

Initial Environmental Examination

March 2021

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

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

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ABBREVIATIONS

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

WEIGHTS AND MEASURES

\$	- United States Dollars
°C	- Celsius/centigrade
amsl	- above mean sea level
dBA	- decibel audible
ha	- hectare/s
km	- kilometre/s
km ²	- square kilometre/s
lps	- litres per second
m	- meter/s
m ³	- cubic meter/s
mg/l	- milligram/s per litre
mm	- millimetre/s
µg/m ³	- microgram/s per cubic meter

NOTES

In this report, “\$” refers to US dollars, and “SMASA” refers to SMASA Manufahi, unless otherwise stated.

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EXECUTIVE SUMMARY

1. The Water Supply and Sanitation Investment Project (WSSIP) will support the Government of Timor-Leste to improve water supply and sanitation in three cities (Lospalos, Viqueque and Same) by drawing on experiences and lessons learned from the ADB Second District Capitals Water Supply Project.
2. This Initial Environmental Examination (IEE) has been carried out during the detailed engineering design (DED) phase for the proposed project, 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 of such a procedure is to ensure that projects are environmentally sound, designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards.
3. The government intends to implement the project over a 7-year period (indicative implementation period is 2022 to 2028) and will be supported through ADB financing using a project lending approach. The MPW is the implementing agency responsible for the overall management, implementation and monitoring of the project and the SMASA office in Same will manage day-to-day operation at the city level. The scope of the DED prepared for the project includes:
 - 1) Rehabilitate the potable water distribution network to consumers within the defined Water Zones;
 - 2) Evaluate existing and new sources for possible supply of the water distribution system;
 - 3) Evaluate the condition and scale of the sanitation situation in the project area and design infrastructure for 4 public toilets;
 - 4) Evaluate and design a stand-alone Faecal Sludge Treatment Plant (FSTP) to receive the collection and treatment of septic tank sludge effluent from all households, buildings and schools within the 15 Km project range.
4. The DED scope also includes all the areas that will be required to implement the abstraction, treatment and distribution of water for human consumption, as well as provide designs and solutions for sanitation for buildings, schools and housing within a diameter area of 15 Km around the city.
5. The various project infrastructure components are in poor condition and are required to be completely rehabilitated/substituted. These are the existing and proposed water origins i.e. springs and boreholes, water storage, water treatment facilities, transmission and distribution lines and public toilets and Faecal Sludge Treatment Plant (FSTP).
6. The water supply system will be composed of 4 water sources namely Erluli, Darelau, Merbuti upstream and Merbuti main springs, with a current calculated production capacity of 180.4 L/s (15,586.56 m³/day) to respond to a 2040 water demand of 61.7 L/s (5,330.88 m³/day). This yield will be responsible to supply 7 different zones encompassing all the existing and projected households in Same city up to 2040.
7. After storage, distribution and consumption, the generated wastewater and sludge are then treated primarily in the household septic tanks and afterwards transferred into the proposed Faecal Sludge Treatment Plant in Akadiruhun, Suco Letefoho.
8. Clean, adequate drinking water is a basic human need and developing drinking water supply facilities has numerous beneficial impacts to individuals and communities. Furthermore, when coupled to sanitation improvement, there is a substantial increase in the quality of life within the project area. Some of the major beneficial impacts of the proposed project are the increase of local employment generation, skill enhancement, improved health and hygiene and also empowering more women.

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

10. The Southern Merbuti system (Merbuti and Kotalala springs) and the Northern System (Erluli and Darelau) are all located within the fringe area of the Kay Rala Xanana Gusmão National Park. Both systems have been supplying water for Same for at least 40 years. They are both pre-existing to the project i.e. “brownfield projects” and already have working water distribution infrastructure within the peripheral area of the PA. However, the Ministry of Agriculture and Fisheries has been working with the Same community and in 2018 has drafted the Protected Area boundary based on Land Use and Community Consensus (yet to be officially published), including the fact that many areas of the PA fringe have been transformed by land use activities i.e. spring areas and while still within the PA boundary, have unofficially become “Zone of Use” areas 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).

11. The project’s environment and potential impacts were assessed through the use of an ADB REA (Rapid Environmental Assessment) Checklist, followed by the application of an evaluation matrix and impact assessment rating for all components and activities in the Pre-construction, Construction, Operation and Decommissioning Phases of the Project. The significance of the impacts was assessed according to the condition of the affected environmental and social components at the time of evaluation and the scale of impact should the impact persist.

12. It is thus concluded that the water supply and sanitation investment project in Same can be categorized as a Category B (IEE) for environment, as per ADB SPS 2009, given it does not have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, or that potential impacts are unlikely to affect areas larger than the sites or facilities subject to physical works and in most cases mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

13. Additionally, the project has presented a corresponding Project Document (PD) for the purpose of Timor-Leste’s official environmental screening process and will present a Simplified Environmental Impact Statement (SEIS) and an Environmental Management Plan (EMP) for a Category B classification, in accordance with the Government of Timor-Leste environmental legislation in effect.

14. 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.

15. The ADB IEE (ADB, 2020) undertook Public Consultation for Same in the Municipal Administrative Meeting Room on the 12th of October 2020, participated by local government agencies and authorities (Chief of Suco and Village), and representative members of the communities within the project area, where the issues of significant social concern, predicted environmental impacts and proposed mitigation measures were presented, in order to collect all useful and relevant inputs from them, for the project construction phase.

16. The stakeholders presented their concerns, suggestions and recommendations for the project implementation, focusing mainly on issues such as Land & Property, Acceleration of the Project Implementation, Project Area, Water distribution system does not serve all villages, misuse by consumers (and direct impact on water availability in the distribution system and measurement for structural preservation of cultural and religious assets within the project area.

17. In addition, 3 other Public Consultations, carried out under the social component in Suco Holarua (4th December 2020), Suco Letefoho (5th December 2020) and Suco Babulo (5th December 2020) further confirmed the expectations and worries in the previous Public Consultation and reassured the team that there is very little risk of any water conflicts or impacts felt by the community during implementation and operation of the future system.

18. Every grievance shall be registered by the Contractor with careful documentation process during construction and development of the project. The MPW will also be involved in the clients' complaints and establish a good network with the chefe suco and aldeia for cultural facilitation purposes. The environmental and social safeguards officer will be fully responsible on the overall grievance redress issues particularly on the environmental and social issues using a combination mechanism.

I. INTRODUCTION

I.1. Background

1. The Water Supply and Sanitation Investment Project (WSSIP) is a Government of Timor-Leste project that intends to provide access to improved water supply and sanitation in the three project cities (Lospalos, Viqueque and Same) by drawing on experiences and lessons learned from the ADB Second District Capitals Water Supply Project.

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

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

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

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

6. While municipalities' capacity is being built, the government intends to implement the project over a 7-year period (indicative implementation period is 2022 to 2028) and will be supported through ADB financing using a sector lending approach. The MPW is the implementing agency responsible for the overall management, implementation and monitoring of the project and the SMASA offices will manage day-to-day operation at the municipality level.

I.2. The WSSIP and Same City

7. This IEE report is prepared for the WSSIP – Same City, within the Sucos of Holarua, Letefoho and Babulo, which has the following components under the project Output 2:

- rehabilitate and expand the Same urban water supply system to cover the new demand volumes for the project horizon year of 2040, including:
 - (i) rehabilitation and improvement of the existing Merbuti and Erluli Spring intakes and complement current water production through the drilling and activation of 2 to 4 new boreholes in Zone 7;
 - (ii) Rehabilitation and improvement of existing water storage and treatment facilities;

- (iii) Rehabilitation of 59.5 Km within the expanded water supply distribution pipe system (7 Zones), simplifying management and substantially improving the level of service and reducing water losses in the project area; and
 - (iv) Installation of bulk metering system within the distribution network and replacement and/or installation of domestic meters for all existing and new connections for proper accounting of water use and system losses.
- establish fully functioning water supply and sanitation infrastructure in 4 (four) public locations that is effectively operated, maintained and managed to provide a minimum level of service for water supply and sanitation to all municipal dwellers while they are active in the city premises; and
 - establish septic tank sludge treatment and disposal facilities and associated sludge transport system within a diameter area of 15 Km around the Same municipal capital that is effectively operated, maintained and managed and that safely transports the septic tank sludge effluent from all households, buildings and schools to a future stand-alone Faecal Sludge Treatment Plant (FSTP) in Akadiruhun, Suco Letefoho.

I.3. Purpose and Scope of the Initial Environmental Examination

8. This Initial Environmental Examination (IEE) is the preliminary environmental evaluation for the Water Supply and Sanitation Investment Project – Same City (known as WSSIP - Same) and has been carried out during the Detailed Design phase, in accordance with ADB's Safeguards Policy Statement (SPS) 2009, and the Government of Timor-Leste environmental requirements and guidelines currently in effect. The objective of such a procedure is to ensure that projects are environmentally sound, designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. An approved company, registered with the Secretariat State for Environment (SSE) has undertaken this IEE (for the purpose of the ADB due diligence procedure) and will prepare the Project Document (PD), Simplified Environmental Impact Statement (SEIS) and Environmental Management Plan (EMP) for the purpose of the Timor-Leste Environmental Licensing requirements.

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

10. The environmental assessment was conducted for the Same city water supply and sanitation project, based on (i) the D4 - Preliminary Engineering Design, and (ii) most likely environmentally sensitive components.

11. The IEE report itself describes this process, where it (i) provides project information and environmental requirements; (ii) provides baseline physical, ecological, cultural and socioeconomic description surrounding the project's area; (iii) identifies and assesses potential environmental impacts from the project's implementation; (iv) includes recommendations for measures to avoid, mitigate, and compensate adverse impacts; (v) informs on stakeholder consultations and participation activities during project preparation; (vi) provides an environmental management plan; and (vi) presents a grievance redress mechanism for the project.

12. This analysis consisted of a stepped approach (characterization of the environment, description of project components, impacts analysis and management and mitigation measures) with close joint work with

the ADP technical team in order to reduce the predicted significant impacts from the various proposed project components in the Design, Construction, Operation and Decommissioning Phases of the Project in this city.

13. The evaluation of the specific environmental conditions for Same city was based on a short preliminary visit during the inception phase (on the 18 and 19 February 2020) and after a rather long period of delay due to COVID-19 restrictions, the team carried out a more in-depth site visit to Same (1 to 3 July 2020).

14. A photographic registry was carried out of the surrounding conditions of all proposed project components defined at the time and the team applied ADB REA checklists for the Water and Sanitation Sector (see Appendix 1) to help survey the preliminary environmental conditions and possible impacts of the WSS components in the project area and review project interactions in regards to the most significant component conditionalities i.e. location, biodiversity and climate change. It also supported and guided the team and client on the probable environmental categorization of the WSS rehabilitation project, depending of the difficulties and/or possible impact control regarding stand-alone, specific infrastructure or in regards to areas where project components may encounter environmental sensitivities and bottlenecks for the project.

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

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

- (i) Same Directorate of Water and Sanitation (Mr. Domingos Soares and technician staff);
- (ii) Ministry of Agriculture and Fisheries: General Director from Forestry, Coffee and Industrial Plants, (Mr. Raimundo Mau) and Chief of Department of Conservation (Mr. Joao Antalmo);
- (iii) Secretary of State for Arts and Culture: General Director from Secretary of State for Arts and Culture (Mr. Manuel Ximenes Smith), National Director of Cultural Patrimony (Mr. Gil Paulino dos Santos Oliveira) and Chief of Department of Archaeology (Mrs. Irene dos Reis Goncalves);
- (iv) Local authorities: Chief of Suco Letefoho (Mr. Agapito da Costa), Chief of Suco Babulo (Mrs. Alice de Jesus) and Chief of Suco Holarua (Mr. Joao Corte Real)

17. The environmental assessment of the Same water supply and sanitation project 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 mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

18. The Southern Merbuti system (Merbuti and Kotalala springs) and the Northern System (Erluli and Darelau) are located within the fringe area of the Kay Rala Xanana Gusmão National Park. Both systems have been supplying water for Same for at least 40 years, thus both pre-existing to the project i.e. "brownfield projects" and already have working water distribution infrastructure within the peripheral area of the PA. The Ministry of Agriculture and Fisheries has been working with the Same community on the PA boundaries and has drafted a preliminary Protected Area boundary based on Land Use and Community Consensus process (yet to be officially published), including the fact that many areas of the PA fringe have been transformed by land use activities i.e. spring areas and while still within the PA boundary, have

unofficially become “Zone of Use” areas 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).

19. Under this scenario, the water supply and sanitation investment project in Same has been concluded as a Category B, in accordance with ADB SPS 2009 and the Government of Timor-Leste Environmental Licensing Legislation (see Chapter I for information on project categorization). The project will present corresponding Project Documents (for official environmental screening purposes) and a Simplified Environmental Impact Statement (SEIS) and an Environmental Management Plan (EMP), in accordance with the Government of Timor-Leste environmental legislation in effect.

I.4. Details of Proponent and Consultant that prepared the Report

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

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

Ministry of Public Works (MPW)

Mr. Salvador Pires, Minister
MPW Corporate Services Building
Avenida 20 de Maio, Caicoli, Díli, Timor-Leste

SMASA Manufahi Office

Mr. Domingos Soares, Director
Suco Holarua, Same, Manufahi, Timor-Leste

22. The Ministry of Public Works (MPW), on behalf of the Government of the Democratic Republic of Timor-Leste, contracted the consortium Águas de Portugal Timor-Leste / Engidro to prepare the “*Detailed Engineering Design for the Water Supply and Sanitation Investment Project in Same, Lospalos and Viqueque*”, financed by the Infrastructure Fund of the Government of Democratic Republic of Timor-Leste. OASIS – Sustainable Projects is the Consultant subcontracted by ADP/Engidro and responsible for preparing the IEE and EMP report.

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

II.1. The ADB Environmental Process

II.1.1. ADB Safeguard Policy Statement

23. The ADB SPS 2009 (ADB, Safeguard Policy Statement, 2009) are operational policies that seek to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process. They consist of three operational policies on the environment, Indigenous Peoples, and involuntary resettlement.

24. 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, which SMASA will be required to comply with these requirements, for this project. Below is a summary of the step-by-step process, while more detailed information can be sought in the ADB SPS 2009.

a) Screening and Categorization: Projects are screened for their expected environmental impacts, and assigned to a specific category¹. Categorization must be based on the most environmental sensitive component. However, for project(s) with component(s) that can trigger Category A or with potentially significant adverse impacts that are diverse, irreversible, or unprecedented, the Project Design Team shall examine alternatives to the project's location, design, technology, and components to avoid, and, if avoidance is not possible, minimize adverse environmental impacts and risks, and to meet Category B categorization. The screening/categorisation process must be properly documented, taking into account the environmental costs and benefits of the various alternatives considered and the "no action" alternative.

b) Environmental Assessment: a description of environmental and social baseline information within the project area to provide an understanding of current conditions, thus forming the benchmark for assessment against identified project activities and respective impacts. Environmental impacts and risks are then analysed for all relevant stages of the project cycle, including design and planning stage, construction, operation, decommissioning, and post-closure activities such as rehabilitation or restoration.

c) Environmental Planning and Management: After environmental impact assessment, the Project Design Team prepares an environmental management plan (EMP) to be included in the IEE report. The EMP describes and addresses the potential impacts and risks identified by the environmental assessment and the level of detail and complexity of the EMP and the priority of the identified measures and actions is commensurate with the project's impact and risks. The EMP includes the proposed mitigation measures, environmental monitoring and reporting requirements, emergency response

¹ 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.

procedures, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.

d) Public Information Disclosure: The Project owner, in this case MPW, shall submit, for disclosure i.e. on ADB or MPW, MPW or other website or paper copies in the MPW office, a final draft IEE in a form and language(s) understandable to affected people and other stakeholders so that they, as well as other stakeholders and the public can provide meaningful inputs into the project design and implementation.

e) Consultation and Participation: The MPW, together with the PDC and the ESS, shall carry out meaningful consultation² 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, together with the PMU, shall monitor, measure and document the progress of implementation of the EMP and identify necessary corrective actions and reflect them in a corrective action plan. These events shall be reported to ADB semi-annually in an environmental monitoring report (EMR) that describes progress in EMP implementation and compliance issues and corrective actions, if any, 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 new the environmental assessment and EMP to assess the potential impacts, evaluate the alternatives and outline mitigation measures and resources to address those impacts.

i) Pollution Prevention and Control Technologies: During the design, construction, and operation of the project, the 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 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 workers³ are provided with a safe and healthy working environment, taking into account internationally recognised standards such as i.e. IFC HSE, to identify risks inherent to the sector and specific classes of hazards in the 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 guidance from World Bank Group's Environmental, Health and Safety Guidelines.

² 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.

³ 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.

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 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 ADB⁴ and (ii) to submit to MPW/PMU, for review and approval, a site-specific environmental management plan (CEMP)⁵. No works can commence prior to approval of the CEMP; a copy of the EMP or 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 or 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 is 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 EMP. Works cannot commence without the domestic environmental license having been secured.

II.1.2. Project Category under ADB SPS 2009

25. All projects funded by ADB must comply with its Safeguard Policy Statement (SPS) to ensure that projects are environmentally sound, designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards.

26. Environmental assessment has been conducted for the Same water supply and sanitation Project based on: (i) Detailed Engineering Design; and (ii) most likely environmentally sensitive components. The environmental assessment used ADB's rapid environmental assessment (REA) checklist (see Appendix 1) and the field review during the project. The environmental assessment of the Same Water supply and sanitation project shows it is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, or that potential impacts are unlikely to affect areas larger than the sites or facilities subject to physical works. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

⁴ 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.

⁵ 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.

27. Therefore, under the ADB SPS 2009, the Same water supply and sanitation project 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.

II.2. GOVERNMENT ENVIRONMENTAL RULES AND REGULATIONS

II.2.1. Decree Law No. 26/2012 – Base Law of Environment

28. 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.

29. 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.

II.2.2. Decree Law No. 5/2011 – Environmental Licensing

30. 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.

31. 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.

32. 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)⁶, prior to implementation.

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

⁶ 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.

34. 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.

35. 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.

36. 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 Categorisation Thresholds under Decree-Law No. 05/2011

	Category A Threshold (EIA required)	Category B Threshold (IEE required)
VII. Sanitation Sector		
3. Wastewater Treatment Plants (WWTP)	≥ 10,000 families/eq.	< 10,000 families/eq.
VIII. Water Sector		
5. Systems of water collection from lakes, rivers, springs and other water sources (excluding the soil or groundwater)	Annual Abstracted Volume > 1 million CBM/year	N/A
6. Abstraction of groundwater with boreholes	≥ 10 L/sec.	< 10 L/sec.
8. Construction of aqueducts and water networks	≥ 3 Km	< 3 Km
XII. Location Factors		
1. Sensitive ecosystems or with value (beaches, mangroves, coral reefs, protected areas, 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

37. 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 [10 days], totalling 90 working days.

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

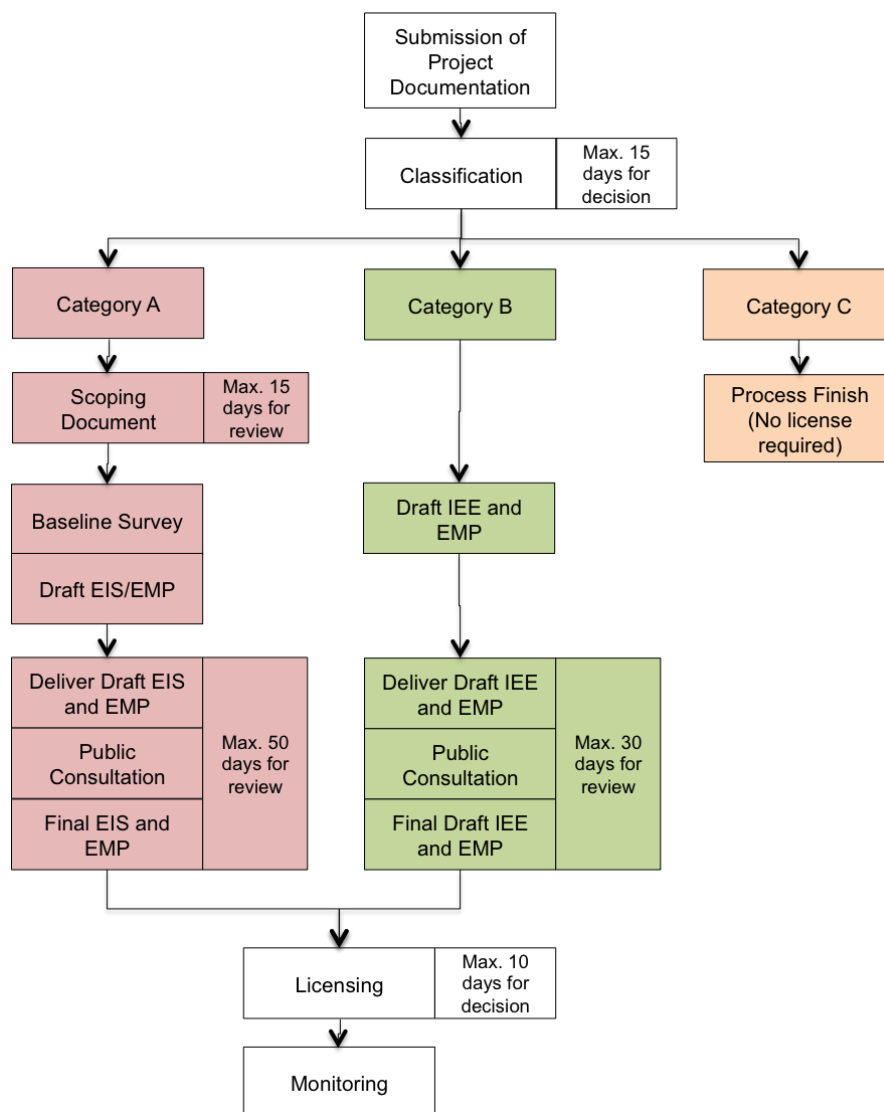
39. It is important to understand that the Environmental Regulator has the power to double (once) any or all timeframes within the process, if duly justified and always in written form to the project proponent, within the legal timeframes.

40. 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:

- (i) Ministerial Diploma no. 44/2017, of 2nd August - Regulation on Impact and Benefits Agreement;
- (ii) 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;
- (iii) 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;

(iv) 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



II.2.3. Project Classification under Decree Law No. 5/2011 – Environmental Licensing

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

42. The proponent is certain that the classification of the project components for Same City falls under a Category B (even though the Water sources i.e. Merbuti and Erluli are located in the fringe of the Kay Rala Xanana Gusmão National Park), given the project is a rehabilitation of the water network i.e. a brownfield project, with pre-existing pipe alignments and zones that have undergone significant land use

change since almost 30 years ago, during the first installation and thus lead to the new intervention being less significant and of temporary duration, particularly given the few “greenfield” project components are located in the distribution system extension areas, outside of the PA boundaries..

43. This assumption is further justified based on the ANLA previously attributed Category B Environmental License for the Government projects for rehabilitation of water distribution infrastructure in the District Capitals Water Supply Project for Manatuto and Pante Macassar 2014 (see Appendix 11). These two projects are of similar nature to the Same project and the scale of pipeline dimension and length, as well as water sourcing and borehole capacity, is higher than that proposed by the Same project, legitimizing the assumption that the resulting screening exercise and categorization for the Same project results in a Category B, as follows:

Table 2 - Estimated Environmental Classification for Same Project Components

Proposed Components	Proposed Capacity	Estimated Classification	Included in XII. Location Factors
<u>Sanitation</u>			
Public Septic Tank Systems	N/A	N/A	No
Faecal Sludge Treatment Plant	4,334 HH	B	No
<u>Water Distribution</u>			
Rehabilitation (Mains and Distribution)	59,450m ⁽³⁾	B ⁽²⁾	No
<u>Water Sources (Existing and/or New)</u>			
Merbuti Upstream Spring ⁽⁴⁾	13.3 L/sec ⁽¹⁾ 1,164,038 m ³ /year	B ⁽²⁾	Yes ⁽¹⁾
Merbuti Downstream Spring ⁽⁴⁾	29.5 L/sec ⁽¹⁾ 930,599 m ³ /year	B ⁽²⁾	Yes ⁽¹⁾
Erluli Spring ⁽⁴⁾	34.5 L/sec ⁽¹⁾ 1,088,328 m ³ /year	B ⁽²⁾	Yes ⁽¹⁾
Darelau Spring ⁽⁴⁾	3.2 L/sec ⁽¹⁾ 100,946m ³ /year	B ⁽²⁾	Yes ⁽¹⁾
New Borehole 1 ⁽⁴⁾	8 lps	B	No
New Borehole 2 ⁽⁴⁾	7 lps	B	No

⁽¹⁾ Pre-existing Project components within peripheral area of Kay Rala Xanana Gusmão National Park (Merbuti and Kotalala Spring locations). Requires Environmental Regulator approval of maintenance of Category B classification as their nature i.e. have been in use since 1983, is as “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. springs and water distribution.

⁽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 (see Appendix 2 and 3).

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

45. Currently, the Same water distribution system has evolved around these established spring systems, particularly in regards to Merbuti and Erluli Springs. The importance of these two sources is now augmented by the fact that SMASA requires the water distribution system to expand into the city’s urban expansion areas i.e. Simpantiga, 9 km to the south of the city, and the Southern system (Merbuti) is already tied in to this urban southern drift, supplying it with a percentage of its current available flow.

46. Based on the extension of proposed water extraction and the nature of the proposed rehabilitation works for Merbuti and Kotalala, the land-use of these areas has been changed, 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 and of temporary duration.

47. It is not likely that the rehabilitation and operation of these water sources will have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, or that potential impacts are unlikely to affect areas larger than the sites or facilities subject to physical works and in most cases mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

48. The Protected Areas legislation itself seems to provide some flexibility and adaptation measures 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 sources for and 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, are estimated as follows:

- Delivery of Project Document: 30 December 2020
- ANLA Classification (Estimated): 25 February 2021
- Delivery of Draft Simplified EIS/EMP to ANLA for review (30 w/days): 01 March 2021
- Public Consultation of draft SEIS/EMP: 15 March 2021
- Delivery of reviewed Draft SEIS/EMP to ANLA: 22 March 2021
- Deadline for ANLA comments: 4 May 2021
- Estimated time for SSE to decide on License (10 w/days): 18 May 2021

II.2.4. Other Relevant National Laws, Policies and Guidelines in Timor-Leste

50. Table 3 below 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), namely identification and description of adverse effects and appropriate measures proposed to prevent, minimize and mitigate the identified impacts.	Relevant to project components in areas adjacent to the Protected areas and stand-alone areas where protected Species may be found.
DL No. 5/2016 – National System for Protected Areas (PA)	Establishes the necessary legal instruments for the protection of declared sensitive ecological areas in Timor-Leste (Article 11) and their allowed and prohibited activities. Provides for a List of Established Protected Areas (Article 50 and Annex I), their typology (Article 12) and geographical demarcation (Article 17) and management instruments (Article 23) for approved activities within	Relevant to project components i.e. water sources and distribution systems already established and under operation within Kablaki Protected area.

Policy/Law/ Guideline	Relevant Provisions	Applicability
	Areas (Article 32) such as Land Use Zone i.e. allows infrastructure installation for human use.	Requires request for classification of these areas as Land Use under PA Management plan, to Municipal and government entity responsible for PA.
Law no. 14/2017 – General Framework for Forestry	Defines the fundamental principles and norms regarding management, protection, conservation and sustainable use of forests and watersheds (Article 1), Forest Classification [State, Community and Private] (Article 8) and Forest (Article 14) and River Basin (Article 17) Management Plans and Forbidden Activities in these areas (Article 24). It also includes Climate Change requirements for Forest development (Article 28), for emissions reduction and conservation of carbon stocks.	Relevant to project components that traverse or are located within any type of forest in the project area. EMP implementation is the overall measure to mitigate adverse impacts.
Regulation UNTAET no.17/2000 – Prohibition of Logging operations and Export of Wood	Provided for in Law 14/2017, establishes the prohibition for felling, burning or destroying trees or forests (Article 2) and the activities exempt of these prohibitions (Article 3)	Relevant to project components that will require cutting trees within alignments and ROWs. EMP implementation is the overall measure to mitigate adverse impacts.
Government Resolution No. 33/2011 – National Adaptation Plan of Action (NAPA) for Climate Change	Adopts trans-sectoral measures to reduce Climate Change vulnerability in essential sectors in Timor-Leste (Agro-forestry, Water supply, Biodiversity, Health, Infrastructure, Natural Disasters). Definition and Prioritization of Proposed Adaptation measures for said sectors (NAPA Table 13), particularly those indicated in Annex 2 - Adaptation measures for the Water Sector (no. 1, 4, 5, 6, 9, 11 and 13) and for Natural Disasters (no. 3 – avoidance of landslides and 4. Early warning systems i.e. droughts or storms).	Relevant to project in the implementation of adaptation measures for Water Source and Distribution System.
Government Resolution No. 8/2012 – Sanitation Policy	Clarifies the sanitation responsibilities and encouragement on improving the sanitary section, including that each family and institution is responsible for the construction, use and maintaining their own hygienic and sanitary facilities, hand washing facilities and others. Also includes Strategies to follow such as Component 2 - Improved Sanitation: b) and c) management and safe integrated management, treatment and elimination of human excreta; Component 3 – Sanitation Financing: Institutional Sanitation (1) investment in public toilets; (2) financed by the user (per use); Urban Sanitation (1) Direct Investment in Urban Sanitation Infrastructure i.e. FSTP; (2) with user payment for O&M costs; (3) based on integrated Urban Planning. Defines the MOPW responsibilities (Section 3) in strengthening, planning, developing and managing urban sanitation services to a) collect sludge from septic tanks and b) operate centralized / decentralised sewer systems.	Relevant to the Proponent responsibility for implementation of the project in the urban development of the city.
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. faecal sludge/sludge; b) Waste in streets; c) drainage obstruction; e) spoils and construction material on sidewalks; and h) noise to community.	Relevant regarding project Work Camps, construction ROW and FSTP treated sludge and distribution of dried bio digested sludge for Agricultural Distribution. EMP implementation is the overall measure to mitigate adverse impacts.
Decree Law No. 4/2004 – Legal Framework for Distribution of Water for Human Consumption	Establishes the conditions for the water distribution system for human consumption (Article 2). The Water and Sanitation Services are required to supply water to the public (urban) which is safe and sustainable (Article 4) and with adequate quality (Article 12)	Compliance with Water Quality Standards in effect in Timor-Leste.
Decree Law No. 33/2017 – Legal Framework for Cultural Heritage	Defines the concept of cultural heritage and the measures for its support, protection, preservation and conservation in Timor-Leste (Article 1) and its different cultural classification (Article 21). It also defines and regulates a 50 metre Protection Zone around immovable Heritage (Article 23) and the rules and licensing requirements for general work within these Zones (Article 26).	Relevant regarding project Work Camps, construction ROW. When Heritage sites Protection Zones cannot be avoided, EMP implementation is the overall measure to mitigate adverse impacts.

Policy/Law/ Guideline	Relevant Provisions	Applicability
Decree-Law no. 4/2012 – Labour Code	Describes the duties and obligations of the private employer and employee while exercising their function within the scope of work, or within the bounds of a work contract (Chapter 1), with the aim of creating good working conditions (Article 20) and a fair, safe and healthy working environment (Article 35).	Environmental management plan (EMP) provides measures to mitigate workers' health and safety hazards.
Law no. 6/2017 – Base Law for Planning	Base rules for Territorial Planning in Timor-Leste. Intends for (Article 3) sustainability of urban areas, with improvement of living conditions for citizens. Establishes the different soil uses (Article 8) and the Municipal Territory Plan and the Land Use Plan (Article 17).	Relevant to location of all project components, particularly FSTP.
Law no. 8/2017 – Public Expropriation	Rules on land expropriation for public interest reasons, responsibilities, procedures, fair compensation, respect for vulnerable groups (Article 10) and project planning requirements that include expropriation, such as public consultation (Article 22), environmental licensing [if applicable] and social or economic impact assessment studies (Article 19).	Relevant to location of all project components, particularly ROW. EMP implementation, Social Safeguards and LARAP are the overall measures to mitigate adverse impacts.
Decree-Law no. 3/2016 – Municipal Administration Statutes	The DL gives local government the functions, duties and powers to, among others: (i) conserve and protect their local environment and natural resources; (ii) plan, implement and/or operate and maintain local water supply projects; (iii) implement or arrange for implementation local sanitation/sewerage/solid waste and drainage projects; (iv) protect cultural heritage and religious sites; and/or (v) monitor project activities within their jurisdictions.	Provides basis for Manufahi Municipality, through SMASA, to monitor the environmental performance of the project.
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.

II.2.5. Pollution Control Standards in Timor-Leste

51. In regards to pollution prevention and control technologies and practices, the Government of Timor-Leste has yet to implement their National Standards (for Air, Water, Noise, etc) and therefore, under the legal requirements of the Base Law for Environment, these minimum requirements are safeguarded by the use of World Health Organisation (WHO) guidelines and, where non-existent, the IFC Environmental, Health and Safety Guidelines are usually referred to as international good practice, consistent with ADB SPS 2009 practice. The Key environmental quality standards applied are listed and presented in Appendix 12.

III. DESCRIPTION OF THE PROJECT

52. Manufahi Municipality and the city of Same in particular is currently attracting an increasing population due to its strategic location on route to the South Coast Oil & Gas Developing area, especially its closeness to New Betano city area. Because of this strategic location, the municipality will tend to grow moderately in the near future.

53. This adaptation requirement highlights the need for the Water Supply and Sanitation Investment Project for Same city, which is encompassed of a number of existing water sources and distribution alignments and this planned expansion will increase water demands and the equivalent wastewater.

54. This chapter is aimed specifically on the sub-project components descriptions of the water sourcing, treatment and storage, supply and consequently, the sanitation sector. The existing features, gaps and proposed water sources, rehabilitation of and/or new construction of conveyance and treatment, distribution, public toilets and faecal sludge treatment plants are all explained in this section, including the technical designs and criteria used.

III.1. Existing condition and need for the Project

55. At present SMASA provides around 6,480 cubic meters of water per day to its population through an aggregate transmission and distribution network length of around 40 km. The project is needed because SMASA presently provides an inadequate water supply service to the Same residents with significant losses and insufficient cost recovery to the government.

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

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

58. In addition, according to the SMASA, there hasn't been a proper management system established for wastewater and solid waste disposal in the municipality. More importantly, the schools' sanitation facilities are not adequate, mainly due to a lack of maintenance from the responsible parties or operators. The increase in water consumption leads to increased production of wastewater, and therefore, in this project, the sanitation scope will be specifically focused on the faecal sludge production from the household's septic tanks and public toilets and its consequent off-grid treatment.

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

60. It is expected to benefit a base year population of Same city of 13,770 (2020) and design year population of 24,651 (2040) by providing a reliable and adequate supply of safe and potable water, by upgrading the existing water supply situation and creating an adequate sanitation management system within a 15 km diameter of service area around the Same city centre. The construction activities such as replacing or rehabilitating old pipes with new ones, increasing the water tank capacity and water treatment, upgrading water sources, creating pilot projects for 4 public toilets, and the installation of a faecal sludge treatment plant, will be implemented within this project, aiming to meet the growing water demand and sanitation requirements.

III.2. Overview of the Project

61. The Same city project area is located in the Southwest area of the Island, in a hilly region with an altitude range between 0m (at the Betano coast) and 1,500 m above mean sea level, height of the Cablaque mountain, the third highest mountain of Timor-Leste. The city has a subtropical to a temperate climate heavily influenced by the Wet season (October to June) with an average annual rainfall of about 300 mm.

62. The project scope includes all the areas that will be required to implement the abstraction, treatment and distribution of water for human consumption, as well as provide designs and solutions for sanitation for public buildings and schools within a diameter area of 15 Km around the city, as clarified by the client in April 2020, taking the Same Water Distribution Zones defined in the Second District Capitals Water Supply Project (ADB, 2016) as the guidelines for the project area and scope.

63. The 15 Km diameter project area around Same encompasses the following:

- Suco Babulo: a small part of the Northern area of the Suco, as it lies almost totally within the 15 Km and includes a third of the proposed Water Supply Network, the existing Koloko Spring and 2 of the 3 proposed pilot wells testing sites, as well as 4 schools for the sanitation component;
- Suco Letefoho: the southern half of the suco lies within the 15 Km, where one third of the suco area is within the Mount Kablaki Protected Area, where the Kotalala and Merbuti Springs are located and includes a third of the water distribution network and the remaining proposed pilot well testing site, as well as 5 schools for the sanitation component;
- Suco Holarua: it lies totally within the 15 Km, where one quarter of the suco area is within the Mount Kablaki Protected Area, where the Erluli and Darelau Springs are located and includes the remaining third of the water distribution network, as well as 4 schools for the sanitation component;

III.2.1. Existing Water Components

III.2.1.1. Water Sources

64. Current Public water supply in Same depends on three existing independent systems (See Map 3.1 Appendix 3 and Appendix 12), complemented by different sources and locations:

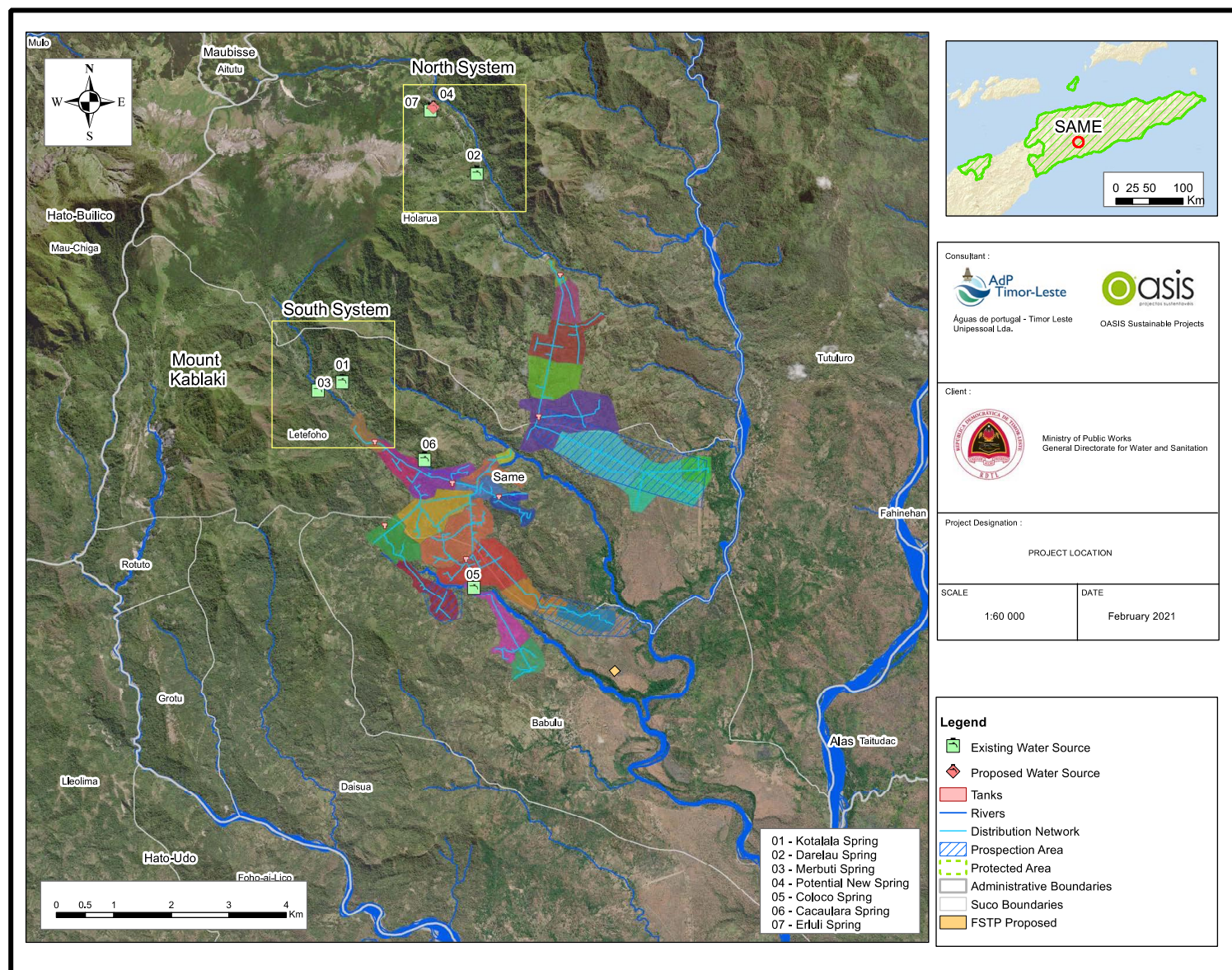
1. Southern system, with the Merbuti and Kotalala springs, located within the Protected area of Mount Kablaki (see Appendix 3, Map 3.2);
2. Northern system, with the Erluli and Darelau springs (see Appendix 3, Map 3)
3. 2 new boreholes in Borehole Prospection Zone 1 - Suco Letefoho (Zone 7)

65. Item 3 infrastructure is located in Prospection Zone 1, studied and selected for bore testing and have been drilled under the DED phase of the project and are currently ready for connection and operation as a part of the current system, as additional sources to be included in the system to complement the existing springs.

