitigation measure.

4.7.2. Rep. BTL (Carlito Soares)

BTL would like to raise a support to the concerns of the population in regards to the environmental and social impact from the west part of Dili, the ADB will support financially as loan to the government with the requirement to follow guidelines that will not reallocate people with mandatory objective so the community environment is not affected.

There are 20 boreholes in Dili and seven active pump installed and 5 active tank, to guarantee water quality, where we use the chlorine. The Be'e moss system is the one that currently support the distribution of water to community. In the near future, everyone will access to the clean water.

This project is to rehabilitate the old pipe and change to a new pipe and increase the perforation before distribute to the community, to rehabilitate and re-install the existing pipe since japanese time and exchange to new pipe.

We will improve the existing four reservoirs or even change to new reservoir for a clean water. In the west part (Golgota) malinamuk, the location for the tank will move a little bit up than before near the "GRUTA" sacred place. In the near future, we will start drilling in this suco.

---------- END OF NOTES ----------

b) PA02 Malinamuk and PA 08 Golgota (21st March 2022)

PUBLIC CONSULTATION

PA 02 - Malinamuk and PA 08 - Golgota

MINUTES OF THE MEETING

1. Details and Agenda

Date: 21 March 2022

Time: 09:00 am to 13:00pm

Location: Sede Suco Comoro

Agenda of the Meeting

- Introduction (Chief of Suco Comoro)
- Brief introduction (ANLA Representative)
- Presentation – Environmental Process
- Presentation – Social
- Discussion : Q&A

2. Introduction

2.1. Mr. Hipolito A. Ximenes, BTL.EP.

In this current situation, our main concerns are clean water. Clean water such main focus for everyone, in terms of the quality and quantity. The majority of the population requires more water as what have been published in the newspaper and related social media, the quantity of water is the main reason in the whole country.

BTL, established in 2021 based on decree Law 41/2020 with the objective on how to guarantee the clean water for the population during 24 hours with enough quantity and good quality. The long-term of BTL plan is the physical improvement of the clean water system in Dili and within 13 municipalities.

BTL have been carried detail engineering design for the four project of water in municipality Baucau, Viqeuque, Lospalos and Manufahi inlcuded Dili.

Physical project that have been implemented according to the environmental law, in base law of the environmental article 5, line C and H where stated the principle of the integration of prevention, where the implementation of the project require the mitigation when give a negative impact to the environmental. The mitigation measure is needed in place to control.

In line H, explain that the principle of the integration, the political of the environmental need to integrate in the physical project in all sectors, in terms of road or water sector is more important is to consider by conducting the public consultation as part of the requirement of the environmental license.

The project proponent, during this public consultation will explain in detail the outline of the project itself. In this Public consultation will discuss further about the zone one and two in suco malinamoc and golgota in three parts. Part one, will talk about the golgota system where support by more less four groups that can define to suco Comoro.

2.2. Eurico da Costa De Jesus (Chefe de Suco Comoro)

In the previous the suco Comoro was consist of 31 Aldeias, then in 2017 he government declare according to the decree Law no. 90 stated that the suco Madohi consist of 8 Aldeias and Suco Bebonuk 5 Aldeias, Comoro 14 Aldeias

Most of the community access water from the West Dili, and it doesn't mean they don't have access to water, however, as there are a lot people have no access to water as they are unregistered consumers. Another concern is most of the community is currently use the long-term water pump (Sanyo). This wrong system needs to be controlled by Minister of Public Work under the Water Department, and control as well the clean water to avoid any unexpected risk to health.

The concern from the Chief of Suco address to BTL in Aldeia 12 Outobro is regarding the distribution of the water, as currently the community in Aldeia 12 Outobro use the underground water pump for their daily needs which is the taste of the water is salty.

3. Presentation

3.1. Project Description

3.1.1. Sr. Evaristo (Dongsung.,Eng)

The Donsung representative introduced the Urban Water Supply Project and the design distribution pipes, and determine the new water system to the community in Dili Capital and include to the system other part of metropolitan area, the question was why do we need the new system?, we would like to answer that, the old water system is currently not working maximal which caused a lot of people have no access to water. Therefore we need to have the new water system. It does not said that only 70% have access to water but it reverse, that means only 30% that is currently have access to clean water with good quality and quantity.

First, require to improve the capacity of the system, especially the water treatment plant and reservoir tank, and additionally replace the underground old pipes that had been used since Portuguese and Indonesia time that had become one of the reason why most of the people have no access to clean water.

- Environmental Impact
- We as human being created the impact itself through felling (tree cutting), slash and burn agriculture. All of these activities contribute to air pollution and reflected to the ozone then resulted the climate change, hot-weather, low intensity of rain, and sometimes lead to the landslide.
- The project is divided to 2 parts: West Dili (started from Maloa) and East Dili.
- Socialization focuses on clean water sector
- The three (3) water tanks, Be'e mos, Malinamuk and Golgota

The benefits of the project

- This project is to benefits the entire population in Dili through improve the water system.
- Construct the good quality of water tank
- Water supply quantity during 24 hours
- Include the water treatment plant and reservoir tank
- Require treatment for underground water
- Distribute clean water to all of the community
- Facilitate first, second and tertiary distribution line
- Distribution system of water

3.2. Environmental Safeguards and Review

3.2.1. Presentation – Environmental Process: Vasco Andre Lobato Leitao (Rep. Mott MacDonald):

The consultant presented the conditions of the Package Areas and the areas where there were more environmental concerns, particularly the pipe laying and mitigation as this is the major activity in the construction phase. There was a focus on the PA 08 - Golgota, due to its classification as a protected area and also its relatively degraded condition due to urban expansion and informal settlements in the area.

3.3. Social Safeguards and Review

3.2.1. Presentation – Carolina Carlos (Rep: Mott MacDonald)

The project proponent would like to state as the following:

First of all, huge congratulation to ADB for conducting the social study and the importance of the participation of woman where 44,6% woman cover all the household services. Another congratulation to the all participants here specially woman, today we would like to hear the opinions and recommendation for the proposed project where concerns from all of you are our main objective for today's meeting.

When it comes to the project construction, there will be a possibility for any related issue in regards to the project implementation either social or technical. The contractor will have to adapt to the situation. The Dili Urban area is quiet small and the percentage of the household of suco Comoro is increased significantly from 2017 to 89%. With all these confusion, we would like to invite the entire local representative to be take part in this process.

4. Q&A Session

4.1. Sr. Julião Gurterres (Lian-Nain Suku Madohi)

a. Where is the location of the drilling?
b. What is the effort from the project proponent to take a responsibility to solve the illegal connection? What is the political things that need to taking care of?
c. The strategic development plan for the clean water is consider as a NGO Program or Government program?
d. If this project is implementing, what is supposed to do with the existing SANYIO??
e. What is the environmental impact for community when it comes to the construction phase?
f. If the impact is happen, who are going to take responsible? Government or BTL?

4.2. Sra. Maria Madalena (Delegada Aldeia Moris Foun):

Based on my point of view, the current water distribution system in our Aldeia is very high risk contaminated and lack of monitoring from the relevant institution. There is no regular monitoring or even the technician is usually conducted a regular check but we can say that just to proof to their institution that they have been monitoring all the system without do a physical check-list. As the representative of the community (leaders) we feel that this project will bring huge benefits to the population for the short and long-term period. With the increase in the population, the need of the water consumption is immediately level-up, therefore we would like to recommend if this project can cover and construct a new reservoir with the sufficient amount of the water that can support domestic needs during the dry season. In addition, kindly suggested to BTL, to apply the restrict law so that the community will be aware of what happening and with the conscience to not do the illegal connection. My concern is more less to claim that with this current amount of water will not fulfill the 2030 requirement, if you don't have water, then we have to buy it from the tank which cost $15

4.3. Recommendations

4.3.1. Mr. Placido Marcal:

Recommend to BTL, in terms of the long-term, if we provide reservoir with the short-term then the long-term canalization for a clean water as we all knew that BTL have been engaged with the Government to centralize the huge distribution lines from Railako. If, we construct the reservoir tank, we can choose to put on top of the hilly area at suco Comoro that will distribute to the population at the suco Comoro and Mandohi mostly in administrative post of Dom Aleixo. In regards to the short-term period, the Aldeia with less than 50 kk will be organizing for the short-term period.

4.3.2. Mrs. Adelina de Jesus (Chefe Aldeia Naroman)

I have a common concern as my Chief of Aldeia, suco Madohi has been suffer for clean water since Independence Day. When we are talking about water distribution, which are going to consider this as personal responsibility mean, we take care of our own water system. There is no point if we constructed then leave it without any monitoring.

Regarding impacts:

- If the construction activity is in the afternoon then the contractor have a duty to control the dust by watering, so that people it will not affect to the near community.
- Distribute the mask and inform;
- In terms of the business, how we are going to solve the issue to the community that don't have a model for business?

4.3.3. Sr. Abilio da Costa (Lian-Nain Suco Comoro)

- If the Tasitolu area covers by sacred place, how we are going to solve this?
- Request to BTL to provide more or less 3 tanks/week.

4.3.4. Sr. Imaculado Conceicão (Chefe Aldeia Fomentu II):

Mrs. Imaculada concern was, during the wet season, some of the community still consumption unhealthy water.

4.8. ANSWERS

4.8.1. Sr. Evaristo Piedade

The first question from Mr. Juliao is in related to the perforation. To be honest, I don't know exactly who did the perforation, however, based on project plan it will add two wells at suco Comoro. Based on overall observation, the community that live near to the distribution line used the daap to take all the water hence, the community that leave far away from the distribution line will receive less water than the other one. This is the problem that currently we are looking for solution, as we all knew that by growing of the population will effect to the water consumption. Therefore, the presence of this project is to improve the capacity of the existing reservoir so that can fulfill the needs of the community. The potential impact that will occur during the improvement of the reservoir or even the canalization for the pipeline will cause unexpected impact to the community plants and house. The government will take part on this and see how to compensate with a fair compensation

4.8.2. Sr . Amelio Quintas (BTL – PMU)

In regards to the improvement of water meter that have been applied, if it is going well or need to improve the government usually only applies in some circumstance instead of improve the system from Becora Mota Ulun to Tasitolu.

4.8.3. Sr. Evaristo (Dongsung)

BTL needs to conduct a monitoring for the water distribution channels and proposed distribution system.

4.8.4. Vasco Andre Lobato (Environmental Safeguards) (Rep: Mott MacDonald):

To respond to the sacred place concern, the more important part is to consider cultural ceremony. We raised this issue as a serious issue because we would like to put this in the management of the project so that the contractor will consider the cultural ceremony or sacred places. I will put this issue in the environmental management plan.

PUBLIC CONSULTATION

PA03 - CENTRAL

SUCO MOTAEL, SUCO COLMERA, SUCO KAMPO ALOR

Details and Agenda

Date: 07 April 2022

Time: 09:00 am to 13:00pm

Location: UNIO Training Centre

Agenda of the Meeting

- Introduction (Chief of Suco Fatuhada)
- Brief introduction (BTL representative)
- Presentation - Project Description
- Presentation – environmental safeguards
- Presentation – social safeguards
- Discussion: Q&A

Introduction

Gaudência Alves (Master of Ceremony)

The objective of this meeting is to hear from BTL team about the improvement of water distribution system in Dili Capital and future construction of reservoir, WTP and boreholes in the west of Dili Capital.

Hipolito A. Ximenes (BTL representative)

Water is an important component in our life and a primary necessity for us which we always face a problem to have access due to the increase in demand for water and quality in the distribution system. Therefore, BTL has a mission to implement water and sanitation politics and the other mission is as a public company, BTL is not only to guarantee the distribution of water to the community to access through water pipes but also need all the community to contribute for better quality.

BTL Plan – To improve Water and Sanitation central system in Timor-Leste and therefore BTL is already prepared master plan including detail engineering design (DED). At the moment, DED's for clean water is already drafted for four municipal capitals such as, Same, Baucau, Viqueque and Lautem including Dili capital. On the other hand, for the master plan studies, we have started for six municipal capitals including, Aileu, Ainaro, Likisa, Ermera, Covalima and Bobonaro. All the project are funded from Timor-Leste OGE (Orçamento geral do Estado) and ADB loan.

For Dili capital, the project is divided into two sectors: East part and West part. For west part is funded by ADB. However, ADB has proper policy on how to access the fun. First principles is to save the environment, because all the project can have negative impact to the environment and society. For

environment, we have an authority Autoridade Nacional Licensiamento Ambiental and ADB Bank also has a proper regulation.

Operation and Maintenance (OM) – To operate all the system and make sure that all the community can have the access to clean water daily. OM staff already identified some problems that the community faced including illegal connection and community that lives close to riverbank connected directly to transmission mains.

