# DEMOCRATIC REPUBLIC OF TIMOR-LESTE

# MINISTRY OF PUBLIC WORKS

# PROJECT DOCUMENT FOR ENVIRONMENTAL LICENSING OF WATER SUPPLY

# LAUTEM MUNICIPAL CAPITAL

**Rev.4 – Final**

**September 2021**

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## ACRONYMS AND ABBREVIATIONS

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

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# INTRODUCTION

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

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

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

The 4MWSS Project intends to produce the following outputs:

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

The Ministry of Public Works (MPW) is responsible for planning, implementation, regulation, and monitoring of WSS, specifically the Be'e Timor-Leste (BTL), which, under the MPW, manages the Water and Sanitation facilities in the municipalities, these operated locally by the SMASA Lautem.

The MPW recognized its regulatory duty, as project proponent, as mandated in Decree Law No. 5/2011 - Environmental Licensing, to file a Project Document to the National Authority for Environmental Licensing (ANLA), as the start-up document for project screening and categorization under the environmental licensing process, for ALL 4 cities.

This Project Document's objective is to provide clear and relevant information on the proposed Water System Improvement Project for ***Lospalos Municipal Capital only*** (hereinafter called "Lospalos WATSAN Project") identified, located and described in Chapter 4.1, taking into account that its rehabilitation will be carried out under a future ADB loan to the Government of Timor-Leste. The project will also include a Sanitation sub-component to cover the Proposed Public Toilets and the implementation of a Feacal Sludge Treatment Plant (FSTP) as destination of the collected septic sludge in the city.

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

The ADB evaluated the environmental impact of the proposed rehabilitation through an Initial Environmental Examination (IEE) process under the ADB Safeguard Policy Statement (SPS) 2009 and concluded that the

rehabilitation and management of the proposed Water and Sanitation components within the Lospalos project area, would improve significantly the life of the Lospalos Municipal Capital dwellers, classifying the project as a Category B for environmental impact because the potential adverse environmental effects are site-specific, few (if any) were irreversible, and technical design and mitigation measures could be designed to address them.

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

# 1. PROPONENT DETAILS

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

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

**Proponent**
Ministry of Public Works (MPW),
Mr. Salvador Eugenio Soares dos Reis Pires, Minister
MPW Corporate Services Building
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**Proponent Primary Contact**
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Lautem, Lospalos Timor-Leste
(Telephone: 77326901)

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

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

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# 2. PROJECT LOCATION AND SCALE

## 2.1 Geographical Location

The 4 MCWSS Lospalos project is located in the urban area of Lospalos Municipal Capital Administrative post of Lospalos, Lautem Municipality, Lautem Administrative post in the northern border, Iliomar and Luro Administrative Posts in the western and southwest border, and the east bordering with Tutuala Administrative

post (See Appendix 1. General Map of the Project Area). Geographical coordinates of the project site are in the SW latitude of 8°35'31.60"S and longitude of 126°55'42.00"E and NE latitude of 8°27'26.40"S and longitude of 127°3'48.14"E.

## 2.2 Area Covered, Scale and Project Components

The Project scope includes all the areas that will be required to implement the Abstraction, Treatment and Distribution of Water for Human Consumption, as well as provide designs and solutions for Sanitation for Buildings, Schools and Housing within a diameter area of 15 Km around the Municipal Capital, as clarified by the client in April 2020, taking the Lospalos Water Distribution Zones defined in the Second District Capitals Water Supply Project (ADB, 2016) as the guidelines for the project area and scope. The 15 Km diameter is also based on limiting the project not to exceed its sanitation activities farther than the designated scope, so that it will not negatively impact much further on the environmental and social components, in other words, there will be no increasing in terms of the magnitude of the impacts.

As we can see in Figure 2, the 15 Km range Lospalos WATSAN Project area encompasses the following:

- Suco Fuiloro: almost the entire suco area, as it lies almost totally within the 15Km and includes the entire proposed Water Supply Network, the existing Papapa and Puahopo Springs and most of the proposed borehole testing sites and the sanitation component;
- Suco Home: half of the suco area, the existing borehole (2Km away from Papapa spring) and some of the proposed borehole testing sites and 1 public toilet;
- Suco Leuro, Souro, Lore II, Muapitine, Bauro and Raça: all these sucos are included in or overlap a bit with the 15Km project limit but, to date, no project component or activity is planned to occur within them.