66. Apart from the new boreholes, the water distribution system as a whole has not had substantial change and as a result the current Flow Diagram does not differ a lot from the 2015 Master plan (see Figure 4).

67. The Design team is currently evaluating the long-term productivity/yield of the water sources after placing V-Notch equipment and carrying out pump tests in October 2020 to measure the water availability of the systems.

Figure 2 Same City - Project Scope and Components



68. These have provided preliminary water estimation data to be able to estimate supply towards the expected demands for the 2040 Scenario B = 61.7 lps. The project will propose a mix of abstraction between the existing springs and boreholes and the potential sources to guarantee sustainability of the extraction while guaranteeing water distribution to all SMASA clients.

69. The Southern system draws water from the Merbuti spring system, located Northeast of proposed Zone 1.1 and has a recently calculated yield of approx. 100 litres per second (lps) [October 2020, equivalent to end of Dry season], which is directed into a collection chamber and transmitted into the Merbuti Tank.

70. These spring sources are supplemented by adjacent mountain streams, which provide good quality water, as per SMASA recent water quality testing results in December 2019 and January 2020 (see Appendix 4). However, both spring intakes tend to have high turbidity during wet season, where the overall springs overflow (and albeit the overflow is dry during dry season), indirectly contributes to agriculture activities e.g. animal husbandry and farming, during the wet season. In addition, there is also the issue of bacteriological contamination and threatened water quality, as they have no protection upstream, where numerous existing households lie, mostly with poor sanitation infrastructure i.e. pervious or no septic tanks.

71. The Social Team has conducted Land due diligence in December 2020 and has concluded that, according to members of the community adjacent to the springs, they are in Public Land.

Figure 3 Example of Existing Toilet upstream of Merbuti Spring



72. Downstream to the Southern system range, there are two (2) other existing spring sources which are hydro geologically associated with the main source from Merbuti and Kotalala springs. Cacaulara spring, adjacent to proposed subzone 1.4, corresponds to a groundwater source. The yield is unknown but the water source team conformed in the field that the remaining surface runoff has a significant volume flow. Additionally, Coloco spring, located in the north east tip of proposed subzone 3.4 can also be considered as a potential source, given it. has a constant flow of 5 lps used year round by 20 neighbouring families in the adjacent community.

Figure 4 Proposed Water Distribution System for Same (AdP-TL 2020)

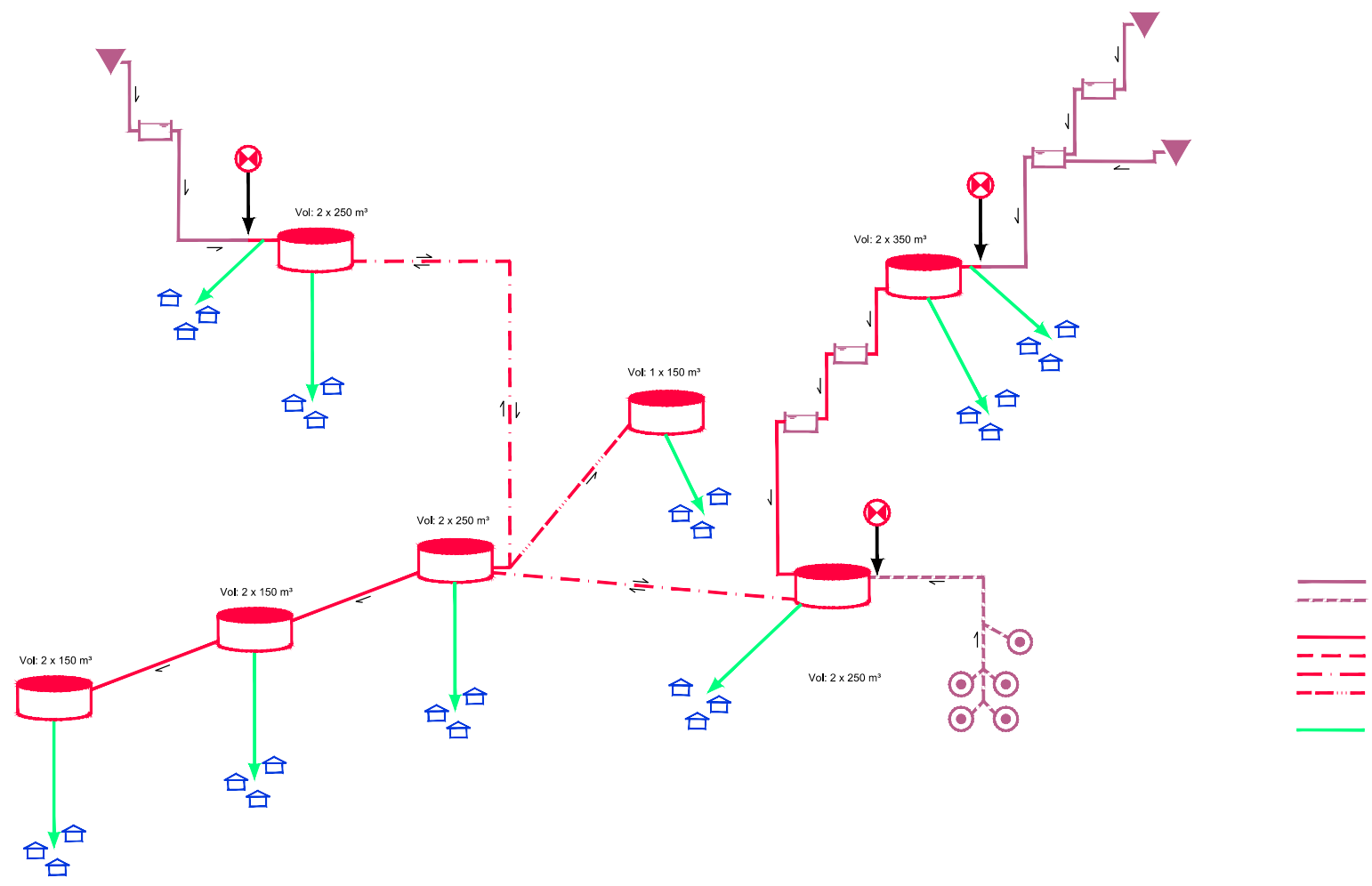


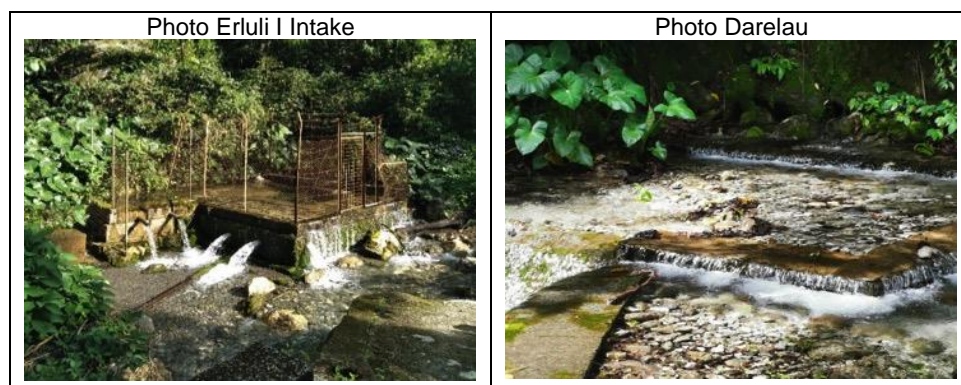
Figure 5 Southern System Existing and Potential Sources



73. The **Northern system** consists of 2 existing springs namely Darelau and Erluli I with a total yield of approx. 83 litres per second (lps) (pump test results in October 2020). The water from both sources are captured and transmitted directly to Holarua tank. Despite the abundance of water in the wet season, the flow in the dry season is practically non-existent in Darelau spring.

74. The structure built for collection does not allow quantifying the discharged volume from the source. The Erluli spring results from the same hydrogeological setting as the Darelau spring, presenting the same variation from wet to dry season, which makes the system very vulnerable.

Figure 6 Northern System Existing and Potential Sources





75. 70 m South from the Erluli I spring is the Erluli II spring with permanent flow all year round. Erluli II is Public land, as per the local community information, surrounded by coffee plantations, which are presumed to be in private land.

76. 2-days-cultural ceremonies were held in Erluli II spring from the 13th to 14th October 2020 (See Figure 7) prior V-notch device installation in the spring. The ceremonies were considered as an opening and clearance for the project activity to be well-implemented without distractions, participated by representative of SMASA, Lia Nain (Traditional Leader), Chief of Aldeia, and representative of the community. After the ceremony, the team carried out water flow measurement with provisional equipment and concluded that the water flow at the spring only produces a very small yield flow of 0.1 L/s, a contrast from what the team observed visually. Details on the ritual process and material offerings are described in sub chapter V.3.2.

Figure 7 Offerings & Lia Nain Leading the Cultural Ceremony in Erluli II Spring



III.2.1.2. Distribution System

77. The two main spring systems (North and South) supply dedicated reservoirs to subsequently supply all distribution zones through transmission and distribution alignments with gravitational system.

78. According to the SMASA technical staff, the Darelau system is responsible to cover half of Suco Holarua and half of Suco Letefoho, while the Merbuti system covers the remaining Suco Letefoho and a

part of Suco Babulo combined from the Coloco spring. Most of the community in Suco Holarua depends on private wells and other smaller springs, including some enhancement of water reticulation from several NGOs projects. This still reflects on some rural areas, which have no water access at all.

79. Two main reservoirs from Merbuti and Holarua tanks are comprised of an older Indonesian era reservoir and a newer JICA reservoir. Those mentioned storages are in good condition and considered effective. While there are smaller tanks, including an elevated tank at Posto and Manico water tank, Letefoho tank (north) (replacing the Ailuli tank) and others in central Letefoho area were built during the Portuguese occupation. Unfortunately, the total reservoir capacity is substantially less than required for the current population. Thus, all the 7 tanks' capacity will be increased following the 2030-2040 demands (See Table 6).

80. Transmission mains in Same are a mix of old (mostly from Indonesian administration) and new pipelines from a JICA project completed in 2008. Additionally, a new transmission main for the Merbuti spring intake was also built in 2012 by the DAA. Sections of the transmission mains are subject to very high static pressures because of the high topography.

81. The distribution system includes old Portuguese pipes particularly in the older city area supplied by the Merbuti system, as well as significant lengths of mains from the period of the Indonesian administration, and some newer mains installed since the country's independence. In addition, the newer mains include substantial lengths of ductile iron and steel distribution mains in both the Darelau and Merbuti zones. According to SMASA information, the existing connections are in a very poor state and without exception will have to be replaced.

82. In general, many of the older pipes, which were intended to be abandoned and replaced by the JICA system, remain functioning and consumer connections have not been transferred to the new distribution pipelines. This resulted in continued utilization of the older distribution pipelines, along with leaking/water loss conditions.

III.2.1.3. Water Quality

83. The project has a recent history of water quality test results, some carried out between 2000 and 2005, with only one test per year from 2003 to 2005, while other tests were performed in 2014 for the 4 cities Master plan and other sporadic tests in 2019 and 2020, at various points in the distribution network and at some water sources. The results from the water quality tests are defined in the Preliminary Design report (see Appendix 4).

84. Conclusions on these results were the following:

- Master plan (2014) tests shows that there is bacteriological contamination (only total coliforms) in the distribution system and Merbuti intake water source. The other water sources tested (Carbulau intake and Kotalala intake) don't have bacteriological contamination;
- Regarding the water quality tests performed in 2019 and 2020, there is only bacteriological contamination (total coliforms and *Escherichia coli*) in the distribution system and in the tested water sources;
- The water temperature is normally high, reaching temperatures of 29°C in some samples;
- The other parameters tested are according to the limits of the WHO.

85. The bacteriological situation justifies the proposal of chlorination systems in particular within the city's proposed tank system.

III.2.1.4. Gaps in the Water Supply

Water Balance: Demand vs Supply.

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

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

88. To clear the uncertainty of the production yield of the sources, a hydrogeological study was conducted in October 2020 (in equivalent conditions to the end of the Dry Season) to determine the available yield of proposed boreholes and existing springs through bore and pump testing. Table 4 presents the water demands versus October 2020 water flow investigation results, which suggest that, under these numbers, and pending a long-term monitoring program, the current proposed sources can produce enough flow. for the requirements of the distribution system up to 2040, for the bigger part of the Dry season. These calculations take into consideration a percentage of overflows for social use and the definition of a seasonal variable flow for ecological purposes (suggested at a minimum 30% of the Wet Season Spring flow (November to May) and 10% of Dry Season Spring flow (June to October).

89. Regarding the dry season, given that the flow numbers are recent and that variability may occur that reduces the Merbuti and Erluli flow considerably, boreholes #1 and #4 will be used to compensate the reduction and maintain the water distribution within demand levels.

Table 4 Water Availability and Origins

Demand	L/s	m ³ /day	L/s	m ³ /day	L/s	m ³ /day	L/s	m ³ /day
2020 Scenario B	33.8	2,920.32						
2030 Scenario B	45.7	3,948.48						
2040 Scenario B	61.7	5,330.88						
Existing sources	Total Flow Production		Distribution requirements		Social		Ecological	
Erluli	79.8	6,894.72	34.5	2981	10.4	899	34.9	3015 44%
Darelau	3.3	285	3.2	276	-----	-----	1	86 24%
Merbuti (upstream)	36.9	3,188.16	13.3	1149	23.6	2039	-----	-----
Merbuti (main)	63.7	5,503.68	29.5	2549	20.1	1737	14.1	1218 22%
Total	180.4	15,586.56						
Potential Sources	L/s	m ³ /day						
Borehole #1	8.0	691.2						
Borehole #4	7.0	604.8						

III.2.2. Proposed Water Supply

III.2.2.1. Water Conveyance and Treatment

90. Given the lack of current information about spring and borehole reliable yield, the analysis was focused on possible layout of the systems (different Scenarios), as shown in Table 5.

Table 5 - Water Sources Scenarios

Same		Proposed Water Sources	Merbuti, Darelau and Erluli Springs and new boreholes near Babulu tank and Letefoho North Tank
------	--	------------------------	--

	Scenario 1 (boreholes with good productivity)	Possible reinforce	More boreholes near the Babulu Tank
	Scenario 2 (boreholes with medium productivity)	Proposed Water Sources	Merbuti, Kotalala, Darelau and Erluli Springs and new boreholes near Letefoho North Tank
		Possible reinforce	More boreholes near the Babulu Tank
	Scenario 3 (boreholes with low productivity)	Proposed Water Sources	Merbuti, Kotalala, Darelau, Erluli, Cacaulara and Colocu Springs and new boreholes near Letefoho North Tank
		Possible reinforce	Not applicable

91. **Scenario I.** At present, Same's water supply is divided in two independent systems, one on each side of Ermetin River. In this Scenario, it is proposed that a single Water Supply System be put in place with 7 Distribution Zones and respective subzones (see Appendix 3, Map 3.4). To the north of Ermetin river, the proposed water supply system will stretch between the elevations 860m at Erluli spring to the distribution network lower elevation at 360m, and goes from an elevation of 725m at Merbuti spring to the distribution network at 335m, at south of Ermetin river.

92. Also to the north of Ermetin river, from the Erluli spring, a 1770 meters long gravity transmission main stretches to a pressure break tank near the Darelau spring. From there, a 2695 meter long gravity transmission main feeds the flows from Erluli and Darelau springs, to the WTP to be built at Holarua Tank and from there a 2580 meters long gravity transmission main will feed into the Letefoho North Tank.

93. South of Ermetin river, from the Merbuti spring, starts a 1495 meter long gravity transmission main to a WTP to be built at Merbuti Tank. The treated water will be stored at the Merbuti Tank and from there it will be fed by:

- A 1625 meters long gravity transmission main to Letefoho Central Tank at 520 masl;
- A 1035 meters long gravity transmission main to Posto Ground Tank - Water Tower at 565 -580 masl;
- A 945 meters long gravity transmission main to Manico Tank at 520 masl;
- A 1755 meters long gravity transmission main to Babulo Tank at 480 masl.

94. Table 6 below is the proposed water tank storage calculated according to the water demand projection for 2040.

Table 6 - Water Tanks Capacity to be increased

City	Tank	MDP + Unaccounted water (m ³ /d)			Storage Needed (m ³)		New Storage Proposed (m ³)	
		Scenario A		Scenario B				
		2020	2030	2040	2020-2030	2030-2040	2020-2030	2030-2040 (*)
Same (Scenario I, 2 and 3)	Merbuti Tank	416	553	861	300	467	300	150
	Letefoho Tank Central	499	604	744	327	403	300	150
	Babulu Tank	417	577	975	312	528	300	300
	Posto - Tower Tank	44	72	144	39	78	150	-
	Manico Tank	178	237	316	128	171	200	-
	Holarua Tank	572	741	1154	401	625	400	200
	Letefoho Tank North	396	593	896	321	486	300	150
	Total	2 521	3 376	5 090	1 829	2 757	1 950	950

(**) Reserve area for future increase capacity (considering possibility of expansion area)

95. The connection of the system on both sides of Ermetin river will be done through a transmission main connecting the Letefoho Central Tank and the Letefoho North Tank. It will be a reversible gravity flow transmission main with Central – North direction and pumped in the North - Central direction.

96. The northernmost part of the system is predicted to have the biggest problems in the dry season, because it is supplied by springs with a suggested smaller yield. To allow the water to come either from the bore field near Letefoho North Tank or from the other bank of the river, and reach the Holarua Tank in the dry season, a reversible transmission main is proposed connecting the Letefoho North Tank and the Holarua Tank.

Figure 8 Same Reversible Transmission Main

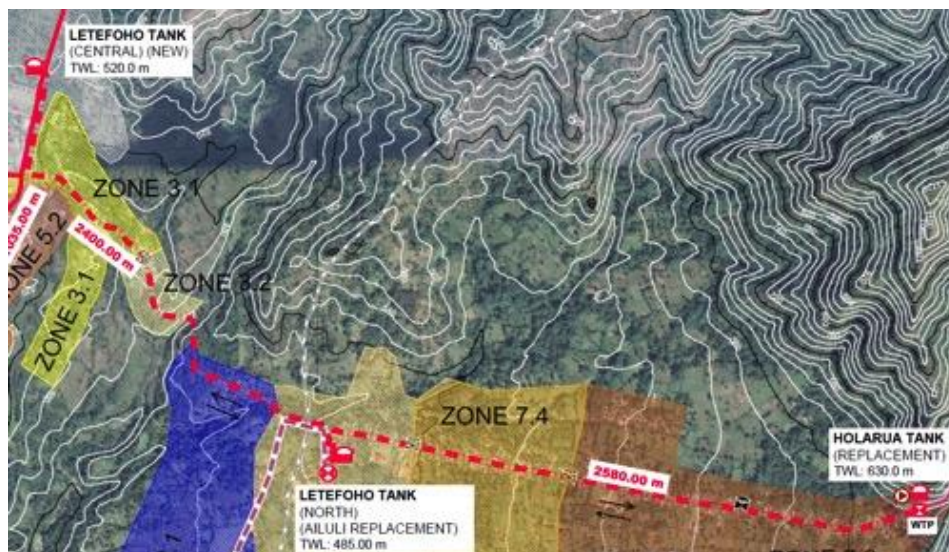


Table 7 Water Supply Proposed Infrastructures (Preliminary Design (D4) Report)

Water Supply System		Same		
		Scenario 1	Scenario 2	Scenario 3
Water Sources	Springs (un.)	3	4	7
	Boreholes (un.)	3	2	0
	River Intake (un.)	0	0	0
Raw Transmission Mains (m)		10 735	9 140	8 880
Water Treatment Plants (un.)		0	0	0
Water Tanks (un.)		7	7	7
Water Tanks (total m ³)		1 950	1 950	1 950
Transmission Mains (m)		10 360	10 360	10 360
Distribution Network (m)		40 326	40 326	40 326

III.2.2.2. Rehabilitation of the Transmission and Distribution Mains

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

a) Material Selection

98. The following criteria is proposed regarding material selection:

Transmission Lines (HPDE and Ductile Iron):

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

Distribution Network (HPDE):

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

b) Trench Design

99. 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.

Figure 9 Laying of Transmission and Distribution Lines Along a Road. Typical Cross Sections

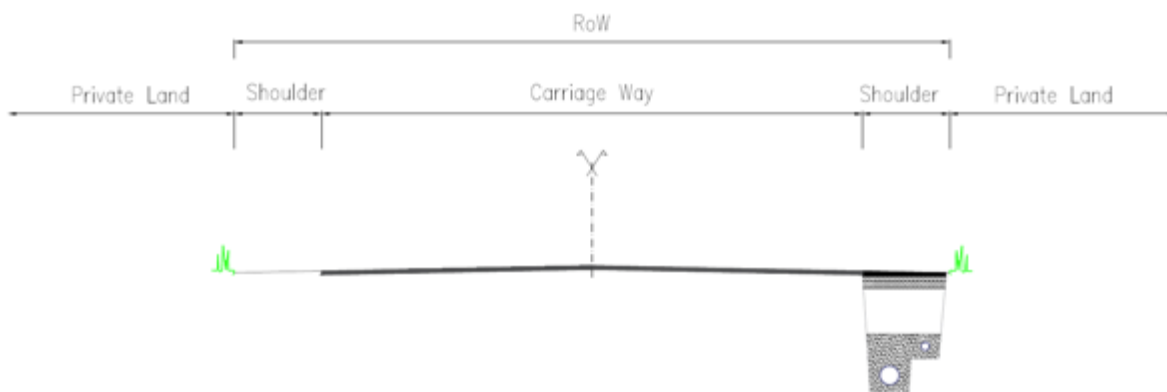
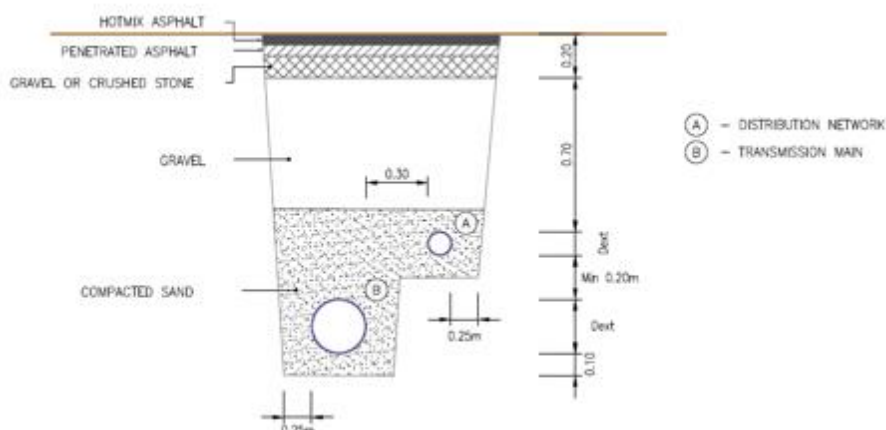


Figure 10 Typical Double Trench Transmission Mains Service



100. 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.

c) Gravity Transmission Mains Operation

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

d) Distribution Network Pressure Zones

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

III.2.3. Sanitation System

III.2.3.1. Existing Sanitation in Same

103. According to the 2016 Master plan, the National 2030 target for household sanitation is 100% access to hygienic toilets and improved hygiene behaviour, consistent with the Government Resolution No. 8/2012 - Sanitation policy. However, major deficiencies of current toilets in Same are: open defecation practices; lack of cleanliness; insufficient water supply; poor construction standards and inadequate lighting. School Sanitation is also not "User friendly" (where none of the toilets cater for special infrastructural requirement of children, physically handicapped persons or menstruating girls), and there is inadequacy of funds for operation and maintenance.

104. According to the 2016 Master plan, only 27% households in Same practice open defecation (see Table 8). All the remaining households that do not practice open defecation are contributing with sludge, through their own toilets or shared toilets.

105. It is presumed that nearly most Households in the project area have installed a sanitation system similar to a septic tank but with a permeable bottom that unfortunately serves as a leaching pit with an accumulating sludge top layer [referring to sub-section 3.4.4- Current Status on p-177 of the 2016 Master plan]. Although not ideal, these sanitation facilities are nevertheless producing digested sludge (which needs to be removed once in two years) and infiltrating semi-treated wastewater into the ground and water table.

Table 8 Toilet Access in Same as per 2014 Household Survey

Toilet type		Units	Percentage Access ¹
			Same
1	Open defecation	%	27
2	Unhygienic toilet (owned)	%	23
3	Unhygienic toilet (shared)	%	5
4	Hygienic toilet (owned)	%	40
5	Hygienic toilet (shared)	%	4
Total			100
Current (2014)		Number of Households ²	
1	Open defecation	HH	869
2	Unhygienic toilet (owned)	HH	738
3	Unhygienic toilet (shared)	HH	174
4	Hygienic toilet (owned)	HH	1,260
5	Hygienic toilet (shared)	HH	130
Total			3,171

1 Based on Household Survey

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

III.2.3.2. Proposed Sanitation Projects

106. The proposed sanitation treatment sector is composed of 4 pilot test sites for public toilets (with septic tank and effluent soak pit system) and the construction of the Faecal Sludge Treatment Plant (FSTP) to receive the sludge from these pilots, as well as all buildings and households located within 15 km of the Same city (See Figure 11 and Figure 22, and Appendix 3, Map 3.1).

107. The public toilets' pilot test locations will be chosen per the location and conditions of current sanitation infrastructure, users, as well as the state of the toilet facilities. It is worth noting that there are concerns across the majority of these public toilet management responsible persons given that current sanitation facilities do not have regular maintenance or access to water supply.

Figure 11 Public Toilets Proposed Locations - Same

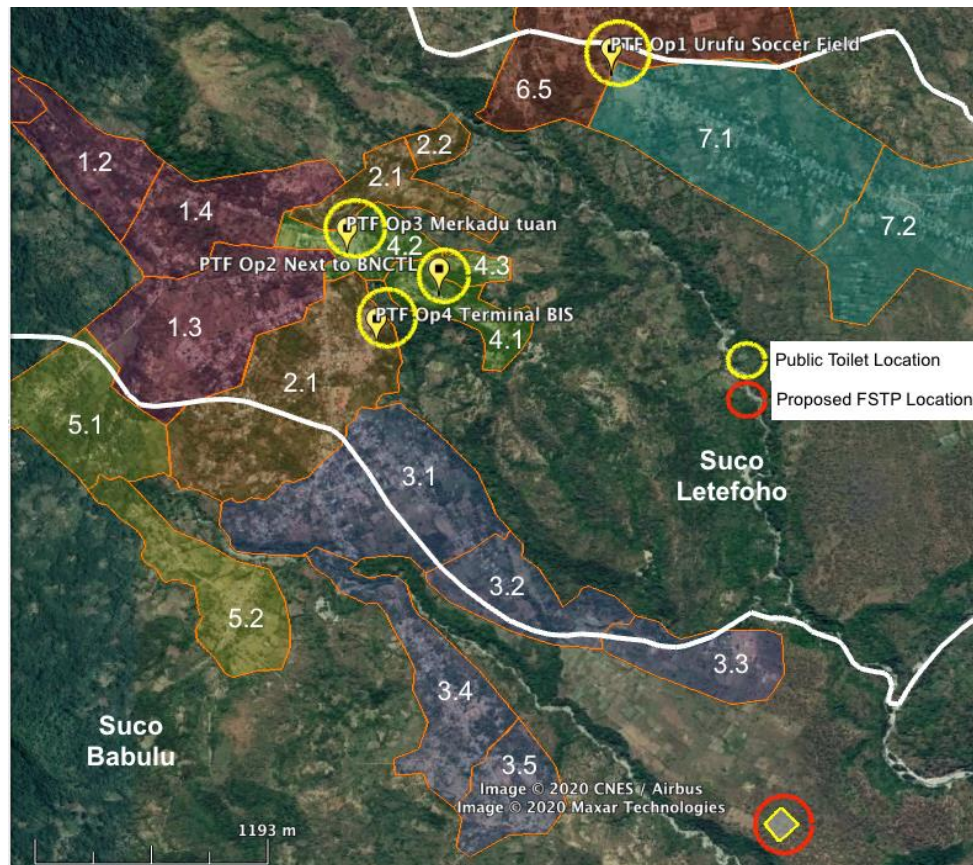
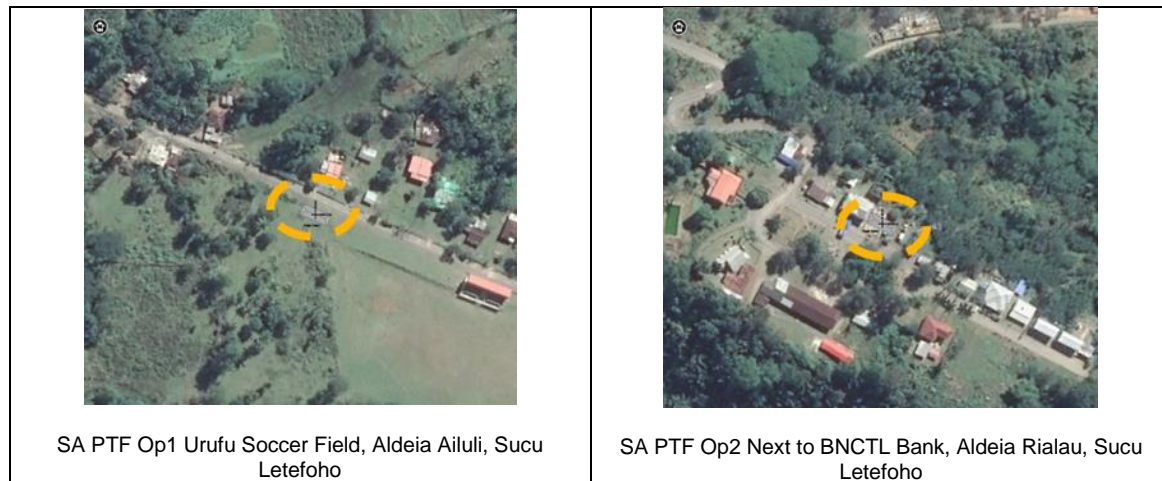
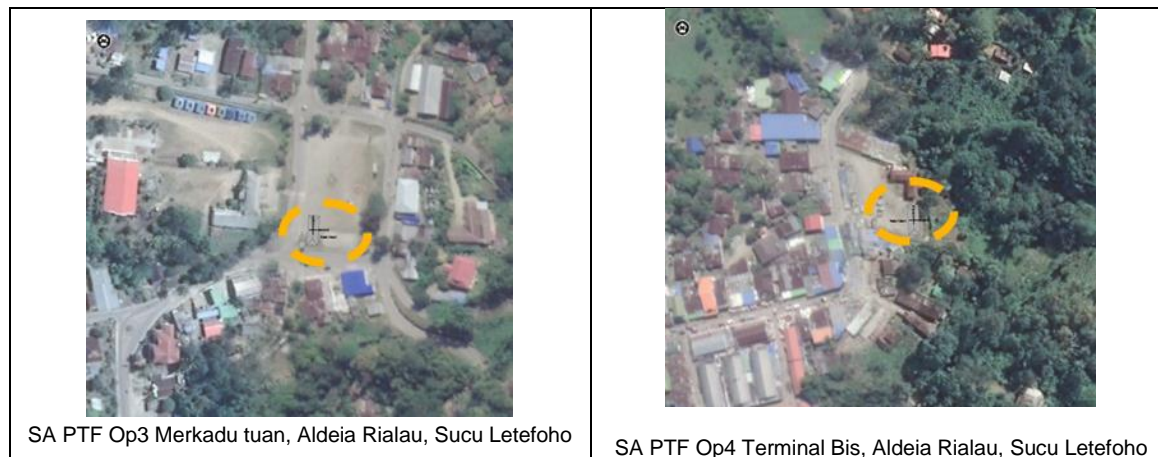


Figure 22 Aerial view of Proposed Public Toilet locations in Same City





A. Public Toilets.

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

Male Toilets:

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

Female Toilets:

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

Physically disabled Toilets:

- Adults & Children: A common latrine for physically disabled person shall be provided at the centre of men's and women's section. Area of latrine with a ramp etc. for a handicapped person=3.70 m² [approx.].

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

- Primary Treatment - Septic Tank: shall have minimum width of 750 mm, minimum depth of one metre below water level and a minimum liquid capacity of 1 000 litres. Inlet: The pipe shall be fixed inside the tank, with top limb rising above scum level and the bottom limb extending about 300 mm below the top water level. Outlet – It would be fixed like inlet but shall be 50 mm below the invert of the inlet pipe.
- Secondary Treatment - Soak Pit or Dispersion trench or Subsurface absorption system: These infrastructures will be carefully selected and designed according to the available areas, local conditions and receiving environment, based on the number of expected users and adapted to the specific local characteristics where the public toilets will be implemented.

Figure 33 Septic Tank for up to 50 Persons Capacity

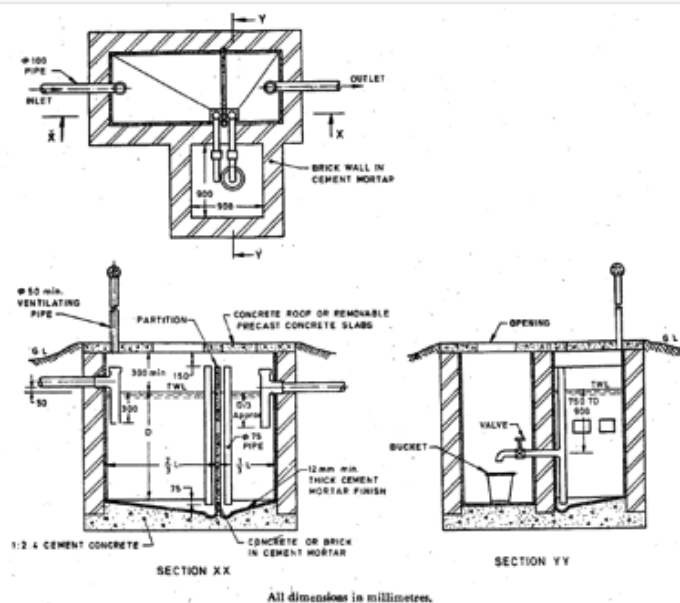


Figure 44 Septic Tank for up to 200 persons

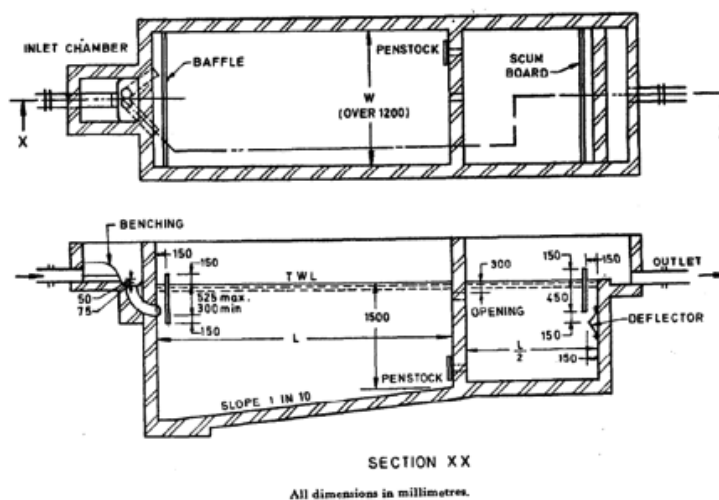


Table 9 Recommended sizes of Septic Tank

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

Faecal Sludge Treatment Plant.

110. The FSTP was designed considering the future users of the sanitation system up to 2040, namely public buildings, households and schools. The FSTP will be supplied with sludge collected by vacuum

trucks from domestic and non-domestic sources and the estimated daily volume collected in Same can be viewed in Table 10.

Table 10 - Total Sludge Volume to be collected daily projections

Village	UNIT	2014	2020	2025	2030	2035	2040
Same	m ³ /d	2.39	2.8	3.15	3.59	2.04	2.37

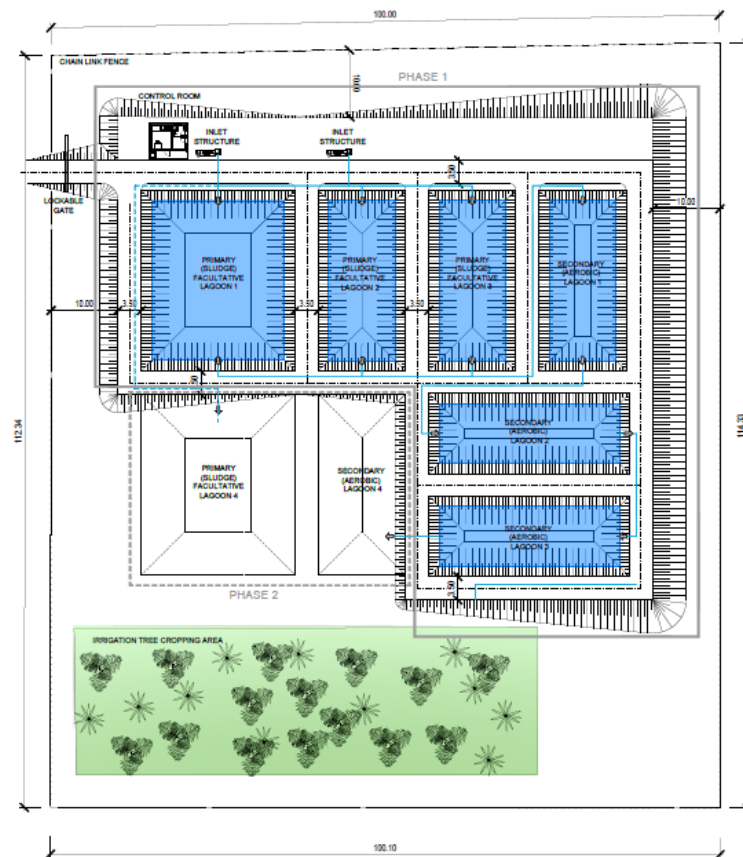
111. This service will then require transport from the sources to the FSTP, where accessibility of trucks for sludge collection and routing to the treatment plant are of the most importance, requiring easy access but with a reasonable distance from the proposed FSTP to the nearest household (>400m) and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

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

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

113. Given issues of planned city expansion, the proposed FSTP has been chosen to be placed in Akadiruhun, Suco Letefoho (See Figure 66 and Appendix 3, Map 3.1.), since the location fills in all the above-mentioned requirements and it is not earmarked for city expansion, according to information from the Manufahi municipality and SMASA.

Figure 55 FSTP Same proposed installation and segments



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

Table 11 - Faecal Sludge Treatment.