Sr. Marcelino Soares (Chefe Suco Fatuhada)

The objective for this public consultation is to improve water distribution system. We have seen and hear about the community that does not have access to water. Therefore, we organize this public consultation to understand and become a reference for us on how to improve water distribution system to fulfill the needs from the community.

Presentation

Project Description

Sr. Evaristo De Sousa (Rep. Dongsung Engineering):

The objective of Water supply project in Dili Metropolitan area is to provide water to the community that not have access to clean water from BTL such as Suco Hera.

We need new system that can have enough capacity to reach the community that not have the access. At present, the water infrastructure that we have still not sufficient to supply water because the total population in urban area increase every year. Statistically in Dili, only 30% of population that have access to quality water whilst 70% is not receive the water from BTL.

The main objective of this presentation is to solve all the problems that related to water and inside our strategic Development Plan for 2011 and 2030 stated that each person has to get quality water with enough quantity as well.

Outline of the water distribution plan are as follows":

- Presentation of the water supply objective
- Presentation of water distribution system maps and reservoir
- The presentation of this project will commence in Dili with 8 package such as: Malenamu, Golgota, Be'e mos, Maloa, central and etc
- Water resources
- Transmission mains
- Distribution mains
- Water control
- WTP
- Example of the underground distribution system map/road edge.

Environmental Safeguards and Review

Presentation – Environmental Safeguards: Vasco Leitao (Rep: Mott MacDonald)

ADB process is to guarantee that the government borrow the money to invest and ADB also needs guarantee from the government that the project will not make major impact. The project can have an impact but, they need a mitigation measure to minimize the impact to minor scale. If BTL do not consider all the impact, ADB will not lend the money. In environment side, we have to give guarantee to them that the project has sustainability, and has to deliver with environment component included.

Based on team evaluation for environment condition in the area and project characteristic based on the guidance suggest that this project can have category B, but ADB license is not the same as the license provided by ANLA because ANLA is adopt the requirement from the government of Timor-Leste. According to the team observation, all the impacts seem to be site specific and temporary.

Environment Impact evaluation from the team continue to maintain based on the description of the project, what the proponent of the project wants to do in the field and the team analyze the project plan and go to the field to confirm. All the concern will record in a document called EMP and summarized and all our evaluation will publish for all to see.

The team has already seen the project components regarding WTP and the distribution from the groundwater and boreholes. In general, when we see the central part regarding the water that is going to flow along protocol road and secondary road have enough place to implement this project with a minimum impact to the community and the transportation.

The environment team also identified cultural heritage that considered to be sensitive place such as gardens and forestry. For example, in the down town are like Motael, we see a high density of Heritage and historical locations, based on official lists from the Ministry of Tourism, the Secretariat of State for Art and Culture and CHEGA. All these require an authorization/license from the relevant entities before commencing any activity near to them.

Social Safeguards

Presentation Mrs. Carolina Carlos (Rep: Mott MacDonald)

The ADB team will gather all information and examine based on requirement from the ADB so that can provide information to BTL and remind them that all the requirements need to be completed before continuing the project.

Relating to social reserve from ADB, they stated that this project will mostly benefit the community, especially women because we all know that, women used water more than men. At present moment, the team has already done verification for infrastructure and also land owners who's their property will be impacted from the expansion of reservoir

If in the middle of the construction, occurs some technical problems between community and contractor than the local authority has the responsibility to solve it. All the technical problems during construction process are better to solve through negotiation, coordination and communication between local community that been affected, proponent and contractor.

ADB not recommends to prolong the process for longer period and involved the court because the objective of this project is to benefit the community. Thus, what we recommend is if the community is not agree with some aspect than inform to contractor or BTL and later on they will notify Chefe Suco and Chefe aldeia. The local authority will record with a process name GAM or better mechanism proposed by all representative.

Another notes that I want to underline is specially in west region of Dili capital, the number of unemployment is risen. Therefore, through this project, we hope that can decrease the number of unemployment through their involvement in this project

Q&A Session 1

Sra. Joana sarmento (Suco Motael):

When will the implementation of this project start? As currently, lot of community still access water at Jardim 5 de Maio (in front of the Dili Port).

Sra. Domingas Pereira (Delegada Fatuhada)

a) The water that we receive from the distribution network Installed before our restauration of Independence is still safe for us to consume?
b) Are you guarantee that water form boreholes are safe to consume?
c) There are communities that take water from the river, is it safe to drink?
d) During your work, how many percentages that you have achieve to provide water to the community in rural areas?

Sra. Hermina Da Costa (Suco Fatuhada)

h) I want to ask about the water distribution in BTN because we don't have access to water. We already inform BTL but we didn't receive water.

Answers Session 1

Mr. Evaristo de Sousa (Dongsung):

Answer to Sra. Joana: regarding the implementation of the project, at the moment the consultant has prepared the DED with 5 phases and we have finished the report. After this phase we will start the provisioning process to look for the company that has a capacity and ability to begin the construction. However, in order to start the project, the government need to discuss with ADB about the project.

Answer to Sra Domingas Pereira: Mr. Evaristo stated that all the pipes that installed during Indonesian occupation will changed because BTL doesn't know the pipes' location. Therefore, the pipes will change with new one based on the studies.

He also adds that before drink the water, we have to make sure that there is no contamination in the water. We also should understand that during the rainy season the quality of water is decreased due to the contamination from rainwater. The underground water also sometimes contains bacteria because of the waste from animal or human. However, in order to get water with high quality we have to dig 50 meters in minimum and requires the treatment.

He also stated that everyone need water but to date some of the households doesn't have access to water. Therefore, this project is to solve this issue in the near future.

Hipolito A. Ximenes (BTL representative)

He explained that, to suco Motael, if the community received the water, they also need to comply with the policy established from the government.

Vasco Leitão (Environmental Safeguards) (Rep: Mott MacDonald)

Explained that BTL intends to do the supervision in the future because when BTL already install all the distribution mains but someone does an illegal connection at the pipes it will impact everyone downstream (environmental, health and Financial) to the surrounding community who have access to this pipe.

Sr. Marcelino Soares (Chefe Suco Fatuhada)

He stated that the main objective of this project is to improve water distribution system to the community. Everyone knows that the current system that we have is not reliable to provide water to the community because it has many illegal connection and failures due to the age of the system. He also adds that the community should ask to BTL what they can do to prevent this type of situation?

Q&A Session 2

Mr. Armenio A. Da Silva (Chefe Suco Colmera)

a) How we can solve the community that face the financial problem? Will they have capacity to access the water?
b) How about the pipes that will not take out or pipes that will leave in underground?

Mr. Saldina Guterres (Chefe Aldeia Ruin Naklekar)

a) If this project is for long term, we totally agree because since 2016 we have spent a lot of money to buy water. What I am asking is can we collect all our invoice and give to BTL to refund?
b) How about the boreholes because BTL has promised that in 6 months we will have the access to water but we didn't receive the water to date.

Sra. Joaninha Alves Soarea (Chefe Aldei Fuslam)

a) In regards to the underground studies for boreholes, we had understood it but are you sure that it will not cause any impact to us?

Answers Session 2

Mr. Evaristo Piedade (Dongsung):

He stated that regarding insufficient of water, pipes broken, illegal connection area a general concerns in Dili urban area. Therefore the government plan is to solve this problem. The water availability at the moment is not enough and the system that we have is too small to distribute water to all the community. He also adds that by 2027, the government will take water from Railaku and Gleno but to do that, government need to build two big dam to accommodate all the water before supply it to the community. He arguments that the water that the community access at present moment is comes from underground and from the surface BTL get it from the rivers, but this will only enough till 2030.

In regards to the blow up of water tanks, he asks the community not to get panicked because engineer from BTL already made a calculation and studies before install the tanks.

Mr Florindo (BTL O&M)

For two Chefes do Suco, he suggests that the government has provide free water and land therefore they should used it wisely and taking care so that the community can used it for longer period because he observed that some households just leave the water drained along the drainage instead of turn the pipes off. He stated that for the long-term run is to assure that the community still has access to water even the population demand is risen.

Summary

The representatives from BTL, Consultants and ADB presented the objectives of the Dili Urban Water project, engineering designs and project implementation plans including financial resources for the project.

During the public consultation the potential environmental and social issues were shared with the communities and their representatives and how environmental and social impacts were going to be properly mitigated.

During public consultation communities or their representatives were mainly concern about the current water supply and how BTL will resolve the issue as it has been happening since long time ago.

Some representatives also concerned about the water quality mainly due to the illegal connections and nearby animal farms in their areas and BTL has not been able to resolve this issue. In addition, the community raised that current pipe had been existing since the Indonesian occupation and these pipes had not been well maintained, including some newer underground pipelines were installed during independence era which were not well maintained too.

Even though some representatives raised their concerns about some waters had been connected illegally, however they emphasized the community should not be totally blamed because they had no choice as water is basic human needs. So, the government shall ensure to provide water to its people in order to avoid or prevent the illegal connections to occur again in the future. So, it should be monitored and actioned by BTL.

Some representatives questioned about the short-term project as Dili Urban Water project is considered long term project. Currently people really need water but struggling to get the clean water. So, how BTL is trying to resolve the short-term water issue etc.

Generally, people have no objection regarding the urban water project as community need to access clean water effectively and efficiently. However, most of the communities still complaints about current water supply which does not meet their requirements.

PUBLIC CONSULTATION

PA05 - MALOA

MINUTES OF THE MEETING

Details and Agenda

Date: 08 April 2022

Time: 09:00 am to 13:00pm

Location: Centro Treinamentu UNIO (Aldeia Terus nain)

Agenda of the Meeting:

- Introduction (Chief Aldeia Terus-nain)
- Brief introduction (BTL Representative)
- Presentation – Project Description
- Presentation – environmental safeguards
- Presentation – social safeguards
- Discussion: Q&A

Introduction

Gaudência Costa (Master of Ceremony)

The Dili Water supply system will have a new construction, as well as the new wastewater treatment plant, and drill underground water at the western part which will be implemented started from 2022 onwards through the financial support from the ADB. Therefore, Government through BTL with the project teams required to have a Public Consultation for information delivery to the community before the implementation of the project.

Dr. Aleixo dos Santos (BTL Representative)

In 2020, BTL as a new company and being trusted by the Government of Timor Leste through the DNSA that responsible for the Water System in the entire territory including Dili. Upon the responsibility, the BTL team would like to receive from community any suggestions and opinions that likely to support the improvement of water system to have a better water quality, and all of the community can have access to it.

Regarding the construction of a new water system, we have to discuss the current situation, and kindly raise your concern according to the existing water system, but first of all please pay attention to the presentation that will be presented, and raise your concerns and opinions for the good future improvement of water system.

Mrs. Paulina S. Fatima (Chefe Aldeia Terus-nain)

The most concern that we identified within our community is a protest about water, as we all know water is vital for our life. Thus, through this project, we would like to request to BTL team to work together with us in order to provide water pipes to the rest of the houses that currently have no access to water, especially in Suco Vilaverde.

Presentation

Project Description

Mr. Evaristo De Sousa (Rep. Dongsung Engineering):

We would like to introduce the Dili Water Supply System and also, we would like to hear from you any convictions, supports or suggestions and questions for the better improvement of this water supply system and at the end everyone can access it for 24 hours without any disturbances. The strategic plan from 2011 to 2030 stated that in 2030 everyone will have access to good water quality and sufficient quantity of water. As a member of United Nations, we know that United Nation has sustainable development goals which 6 out those 11 goals discuss about water. For that reason, the government has a responsibility to manage the water supply system for everyone to have the good water quality and sufficient amount of water. The bad water quality due to untreated water will create negative impact to our health e.g., diarrhea.

In general, only 30% of people have access to good water quality, and the rest 70% have difficulty access to water. The first reason is as the water demand is high as the population is increasing, another reason is we have old distribution pipes that had been used since Indonesian and Portuguese time and we have no idea either those pipes still working properly or not. Therefore, government has an initiative to construct a new water system and reservoir tank with the financial support from ADB and World Bank.

The project will benefit and ensure the community;

- ✓ access to water for 24 hours;
- ✓ access to good water quality i.e., no virus or bacteria is detected inside the water and water must be colorless; and
- ✓ access to sufficient amount of water.

Dili capital is divided into 2 zones which are Eastern and Western part. Eastern part will receive financial support from World Bank and Western Part from ADB.

Social Safeguards

Presentation Mrs. Carolina Carlos (Rep: Mott MacDonald)

The social team has been working with BTL since last year, we also worked with ADB and had a discussion with the Chefe Aldeia Lemorama which focused on the information needed by ADB and deepest explore to this project. In particular, the primary benefit of this project is women. Last year, we visited the Aldeia Lemorama and other aldeias, to hear their concern in social and gender part and the question we asked is in line with ADB system, called Safeguard Policy Statement 2009.