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

The team carried out site visits respectively on the 18$^{th}$ – 19$^{th}$ of February 2020 (inception phase) and 2$^{nd}$ – 4$^{th}$ of June 2020 aiming to evaluate the specific environmental conditions of Lospalos city. The Team identified that the 15 Km diameter project area overlaps several cultural patrimony sites that lie adjacent and parallel to the project components i.e. transmission and distribution mains, albeit the proponent intends to apply mitigation measures diligently so that the referred sites are not impacted. The team did a field observation and an interview with several entities from Lautem Cultural Centre in order to identify these sites. Other sites such as sensitive biodiversity areas were identified in Kokoho Marsh, upstream of Papapa lagoon, and in Heller Marsh, West of the FSTP proposed site. The team was informed by the local administration i.e. Chefes de Suco, that the communities note there is movement of some wildlife through both the above mentioned areas, however it was not possible to understand if there are established hunting areas within the project area.

The implementation of the project is associated according to the project cycle, which comprises of 4 phases, commencing from the design activity. The subsequent phases are the construction activities of infrastructures, following the operational and maintenances of the facilities, and the decommissioning. Taking into account that each component is considered in order to elaborate the environmental management plan comprehensively, the project components are all aggregated within the 15 km radius project scope as shown in Figure 2, to be rehabilitated and/or newly constructed as described below:

a) *Water Sources:* the Lospalos water supply system for the community includes one spring and a lagoon, composed of:
   *i)* Puahopo spring that will be abstracted into the water treatment plant;
   *ii)* Papapa Lagoon, associated with Papapa spring that will contribute to the community's agriculture farms and the remaining flow will be released to the environment.

   It's important to note that Puahopo spring and Papapa lagoon are located adjacent to each other, while the Papapa spring is in the South side of the lagoon (See Figure 3) and although tested for its productivity, is currently not used. To the Southeast of the Papapa lagoon is the weir for alternative

abstraction surface water. These 3 sources are probably connected to one another and are assumed to be in one aquifer system because of their location.

b) Several new bore wells as additional sources to be included in the system and complement the existing springs. 7 boreholes in total are proposed in this project, 3 of them to be constructed as reserve for future demand requirements. Below is the list of names of the boreholes, both constructed and not yet constructed, including their GPS location.

Table 1 - Boreholes GPS Locations

| Boreholes | GPS Coordinates |
|---|---|
| Borehole #2 - Home 1 (RN438) | 8°30'9.32"S / 126°57'40.38"E |
| Borehole #3 - Home 2 (RN439) | 8°30'14.66"S / 126°57'35.42"E |
| Borehole #8 - Home 3 | 8°30'12.48"S / 126°57'48.41"E |
| Borehole #7 - Home 4 | 8°30'19.04"S / 126°57'44.39"E |
| Borehole #6 - DNSA 2018 | 8°30'16.33"S / 126°58'18.00"E |
| Borehole #5 - Sawarica (RN441) | 8°31'40.35"S / 126°59'28.73"E |
| Borehole #9 | 8°31'42.71"S / 126°59'27.90"E |

c) *Water Distribution Zones:* The main Puahopo spring supplies storage reservoirs and these subsequently supply 3 distribution zones with manual rotation in terms of supplying to the customers through gravity transmission and distribution pipelines.

d) Sanitation Sector: 4 public toilets pilot tests in located within the 15 km project area and a new Faecal Sludge Treatment Plant (FSTP) to be implemented in Parapata, suco Fuiloro. This proposed site is in an open area within the Lospalos plains, 1,400 m East of Zone 3.2 and right next to the Municipal Capital solid waste dumpsite, as well as a large agricultural area 400m to the East and 200m to the South.

Proposed water supply infrastructures for Los Palos are compiled below.