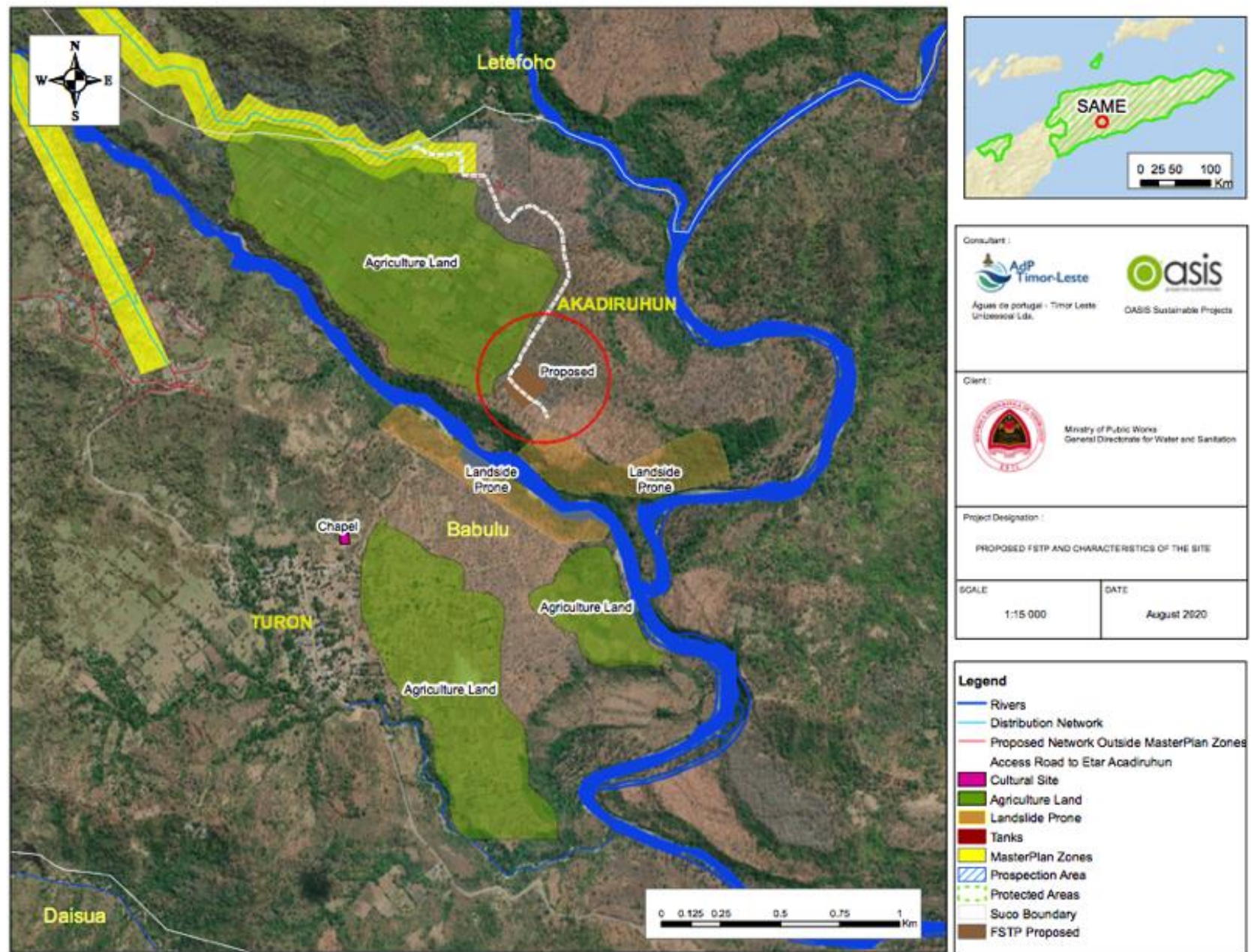
TREATMENT STAGES	TREATMENT MODULES
Sludge Stabilization/ Dewatering	Drying Beds
Liquid Wastewater Treatment	Integrated Settler and Anaerobic Filter
	Horizontal Planted Gravel Filter

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

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

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

Figure 66 FSTP location in Suco Letefoho



IV. ALTERNATIVES ANALYSIS

IV.1. 'Without-project' or 'do-nothing' Alternative.

118. The citizens of Same 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.

119. The existing water supply in the project area is intermittent, not able to meet the increasing demands of the increasing population of Same. Limited water supply will compel SMASA 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.

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

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

IV.2. Design Alternative




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

IV.3. Source Alternative

123. Several existing water sources were assessed to ascertain feasibility for the distribution system year round, as well as their social and environmental role in the area and were further compared with the Merbuti and Erluli Springs, which are, at the moment, under October 2020 "end of dry season" conditions, the most abundant water sources in the system at 100 lps and 79.8 lps respectfully, with the capacity to supply water distribution demands for the horizon year of 2040 and still provide for social and ecological flows in the order of 54% and 57% of the respective flows.

124. Therefore, the below-mentioned sources have not been included in the system to reduce the possibility of environmental and/or social impacts occurrence as their flows are considered smaller in wet

season and sometimes deplete in the dry season and this way can continue to cater for adjacent community and environmental needs, such as i.e. Kotalala spring and Agriculture and fish farming or Coloco Spring and its sacred/cultural significance.

<ul style="list-style-type: none"> Components and Site Salient Features 	
A. Spring near Erluli (potential source)	
<ul style="list-style-type: none"> • Located 70 meters south from the Erluli upstream, precisely in the coffee plantation area (private property). • No specific sacred area, according to SMASA technician • Prone to landslide as the spring is located in a slope area with soil composed of sedimentary rocks. • Water flow and quality to be confirmed after hydrogeological study 	 <p>East view</p>
B. Kotalala spring	
<ul style="list-style-type: none"> • Located in the southern part of the distribution system and lies in the protected area. • A distribution piped originated from Merbuti spring, connects with Ermer and Betululi springs. • Kotalala spring area is surrounded with fences and is protected with a roof managed by the SMASA. On-going construction for disinfection unit. • Same vegetation as in Merbuti spring. • A yearly cultural ceremony is needed. • Distribution pipes consisted of 4: <ul style="list-style-type: none"> - From JICA which supplies for 3 aldeias in Suco Holarua and 2 aldeias in Suco Letefoho. - Connects to Coloco spring and distributes to Suco Babulu. - 2 other pipes distribute to other aldeias in Suco Letefoho. 	
 <p>Water capturing in Kotalala</p>	

• **Components and Site Salient Features**



Disinfection Unit



Distribution Pipes (JICA Project)

C. Cacaulara spring

- Vegetation: ipot palms, Piper betel, taro plants, coffee plantation, and bamboos.
- Water flow is very small.
- Spring is considered sacred/lulik with yearly cultural ceremony needed.
- Falling tree causing damages to the distribution pipe.



Cacaulara Spring



East View of Green vegetation



Pipelines capturing water from the spring



West view of green vegetation

• **Components and Site Salient Features**



Falling tree jeopardizing the distribution pipe



Pipeline direction from the spring (east view)



A small flow of surface water connecting to the spring



Downstream surroundings where the distribution pipe is directed

D. Cocolo spring

- Coloco spring is located southern part of the distribution system in Suco Babulu. Water intakes from Merbuti and Ermei (Kotalala) springs which consist of 2 tubes and connect to Coloco spring.
- According to the technic staff, besides the Caculaara spring, Coloco is more sacred comparing to the other springs.
- South west part is adjacent to the main road and is surrounded with vegetation such as Dryopteris wallichiana, taro plants, bamboos, banana trees, siam weeds, and other wild bushes.
- The distribution system of this spring is described below, according to SMASA technician:
 - Distribute to Aldeia Lapuru (Suco Babulu)
 - Aldeia Turon and a place named Aiasa (out of the supply zone).

• Components and Site Salient Features	
	
Northwest view of the pipelines	Vegetation (Northeast view)
	
Coloco spring (west view). Declining is the national road	

IV.4. Faecal Sludge Treatment Plant (FSTP) Location Alternative

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

126. 4 sites were identified, all with the land space of 15,000m² required for the implementation of the FSTP (see Table 12). Of the 4 locations, Site 1 – Akadiruhun was the chosen location for the FSTP since it filled almost all the criteria. However, the site was not the first choice. Site 4 (Luac) had the best conditions regarding distance to community but the Same Municipality has earmarked this area for urban expansion of the city and Municipality service buildings, rendering it unfeasible, while Sites 2 and 3 lacked the existence of substantial agricultural land adjacent to the site to absorb the proposed dried treated sludge and were reasonably close to the Turon community.

Table 12 FSTP Proposed Locations in Same City

FSTP	Coordinates	Actual Area Available (m ²)	Distance from (m)		Site elevation above MSL (m)	Description	Comments
			Houses	Water Body			
1 – Akadiruhun, Suco Letefoho	Lat: 9° 1'46.92"S Long: 125° 40'17.64" E	15000m ²	1 km	200m	323.793m	Location characteristics: - located on grassland, - flat area - has the access road, - 1 km from community settlements, - 250 meters from the population garden; - Adjacent to agricultural area (sludge reuse); and - has precipice 200 meters from the river.	Recommended
2 – North West Aldeia Turon, Suco Babulo	Lat: 9° 1'51.64"S Long: 125°40'9.06"E	15000m ²	480m	160m	322m	Location characteristics: - located on grassland, - flat area, - has access road, - 300 m from a chapel - 480m from community settlements and - has precipice 200 meters from the river.	Not recommended
3 – South East Aldeia Turon, Suco Babulo	Lat: 9° 2'1.14"S Long: 125°40'12.66"E	15000m ²	480m	160m	306m	Location characteristics: - located on grassland, - flat area, - has access road, - 600 m from a chapel - 570m from community settlements and - has precipice 200 meters from the river.	Not recommended
4 - Luak, Aldeia Turon, Suco Babulu	Lat: 9° 3'29.85"S Long: 125°41'18.52"E	15000m ²	470m	350m	216m	The area has been selected by the Same Municipal government as an administrative area so all government buildings will be moved here, therefore FSTP purpose locations should not be planned in that area.	Not recommended

• **Components and Site Salient Features**

E. FSTP No. 2, North West Aldeia Turon, Suco Babulo

(+)

- The topography is relatively flat covered with grassland and siam weeds, with no affected private owned or endangered vegetation.
- The site is easily accessed with good condition road, although not paved.
- No specific sensitive area i.e. lulik/sacred area in the location.
- Surrounded with dispersed agriculture activity i.e. animal husbandry and horticultures.
- No potential of flooding and landslide. Distance from precipice is 300m.

(-)



- 300m South west from the selected site is where a small chapel is located in a small hilltop.
- Close to dwellings approximately 600 m from the proposed site. The sludge transference will result amenity either odour, and noise from movement of sludge trucks and operational activity.
- Possible private land, therefore compensation will have to be considered.



East view of the Proposed Location



South view of the Proposed Location

F. FSTP No. 3, South East Aldeia Turon, Suco Babulo		
<p>(+)</p> <ul style="list-style-type: none"> The land is relatively flat covered with Eucalyptus and teak trees, siam weeds, and grassland. No specific human-planted trees, plantation or other endangered vegetations. Easily accessed with good condition road, although not paved. No specific sensitive area i.e. lulik/sacred area identified in the location, except possible of cultural rituals by farmers solely for protecting the animal livestock, however it does not make the area less conspicuous with sensitivity. Surrounded with dispersed but vast agriculture land. No potential of flooding and landslide. Distance from precipice is 300m. <p>(-)</p> <ul style="list-style-type: none"> Close to dwellings approximately 500 m from the proposed site. The sludge transference will result amenity either odour, and noise from movement of sludge trucks and operational activity. Possible of private land, therefore compensation will have to be considered. 		
 <p>Proposed Location (East view)</p>		 <p>Private Farm 250 m south west from the Proposed FSTP Site (East view)</p>
G. FSTP No. 4, Luac, Aldeia Turon, Suco Babulo		
<p>(+)</p> <ul style="list-style-type: none"> The topography is relatively flat, empty plot and is not surrounded with human's activity. Is located Southern and approximately 2 Km from the urban area and supply zone. <p>(-)</p> <ul style="list-style-type: none"> No possible access therefore could not allow the team to do photographic recording. The proposed area is earmarked by the Municipality for urban expansion i.e. allocation of the local states' offices. 		No Photos Available

V. DESCRIPTION OF THE ENVIRONMENT

V.1. Physical Environment

V.1.1. Topography

127. Same city is located in the interior of Timor-Leste, in the Manufahi Municipality, 49 kilometres south of the capital Dili, south of the Kablaki mountain. Manufahi generally consists of an elevated landmass reaching 1,500 m at its Northern ridge. It has higher elevations to the North and descends with steep and rolling slope (10% to >50%) to extensive coastal plains in the South Coast (0 -100 m) (Seeds of Life, 2014).

V.1.2. Climate

128. As Same city located in central part of Timor (mountainous region), it experiences more rainfall at higher elevations. In Same, the wet season runs from November to June (>150 mm) with the highest rainfall experienced from December to March (between 300 mm – 400 mm). The onset of the dry season is started in June and only lasts until October, with rainfall ranging from 20 mm to 70 mm (Climate Change, Seeds of Life, 2012). Same experiences a defined transition in the changes of rainfall patterns between wet and dry.

129. Same generally has a temperate climate where temperature ranges from 17°C to 28°C. The coldest temperatures (<20°C) are experienced from July to September and the hottest from October to December (25°C to 28°C) (Climate Change, Seeds of Life, 2012).

V.1.2.1. Climate Change Projection

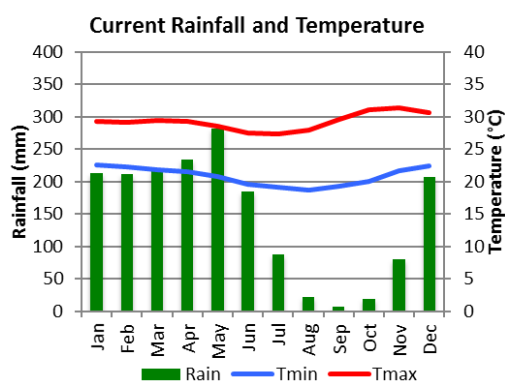
130. From 2000 - 2050, there is an estimated 7.65% decrease in average annual rainfall (2,315 mm to 2,138 mm) and a 6.72% increase in average annual temperature (23.8°C to 25.4°C) in Same. This climate change predicts dryer and hotter periods and less frequent rain events but with higher intensities of rainfall, leading to high-risk probability of flash floods and landslide occurrences.

131. 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. The overall impact could lead to land degradation and soil infertility, and damage of seedlings caused by extreme storms.

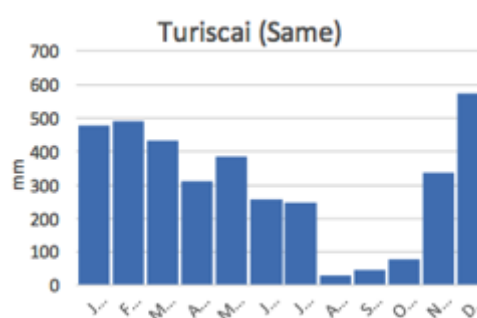
132. The projected increase in temperature for Same (increase of approximately 1°C across the project sucos, based on 2050 IPCC4 CSIRO A2A Projection) may come to cause the farmers to i.e. suffer from yields decline of 10% for every 1°C increase in temperature (GovTL, 2010).

Figure 77 Average Temperature and Rainfall Patterns Throughout 2000 in SAME (CCCB - TL, 2018) and Average Rainfall Pattern for Same from 2010 to 2018 (ADP/Engidro, 2020)

133. SAME (2000)



135. Turiscai (2010 – 2018)



V.1.3. Geology

136. The West of Same has geo-formation units that belong to the Viqueque and Ainaro formation while the North of Same lies on the Lolotoi formation (National Ecological Gap Assessment for Timor-Leste 2010, 2010).

137. As explained in Appendix 3 of the D3 Report – Water Resources, the geologic formations present at the region are the Hard-Fractured Limestone that constitutes 30% of the total area. Under this formation and outcropping in the rest of the area are impermeable formations composed by sedimentary rocks, namely recent deposit of gravels, sands and silts.

138. The presence of these metamorphic sediments at higher areas of the mountain (North of Same) is an indication of Same's high vulnerability to the effects of soil erosion and landslides due to its weak and incoherent structure.

V.1.4. Water Resources and Hydrology

139. 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.

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

141. 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.

142. Figure 18 shows that the Northern catchments tend to be larger than those located in the south. Most of catchments in the northern coast generate semi-permanent (i.e. seasonal) flows during the wet season after heavy rainfall events. On the other hand, the southern coast benefits from higher rainfall and thus is able to supply larger permanent river systems in the wet season and several rivers with a permanent base flow in the dry season.

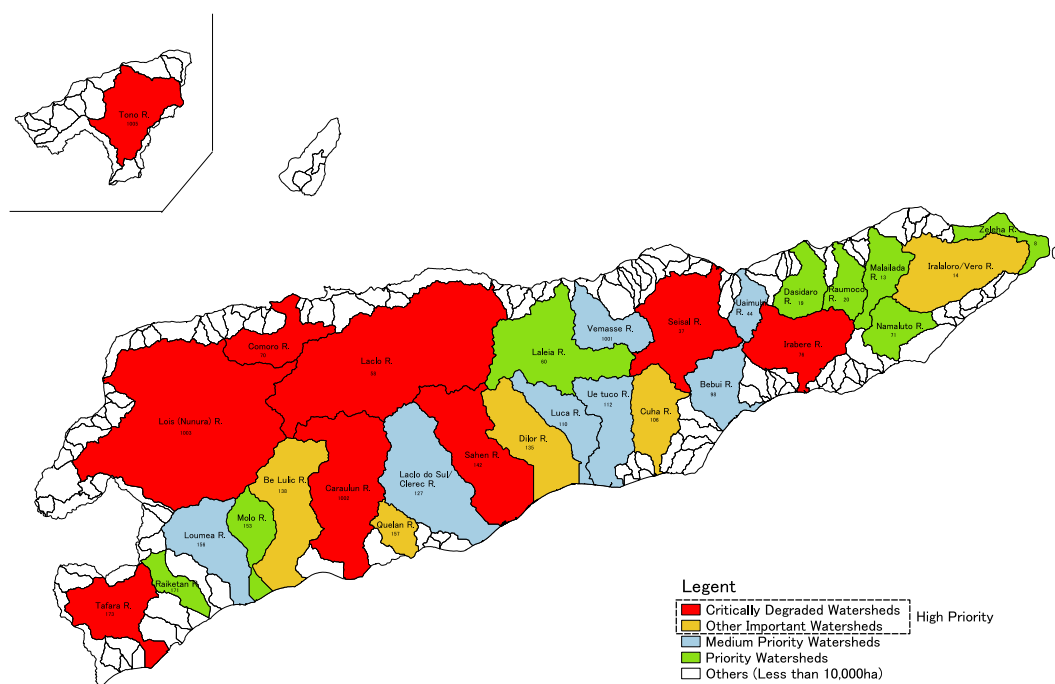
Water Resources in the Project Area

A. Surface and Groundwater

143. The hydrological system in SAME falls into the Caraulun River Watershed, considered a Very High Priority [Red] (JICA, 2017), composed of several secondary water body elements (rivers and streams) draining through Same, Southwards towards Betano at the coast (ADB, 2016).

144. The main river, Mota Caraulun, is located upstream in Northern Manufahi, North of Same. The Southern coastal water bordering Suco Betano is networked to Aisa River flowing from upstream of Northern Same. The two sub-river network running from East and West of Same intersects at the junction of Babulo and Daisua and connects to Aisa and subsequently to the sea. The two sub-rivers have multiple river networks, including Tutu Luru, Bui Sara, Lakuku, Manicun, Ermyty and Kamilaran. This network of rivers flow downstream to Aisa River. Bui Sara, Lakuku, and upstream of Ermyty are within the protected area network of Mount Kablaki.

Figure 18 Important Watersheds in Timor-Leste (JICA 2017)



145. As seen in 3.2.1. and further described in 4.4. the Project Area of Same city is supplied with Spring water, mainly from the larger Northern (Erluli/Darelau Spring) and Southern (Merbuti/Kotalala) Systems, and smaller spring systems such as the Cacaulara and Coloco Springs.

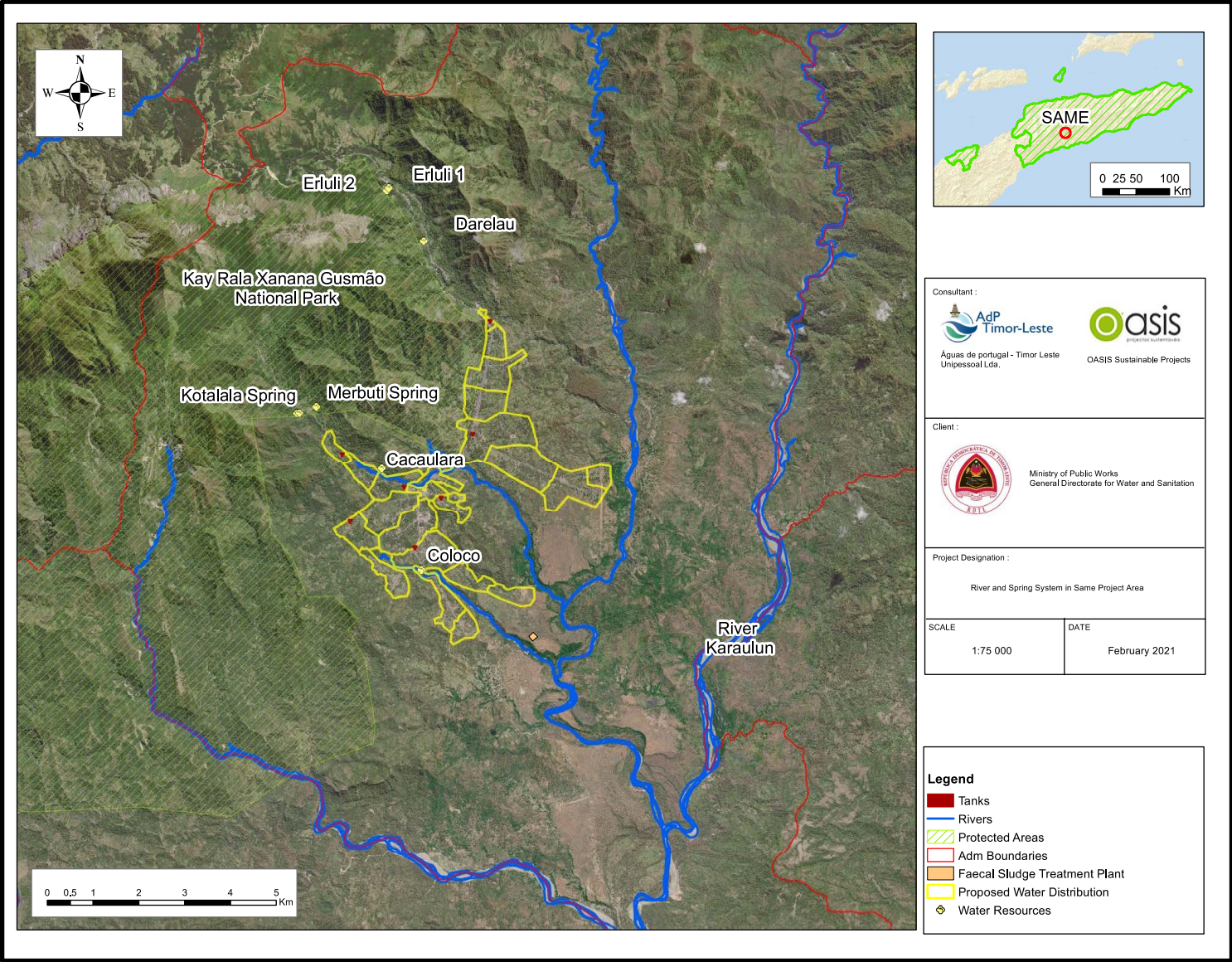
146. Given the predominance of water during the dry season, the larger systems are used year round for Water Supply from SMASA and downstream activities such as agriculture and, more recently, fish farming (Kotalala and Erluli II), while the smaller systems are used for water consumption when water is available during the year.

B. Water Quality

147. Several water quality studies have been carried since 2000 up to 2019, to several water sources in Same, particularly those used for the Water Distribution system and during the Masterplan in 2014 (ADB, 2016). These have been evaluated and assessed in Chapter 4.2. – Water Quality Investigations on the D3 report.

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

Figure 19 River and Spring System in Same Project Area



V.2. Biological Profile

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

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

151. 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.

V.2.1. Flora, Fauna and Protected Areas

V.2.1.1. Protected Areas, National Parks or sensitive ecological areas

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

Table 13 - List of Protected Areas in Timor-Leste

No	Name	Area (Ha)	Ref	Remarks
1	Nino Konis Santana National Park	126249.619	GR 08/2007	Area REDUCED to 123600 ha in DL 5/2016
2	Mount Legumau	10035.876	NEGA 2010	Area INCREASED to 35967 ha in DL 5/2016
3	Lake Maurei	200.312	NEGA 2010	Area INCREASED to 500 ha in DL 5/2016
4	Be'e Matan Irabere	0	DL 5/2016	New proposed protected area, area not defined
5	Mount Matebian	10340.534	NEGA 2010	Area INCREASED to 24000 ha in DL 5/2016
6	Mount Mundo Perdido	4168.339	NEGA 2010	Area INCREASED to 25000 ha in DL 5/2016
7	Mount Laretame	896.449	NEGA 2010	Area INCREASED to 16429 ha in DL 5/2016
8	Mount Bullo	6987.437	NEGA 2010	Area INCREASED to 8000 ha in DL 5/2016
9	Mount Burabo	3927.136	NEGA 2010	Area INCREASED to 18500 ha in DL 5/2016
10	Mount Aitana	4236.951	NEGA 2010	Area INCREASED to 17000 ha in DL 5/2016
11	Mount Bibileo	4545.537	NEGA 2010	Area INCREASED to 19000 ha in DL 5/2016
12	Mount Diatuto	9897.168	NEGA 2010	Area INCREASED to 15000 ha in DL 5/2016
13	Mount Kuri	1766.019	NEGA 2010	Area not defined in DL 5/2016
14	Kay Rala Xanana Gusmao National Park	18000	DL 5/2016	New proposed protected area
15	Ribeira de Clere	9926.638	NEGA 2010	Area INCREASED to 30000 ha in DL 5/2016
16	Lake Modomahut	22	DL 5/2016	New proposed protected area
17	Lake Welenas	20	DL 5/2016	New proposed protected area, part of Mt. Cablaque

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

Protected Areas in and around the Project Area

153. Of the 46 declared Protected Areas (PA) in the country, Same has within it the Kay Rala Xanana Gusmão National Park and surrounding forest, designated according to the Government Resolution No. 38/2015 and covering a total land area of 93 km².

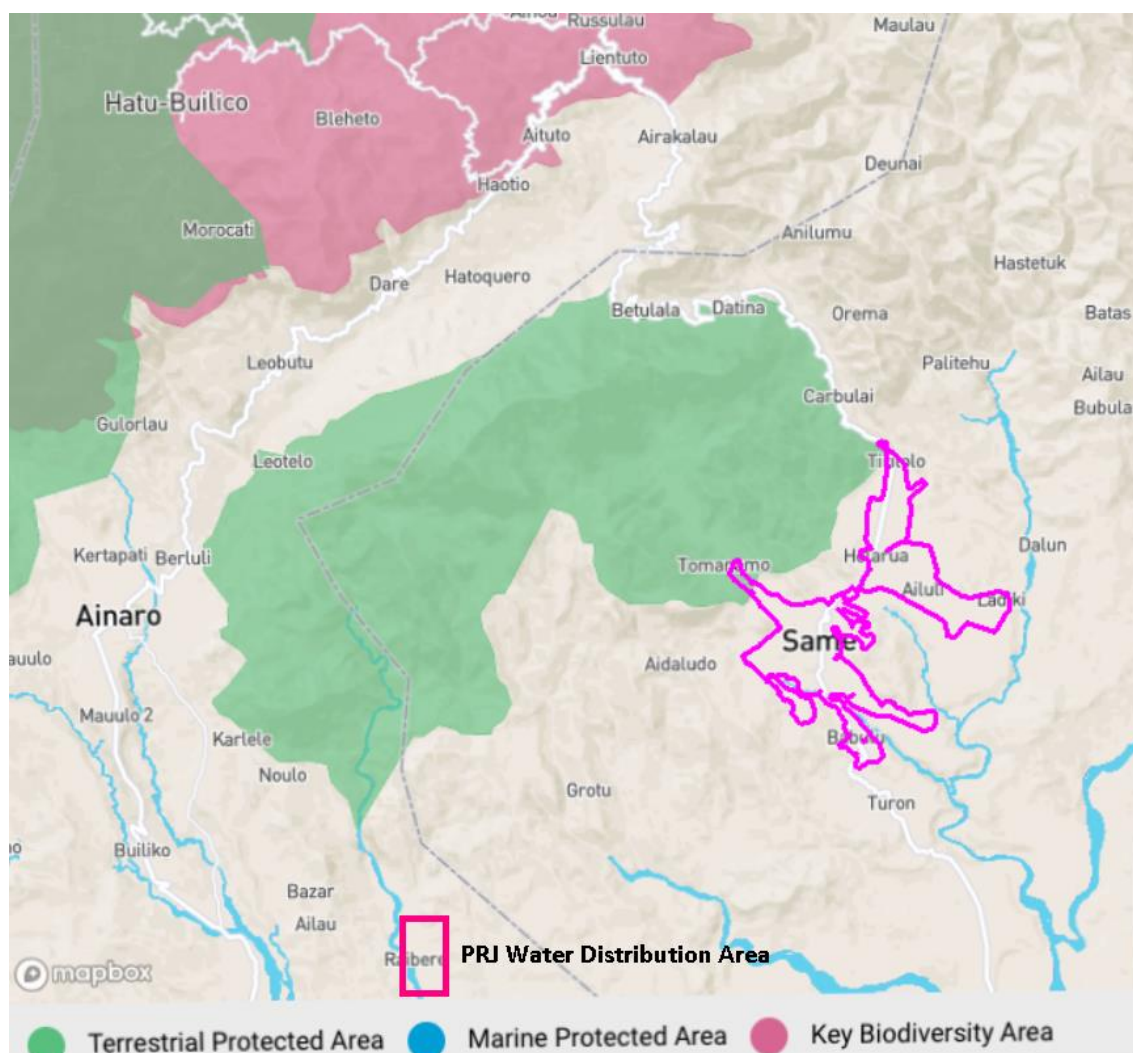
154. It is the only Protected Area and/or Key Biodiversity Areas within the 15 km diameter project limit for the Water Supply and Sanitation Investment Project. Suco Letefoho reaches into the PAs southeastern border (where the Merbuti/Kotalala system lies), while Suco Holorua reaches into the PA through its Eastern Border (where the Erluli/Darelau system lies).

155. The team met with Mr. João Antalmo, (National Director for Protected Areas) on the 12th September 2020, to procure updated GIS documentation on the National Protected Areas Borders, particularly for the Kablaki PA, now Kay Rala Xanana Gusmão National Park. Whilst at the time these were not available, the team further complemented this consultation with a meeting with the General Director for Forestry, Mr. Raimundo Mau (on the 10th December 2020), where it was confirmed that new community-led PA boundaries exist, and although still in draft form, should be used as the most current PA boundary reference. Updated GIS data were supplied which have made it possible to define the areas of the project that may be in and out of the PA.

156. The General Director further cleared that the Ministry has been working with the Same community and has drafted the Protected Area preliminary boundary based on Land Use and Community Consensus (yet to be officially published), including the fact that many areas within the previous PA boundary have been transformed by land use activities i.e. Zones 6.3, 6.4 and 6.5 and with the new PA boundary redraw are now placed outside of the PA (see Figure 91). Merbuti and Erluli Spring systems are still located within the fringe of the PA.

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

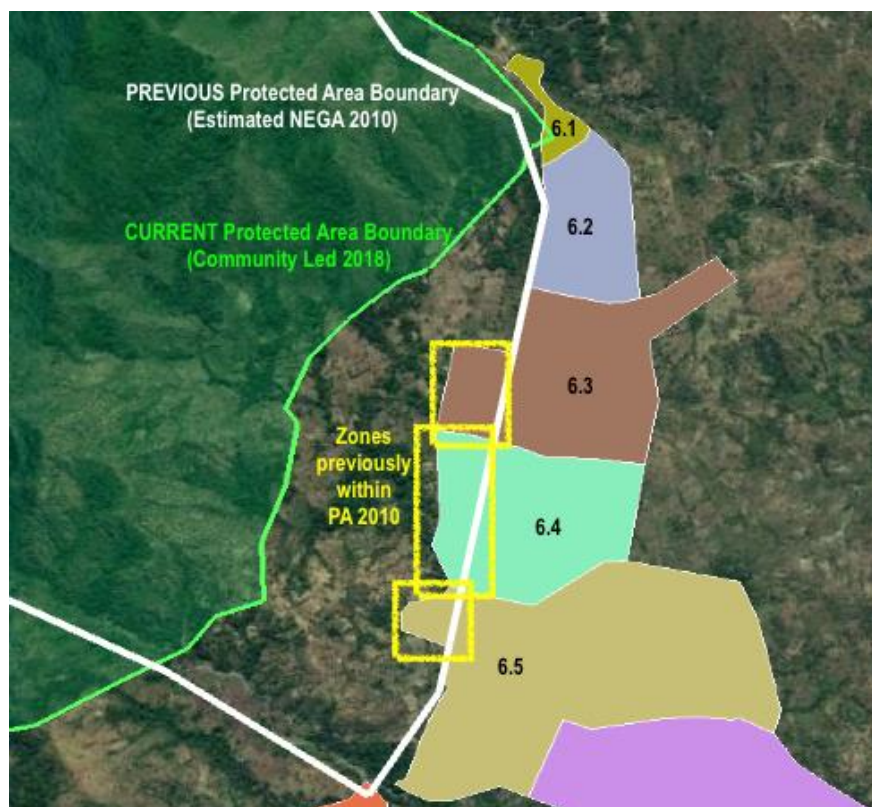
Figure 80 IBAT mapping of Protected Areas and Key Biodiversity Areas near Same Project (Source: www.IBAT-alliance.org, accessed 10.12.2020)



V.2.1.2. Flora and Forests

158. 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).

Figure 91 - PA Boundary (2010 vs current 2018) and Project Expansion Distribution Zones



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

160. 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.

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

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

Flora and Forests around and in the Project Area

163. The dominant natural vegetation of the area of Same consists of forested areas with some stands of tropical evergreen and semi evergreen forest and dry forest. The Same upstream forest is considered tropical rainforest, with high species diversity.

164. Mt. Cablaque consists mainly of dense (60% < crown density) and medium forest covers (20% - 60% crown density). This means that the land cover of Mt. Cablaque has more mature and sturdy trees that is more intact and has less human intervention. This characteristic of forest type is correlated to higher species diversity higher soil productivity and its ability to better withstand soil erosion (NEGA, 2010) (JICS/NDF, 2010-2011).

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

166. The forest plays role in providing ecosystem services including regulating microclimate in the area. Throughout the mountain range the major flora is a mix of shrubs, ferns and weeds, and substantial agricultural crops, such as Coffee plantations (*Coffea arabica*), palm trees (*Arecaceae* spp.), screwpine (*Pandanus utilis*), hazel stericula (*Stericula foetida*), leucaena (*Leucaena Leguminosae*), burgundy leea (*Leea guinensis*), fig tree (*Ficus moriciae*), castor bean (*Ricinus euphobiaceae*), etc. A few endemic trees are defined to exist, sparsely distributed within the project area, namely, Teak, Eucalyptus and Sandalwood, existing throughout in the forest area surrounding the urban area. There is a predominance of the "Siam weed" invasive shrub (*Chromolaena odorata*) all throughout the area and along the existing roads of the Project area, particularly where vegetation clearing for agriculture is present.

167. There most significant sensitive vegetation areas within the determined 15 Km project area border is the Mount Kablaki Protected Area and therefore there are minor risks to this area regarding the project activities.

V.2.1.3. Fauna

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

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

170. The NBSAP (G-RDTL, 2015), based on studies conducted by (Trainor, 2007), substantiates this importance, registering at least 262 bird species that are known to be from Timor, from which 169 are

considered resident, 76 regular migrants and 17 considered as vagrants. Of all these, three (3) species are identified as endangered, namely the Timor Green Pigeon (*Treron psittacea*, local name (LN): Punai Timor], the Timor Imperial Pigeon (*Ducula cineracea*, LN: Pergam Timor) and the Wetar Ground Dove (*Gallicolumba hoedtii*, LN: Delimukan Wetar). Additionally, one is classified as critically endangered – Yellow-Crested Cockatoo (*Cacatua sulphurea*, LN: Kakatua jambulkuning) and another as vulnerable – Timor Sparrow (*Padda fuscata*, LN: Gelatik Timor).

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

Fauna around and in the Project Area

172. Several mammals have previously been identified as existing in Mt. Cablaque, such as *Macaca fascicularis* (crab-eating macaque), *Phalanger orientalis* (Northern common cuscus), *Cervus timorensis* (Javan rusa), *Rattus Timorensis* (Timor rat), *Sus scrofa* (Wild boar), *Rhinolophus philippensis montanus* (Large-eared Horseshoe Bat) and *Paradoxurus hermaphroditus* (Asian palm civet), amongst others, all not included in the IUCN list of endangered species (Santana, 2006)

173. In terms of avifauna, in the lowland area 10Km southeast of Same Urban Area (Simpang Tiga) there is a registered Important Bird Area (IBA) TL 05 – Sungai Clere. The local topography consists of lowland coastal forest – lowland alluvial forest with savannah – and, a seasonally flooded coastal swamp dominated by *Canarium spp.* and Modo Mahut freshwater (10 km square) with extensive grassland and perennials, and the hinterland of Welaluhu and Natabora. The described site hosts twenty-five (25) restricted range species, including Timor's Endangered Timor Green-pigeon (*Treron psittaceus*) and critically endangered Yellow-crested Cockatoo (*Cacatua sulphurea*). The habitat of the identified species is being damaged due to slash and burn, wildfires, and hunting (Trainor, 2007).

V.2.1.4. Coastal Resources

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

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

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

whale sharks, manta rays and a diversity of marine mammals, such as 22 dolphin species and a variety of whale species” (G-RDTL, 2010).

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

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

Coastal Resources in and around the Project Area

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

V.3. Socio-Economic and Cultural Environment

V.3.1. Economic Development

180. **Industries and agriculture development.** Human interaction within this setting results in several land-uses in the country such as 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 are preferred for a range of agricultural crops and land uses that may limit activities such as reforestation or commercial tree plantations.

181. Betano complex in the southern coast area, Suco Betano is selected for future industrial park with refinery and petrochemical industries, aligned with LNG Plant in Beacu and Supply Base Area in Suai.

182. The predominant form of livelihood for households in the project area (Same city) is mostly near subsistence swidden agriculture for the production of primary staple crops such as i.e. maize, cassava, etc. for farmer households, whilst a larger proportion of livestock activities i.e. buffalo, spread out towards the lower land areas towards Betano.

183. This majority of the population is mostly composed of farmers, consisting of 27% of the municipality population and water has been an important source for securing their activity so as to have a sustainable income. Agriculture is heavily dependent to the amount of rainfall in a given year, followed by harvesting water from nearest water stream and some of the identified springs such as Merbuti, Kotalala, and Rusata (just above Merbuti Spring).

184. **Infrastructure.** Commercial activities including their facilities will be earmarked in one particular area in Aldeia Turon, Suco Babulo for centralisation and expansion purpose, as informed by the Municipal Administrative office.

185. **Transportation.** Public transportation in Same city varies comparing to Dili city with access only to *Bemo* and motorcycle/*ojek* (taxibike) service for rural and urban destination. For travelling outside Municipality, public vehicle such as bus heading to Dili and vice versa is commonly used by the community.

186. Manufahi Municipality also has an inoperable runway for aircraft landing located in western part of Same city, Aldeia Ailuli, Suco Letefoho and is a pre-existing infrastructure since the Indonesian administration. The mentioned site is said to be included for future expansion and re-functioning implementation as in accordance with the urban planning design.

187. **Land use.** An assessment of Land use and cover in 2010 (JICA, 2013) indicated forest as the largest land use/cover category in the country (occupying about 60% of the country) and the second largest being grassland and shrubs (at 27% of the total land area). The remaining areas consisted of bare land (3.3%), rice and agricultural fields (2.8%) and dry farm (1.5%) while settlement covers 0.2% of the total land area.

188. **Power sources and transmission.** Energy consumption increased since the number of clients also increased. In 2015 there were 2,860 clients and in 2016 increased to 3,878 clients (Direccao Geral de Estatistica Municipio de Manufahi, 2016)

189. **Mineral development.** The mineral source e.g. sand and stone for construction necessity are extracted dividedly from earmarked locations, as needed, namely in the following six rivers; Buisara and Bua Haeh (inside the Protected Area) and Manicun River, Ermiti River (Downstream), Tutu Luru River and Aisa River (outside the protected area). Crushed aggregates are usually purchased from a local supplier in Aisa River. Only required quantity of minerals harvested from the said rivers in order to prevent generation of spoils.

190. **Tourism facilities.** Centralized in Same providing natural and historical tourism, commonly the Kablaki National Park, Pousada and Erlesu Pool. The Manufahi Municipality Administrative is still undergoing some improvements on infrastructure rehabilitation and regulations for conservation purpose.

V.3.2. Social and Cultural Resources

191. **Population and Communities.** The project is situated in the Same city and its population was projected, in 2015 (General Directorate of Statistics, 2015) to be at 53,691 persons and the population of Babulo to be 4,468 persons, of Letefoho to be 7,573 persons and of Holarua to be 6,871 persons.

192. **Health Facilities.** In terms of facilities in Same city, there are 13 including Health Centres and private clinics with 51 Health professionals (Direccao Geral de Estatistica Municipio de Manufahi, 2016).

193. **Education Facilities.** In 2016, Basic Education counts with a total of 76 schools, 599 teachers and 15,743 students. On the other hand, Secondary Education only has 7 schools, 100 teachers and a total of 2,597 students while professional technician education has 847 students, taught by 57 teachers in 4 facilities (Direccao Geral de Estatistica Municipio de Manufahi, 2016).

194. **Socio-economic Conditions.** Despite being a 95% Catholic country, there is an underlying and very vast animistic culture in all the ethno-linguistic communities of Timor-Leste, maintaining institutional forms associated with the importance of the “Sacred” or Lulik beliefs in contemporary social life. Society and households in Timor-Leste engage with in a variety of ways, engaging in exchange relationships and customs that maintain narrative stories and founding myths, ancestral regalia and inherited knowledge, as well as landed property and ritual practices.