In the future, if the construction is implemented what system we use to claim and/or answer complaints rising from the community, as we know that ADB is likely to maintain peace and stability between the contractor and community. As we have received a lot of information from Chefe Aldeias and several representatives, we also need to have a discussion with a woman delegation as women primarily benefit from this project. What system do we need to apply in case there is a technical problem during the construction phase, for instance, the improper disposal of solid waste near the residential area. The top tools in the system are communication and negotiation. Therefore, we need one focal point from each of the aldeias to represent their aldeias in doing good coordination with the proponent if there is a problem.

Environmental Safeguards and Review

Presentation – Environmental Process: Vasco Andre Lobato Leitao (Rep: Mott MacDonald)

We are doing the Environmental review, because ADB has a regulation to ensure that every project that ADB lends money to, must guarantee the sustainability of the project, therefore, environmental take part in this project to ensure the sustainability, also based on the Timor-Leste laws.

The map shows that the urban area is impacted by this project. Most of the impact is likely to occur during the construction phase. The impact has been identified and analyzed, and the project will provide solutions to minimize or reduce the impact.

Q&A Session 1

Sr. Abrao D.M Jesus (Aldeia Mate-restu):

- Is this project for short or long term?
- We have been notified regarding the plan to fix the pipes within 3 Aldeias, started from Aldeia terus-nain, and the pipe was just being welded and still cannot supply sufficient water to us. When will this plan be implemented?

Sr. Daniel Moniz (Chief Aldeia Laulara)

- I would like to suggest to BTL to have maximum control over those people that are currently doing illegal connections as it is really impacting some communities which have less access to water.

Sr. Julio Agustinho (Lianain/Traditional Leader of Vilaverde)

- I Heard from Mr. Vasco presented that the volume of water is 1200 m^3, is the calculation per day or per minute? And regarding the size of the tank is 400 m^3, where the water volume 1200 m^3 coming from, is it from river or from another place?

Answers

Dr. Aleixo dos Santos (BTL):

As we have explained this plan is to address the problems of water and this is a long term plan (construction up to 2030), but we need to look for the area in Dili that can still be implemented after 2023 as shown in the engineering design plan.

Mr. Evaristo de Sousa (Rep. Dongsung Engineering)

The water will be taken from Maloa with the capacity up to 400 m^2 during summer. Operation and maintenance will address the issue raising by the community and for the better improvement of water supply system. This project is implemented for the upcoming 7 years from 2023 to 2030.

Mr. Vasco Leitão (Additional information) (Rep: Mott MacDonald)

The plan of BTL to be implemented up to 2030 is to ensure that water that reaches everyone's home is safe to drink, at any time of the day or night and at a more affordable cost that those currently paid by all families for water that is not treated and not tested, or that they must pay for gallons for drinking water.

Mr. Antonio da Silva (Additional information)

This project is not only for Maloa area as the Government has a plan to do the water system improvement for the entire area in Becora due to an old distribution pipe that had been used since Indonesian and Portuguese time and we have no idea either those pipes still working properly or not. Also, to ensure that not only 30% of the community has access to water, and the improvement is to supply water for the whole community. In Maloa we will improve the water distribution pipes and construct the water treatment plant.

Q&A Session 2

Mr. Julio Agustinho (Lianain/Traditional Leader Vilaverde)

- My concern is still water as we are currently buying water, I highly demand for this project to be implemented immediately!

Mr. Domingos da Silva (Chief Aldeia Matua)

- If the tank has been installed, then you must fill in with water in order for us can utilize the water already!

Mr. Tomas Jose Goncalves

- BTL, if you still remembered last time, I went with you to determine the location of clean water and you decided to put in the hilly area, do you think is this safe?

Mrs. Feliciana Iris Soares (Chief Aldeia Virgolojia)

- Is the water taken from Maloa for the consumption of the community?
- Which water pipe that distribute from the Central WTP to us?
- Suggestion: Agreed with Mr. Tomas as the case of Caicoli we have water that's coming from the river and will have bad quality during raining season. I highly recommend doing the analysis study for the area of Caicoli and Vilavrede.

Mr. Natalino Ventura (ANLA)

- Raised his concern about the project design and asked if any relevant studies had been conducted by the consultants for the groundwater and if the extraction is sustainable. As this project is financed by ADB, the BTL shall ensure the reliability and the integrity of this project

during implementation and operational phase, especially if the Dili aquifer is enough or if it has the risk to be depleted. The studies must be done to ensure benefit of this project to community and its continuity during the operational phase.

Answers

Mr. Aleixo (BTL Director)

The good plan is for everyone to have access to good water quality through plan and discussion and for better improvement in the future. Maloa already has a new water system to share with other all of the community, and all of the suggestions and questions that we received from you will be considered as a support for this project.

Mr. Vasco Leitão (Environmental Safeguards) (Rep: Mott MacDonald)

Explained that the Consultants are part of a larger team under Mott Macdonald, Dongsung and others. In particular, the groundwater studies have been done by a Thailand Consultancy in 2021 that defined the levels of the sustainability of extraction based on the existing groundwater, current BTL extraction and future water distribution system demand. In addition, the ADB TA was conducting a study to model the aquifer, with review of the data of the previous study, in order to define the maximum extraction for distribution and the project horizon regarding groundwater. In addition, Dongsung have done an analysis of the Surface water sources sustainability for Dili.

For the long term, given that the water extraction has limits on the extraction rates because of Climate Changes and/or salinity intrusion issues, BTL is also looking into longer term studies for sources such as i.e. Water Dams in upper Comoro River (Gleno), to complement the projected increase in population.

Summary

The representatives from BTL, Consultants and ADB presented the objectives of the Dili Urban Water project, engineering designs and project implementation plans including financial resources for the project.

During the public consultation the potential environmental and social issues were shared with the communities and their representatives and how environmental and social impacts were going to be properly mitigated.

During public consultation communities or their representatives were mainly concern about the current water supply and how BTL will resolve the issue as it has been happening since long time ago.

The representatives of the communities raised that some of the water pipelines were constructed and never been broken by their communities, however, they still had no water. Some representatives also concerned about the sources of water to be obtained whether groundwater or rivers and how the quantity of water is guaranteed enough to be consumed by community etc. in addition, some asked about any training opportunities for them in regards to small and medium enterprises and when this project is implemented.

The representative from ANLA also raised concerns about the project design and any relevant studies had been conducted. As this project is financed by ADB, the BTL shall ensure the reliability and the integrity of this project during implementation and operational phase. This is done to ensure benefit of this project to community and its continuity during operational.

Again, generally, people have no objection regarding the urban water project as community need to access clean water effectively and efficiently. However, most of the communities still complaints about current water supply which does not meet their requirements.

---------- END OF MINUTES ----------

Appendix 5 Selected Photographs of the Public Consultation for DWWSP Dili - West

a) Public Consultation - PA01 Be'e mos (4th March 2022)

Participation of the Local Community and Other Stakeholders Before Commencing

PC Head Table (Aleixo dos Santos [BTL], Evaristo Piedade [Dongsung], Anibal Soares [ANLA], Carolina Carlos [MottMacdonald - Social]. Photo by: Vasco Leitão [MottMacdonald - Environment]

Project Description Presentation by Evaristo Piedade (Dongsung National Engineering Specialist)

General View of the Public Consultation Venue

b) PA02 Malinamuk and PA 08 Golgota (21st March 2022)

Participation of the Local Community and Other Stakeholders Before Commencing

PC Head Table (Evaristo Piedade [Dongsung], Eurico da Costa de Jesus [Chefe de Suco Comoro], Bernardino de Cristo Ferreira [Chefe de Suco Madohi] and Marcelino Lemos [Chefe de Suco Tibar]. Photo by: Vasco Leitão [MottMacdonald - Environment]

Project Description Presentation by Evaristo Piedade (Dongsung National Engineering Specialist)

Environmental Component Presentation by Vasco Leitão (Mott Macdonald international environmental safeguards specialist)

Social Component Presentation by Carolina Carlos (Mott Macdonald National social safeguards Specialist)

General View of the Public Consultation Venue (1)

General View of the Public Consultation Venue (2)

Public Consultation PA05 – MALOA, 08 April 2022

General View of consultation

Environmental safeguards expert presenting the environmental issues of the project

Q&A Session and general view of the Public Consultation

PA03 - Central Public Consultation, 07 April 2022

Lead Table with Chefes de Suco for Colmera and Fatuhada, DingSung and BTL Representatives

General view of the Public Consultation

General View (2) of the Public Consultation

Appendix 6 Attendance Sheet of the Stakeholders during Public Consultation

a) Public Consultation - PA01 Be'e mos (4th March 2022)

CONSULTING SERVICES FOR DILI URBAN WATER SUPPLY PROJECT
TIMOR-LESTE

Lista Presensa

Data: 04/03/2022

Hora: 9:00h

Local: Sede Suco Manleuana

Assunto: Konsulta Publika Safeguards Ambientais no Social - Área Projetu 3 - Be'e Mos

Presencas

	Nome	Entidade/Posição	Contacto / Email	Assinatura
1	Filomeno J. [illegible]	Chefe Aldeia M. [illegible]	77863311	
2	[illegible] Guimarães	Chefe Aldeia	77347389	
3	Antonio [illegible]	Chefe Aldeia	98557193	
4	Antonio de Jesus	Chefe Aldeia	76475778	
5	Elvino M. dos Santos	-//- Aldeia	78560062	
6	Carlos Sarmento	-//- Aldeia	77859840	
7	Estanislau Tilman	Chefe Aldeia [illegible]	76266344	
8	Nilton M. [illegible]	Joventude	78066450	
9	Carlos Correia		77291220	
10	Nino José das dores	Delegado	76357924	
11	Daniel [illegible] da Silva	Joventude	75625607	
12	Carlito Estolas	Komunidade	76240569	
13	Domingos Sarmento Barreto		76840201	
14	Rofinha Matos Barreto	Joventude	75989154	
15	Mariazinha C. Gouveia	Joventude	75680936	
16	Hipolito [illegible] Ximenes	DGBC Manager	—	
17	Ana [illegible]	BTL - RHJ	78525541	
18	[illegible] Araújo	BTL - Tecnico	74869081	
19	[illegible] da C. Mendonça	Juventude	75055474	
20	[illegible]	Juventude	77283138	
21	Abilio M. Diaz	KPK	75990762	

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[illegible]	Olcemat [illegible]	Chefe Juventude	77429 865	
24	Elisa Tarqui	Po'os suco	77469606	

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b) PA02 Malinamuk and PA 08 Golgota (21st March 2022)

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DD/MM/YY: 21 - 03 - 2022

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1	Filomena Da Silva Sarmento	Delegado	77156676	-	[signature]
2	Julião Guterres	LIA-NAIN	77377815	-	[signature]
3	Anibal Antero Soares	SEA-ANLA	7509-7342	-	[signature]
4	Celestino da Cruz	SEA-PAULA	7581-5788	—	[signature]
5	João dos Santos	MOP/Floresta	77073620	—	[signature]
6	Joaquim Aparicio Guterres	Chefe Aldeia 7/M	77331476	—	[signature]
7	Bernardino de Cristo Ferreira	Kep. Sefuco	78066449	74541144	[signature]
?	Placido Marçal	Chefe Al. 12/10	77373550	—	[signature]

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9	Atilio da Costa Pinto	Lianain Comuro	77255586	—	
10	Armindo Lemos	Juventude	78267347	—	
11	Tiago Sarmento	DELEGADO	74015400	—	
12	João Magno	chefe Aldeia	7855363	—	
13	RAMIRO GOMES	delegado	77294866	—	
14	Anita F. de Araujo	Delegada	75126496	—	
15	celeste soares	Delegada	78650890	—	
16	Arminda da Silva A. Quefi	Delegada	74[illegible]9416	—	

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17	Agostinha Marçal	Dagasa 12/10	78527504	—	
18	Olivia S. de S. Viegas	Delegada F.II	73250727	—	
19	João A.M. Calau	Ex Aldeia 4/9	77315461	—	
20	Esterlita A. Pereira	Delegada F1	73076096	—	
21	Carlito Araujo	DBL. EP.	78012971	—	
22	Florindo de Jesus	—11—	77285359	—	
23	Hipolito A. Ximenes	—11—	78472155	—	
24	Nuno M.C. Motta	MM			

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25	Amelia Dias Quintas	SPMA - BTL	78076671		
26	Lino Pereira da Cruz	CDO Dom Aleixo	7761 9904		
27	Salvadora L. R. Pereira.	Liurtem.	77869402		
28	Funshiria pe e. Johans	Pres. BTL	—		
29	Tomas de Jesus	Sede Suco	77309690		
30	Maria do Rosario de F. dade. N. de Sousa	Delegado Sé Pto	77083445		
31	Adelina de Jesus	Delegado Naroman BT	77310037		
32	Veronica Soares	Delegado B.leh	7099 6004		