Table 2 - Water Supply - Summary of the Proposed Infrastructures

| Water Supply System | | Los Palos |
|---|---|---|
| Water Sources | Springs (un.) | 1 |
| | Boreholes (un.) | 7 |
| | Lagoon (un.) | 1 |
| | River Intake (un.) | 0 |
| Raw Transmission Mains (m) | | 4,958 |
| Water Treatment Plants (un.) | | 1 |
| Chlorination Buildings (un.) | | 2 |
| Water Tanks (un.) | | 3 |
| Water Tanks (total $m^2$) | | 4,250 |
| Transmission Mains (m) | | 8,470 |
| Distribution Network (m) | | 53,487 |

The proposed water supply system is reflected in Figure 1 (see also Appendix 1 and 6), also citing the length of transmission mains that conveys both raw and treated water from water spring intakes and boreholes, along with water storage, distribution reticulations discriminated per sub-zones. The raw transmission mains are associated separately according to the proposed water sources (groundwater and springs) i.e., Puahopo spring and 7 boreholes located in different Sucos ("Villages"). Water that is extracted will be treated before entering the storages. The proposed water supply is described in Section 4.

## 2.3 Material Source and Project Cost

This project will need raw materials for the implementation of construction activities such as sands, rocks and other necessary aggregated materials sourced from existing legitimate suppliers and designated quarry to be extracted nearby the project area. Before proceeding on the material extraction in the selected quarry, it is important to make sure that the activity is licensed, which will be prepared according to the procedure required.

Although, trenching activity will preferably be chosen to do backfilling of the excavated soil, in order to minimize mobilization and reduce excessive extraction on the quarry. While the cement is imported and the production of the concrete is done at projection sites. The preliminary cost of the 4MCWSSP for Lautem Municipality is estimated around $16,112,852 for proposed water supply and sanitation expenses, which is presented in the following table below:

Table 3 - Preliminary Cost Estimate for 4MCWSSP Lautem Municipality

| Water Supply System | USD ($) |
|---|---|
| Water sources and raw transmission mains | 2,087,814 |
| Water treatment plant | 939,360 |
| Water tanks and pumping stations | 3,068,820 |
| Transmission mains | 1,456,632 |
| Distribution network | 7,493,306 |
| Sanitation | USD ($) |
| Faecal Sludge Treatment Plant | 861,480 |
| Construction of 4 public toilets per City | 205,440 |