195. 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.

196. **Physical or Cultural Heritage.** Same 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.

197. In regards to Springs and water Sources, the Lia Na'in (or traditional leader) has the core role to leads 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. Below is an overview of ritual processing, materials provided and list of participants during the cultural ceremony that took place in Erluli II spring.

Table 14 Cultural Ceremony Participatory and Processions at Erluli II Spring

Offerings	Ritual Process	Participants
<ul style="list-style-type: none"> - Bua (betel nut) - Malus (betel leaf) - Ahu (lime for betel consumption) - Packs of cigarettes (Number depends on necessity or request) - A dog (animal) - A local rooster or it can be a hen depends on the flexibility of the ritual. But usually a rooster is preferable 	<u>Day 1 (13th Oct. 2020):</u> <ul style="list-style-type: none"> • Began in the afternoon after lunch time. The first day is considered as a preparation ceremony. • Placing betel nuts and leaves on the front of Erluli II spring • Praying and asking for permission to the Lulik (sacred material and immaterial objects) and ancestors led by the Lia Nain 	<ul style="list-style-type: none"> - Lia Nain (Traditional leader) - Chief of Aldeia - SMASA - ADP representative - XL Construction representative - Local community/its representative
	<u>Day 2 (14th Oct. 2020):</u> <ul style="list-style-type: none"> • Began in the morning • Animal offerings prepared i.e. a dog and a local rooster through ritual slaughtering. The blood from the animals will be dropped into the spring and rubbed to the sacred stone as a symbol of feeding and nurturing the soil/nature • After slaughtering were cleaning and cooking the animals by boiling them without having to fry or use various spices except salt. The assistants also cooked rice and set the plates. The meals were placed in front of the water spring as a symbol of offering to the nature • Participants sitting together and having meals without leftovers, as a mandatory requirement • Each participant received a betel leaf and a betel nut that were already blessed by the ancestors and received another blessing from the Lia Nain himself before closing the ceremony. The Lia Nain marked a circle boundary in the spring vicinity for protection 	

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

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

Manufahi Municipality has numerous of physical or immobile material objects that are registered and conserved by the Secretary of State of Arts and Culture⁷ and are widely known by their heritage value. Same in particular includes several objects and sites that are immaterial and sensitive, that are protected not only by the State but also by the community itself. Therefore, during the site visit, the team made sure that the referred features were identified diligently within the distribution zones. Information was also collected with help from the local authorities for the site identification to be more efficient and accurate. All 15 locations are within 10m to 20m of one of the borders of these assets and there are plans for site 1. BNCTL area, to be traversed by the distribution line (see Table 15 and Figure 102 below for cultural heritage sites listed by the team). All sites will require pre-approval from the local and national Culture Directorate, regarding protection during the Construction Phase.

Table 15 - List of Cultural Heritage Sites Identified in Same

No.	• Name of Site	• Type	• Coordinates	• Distance from Site Border
1.	BNCTL office & other old buildings	Heritage	9°00'02.59"S 125°39'09.20"E	Distribution goes through site
2.	Old Church Hatumera & Cemetery	Heritage, socio-cultural	9°00'12.80"S 125°38'27.94"E	Distribution Parallel to NE boundary (<10m)
3.	Traditional House 1	Socio-cultural	8°59'28.99"S 125°39'49.53"E	Distribution Parallel to NE boundary (<10m)
4.	Erlesu pool	Touristic	8°57'01.04"S 125°38'59.28"E	Transmission Parallel to West boundary (<10m)
5.	Mosque	Heritage	9°00'37.40"S 125°38'46.11"E	Distribution Parallel to SE boundary (<10m)
6.	Church 1	Socio-cultural	8°59'55.97"S 125°38'53.30"E	Distribution Parallel to East boundary (<10m)
7.	Evangelic Church	Socio-cultural	9°00'24.68"S 125°38'54.40"E	Distribution Parallel to West boundary (<10m)
8.	Church 2	Socio-cultural	9°00'21.65"S 125°38'54.10"E	Distribution Parallel to West boundary (<10m)
9.	Religious cave nearby Merbuti spring	Heritage, socio-cultural, touristic	8°59'50.76"S 125°37'25.27"E	Distribution Parallel to West boundary (<20m)
10.	Chapel in Turon	Socio-cultural	9°01'59.41"S 125°39'49.53"E	Outside of Water Distribution Zone

⁷ The team had previously requested for data regarding to the cultural heritage sites for all the 4 Municipal Capitals of Water Supply and Sanitation Project to the National Department of Cultural Patrimony, Secretary of State of Arts and Culture. The SEAC provided the Consultant team hardcopies of lists available from current studies in which all of the referred sites are located outside the project area. Thus, site visit was conducted to fortify the said necessity for further assessment of environmental impact and monitoring plan. Minutes of meetings are provided in APPENDIX 1. Appendix 9.

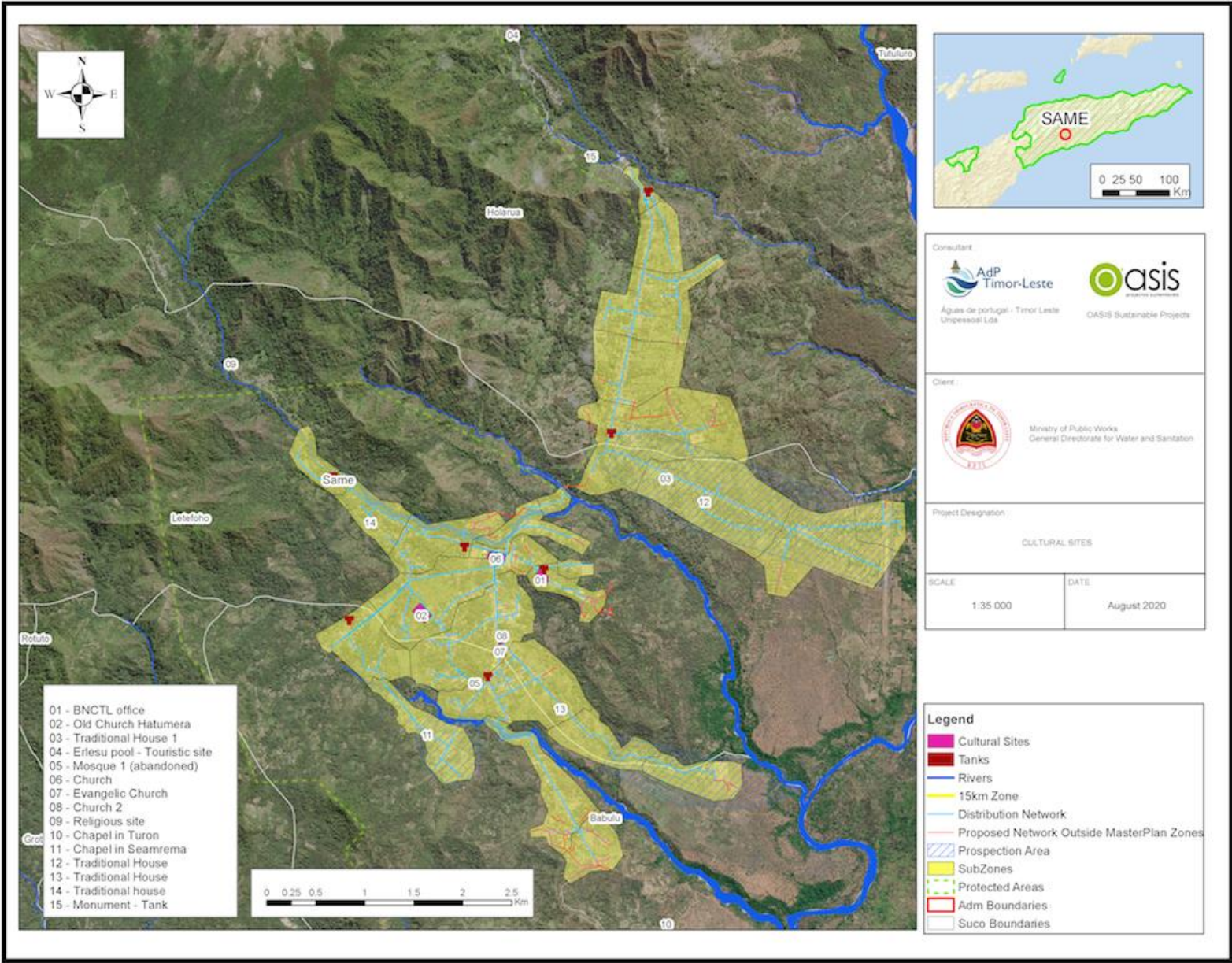
No.	• Name of Site	• Type	• Coordinates	• Distance from Site Border
11.	Chapel in Seamrema	Socio-cultural	9°00'54.23"S 125°38'30.46"E	Distribution Parallel to NE boundary (<10m)
12.	Traditional House 2	Socio-cultural	8°59'37.34"S 125°40'1.76"E	Distribution Parallel to West boundary (<20m)
13.	Traditional House 3	Socio-cultural	9° 0'45.48"S 125°39'14.84"E	Distribution Parallel to SW boundary (<20m)
14.	Traditional House 4	Socio-cultural	8°59'43.93"S 125°38'11.82"E	Distribution Parallel to NE boundary (<20m)
15.	Monument - Tank	Heritage, touristic	8°57'43.10"S 125°39'24.03"E	Transmission main goes through site

200. **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.

V.4. Site-Specific Environmental & Social Features







201. Table 16 - Project Site Environmental and Social Features, summarizes site-specific conditions of the component locations/sites/alignments.






Figure 102 Same Cultural sites within Project Area
















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Table 16 - Project Site Environmental and Social Features

Components	Site Salient Features	Site Photographs			
1. Intakes					
H. Darelau spring	<ul style="list-style-type: none">Downstream to Erluli Spring, follows through South into the Karaulun River system.According to SMASA technician, water is scarce with very low debit during dry season and abundant during wet season.Located 30 meters to southwest from the national road and within the fringe of the Kay Rala Xanana Gusmão National Park (see 5.2.1.1).It is fenced and protected by the SMASA and to the West side towards the hill lie the community's agriculture plots that benefit from this water source.Characterization of green vegetation surrounding the spring area such as taro plants (<i>Colocasia esculenta</i>), <i>Timonius timon</i>, <i>Glochidion eriocarpum</i>, and <i>Piper betle</i>.Excess water overflows and combined with surface water.The spring has a cultural sacredness and requires a yearly cultural ceremony.	 <p>West view</p>	 <p>Agriculture land nearby Darelau spring (West view)</p>		
I. Erluli spring	<ul style="list-style-type: none">Erluli spring is located northern part from Darelau spring and approximately 30 meters to the southwest of the main road.The hydrogeological condition is opposite to Darelau spring since it produces the highest volume registered in the system, at 79.8 lps in the dry season.The vegetation is the similar to Darelau spring, with the same land use i.e. agriculture.Fenced and managed by the SMASA, consists of two pipes, one distributes to the Erluli community and the other distributes water to a reservoir together with water abstraction from Darelau spring. Excess water overflows and combined with surface water.Also as Darelau, located within the fringe of the Kay Rala Xanana Gusmão National Park (see 5.2.1.1).	 <p>Erluli Spring</p>	 <p>Vegetations and agriculture land (west view)</p>	 <p>Water capture with pipelines and the excess overflows with surface water (south east view)</p>	 <p>National road 30 m from the spring (east view)</p>

Components	Site Salient Features	Site Photographs			
J. Merbuti spring	<ul style="list-style-type: none">Located in the southern part of the distribution system, it is also located within the fringe of the Kay Rala Xanana Gusmão National Park (see 5.2.1.1). According to local community, the spring is in public land.The vegetation surrounding the spring area varies from coffee plantation (private land), <i>Borassus flabellifer</i>, vanilla plantation, <i>Ficus stipulosa</i> Miq. Linn., mangoes, <i>Dryopteris wallichiana</i>, and taro plants, which suggest an important agricultural use of this source.In the Dry season, this is the origin of the existing water availability in this area, and flows South towards the River Karaulun 12Km away.Consisted of 2 small water concrete bunkers for water collection, with 2 pipes (1 for distribution and the other one for sludge discharge).50 meters south along the creek and drainage overflow is a sacred area, where a religious cave is located on top of a stone, which is a place for yearly religious mass and ceremonies by the community and church.Merbuti tank is placed (250 meters south from the spring), aiming to distribute water to Luak and ends in Aiasa, Suco Babulu, according to SMASA technician.Surrounding the spring location there are several housings and dwellings, newly rehabilitated road and a school within 100m of the spring (mixed use area “Zone of Use”).				
	 <p>Surrounding ecosystem nearby the spring (southeast view)</p>	 <p>Religious cave 50 m southeast from the spring</p>	 <p>Surrounding ecosystem nearby the spring (North view)</p>	 <p>Merbuti Tank</p>	

Components	Site Salient Features	Site Photographs			
2. Borehole Prospection Area 1, Suco Letefoho (Zone 7)	<ul style="list-style-type: none"> Located in Aldeia Raiubu, 100 meters south west from the football stadium, nearby a community's house, an old abandoned house during the Indonesian time and several farms which are dispersed in several places. 200 meters south is a private and small fish farm. During dry season, the water volume maintains the same, according to SMASA. The area is covered with dispersed vegetations such as coconut trees, madre de cacao, banana trees, <i>Borassus flabellifer</i>, mahogany, and siam weed, additionally with no specific lulik or historical site and no potential of flooding. The SMASA has proposed a location for bore test in Aldeia Raiubu, which is located 150 meters going east from the football stadium but it was then cancelled due to the density of houses and uma lulik (traditional houses). 	 <p>Small spring with permanent flow. The area is recommended by SMASA for bore test (south east view)</p>	 <p>10 m from the proposed location (south view)</p>	 <p>Near the airport runway</p>	 <p>Airport runway, Aldeia Ailuli</p>
3. Borehole Prospection Area 2, Zone 5.2, Aldeia Searema, Suco Letefoho	<p>Prospection Area 2 is in the southwest of the distribution system. The location is mostly consisted of dwellings, school, Aldeia Searema headquarter, agriculture activities, and a small chapel which lies adjacently to the rehabilitation pipe. The area is mostly flat.</p>	 <p>Existing Distribution pipe (Southeast view)</p>	 <p>Dwellings Southeast view</p>		 <p>Chapel</p>
4. Borehole Prospection	<p>This part of the area is considered rural, sparsely populated, with agriculture activities (mostly corn and rice paddies) and a training school. Most of the area is free from flood plain and is distant from the precipice, since it is an open and vast terrain with only slightly different topography level.</p>				

Components	Site Salient Features	Site Photographs	
Area 3, Zone 3.3, Akadiruhun, Suco Letefoho	 <p>A creek used for irrigation system by the local community (south view)</p>  <p>Road condition (East View)</p>	 <p>A school at the end of the distribution line (north view)</p>	
5. FSTP No. 1 (Proposed Site), Akadiruhun, Suco Letefoho	<p>(+)</p> <ul style="list-style-type: none"> The topography of the terrain is relatively flat covered mostly with grassland, eucalyptus, teak trees and siam weed. 200-300 m away from the western precipice. Not located in floodplain so no possibility of flooding and/or landslide. Adjacent to agriculture land and farms. The produced dried sludge can be contributed to the farmers as composting material. Moderate road access, with existing road in good condition which can easily facilitate the sludge delivery to the FSTP. Distance from dwellings is far (approximately 1080 m). No social and health impacts towards the community. <p>(-)</p> <ul style="list-style-type: none"> The land status is private, customary use, as per the social assessment in December 2020. Nuisance such as odour to the affected farmers. Although the FSTP will have proper septic treatment infrastructure and planned for regular emptying and maintenance.  <p>FSTP 1 East view</p>	 <p>FSTP 1 Northwest view. Community's farm fenced</p>	

Components	Site Salient Features	Site Photographs	
6. FSTP No. 2, North West Aldeia Turon, Suco Babulo	<p>(+)</p> <ul style="list-style-type: none"> The topography is relatively flat covered with grassland and siam weeds, with no affected private owned or endangered vegetations. The site is easily accessed with good condition road, although not paved. No specific sensitive area i.e. lulik/sacred area in the location. Surrounded with dispersed agriculture activity i.e. animal husbandry and horticultures. No potential of flooding and landslide. Distance from precipice is 300m. <p>(-)</p> <ul style="list-style-type: none"> 300 m South west from the selected site is where a small chapel is located in a small hilltop. Close to dwellings approximately 600 m from the proposed site. The sludge transference will result amenity either odour, and noise from movement of sludge trucks and operational activity. Possible of private land, therefore compensation will have to be considered. 	 <p>East view of the Proposed Location</p>	 <p>South view of the Proposed Location</p>
7. FSTP No. 3, South East Aldeia Turon, Suco Babulo	<p>(+)</p> <ul style="list-style-type: none"> The land is relatively flat covered with Eucalyptus and teak trees, siam weeds, and grassland. No specific human-planted trees, plantation or other endangered vegetations. Easily accessed with good condition road, although not paved. No specific sensitive area i.e. lulik/sacred area identified in the location, except possible of cultural rituals by farmers solely for protecting the animal livestock, however it does not make the area less conspicuous with sensitivity. Surrounded with dispersed but vast agriculture land. No potential of flooding and landslide. Distance from precipice is 300m. <p>(-)</p> <ul style="list-style-type: none"> Close to dwellings approximately 500 m from the proposed site. The sludge transference will result amenity either odour, and noise from movement of sludge trucks and operational activity. Possible of private land, therefore compensation will have to be considered. 	 <p>Proposed Location (East view)</p>	 <p>Private Farm 250 m south west from the Proposed FSTP Site (East view)</p>
8. FSTP No. 4, Luac, Aldeia Turon, Suco Babulo	<p>(+)</p> <ul style="list-style-type: none"> The topography is relatively flat, empty plot and is not surrounded with human's activity. Is located Southern and approximately 2 Km from the urban area and supply zone. <p>(-)</p> <ul style="list-style-type: none"> No possible access therefore could not allow the team to do photographic recording. The proposed area is earmarked by the Municipality for urban expansion i.e. allocation of the local states 'offices. 	No photos available	

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VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

VI.1. Overview of Impacts

202. 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.

203. A characterization study of existing origins and pilot well testing areas was conducted during a site visit (1 to 3 July 2020) aiming to identify specific protected biodiversity, sacred site, water usage, land status, and activities downstream and upstream and the main objective of the Assessment was to evaluate the impacts based on the characterization study and the site visits, as well as the social safeguards impacts evaluation from the Social Specialist and stakeholder and public consultations carried out during the IEE survey.

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

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

206. An environmental management plan (EMP) has been developed (see Chapter IX) to provide mitigation measures to help control and/or reduce all negative impacts to acceptable levels, presented in the form of an Environmental Management Plan (EMP) matrix, to be used by SMASA (for monitoring purposes) and the Contractor (for management) prior, during and post-construction activities.

VI.2. Impact Analysis

207. An Impact evaluation was carried out for all project components and activities by applying an evaluation matrix (see example in Table 18) 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.

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

209. These classifications are the result of the product between “Scale of Present Condition” and “Scale of Impact”, based on the criteria in Table 17 - Scales for Present Conditions and Impacts, 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 17 - Scales for Present Conditions and Impacts

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

The product of the scale of present condition and the scale of impact is used to assess whether the impact is significant (S), Moderate Significant (MS) or insignificant (IS). Table 18 - Impact Assessment Rating, presents the matrix for the assessment of impacts based on the values for the scale of importance and the scale of impact.

Table 18 - 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

VI.2.1. OVERALL BENEFICIAL (POSITIVE) IMPACTS

210. 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.

211. **C3.2.1. Local Employment Generation.** This project will directly generate employment opportunities either skilled or non-skilled work for the local people. Their earnings will consequently affect the local economy, given the employment process will prioritize local people, reducing the need for immigration (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.

212. **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.

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

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

VI.2.2. IMPACTS IN DESIGN/PRE-CONSTRUCTION PHASE

215. The pre-construction works involve field survey and investigation, development of design and detailed drawings, carrying out cost estimate etc, as well as the evaluation of water availability and competing uses. A characterization study of existing origins and pilot well testing area was conducted during site visit (1 to 3 July 2020) for the preliminary design, aiming to identify specific protected biodiversity, sacred sites, water usage, land status, and competing activities downstream and upstream.

VI.2.2.1. PC1. Water Sources

PC1.1. Location and Sensitive/Protected Areas

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

216. The Southern Merbuti system (Merbuti and Kotalala springs) and the Northern System (Erluli and Darelau) are all located within the fringe area of the Kay Rala Xanana Gusmão National Park. Both systems have been supplying water for Same for at least 40 years. They are both pre-existing to the project i.e. “brownfield projects”, already have working water distribution infrastructure and surrounding the spring there are dwellings and housing with agricultural activities, a rehabilitated road and a school within a 100m radius, all within the peripheral area of the PA. The environmental assessment of these 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).

217. As stated in Chapter 5.2.1.1, the Directorate General for Forestry has clarified that, in the case of the Merbuti and Erluli spring areas, while still within the PA boundary, they have unofficially become “Zone of Use” areas 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).

218. Irrespective of this situation, it is important to apply more stringent forms of implementing the mitigation measures identified in C3 that may prevent and manage the activities of the project when working in the ROW and accessory areas of the rehabilitation of the Merbuti and Erluli/Darelau infrastructure, within the PA fringe.

219. While there are no official lists of Mitigation Measures to be applied by Projects in Protected Areas, previous measures in past project 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 be cut will be marked and the direction of fall should be inclined away from the trees with nests. If chicks are already present felling must take place, where possible, > 50 m distance from the nest. All activities must be supervised and decided upon by a Forest Guard or representative of the National Directorate for Protected Areas (DNAP).
- 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.

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

PC1.2. Use of Water Sources (springs and boreholes)

1.2.1. Available Water for all users

221. Consumers in Same 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 Same consumer (S- = Negative Significant).

222. Preliminary production yield of the sources was carried out in October 2020 (in equivalent conditions to the end of the Dry Season) of proposed boreholes and existing springs through bore and pump testing. The water demands versus October 2020 water flow investigation results, suggest that, under these numbers, and pending a long term monitoring program, the current 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 use and especially an ecological flow (suggested at 30% of Wet Season Spring flow (November to May) and 10% of Dry Season Spring flow (June to October), with much more volume in the wet season to cover the requirements for the whole system.

223. 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.

224. However, if the Dry season spring flow depletes naturally, to guarantee the distribution system maintains service to Same 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 #1 and #4 to come online to support the water distribution, especially in the dry season. These borehole systems must also have a well monitoring program to be able to track aquifer performance.

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

225. The issue of water benefits, in source area communities, has been raised by local authorities and Chefes de Suco, during the Public Consultation. This, together with a mixed urban/rural setting that has several different water consumptions beyond human consumption alone i.e. agriculture, fish farming and rice fields, 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).

226. As seen in 1.2.1. preliminary numbers identify that the Merbuti and Erluli Springs are currently very productive, being able to support the current water demand and the 2040 horizon year demand numbers (62 lps).

227. 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.

228. For Same, 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

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

230. It is important to understand that almost all springs, new and currently in use i.e. Merbuti Kotalala and Erluli/Darelau, are and have always been involved in and have a spiritual importance to the community, under cultural/animistic protection (MS- = Negative Moderately Significant).

231. 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.

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

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

PC 1.3. Protection of the water source for distribution purposes

1.3.1. SMASA borehole over extraction

234. There may be the risk of the SMASA boreholes and adjacent private wells drying up due to over extraction for the purpose of the Distribution network boreholes.

1.3.1.1. SMASA Protection Area

235. In areas where the project has been successful in testing and sourcing water for the system i.e. Borehole Prospection 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).

236. It is important that MPW and SMASA 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.

VI.2.2.2. PC2. Water Treatment and Storage

PC 2.1. New Disinfectant and Storage Systems

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

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

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

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

VI.2.2.3. PC3. Water Distribution Network

PC 3.1. Identification of Cultural Heritage sites

3.1.1. Impairment of Cultural heritage properties

240. 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 (15 in total) during the field visits in the Inception and Preliminary Design Phase, which are within <20m from and may be impacted by the construction activities, if precautions are not taken (S- = Negative Significant)

241. 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 /authorisation for intervention in the area. In case a new cultural/historical heritage site is identified during the construction, the Contractor will notify the SMASA and follow the same procedure regarding these sites.

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

3.2.1. Risk to Health and Safety of Workers - General

3.2.1.1. Health & Safety Plan

242. 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.

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

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

245. 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.

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

- a. Train all site personnel on environmental health and safety;
- b. Provision of PPE and proper utilization;
- c. Health and safety training and toolbox meeting, including the communicable diseases and operational system of the equipment;
- d. Maintain records of reports and complaints concerning health & safety occurrences;

- e. Installation of sick bay in the base campsite including recruitment of medical staff (intermittent, on-call) for primary response prior delivering to the hospital or closest clinic;
- f. Emergency plan and collection of all contacts in Same-city related to accident response;
- g. COVID-19 prevention and response (as per C3.3.7 and Appendix 14 – COVID-19 Protection and Mitigation Measures);

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

3.2.1.2. HSE Manuals and documentation in Tetum

248. 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.

249. 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).

250. 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

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

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

253. Therefore, mitigation measures to be taken are as:

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

VI.2.2.4. PC4. Sanitation (Public Toilets & FSTP)

PC 4.1. Improvement of Water Distribution

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

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

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

PC 4.2. Location for Proposed FSTP

4.2.1. Several impacts due to FSTP project nature

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

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

4.2.2. Possible location in Private Land

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

259. The social component has conducted a land due diligence survey of the affected land and property on the 4th December 2020, in order to substantiate future compensations. Members of the community who were present during the visit confirms that the AH are actual users and claimant of the land. (S- = Negative Significant).

260. While almost all the mitigation measures in PC 4.2.1 were met, in terms of location, the chosen location (Site 1) is included in private land. At least four (4) FSTP possible locations were identified and proposed due to their technical and environmental characteristics, but due to the reasons below, Option 1 was the location chosen and decided a/upon by MPW:

- a) Site 1 (the chosen site) in Akadiruhun/Suco Letefoho – overall presented most of the required conditions, although there is still doubts regarding site's status, if it is government or Private land; (S- = Negative Significant)
- b) Sites 2 and 3 in Aldeia Turon/Suco Babulo – overall presented all the requirements except for the closeness to housing areas as these locations would require frequent crossing of FSTP collection

trucks through the community to discharge the sludge in the FSTP and therefore are not a feasible option; and

c) Site 4 in Luak/Suco Babulo – This site, albeit the one which presented the best environmental and social conditions, is marked for urban expansion and location of future Government buildings, according to information from the Manufahi Municipality and therefore is not a feasible option.

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

PC 4.3. Sludge Disposal from FSTP

4.3.1. Soil and Groundwater Pollution

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

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

VI.2.3. IMPACTS IN THE CONSTRUCTION PHASE

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

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

266. 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.

VI.2.3.1. C1. Water Sources

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

1.1.1. Intake/bore overflow to cause erosion

267. The spring intakes and 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).

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

1.1.2. Socio-Cultural Impact

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

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

VI.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

271. 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).

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

VI.2.3.3. C3. Water Distribution

C3.1. Induction of Contractor

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

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

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

C3.2. Construction Activities – Macro Benefits

275. See 5.2.1. Overall Beneficial Benefits

C3.3. Construction Campsite

3.3.1. Campsite Location, Community and Landslide Risk

276. 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).

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

278. 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

279. 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).

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

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

3.3.2. Water Source for Campsite may compete with Community Sources

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

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

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

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

285. 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.

286. 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.

287. When identified, Asbestos Containing Materials (ACMs) i.e., used pipes must be handled under controlled conditions (with gloves, mouth and eye protection and under moist conditions so as to not break the materials and risk inhalation. The contractor must coordinate with the DNCP on solution for deposition of these materials. The CEMP must include ACM management plan to detail how to identify, remove, and safely dispose of ACMs. When Asbestos Containing Materials (ACMs) are identified:

- (i) First confirm ACM status. Send a carefully extracted and properly wrapped sample to an approved laboratory for testing.
- (ii) Cordon off the area, control access, and provide clear signage of the ACM risk.
- (iii) Provide all staff with correct PPE:
 - Clothing -> personal protective clothing to prevent skin contact / long sleeve + disposable.
 - Respirator -> min P3 respirator, or N95 Dust mask.
 - Goggles, gloves and safety boots.
- (iv) Identify, mark, delineate the ACM that will be removed and do-not mix ACM with non ACMs.
- (v) Avoid cutting or breaking ACMs if possible. If cutting is required wet the ACM surface and add duct tape to reduce the risk of dust generation.
- (vi) Decontaminate equipment prior to and after use.
- (vi) Supervision + Sampling material (if any left), make sure all asbestos material has been removed. Prepare Site Clearance Report.
- (viii) Removed asbestos must be contained, wrapped or sealed, and placed into removal bags or bins and labelled. Use only durable container: double bag polythene, drum or bin.
- (ix) 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.

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

- The East Timor Transition Administration (ETTA), in cooperation with AusAid prepared a guideline on asbestos risk reduction; "Guidelines on Maintenance, Handling and Disposal of Asbestos Materials and Asbestos Waste" - September 2000. This provides: (i) guidelines on the maintenance of asbestos-cement products; (ii) guidelines on the handling of building rubble and other material containing asbestos; and (iii) guidance for the siting and management of asbestos disposal sites.

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

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

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

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

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

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

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

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

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

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

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

296. 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).

297. 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 COHSE Plan.
- Risk communication, training, and education. Training of workers in infection prevention and control practices.
- Adopt engineering, organizational and administrative measures, plan work so employees can keep distance from each other and minimize contact.
- Provide clear and visible guidelines on how to prevent infection at the construction site and initiatives taken.
- Screen on entry the temperature of each person entering the work site and record their contact details to facilitate tracking of infected persons should there be a need.
- Promote personal hygiene (including hand and respiratory hygiene), make 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.
- 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

298. 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).

299. The Contractor will request licensing/authorisation for all extraction sites from the necessary authorities (ANPM), under MPW supervision. The extraction activities for these materials must be done to the quantities required by the project only. The MPW weekly supervision will allow regulating the extent and volume of extraction based on the current conditions of the quarries and/or rivers (sand extraction) and allow authorities to monitor and ensure the quality and good condition of the extraction sites, ensuring that extraction activities will not have social or ecological disturbances, and that the quantities of extracted sand and stone conform to the project specifications, which will also reduce the generation of spoils in the construction site.

300. 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. All non-established extraction sites/borrow pits must be restored maintaining natural contours and vegetation.

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

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

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

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

303. 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 built drainage to contain wastewater contaminants. The drainage may be built as a subsurface drainage for direct treatment. Otherwise, the drainage should channel wastewater to an infiltration trench system for treatment of wastewater constituents (hydrocarbon and metals) prior to infiltration to the subsoil. A fuel secondary containment must be available in the event of fuel spills and Removable Well Cap for monitoring and sampling purposes.

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

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

305. 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. Vivid and readable Warning signs maintained on sites of construction, especially haphazard zones will inform public of danger sites and caution to take precautions. This will reduce the likelihood of construction and road accidents.

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

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

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

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

308. 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).

309. 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

310. 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).

311. 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

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

313. The Contractor must apply an Air Quality and Dust Management System with mitigation/control measures such as watering and sprinkling of the excavated ground surface, to suppress dust from becoming airborne (at least twice a day or whenever visual inspection/monitoring or GRM complaint require immediate dust suppression), especially required frequently during dry season or near residential and built-up areas. Covering stockpiles will protect them from wind and will contain light particulates to the surface. Minimising the movement of vehicles to 40 km/h in residential and 50 Km/h maximum in urban area will also reduce the generation of fugitive dust.

3.5.7. Construction and Impact on Ecological Resources

314. During the implementation for the rehabilitation project, attention must be given to protect and minimize negative impacts on environmental sensitive areas and ecosystems, or the natural environment. Overall, the project area is in urban area and the trenches and trenchless works will not have direct impacts since the work will be done within the ground adjacent to the road (ROW) or confined to the planned area of construction. Nevertheless, the project only has 2 locations situated in a pre-existing mixed agro-forest area within the border of Mt. Cablaque PA (see PC1.1.1. and PC 3.1.1.) and should other areas be encountered during the construction activities, the contractors must ensure establish a Sensitive Areas Management Plan to make sure no impacts occur in this regard (S- = Negative Significant), namely vegetation and trees removal are avoided and no fauna is destroyed.

315. However, if some of the construction works must forcefully remove roadside trees under the supervision of the NDPA and SMASA, 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

316. 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.

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

318. 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).

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

3.5.8.1. Reducing impact on established Businesses activities and others

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

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

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

3.6.1. Site clean-up and rehabilitation of locations

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

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

324. 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.

VI.2.3.4. C4. Sanitation

All construction activities for this component are reflected in VI.2.3.3. C3. Water Distribution.

VI.2.4. IMPACTS IN THE OPERATION AND MAINTENANCE PHASE

325. The operation and maintenance phase is a stage where the constructed facilities are ready to be used and how SMASA, 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 SMASA with some provided mitigation measures aiming to minimize or inhibit possible impacts from occurring. This too, enables SMASA to resolve the anticipated issues as fast as possible.

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

VI.2.4.1. O1. Water Sources

O1.1. Protection of the Water Source Quality

327. The existing condition in most of the water sources in Same, with the exception of the Darelau system, are not well protected and according to the field observation, the upstream of Merbuti system are identified with human's activities with no proper sanitary infrastructure, as previously cited in Chapter 3.2.3. along with figures of existing private toilet.

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

1.1.1. Declining of the Water Source Quality

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

1.1.1.1. Implementation of Upstream Watershed Protection Programs

330. 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. SMASA 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

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

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

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

333. 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 SMASA will be the one responsible for all the requirements to prepare for the Cultural Ceremony.

VI.2.4.2. O2. Water Treatment and Proposed Storage

O2.1 Mishandling of Chlorine

334. Water quality tests to Same Source water have shown that some intakes 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, 2 out of 7 water tanks in total to be reconstructed will be designed with treatment facility i.e. disinfection type by injecting Sodium Hypochlorite into the Merbuti and Letefoho tanks with stored water.

335. After the construction phase, the SMASA 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

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

2.1.1.1. Ensure Proper Storage and Handling Practices for Chemicals

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

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

338. 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

339. Workers or operators are obligated to use PPE as part of HSE 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.

340. 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.

VI.2.4.3. O3. Proposed Distribution Network

O3.1. Sound Operation of Clean Water Distribution System

3.1.1. Improved Health and Hygiene

341. 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

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

03.2. Drinking Water Supply System

343. 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.

344. 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 that are constituted in the EMP matrix, particularly regarding the water delivery system, are described below along with their mitigation measures.

3.2.1. Delivery of Unsafe Water

345. 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.

346. 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

347. 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 SMASA as a guideline during operating and maintaining the quality of the facilities from impairments.

3.2.1.2. Implement a Water Quality Control Program (WQCP)

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

3.2.1.3. Monitor Water Quality

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

3.2.2. Detection and Repair of Leaks and Pipe Bursts

350. 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

351. 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

352. The presence of algal in reservoir can affect in deteriorating water quality because it releases toxins that often lead to several disruptions e.g. health concerns, water taste and odour problems. Water that are 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

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

VI.2.4.4. O4. Sanitation (Public Toilets & FSTP)

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

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

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

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

4.1.1.1. Further Septic Tanks Design

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

O4.2. Operation of FSTP

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

4.2.1. Soil and Groundwater Contamination

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

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

359. Treatment and disposal of sewage sludge and effluent are major factors in the operation of the specific faecal sludge treatment plant. Treating sludge before final disposal is aimed on reducing its volume and stabilizing the organic materials, nitrogen, phosphorus and potassium. The treated dried sludge will derive from the maintenance cycles of the primary treatment and may be contributed for surrounding agriculture activities, while the effluent will be discharged into a horizontal planted gravel filter for final treatment before absorption into the soil medium. Stabilized sludge does not have an offensive odour and can be handled without causing nuisance or health hazard.

4.2.1.2. FSTP Malfunction

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

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

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

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

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

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

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

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

366. Equally important is the need for the operator to implement fencing and appropriate signage to prevent public access to the FSTP infrastructure, as well as cover as much standing water as possible and

regularly treat for mosquitoes during seasons of high incidence of mosquito- borne diseases such as dengue.

4.2.3. Odour Occurrence

367. It is important that the FSTP is performing as designed and constructed so that odour perception around the plant is within acceptable limits. This odour may also occur due to the frequent dumping of truckloads of faecal sludge in and around the FSTP (IS- = Negative Insignificant).

368. However, the FSTP is located 1 Km Southeast of the city amidst a wide open agricultural area and separated from other communities by a river gorge on the West side of the FSTP site, so foul smell is expected to be of minor significance. Additionally, the closest dwelling is 800m away from the site.

369. Nevertheless, good practice will be instituted in the FSTP operation procedures and proper maintenance of the facility must be upheld, including avoidance of pools of dirty stagnant waters and spills in the FSTP area and surroundings i.e. access road.

370. Odour monitoring will be practiced by the FSTP operators and maintain procedures for recording and managing complaints from the public, as well as consult with residents to identify record odour or nuisance issues – preferably date, time and duration of odorous events.

VI.2.5. DECOMMISSIONING PHASE

371. The decommissioning phase is the dismantling of the project's facilities due to the incapacity of the facilities to be operating. The SMASA 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.

VII. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

VII.1. Consultation and Participation under the IEE process

372. 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.

VII.1.1. Same Public Consultation (12th October 2020)

373. The ADB IEE (ADB, 2020) undertook Public Consultation for Same in the Municipal Administrative Meeting Room on the 12th of October 2020, participated by local government agencies and authorities (Chief of Suco and Village), and representative members of the communities within the project area, where the issues of significant social concern, predicted environmental impacts and proposed mitigation measures were presented, in order to collect all useful and relevant inputs from them, for the project construction phase.

374. The stakeholders presented their concerns, suggestions and recommendations for the project implementation, focussing mainly on issues such as Land & Property, Acceleration of the Project Implementation, Project Area, Water distribution system does not serve all villages, misuse by consumers (and direct impact on water availability in the distribution system and measurement for structural preservation of cultural and religious assets within the project area (see Appendix 5 for Manufahi Public Consultation Notes).

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

Figure 113 Same Public Consultation; participation of the Local Leadership and Other Stakeholders



VII.1.2. Suco Social Public Consultation (4th and 5th December 2020)

376. 3 other Public Consultations were carried out under the social component in Suco Holarua (4th December 2020), Suco Letefoho (5th December 2020) and Suco Babulo (5th December 2020). All PCs registered a significant attendance especially with a strong female participation at the Aldeia level. After the non-technical presentation of the project, the floor was given to the attendees to discuss water supply and sanitation issues related to the project.

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

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

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

380. The results of these Public Consultations further confirmed the expectations and worries stated in the previous general Same Public Consultation and reassured the team that there is very little risk of any water conflicts or impacts felt by the community during implementation and operation of the future system.

Figure 124 - Suco Holarua Public Consultation



Figure 135 - Suco Letefoho Public Consultation



Figure 146 - Suco Babulo Public Consultation



VII.2. Consultation in upcoming Project Phases

VII.2.1. Consultation during the SEIS/EMP Domestic process

381. As required by the national environmental licensing law, the PDC, together with the MPW and PMU, will conduct a Public consultation regarding the SEIS/EMP of the project, with the objective to receive final comments and questions regarding the project's environmental safeguards, from the communities and their local leaderships. A tentative agenda for said meeting is below: (i) general overview of the projects; (ii) project benefits, positive impacts and outcomes; (iii) potential environmental impacts from the 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 Constructor Environmental Management Plan (CEMP); (vii) existence and observance of a grievance redress mechanism during project implementation; and (viii) compliance with Timor-Leste and ADB environmental safeguard policies.

VII.2.2. Consultation during Construction

382. Prior to the start of construction, the contractor, MPW and the PSC 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.

383. 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 PSC 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.

VII.3. Information Disclosure

384. For disclosure and information purposes, a copy of the IEE/SEIS/EMP with the Executive summary translated into Tetum (local language) will be distributed to SMASA 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.

385. An Electronic version of the IEE/SEIS/EMP in English and Executive Summary 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.

386. 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.

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

VIII. GRIEVANCE REDRESS MECHANISM

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

389. The function of GRM is to receive, evaluate and facilitate resolution of affected persons' concerns, complaints, and grievances related to social, environmental and other concerns on the project in a form of forum which can be accessible to other related parties with a provision of Complaint Registry Form (See Appendix 2) by the Contractor as described below on the Grievance Procedure.