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NO	NARAN	INSTITUISAUN	TELEMOVEL	EMAIL	ASSINATURA
33	Maria Jose K. de Sousa	Comoro	77298033	–	
34	Afonso Rodrigues	Makdoni	78551210	–	
35	Januario Ribeiro Marcelina Alberto Carlos	Makdoni	–	–	
36		comoro	77829147	–	
37	Imaculado da C. D. Pereira	Autori dade loc XF aldeia	77108750		
38	Luis Comoro	— —	78560090	–	
39	Natalino Ventura M. Vitor	Chff ANLA		–	
40	Januario Ximenes	Chefe Aldeia	77319879	–	

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41	Jow Dos Santos	Comoro	77577197	-	
42	Bárbara Fátima A. Pereira	Comoro	78462341	-	
43	Cipriana Ximenes dos Santos	Comoro	77008229	-	
44	Antonio da Costa	Xefe Aldeia	77312595	-	
	Maria M. Guterres	Delegada	78380606	-	

c) Public Consultation Pa05 – Maloa, 08 April 2022

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Data: [redacted]04/2022

Hora: 9:00h

Local: Pavilhão Formosa

Assunto: Konsulta Publika Safeguards Ambientais no Social - Área Projetu 5 - [redacted] MALOA

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2	Fabiola Loy	Estudante	73515155	
3	Celsio [illegible]	Estudante	74437534	
4	C. Carlos	MM [illegible]	74795136	
5	Francisca Pereira	Virgolosa	7725[illegible]	
6	Feliciana Soares	Virgolosa	77572701	
7	Natalina Ventura	ANLA-SEA	76383607	
8	[illegible]	Chefe de Aldeia	77329892	
9	Julio Agostinho	[illegible] VV	78094142	
10	Domingos Sabes	Chefe Aldeia Maloa	77324442	
11	Julio do [illegible]	Chefe Aldeia 09-1-R-R	77394099	
12	Ramaldo M.	Mala-meris	77597625	
13	[illegible]	[illegible]	75544550	
14	[illegible] de [illegible]	[illegible]	77204796	
15	Alice da Costa	Lemorana	76129244	
16	Lidia Martins	Lemorana	75935237	
17	Arlete dos Santos	Director PEI [illegible]	77329536	
18	Ana [illegible]	Media [illegible]	77272220	
19	Julio M. [illegible]	Estudante	79411980	
20	Olga de Fatima	[illegible] Main	77398810	
21	[illegible]	[illegible] Main	77046569	


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Luis J. S. Moreira	BTL. Ep	[illegible]	
[illegible]	OPS Vida Verde	[illegible]	
[illegible]	ANLA - SEA	[illegible]	
Tomas J. Gonçalves	[illegible]	[illegible]	
[illegible]	Chefe aldeia [illegible]	78530370	

d) Pa03 - Central Public Consultation, 07 April 2022

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Data: 08/04/2022

Hora: 9:00h

Local: Pavilhão Formosa

Assunto: Konsulta Publika Safeguards Ambientais no Social - Área Projetu 3 - Central

Presencas

	Nome	Entidade/Posição	Contacto / Email	Assinatura
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2	Aniceto M. Soares	Delegado 03	77580707	[signature]
3	Lorenso Soares	Delegado 03		[signature]
4	Fernando M. de Araujo	" " 01	77560730	[signature]
5	Antonio M. Soares	Chefe Aldeia	75502881	[signature]
6	Natalico Ventura	ANLA	76383842	[signature]
7	Zenilio Fonseca	BTL, EP	76234452	[signature]
8	Luis Soares	[illegible] Bairo Pite	77373868	[signature]
9	[illegible]	[illegible]	–	[signature]
10	Hipolito [illegible]	Env Quality Manager	78472155	[signature]
11	Bernardo Pinto	OPS Mofael	77726872	[signature]
	Delfino Soares	Chefe Aldeia	77506778	[signature]
12	Joaninha A. Soares	Chefe Aldeia	78386881	[signature]
13	Angela L. Martins	Delegada 02		[signature]
14	Silvino da Conceição	Chefe Aldeia [illegible]	77693057	[signature]
15	Florindo da Jesus	official ASM Dili	77282339	[signature]
16	Atanasio A.	Chefe Suco [illegible]	77066411	[signature]
17	Aurelio A. A.	BTL	77035676	[signature]
18	Marcelino [illegible]	Chefe Suco [illegible]	78483868	[signature]
19	Carolina da Cruz	Chefe ANLA	77033580	[signature]
20	Eugénia de Jesus	Chefe Aldeia	77361370	[signature]

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21				
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Appendix 7 Culture and Heritage Sites in the Dili-West Water Distribution Area

Number	Architectural Heritage Name
1	Kotis Farol (Farol de Dili)
2	A-74-99 Foundation Building
3	Mr. Adelino Silva Residence / Fomento Building
4	Motael Central Elementary School
6	Sporting Clube de Timor-Leste Head Office
8	BNU Head Office
12	Former Dr. Francisco Machado High School (UNTL)
13	UNTL Library UNTIM
24	Former Agricultural Society (SAPT)
28	Ensul Head Office
85	Hotel Timor
91	Antigo Posto de Alfandega
94	Antiga Aerogare de Dili
95	Edificio Residencial-FSC TIPO B Funcionarios do BNU
96	Edificio Residencial Sr. Fernando da Costa Soares
99	Edificio Residencial Sr. Vergilio e Rede sociedade Civil Hasatil
100	Edificio Residencial Sr. Jorge Emanuel Soares
106	MIAP_Edificio Comercial
107	Edificio Residencial Habitante
109	Edificio Residencial Benjamim da Silva Sarmento & Officina Militar
110	Residencia Sr. Adelino da Silva
111	Edificio Residencial Sr. Delio Ximenes Teixeira
112	Edificio Residencial Sr. Fernando de Fatima Sarmento Ximenes
113	Edificio Residencial Sr Luis Francisco de Gonzaga Soares
114	Edificio Residencial Sra. Ana Maria Costa
115	Edificio Residencial-Habitante Sra. Teresa Rego Faria Reis
116	Edificio Residencial-Habitantes Sr. Cornelio A. Lopes
117	Edificio Residencial-FSC TIPO B Sra. Joana de Fatima Magno Ximenes Antigas Residencias dos funcionarios do BNU
118	Edificio Sra. Carminda Carlota
119	Edificio Residencial Sra. Maria Emilia Batista Gusmão
120	Edificio Residencial Sra. Luisa Maria de Jesus Xavier
121	Edificio Residencial-Bahai-Instituição Religiosa

Number	Architectural Heritage Name
122	Edificio Residencial Sr. Francisco do Nascimento
123	Edificio Residencial Liro Soares Saldanha
124	Edificio Residencial-Habitante Sr. Jose do Rosario Ximenes e Maria Felomena de Carvalo Ximenes
125	Edificio Residencial Hotel Vasco da Gama
126	Edificio Residencial Antiga Messe de Oficiais
127	Edificio Residencial-Estado Tribunal de Rescursos
128	Edificio Residencial Escritorio da JICA Atual Escritorio da Organização Japan Internacional
130	Edificio Residencial Dom Luis de Gusmão
131	Edificio Residencial Sr Joaquim da Costa Sarmento

Number	Historic Heritage Name
5	Liberator Statue Monument
22	Mrs. Rosa Lay Residence
25	Water Front
27	Hasatil Civil Society Network
29	Sang Tai Hoo
30	SGI
36	UNTIM
31	Dili´s Port
32	Kotis
33	POLDA
35	SENOPATI
37	Mota Maloa
46	Monument Ailok Laran Massacre
59	Camara Eclesiastica
61	Brimob Quartel Bairopite
63	Tasi Tolu
64	Igreija de Santo Antonio de Motael

Number	Cultural Heritage
5	Liberator Statue Monument
38	Rosa Mukit Bonaparte Garden
54	Jardim 5 de Maio
55	Mercado Tais

Number	Sacred Lulik and Religious sites
34	Dili Cathedral
49	Lulik Vila Verde
50	Fatin Lulik, Aldeia Beto Tasi
73	Rate Aldeia Zero III
81	Perumnas Chapel
82	Surikmas Chapel

	Inside Tasitolu area
	Cemetery on Hill
	Cemetery next to Malalu Builalu
	Lulik Adat boot
	Malalu Builalu
	Lulik 2 - Lulik Foho Kabuar
	Lulik 3 – Fatuk S. Paulo
	Monumentu J. Paulo II
	Capela Maria Auxiliadora

Appendix 8 Surface and Groundwater Quality Results for Groundwater Sources in Dili

1. Surface Water Sampling Campaign (Source: Dongsung, 2021)

Item	1st Sampling Date, (Dry Season)	2nd Sampling Date, (Wet Season)
Benamauk	05/10/2020	02/02/2021
Nahaek	06/10/2020	03/02/2021
Lakoto	06/10/2020	03/02/2021
Motodare	06/10/2020	03/02/2021
Maloa	06/10/2020	02/02/2021
Bemos	07/10/2020	01/02/2021

2. Surface Water Results [Dry and Wet Season] - Selected Indicators (Source: Dongsung, 2021)

Item	1st Sampling Date, (Dry Season)			2nd Sampling Date, (Wet Season)		
	Turbidity (NTU)	Total Coliform (CFU/100mL)	E. Coli CFU/100mL)	Turbidity (NTU)	Total Coliform (CFU/100mL)	E. Coli CFU/100mL)
Benamauk	3.4	11	0	1,077	TNC	18
Nahaek	1.1	0	0	98.9	33	3
Lakoto,	1.4	4	0	82	7	2
Motodare	3	3	0	182	TNC	10
Maloa	0.7	18	0	843	TNC	16
Bemos	0.8	3	0	20.6	6	2

TNC(Too numerous to count)

3. Groundwater Quality Survey Results (Source: Government of Timor-Leste, 2019)

No.		East Timor Guidelines	B05	B09	B10	B39	B11	B12	B14	B17	B37	B40
Sampling Point			COMORO B	MANUANA	MANLUANA MARKET	MALINAMUK	MARCONI	BAIROPITE-1	BAIRO PITE-2	MASCARENHAS	CARCOLI	QUINTAL BOOT
Date			4-May-10	3-Mar-10	9-Jul-15	16-Mar-10	14-Aug-12	18-Mar-13	25-Mar-13	27-May-12	7-Feb-11	6-Apr-10
Initial GWL (m.)			1.92	10.40	25.93	9.44	20.9	0.00 (Artesian)	0.00 (Artesian)	3.20	2.00	1.00
pH		6.5-8.5	7.7	7.9	8.1	7.4	7.4	8.6	7.4	7.7	8.3	7.2
Cond.	(µS/cm)	NS	331	330	340	404	328	713	438	904	659	515
TSS			0.02	0.02	0.01	0.02	0.02	0.05	0.05	0.07	0.05	0.02
TDS	(mg/L)	1000	165.4	165	170	202	164	356	219	452	329	258
Salinity	(%)	NS	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.5	0.4	0.3
Temp.	(oC)	NS	24.7	20.8	20.3	24.7	26.0	23.1	24.0	27.7	21.5	11.4
Turbidity	(NTU)	5.0	0.2	0.7	1.7	2.3	2.0	0.6	4.8	0.6	2.6	1.0
NH3-N	(mg/L)	1.5	0.4	0.1	0.9	1.4	ND	ND	0.2	0.5	0.9	0.6
NO3-N	(mg/L)	10	0.2	ND	0.6	0.1	0.3	ND	ND	0.1	0.6	0.3
NO2-N	(mg/L)	1	0.002	0.002	0.004	0.004	0.007	0.005	0.012	0.005	0.008	0.002
Fe	(mg/L)	0.3	0.03	0.01	0.06	0.1	0.10	ND	0.1	ND	0.2	ND
Mn	(mg/L)	0.5	ND	ND	0.1	0.1	0.2	ND	ND	ND	0.1	ND
Fluoride	(mg/L)	1.5	0.9	0.23	0.29	0.26	0.29	0.39	0.43	0.35	0.47	0.10
Cl	(mg/l)	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ca.Hard	(mg/l)		115	115	95	80	110	195	125	205	210	190
AS	(mg/l)	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hardness	(mg/L)	200	220	160	110	84	250	220	210	200	225	215
Alkalinity	(mg/L)	NS	NT	NT	100	NT	195	200	200	190	215	NT
So42-	(mg/L)	250	26	31	18	29	41	44	38	45	36	47
T.Coli	CFU		TNC	TNC	TNC	TNC	TNC	5	NA	TNC	TNC	16
E.Coli	CFU	0	4	NA	4	NA	NA	NA	NA	NA	NA	NA

Source: Groundwater Feasibility Study, Government of Timor-Leste, 2019

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Appendix 9 Applicable Environmental Quality Standards

(1) Ambient Air Quality Standards

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

Parameter	Averaging Period [a]	WHO Air Quality Guidelines (μg/m^3)		Standards to be followed by Project (μg/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.
[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
Escerichia 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