**Figure 1 – Proposed Water Distribution System for Lospalos (AdP-TL 2021)**

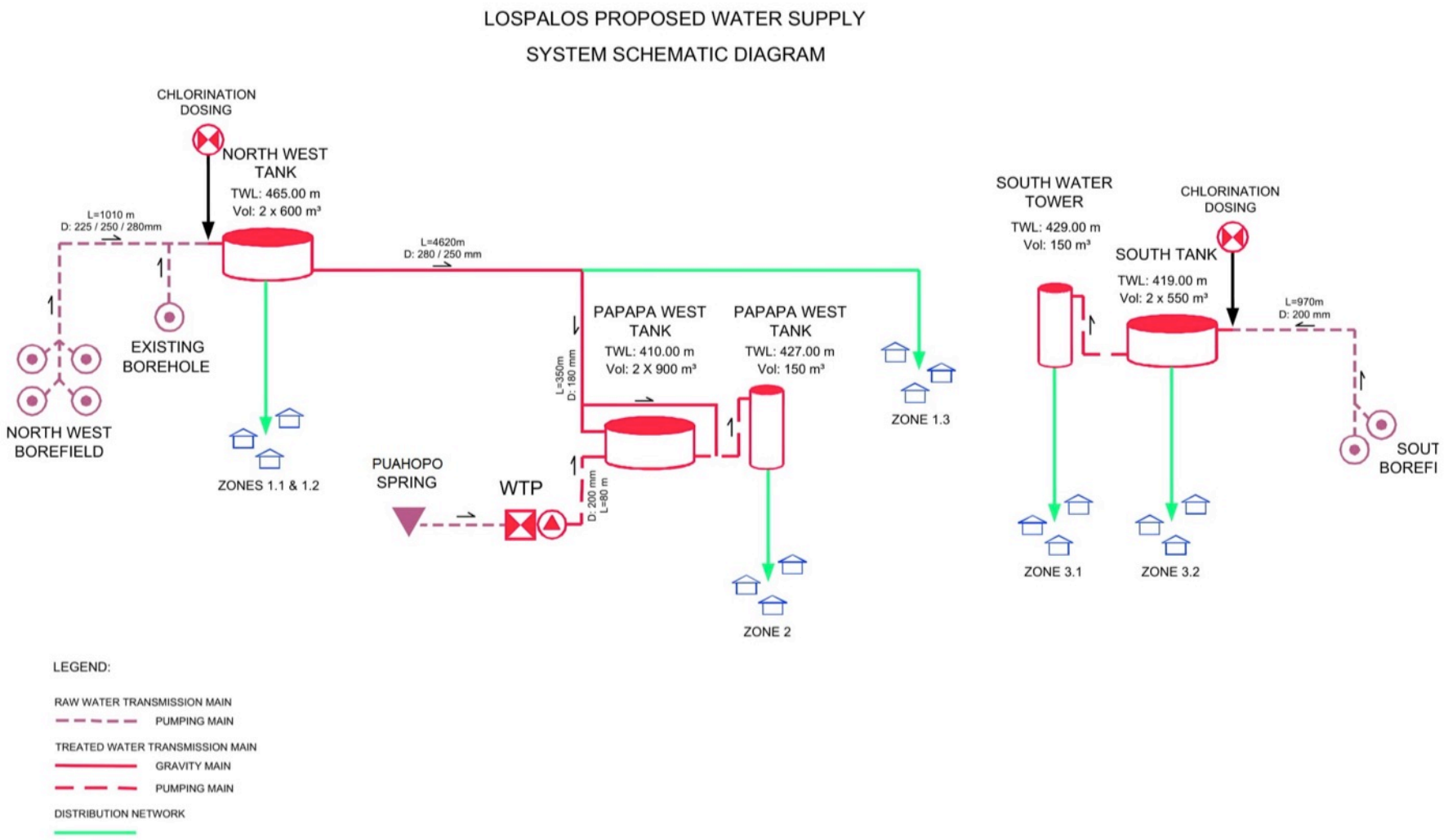


**Figure 2 - Location of the Lospalos WATSAN Project within Lautem Municipality**

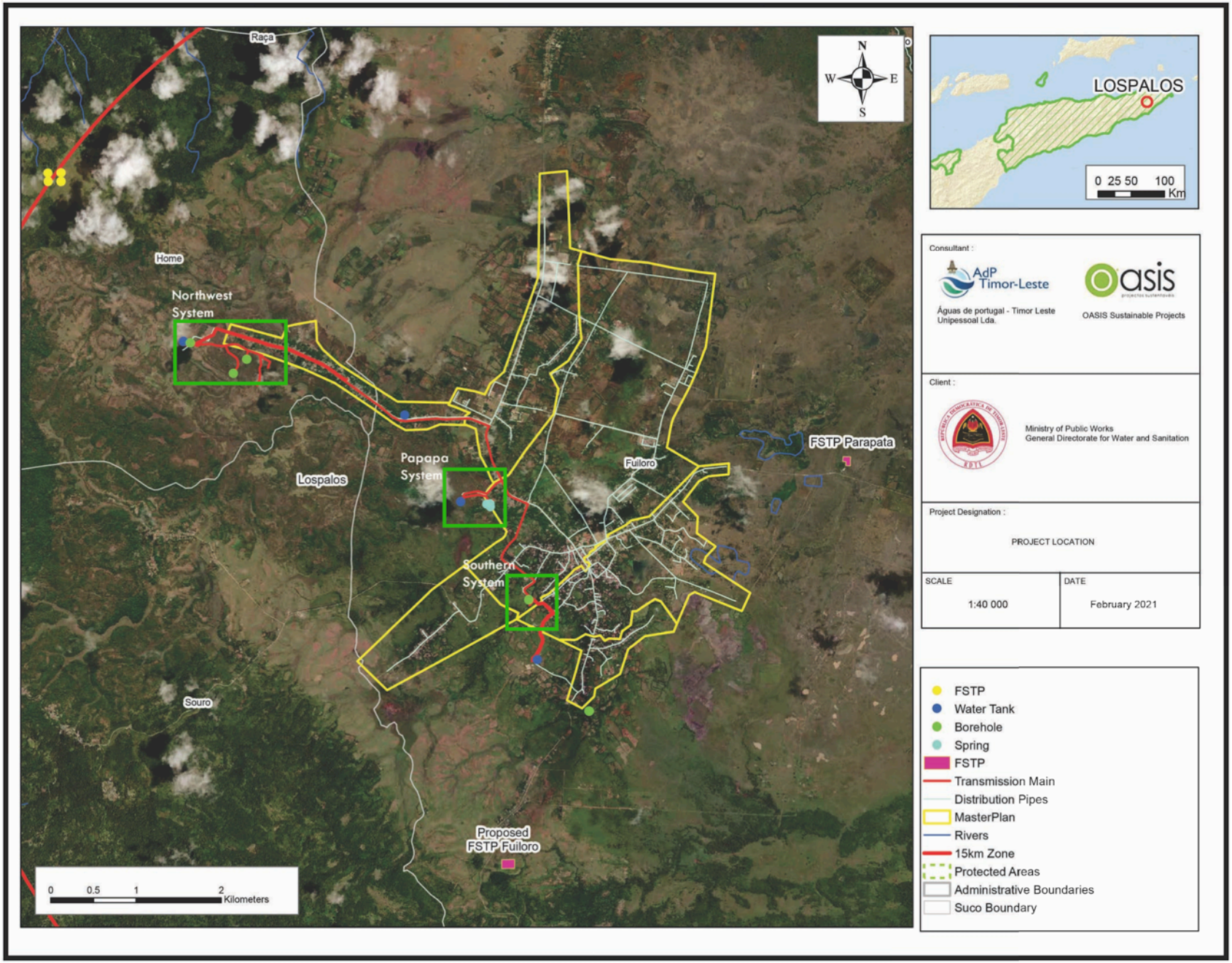

Raça
Home
Northwest System
Papapa System
Lospalos
Fuiloro
FSTP Parapata
Southern System
Souro
Proposed FSTP Fuiloro
N
W
E
S
0 0.5 1 2 Kilometers
LOSPALOS
0 25 50 100 Km
Consultant :
AdP Timor-Leste
Águas de portugal - Timor Leste Unipessoal Lda.
oasis
OASIS Sustainable Projects
Client :
Ministry of Public Works
General Directorate for Water and Sanitation
Project Designation :
PROJECT LOCATION
SCALE
1:40 000
DATE
February 2021
FSTP
Water Tank
Borehole
Spring
FSTP
Transmission Main
Distribution Pipes
MasterPlan
Rivers
15km Zone
Protected Areas
Administrative Boundaries
Suco Boundary