390. The proposed mechanism for grievance redress of environmental matters in construction and operation of the project's infrastructure subcomponents uses existing Suco ("village") and Aldeia ("Hamlet") administrative structures (affected persons/ village committees/ village groups), any of which can be complainants.

391. The benefits contribute to the project itself and also the affected persons and other stakeholders. The benefits of the project will resolve any relative disputes before they escalate to a higher level, help building trust and confidence to the related community members, create productive relationships between the parties, and helps avoid project delays and increasing of costs, thus will improve the quality of work. Other benefits that can contribute to the affected persons and stakeholders are easing and facilitating access to information and providing an effective way to report their grievances and complaints.

392. Every grievance shall be registered by the Contractor under a careful documented process. The SMASA will also be involved in the clients' complaints and establish a good network with the chefe de suco and aldeia for cultural facilitation purposes. The environmental and social safeguards officer will be fully responsible on the overall grievance redress issues particularly on the environmental and social issues using a combination mechanism.

VIII.1. Grievance Procedure

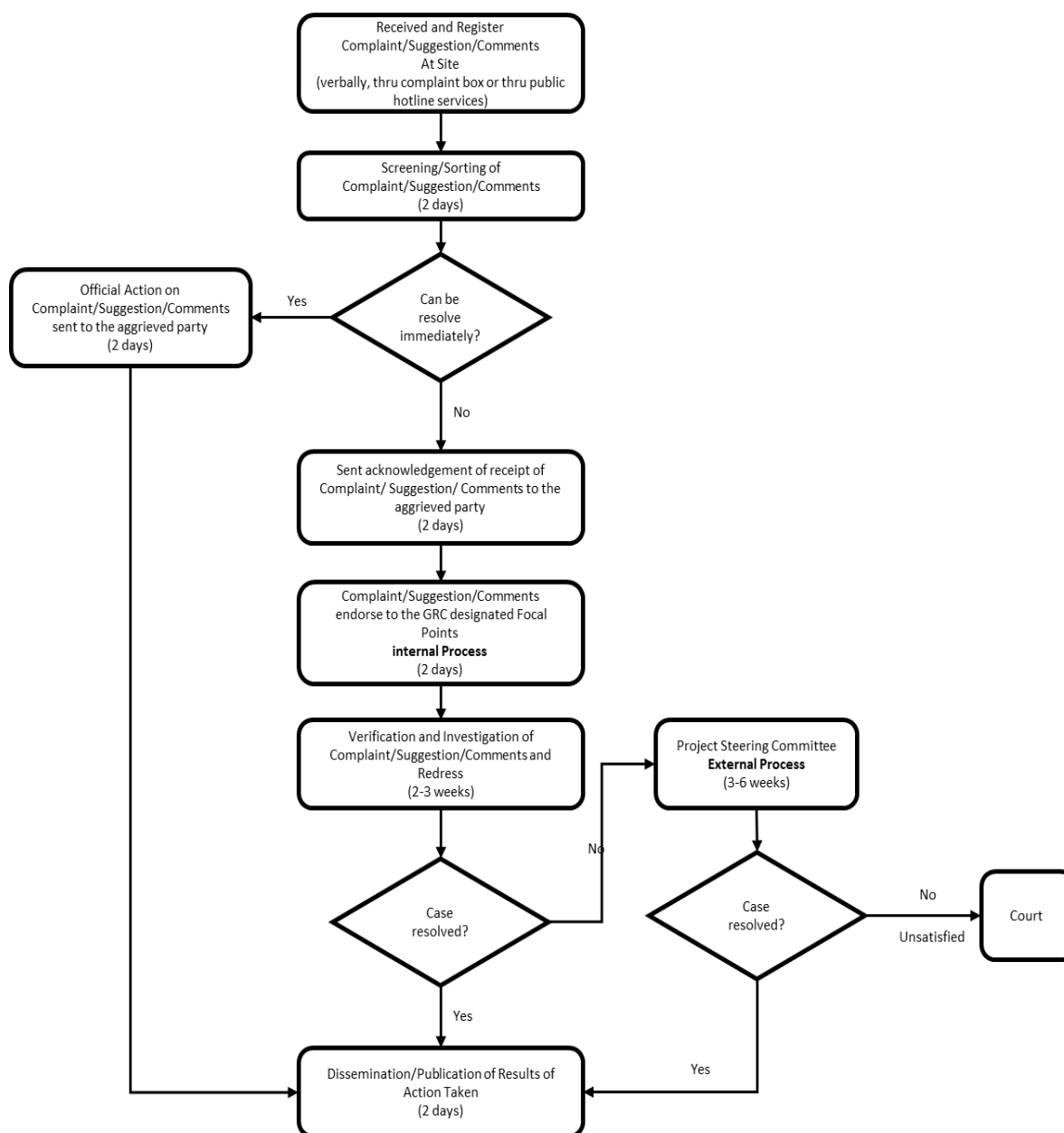
393. Grievance regarding the process can be redressed at two levels, which are during the construction, and during Operation of the project, following the process in Figure 157.

394. At the project level, a complaint registry shall be set up in the project work area, under the responsibility of the contractor, identifying a staff member that is management level and whom, due to the nature of his/her function, will always be available on site and people shall be informed of his/her presence.

395. The contractor representative shall accept complaints on environmental safeguards issues during the rehabilitation works, by registering them in the Complaint Template, identifying the name of the complainant and the date of receipt. For a verbal complaint the contractor must make written records properly and record them in a complaint register.

396. The contractor representative will inform the MPW representative of the occurrence and review the nature of the complaint with MPW to make sure it is environment related. MPW performs an internal review of the issue, contacting the safeguards specialist for technical support to solve the grievance, if required, and after will agree with the Contractor on the necessary action and reasonable timeframe for correction/response to the grievance.

Figure 157 - Grievance Redress Procedure for the Project



397. If the grievance requires local mediation, MPW and contractor representatives should consult quickly with local Chefes de Suco and Aldeia (in the area of related grievance) and the affected stakeholder/person to arrive at a conclusion on the correction of the grievance. MPW must follow up on the corrective measure, within the agreed timeframe.

398. If the Contractor has not taken any satisfactory corrective action within the defined timeframe, MPW will take action in accordance to environmental legal and contractual clauses in effect.

399. If the Grievance cannot be solved at the project level, by MPW, the case will be referred to the court of law to adjudicate the matter.

400. Complainants can also file a direct complaint to MPW, under their official Department for Client Support (Address: MPW, Caicoli, Díli; Telephone: 331 71 57), who will follow up directly with the project complaint registry at the construction level.

401. This MPW Department for Client Support is the official grievance redress representative for water supply purposes, when the operation phase of the project comes online.

IX. ENVIRONMENTAL MANAGEMENT PLAN

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

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

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

- a) Mitigation and monitoring measures;
- b) Institutional arrangements and project responsibilities;
- c) EMP budget for implementation;
- d) Capacity building and training requirements;
- e) Public consultation and information disclosure;
- f) GRM including timescale and responsibilities.

404. A detailed EMP is provided for the project in a separate document, where the detailed mitigation measures are included per each of the activities and Project Phases.

405. The overall responsibility for EMP implementation lies with the Implementing Agency, the Ministry of Public Works (MPW). The MPW will establish a Project Management Unit (PMU) based in Dili, responsible for general project implementation with the support of a Project Supervision Consultant (PSC).

406. The costs for the EMP implementation are summarised below in Table 19 and are regarding the construction period (4 years) and an initial 2 year operation phase (under the contractor support), of a 14 year total operation phase up to the year 2040:

Table 19 EMP Estimated Cost

Particulars	Stages	Unit	Total Number	Rate (\$)	Cost (\$)	Cost covered by:
A Mitigation Measures						
1 Mitigation Measures per Project Activity	Construction and Operation	N/A	N/A	To be defined in Bid	To be defined in Bid	Contractor
2 Contractor's HSE Officer	Construction	Person	1	\$1,500 / month	\$54,000	Contractor
Subtotal (A)					\$54,000	
B Environmental Monitoring Measures						

	Particulars	Stages	Unit	Total Number	Rate (\$)	Cost (\$)	Cost covered by:
1	Water Quality (upstream and downstream of Merbuti / Erluli)	Construction	(as in DL31/2020)	16	\$500	\$8,000	Contractor
2	Noise (if complaint at sensitive/residential location)	Construction	dBA	4	\$1,500	\$6,000	Contractor
3	Water Quality (FSTP discharge before Gravel Filter)	Operation	(as in IFC Guidelines)	8	\$500	\$4,000	Contractor
Subtotal (B)						\$18,000	
C	Capacity Building and Training						
1	EMP Development and Implementation	Before and during Construction	Training Session	2	\$1,000	\$2,000	Contractor
2	Consultation with Affected People	Before and during Construction	Training and PC Sessions	16	\$1,000	\$16,000	Contractor
3	Grievance Redress Mechanism	Before and during Construction	Training Session	2	\$1,000	\$4,000	Contractor
4	Environmental Protection	Before Construction	Training Session	1	\$1,000	\$1,000	Contractor
5	Environmental Monitoring	Before Construction	Training Session	1	\$1,000	\$1,000	Contractor
6	FSTP Operation and Maintenance	Before and during Operation (2 years Contractor)	Training and on-the-job Sessions	3	\$12,600	\$37,800	Contractor
Subtotal (C)						\$61,800	
TOTAL (A+B+C)						\$133,800	

407. A summary of the key functions for project implementation and therefore environmental safeguards is presented in Table 20:

Table 20 – EMP general roles and responsibilities

Role	Abbreviation	Location	Summary of Functions
MPW and Project Management Unit	MPW/PMU	Díli and Same	Responsible for general project implementation and reporting; clearance of environmental due diligence documents; approval of the CEMP.
Project Supervision Consultants	PSC	Díli and Same	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 PSC 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; supporting the PMU with the environmental safeguards inputs for the quarterly progress reports to ADB, as well as for the semi-annual environmental monitoring reports to ADB.
Project Design Consultants	PDC	Díli and Same	Prepare and finalize PD, SEIS and EMP Reports based on the IEEs and EMPs, for domestic Licensing purpose.
Contractor and respective Environmental, Health and Safety Officer	Contractor / HSE officer	Same	Preparation of the CEMP for approval of the PMU; Mitigation measures implementation and reporting, capacity building and training as per Table 19; monthly reporting to the PSC/PMU; implementation of environmental safeguards corrective action measures.
Local and National Authorities	ANLA / Chefes Suco and Aldeia	Díli and Same	Review, comment, approve and monitor the SEIS and EMP compliance and implementation;

Role	Abbreviation	Location	Summary of Functions
			Supervise Contractor employment mechanism, community awareness programs and Grievance Redress Mechanism.
Asian Development Bank	ADB		Review and clear IEE/EMP, Bid documents, and SEMRs and any resulting corrective action plans. Review missions. Due diligence documents disclosure on the ADB website.

X. CONCLUSION AND RECOMMENDATIONS

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

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

410. The EMP (already prepared as a separate document 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 is expected to be local, confined within the projects' main areas of influence, quarry or burrowing sites, waste disposal sites, and the routes to and from these sites. With mitigation measures in place and ensuring that the bulk of earthworks are completed before the onset of the rainy season, the potential adverse impacts during construction would be site-specific.

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

412. 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.

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

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

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APPENDIXES

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

Rapid Environmental Assessment (REA) CHECKLIST - WATER SUPPLY

Instructions: <ul style="list-style-type: none"> <input type="checkbox"/> This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department. <input type="checkbox"/> This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department. <input type="checkbox"/> This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development. <input type="checkbox"/> Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:	Timor-Leste / Water Supply and Sanitation Investment Project
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Sector Division	SAME
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SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the project area...			
▪ Densely populated?		X	Same city holds a moderate population concentration with 86.9 persons per square kilometer.
▪ Heavy with development activities?		X	Some development (southern system near the spring sources (Merbuti, Kotalala) there is an R4D project: rural road being built) but basic infrastructure in Same is generally done (i.e. Roads)
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site	✓		Merbuti and Kotalala, and Rusata are inside PA, the rest are adjacent. The TA team has identified several traditional houses close to the distribution pipe, cemeteries, areas of worship (used and not used) with a total of 4 churches, a chapel, and a mosque within the distribution area.
• Protected Area	✓		Some parts of the project 15 Km Diameter (Merbuti, Kotalala and Rusata Springs are inside the Kablaki PA and a small part of Zone B1 (in Suco Holarua)) overlaps slightly the PA border).
• Wetland		X	No wetlands are identified in literature or were assessed during inception visit, in the project area. TBC during Field visit.
• Mangrove		X	Project location is within the upper range of the Same Plateau, not at the coast near Betano
• Estuarine		X	Project location is within the upper range of the Same Plateau, not at the coast near Betano
• Buffer zone of protected area	✓		TBC with National Directorate for Protected Areas. Besides being declared under DL05/2016 – National System for Protected Areas, there hasn't been published (to date) any specific Buffer Zone limits beyond the PA border. This is particularly relevant for all the project areas that are adjacent to the PA border, namely Zone B1 [has an established neighborhood inside the PA] and Darelau and Erluli Springs (Suco Halarua) and Zone A3 (Suco Letefoho), in its Northeast corner.
• Special area for protecting biodiversity	✓		The Merbuti, Kotalala and Rusata springs and also small community area are inside the PA with high biodiversity.
• Bay		X	Project location is within the upper range of the Same Plateau, not at the coast near Betano

SCREENING QUESTIONS	Yes	No	REMARKS
B. Potential Environmental Impacts Will the Project cause...			
▪ pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?	✓		Yes. Construction materials and excavation works for the spring's infrastructure developments will cause sediments runoffs that also affects the surface water quality, flowing downstream. The Water at the spring sources already have some microbiological contamination before project proposed treatment, suggesting cattle/husbandry activities and/or lower sanitation levels upstream.
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?	✓		Yes. In general, the springs are considered sacred by locals for which proper handling and fulfilments in the culture ceremony before the development is required. The TA team has identified several traditional houses close to the distribution pipe, cemeteries, areas of worship (used and not used) with a total of 4 churches, a chapel, and a mosque within the distribution area. The future EMP will include measures to mitigate the impacts during the construction phase to comply with the protection measures defined in the Cultural Policy/regulations of Timor-Leste
▪ hazard of land subsidence caused by excessive ground water pumping?		X	Since the existing water extraction rates will be small to the also small-scale of the project, the aquifer is not expected to be overexploited. For this reason, there are no risk of land subsidence.
▪ social conflicts arising from displacement of communities ?	✓		Some residential and agricultural land areas of private individuals and households will be affected and compensation for the affected land will be required
▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	✓		Yes. Communities currently share the benefit from the existing ground and surface. Maximum extraction rates to guarantee impact avoidance must be confirmed during borehole tests. It should be noted that the private wells in these conditions are located in urban areas included into the future supply system.
▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?		X	Raw water is planned to be treated prior to distribution, both for pathogens and calcium carbonate. Resulting quality of treated water will comply with the Timorese Legislation and WHO standards for drinking water, improving the already contaminated water sources.
▪ delivery of unsafe water to distribution system?		X	The rehabilitated network will provide treated water through the substitution of old for new pipes, preferably under the city urban alignments to prevent illegal connections and consequent leakages and contamination.
▪ inadequate protection of intake works or wells, leading to pollution of water supply?	✓		Contractor to establish an integrated CEMP to take care of this issue during construction. The intake will be secured and only accessible to authorized persons. It will also be regularly monitored to ensure only treated water is distributed.
▪ over pumping of ground water, leading to salinization and ground subsidence?		X	N/A. No groundwater pumping is considered
▪ excessive algal growth in storage reservoir?	✓		Not anticipated as the storage reservoirs are planned to be fully enclosed structures and the treated water will only be stored for a short period of time.
▪ increase in production of sewage beyond capabilities of community facilities?		X	The Project is indeed expected to increase the water consumption and, consequently the wastewater output. However, the Project scope includes pilot projects for 4 Public WC septic tank treatment within the city and the design of a decentralized Waste Water/Sludge Treatment Plant. However, the septic treatment capacity of the households and the transport of their sludge are not included.
▪ inadequate disposal of sludge from water treatment plants?	✓		Currently Same does not have an established Solid Waste Landfill/dumpsite and therefore possible solutions for the sludge disposal from the Decentralized WW Treatment Plant will need to be assessed in the field visit

SCREENING QUESTIONS	Yes	No	REMARKS
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		X	Not applicable
▪ impairments associated with transmission lines and access roads?	✓		Yes. Some established road infrastructure will have to be excavated and repaired thereafter. Anticipated during construction activities but impacts are temporary and short in duration. The future EMP will include measures to mitigate the impacts.
▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		X	Not applicable. The MPW storage facilities will be designed to guarantee enough space for the correct handling of the water treatment chemicals.
▪ health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?		X	Not applicable. The MPW storage facilities will be designed to guarantee enough space for the correct handling of the water treatment chemicals. Personal protective equipment will be provided to workers and training will be provided to ensure workers are aware of the potential hazards.
▪ dislocation or involuntary resettlement of people		X	The activities do not estimate any resettlement.
▪ social conflicts between construction workers from other areas and community workers?	✓		Yes. Priority/proportion in employment should be given to local residents if/when qualification requirements are reached for each work position, is in compliance with SEPFPOE regulations.
▪ noise and dust from construction activities?	✓		Anticipated during construction activities but impacts are temporary and short in duration. The future EMP will include measures to mitigate the impacts.
▪ increased road traffic due to interference of construction activities?	✓		Anticipated during construction activities but impacts are anticipated as small scale, temporary and short in duration, given Same does not have significant traffic flow in the project area. The future EMP will include measures to mitigate the impacts and the construction contractors will be required to coordinate with the local traffic police.
▪ continuing soil erosion/silt runoff from construction operations?	✓		Yes. Same has steep topography and loose soil will be eroded if no mitigation measures established. Landslide risks in spring areas. During Construction, storage of topsoil can runoff and cause sedimentation in the raw water harvested by downstream community. The EMP still includes measures to mitigate the impacts. Construction contractors will be required to include soil management guidelines and procedures where required.
▪ delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?		X	Not anticipated. Chlorine Monitoring is included in the proposed methodology for Water Monitoring during the Operation Phase.
▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		X	Not anticipated.
▪ accidental leakage of chlorine gas?		X	Not anticipated.
▪ excessive abstraction of water affecting downstream water users?	✓		Yes. current users of surface water will be impacted due to risk of over abstraction for water supply. Will require review of downstream water use. TBC in the field visit.
▪ competing uses of water?	✓		Preliminary information is that communities are in competing use of Rusata water, when Merbuti and Kotalala are low in supply. Coloco and Cacula are also used by local communities. Several community areas with less access to water distribution tend to abstract water from alternative sources i.e rivers and several small water springs.
▪ increased sewage flow due to increased water supply	✓		The Project is expected to increase the water consumption and, consequently the wastewater output.
▪ increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	✓		The Project is expected to increase the water consumption and, consequently the sludge output, including from kitchens.

Checklist for Preliminary Climate Risk Screening

Country/Project Title: Water Supply and Sanitation Investment Project

Sector: SAME

Subsector: Water Distribution Network

Division/Department: MPWMinistry of Public Works (MPW)

Screening Questions		Score	Remarks ⁸
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	<i>The topography of the site is quite steep with risk of flash flooding and extreme weather occurrences and consequent landslides and so location and routing is considered to be a substantial problem, as the infrastructure will almost all require reinforced structure and support.</i>
	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	<i>The project will require water-level metering monitoring regarding flow, as well as review of quantities variations to correlate with seasonal meteorological variations and estimate source productivity and possible climate change problems such as i.e. water supply source depletion</i>
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold 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)?	1	<i>Given the area has 2 seasons with frequent extreme conditions, there may be a requirement to look into more climate resistant piping infrastructure and fill-in materials to guarantee the quality integrity of the distributed water quality and spring infrastructure.</i>
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	1	<i>Occasional extreme weather will interfere with planned maintenance schedule when/if extreme events may breakage in the established infrastructure.</i>
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 life time?	0	<i>No hydropower infrastructure identified</i>

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

⁸ 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.

Rapid Environmental Assessment (REA) CHECKLIST - SANITATION

Instructions: <ul style="list-style-type: none"> <input type="checkbox"/> This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department. <input type="checkbox"/> This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department. <input type="checkbox"/> This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development. <input type="checkbox"/> Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:	Timor-Leste / Water Supply and Sanitation Investment Project
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Sector Division	SAME
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SCREENING QUESTIONS	Yes	No	REMARKS
B. Project Siting Is the project area...			
▪ Densely populated?		X	Same city holds a moderate population concentration with 86.9 persons per square kilometer.
▪ Heavy with development activities?		X	There is some activity in the southern system near the spring sources (Merbuti, Kotalala) there is an R4D project: rural road being built,
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site		X	There is no specific or any apparent cultural assets found nearby the proposed FSTP.
• Protected Area	✓		Some parts of the project 15 Km Diameter border overlaps the Kablaki Protected Area. However, the proposed septic treatment for the 4 Public Toilet Infrastructures will have to be well chosen as there are 3 schools in Suco Halarua that are close to adjacent to the PA. Additionally, the location of the decentralized wastewater treatment plant (DFSTP), will have to be within the 15Km but at a reasonable and safe distance from the PA boundaries.
• Wetland		X	No wetlands are identified in literature or were assessed during inception visit, in the project area. TBC during Field visit.
• Mangrove		X	Project location is within the upper range of the Same Plateau, not at the coast near Betano
• Estuarine		X	Project location is within the upper range of the Same Plateau, not at the coast near Betano
• Buffer zone of protected area	✓		TBC with National Directorate for Protected Areas. Besides being declared under DL05/2016 – National System for Protected Areas, there hasn't been published (to date) any specific Buffer Zone limits beyond the PA border. This is particularly relevant for all the project areas that are adjacent to the PA border, namely Zone B1 [has an established neighborhood inside the PA] and almost all the schools within the 15 Km area.
• Special area for protecting biodiversity		X	Kablaki protected area has a high biodiversity, but the proposed FSTP is very much distant from the PA. Even if the proposed location is near from the river and surrounded with dispersed agriculture lands, there is no specific biodiversity found in that area according to site visit analysis.
• Bay		X	Project location is within the upper range of the Same Plateau, not at the coast near Betano
A. Potential Environmental Impacts Will the Project cause...			
▪ Impairment of historical/cultural monuments/areas and loss/damage to these sites?		X	There is no specific or any apparent cultural assets found nearby the proposed FSTP. Therefore, there will be no impairment or damages occur.
▪ Interference with other utilities and blocking of access to buildings; nuisance to neighbouring areas due to noise, smell, and influx of insects, rodents, etc.?		X	No blocking/interference with other utilities are expected, given Public Sanitation Installations will have proper septic treatment infrastructure and planned for regular emptying and maintenance. FSTP site is in a predominantly agricultural area and unused private lands with no houses nearby the proposed area. No interference is predicted.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ dislocation or involuntary resettlement of people		X	Public Sanitation Installations are planned to be in Government Land, as well as location of DFSTP. TBC Officially with Los Palos and or National Land and Property Services.
▪ impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		X	The proposed FSTP will have Solid/Liquid Separation (sludge drying bed) and Post Sludge Percolate Treatment (Anaerobic Baffled Reactor Tank and Filter [secondary treatment], Planted Gravel Filter [Tertiary Treatment] and UV Treatment or Polishing Pond. Dried Sludge and/or Residual percolate may be used for Agriculture in the area. FSTP effluent discharges shall meet the norms laid out by the Government of Timor-Leste (WHO/IFC) and can also utilized for agriculture purpose.
▪ overflows and flooding of neighbouring properties with raw sewage?		X	FSTP will be designed considering the population growth up to the project time horizon of 2040, to accommodate sludge treatment for the long term. No impact is envisaged. It should be noted that this station will only receive effluent transported by tanker trucks and therefore it is not possible flooding due to the inflow of sewage. In addition, the following measures are planned: <ul style="list-style-type: none"> • During operation of the sludge/liquid separation bed, an extra margin up to the top of the earth bank would be kept to prevent overflow after a large rain storm. • Furthermore, a shallow earth bank will be constructed along the perimeter of the total area to protect from the plant storm water. • The earth bank is to be planted with grass and small trees to demarcate the area. The soil for construction of the earth bank comes from excavation of the ponds. • Regular checking of the adequacy of the facility, particularly when beds are (nearly) full and during the rainy season. • Timely heightening of the bund surrounding the facility and / or increasing the bed capacity.
▪ environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		X	The proposed system is based on Domestic wastewater from septic tanks, collected and transported by truck to the DFSTP. No industrial WW planned to be directed to this treatment system.
▪ noise and vibration due to blasting and other civil works?	✓		No blasting activities envisaged. Temporary nuisance/disturbance due to construction activities will be minimized with appropriate mitigation measures.
▪ discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		X	The proposed system is based on Domestic wastewater from septic tanks, collected and transported by truck to the DFSTP. No industrial WW planned to be directed to this treatment system.
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?	✓		The proposed system is based on Domestic wastewater from septic tanks, collected and transported by truck to the DFSTP. Any impact from the collection is planned to be temporary. However, the DFSTP will be fenced off to protect facilities and control access and provide for space to avoid these impacts.
▪ social conflicts between construction workers from other areas and community workers?	✓		Priority in employment should be given to local residents if/when qualification requirements are reached for each work position.
▪ road blocking and temporary flooding due to land excavation during the rainy season?	✓		Road blocking and Traffic re-routing may be required during construction stage of the FSTP. However, surrounding area is agricultural and with little to no daily traffic.
▪ noise and dust from construction activities?	✓		While the impact in the Septic tanks in the Public Toilet locations will be very reduced, the DFSTP construction site may have these impacts in a larger scale and the EMP should define that all the construction activities should comply with the WHO noise standards, currently applicable for Timor-Leste. Sprinkling of water should be done along the construction area for dust suppression.
▪ traffic disturbances due to construction material transport and wastes?	✓		While the location of the DFSTP is to be remote and out of the urban area, traffic management with re-routing of traffic during construction period will be required to avoid conflict of public transport with construction material / waste transport.
▪ temporary silt runoff due to construction?	✓		During construction phase, the excavation will be planned in such a way that it is avoided during heavy rains. During construction of FSTP especially during rainy season, this aspect will be kept in mind. The work would be undertaken in small pockets to avoid any silt runoff. Furthermore earth strengthening measures would also be undertaken.

SCREENING QUESTIONS	Yes	No	REMARKS																																																																						
			All excavated spoil is expected to be reused in the construction of the FSTP and its protective measures. Any excess should be well managed through levelling or tipped into low lying areas or borrow areas which are no longer useful.																																																																						
▪ hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?	✓		<p>Regular maintenances of the FSTP have to be carried out to avoid over flow and related impact of public health due to pollution. The design may be required to provide additional bunkering for overflow collection and re-pumping back into the system, as well as emergency shutdown procedures to avoid the possibility for groundwater pollution due to malfunction of FSTP system.</p> <ul style="list-style-type: none">Treatment units would be raised sufficiently to keep them clear of the highest predicted flooding level.There are two concerns for ground water protection, these are the potential pathogen movement in the groundwater and the infiltration of soluble nutrients. Due to their size, the pathogens will adhere to the soil particles and not move very far. With a minimum safe distance of 100 m for ordinary soil, there will be no pathogens in the groundwater outside this distance.The soluble nutrients, such as nitrate from urine, will move with the groundwater, but will be diluted to a level where there is no health risk. It is assumed that most of the nitrate has already infiltrated at the site of origin, that is near the households from the infiltration of liquid waste the septic tanks and pit latrines. <p>Close monitoring of the facility to ensure it functions as planned, this involves monitoring of ground and surface waters in the surroundings of the FSTP.</p>																																																																						
▪ deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?	✓		<p>Currently Los Palos does not have an established Solid Waste Landfill/dumpsite (only an uncontrolled dumpsite next to the proposed FSTP site). Given the sensitivity of the National Park area downstream, the sludge treatment will be as complete as possible and dewatering of the sludge will be priority for further safe reuse of dry sludge in agricultural activities.</p> <p>Adequate measure of sludge disposal and prohibit discharge of untreated sludge from septic tanks need to be taken.</p> <p>In no way will sludge be allowed to be discharged from FSTP without complete & proposed treatment. Treated effluent will meet the WHO Standards as well as DL 236/98 (Portugal) as given below:-</p> <table><tr><td></td><td colspan="2">BOD (mg/L)</td><td rowspan="2">NH₄-N (mg/L)</td><td rowspan="2">Helminth eggs (No./filter)</td><td rowspan="2">FC (Nº/100 ml)</td></tr><tr><td></td><td>Total</td><td>Filtered</td></tr><tr><td colspan="6">A. LIQUID EFFLUENT (WHO Standards)</td></tr><tr><td colspan="6">A.1 - Discharge into receiving waters:</td></tr><tr><td>Seasonal stream estuary</td><td>100-200</td><td>30-60</td><td>Oct-30</td><td>≤2-5</td><td>≤10⁴</td></tr><tr><td>Perennial river or sea</td><td>200-300</td><td>60-90</td><td>20-50</td><td>≤10</td><td>≤10⁵</td></tr><tr><td colspan="6">A.2 - Reuse</td></tr><tr><td>Restricted irrigation</td><td colspan="2">n.c.</td><td>1)</td><td>≤1</td><td>≤10⁵</td></tr><tr><td>Unrestricted irrigation</td><td colspan="2">n.c.</td><td>1)</td><td>≤1</td><td>≤10³</td></tr><tr><td colspan="6">B: TREATED PLANT SLUDGE (WHO Standards)</td></tr><tr><td>Use in agriculture</td><td colspan="2">n.c.</td><td>n.c</td><td>≤3-8 g TS₂</td><td>3)</td></tr></table> <p>1) ≤ crop's nitrogen requirement (100-200 kg N/ ha-year) 2) Based on the nematode egg load per unit surface area derived from WHO guidelines for wastewater irrigation (WHO 1989) and on manuring rate of 2-3 tons of dry matter /ha -year 3) Safe level if egg standard is met. n.c----not critical</p> <table><tr><td></td><td>BOD (mg/L)</td><td>TSS (mg/L)</td><td>N total</td><td>p total (mg/L)</td><td>TC (Nº./100 ml)</td><td>FC (</td></tr></table>		BOD (mg/L)		NH ₄ -N (mg/L)	Helminth eggs (No./filter)	FC (Nº/100 ml)		Total	Filtered	A. LIQUID EFFLUENT (WHO Standards)						A.1 - Discharge into receiving waters:						Seasonal stream estuary	100-200	30-60	Oct-30	≤2-5	≤10 ⁴	Perennial river or sea	200-300	60-90	20-50	≤10	≤10 ⁵	A.2 - Reuse						Restricted irrigation	n.c.		1)	≤1	≤10 ⁵	Unrestricted irrigation	n.c.		1)	≤1	≤10 ³	B: TREATED PLANT SLUDGE (WHO Standards)						Use in agriculture	n.c.		n.c	≤3-8 g TS ₂	3)		BOD (mg/L)	TSS (mg/L)	N total	p total (mg/L)	TC (Nº./100 ml)	FC (
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			<table><tr><td></td><td></td><td></td><td>(mg/ L)</td><td></td><td></td><td>Nº./100 ml)</td></tr><tr><td colspan="7">A. LIQUID EFFLUENT (DL 236/98)</td></tr><tr><td colspan="7">A.1 - Discharge into receiving waters:</td></tr><tr><td>Emission limit values (ELV) for wastewater discharge (Attachment XVIII)</td><td>40</td><td>60</td><td>15</td><td>10 (1)</td><td>n.c</td><td>n.c</td></tr><tr><td>Quality of surface fresh water for the production of water for human consumption (Attachment I)</td><td>200-300</td><td>60-90</td><td>20-50</td><td>n.c</td><td>2*10⁵</td><td>2*10⁴</td></tr><tr><td colspan="7">A.2 - Reuse (DL 236/98)</td></tr><tr><td>Quality of water for irrigation (Attachment XVI)</td><td>n.c.</td><td>60</td><td>50 (2)</td><td>n.c</td><td>n.c</td><td>100</td></tr><tr><td colspan="7">1) ≤ 3 mg/L in waters that feed ponds or reservoirs 2) nitrates (NO3)</td></tr></table> <p>It should be noted that to fulfill an irrigation water quality, bacteriological removal must be by UV</p>				(mg/ L)			Nº./100 ml)	A. LIQUID EFFLUENT (DL 236/98)							A.1 - Discharge into receiving waters:							Emission limit values (ELV) for wastewater discharge (Attachment XVIII)	40	60	15	10 (1)	n.c	n.c	Quality of surface fresh water for the production of water for human consumption (Attachment I)	200-300	60-90	20-50	n.c	2*10 ⁵	2*10 ⁴	A.2 - Reuse (DL 236/98)							Quality of water for irrigation (Attachment XVI)	n.c.	60	50 (2)	n.c	n.c	100	1) ≤ 3 mg/L in waters that feed ponds or reservoirs 2) nitrates (NO3)						
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contamination of surface and ground waters due to sludge disposal on land?	✓		<p>Sludge reuse for agricultural activities will follow strict guidelines and information on best-use/restrictions of use will be given to potential re-users of the dried sludge.</p> <ul style="list-style-type: none">Inadequate sludge disposal on land can contaminate ground water and surface water and measures of adequate sludge disposal would be taken to avoid any environmental impact. <p>For reuse of the dried faecal sludge from the facility, the operation will secure elimination of Ascaris eggs, for example by using a one year cycle for moving sludge from pond to the two drying beds (for odd and even year) giving a total three years retention time before final removal of the dry faecal material. After three years, the infection risk of Ascariasis is minimal.</p>																																																								
health and safety hazards to workers from toxic gases and hazardous materials which maybe contained in sewage flow and exposure to pathogens in sewage and sludge?	✓		<p>No significant impacts are expected from the septic tank systems in the 4 proposed Public WCs maintenance as their scale is much smaller and less dangerous than a fully reticulated sewer collection system. However, especially for the FSTP site operation, personal protective equipment and training will be provided to workers to ensure they are protected and aware of the potential hazards.</p>																																																								

Checklist for Preliminary Climate Risk Screening

Country/Project Title: Timor-Leste / Water Supply and Sanitation Investment Project

Sector: SAME

Subsector: Sanitation

Division/Department: Ministry of Public Works (MPW)

Screening Questions		Score	Remarks ⁹
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?	0	Regarding the FSTP, the choice of the site will have to be done in a location that is deprived of these hazardous conditions. The topography of the project site is quite flat and landslide risk free and is outside the flood plain risk area so location of the FSTP is not considered to be a substantial problem. The access road from the public road to the treatment plant site needs to be paved, without steep gradients. It should preferably have sufficient width to allow tankers to pass. Where this is not possible, frequent passing places should be provided. In addition, capacity of the proposed facility can be increased by shortening the time of each cycle for removal of semi-dried faecal sludge from the ponds to the drying beds, while still providing the secure storage time for a safe Ascaris egg-free waste product. The planning of the operation of the faecal sludge treatment facility would take the weather into account when estimating the reasonable maximum capacity with regards to the number of cycles per year for emptying the sludge/liquid separation bed. The emptying should then be completed by the end of the dry and wet seasons.
	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)?	0	May require reliable knowledge on peak river flow and water level. The existing river is constructed sufficiently high to avoid flood occurrences and interruption of faecal sludge collection services. There is no existing bridge where trucks have to cross for the WW to be transported from Households to the DFSTP since the proposed location is 2 kilometres away from the national road.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold 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)?	1	Given the project area has 2 seasons with frequent extreme conditions and one is predominantly drought prone, there may be a requirement to look into guaranteeing water or wastewater constant supply to maintain optimum conditions for WW treatment and avoid lagoons to dry out. Construction material will be selected keeping in mind the climatic conditions existing in the area.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance	1	The proposed FSTP location is above floodplain levels but strong rain occurrences may require temporary delays. Infrastructure maintenance and

⁹ 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.


Screening Questions		Score	Remarks ⁹
	(scheduling and cost) of project output(s)?		contingency measures must be in place for i.e. extreme rainfall and possible overflowing of FSTP. The civil construction design would be undertaken so that structures can be maintained well without incurring unduly high expenditure.
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 life time?	1	<p>Infrastructure maintenance and contingency measures must be in place for i.e. extreme rainfall and possible overflowing of FSTP. Possible options may be additional Bunding Areas with recirculation after extreme event occurrence. Under evaluation by the technical team.</p> <p>FSTP is going to produce dry solids in the form of compost which can be utilised by farmers having agricultural fields in the vicinity of FSTP. For reuse of the dried faecal sludge from the faecal sludge treatment facility, the operation must secure elimination of Ascaris eggs, for example by using a one year cycle for moving sludge from pond to the two drying beds (for odd and even year) giving a total three years retention time before final removal of the dry faecal material. After three years the infection risk of Ascariasis is minimal.</p> <p>Yes the storage for the compost needs to be adequately provided keeping in mind the very long rainy season of approx. 06 months.</p> <p>FSTP is going to produce liquid effluent which would meet the WHO standards for it to be used for agriculture purpose. Excessive rainfall effect on the design of FSTP has to be taken into account t as it would not only dilute the influent sludge but would also lead provision of higher volumetric capacities of the treatment units.</p>

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.