Parameters	Units	Timor-Leste (DL 31/2020 – Control of Water Quality for Human Consumption	WHO Guidelines [1] [2]
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 CaCO3	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 odor	dilution rate	Free of taste and odor	Free of taste and odor
Total dissolved solids	mg/L	1000	1000
Turbidity	NTU	5	4

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

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

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

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

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

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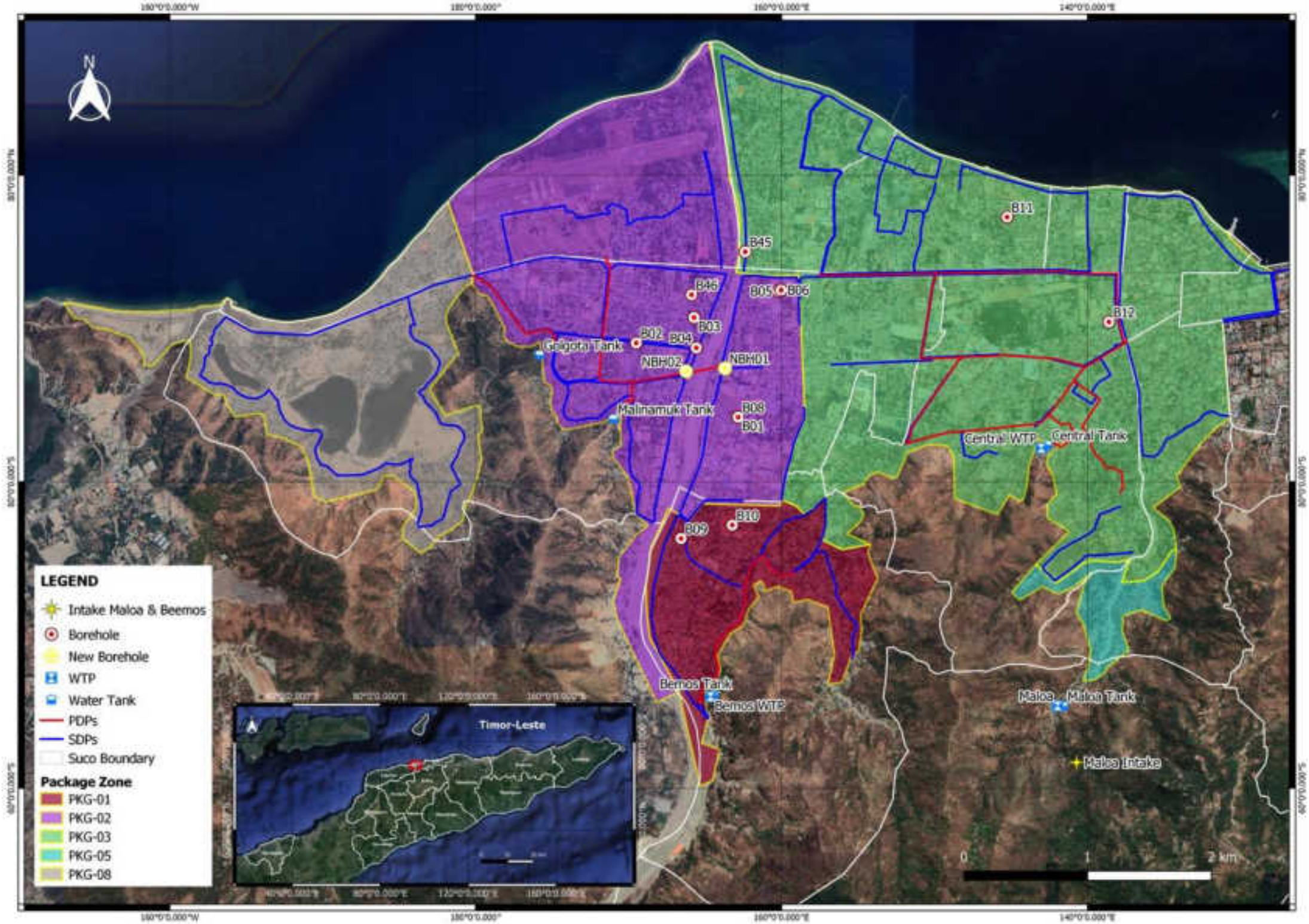
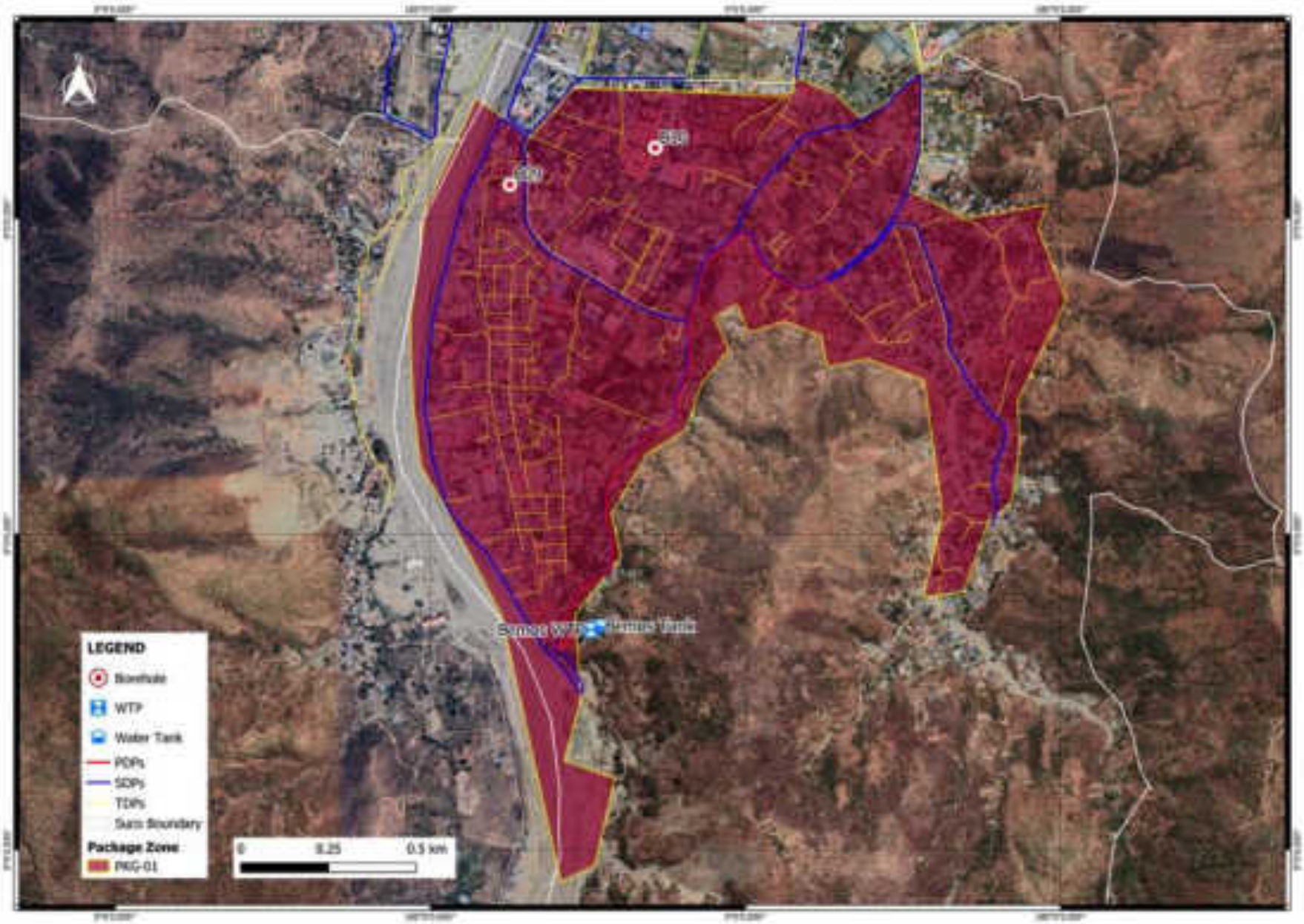
Appendix 10 DWWSP West Maps – Proposed Water Supply System