**Figure 3 – Northwest Water Systems**

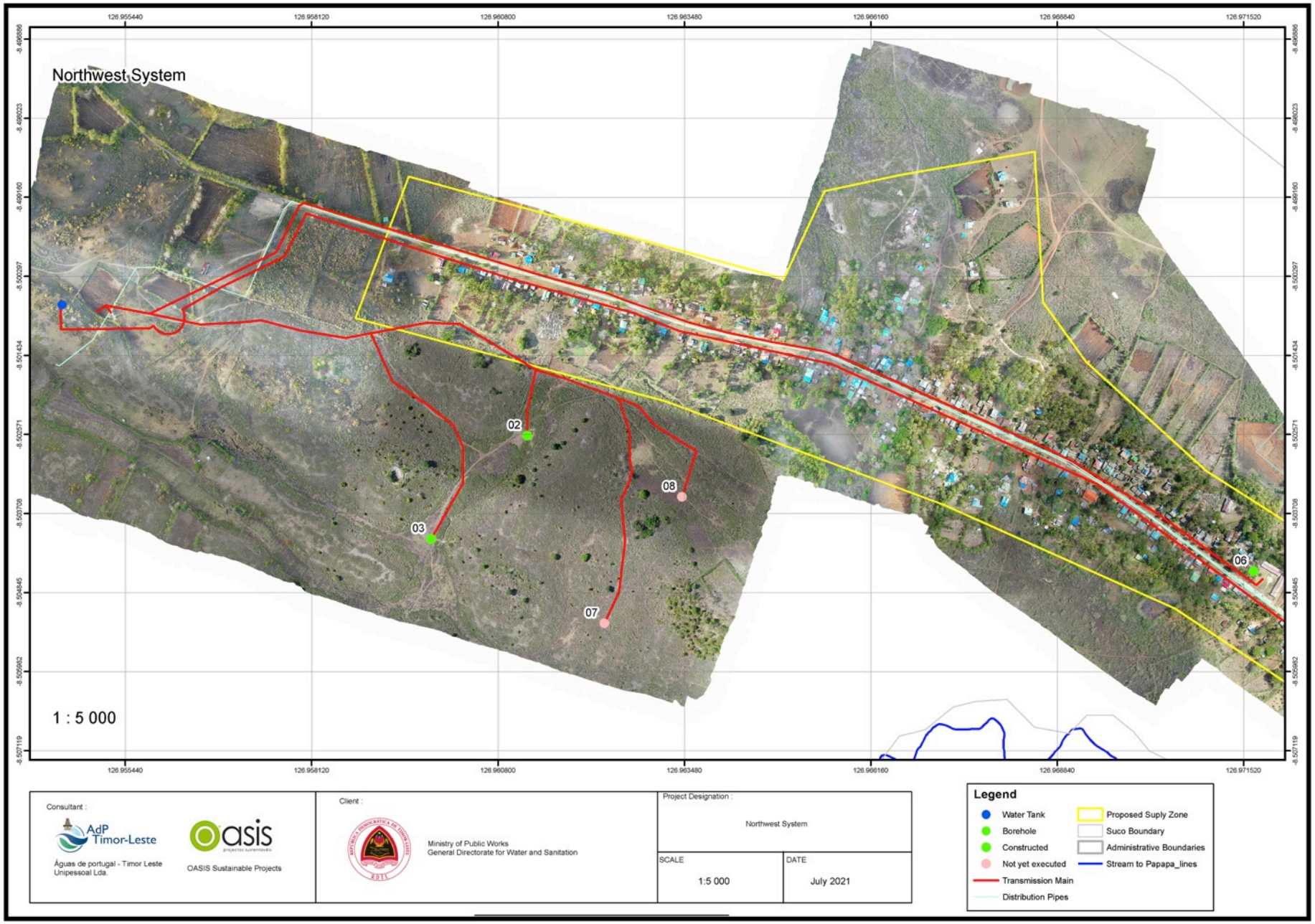