Appendix 2. Sample Grievance Redress Form



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

COMPLAINT REGISTRY FORM

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

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

Complainant Profile

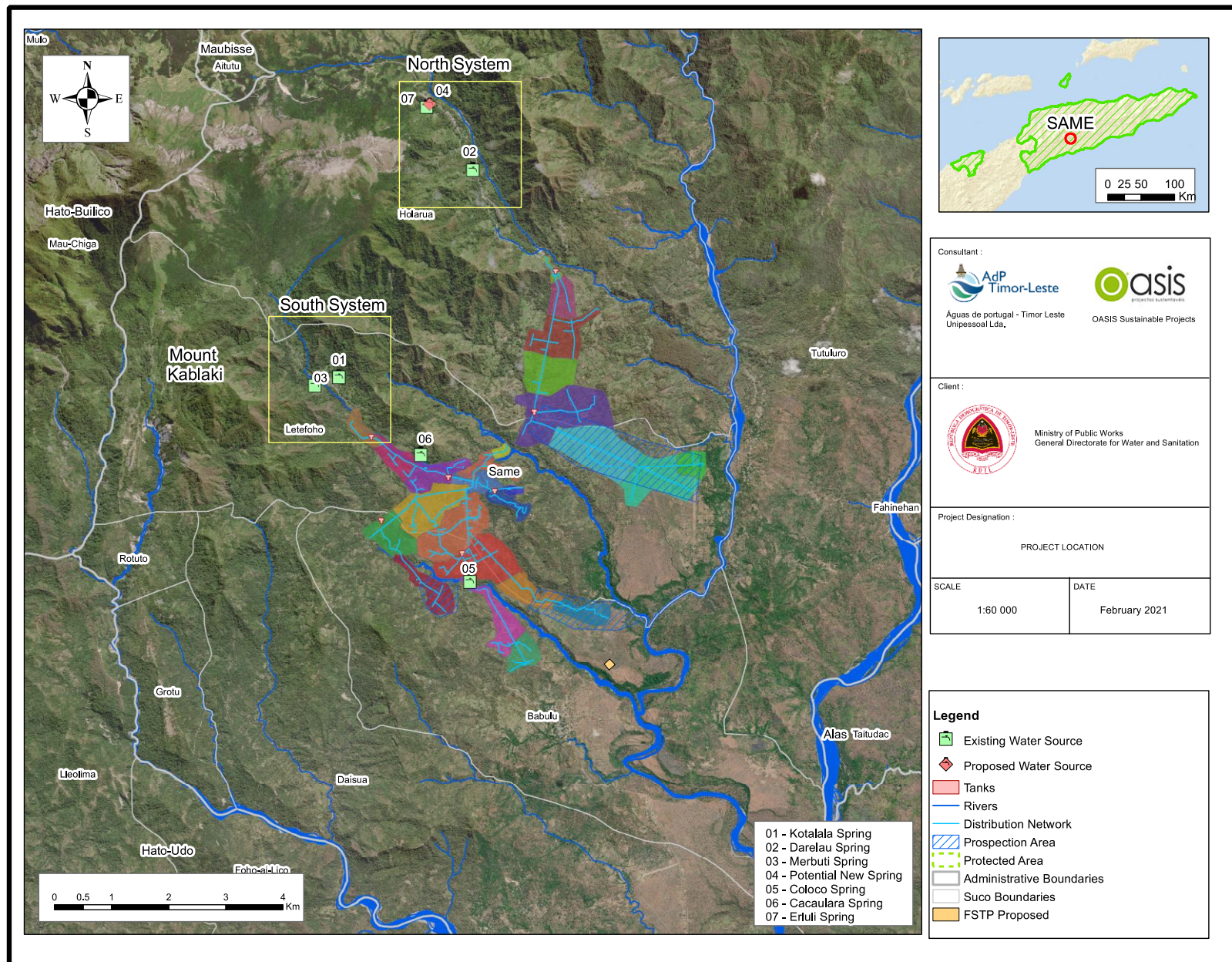
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Gender	:	<input type="checkbox"/> Male	Civil Status	:	<input type="checkbox"/> Single
		<input type="checkbox"/> Female			<input type="checkbox"/> Married
				<input type="checkbox"/> Widow/er	
Address		<u>Aldeia</u>			
		<u>Suco</u>			
		<u>Administrative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

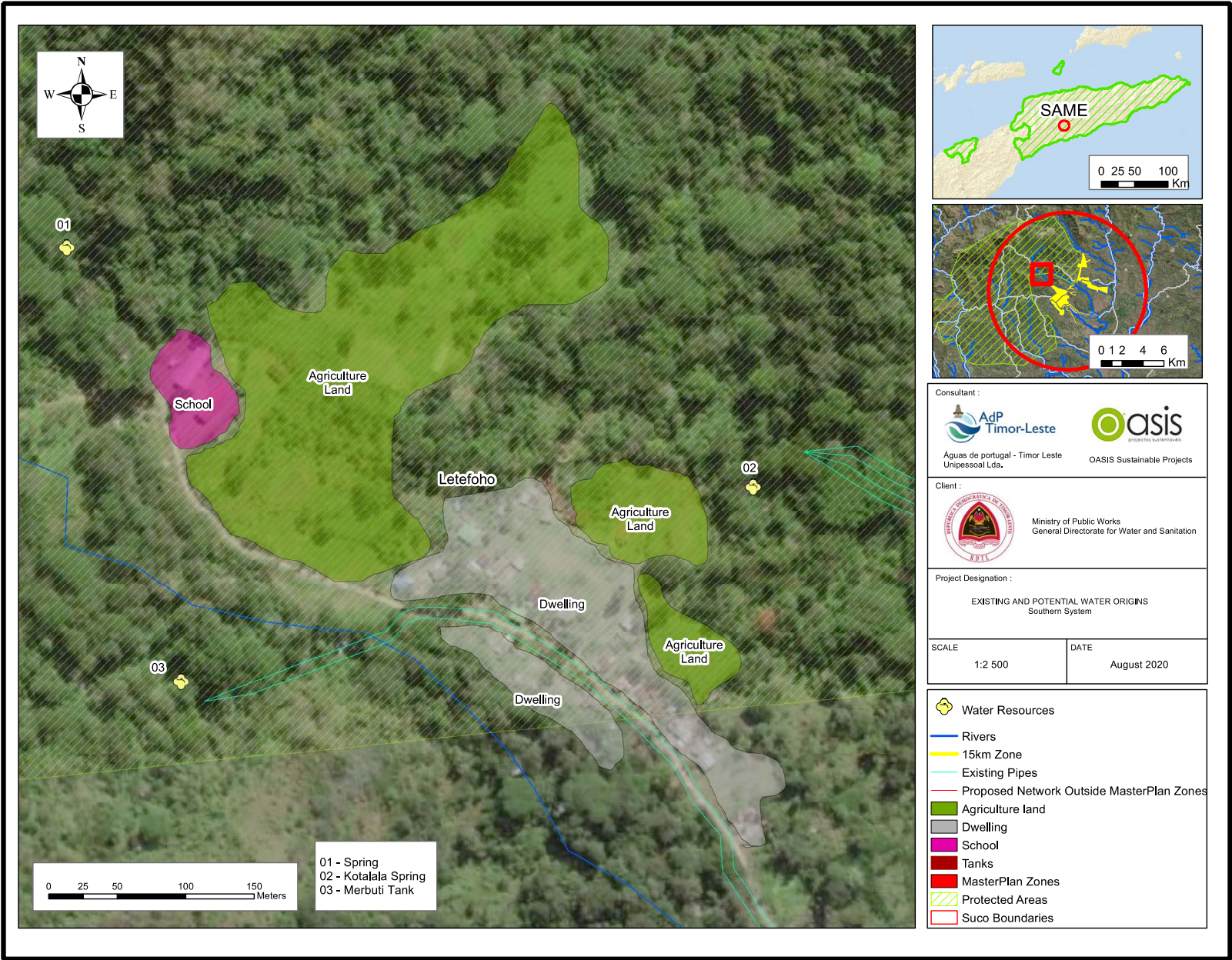
Complaint Details

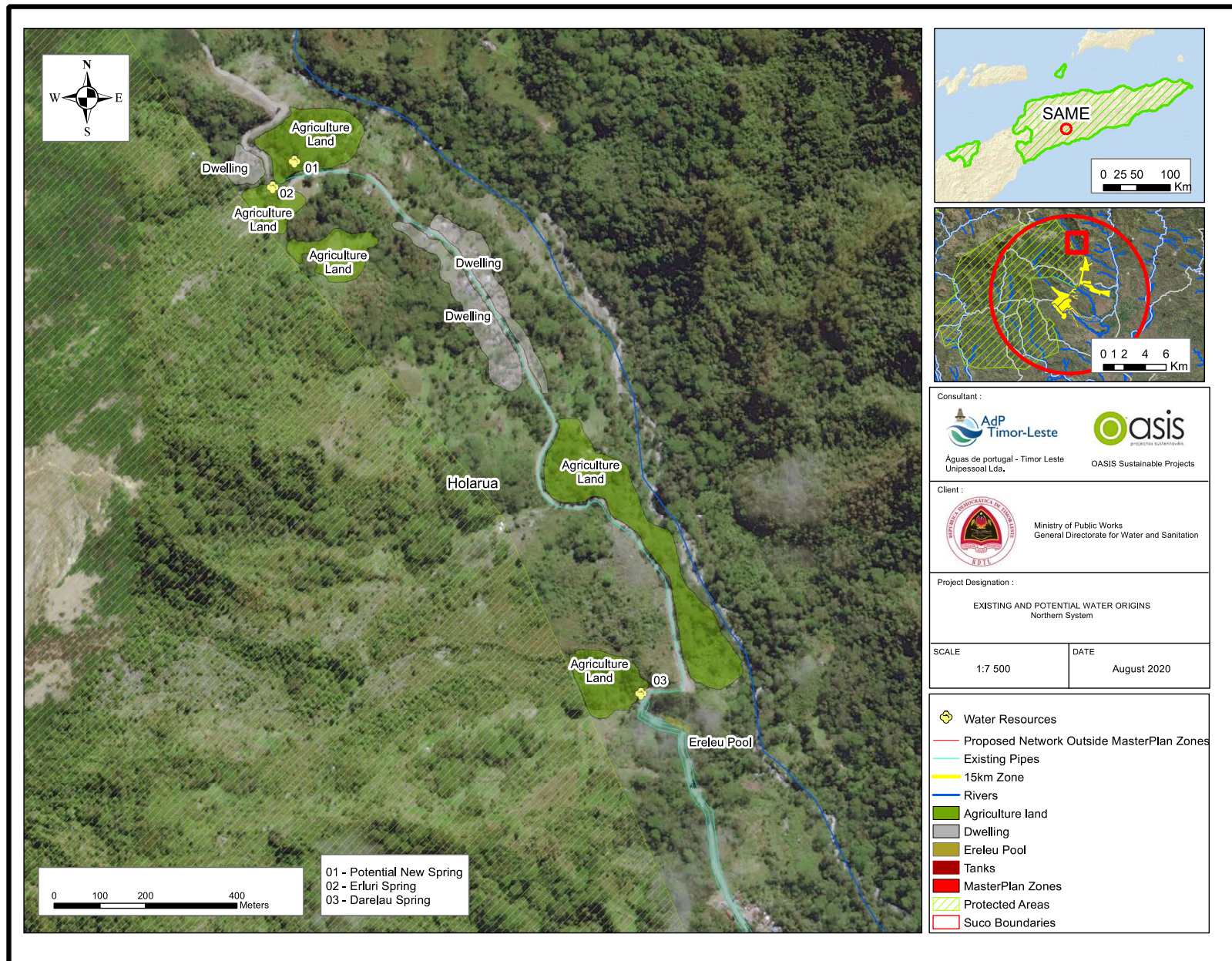
Attending Officer:	
Name/Designation	Complainant Signature

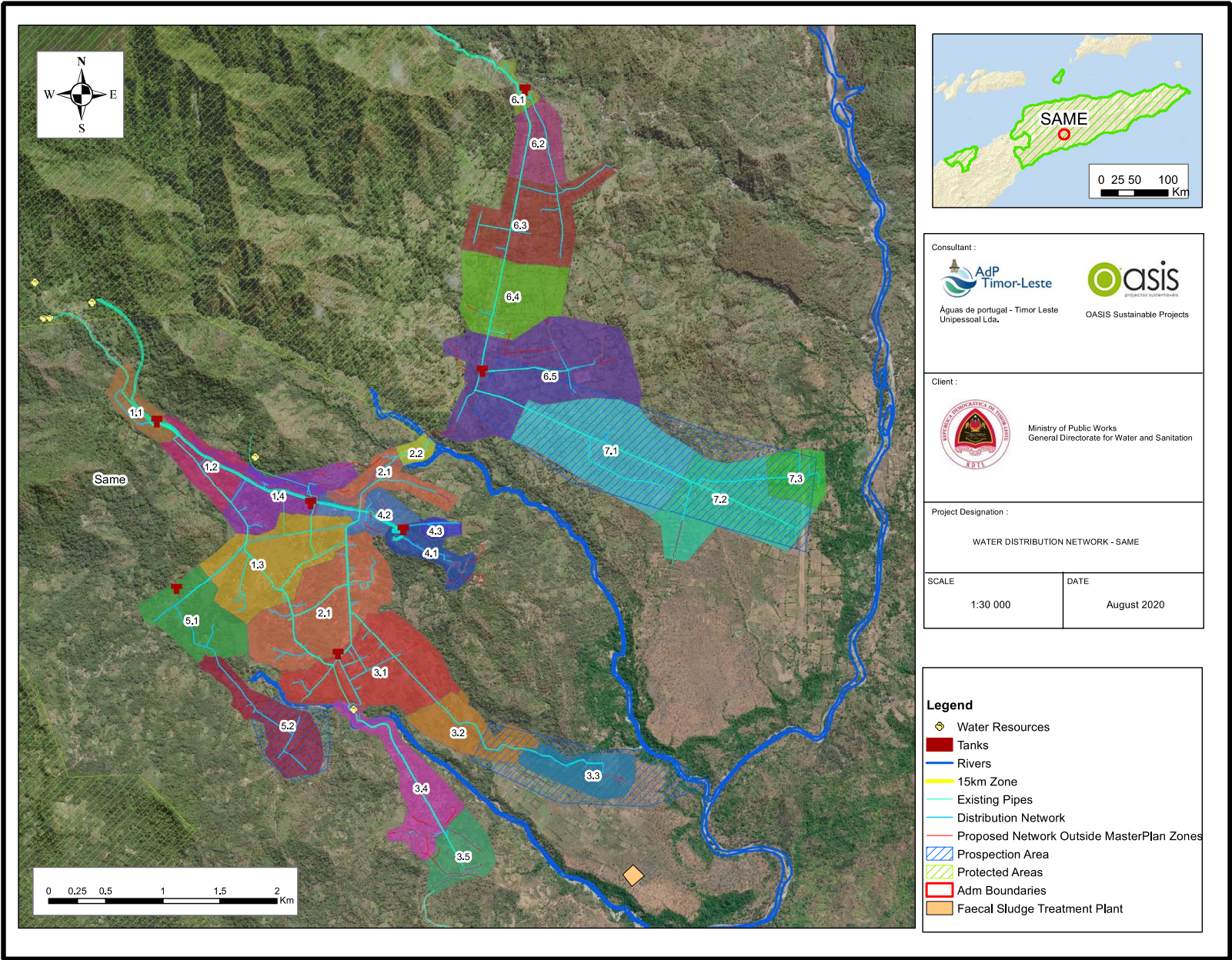
Appendix 3. Maps for WSSIP – Same City

- 3.1 Location of the Project Components**
- 3.2 Water Sources in the South System**
- 3.3. Water Sources in the North System**
- 3.4. Water Distribution Components**









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Appendix 4. Water Quality Test Report (JICA & Masterplan)

District : Manufahi

Town : Same

Sampled and tested by: Mario Soares, WSS laboratory and T.ISHIHARA, JICA Study Team

No.	Sampling Point	Date		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Alkali.	Hard.	Ca-Hard	NH ₃ -N	NO ₃ -N	NO ₂ -N	Fe	Fluoride	Mn	SO ₄ ²⁻	R.Cl ₂	T.Coli	G.Bac
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU	CFU	
Timor Loro sa'e Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	NS	200	NS	1.5	10	1	0.3	1.5	0.5	250	5	0	0
SM-1	Carbulau, intake 1	27/mar/00	29/mar/00	7.9	18.9	257	123	0.1	0.2	131	135	NT	ND	0.1	0.007	ND	0.28	0.1	NT	NT	+	+
SM-2	Mibuteluli, intake 2	27/mar/00	29/mar/00	7.2	21.7	262	126	0.1	0.3	139	139	NT	ND	0.1	0.006	ND	0.11	ND	NT	NT	+	+
SM-3	Break Pressure Tank, Market	27/mar/00	29/mar/00	7.9	21.9	346	166	0.2	0.4	NT	NT	NT	ND	NT	NT	NT	0.11	NT	NT	NT	+	+
SM-4	Kamilaran, PT	27/mar/00	29/mar/00	7.6	23.2	267	128	0.1	0.5	NT	NT	NT	ND	NT	NT	NT	0.13	NT	NT	NT	+	+
SM-5	Babulu	27/mar/00	29/mar/00	7.7	23.1	347	167	0.2	1.0	186	185	NT	ND	0.1	0.007	0.01	0.14	0.1	NT	NT	++	+
SM-6	Raimerak	27/mar/00	29/mar/00	7.9	26.0	345	166	Salinity	2.3	NT	NT	NT	ND	NT	NT	NT	0.13	NT	NT	NT	++	++
SM-7*	Rai Upun	27/mar/00	29/mar/00	7.8	23.1	347	167	0.2	0.5	NT	NT	NT	ND	NT	NT	NT	0.14	NT	NT	NT	++	+
SM-8*	Nenu Aha	27/mar/00	29/mar/00	7.9	20.2	260	125	0.1	0.3	NT	NT	NT	ND	NT	NT	NT	0.39	NT	NT	NT	++	+

Legend:

ND: not detectable

NT: not tested

NS: not set

CFU: colony formed unit

-: 0-3

±: 3-10

+: 10-20

++: 20-30

+++: more than 30

*Sample points of SM-7 and SM-8 would be abolished after this sampling.

District : Manufahi

Town : Same

Tested by: Alvaro Godinho, technician, OWS laboratory

No.	Sampling Point	Date		pH	Temp.	R.Cl ₂	Cond.	TDS	Salinity	Turbidity	NH ₃ -N	Fluoride	Alkalinity	Hardness	NO ₃ -N	NO ₂ -N	Fe	Mn	T.Coli	G. Bacteria
		sample	test		(°C)	(mg/L)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU	CFU
WHO Guideline Value				6.5-8.5	NS	0.5	NS	1000	NS	5.00	NS	1.50	NS	200	10.00	0.913	0.30	0.3	0	0
1	Carbulau, intake	15/mai/00	16/mai/00	7.7	17.6	NT	261	127	0.1	0.20	0.4	0.16	128.0	NT	0.1	0.002	0.02	ND	+	+++
2	Mibuteluli, intake	15/mai/00	16/mai/00	7.1	20.9	NT	265	124	0.1	0.29	ND	0.09	183.0	NT	0.2	0.015	ND	0.1	+	+
3	Kamilaran, PT	15/mai/00	16/mai/00	7.4	21.5	NT	268	130	0.2	0.55	0.1	ND	NT	NT	0.1	0.006	0.01	0.1	-	-
4	Break Pressure Tank, Market	15/mai/00	16/mai/00	7.8	22.0	NT	318	160	0.1	0.27	0.4	ND	NT	NT	ND	0.003	0.04	ND	+	++
5	Babulu	15/mai/00	16/mai/00	7.6	25.1	NT	330	162	0.1	1.03	0.0	ND	190.0	NT	ND	0.003	0.03	ND	++	+++
6	Raimerak	15/mai/00	16/mai/00	7.5	22.1	NT	346	167	0.2	1.20	0.3	ND	292.0	NT	0.2	0.001	0.02	ND	++	+++

Legend:

ND: not detectable;

NT: not tested;

NS: not set;

CFU: colony formed unit;

-: 0-3

±: 3-10

+: 10-20

++: 20-30

+++: more than 30

Suggestions

Boiling water before drinking

District: Manufahi**Town: Same**

Sample and testing by Mario Soares and ISHIHARA JICA Study Team

No.	Sampling Point	Date		pH	Temp.	R.Cl ₂	Cond.	TDS	Salinity	Turbidity	Alkalinity	Hardness	NH ₃ -N	NO ₃ -N	NO ₂ -N	Fe	Mn	Fluoride	SO ₄ ²⁻	T.Coli	E.Coli
		sample	test		(°C)	(mg/L)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU	CFU
East Timor Guideline Value				6.5-8.5	NS	0.5	NS	1000	NS	5	NS	200	1.5	10	1	0.30	0.5	1.50	250	-	-
1	Daraleo intake 1	02/out/00	03/out/00	7.8	18.7	NT	294	141	0.1	0.23	139	165	0.8	0.1	0.140	ND	0.5	0.42	27	—	—
2	Hatunifa reservoir	02/out/00	03/out/00	7.8	21.3	NT	299	144	0.1	0.49	NT	NT	ND	0.1	0.004	NT	NT	NT	NT	+++	+++
3	Borlala	02/out/00	03/out/00	8.0	22.2	NT	299	144	0.1	0.26	NT	NT	0.4	0.1	0.015	0.01	0.6	NT	NT	+++	++
4	Mibuteluli, intake 2	02/out/00	03/out/00	7.8	20.7	NT	3.7	152	0.1	0.38	142	214	0.6	0.1	0.005	ND	0.3	ND	7	-	±
5	BPT, Market	02/out/00	03/out/00	8.2	23.2	NT	315	151	0.1	0.26	NT	NT	ND	0.1	0.008	NT	NT	NT	NT	+++	++
6	Clinic, Oikos	02/out/00	03/out/00	8.0	23.3	NT	317	153	0.1	0.79	NT	NT	ND	0.1	0.004	NT	NT	NT	NT	+	+
7	UNTAET office	02/out/00	03/out/00	8.0	28.1	NT	316	152	0.1	0.95	NT	NT	1.3	ND	0.010	0.01	0.3	NT	NT	-	±
8	Kotalala intake 3	02/out/00	03/out/00	7.4	21.5	NT	332	160	0.2	0.85	NT	198	ND	0.1	0.004	0.01	ND	0.06	NT	++	+++
9	Kamiraran PT	02/out/00	03/out/00	7.8	22.8	NT	329	158	0.2	0.47	166	NT	ND	0.1	0.013	NT	NT	NT	6	+++	+++
10	Save Heaven civpol	02/out/00	03/out/00	7.8	25.7	NT	330	159	0.2	5.14	NT	NT	ND	0.1	0.006	0.02	0.3	NT	NT	+++	++

Legend:

ND: not detectable;

NT: not tested;

NS: not set;

CFU: colony formed unit;

-: 0-3

±: 3-10

+: 10-20

++: 20-30

+++: more than 30

T.Coli: total coliform

G.Bact.: general bacteria

Suggestions

Boiling water before drinking

District: Manufahi**Town: Same**

Sampled and tested by: Mario Soares, WSS laboratory and T.ISHIHARA, JICA Study Team

No.	Sampling Point	Date		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Alkali.	Hdns.	Ca-Hdns	NH ₃ -N	NO ₃ -N	NO ₂ -N	Fe	Fluoride	Mn	SO ₄ ²⁻	R.Cl ₂	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU
Timor Loro sa'e Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	NS	200	NS	1.5	10	1	0.3	1.5	0.5	250	5	0	0
SM-1	Carbulau, intake 1	06/nov/00	07/nov/00	8.2	18.8	301	145	0.1	0.2	138	153	NT	0.3	ND	0.004	ND	0.48	0.3	29	NT	75	0
SM-2	Mibutelulij, intake 2	06/nov/00	07/nov/00	8.0	20.9	311	149	0.1	0.9	164	162	NT	ND	ND	0.005	ND	0.33	0.5	14	NT	TNC	414
SM-3	Break Pressure Tank, Market	06/nov/00	07/nov/00	8.3	24.8	315	152	0.1	0.3	NT	NT	NT	ND	NT	NT	NT	0.31	NT	NT	NT	160	18
SM-4	Kamilaran, PT	06/nov/00	07/nov/00	8.2	24.7	328	158	0.2	6.3	168	170	150	ND	ND	0.005	0.01	0.34	0.3	14	NT	TNC	TNC
SM-5	SAVE HAVEN, CIVPOL	06/nov/00	07/nov/00	7.8	28.5	335	161	0.2	5.6	NT	176	151	ND	NT	NT	NT	0.39	NT	NT	NT	TNC	TNC
SM-6	UNTAET Office	06/nov/00	07/nov/00	8.1	32.5	322	155	0.2	0.2	NT	167	147	ND	ND	0.005	0.03	0.30	0.3	15	NT	60	8
SM-7	Kotalala Intake 3	06/nov/00	07/nov/00	7.7	21.6	346	166	0.2	0.2	179	179	NT	0.5	0.1	0.004	ND	0.36	0.2	12	NT	265	108
SM-8	Borlala	06/nov/00	07/nov/00	8.1	26.2	303	146	0.1	0.2	NT	154	120	0.5	ND	0.004	ND	0.68	0.3	29	NT	420	30
SM-9	Hatunifa Reservoir	06/nov/00	07/nov/00	8.1	23.8	300	144	0.1	0.3	NT	NT	NT	0.5	NT	NT	NT	0.49	NT	NT	NT	420	12
SM-10	Clinic OIKOS	06/nov/00	07/nov/00	8.1	26.2	320	154	0.2	0.1	160	165	145	1.5	ND	0.004	ND	0.29	0.3	14	NT	128	0

Legend:

ND: not detectable

NT: not tested

NS: not set

CFU: colony formed unit;

TNC: too numerous to count

Suggestions

Boiling water before drinking

District: Manufahi**Town: Same**

Sampled by Armando Tilman, DWSS Manufahi; tested by Mario Soares, WSS Laboratory

No.	Sampling Point	Date		pH	Temp.	Cond.	TDS	Salinity	Turbid.	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	CFU	CFU
Timor Loro sa'e Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	0	0
SM-1	Carbulau, intake 1	18/dez/00	20/dez/00	8.3	20.6	298	143	0.1	0.4	0	0
SM-2	Mibuteluli, intake 2	18/dez/00	20/dez/00	8.2	21.0	32	150	0.1	0.3	230	26
SM-3	Break Pressure Tank, Market	18/dez/00	20/dez/00	8.1	21.1	293	141	0.1	0.4	275	50
SM-4	Kamilaran, PT	18/dez/00	20/dez/00	8.1	21.2	293	141	0.1	0.9	265	72
SM-5	SAVE HAVEN, CIVPOL	18/dez/00	20/dez/00	8.0	21.2	295	142	0.1	0.5	190	60
SM-6	UNTAET Office	18/dez/00	20/dez/00	8.2	21.2	312	152	0.1	0.4	230	46
SM-7	Kotalala Intake 3	No sample		NT	NT	NT	NT	NT	NT	NT	NT
SM-8	Borlala	18/dez/00	20/dez/00	8.2	21.3	293	141	0.1	0.3	60	2
SM-9	Hatunifa Reservoir	18/dez/00	20/dez/00	8.3	22.0	293	141	0.1	0.4	205	6
SM-10	Clinic OIKOS	18/dez/00	20/dez/00	8.3	22.9	316	152	0.1	0.4	180	60

Legend:

ND: not detectable; NT: not tested; NS: not set; CFU: colony formed unit; TNC: Too numerous to count; FAC: free available chlorine

Suggestions

Boil water before drinking

District : Manufahi**Town : Same**

Sample by Armando Tilman,.DWSS Manufahi Tested by Alvaro Godinho, Mario Soares WSS Laboratory

No.	Sampling Point	Date		pH	Temp.	Cond.	TDS	Salinity	Turbid.	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	CFU	CFU
Timor Loro sa'e Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	0	0
SM-1	Carbulau, intake 1	16/fev/01	19/fev/01	8.0	26.2	265	123	0.1	0.5	70	0
SM-2	Mibuteluli, intake 2	16/fev/01	19/fev/01	8.3	25.4	143	68	0.1	0.4	35	0
SM-3	Break Pressure Tank, Market	16/fev/01	19/fev/01	8.1	25.8	260	125	0.1	0.3	0	0
SM-4	Kamilaran, PT	16/fev/01	19/fev/01	8.1	25.6	333	160	0.2	0.5	405	0
SM-5	SAVE HAVEN, CIVPOL	16/fev/01	19/fev/01	8.1	25.7	252	121	0.1	0.9	370	0
SM-6	UNTAET Office	16/fev/01	19/fev/01	8.1	25.8	330	159	0.2	0.5	135	8
SM-7	Kotalala Intake 3	16/fev/01	19/fev/01	8.1	25.7	505	245	0.2	0.5	105	0
SM-8	Borlala	16/fev/01	19/fev/01	8.0	25.8	442	314	0.2	0.5	30	2
SM-9	Hatunifa Reservoir	16/fev/01	19/fev/01	8.1	25.6	259	124	0.1	0.5	155	0
SM-10	Clinic OIKOS	16/fev/01	19/fev/01	8.0	25.9	246	118	0.1	0.7	10	2
SM-11	Cacaularan intake-4	16/fev/01	19/fev/01	7.6	25.6	310.0	145	0	0.8	320.0	0
SM-12	Maitimer Intake -5	16/fev/01	19/fev/01	7.7	25.8	552	268	0	0.7	65.0	0
SM-13	Babulo Intake-6	16/fev/01	19/fev/01	7.9	25.2	513.0	248	0	0.5	280.0	0

Legend

ND;not detectable; NT: not tested NS not Set CFU: colony Formed unit TNC: too numerous to count, FAC Free Availabel Chlorine

Suggestions

Boil water befor drinking

District : Manufahi

Sampling Date : 27-April-2001

Sampled by : Armando Tilman.DWSS Manufahi

Town : Same

Testing Date : 30-April-2001. Received by : Mario Soares.

Tested by : Alvaro Godinho.Mario Soares WSS Laboratory

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Ca.Hardness	T.Coliform	G.Bacteria
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	CFU	CFU
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
SM-1	Carbulau, intake 1	07:15	14:10	8.4	26.4	281	135	0.1	0.5	172	NT	—	+
SM-2	Mibuteluli, intake 2	08:01	14:12	8.3	25.5	304	146	0.1	1.0	162	NT	±	++
SM-3	BPT.Market	08:42	14:16	8.3	24.8	323	155	0.2	0.5	NT	NT	—	±
SM-4	Kamilaran, PT	08:25	14:18	8.3	24.8	255	122	0.1	0.6	NT	NT	++	—
SM-5	SAVE HAVEN, CIVPOL	08:50	14:20	8.0	24.8	254	122	0.1	0.8	NT	NT	—	—
SM-6	UNTAET Office	09:05	14:22	8.2	24.6	322	155	0.2	1.5	NT	NT	—	—
SM-7	Kotalala Intake 3	08:10	14:24	8.2	24.9	249	119	0.1	0.8	142	NT	±	++
SM-8	Borlala	07:30	14:26	8.3	24.6	269	129	0.1	1.1	NT	NT	±	++
SM-9	Hatunifa Reservoir	07:25	14:28	8.3	25.1	270	130	0.1	0.4	NT	NT	+	++
SM-10	Clinic OIKOS	09:00	14:30	8.3	25.0	322	155	0.2	0.8	NT	NT	—	—
SM-11	Cacaularan intake-4	08:37	14:32	8.2	25.5	446.0	216	0.2	0.4	236	NT	+++	+++
SM-12	Maitimer Intake -5	09:40	14:34	8.1	25.5	577	280	0.3	0.3	298	NT	++	+++
SM-13	Babulo Intake-6	09:29	14:36	8.2	26.3	448.0	216	0.2	2.4	242	NT	++	+++

Legend

ND :Not Detectable

NT : Not Tested

CFU : Colony Formed Unit

TNC : Too Numerous to Count

FAC : Free Availabel Chlorine

For Paper Slip (-) : 0 - 3

(±) : 3 - 10

(+) : 10 - 20

(++) : 20 - 30

(+++) : More than 30

Suggestions

Boil water befor drinking

District : Manufahi

Sampling Date :01-June-2001

Sampled by :Armando Tilman.DWSS Manufahi

Town : Same

Testing Date :04-June-2001

Tested by :.Mario Soares WSS Laboratory

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	CFU	CFU
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
SM-1	Carbulau, intake 1	09:38	10:10	8.3	21.1	295	142	0.1	2.2	160	152	+	+
SM-2	Mibuteluli, intake 2	07:26	10:13	8.0	24.3	346	167	0.2	2.8	192	166	+++	+++
SM-3	Break Pressure Tank, Market	08:24	10:19	8.1	24.4	326	157	0.2	0.6	NT	NT	-	-
SM-4	Kamilaran, PT	07:57	10:22	8.2	24.0	279	134	0.1	0.8	NT	NT	-	-
SM-5	SAVE HAVEN, CIVPOL	08:18	10:27	7.9	23.9	282	135	0.1	0.8	NT	NT	-	-
SM-6	UNTAET Office	08:36	10:30	8.0	23.8	282	135	0.1	1.1	NT	NT	-	-
SM-7	Kotalala Intake 3	07:40	10:34	8.0	23.8	274	132	0.1	0.8	158	134	+	+
SM-8	Borlala	09:20	10:36	8.1	24.2	282	136	0.1	0.7	NT	NT	-	-
SM-9	Hatunifa Reservoir	09:26	10:39	8.1	24.0	283	136	0.1	0.6	NT	NT	±	-
SM-10	Clinic OIKOS	08:49	10:40	8.1	23.9	326	157	0.2	0.7	NT	NT	-	-
SM-11	Cacaularan Intake-4	08:10	10:42	7.9	23.9	326.0	157	0.2	0.6	234	218	+++	+
SM-12	Maitimer Intake-5	08:29	10:43	7.6	23.9	326	157	0.2	0.5	294	310	±	±
SM-13	Babulo Intake-6	08:43	10:46	7.9	24.8	459	222	0.2	0.7	228	216	+	±

Legend

ND;not detectable; NT: not tested NS not Set CFU: colony Formed unit TNC: too numerous to count, FAC Free Availabel Chlorine

For Paper Slip

(-) : 0 - 3

(±) : 3 - 10

(+) : 10 - 20

(++) : 20 - 30

(+++) : More than 30

Weather Report :

Sunny

Cloudy

Rain

Suggestions

Boil water befor drinking

District : Manufahi

Sampling Date :23/07/2001

Sampled by :Natalino Corte Real Laranjeira,DWSS Manufahi

Town : Same

Testing Date :23/07/2001

Tested by : Miguel Quintao & Mario Soares WSS Laboratory

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Ca.Hard	NH ₃ -N	NO ₃ -N	NO ₂ -N	Fe	Fluoride	Mn	SO ₄ ²⁻	R.Cl ₂	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	CFU	CFU	
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	NS	10	1.0	0.3	1.5	0.5	250	0.5	0	0
SM-1	Carbulau, intake 1	06:52	09:22	8.6	8.1	140	67	0.1	6.7	115	NT	ND	ND	0.005	ND	ND	0.2	23	NT	NT	NT
SM-2	Mibuteluli, intake 2	07:27	09:26	8.3	12.7	118	56	0.1	9.8	115	NT	ND	ND	0.006	0.04	ND	0.3	10	NT	NT	NT
SM-3	Break Pressure Tank, Market	08:24	09:29	8.0	8.3	216	104	0.1	5.2	NT	NT	ND	ND	0.005	0.01	ND	NT	10	NT	NT	NT
SM-4	Kamilaran, PT	07:53	16:39	8.5	7.8	263	126	0.1	2.9	NT	NT	ND	ND	0.005	ND	ND	NT	2	NT	NT	NT
SM-5	SAVE HAVEN, CIVPOL	08:18	16:43	8.4	5.3	277	133	0.1	2.3	NT	NT	ND	ND	0.005	ND	ND	NT	1	NT	NT	NT
SM-6	UNTAET Office	08:35	16:51	8.4	7.2	321	155	0.2	1.8	NT	NT	ND	0,1	0.007	ND	ND	NT	11	NT	NT	NT
SM-7	Kotalala Intake 3	07:40	16:47	8.4	6.0	276	133	0.1	2.0	NT	NT	ND	ND	0.005	ND	ND	NT	1	NT	NT	NT
SM-8	Borlala	07:07	09:31	8.1	6.3	166	79	0.1	5.8	NT	NT	ND	ND	0.002	ND	ND	NT	24	NT	NT	NT
SM-9	Hatunifa Reservoir	07:03	16:45	8.4	5.0	267	128	0.1	2.3	NT	NT	ND	ND	ND	ND	ND	NT	24	NT	NT	NT
SM-10	Clinic OIKOS	08:48	17:07	8.2	13.4	0.70	ND	ND	18.0	NT	NT	ND	ND	0.011	ND	ND	NT	11	NT	NT	NT
SM-11	Cacaularan intake-4	08:05	09:38	7.9	8.8	180	86	0.1	6.6	235	NT	ND	ND	0.009	ND	ND	0.3	7	NT	NT	NT
SM-12	Maitimer Intake -5	08:30	17:05	8.1	11.7	309	148	0.1	7.8	315	NT	ND	ND	0.001	ND	ND	0.2	ND	NT	NT	NT
SM-13	Babulo Intake-6	08:43	09:35	7.9	8.5	165.4	79	0.1	4.3	255	NT	ND	ND	0.001	ND	ND	0.2	9	NT	NT	NT

Legend

(ND) : Not Detectable

(NT) : Not Tested

(NS) : Not Set

(CFU) : Colony Formed Unit

(TNC) : Too Numerous to Count

(FAC) : Free Availabel Chlorine

For Paper Slip

(-) : 0 - 3 (±) : 3 - 10

(+) : 10 - 20

(++) : 20 - 30

(+++) : More than 30

Suggestions

Boil water befor drinking

District : Manufahi

Sampling Date : 24/August/ 2001

Sampled by : Natalino Corte Real Laranjeira DWSS Same

Town : Same

Testing Date : 27/August/2001

Tested by : Mario Soares WSS Laboratory

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Ca.Hardness	T.Coliform	G.Bacteria
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	CFU	CFU
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
SM-1	Carbulau, intake 1	09:27	10:58	8.4	26.4	269	129	0.1	0.7	150	122	94	2
SM-2	Mibuteluli, intake 2	08:32	10:59	8.3	26.4	306	147	0.1	0.5	188	156	TNC	8
SM-3	BPT.Market	09:42	11:00	8.3	26.3	288	139	0.1	0.6	NT	NT	TNC	8
SM-4	Kamilaran, PT	09:49	11:11	8.4	26.2	272	131	0.1	0.6	NT	NT	408	66
SM-5	SAVE HAVEN, CIVPOL	09:08	11:13	8.3	26.2	274	131	0.1	0.6	NT	NT	146	30
SM-6	UNTAET Office	08:05	11:14	8.3	26.2	289	139	0.1	0.7	NT	NT	26	0
SM-7	Kotalala Intake 3	08:40	11:25	8.3	26.2	274	132	0.1	0.8	162	154	192	8
SM-8	Borlala	09:17	11:26	8.3	26.1	258	124	0.1	0.6	NT	NT	260	8
SM-9	Hatunifa Reservoir	09:20	11:27	8.3	26.1	258	124	0.1	0.7	NT	NT	TNC	0
SM-10	Clinic OIKOS	07:55	11:37	8.3	26.1	288	138	0.1	1.0	NT	NT	56	0
SM-11	Cacaularan intake-4	09:00	11:38	8.2	26.1	407	196	0.2	0.5	224	214	TNC	14
SM-12	Maitimer Intake -5	08:18	11:39	8.1	26.1	517	250	0.2	0.7	266	336	TNC	28
SM-13	Babulo Intake-6	08:00	11:49	8.1	26.1	401	194	0.2	0.5	206	250	298	60

Legend

401

ND :Not Detectable

NT : Not Tested

CFU : Colony Formed Unit

TNC : Too Numerous to Count

FAC : Free Availabel Chlorine

For Paper Slip (-) : 0 - 3

(±) : 3 - 10

(+) : 10 - 20

(++) : 20 - 30

(+++) : More than 30

Weather Report:

Sunny

Cloudy

Rain

Suggestion : Boiling Water Before Drink

District : Manufahi

Sampling Date : 19 / September / 2001

Sampled by : Natalino Laranjeira, DWSS Same

Town : Same

Testing Date : 21 / September / 2001

Tested by : EHA and Mario Soares WSS Laboratory

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	T.Coliform	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	CFU	CFU
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	0	0
SM-1	Carbulau, intake 1	09:27	10:58	7.2	21.3	279	134	0.1	0.8	185	175	6	0
SM-2	Mibuteluli, intake 2	08:20	10:59	7.4	21.2	326	157	0.2	0.6	175	135	TNC	6
SM-3	BPT.Market	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM-4	Kamilaran, PT	08:30	10:59	7.8	21.8	304	146	0.1	0.4	NT	NT	84	8
SM-5	SAVE HAVEN, CIVPOL	08:26	11:11	7.9	22.3	308	148	0.1	0.8	NT	NT	22	6
SM-6	UNTAET Office	08:14	11:12	7.9	21.9	301	145	0.1	1.1	NT	NT	TNC	16
SM-7	Kotalala Intake 3	08:49	11:13	7.9	24.9	310	149	0.1	0.5	155	215	TNC	16
SM-8	Borlala	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM-9	Hatunifa Reservoir	09:38	11:28	8.0	25.3	310	149	0.1	1.0	NT	NT	TNC	0
SM-10	Clinic OIKOS	08:03	11:29	8.3	25.6	303	146	0.1	0.5	NT	NT	TNC	18
SM-11	Cacaularan intake-4	09:05	11:30	8.0	25.3	431	208	0.2	0.5	215	260	TNC	14
SM-12	Maitimer Intake -5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM-13	Babulo Intake-6	08:09	11:40	8.1	25.4	424	205	0.2	0.5	240	220	222	0

Legend

ND :Not Detectable

NT : Not Tested

CFU : Colony Formed Unit

TNC : Too Numerous to Count

FAC : Free Availabel Chlorine

For Paper Slip (-) : 0 - 3

(±) : 3 - 10

(+) : 10 - 20

(++) : 20 - 30

(+++) : More than 30

Weather Report :

Sunny

Cloudy Rain

Suggestion : Boiling Water Before Drink

District : Manufahi

Sampling Date : 04/November/2001

Sampled by : Natalino Corte Real Laranjeira.DWSS Same

Town : Same

Testing Date : 05/November/2001

Tested by : Mario Soares WSS Laboratory

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Ca.Hard	Alkalinity	NH ₃ -N	NO ₃ -N	NO ₂ -N	Fe	Mn	Fluoride	SO ₄ ²⁻	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU	CFU
East Timor Guidelines		Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	NS	1.5	10	1	0.3	0.5	1.50	250	0	0
SM-1	Carbulau, intake 1	08:53	10:03	8.3	26.3	330	159	0.2	1.2	205	NT	250	NT	NT	NT	NT	NT	NT	NT	TNC	304
SM-2	Mibuteluli, intake 2	07:30	10:04	8.2	28.6	404	195	0.2	1.1	160	NT	240	NT	NT	NT	NT	NT	NT	NT	TNC	18
SM-3	BPT.Market	10:40	10:05	8.3	29	392	189	0.2	1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	332	0
SM-4	Kamilaran, PT	08:09	10:17	8.3	22.7	356	171	0.2	1.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	246
SM-5	SAVE HAVEN, CIVPOL	10:45	10:18	8.3	22.1	358	173	0.2	0.9	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	126
SM-6	UNTAET Office	10:25	10:19	8.2	22.3	356	172	0.2	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	428	8
SM-7	Kotalala Intake 3	07:55	10:34	8.2	28.1	332	160	0.2	0.6	205	NT	280	NT	NT	NT	NT	NT	NT	NT	TNC	0
SM-8	Borlala	09:05	10:35	8.2	28	312	150	0.2	0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	28
SM-9	Hatunifa Reservoir	09:40	10:36	8.3	23.4	317	153	0.2	0.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	4
SM-10	Clinic OIKOS	10:35	10:48	8.2	23.8	330	159	0.2	0.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	322	14
SM-11	Cacaularan intake-4	08:20	10:49	8.1	24.2	387	187	0.2	0.5	265	NT	220	NT	NT	NT	NT	NT	NT	NT	TNC	82
SM-12	Maitimer Intake -5	No Sample		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM-13	Babulo Intake-6	10:00	10:50	8.1	21.2	513	248	0.2	0.5	240	NT	285	NT	NT	NT	NT	NT	NT	NT	384	4