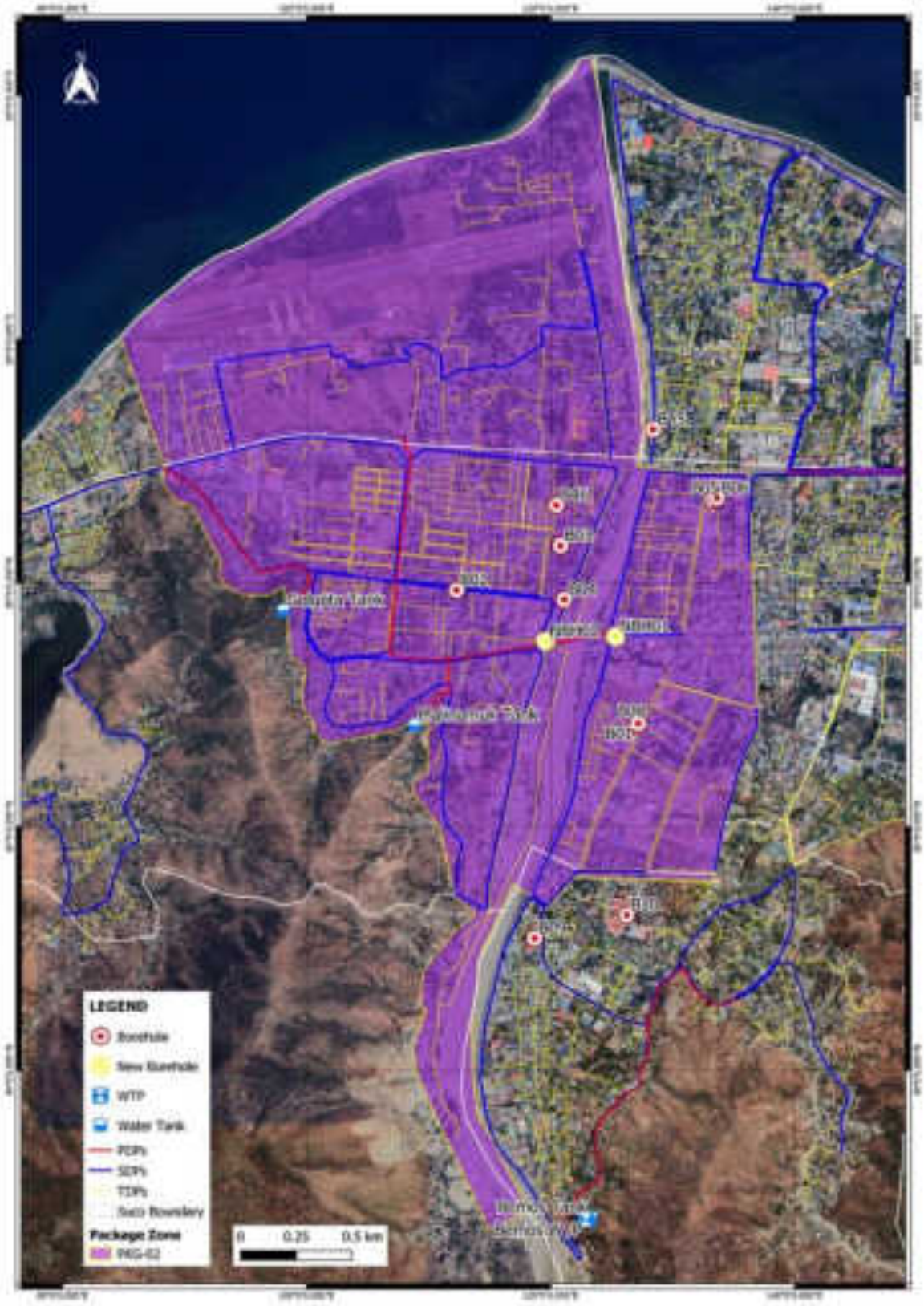
10.1 Location of the Project Components



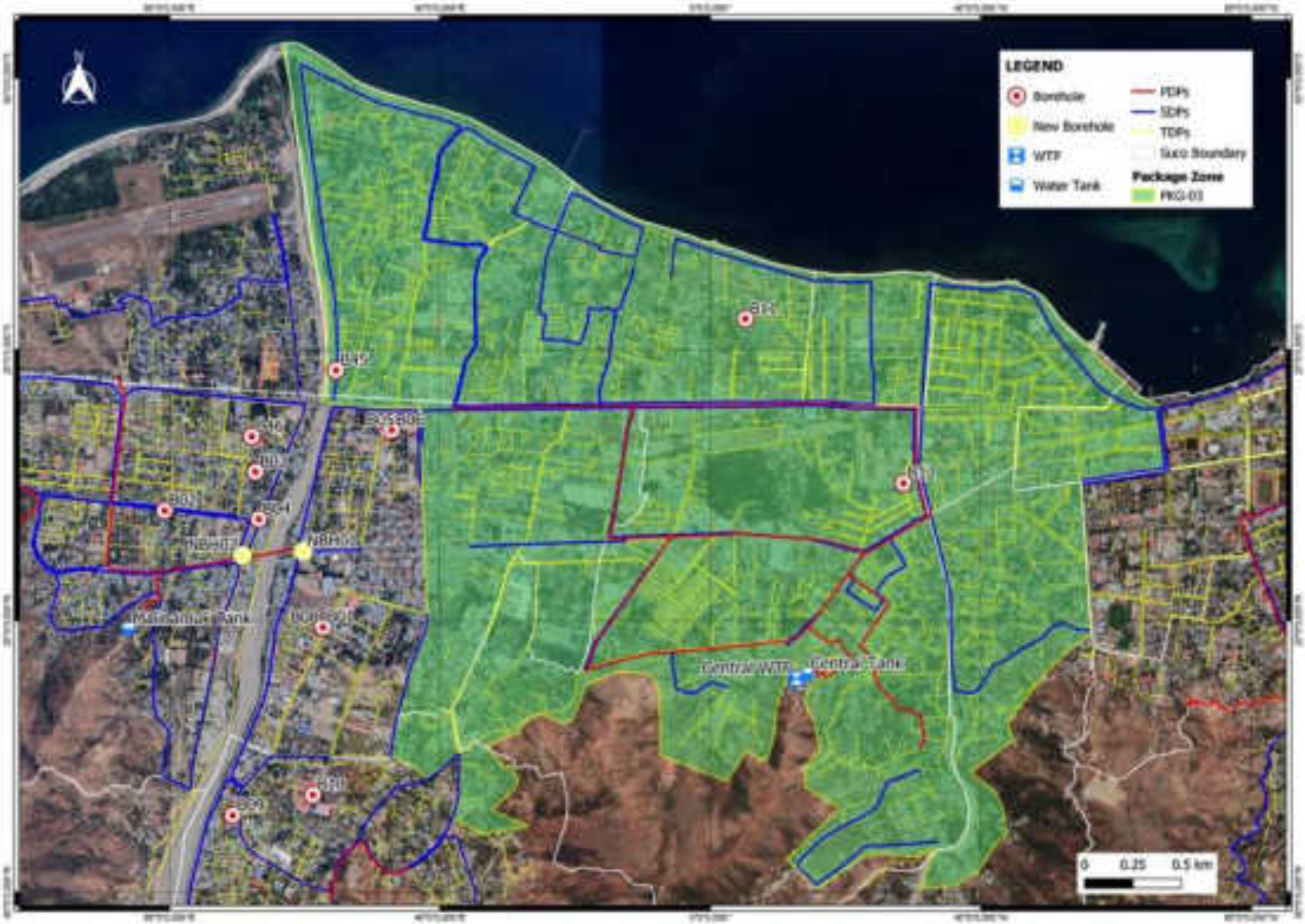
10.2 PA01 - Be'e mos - Proposed Components



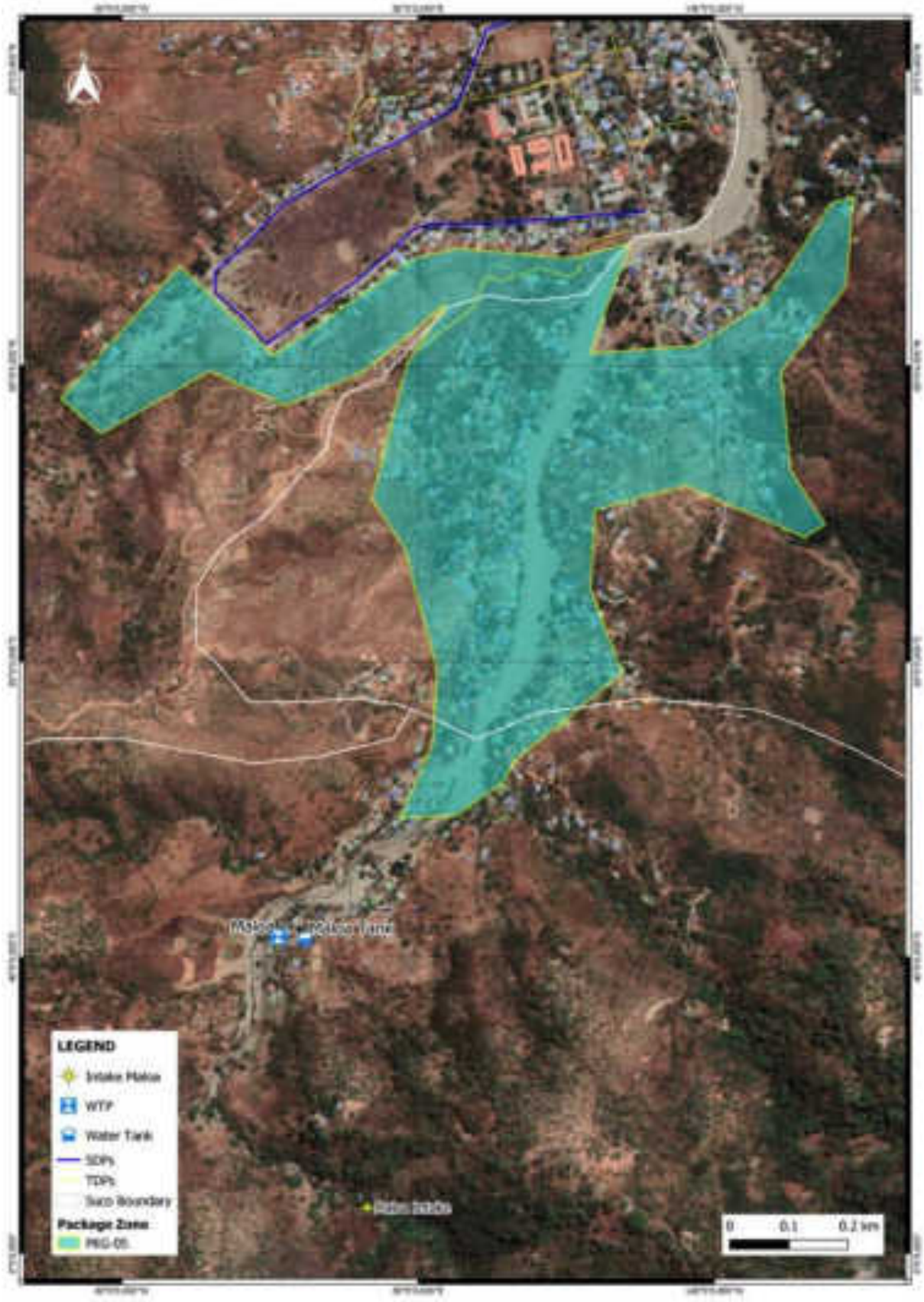
10.3 PA02 - Malinamuk - Proposed Components



10.4 PA03 - Central - Proposed Components



10.5 PA05 - Maloa - Proposed Components



10.6 PA08 - Golgota - Proposed Components

Appendix 11 COVID-19 Protection and Mitigation Measures

1 Construction Site Working Conditions Mitigation Measures for COVID-19	
1. Form a joint team to plan and organize return to work	• Develop or convene a joint occupational safety and health committee with members representing the employer and workers. • Train team members on the basic principles for the formulation and implementation of occupational safety and health preventive and control measures. • Develop and communicate a work plan on safe working for COVID-19. Such plan should be fully aligned with any government regulations and guidelines on COVID-19 prevention and control, or in the absence thereof, with international good practice guidelines as may be updated from time to time.
2. Risk assessment to decide when to work, who works and how	• Undertake a risk assessment to determine the preventive and control measures. • Ensure preventative measures are in place before resuming or beginning construction work.
3. Adopt engineering, organizational and administrative measures	• Avoid physical interaction and maintain physical distancing requirements as prescribed by national policy, or in the absence thereof, international good practice. • Ventilate enclosed workplaces including work camps and communal spaces. • Avoid concentration of workers - limit the capacity of common areas such as work camp dining rooms and changing rooms to allow the minimum separation of 2 m and organize one-way systems. This includes sleeping areas which must be a minimum of 2 m between beds. • Put in place training and information on COVID-19 and measures required for its management. • The construction site is to be segregated to the extent possible in zones or other methods to keep different crews physically separated at all time. • Stagger break and lunch schedules to minimize the number of people in close proximity to one another.
4. Regularly clean and disinfect	• Increase the frequency of cleaning and disinfection, in particular heavily trafficked areas and common areas, including work camps. • All door handles, railings, ladders, switches, controls, eating surfaces, shared tools and equipment, taps, toilets, and personal areas are wiped down at least twice a day with a disinfectant. • Discourage the sharing of items such as cups, glasses, plates, tools.
5. Promote personal hygiene	• Provide workers with the conditions and means necessary for frequent hand washing (soap, water or alcohol gel) with a posted hand washing protocol at site entries, exits, bathrooms, communal areas, offices, and any other areas with commonly touched surfaces. • Inform workers of the need to avoid physical contact when greeting, and avoid touching eyes, nose and mouth. • Inform workers of the need to cover the mouth and nose with a disposable handkerchief when coughing or sneezing or the crook of their arm. • Dispose of tissues in a lined and covered waste bin and wash hands afterwards.
6. Provide PPE and inform workers of its correct use	• Identify appropriate PPE related to the tasks and health and safety risks faced by workers according to the results of risk assessment and the level of risk, and provide it to workers free of charge and in sufficient number, along with instructions, procedures, training and supervision. • Non-medical face-coverings (such as homemade cloth masks) should be worn as mitigation for catching and transmitting the virus, but are not to be treated as substitutes for proper handwashing.

7. Health surveillance and insurance	• Before entering the site, staff and visitors must confirm that they are not currently exhibiting flu-like symptoms.
	• Monitor the health status of workers, develop protocols for cases of suspected and confirmed COVID-19. The protocol will state that:
	  • Workers with symptoms or confirmed cases must be isolated within the construction camp or stay at home for 7 days after symptoms started.
	  • If symptoms persist after 7 days the person must isolate until the symptoms stop.
	  • People who have been in close contact with the person with confirmed COVID-19 be quarantined for 14 days.
	• All workers in quarantine or isolation must be provided with adequate food, water, medical assistance and sanitation.
	• Identify workers who have had close contact with people infected with
	• COVID-19 and follow national medical guidance.
	• Communicate confirmed cases of COVID-19 infection to the appropriate authorities.
	• All workers should be provided with health insurance that includes.
	• COVID-19 treatment.

1 Construction Site Working Conditions Mitigation Measures for COVID-19	
8. Consider other hazards, including psychosocial	• Promote a safe and healthy working environment free from violence and harassment. • Encourage health promotion and wellbeing in the workplace through enough rest, balance of physical and mental activity and adequate work- life balance. • Implement prevention and control measures for the use and storage of chemicals, particularly those used for disinfection during COVID-19.
9. Review emergency preparedness plans	• Develop an emergency plan adapted to COVID-19 and regularly review it.
10. Review and update preventive and control measures as the situation evolves	• Periodically monitor prevention and control measures to determine whether they have been adequate to avoid or minimize risk, and identify and implement corrective actions for continuous improvement. • Establish and maintain records related to work-related injuries, illnesses and incidents, worker exposures, monitoring of the work environment and workers' health.
Source: Adapted from: ILO, WHO, Canada Construction Association, and UK Government.	