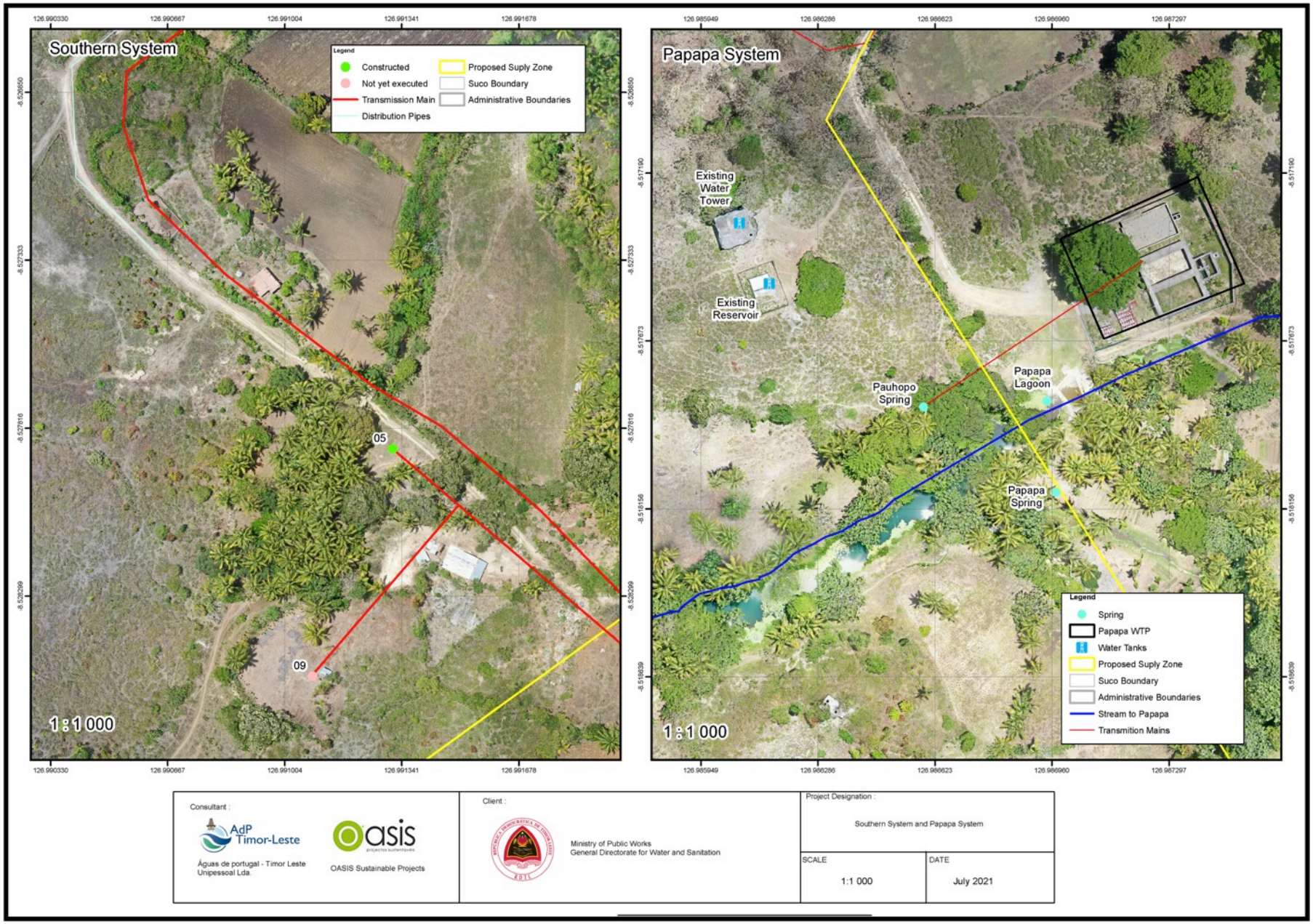