Legend

ND :Not Detectable

NT : Not Tested

CFU : Colony Formed Unit NC : Too Numerous to Count FAC : Free Available Chlorine

Inspected by :

Weather Report :

Sunny Cloudy Rain

Recommendation : - Bacteriologi is problem

- Boiling Water Before Drink

Mario Soares Laboratory Manager

District : Manufahi

Sampling Date : 28/11/2001

Sampled by : Natalino Corte Real Laranjeira DWSS Same

Town : Same

Testing Date : 29/11/2001

Tested by : Mario Soares WSS Laboratory

Received by : Mario Soares

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	NH ₃ -N	NO ₃ -N	NO ₂ -N	Fe	Mn	Fluoride	SO ₄ ²⁻	T.Coli	E.Coli		
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU	CFU		
East Timor Guidelines				Hours And Minutes		6.5-8.5	NS	NS	1000	NS	5.0	200	NS	1.5	10	1	0.3	0.5	1.5	250	0	0
SM-1	Carbulau, intake 1	14:32	10:18	7.8	26.6	281	135	0.1	2.3	150	146	ND	ND	0.006	0.01	NT	0.43	27	84	0		
SM-2	Mibuteluli, intake 2	13:15	10:19	7.9	26.3	323	155	0.2	1.7	160	188	0.2	ND	0.003	0.01	NT	0.27	27	TNC	242		
SM-3	BPT.Market	13:35	10:20	7.9	26.3	323	155	0.2	0.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	236		
SM-4	Kamilaran, PT	13:22	11:06	8.0	26.1	291	140	0.1	0.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	306	20		
SM-5	SAVE HAVEN, CIVPOL	13:40	11:07	8.0	26.3	323	156	0.2	0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	202		
SM-6	UNTAET Office	13:45	11:08	8.0	26.3	326	157	0.2	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	298	38		
SM-7	Kotalala Intake 3	14:01	11:18	8.0	26.3	292	140	0.1	0.8	150	188	0.2	ND	0.004	ND	NT	0.28	27	244	30		
SM-8	Borlala	14:15	11:19	8.0	26.3	283	136	0.1	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	166	0		
SM-9	Hatunifa Reservoir	14:20	11:20	8.0	26.3	283	136	0.1	0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	154	2		
SM-10	Clinic OIKOS	13:43	11:32	8.0	26.4	326	158	0.2	1.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	340	32		
SM-11	Cacaularan intake-4	13:38	11:33	7.9	26.5	436	211	0.2	0.7	214	232	0.4	0.1	0.003	0.01	NT	0.30	8	TNC	5		
SM-12	Maitimer Intake -5	13:42	11:34	8	26.6	283	136	0.1	0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	272	0		
SM-13	Babulo Intake-6	13:53	11:45	7.9	26.6	456	220	0.2	0.7	216	246	0.4	ND	0.004	0.01	NT	0.30	13	TNC	0		

Legend

NT : Not Tested

CFU:colony formed unit

TNC: Too umberous to Count

FAC:Free Available Chlorine

ND :Not Detectable

Sunny Cloudy Rain

Inspected by :

Weather Report :

Recommendation : - Bacteriologi is Problem

- Boiling Water Before Drink

Mario Soares Laboratory Manager

District : Manufahi

Sampling Date : 04 / 02 / 2002

Sampled by : Natalino Corte Real Laranjeira DWSS Same

Town : Same

Testing Date : 06 / 02 / 2002

Tested by : Miguel Quintao & Mario Soares WSS Laboratory

Received by : Mario Soares

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	NH ₃ -N	NO ₃ -N	NO ₂ -N	Fe	Mn	Fluoride	SO ₄ ²⁻	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU	CFU
East Timor Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	200	NS	1.5	10	1	0.3	0.5	1.5	250	0	0
SM-1	Carbulau, intake 1	08:15	10:05	8.0	24.0	261	125	0.1	0.2	120	140	NT	NT	NT	NT	NT	NT	NT	42	4
SM-2	Mibuteluli, intake 2	08:20	10:06	8.0	25.8	292	140	0.1	0.4	160	180	NT	NT	NT	NT	NT	NT	NT	TNC	TNC
SM-3	BPT.Market	08:30	10:13	8.0	26.4	280	134	0.1	0.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	TNC	TNC
SM-4	Kamilaran, PT	09:40	10:14	8.1	26.4	267	128	0.1	0.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	168	66
SM-5	SAVE HAVEN, CIVPOL	09:50	10:15	8.2	26.4	266	128	0.1	0.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	242	42
SM-6	UNTAET Office	10:40	10:21	7.9	26.2	308	148	0.1	0.4	NT	NT	NT	NT	NT	NT	NT	NT	NT	556	6
SM-7	Kotalala Intake 3	09:55	10:22	8.0	26.3	266	128	0.1	0.3	170	185	NT	NT	NT	NT	NT	NT	NT	150	70
SM-8	Borlala	10:50	10:23	8.1	12.3	418	202	0.2	0.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	486	30
SM-9	Hatunifa Reservoir	09:20	10:30	7.9	13.9	319	154	0.2	0.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	256	12
SM-10	Clinic OIKOS	10:30	10:31	8.1	13.9	401	193	0.2	0.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	480	8
SM-11	Cacaularan intake-4	10:11	10:32	8.1	14.2	429	207	0.2	0.5	295	190	NT	NT	NT	NT	NT	NT	NT	TNC	26
SM-12	Maitimer Intake -5	10:16	10:41	8.1	14.2	534	259	0.3	0.5	270	210	NT	NT	NT	NT	NT	NT	NT	TNC	TNC
SM-13	Babulo Intake-6	10:20	10:45	7.9	14.3	536	259	0.3	0.3	320	285	NT	NT	NT	NT	NT	NT	NT	394	40

Legend

NT : Not Tested

CFU:colony formed unit

TNC: Too umberous to Count

FAC:Free Available Chlorine

WD :Not Detectable

Sunny Cloudy Rain

Inspected by :

Weather Report :

Recommendation :

1. Bacteriological is Problem
2. Boil Water before drink

Mario Soares Laboratory Manager

District : Manufahi

Sampling Date : 24/June/2002

Sampled by : Natalino Corte Real Laranjeira DWSS Manufahi

Town : Same

Testing Date : 25/June/2002

Tested by : Mario Soares WSS Laboratory

Received by : Mario Soares

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	NH ₃ -N	NO ₃ -N	NO ₂ -N	Fe	Mn	Fluoride	SO ₄ ²⁻	T.Coli	E.Coli
		sample	test		(°C)	(μS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU	CFU
East Timor Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	200	NS	1.5	10	1	0.3	0.5	1.5	250	0	0
SM-1	Carbulau, intake 1	05:00	10:36	8.3	25.4	309	149	0.1	0.5	210	195	4.8	0.2	0.012	0.01	NT	0.57	NT	TNC	22
SM-2	Mibuteluli, intake 2	05:30	10:37	8.2	25.3	301	145	0.1	0.5	175	205	0.5	0.2	0.024	0.01	NT	0.73	NT	TNC	22
SM-3	BPT.Market	05:40	10:49	8.2	25.3	302	145	0.1	0.5	NT	NT	0.5	0.3	0.022	0.01	NT	0.67	NT	TNC	50
SM-4	Kamilaran, PT	05:55	10:50	8.4	25.4	303	146	0.1	0.6	NT	NT	0.4	0.2	0.026	0.02	NT	0.64	NT	TNC	18
SM-5	SAVE HAVEN, CIVPOL	06:11	10:59	8.2	25.5	302	145	0.1	0.5	NT	NT	0.2	0.2	0.006	0.01	NT	0.64	NT	TNC	36
SM-6	UNTAET Office	06:15	11:00	8.4	25.6	303	146	0.1	0.6	NT	NT	0.2	0.2	0.011	0.02	NT	0.77	NT	34	28
SM-7	Kotalala Intake 3	06:20	11:05	8.2	25.7	302	145	0.1	0.4	NT	NT	ND	0.2	0.011	0.01	NT	0.64	NT	TNC	162
SM-8	Borlala	06:40	11:06	8.4	25.4	304	146	0.1	0.5	NT	NT	1.9	0.3	0.015	0.04	NT	0.30	NT	TNC	26
SM-9	Hatunifa Reservoir	06:51	11:15	8.2	26.0	303	145	0.1	0.5	NT	NT	0.6	0.2	0.021	0.03	NT	0.26	NT	TNC	34
SM-10	Clinic OIKOS	07:01	11:16	8.4	26.0	303	146	0.1	0.5	NT	NT	0.1	0.3	0.014	0.01	NT	0.54	NT	0	18
SM-11	Cacaularan intake-4	07:15	11:19	8.2	26.4	302	145	0.1	0.7	160	155	0.2	0.2	0.015	0.02	NT	0.80	NT	TNC	28
SM-12	Maitimer Intake -5	07:21	11:20	8.2	26.5	304	146	0.1	0.9	170	180	0.1	0.4	0.011	0.05	NT	0.83	NT	TNC	50
SM-13	Babulo Intake-6	07:30	11:30	8.2	26.3	302	145	0.0	0.6	180	165	0.2	0.3	0.014	0.03	NT	0.71	NT	TNC	30

Legend

ND :Not Detectable

NT : Not Tested

CFU:colony formed unit

TNC: Too umberous to Count

FAC:Free Available Chlorine

):Not Detectable

Sunny Cloudy Rain

Inspected by :

Weather Report :

Recommendation :

1. Bacteriological is Problem
2. Boil Water before drink

Mario Soares Laboratory Manager

District : Manufahi

Sampling Date : 27 - 3 - 2003

Sampled by : Natalino Corte Real L.

Town : Same

Testing Date : 28 - 3 - 2003

Tested by : Miguel Quintao

Received by : Miguel Quintao

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Alkalinity	NH ₃ -N	NO ₃ -N	NO ₂ -N	Fe	Mn	Fluoride	SO ₄ ²⁻	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU	CFU
East Timor Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	200	NS	1.5	10	1	0.3	0.5	1.5	250	0	0
SM-1	Carbulau, intake 1	05:10	10:55	8.5	29.1	345	195	0.1	0.6	115	130	NT	NT	NT	NT	NT	NT	NT	34	2
SM-2	Mibuteluli, intake 2	08:35	10:56	8.4	29.0	400	210	0.1	0.5	145	165	NT	NT	NT	NT	NT	NT	NT	38	2
SM-3	BPT.Market	08:20	11:01	8.4	28.9	415	205	0.1	0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	68	2
SM-4	Kamilaran, PT	08:05	11:02	8.5	29.1	407	200	0.1	0.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	76	0
SM-5	SAVE HAVEN, CIVPOL	07:54	11:03	8.3	29.1	405	210	0.1	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	42	0
SM-6	UNTAET Office	08:46	11:09	8.6	29.1	400	202	0.2	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	132	0
SM-7	Kotalala Intake 3	07:30	11:10	8.5	29.0	400	208	0.2	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	106	0
SM-8	Borlala	05:51	11:11	8.5	29.2	407	209	0.1	0.6	NT	NT	NT	NT	NT	NT	NT	NT	NT	48	4
SM-9	Hatunifa Reservoir	05:59	11:16	8.5	29.1	406	210	0.1	0.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	42	0
SM-10	Clinic OIKOS	08:52	11:17	8.5	29.1	400	207	0.1	0.7	NT	NT	NT	NT	NT	NT	NT	NT	NT	102	0
SM-11	Cacaularan intake-4	06:25	11:18	8.5	29.1	400	206	0.1	0.8	300	245	NT	NT	NT	NT	NT	NT	NT	30	0
SM-12	Maitimer Intake -5	06:40	11:23	8.5	29.1	400	203	0.1	0.9	250	210	NT	NT	NT	NT	NT	NT	NT	24	0
SM-13	Babulo Intake-6	07:01	11:24	8.5	29.1	400	210	0.1	0.5	305	220	NT	NT	NT	NT	NT	NT	NT	46	2

Legend

ND :Not Detectable

ND :Not Detectable

NT : Not Tested

CFU:colony formed unit

TNC: Too umberous to Count

FAC:Free Available Chlorine

Weather Report:

Sunny Cloudy Rain

Inspected by :

Recommendation :

1. Bacteriological is Problem

2. Boil Water before drink

Mario Soares Laboratory Manager

District : Manufahi

Sampling Date : 15/11/2004

Sampled by : Natalino Corte Real Laranjeira DWSS Same

Town : Same

Testing Date : 16/11/2004

Tested by : Rui Manuel Pinto Belo & Mario Soares SAS Laboratory

Received by : Mario Soares

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	Hardness	Ca.Hard	Alkalinity	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/l)	CFU	CFU
East Timor Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	200	NS	NS	0	0
SM-1	Carbulau, intake 1	6.20	9.58	9.1	22.5	30.7	155	0.2	0.5	160	175	210	TNC	0
SM-2	Mibuteluli, intake 2	7.42	9.59	9.2	21.8	295	151	0.1	0.4	180	180	210	TNC	2
SM-3	BPT.Market	6.40	10.00	9.0	22.1	298	152	0.1	0.4	180	185	205	TNC	8
SM-4	Kamilaran, PT	7.00	10.15	9.2	21.9	295	152	0.1	0.5	165	180	250	TNC	0
SM-5	SAVE HAVEN, CIVPOL	No Water		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM-6	UNTAET Office	8.40	10.17	9.2	21.9	297	152	0.1	0.4	200	190	250	TNC	0
SM-7	Kotalala Intake 3	8.10	10.42	9.2	21.9	294	151	0.1	0.4	135	190	130	TNC	0
SM-8	Borlala	No Water		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM-9	Hatunifa Reservoir	6.01	10.44	9.2	22.1	299	153	0.1	0.4	180	175	200	TNC	0
SM-10	Clinic OIKOS	7.55	10.46	9.2	22.0	296	152	0.1	0.4	240	140	245	TNC	0
SM-11	Cacaularan intake-4	9.00	10.16	9.1	22.1	297	152	0.1	0.4	150	205	170	TNC	0
SM-12	Maitimer Intake -5	No Water		NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM-13	Babulo Intake-6	9.40	10.43	9.1	22.1	298	152	0.1	0.4	190	180	205	TNC	4

Legend**ND** :Not Detectable**NT** : Not Tested**CFU**:colony formed unit**TNC** : Too Numerous to Count**FAC** :FreeAvailable Chlorine

Weather Report :

Sunny

Cloudy

Rain

Recommendation :

Inspected by

1. Bacteriological is Problem

2. Boil Water before drink

Laboratory Supervisor SAS

District : Manufahi

Sampling Date : 28/07/2005

Sample by : Natalino Corte Real Laranjeira

Town : Same

Testing Date : 28/07/2005

Sample Tested by : Rui Manuel Pinto Belo

Received by : Mario Soares

No.	Sampling Point	Time		pH	Temp.	Cond.	TDS	Salinity	Turbid.	T.Coli	E.Coli
		sample	test		(°C)	(µS/cm)	(mg/L)	(‰)	(NTU)	CFU	CFU
East Timor Guidelines				6.5-8.5	NS	NS	1000	NS	5.0	0	0
SM-1	Carbulau, intake 1	16.48	14.00	7.9	28.0	312	156	0.1	1.7	TNC	70
SM-2	Mibuteluli, intake 2	16.51	14.01	7.7	26.7	307	153	0.1	2.0	TNC	76
SM-3	BPT.Market	16.54	14.02	7.7	27.3	308	154	0.1	1.3	TNC	94
SM-4	Kamilaran, PT	16.58	14.20	7.9	26.6	305	153	0.1	1.4	TNC	76
SM-5	SAVE HAVEN, CIVPOL	17.01	14.21	7.8	27.3	308	154	0.1	1.3	TNC	TNC
SM-6	UNTAET Office	17.06	14.22	7.8	27.4	309	154	0.1	1.1	TNC	112
SM-7	Kotalala Intake 3	17.09	14.30	7.8	27.5	334	167	0.1	1.8	TNC	TNC
SM-8	Borlala	No Water		NT	NT	NT	NT	NT	NT	NT	NT
SM-9	Hatunifa Reservoir	17.12	14.31	7.7	27.6	334	167	0.1	1.4	TNC	96
SM-10	Clinic OIKOS	No Water		NT	NT	NT	NT	NT	NT	NT	NT
SM-11	Cacaularan intake-4	No Water		NT	NT	NT	NT	NT	NT	NT	NT
SM-12	Maitimer Intake -5	17.16	14.32	7.8	28.2	333	167	0.1	1.5	TNC	TNC
SM-13	Babulo Intake-6	No Water		NT	NT	NT	NT	NT	NT	NT	NT

Legend

ND :Not Detecta NS: not set

NT : Not Tested

CFU; Colony formed unit

TNC: too numerous to count

FAC: free Available Chlorine

Weather Report :

Sunny Cloudy

Rain

Recommendation :

1. Bacteriological is Problem

2. Boil Water before drink

Inspected by

Laboratory Supervisor SAS

District : MANUFAHI

Sampling Date : 26/12 /2019

Sampled by : SMASA MANUFAHI

Town : SAME

Testing Date : 27/12/2019

Tested by : Estela Saldanha

No	Sampling Point	Time		pH	Temp.	Cond.	TDS	Sal	Turb.	Ca.Hard.	T.Hard	Alk.	NH ₃ -N	NO3-N	NO ₂ -N	Fe	Flu	Mn	SO ₄ ²⁻	T.Coli	E.Col
		Samp	Test		(°C)	(μS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU	CFU
East Timor Guidelines		Hours & Mint		6.5-8.5	NS	NS	1000	NS	5.0	NS	200	NS	1.5	10	1	0.3	1.5	0.5	250	0	0
SM-1	Carbulau, intake 1			7.2	23.3	334	167.0	0.2	0.7	155	165	175	0.2	0.0	0.005	0.03	0.79	0.0	10	4	1
SM-2	Betululi intake			7.8	23.1	291	146	0.1	0.6	125	165	170	0.2	0.0	0.002	0.0	0.27	0.1	10	4	0
SM-3	BPT.Market			7.7	22.0	333	166	0.2	0.4	125	145	155	0.3	0.0	0.001	0.0	0.25	0.1	11	12	4
SM-4	Kamilaran, PT			7.8	22.5	263	131	0.1	0.8	125	160	170	0.3	0.0	0.003	0.0	0.20	0.1	9	TNC	12
SM-5	SAVE HAVEN, CIVPOL																				
SM-6	UNTAET Office																				
SM-7	Kotalala Intake 3																				
SM-8	Borlala																				
SM-9	Hatunifa Reservoir																				
SM-10	Clinic OIKOS																				
SM-11	Cacaularan intake-4			7.7	22.4	365	183	0.2	0.6	130	140	150	0.3	0.0	0.004	0.0	0.20	0.1	10	TNC	TNC
SM-12	Maitimer Intake -5																				
SM-13	Babulo Intake-6			7.6	22.3	425	212	0.2	0.7	135	145	155	0.2	0.0	0.002	0.0	0.31	0.1	15	TNC	TNC

Legend:

ND: not detectable; **NT:** not tested; **NS:** not set; **CFU:** colony formed unit; **TNC:** Too numerous to count; **FAC:** free available chlorine

Weather Report : Sunny Cloudy Rain

Suggestions

1. Persiza Funsiona fila fali Sistema Chlorinasi !
2. Persiza hadia sistema distribuisaun tamba iha contaminasaun !
3. Nono be'e molok atu hemu !

Inspected by :

Chief of DNSA Laboratory

District : MANUFAHI

Sampling Date : 28 / 01 / 2020

Sampled by : SMASA MANUFAHI

Town : SAME

Testing Date : 29-30 / 01 / 2020

Tested by : Estela & Sidonio

No	Sampling Point	Time		pH	Temp.	Cond.	TDS	Sal	Turb.	Ca.Har.	T.Hard	Alk.	NH ₃ -N	NO3-N	NO ₂ -N	Fe	Flu	Mn	SO ₄ ²⁻	T.Coli	E.Coli
		Samp	Test		(°C)	(μS/cm)	(mg/L)	(‰)	(NTU)	(mg/l)	(mg/l)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	CFU	CFU
East Timor Guidelines		Hours & Mint		6.5-8.5	NS	NS	1000	NS	5.0	NS	200	NS	1.5	10	1	0.3	1.5	0.5	250	0	0
SM-1	Carbulau, intake 1			7.3	27.6	330	165.2	0.2	0.3	145	155	165	0.6	0.4	0.004	0.07	0.06	0.1	12	2	0
SM-2	Betululi intake			7.3	26.9	405	202	0.2	0.3	140	150	160	0.6	0.4	0.004	0.05	0.05	0.1	6	8	0
SM-3	BPT.Market																				
SM-4	Kamilaran, PT																				
SM-5	SAVE HAVEN, CIVPOL																				
SM-6	UNTAET Office			7.0	26.8	657	329	0.3	0.3	150	160	170	0.5	0.4	0.005	0.1	0.03	0.1	17	10	3
SM-7	Kotalala Intake 3			7.3	26.8	473	236	0.2	0.4	155	165	175	0.9	0.8	0.003	0.01	0.02	0.1	13	4	0
SM-8	Borlala																				
SM-9	Hatunifa Reservoir			7.4	27.0	347	174	0.2	0.5	140	150	160	0.2	0.0	0.004	0.04	0.1	0.1	15	24	1
SM-10	Clinic OIKOS																				
SM-11	Cacaularan intake-4			7.3	26.7	552	276	0.3	0.3	165	175	185	0.3	0.6	0.003	0.0	0.08	0.0	10	1	0
SM-12	Maitimer Intake -5																				
SM-13	Babulo Intake-6																				

Legend:

ND: not detectable; **NT:** not tested; **NS:** not set; **CFU:** colony formed unit; **TNC:** Too numerous to count; **FAC:** free available chlorine

Weather Report: Sunny Cloudy Rain

Suggestions

1. Persiza Funsiona fila fali Sistema Chlorinasi !
2. Persiza hadia sistema distribuisaun tamba iha contaminasaun !
3. Nono be'e molok atu hemu !

Inspected by :

Chief of DNSA Laboratory

Source - District Capitals Water Supply and Sanitation Master Plan - Baucau, Lospalos, Same and Viqueque

Appendix C

Water quality test results

Cycle 1 tests May 2014

References and parameters	Units	Town	SAME	SAME	SAME	SAME	SAME	SAME
		Date	12-May-14	12-May-14	12-May-14	12-May-14	12-May-14	12-May-14
		Location	CARBULAU INTAKE	SAS OFFICE	MDG	HOSPITAL	MERBUTY INTAKE	KOTALALA INTAKE
WHO/TL Guideline		Sample Reference	Sample Reference	Sample Reference	Sample Reference	Sample Reference	Sample Reference	Sample Reference
Physical tests								
pH	-	6.5 - 8.5	8.3	7.6	8.1	8.1	8.5	8.5
E. Conductivity	µs/cm	NS	293	294	326	360	362	322
TSS	mg/L	NS	0.01	0.01	0.01	0.01	0.01	0.01
TDS	mg/L	1000	147	147	163	180	181	161
Salinity	%	NS	0.1	0.1	0.2	0.2	0.2	0.2
Temperature	°C	NS	21.2	24.6	24.5	25.7	22.3	26.6
Turbidity	NTU	5	3.2	0.6	2.9	0.6	0.3	0.2
Chemical tests								
NH3-N	mg/L	1.5	0.3	0.3	0.5	0.3	0.2	0.3
NO3-N	mg/L	10 (as NO3-N)	ND	ND	0.1	ND	ND	ND
NO2-N	mg/L	1 (as NO2-N)	0.001	0.004	0.003	0.003	0.002	0.004
Iron (Fe)	mg/L	0.3	0.1	0.1	0.1	ND	ND	ND
Manganese (Mn)	mg/L	0.5	ND	ND	ND	ND	ND	ND
Fluoride	mg/L	1.5	0.11	0.24	0.06	0.17	0.11	0.11
Free chlorine	mg/L	0.5	ND	ND	ND	ND	ND	ND
Ca hardness	mg/L	NS	160	130	125	140	145	140
Arsenic	mg/L	0.01	ND	ND	ND	ND	ND	ND
T. Hardness	mg/L	200	165	170	190	190	180	150
Total alkalinity	mg/L	NS	150	150	130	150	150	130
Sulphate (SO4 2-)	mg/L	250	18	15	9	9	10	8
Bacteriological test								
Total coliform	CFU/100 mL	0	0	0	15	TNC	26	0
E. Coli	CFU/100 mL	0	0	0	0	0	0	0

Legend:

ND: not detectable; NT: not tested; NS: not set; CFU: colony formed unit; TNC: Too numerous to count; FAC: free available chlorine

Non compliant

Serious non compliance/health risk



Appendix 5. Same Public Consultation Meeting Notes (12th October 2020)

1. Introduction

Meeting Details

Detail : 12th October 2020

Time : 09.00 AM to 12.00 PM

Location : Meeting Room, Manufahi Municipality Administration Office, Suco Holarua

The public consultation was led by the Administrator of Manufahi Municipality, accompanied by the National Director for Basic Sanitation, and lastly attendees coming from local authorities, representatives from the PNDS, Ministry of Public Works and ADB, with a total of 36 participants (Attendance Sheet provided in the subsequent Appendix).

The agenda was comprised of several sessions, as described below:

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

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

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

2.1. Armando Silva – Local Community

➤ Recommendation: Land & Property

Concern about the drilling location at Suco Letefoho located in the community land nearby the dwellings, with no positive result from the drilling activity and considered inefficient in terms of costs. He suggested that the Project Proponent should collaborate in maximum to identify the best location, preferred to be in the Government land for the upcoming drilling activity, if required.

➤ Consultant's Clarification:

Aguas de Portugal – Mario Santos: The Water Resources team from ADP have done the survey for water Sources/ aquifer drilling and they identified several locations including the mentioned above.

The activity is part of an initial phase conducted by the Water Resources engineer/team to find out the potential water sources to be included in this project for the next phase (implementation phase) to support distribution system network

Recently water resources team still continues to look for potential sources and potential locations for drilling in order to support the upcoming water distribution network. Based on the Calculation for in 2040 water demand will be 5,327m³/day in parallel with the increase in the number of Population.

We also have to examine the environmental and social aspects prior implementing the canalization process from the intake to the distribution tanks and to fulfill the water usage by identifying good water sources (referred to underground water) for perforation in supporting the referred system. There won't be any sustainability if the system only depends on the Merbuti spring.

2.2 Fransisco Tilman and Ms. Anita dos Reis Fernandes – Local Community from Suco Holarua

➤ Recommendation: Acceleration of the Project Implementation

Common recommendation to the Project Proponent in order to be carried out as soon as possible. Based on their perspective, this project will provide a long-term need but the implementation will take some time before reaching to operational phase. As older generation, they are hoping that they could also have the opportunity to enjoy the benefit of this project. As community, they are fully supporting all the trusted consultant and future contractor, and they declared that they are very eager and ready to cooperate anytime with the project proponent.

➤ Consultant's Clarification: Noted

2.3 Mendes – Local Community

➤ Questions: Guarantee of the Project

Mr. Mendes stated that this is such an important project for a developing country it will bring huge benefits to the local community. How will this Project guarantee that all local communities will access clean water both for those who already have access to and who have not since the past few years ago?

2.4 Jenico Marcal – Local Community

➤ Recommendation: Project Area

Concern regarding the Project area in Suco Babulu that some of the Aldeia of Suco Babulo are out of the Project zone whether or not this project will cover all of Aldeia at Suco Babulo? Because most of Suco Babulu Community live in remotes areas, far from the city, there is an existing distribution pipe of clean water with less water volume that could not support enough community's needs.

➤ Consultant's Clarification: Noted

2.5 João Corte Real – Holarua Suco Chief

➤ Recommendation: Storage tank Location (Land & property)

Stated that Suco Holarua comprises of two springs with potential sources namely; Erluli and Darelau Springs, from Aldeia Atara to Fatuku and Aldeia Urufu will establish two storage tanks for water distribution, he recommends to identify location for storage tank as soon as possible to minimize unwanted social impact during Project implementation.

➤ Consultant's Clarification: Noted

2.6 Ricardo de Araujo – Tomonamo Aldeia Chief, Suco Letefoho

➤ Recommendation and Concern: Water Sources & Water Quantity

Concern regarding the quantity of water of Merbuti Springs that declines by time while the number of the population increases, Mr. Ricardo stated that there is an existing wallow/small lagoon at Aldeia Aileu Suco Letefoho since Portuguese time that might be utilized as rain catchment, as he suggested to the project proponent. This aims at supporting water availability for a longer-term consumption.

He is also concerned that the community have been neglecting the Tara Bandu, sabotaging biodiversity, and eventually diminish the water availability. There's also an additional water spring used for consumption since the Portuguese time until the Japanese time, and dried in the end because the community did not follow the Tara Bandu and other traditional rules for particular sacred areas. That spring was supposed to sustain the community for a longer-term, but given the condition, the project proponent should be able to find other alternative sources, to satisfy the community's needs.

This is a long-term project that would take time. As older generation, they would like to recommend to the project proponent to find another alternative for a more sustained water flow.

➤ Consultant's Clarification: Noted

2.7 Alfredo Rego – Local Community

➤ **Questions: Project area**

Mr. Alfredo Rego has the same concerns as Mr. Jenico Marsal (see question 2.4. regarding the project area in Suco Babulo in Aldeia Umaluli, he is requesting if possible, to include his Aldeia in this scope of the Project. In previous years, JICA has established water distribution channels in Aldeia Umaluli nevertheless there is no sufficient water volume due to lack of monitoring of water used

2.8 Amandio de Jesus – Aldeia Chief, Suco Babulo

➤ **Questions: Water Drilling Location & Environmental Impact**

He questioned about the Environmental Impact in regards to the 3-borehole tests for water drilling at Suco Babulo namely; Suco Searema, Lapuro, and Raimera. what is the Environmental Impact of this? How can this drilling guarantee distribute water for all of Aldeia at Suco Babulo?

2.9 Bernardino Lobato – Aldeia Chief of Lapuro, Suco Babulo

➤ Question: Project Location – Suco Babulo

He mentioned that Suco Babulo has 2 Aldeia Lapuro, which Lapuro 1 (near by the city) and Lapuro 2 far from city or nearby Suco Daisua – out of the Project Zone. Which Aldeia that would be included in the project area?

➤ Consultant's Clarification to Respond sub-section 2.2 to 2.9:

Agua de Portugal - Mario Santos : As mentioned from the beginning of this meeting, water sources and springs are identified, local entities will collaborate all information regarding water resources are in place, the only information that needs to identify at the moment is; water quantity of water, shortly the Water Resources team will conduct a survey for each spring to calculate the volume of water in order to know how much volume that need for distribution for the project area according to the map in the red line (project zone).

The government of Timor Leste has invested in this project to cover Urban area only as of the Government also has a specific program for rural area development (PNDS) which will respond to those issue in the rural area. The project proponent has cooperated with local authority such as MPW, Land and Property, Chief of Sucos and Aldeias, and other related entities, and the project proponent also confirming (ongoing follow up) the identified locations point of the storage tank waiting for the confirmation at the moment.

In regards to Mr. Bernardino concerns about Aldeia Lapuro 1 and 2, the technical team should conduct a more detailed study particularly to know the exact the Aldeia boundary between Lapuro 1 and 2 with the rest of the Aldeias within the supply zone, therefore it still needs to be confirmed.

2.10 Filomeno Tilman – Former Administrator of Manufahi Municipality

➤ Question & Recommendation: Monitoring, Management Plan & Legislation for Water Usage

Appreciated the presentation and the project plan that have been presented by the project proponent, one of the main concerns from the community according to our opinion in regards to the water consumption and distribution was lack of monitorization and strict law that can regulate communities to use water in manner ways. What is the Management Plan for this system in the future? How can project proponent do a monitorization for the system?

I would like to suggest, in the meantime, water meter installation should be implemented in every household, in order to control the water usage and to avoid wasting on water.

2.11 Alice de Jesus – Suco Chief of Babulo

➤ Recommendation and Concern

Ms. Alice has a common concern as Mr. Filomeno stated above regarding establishing a more stringent law.

In conclusion, the most relevant issue regards to the water consumption and distribution was the lack of control, we might establish a system with high technology even so no law is necessarily established. It will be the same, local community that live in a rural area will not be able to access for clean water even though in the urban area will be face the same issue, according to my observation 56% of local community have a fishpond nearby the house which will minimize water volume to the other household, there is no maintenance program. Other issues are the leaked pipes and public water taps that are always open carelessly by the community.

Nevertheless, she also expressed her gratitude to the ADB and the whole team for providing this kind of program, and hoping that this project will give positive impacts to the community.

➤ Consultant's Clarification: Noted

2.12 Fransisco Tilman – Local Community

➤ Suggestion: Commitment from the Government and the technical team

Mr. Fransisco expressed his gratitude and suggested that the Government and Consultant team should be committed with less talk and implementation more on the project. The community does not want promises and does not want to attend to many meetings regarding with this project, but they want concrete results. The community is ready to support and collaborate with the project proponent, Consultant and related Contractor whenever there's an action to be done.

➤ Consultant's Clarification to Respond Sub-section 2.10 to 2.12:

Before reaching the Operational Phase, water meter will be installed in the registered households within the water supply system during Construction phase. Every households with water meter will then have access to water and will have to pay for monthly consumption fee. With this system, the consumers will be able to control water usage.

The mechanism during operational phase, I have discussed this with the Director of SMASA (Mr. Domingos), that SMASA should provide more workers and build their capacity, especially the youths to take part in this project. Based on our experience, there should also be a team for proper maintenance with 24/7 service, to take immediate action in case the consumers have urgent problems with leakages and etc. Water meters that are being installed in the community's

households will have to be the owners' responsibility himself/herself, while water meters located in the road and other public places will be SMASA's responsibility.

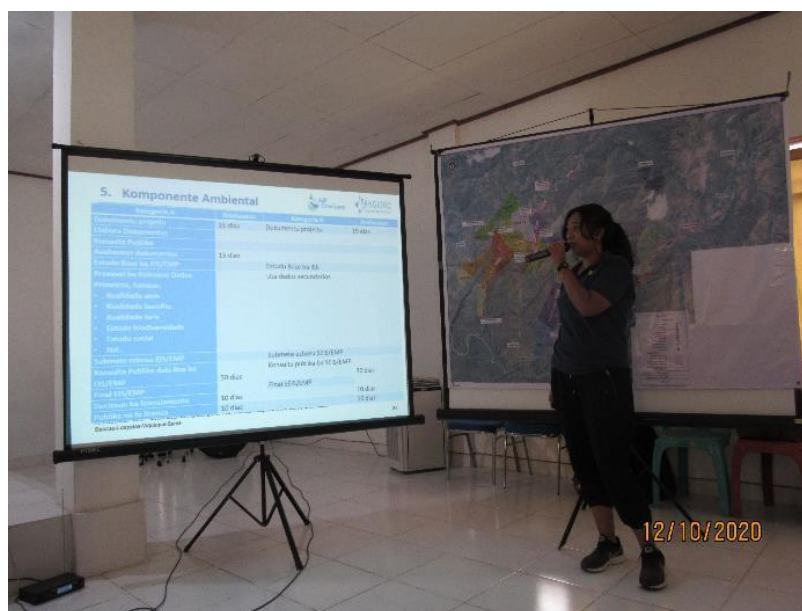
Related to the Chief of Suco, Ms. Alice, we will make sure relevant regulations to be established e.g. workers are in compliance with PPE usage while operating the water treatment (exposure to the chemical substances), and well-protection to the water springs in order to avoid contamination.

3. Conclusion

- This project should be able to consider on supplying water not just to the community's households, but also for other activities outside the households' scope to avoid water deficits.
- Most of the community is expecting for this project to be implemented as soon as possible, since they are facing crucial issues on water for daily consumption and don't want to repeat uncertain schedule for water delivery into the households in the future, which means 24/7 on water service.
- Positive responds and inputs from the local community.
- Community's most concern is that certain areas (Aldeias) are not covered in the project, while some of those areas are considered remote and are in need for water.
- Regulations need to be established and well-implemented in order to enforce the protection of water sources, delivery to the consumers and its sustainability.



Participation of the Local Community and Other Stakeholders Before Commencing



Environmental Component Presentation by Maria Helena (OASIS National Environmental Technician)



Environmental CPresentation (Sanitation Sector) by Vasco Leitão
(Environmental Specialist)



Manufahi Municipality Administrator, Abrantes Isaac as the Chairman for
Public Consultation Meeting, along accompanied by AdP Project
Manager, Mario Santos and SMASA Director, Domingos Soares

Appendix 7. Attendance Sheet of the Stakeholders during Public Consultation



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

"Consulta Pública ba Desenvolvimento Projeto Abastecimento Be'e Mos no Saneamento Iha Capital Município"
Dia: 12 de Outubro de 2020

LISTA PREZENZA

MUNICIPIO MANUFAHI

NO	NARAN	SEXO		INSTITUISAUN/POZISAUN	SUÇO/ALDEIA	NO CONTACTO	ASSINATURA
		F	M				
1	Arantes Isaac S		✓	KSM M F	Utho ho	77304029	
2	Domingos Soares		✓	8as	holoana	773266895	
3	Anor Sihombing		✓	SPMU-DEAS	Dili	7725541	
4	Jorio Ode Raul		✓	chefe Saco	Hila Rua	78066859	
5	Antonio Miranda		✓	Chefe Aldeia kotala	/Jeterdho	7729178495	
6	Ricardo de Araujo		✓	Chefe Aldeia Tomomano	/Jeterdho	773370093	
7	Andre Barreto M.		✓	delc gado	late foho	7642586	

8	Domais da c. M. Perwenfo	M	Xefe Addeia muisa	leto-folho	77634760	
9	Alfredo Prego	M	Chefe Addeia kumuloti Babulu		77440422	
10	Ismael Figueira d.c. wassa	M	Delegado	lele-foko	-	
11	Jose Ferveira	M	X.F. Addeia rialau tetepoko		76348500	
12	Matinho da Gisa M.	M	Chefe Addeia	lele-foko	77776079	
13	Bernadino Lobato	M	Chefe Addeia	Babulu/Baporo	77071869	
14	Alice de Jesus Nunes	F	Xefe Suco	Babulu	70066849	
15	Amadio de Jesus	M	Chefe Addeia	Raimera	75845801	
16	Jaunico da e massa	M	Komunidade	Raimera	75723483	
17	Juica de Jesus da Costa	F	Komunidade	Raimera	76455521	
18	Siti Marbatiya	F	Komunidade	Deidera	75201024	
19	Deuísio Tífua	M	FPA	Sare	76791591	
20	Alarico da Costa paraim	M	FPA	Same	75424416	
21	Taine Prego Munet	M	Oficial Saneamento	Same	75716077	
22	Therito Yeadaa	M	X.F. Addeia	Saimé	77172719	

23	Benedito Mendes da Costa	M	Comunidade	Holarua	756725410	Bick
24	Jaime da Costa S.	M	— " —	— " —	774085491	APM
25	Bembaio da Costa			Holarua	773982416	APM
26	Francisco Filomena	M	Clube Aldeia	Orupia	7795607	APM
27	Amato das Reis Fernandes	F	Comunidade	— " —		Amato
28	Luís M.C. Soares	M	PNDs / DIR. DATA.	Letefoho	78943049	Amato
29	TONI DA COSTA M.	M	FPN POSTO	Letefoho	7522667	Amato
30	Leopoldino da Costa	M	SAS	Letefoho	74067332	Amato
31	Henneredecio T. Lourenço	M	SAS	Letefoho	76141338	Amato
32	Angelino P. Doloroso	M	SAS	Babelua	75615579	Amato
33	Procurador da Costa Lopes	M	SAS	Holarua	-	Amato
34	Francisco Pinto	M	Limpaga Adm.	Mauico	-	Amato
35	Silvestre da Costa	M	Comunidade	Faluta	-	Amato
36	Cyril da Costa Nasser	M	Amato	Holarua		Amato
37						Amato
38						Amato

Appendix 8. Spoil Management Plan

SPOIL MANAGEMENT PLAN

A. Spoil Management Plan

The SMP is to describe how the contractor will manage the generated spoil and reuse related to design and construction activities. This is an integral part of EM.