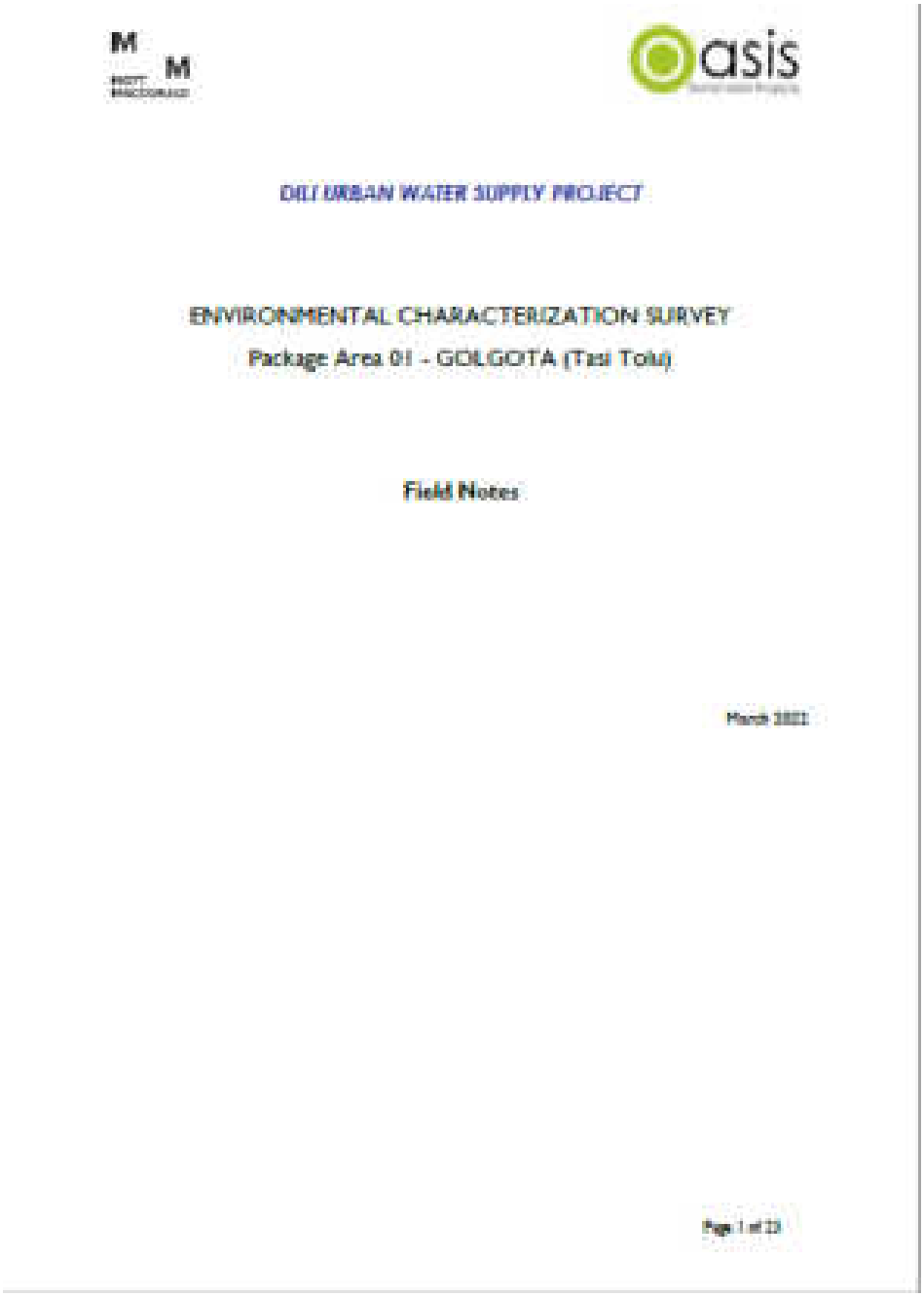
2. Worker Camp Siting and Management Mitigation Measures for H&S and COVID-19	
1. Siting	• Not in area liable to flooding, landslide or other natural disaster. • Not in area affected by construction dust, noise, sewage or other pollution. • Not in a residential area.
2. Minimum housing standards	• A separate bed for each worker. • Beds should not be arranged in tiers of more than two. • Separate accommodation of the sexes or to accommodate couples. • Adequate natural light during the daytime and adequate artificial light. • Adequate ventilation to ensure sufficient movement of air. • Adequate supply of safe potable water. • Adequate sanitary facilities (see below). • Adequate drainage. • Adequate furniture for each worker to secure his or her belongings, such as a locker. • Common dining rooms, canteens or mess rooms, located away from the sleeping areas. • Appropriately situated and furnished laundry facilities. • Reasonable access to plug sockets for charging telephones and other devices. • Rest and recreation rooms and health facilities, where not available in the community.
3. Minimum accommodation sizes	• Sleeping space. • Inside dimensions over 198 cm by 80 cm; sleeping room headroom of over 203 cm allowing full free movement. • Beds minimum 2 m apart for COVID-19 risk management.
4. Sanitation Facilities	• One toilet, one tap / basin, one toilet for every 6 people. • Convenient location to accommodation. • Provision of soap. • Separate facilities for men and women. • Ventilation to open air. • Fresh cold running water. • Clean and hygienic. • Septic tank / sewage treatment facility, or pit latrines located at least 200 m from surface waters, and in areas of suitable soil profiles and above the groundwater levels.
5. H&S within worker accommodation	• Separate area for sick workers to prevent transmission of disease. • Smoke detector in sleeping area. • Fire safety throughout accommodation such as fire extinguishers, fire alarms, fire blankets. • Worker training in fire prevention and procedures. • Fire exit sign, adequate means of escape and clearly maintained exit. • Security lighting within camp and for sanitation block and lighting for route from sleeping area to sanitation block. • Electrical cables to be in safe condition, elevated and not in areas liable to flood.
6. Inspection	• 2 weekly inspect to inspect for cleanliness, state of repair of building, accommodation and fire equipment. • Record inspection results and retain for review.

Appendix 12 Example Asbestos Register

The following information is recommended for an asbestos register:

Asbestos Register for:	**[Facility/site name]**				
Date asbestos was identified	**Specific location**	**Detailed description of material** (including surface treatment, color, purpose, size)	**Bonded or Unbonded**	**Condition of material** (friable, good condition, loose pieces)	**Likelihood of disturbing the material?** (during maintenance or site use)
21-June-22	WTP Roof	Corrugated roof sheets, unpainted	Bonded	Poor condition, crumbling in places	Low during WTP maintenance and site use
21-June-22	Behind main generator on wall	Insulation board, $2m^3$ sheet	Unbonded	Good condition	High likelihood of damage during generator repair
21-June-22	Water pipe leading to North East from intake X	Pipe estimated 300m long, 80mm diameter	Bonded	Mostly good, some deterioration in places	High during network maintenance

Appendix 13 Site Visit Report for PA 08 - Golgota - Tasitolu Lakes



DILI URBAN WATER SUPPLY PROJECT

ENVIRONMENTAL CHARACTERIZATION SURVEY

Package Area 01 - GOLGOTA (Tasi Tolu)

Field Notes

March 2021

Page 1 of 23

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LIST OF FIGURES

1 Project Background

The Dili Urban Water Supply Project intends to provide water to the city of Dili.

Under the ADB TA TA-6752 REG: Southeast Asia Facility for Resilient Cities [illegible] Task Order 1 Dili Urban Water Supply, the scope of analysis is what is identified as the Dili-West area, namely the Package Areas no.01 Golgota, 02 Malimamuk, 03 Be'e Moc, 04 Central and 05 Maloa.

The Mott Macdonald environmental team is following a process to support the ADB with its loan process for the project, specifically in regards to the production of an Initial Environmental Examination (IEE) process under the ADB SPS 2009, for loan fact finding and decision, within the scope of the above-mentioned Package Areas.

2 Scope and Objective of the Field Survey

On the 9th March 2022, the Environmental team carried out a field survey of Package Area 01 – Golgota, in order to assess the current environmental, cultural, etc. conditions of the area, for further impact assessment in the IEE and mitigation measure identification to include in the Environmental Management Plan (EMP).

The team was composed of the following members:

a) Vasco Leitão (International Environmental Specialist);
b) Zélio Moniz (National Environmental Technician);
c) Paulo Loureiro (National Liaison Team Member)

The team carried out the following activities throughout the Survey:

1. Meet and greet with the Chefe Aldeia 12 de Outubro (Flavio Marçal)
2. Meeting with Comoro La Nain (Abilio da Costa)
3. Survey around Lake 1, 2 and 3, to determine environmental conditions and identify sensitive hotspots i.e. Cultural, Religious, Ecological, etc.

The survey started at 7am on the 9th March 2022 and was completed at 2pm. The team carried out the site visit and used the following methods to collect the data for the characterization.

a) Field observation;
The team observed the current situation within the designated target area to understand the site condition and surrounding environment, the ecological and cultural aspects, as well as the existing infrastructures and other impacting activities.
This survey is complemented with several KMZ files, which include geo-referenced photos taken throughout the project area (see Figure 1).

b) Local community quick questions
In order to identify and to understand particular conditions in the project area, the team also asked targeted questions to local community members while going through the area. These questions referred to water sources, sanitation, waste disposal and or flood water level during the flooding event in 4th of April 2021.

The field survey was delimited based on the Package Area – Golgota which encompasses three lakes (or sections) and surrounding shoreline and hillsides, as shown in Figure 1 and Figure 6.

The team surveyed Lake number one, furthest to the west and then followed along its most southern road access to the area between Lakes 1 and 2. The team then continued on along the most southern road access, along the shore line of Lake 2 and then further on Lake 3.

The Area at the South East watershed was also surveyed for its condition, as it is included under the scope of the project and is a relatively formal and organized housing area.

The team then continued following the proposed pipe ROW along the eastern shoreline up to the most populated locations of the lake areas, the North East Shoreline and towards the main road, as well as the formal neighborhoods that line on the Border between PA 01 - Golgota and PA02 - Malinamuk.

These notes do not represent a full report with the characterization of the lakes but present the summary of the data collect by the team during the survey, for information to the IEE report.

They also include an estimation of the most Current Lake Shoreline vs the Shoreline after the flood event that occurred in 4th April, 2021. The satellite imagery closest to the event date was the 9th April 2021 and is represented in all the maps as a red line.

Figure 1 Photo Registry of the Survey

Figure 2 Paths taken during survey

3 Survey Activities

3.1 Meet and Greet with Chefe de Aldeia 12 de Outubro - Flavio Marçal

The Chefe de Aldeia was very welcoming and informative about the current and past conditions of the Tasitolu area.

He mentioned that the Pelican Paradise Process was still ongoing, but no resettlement had started yet. In this regard, in 2015, Xanana Gusmão prepared a dispatch (Pelican Paradise related) applicable to the municipality, and Dom Aleixo Administrative Post, that no more construction should happen in the lake area. However, construction continued and from then until now many more people have been coming to establish themselves on the lakes shore line and hillsides.

In addition, during the disaster events of 4 April 2022, Xanana Gusmão also discussed with the local leadership about options for resettlement because of the floods and because of the pelican paradise project, mainly the following:

1) Land for land
2) Receive compensation to return to the municipality of origin
3) Monetary compensation for the house and other valuables and look for an alternative land/house individually.

The Chefe de Aldeia mentioned that the current pressure is degrading the quality of the lake system, in terms of sanitation and the natural vegetation within the lakes and in the hillside.

He informed to that the Department of forestry and protected areas have you been implementing a few projects for reforestation on the hillsides (which includes dedicated tanks for watering the new seedlings), as well as an attempt to reforest the mangrove areas on the lakes shores. Nevertheless, the expansion of the housing towards the hillsides and the need for fuel wood continues to pressure the ecological balance in the area.

He also requested that, when the time comes for project implementation, BTL communicates with the local authority and the community to understand the phasing of implementation, so that it is easier to manage the community's expectations.

3.2 Site Visit

3.2.1 Description of Area

The pressure zone is bounded by the Northern coast of Dili, between the Nicolau Lobato International Airport boundary and the tip of Tibar Bay, to the West, along a strip of land that makes up the boundary between the coastline and the Tasitolu lakes, to the South. The boundary then runs south along the hillsides upwards towards these three Lakes that vary in size throughout the year, based on the wet and dry season rain intensity. The Pressure Zone is traversed by a national road from east to west, and several secondary roads and tertiary roads that follow the occurring urban sprawl into and around the Lakes watershed areas and hillsides.

3.2.2 Ecological Receptors and Protected Areas

The lake areas have a defined boundary and are declared as a protected area, under Timorese legislation. However, despite its importance, the hillsides of the area are the ones that include the last remaining patches of shrubs and trees due to the high pressure of urbanization within this area.

Some small patches of mangroves still exist in the area, within the lake shoreline, however it is evident that these are becoming less and less due to their exploration for firewood. This urban sprawl is also spreading towards the lake shoreline and hillsides from the adjacent housing expansion and the terrestrial cover is composed of brush and some trees, the later particularly scarcer in the hillsides.

During the visit, very little wildlife was evident in the lakes but requires confirmation of migration patterns to determine expected avifauna movement at the time of year of the survey.

3.2.3 Water and Sanitation

Discussion with the Chefe de Aldeia have clarified that there is no water distribution system in the area and most of the formal and informal houses procure their water daily from other part of the city, towards Packages Areas 02 Malinamuk and 03 Be'e mos, through trucks and/or motorbikes that travel a few times with reused plastic recipients to supply the much needed water.

There is no centralized treatment that collects wastewater from all the buildings and housing areas in and around the project area. The construction method used by these installations is usually the following: a) Direct discharge to a hole in the ground; b) discharge to a permeable septic tank; and c) discharge to an impermeable septic tank or box, for a later withdrawal by service tanker and taking the wastewater to the neighboring Tibar waste water treatment plant.

From observation in the field, items a) and b) are the main Solutions used by the dwellings to take care of their wastewater. It is note worthy to indicate that dwellings around the lakes discharge their

wastewater directly into the lake, either by a direct pipe or through the ground, through the permeable septic tanks used.

Likewise, solid waste management is still incipient and many Cement Box-like structures for collection of the waste are used for burning the waste if there is no collection from the Municipality. All the waste, burnt and/or unburnt, ends up inside the lakes due to surface runoff during rainfall events or because of the locations of these boxes, some of which are close or on the lake shoreline itself.