1. Objectives of SMP:

- To minimize spoil generation
- To maximize beneficial reuse of spoil from construction activities in accordance with spoil management hierarchy
- To minimize environmental impacts on resident and other receivers
- Minimize and/or avoid any further site contamination of land, water and soil

2. Structure of SMP:

Section 1: Introduction of SMP

Section 2: Legal and other requirements

Section 3: Roles and responsibilities

Section 4: Identification and assessment of spoil aspects and impacts

Section 5: Spoil volumes, characteristics and minimization

Section 6: Spoil reuses opportunities, identification and assessment

Section 7: On site spoil management approach

Section 8: Spoil transportation methodology

Section 9: Monitoring, Reporting, Review, and Improvements

3. Aspects and Potential Impacts:

Aspects	Potential Impacts
Air Quality	Airborne dust generation due to wind
Sedimentation	Sediment laden site runoff from spoil stockpiles and spillage of spoil from truck on roads
Surface and Groundwater	Contamination of water quality
Noise	Temporary duration associated with spoil handling, haulage and storage
Traffic	Associated with spoil haulage
Land Use	Spoil being transported to a receivable site that doesn't have a permission for disposal

B. Spoil Volumes, Characteristics and Minimization

- 1. Spoil Volume Calculations.** Estimate the volumes of spoils produced from each of the construction sites.
- 2. Characterization of Spoil.** Based on the type of spoil (sand, stone, mix materials, reusable materials).
- 3. Adopt Spoil Reduce, Reuse Opportunities.** An overview of the assessment methodology to be used:

- a. Consideration of likely spoil characteristics
- b. Identification of possible reuse sites
- c. Screening of possible reuse opportunities

4. Identification of Possible Safe Disposal Sites for Spoil. Those spoils which can't be reuse shall be properly disposed in designated areas; such disposal areas should be identified in project locations. Such disposal areas should be safe from environmental aspects and there should be any legal and resettlement related issues. Such areas need to be identified and prior client approval should be obtained to use it as spoil disposal area. The local administration must be consulted and if required permission should be obtained from them.

C. Storage and Stock Piling

- 1. Stockpiling.** Spoils shall be stockpiled at locations at least 300 m away from water courses and covered.
- 2. Transportation and Haulage Route.** Based on the above, the contractor will have to prepare a transport and route plan, and submit it to the consultant for review and approval.

**Appendix 9. Meeting Notes – National Department of Cultural Patrimony,
Secretary of State for Art and Culture (SEAC) on the 7th & 22nd
September 2020**

Meeting Notes

“Water Supply and Sanitation Investment Project”

Venue	Secretary of State for Arts and Culture Main Office, Pantai Kelapa
Date	September 7, 2020
Time	9.45 – 11.00
Interviewer	Maria Helena A. de Jesus
Sources/Participants	<ol style="list-style-type: none"> 1. Irene dos Reis Goncalves (Chief Department of Archeology) 2. Ilisio do Carmo (Personnel staff) 3. Eustorgio da Silva (Personnel staff, Archeologist) 4. Joaquina Lopes (Personnel staff) 5. Leandro Aristides (Personnel staff, Archeologist) 6. Chris (Personnel staff, Engineer) 7. Carlos (Personnel staff, Engineer)
<p>Ms. Maria Helena (National Environmental Technician) on behalf of OASIS conveyed the objective of the meeting; to request cultural heritage sites data in all 4 Municipals in a form of shapefilez/kmz files in adherence to a request letter sent from the Ministry of Public Works (MPW) with a reference number 172/C50605/Gab.DGAS/MOP/VII/2020. This aiming to identify whether or not the sites are located adjacent to the project components and how they will impact on the related sites. Ms. Maria Helena also stated that the Environmental team from OASIS has identified several cultural, touristic and historical sites during the field visit in 4 Municipals. Hence, adjusting the data prepared from the National Directorate of Cultural Patrimony would be very beneficial in order to complete the information for subsequent mapping and analysis of environmental and social impacts. Mrs. Irene Goncalves, Mr. Ilisio do Carmo and Mr. Leandro Aristides expressed gratitude and explained briefly on each of the personnel's roles who participated on the meeting. They are willing to share what the team requested, although some of the data are still confidential and cannot be publicized in order to avoid any interested parties in taking advantage of the assets. They highlighted the importance of their involvement in various projects and reminded us to invite the delegated person from the mentioned department to have a joint site visit whenever if necessary. The objective of the statement is to gain additional insights as inputs particularly for the Department of Archeology. Thus, the Chief Department and colleagues would like to know the location and total of the sites that the OASIS team had identified.</p> <p>Ms. Maria Helena intervened that the site visits that the OASIS team had conducted was to characterize the environmental condition in the project area and had collaborated with local authority and Municipal Cultural center to gain the needed information. At the current moment, the OASIS team only needs the said description of the data, photographs, and kmz or shapefiles of the cultural heritage sites within the 15 km radius of the project area. The OASIS team for WATSAN project considers the existence of Secretary of State for Arts and Culture and will need the presence of their participation during the Public Consultation in all 4 Municipalities which will be conducted very soon within this September post submitting the IEE documents to ANLA. And the OASIS team is ready to do a presentation in regards to the related project's sensitive and cultural sites cumulated during the last site visit, if needed.</p> <p>Mrs. Irene, Mr. Ilisio, Mr. Leandro and Ms. Maria Helena agreed and confirmed that OASIS team will do a presentation on Thursday, September 9 at 3 o'clock in the afternoon.</p>	








Venue	Secretary of State for Arts and Culture, Pantai Kelapa
Date	September 22, 2020
Time	9.00 – 10.00
Interviewer	Maria Helena A. de Jesus
Sources/Participants	<ol style="list-style-type: none"> 1. Irene Goncalves dos Reis (Chief of Department of Archeology) 2. Maria Isabel Alves do Rego (Architecture)

	3. Eugenio de J. Sarmento (Chief of Department of Architectonic) 4. Octaviano Mota (Engineer) 5. Lisandro Manuel (Engineer) 6. Jose P. de S. Garcia (Staff) 7. Romeu Soares da Silva (Staff) 8. Elisio do Carmo (Staff/Technician)
<p>The objective of the meeting is to provide information of the cultural, touristic, sacred, and other heritage sites identified by the OASIS team in a form of power point presentation, which included photographic documentation, coordinate locations list, and mapping presentation. This meeting is to comply the National Department of Cultural Patrimony agreement with the OASIS team which was represented by the National Environmental Technician, Maria Helena, during a meeting conducted on the 7th of September 2020 and in relevance with MPW request letter No. 172/C50605/Gab.DGAS/MOP/VII/2020 aiming to receive data of location and description of the patrimony cultural in the associated 4 Municipalities.</p> <p>The meeting was attended by 8 participants coming from the Secretary of Arts and Culture and was commenced with a presentation from Maria Helena regarding to the Cultural Patrimony sites that was defined or identified by the OASIS team during a site visit for the Preliminary Design phase.</p> <p>Post the presentation is the discussion session composed of questions and recommendations from the Secretary of Arts and Culture party and answers were provided by Maria Helena. The discussion session is described below:</p> <ol style="list-style-type: none"> 1. Q: During the replacement of the pipe, what is the type of the pipe would your consultant recommend on implanting? (Octaviano Mota) A: For transmission lines, the selected material would be HPDE and Ductile Iron. Meanwhile, the distribution network will be using HDPE 2. Q: In this project that you are referring to, will it give a direct or indirect impact towards the cultural objects? And how do you plan to mitigate? (Elisio do Carmo) A: The impact would mostly be direct coming from various construction activities, although the duration will be temporary. The mitigation would be in compliance with the Decree Law No. 33/2017 by not interfering the 50 m radius of each object located adjacent to the distribution alignments or any other project components. 3. Request from Chief of Department, Mrs. Irene: Sharing the kmz files of distribution lines in order for them to inform us for additional information of the cultural patrimony object or other historical sites. 4. Suggestion from Mr. Jose Garcia: If possible, the cultural sites that have been identified should also be described with their historical background Respond: It is not part of our scope of work 5. Comment from Mr. Octaviano Mota: The magnitude of the impacts towards the cultural objects won't be strong comparing to the Drainage (DDIUP) project for Dili 	

Appendix 10. Attendance Sheet – SEAC









ATTENDANCE SHEET
MEETING AT THE STATE SECRETARY OF ARTS AND CULTURE, TIMOR-LESTE
FOR
"CONSULTING SERVICES FOR DETAILED ENGINEERING DESIGN OF TIMOR - LESTE FOUR MUNICIPAL CAPITALS
WATER SUPPLY & SANITATION PROJECT"

Tuesday, 22nd of September 2020
Dili, Timor-Leste

No.	Naran	Instituisaun	Pozisaun	No. Kontaktu	Assinatura
1	Ismael Gonçalves dos Reis	SEAC / DNRC	Ag. Depart. AE	993 999 35	
2	Maria Isabel Alves do Rego	SEAC / SEAC	Arquiteta	7713 2215	
3	Jaqueline de J. Somenza	SEAC	Chief department	-	
4					
5	Ottaviano Noh	SEAC / DNRC	Engineer	9967 4555	
6	Lisandro Manuel	SEAC / DNRC	Engineer	7738 2228	
7	Jose P. de S. Sousa	SEAC / DNRC	Staff	9959 2612	
8	Romualdo Soares da Silva	SEAC / DNRC	Staff	9933 2636	
9	Elisio do Carmo	SEAC / DNRC	Staff	9936 6932	

ATTENDANCE SHEET
MEETING AT THE STATE SECRETARY OF ARTS AND CULTURE, TIMOR-LESTE
FOR
"CONSULTING SERVICES FOR DETAILED ENGINEERING DESIGN OF TIMOR - LESTE FOUR MUNICIPAL CAPITALS
WATER SUPPLY & SANITATION PROJECT"

Monday, 7th of September 2020
Dili, Timor-Leste

No.	Naran	Instituisaun	Pozisaun	No. Kontaktu	Asinatura
1	Josue Gonçalves dos Reis	SEAC / DWR	xepi Depart. AE	77399935	
2	Sandra A. B. B.	SEAC / DWR	Staff	75668685	
3					
4	Joaquina Lopes	SEAC / DWR	staff	77269330	
5	Estevão Mota	SEAC / DWR	Engineer	-	
6	Eustorgio da S.P. Lopes	SEAC / DWR	staff	-	
7	Cristoforo C.C. Carvalho	SEAC /		-	
8	Natalia de Jesus A. Ximenes	SEAC / DWR	Staff	-	
9	Elisio do Carmo	SEAC / DWR	Staff	-	

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Appendix 11. Environmental Licenses from the District Capitals Water Supply Project in Pante Macassar and Manatuto cities



REPÚBLICA DEMOCRÁTICA DE TIMOR-LESTE

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

ENVIRONMENTAL LICENSE

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

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

Schedule

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

Notes

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

5. The Proponent is responsible for ensuring that all subcontractors or others carrying out works associated with this Environmental License comply with the SEIS, EMP and terms of this Environmental License.
6. All future communications, documents and reports prepared by or on behalf of the Proponent in relation to the Project and submitted to the National Directorate for Environment ('DNMA') shall be in both Tetum and English, and in both electronic and hard copy.

Annex - Conditions of Environmental License

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

General Conditions

1. *Project in accordance with initial environmental examination documents, and future environmental licenses*
 - 1.1 The District Capital Water Supply Project must be conducted in accordance with the Final Report of Simplified Environmental Impact Statement (SEIS) prepared by Project Implementation Unit Consultant dated 20th of March 2014 and the incorporated Environmental Management Plan (EMP), except as modified or amended by this Environmental License.
 - 1.2 The Expansion, Rehabilitation and operation and maintenance of Manatuto Water Supply Systems must be conducted in accordance with Asia Development Bank Safety Environmental Principle.
 - 1.3 The Nature, Size, Location and Importance of the Project, described on page 12 – 15 (5.1-5.2) of the SEIS, strictly states the Project Site Boundary for all development and construction activities related to The District Capital Water Supply Project.
 - 1.4 To successfully implement the EMP the SEIS has given adequate instructions for the Project Implementation Unit (PIU) to monitor and report environmental compliance all through the project implementation period.
 - 1.5 As planned in the SEIS this Water Supply Project is given the Environmental License granted for two (2) years starting from the Date of the Notification mentioned in *Licensing*
 - 1.6 Any proposed changes, alterations or additions to the Project that the Proponent wishes to undertake that are not consistent with the SEIS and EMP and this Environmental License will require an additional Environmental License or amendment of this Environmental License, in accordance with relevant provisions of *Decree Law 05/2011*.
 - 1.7 DNMA may review and alter any conditions in this Environmental License, including by requiring alterations to the Environmental Management Plan, to respond to any proposed changes to any component of the Project through any application made by the Proponent to DNMA relating to the Project, if DNMA deems it necessary to do so to protect the environment.

Additional requirements and modifications

2. Construction phase

- 2.1 When the activity starts, community near the area of the project must be included to offer them jobs in which could help minimize the social impacts.
- 2.2 The proponent must coordinate with other institution that related to this activity before implementing the project.
- 2.3 For air quality related to dust, inspection should be done to ensure that residents living along the construction route are not affected. Hence spreading water will help minimize dust emission close to the residential areas;
- 2.4 The proponent must assure that water bodies nearby are safe from siltation and contamination that includes fuel and lubricants used in the rehabilitation of the water supply project;
- 2.5 The proponent must enforce the disposal of surplus material at environmentally safe disposal/ fill sites and that spoil stockpiles are managed properly;
- 2.6 Soils from the excavation must not be disposed of near the water bodies, paddy field, Farmland and community's residential area along the road rehabilitation route;
- 2.7 Sites where rocks and sands are excavated should be 20 meters away from the river bank;
- 2.8 Avoiding excavation of soil and stone in the sensitive environmental areas (protected area/ Forest, potential landslides field, high elevation hills, etc);
- 2.9 When the project is complete, excavated areas must be rehabilitated, materials dumping, Facilities for staff and logistic installed must be demolished and managed it properly;
- 2.10 Actively monitor the water bodies that are close to the construction site during the Rehabilitation process;
- 2.11 The community from the residential areas, horticulture, paddy fields, And other types of farmlands and agricultural plantation whom are affected must be Given compensation in a fair and just manner;
- 2.12 Avoiding in necessary eviction. If any target household need to be remove, please Negotiate in fair manner and applying prior consent principle
- 2.13 During the rehabilitation activity, noise from the excavator must be controlled, need to Install appropriate warning signal for safety traffic, for the safety of worker and road Users;
- 2.14 Trucks carrying construction materials (sand, stones, cement etc) must be covered by Tarpaulin to prevent materials from falling off of the trucks;
- 2.15 Alternative roads must be built to ensure that public transportations are not delayed during the rehabilitation;

- 2.16 Rehabilitate eroded areas that caused by the construction activity;
- 2.17 During daytime construction site should be sprayed with water every three hours each day along the Rehabilitation project route;
- 2.18 Prepare disposal site for solid and liquid waste from the construction activity, excavator and trucks; except dangerous waste (oil ,lubricant and so on)
- 2.19 Worker and staff compound close by community village must be develop in coordination with local leaders and the residence. Worker and staff need to respect local people, ritual, symbols of believe and cultures;
- 2.20 Need to apply local content principle for the involvement of local people in working Opportunity and possible local material procurement;
- 2.21 Identified appropriate location for material (sand, stone, wood, water and other material) collection;
- 2.22 Due to the instability of soil, high elevation of the areas and impact of climate change (more rain or less rain could cause erosion), there is need to have bio engineering expert in providing knowledge and techniques to community for re-vegetation and reforestation;
- 2.23 The Proponent must ensure that the waste is disposed of at disposal area;
- 2.24 After the project is finally done, the company is responsible to clean up all the waste and piles from the construction activity along the project route.

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

Dili, 07th of August 2014

Approved by:



Numinando Soares Martins "BURAS"
Secretary of State for Environment



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

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

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Schedule

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

Notes

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

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

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

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 - 1.3. The Nature, Size, Location and Importance of the Project, described on page 13 – 19 (5.1-5.2) of the SEIS, strictly states the Project Site Boundary for all development and construction activities related to The District Capital Water Supply Project.
 - 1.4. To successfully implement the EMP the SEIS has given adequate instructions for the Project Implementation Unit (PIU) to monitor and report environmental compliance all through the project implementation period.
 - 1.5. As planned in the SEIS this Water Supply Project is given the Environmental License granted for two (2) years starting from the Date of the Notification mentioned in *Licensing*.
 - 1.6. Any proposed changes, alterations or additions to the Project that the Proponent wishes to undertake that are not consistent with the SEIS and EMP and this Environmental License will require an additional Environmental License or amendment of this Environmental License, in accordance with relevant provisions of *Decree Law 05/2011*.
 - 1.7. DNMA may review and alter any conditions in this Environmental License, including by requiring alterations to the Environmental Management Plan, to respond to any proposed changes to any component of the Project through any application made by the Proponent to DNMA relating to the Project, if DNMA deems it necessary to do so to protect the environment.

Additional requirements and modifications

2. Construction phase

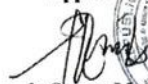
- 2.1 When the activity starts, community near the area of the project must be included to offer them jobs in which could help minimize the social impacts;
- 2.2 For air quality related to dust, inspection should be done to ensure that residents living along the construction route are not affected. Hence spreading water will help minimize dust emission close to the residential areas;
- 2.3 The proponent must coordinate with other institution that related to this activity before implementing the project;
- 2.4 The proponent must assure that water bodies nearby are safe from siltation and contamination that includes fuel and lubricants used in the rehabilitation of the water supply project;
- 2.5 The proponent must enforce the disposal of surplus material at environmentally safe disposal/ fill sites and that spoil stockpiles are managed properly;
- 2.6 Soils from the excavation must not be disposed of near the water bodies, paddy field, Farmland and community's residential area along the road rehabilitation route;
- 2.7 Sites where rocks and sands are excavated should be 20 meters away from the river bank;
- 2.8 Avoiding excavation of soil and stone in the sensitive environmental areas (protected area/ Forest, potential landslides field, high elevation hills, etc);
- 2.9 When the project is complete, excavated areas must be rehabilitated, materials dumping, Facilities for staff and logistic installed must be demolished and managed it properly;
- 2.10 Actively monitor the water bodies that are close to the construction site during the Rehabilitation process;
- 2.11 The community from the residential areas, horticulture, paddy fields, And other types of farmlands and agricultural plantation whom are affected must be Given compensation in a fair and just manner;
- 2.12 Avoiding in necessary eviction. If any target household need to be remove, please Negotiate in fair manner and applying prior consent principle
- 2.13 During the rehabilitation activity, noise from the excavator must be controlled, need to Install appropriate warning signal for safety traffic, for the safety of worker and road Users;
- 2.14 Trucks carrying construction materials (sand, stones, cement etc) must be covered by Tarpaulin to prevent materials from falling off of the trucks;
- 2.15 Alternative roads must be built to ensure that public transportations are not delayed during the rehabilitation;

- 2.16 Rehabilitate eroded areas that caused by the construction activity;
- 2.17 During daytime construction site should be sprayed with water every three hours each day along the Rehabilitation project route;
- 2.18 Prepare disposal site for solid and liquid waste from the construction activity, excavator and trucks; except dangerous waste (oil ,lubricant and so on)
- 2.19 Worker and staff compound close by community village must be develop in coordination with local leaders and the residence. Worker and staff need to respect local people, ritual, symbols of believe and cultures;
- 2.20 Need to apply local content principle for the involvement of local people in working Opportunity and possible local material procurement;
- 2.21 Indentified appropriate location for material (sand, stone, wood, water and other material) collection;
- 2.22 The Proponent must ensure that the waste is disposed of at disposal area;
- 2.23 Due to the instability of soil, high elevation of the areas and impact of climate change (more rain or less rain could cause erosion), there is need to have bio engineering expert in providing knowledge and techniques to community for re-vegetation and reforestation;
- 2.24 After the project is finally done, the company is responsible to clean up all the waste and piles from the construction activity along the project route.

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

Dili, 07th of August 2014

Approved by:



Numinando Soares Martins "BURAS"
Secretary of State for Environment

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Appendix 12. 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 ($\mu\text{g}/\text{m}^3$)		Standards to be followed by Project ($\mu\text{g}/\text{m}^3$)
		Global Update 2005 ^b	Second Edition 2000 ^c	
PM ₁₀	Annual	20		20
	24-Hour	50		50
PM ₂₅	Annual	10		10
	24-Hour	25		25
SO ₂	24-Hour	20		20
	10-minute	500		500
NO ₂	1-year	40		40
	1-Hour	200		200
CO	8-hour		10,000	10,000
	15-minute		100,000	100,000
Pb	1-year		0.5	0.5

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

^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.

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

Parameters	Units	Timor-Leste (DL 31/2020 – Control of Water Quality for Human Consumption)	WHO Guidelines ^{(1) (2)}
Bacteriological tests			
Total Coliform	CFU/100 ml	0	0
Escherichia coli (E.coli)	CFU/100 ml	0	0

Parameters	Units	Timor-Leste (DL 31/2020 – Control of Water Quality for Human Consumption)	WHO Guidelines ^{(1) (2)}
Physical and chemical tests			
Aluminum	mg/l Al	0.2	0.2
Arsenic	mg/l As	0.01	0.01
Ammonia	mg/l ⁽³⁾	0.5	1.5
Calcium	mg/l Ca	100	100-300
Chlorides	mg/l CL	250	250
Chlorine	mg/l Cl	0.2-0.6	5
Conductivity	µS/cm	2500	
Colour	mg/l Platinum-Cobalt Scale	20	15
Fluoride	mg/l F	1.5	1.5
Hardness	mg/L CaCO ₃	110-500	200-500
Iron	mg/l Fe	0.3	0.3
Langelier Index		-0.5 – 0.5	-
Magnesium	mg/l Mg	50	-
Manganese	mg/l Mn	0.05	0.1
Nitrate	mg/l ⁽⁴⁾	11	50
Nitrite	mg/l ⁽⁵⁾	0,15	3
pH	Sorensen	6.5-8.5	6.5-8.5
Sulphate	mg/l SO ₄ ²⁻	250	250
Taste and 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 n° 152/2017 and mg/l NH₄-N for Timor-Leste legislation

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

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

(4) Wastewater Standards

Source: WHO Guidelines for Wastewater Irrigation (1989).

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

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

ITEM	BOD (mg/L)		NH ₄ -N (mg/L)	Helminth eggs (No. /filter)	FC (No. /100 ml)
	Total	Filtered			
A. Liquid effluent - Discharge into receiving waters:					
Seasonal stream estuary	100-200	30-60	10-30	≤2-5	≤10 ⁴
Perennial river or sea	200-300	60-90	20-50	≤10	≤10 ⁵
B. Reuse					
Restricted irrigation	n.c.		1)	≤1	≤10 ⁵

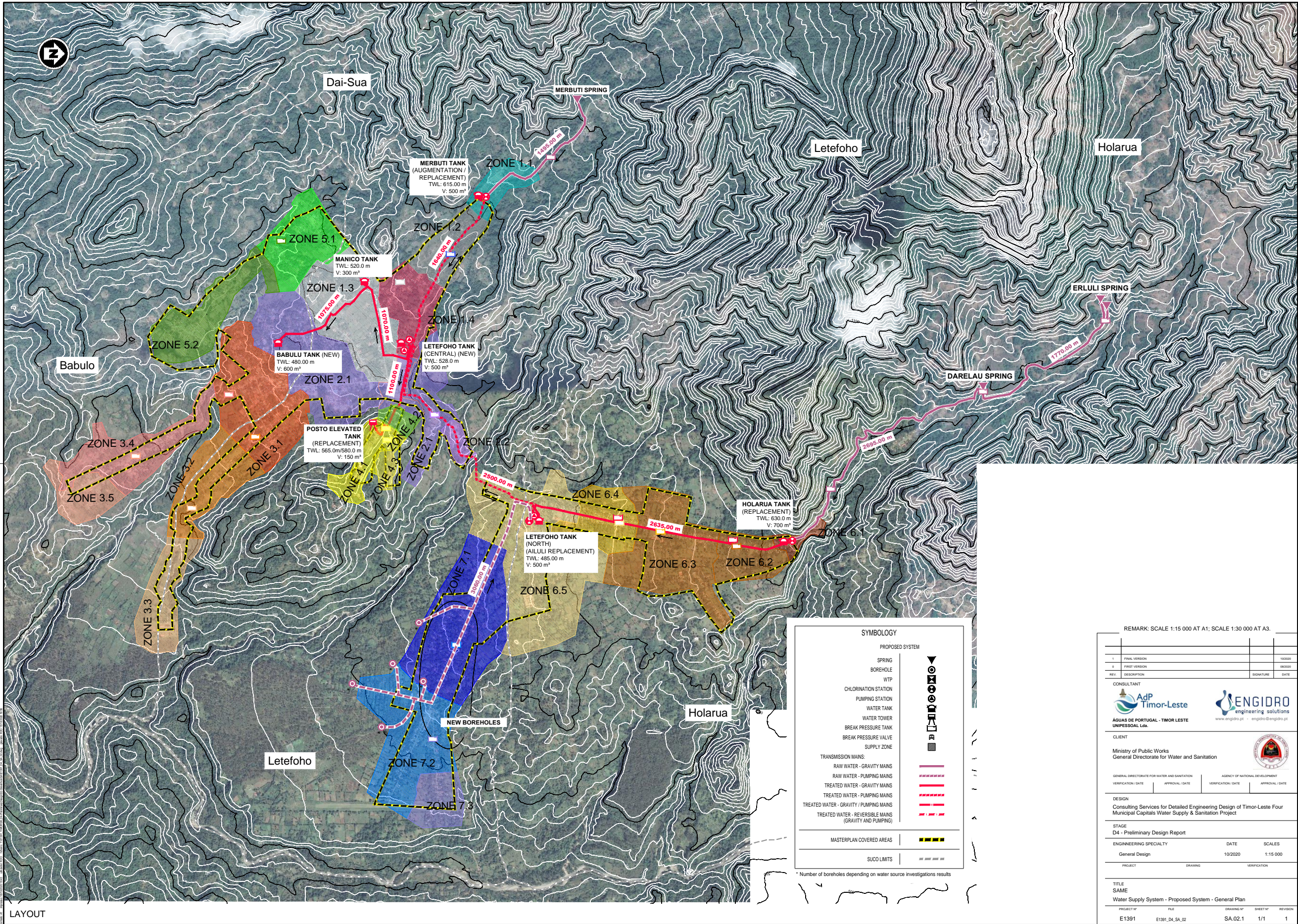
ITEM	BOD (mg/L)		NH ₄ -N (mg/L)	Helminth eggs (No. /filter)	FC (No. /100 ml)
	Total	Filtered			
Unrestricted irrigation	n.c.		1)	≤1	≤10 ³
C. Treated Plant Sludge					
Use in agriculture	n.c.		n.c.	≤3-8 g TS ²⁾	3)
NOTES:					
1) ≤ Crop's nitrogen requirement (100-200 kg N/ ha-year)					
2) Based on the nematode egg load per unit surface area derived from WHO guidelines for wastewater irrigation (WHO 1989) and on maturing rate of 2-3 tons of dry matter /ha-year					
3) Safe level if egg standard is met.					
n. c.----not critical					

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

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

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Appendix 13. Same – Proposed Water Supply System – General Plan



LAYOUT

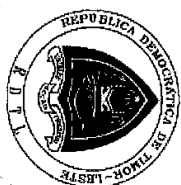
Appendix 14. COVID-19 Protection and Mitigation Measures

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

1 Construction Site Working Conditions Mitigation Measures for COVID-19	
9. Review emergency preparedness plans	<ul style="list-style-type: none"> Develop an emergency plan adapted to COVID-19 and regularly review it.
10. Review and update preventive and control measures as the situation evolves	<ul style="list-style-type: none"> Periodically monitor prevention and control measures to determine whether they have been adequate to avoid or minimize risk, and identify and implement corrective actions for continuous improvement. Establish and maintain records related to work-related injuries, illnesses and incidents, worker exposures, monitoring of the work environment and workers' health.
Source: Adapted from: ILO, WHO, Canada Construction Association, and UK Government.	

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

Appendix 15. Same Social Public Consultations List of Participants



MINISTÉRIO DAS OBRAS PÚBLICAS
DIRECÇÃO GERAL AGUA E SANEAMENTO (DGAS)

Rua: Avenida 20 de Maio - Caiçoi, Caixa postal No 17, Tel. 3317157, 3317156 - DHI

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Dia: 05 de Dezembro de 2020

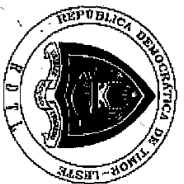
LISTA PREZENZA

Suco Babulo - Municipio Manufahi

NO	NARAN	SEXO		INSTITUISAUN/POZISAUN	ALDEIA	NO CONTACTO	ASSINATURA
		F	M				
1	Valente de Araújo		✓	Escola / Director	Capuro	99802404	
2	Carwelfa dos Reis	✓		Escola / Professora	Searema	75916246	Comp
3	RECARDINA MARTINS	✓		Delegada	Vina Linrai	75260453	RECUR
4	mateus P. mendes		✓	chefe de pagamento	Turon	76101960	
5	lauriana de s.m. Dargiac	✓		boveri	Searema	75659182	Indist
6	Beltra Antonio da Silva	✓			Lauro	76090290	Beu

7	Miranda Nunes de Jesus	F		Juventude	Lapuro	76242210	Pat
8	Rodeira da costa martins	F		Juventude	scarema	76435367	foi
9	Alcira noronha martins	F			lapuro	—	Pat
10	Josinta Xeisas.	F			lapuro	—	Pat
11	Leopoldina De Jesus.	F		Juventude " —	Nunupa	—	Pat
12	Maria Noronha Da Silva	F		Juventude	lapuro	—	Pat
13	JUANO DOS R. FERREIRO DOS	M		PROFESSOR	lapuro	77306838	Pat
14	LAMBERTO. D MARTINS	M		GUARDA ESCOLA	SEAPENA	45876559	Pat
15	JUSE PEREIRA	M		COMUNIDADE	lapuro	—	Pat
16	JOSE NORONHA	M		PROFESSOR	—	—	Pat
17	BRUNO DE ANDRADE	M		comunidade	raianera	—	Pat
18	Alcino da costa F.	F		comunidade	Seq-remq	—	Pat
19	LORELA DE COSTA	F		—	LPURU	—	Pat
20	Alcino Fatima	F		—	Seq-remq	—	Pat
21	Quintão Riverio	M		—	lapuro	—	Pat

22	Loafelino da C. Mungul		M	Adjunto	Lafuro	76094369	
23	Andre Gonzaga		M	C.GAT	Turon	77031954	
24	Eduarda Cortereal	F		Delegada Resumo	Raimera	75653746	
25	Josela da Costa Noronha	F		Delegada	Lopurto	77697704	
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MINISTÉRIO DAS OBRAS PÚBLICAS
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“Consulta Pública ba Desenvolvimento Projeto Abastecimento Be'e Mos no Saneamento Iha Capital Município”

Dia: 04 de Dezembro de 2020

LISTA PREZENZA

Suco Holarua - Municipio Manufahi

NO	NARAN	SEXO		INSTITUISAUN/POZISAUN	ALDEIA	NO CONTACTO	ASSINATURA
		F	M				
1	Elamina da costa	F		vara ob casa	Fatuco		<i>[Signature]</i>
2	inaculada T- Vicente	F		vara da casa	Fatuco		<i>[Signature]</i>
3	Dicaia f. Barreto	F		Studente <i>[Signature]</i>	Fatuco	76021498	<i>[Signature]</i>
4	Livaria de S. Soares	F		studente	Fatuco	75980599	<i>[Signature]</i>
5	Fátima TAVARES DE NASCIMENTO	F		studente	Fatuco	—	<i>[Signature]</i>
6	DAVID CORTE-REAL		M	Juventude	Fatuco	76639023	<i>[Signature]</i>

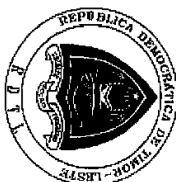
7	TONÉ DE Jesus		M	governante	Deunai	469076892374	
8	João BAPTISTA		M	Jovenfude	FATICO	76323525	
9	CARLITO DA CONCEIÇÃO		M	Jovenfude	faticu u	76772588	
10	JOSE NICOIAN DA COSTA		M	Jovenfude	Russu	75433695	
11	Afmeio Pires		M	Jovenfude	faturde	76535025	
12	DENIS da costa marcel.		M	Jovenfude	faturco	75477922	
13	MARIO P. MARONHA		M	Jovenfude	Faturo	76783850	
14	Deivis A.D.S. Gomes		F	— 11 —	— 11 —	76429290	
15	Anelita F. Freitas		F	— 11 —	— 11 —	467076660493	
16	Domingos Pacheco		F	— 11 —	— 11 —	75253370	
17	Augusta M. Sarmanto		F	— 11 —	— 11 —	76565672	
18	Cosimiro P. De Araujo		M	— 11 —	— 11 —	76471120	
19	Lidia V. Dos Santos Marçal		F	— 11 —	— 11 —	75659811	
20	Rosalia Pinheiro Vicente		F	— 11 —	— 11 —	75659811	
21	Joanica Vicente Marçal		F	— 11 —	— 11 —		

22	Aida Vicente dos Santos	F		Juventude	Faturco			Arévalo
23	Luciana M. do Carmo	F		Xf. JOVITUDE FERO	FATH-LUHAN	75667315		Arévalo
24	Angela Maici Saly	F		PARISI PANTI	FATUCO	76377068		Arévalo
25	Flomema Cardoso	F		u	u	-		Arévalo
26	Petronela Cutters	F		u	u	-		Arévalo
27	Alizira Soares Corte-Real	F		u	u	-		Arévalo
28	Leonardo Nunes	F		Dona de casa	u	-		Arévalo
29	Luciana de Jesus	F		-11-	D eunai	77719626		Arévalo
30	Joana Feitina	F		-11-	faturu	-		Arévalo
31	Angelina Laranjeira	F		-11-	D eunai			Arévalo
32	Diana Lurdes	F		-11-	finilolo	-		Arévalo
33	Ana Cardoso	F		-11-	faturu	-		Arévalo
34	Posita de Reis Fernandes	F		-11-	finilolo	-		Arévalo
35	Aurilia Martins Soares	F		-11-	faturu	-		Arévalo
36	Adelina Sacramento	F		Faturu	Faturu	78668933		Arévalo
37	Ibernia P. Tilman	F		-11-	faturu	77558743		Arévalo

38	Emelita da Costa	F	Dona de casa	Faturou	-	Blues
39	Ideltrudes M. DE A. T. M. BRANCO	F	coordenadora EPS.	Faturou	-	Blues.
40	MARIA DA COSTA	F	dona de casa	Faturou	-	May
41	ANTÓNIA DA COSTA	F	dona de casa	Faturou	-	Case
42	Carmines da Costa e Silva	M	Dona de casa	Faturou	75161038	Blues
43	Agostas dos Santos	M	Agostas dos Santos	Faturou	75161038	Blues
44	Jackson da Jesus Soares	M	Dona de casa	Faturou	75161038	Blues
45	MARTINA NORONHA	F	Dona de casa	Faturou	75161038	Blues
46	REGIÂNIA MARCAL	F	Dona de casa	Faturou	75161038	Blues
47	DULCEIA S. MENDONÇA	F	Dona de casa	Faturou	75161038	Blues
48	Juliete D.C Barros	F	Dona de casa	Faturou	75161038	Blues
49	SOFIA YOSIA de Jesus Corte-Real	F	Jovem de casa	Faturou	75161038	Blues
50	Bonifácia Corte-Real Soares	F	Dona de casa	Faturou	75161038	Blues

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7	Ronaldo M. Fernandes	M	estudante	Fátima	76354529	
8	Alberto Ribeiro de Araujo	M	Camada da de	Fátima	75438476	
9	Jenninges Dias Pires	M	xf. de lais	Fátima	75659811	
10	Natércia S. Costa-D-eal	M	est. estudante	Fátima	76767020	
11	Olivia da Costa Mendes	F	Estudante	Fátima	75788802	
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MINISTÉRIO DAS OBRAS PÚBLICAS

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Rua: Avenida 20 de Maio - Caiçol, Caixa postal No 17, Tel. 3317157, 3317156 - Dili

"Consulta Pública ba Desenvolvimento Projeto Abastecimento Be'e Mos no Saneamento iha Capital Municipio"

Dia: 05 de Dezembro de 2020

LISTA PREZENZA

Suco Letefoho - Municipio Manufahi

NO	NARAN	SEXO		INSTITUISAUN/POZISAUN	ALDEIA	NO CONTACTO	ASSINATURA
		F	M				
1	Martinho da Silva 17.		M	Chefe Aldeia	Ladique	77776479	
2	António Miranda		M	Chefe Aldeia	Notalala	77678493	
3	Rigardo Araújo		M	Chefe Aldeia	Tomamano	77370093	
4	Engracia B. DA-COSTA.		F		Tei-Ubu		
5	Leônia S. Corte-Real		F	Advogada	Ulu		
6	Flaminia Gonçalves		F		Aldeia		

7	Rosa Dacosta Maria	F		Delicada	Louisi		Priscila
8	Marta da da Silva	F		delegada	Tomonans		mezzos
9	Alcino P. De Araujo	M		delegado	Manco		mezzos
10	Miguel da Silva	M		delegado	Tomonans	75280997	mezzos
11	Nelita da Costa	F			Rai - upu		Nilda
12	Carmelita Pacheco da Costa	F			Rai - upu		mezzos
13	Rosa da Costa	F		Delegada	ailuli		mezzos
14	Terezinha d.J. Sarmiento	F		Donadelega	Ladiquei		mezzos
15	NATERSIA Xavier	F					mezzos
16	Joana Pereira da Costa	F		Dona de casa	Piui		mezzos
17	Monica EAFU	F			ailuli		mezzos
18	Carolina da Silva	F		--	catalala		mezzos
19	Delcio L. Xavier	F			Alui	76095310	mezzos
20	Terezinha De Jesus	F		juventude	Pilui	74374430	mezzos
21	Gracila da.c maria	F		Dona da casa	Raiuba	75775870	mezzos

22	Francisca F. de Andrade	F		Estudante	Catalala	75495655	
23	Maria F. da Silva	F		Dep. Juventude Feto-	Tomonano	78575731	
24	Leonardo d.c. magalhães	F		Dona da casa	Hiluli	76713568	
25	Beias Trinta	M		chefe famuleia	Ailuli	77287339	
26	francesco da silva	M		delegado	Ailuli	76769029	
27	Pacarr duma da costa	F		delegada	manico	76659942	
28	Osteiro muranda	F	✓	Mts telefonia	cafalula	76541535	
29	Silvina da costa	F		Estudante	catalala		
30	Elisabeth da costa P.	F		Dona de casa	Rimui		
31	Marguita Pereira P	F		Dona de casa	Ailuli	75668408	
32	Camêda do Rosário Fernandes	F		Dona da casa	Ailuli	76764360	
33	Antonio dos Reis	M		penguarua		7279862	
34	Antonio Abel da Costa dos Reis	M		delegado	Bai-velo		
35	Guacal pinheiro da costa Maxie	M		delegado	Catalala		
36	Jose Ferreira	M		Dep. Aldeia e cultura	Rimulaa	76348500	
37	904 mar tins	M			Ailuli	77497102	

38	André Barreto M.	M		Delegado Ar-luli	Ar-luli	76346214	
39	Jamardo da Costa M. Jamurto	M		Xefe A Klein Mauico	Mauico	75249372	
40	Travito Vendiane	M		Xefe Aldeia Filis	Ar-luli	77192719	
41	Marizito da Costa	M		Xefe Aldeia Rai-ubo	Rai-ubo	75729045	
42	ATIPU DE A.	M		Relegado Bentem	Rai-ubo	76429511	
43	Madalena da Costa A.	F		Dono da casa	Ladiqui	75188392	
44	Filomena de consaun	F		Dono da casa	Ladiqui		
45	Valentina Fernandes	F		Dono da casa	Ladiqui	75097541	
46	ELISABETH DA COSTA S.	F		Dono da casa	Ladiqui	75251342	
47	Fernando da Costa magalhães	F		—ll—	—ll—	78648792 76310804	
48	VICTOR B. da Costa	M		Participante	Ar-luli	77433355	
49	Antônio da Costa	M		—ll—	Mauico	77405495	
50	Tomás da Costa Real Lopes	F		Participante	Ar-luli	76590255	

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7	Cidalino Rodario d. c.	F		Participante	Aituli		Conf.
8	Teresa da Costa	F		—	ladroes		Conf.
9	Henrique bernardino	M		—	Nilike		Conf.
10	Flomera da Costa	F		—	Aituli	—	Conf.
11	FERNANDA DA CONCEIÇÃO	F		—	Aituli	—	Conf.
12	João da Costa	M		—	Mauilo	7348298	Conf.
13	Paulino Diana Ferreira	M		—	Aituli	73341172	Conf.
14	Nizela DA COSTA BARRO	F		Participante	Aituli	76842547	Conf.
15	Veronica MARIETA DA COSTA	F		Participante	Aituli	—	Conf.
16	Leopoldo DA COSTA PEREIRA	F		Participante	Aituli	—	Conf.
17	Nobre Barros Da Costa				Aituli	—	Conf.
18	Osorio da Costa araujo				Aituli	—	Conf.
19							
20							
21							