Water collected daily from other PAs and transported to PA 01

Photo 2 (Northeast view)

Dwellings with direct sanitation pipes to the lake

Septic tanks (permeable and impermeable) draining to groundwater and lake system

Solid Waste Recipients on Lake Shoreline (1)	Solid Waste Recipients on Lake Shoreline (2)
	

3.2.4 Hydrology

Observations and some interactions with locals in the field point to the hydrology of the lake being very dynamic, much related to the rainfall variation between dry and wet season and interaction with high and low tide influence of the nearby coast. While the Lake shore line in the satellite imagery used for these notes (2021) show a retracted shoreline towards the center of the lakes, 2021 satellite imagery, close to the events of 4 April show a very expanded lakeshore line, which places a large number of houses under the flood line of the lake, including the access roads. Additionally, at the time of the field Study, many areas demonstrated recent flooding due to heavier rainfall a few days before. According to information collected at the site and in accordance with the national team member, in the event of 2021, many of the access roads were underwater for three months until the waters receded.

In addition, the South East watershed that the discharges into the lakes is blocked by expanding and uncontrolled, disorganized urbanization so the existing drainage infrastructure is used as road access and seems not to be enough to avoid flooding upstream of the lake, during extreme rainfall events.

Figure 3 Hydrology variation of Lake 3 (Flood events in April 2021 vs Dry season August 2021)

Figure 4 Hydrology variation of Lakes 1 and 2 (Flood events in April 2021 vs Dry season August 2021)

3.2.5 Land Use in the area

Roughly 60% of the Package Area is within the Tasitolu Protected Area boundary. However, this protected area has suffered major urban pressure and land use in this area looks anything but that of a protected area (see Figure 5)

Currently, green spaces are reduced to a few dispersed patches and the lakes themselves and the hillsides have been stripped from most of the tree cover, resulting in areas of brushes and low-lying vegetation with occasional trees. There are attempts of reforestation patches from the National Directorate for Protected Areas but these seem to be more and more being pushed aside for housing development in the hillsides. The same is happening to mangrove patches close to the lake shoreline, especially around Lake 1.

The business area of the Package area, which runs parallel to the National Road traversing the Northeast area, includes a market and state and commercial buildings and there is substantial new civil construction occurring in this area.

Urban sprawl is certainly the key driver for land use in the PA, as almost all available areas are used for housing, particularly the expansion into the Southeast watershed area, where there are a mix of housing and upstream agriculture activities, as well as some small-scale activities in the upper hillsides that already show signs of erosion, which, together with the deforestation, are impacting the lower areas of the drainage plain with sedimentation problems.

For the purpose of land use differentiation and of the present exercise, based on the field visits and the most recent available satellite imagery of the area (August 2021), the following percentages have been roughly estimated for land use within the area, namely:

- 2% Mixed Use Areas - services, business and commerce building, in the Northeast zone and along the main East to West National road
- 10% Urban requalification - mostly agriculture and undifferentiated spaces
- 60% Urban Residential - Dwelling areas along secondary roads around the lake and expanding to hillsides and upper watershed, connected to agricultural areas/patches
- 20% Green spaces - the lakes' surface and small low density trees and vegetation patches that are under pressure from residential urban sprawl
- 3% Special Use Spaces - includes schools, Government buildings, etc.
- 2% Culture/Heritage - includes sacred houses (adat), religious infrastructure, cemeteries and others. However, the lakes themselves are considered lulik and thus, if included in this calculation, this percentage would be estimated at close to 15% of the total area.

School (EBF 12 de Outubro) inside the protected area

FFDTL Military Compound in Mixed Use area

Main Road side Market on the NE Area

Mixed use commercial activity in NE area

Typical road disposition in the PA mixed use area North of Main road (Aldeia Terra Santa - NE)

Typical road disposition in the PA Formal Housing area North of Main road (Aldeia Terra Santa - NE)

Example of road disposition in the PA Formal Housing area South of Main road (Aldeia 12 de Outubro)

Example of road disposition in the PA informal Housing area East of Lake 1 (S to N view)

Dweling disposition in the PA Informal Housing area East of Lake 1 (S to N view)

Dweeling disposition in the PA Informal Housing area South East of Lake 1 (SW to NE view)

Road disposition in the PA informal Housing area Downstream entrance to SE Watershed (S to N view)

Road disposition in the PA informal Housing area Downstream entrance to SE Watershed (W to E view)

Road and dwelling disposition in the PA informal Housing Downstream entrance to SE Watershed (E to W view)

Road and dwelling disposition in PA informal Housing Downstream entrance to SE Watershed (W to E view) Drainage 1 of 3 undefined pathway and flood area

Road disposition in the PA informal Housing area Upper SE Watershed Area (E to W view)

Drainage Channel (3 of 3) Conditions in SE Watershed Housing Area (S to N view)

Drainage Channel (1 of 3) Conditions in SE Watershed Housing Area (S to N view)

Drainage Channel (1 of 3) Conditions in SE Watershed Housing Area (N to S view)

Drainage Channel (2 of 3) Conditions in SE Watershed Housing Area (S to N view)

Drainage Channel (2 of 3) Conditions in SE Watershed Housing Area (N to S view)

Local Extractive Activities in Upstream Hillside areas (SE) (N to S view)

Agricultural Activity in SE Upper Watershed Area (N to S view)

Road and dwelling disposition in the PA informal Housing along South Lake shoreline (W to E view)

Dwelling disposition in the PA informal Housing along South Lake shoreline (N to S view) Lake to North

Road and dwelling disposition in the PA informal Housing along South Lake 2 shoreline (W to E view)

Road and dwelling disposition in the PA informal Housing along South Lake 2 shoreline (W to E view). Maximum floodline at foothill

Dwelling expansion to hillsides in the PA informal Housing along South Lake 2 shoreline (E to W view)

Road and dwelling disposition in the PA informal Housing along SW Lake 2 shoreline (W to E view). Road within floodplain level

Dwelling disposition in the PA informal Housing along SW Lake 2 shoreline (W to E view)

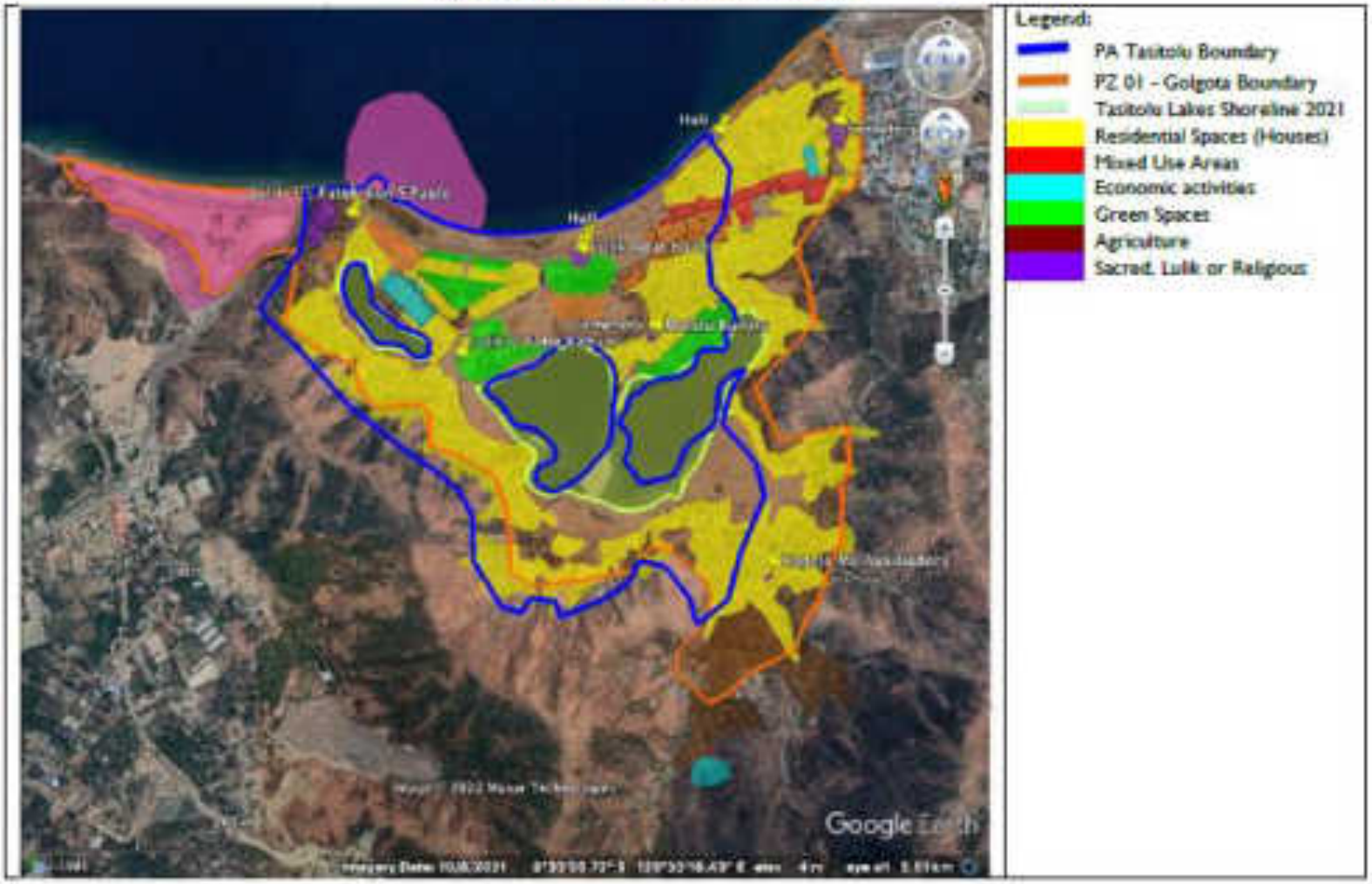
Dwelling disposition in the PA informal Housing along SW Lake 2 shoreline (NW to SE view)

Dwelling disposition in the PA informal Housing along W Lake 3 shoreline (W to E view). Floodline at motorcycle location

Dwelling disposition in the PA informal Housing along W Lake 3 shoreline (NW to SE view)

Land Use disposition in the PA informal Housing along West End of Lake 3 shoreline (SW to NE view)

Figure 5 Land Use in Tasitolu (2021) vs Protected Area



3.2.6 Culture

3.2.6.1 Meeting with Comoro Lia Nain - Abilio da Costa

The team met with the Comoro Lia Nain, cultural leader for the Tasi Tolu Lakes.

He informed that all the lulik sitas were marked and the following were Lulik and/or sacred locations within the project area (see):

i) Uma adat Malalu Builalu (community house);
ii) John Paul II location (confirmed as the location where human remains were found a few years ago);
iii) Foho Kaibuar (a small hill located between the two main lakes and the smaller lake);
iv) Uma Adat bo'ot (1989);
v) Fatin Lulik (Southeast hillside of the lake);

Other religious locations identified in the area by the Lia Nain and the Chefe de Aldeia were:

vi) Local Cemetery (next to Malalu Builalu);
vii) Igreja N. Senhora das Graças;
viii) Capela Maria Auxiliadora;
ix) Cemetary on Hill.

The Lia Nain also informed that the lakes, in general, are Lulik because the water appears from the ground and recharges the lakes, but there is an agreement, due to the pelican paradise project, to ask the spirits to use the lake even if with restrictions. The purpose of the request is so that the spirits allow the use of the location for the project (pelican paradise or other) and to protect the lakes and any other lulik sites in the area. For this to happen, there must be a cultural ceremony before any activity of construction happens, with the usual ceremonial animal sacrifice, alcohol, etc.

He also advised that there is a small hill in between the Lakes that is Lulik, named Foho Kaibuar. Its limits have been established but there are constructions of dwellings up to the Foothill already, although these do not go into the areas limit.

In addition to the information from the Lia Nain, the team also identified several occurrences of a sacred tree specimen called "Ai-Hali" (Ficus Sp. Indian Banyan or "Fig-tree") in several proposed road alignment ROWs.

All of these locations and items presented enough space to prepare a buffer protection area during construction phase.

Uma Adat Malalu Builalu (sacred house)	Fatin Lulik João Paulo II (location of human remains)
	

Lulik Hill (Foho Kaibasar) - Centre of the Lakes

Uma Adat Bo'ot (sacred house)

Local Cemetery (next to Ptalalu Bulalu)

Igreja N.Senhora das Graças

Capela Maria Auxiliadora (SE Watershed Area)

Cemetery on Hill (Suco Madoli, Aldeia Terra Santa)

Ai-Hali (*Ficus Sp.* Indian Banyan or "Fig-tree")	Ai-Hali (*Ficus Sp.* Indian Banyan or "Fig-tree") (2)
	

Figure 6 Lulik and Sacred Locations identified by the Lia Nain

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