**Figure 4 - Papapa and Southern Water System**



## 2.4 Land Ownership

Table 4 - L results from the Social team survey regarding land ownership within the project components, namely public/government, private, and community land. This survey followed ADB Social Safeguards and procedures. Most of the land required for the project component has been identified as public land. Those plots registered as private land will follow the compensation process applicable in Timor-Leste, such as the customary land methodology or the legal procedure in the law.

Table 4 - Land due Diligence

| Project Components | Physical site | | Site ownership | | Comments |
|---|---|---|---|---|---|
| | Area ('000 m2) | Date Visited | Public | Private | |
| Intakes | | | | | |
| Northwest Borefield | | | | | |
| Bore 1 | 0.00125 | 07-12-20 | | √ | Members of the community who were present during the visit reported that the AH are actual users and claimant of the land |
| Bore 2 | 0.00125 | 07-12-20 | | √ | |
| Bore 3 | 0.00125 | 07-12-20 | | √ | |
| Bore 4 | 0.00125 | 07-12-20 | | √ | |
| South Bore field | | | | | |
| Bore 1 | 0.00125 | 07-12-20 | | √ | Members of the community who were present during the visit reported that the AH are actual users and claimant of the land |
| Bore 2 | 0.00125 | 07-12-20 | | √ | |
| Raw Water Transmission (Length x 0.6m-width) | | | | | |
| Northwest Bore 1 | | 07-12-20 | √ | | Transmission pipes will run along the road corridor |
| Northwest Bore 2 | | 07-12-20 | √ | | |
| Northwest Bore 3 | | 07-12-20 | √ | | |
| Northwest Bore 4 | | 07-12-20 | √ | | |
| Existing bore | | 07-12-20 | √ | | |
| Northwest Bore 2/3 | | 07-12-20 | √ | | |
| Northwest Bore 3/4 | | 07-12-20 | √ | | |
| Northwest Bore 4/ Northwest Tank | | 07-12-20 | √ | | |
| South Bore 1 | | 07-12-20 | √ | | |
| South Bore 2 | | 07-12-20 | √ | | |
| WTP | 2.2365 | 08-12-20 | √ | | The WTP is on an existing location which is public land based on public knowledge. Members of the community, confirms that the land has no claimant and active user. |
| Reservoirs (including pump stations) | | | | | |
| Northwest tank | 0.9000 | 07-12-20 | | √ | Members of the community who were present during the visit reported that the AH are actual users and claimant of the land. |
| Papapa West Tank | 0.9000 | 08-12-20 | √ | | There is an existing ground tank<br>The location is public land based on public knowledge. Members of the community, reported that the land has no claimant or active users. |
| South Tank & Pump station | 0.9000 | 08-12-20 | √ | | The location is public land based on public knowledge. Members of the community, confirm that the land has no claimant or active users. |
| Treated Water Transmission Mains (Length x 0.6m-width) | | | | | |
| Northwest tank to bifurcation to Papapa West Tank | 2.8122 | 07-12-20 | √ | | Transmission pipes will run along the road corridor |
| Connection ot Papapa West Tank | 0.3540 | 07-12-20 | √ | | |
| Bifurcation to Papapa West Tank - Future connection to supply Zone 1.3 | 0.5730 | 07-12-20 | √ | | |
| Connection to South Tank | 2.3328 | 07-12-20 | √ | | |
| Papapa WTP to Papapa West tank | 0.2190 | 07-12-20 | √ | | |
| Distribution network (Length x 0.6m-width) | 35.7804 | 07-12-20 | √ | | Distribution pipes will run along the road corridor |
| FSTP | 10.9812 | 08-12-20 | √ | | The location is a public land based on public knowledge. Members of the community, reported that the land has no claimants or active users. |
| Toilets | | | | | |

| Project Components | Physical site | | Site ownership | | Comments |
|---|---|---|---|---|---|
| | Area ('000 m2) | Date Visited | Public | Private | |
| Toilet 1 | 0.0840 | 07-12-20 | √ | | Location is public land within the perimeter of the Lospalos Market (please refer to Plate 8) |
| Toilet 2 | 0.0840 | 07-12-20 | √ | | Location is public land within the perimeter of the Cultural Center in Lospalos (please refer to Plate 9) |
| Toilet 3 | 0.0840 | 08-12-20 | √ | | Location is public land in the future government site in Lospalos (please refer to Plate 10) |
| Toilet 4 | 0.0840 | 08-12-20 | √ | | Location is public land within the perimeter of the health center in Suco Home (please refer to Plate 11) |

# 3. DISTRICT AND VILLAGES

As previously mentioned, the 4 Municipal Capitals Water Supply and Sanitation Project (4MCWSSP) for Lautem Municipality will cover 2 sucos, namely **Suco Fuiloro** (where 8 of the 11 aldeias will be covered by the system [Nacroman, 30 de Agusto, Lospala, Central, Bemoris, Ira-ara, Lereloho, Kuluhu]) **and Suco Home** (where 3 of the aldeias will be covered by the system [Tchenuloru, Reisoru, Larinatcha])**.** However, there are some sucos that are included in or overlap a bit with the 15 Km project limit, which are **Suco Leuro, Lore II, Muapitine, Souru, Bauro and Raça** but no project component or activity is planned to occur within them**. Therefore, no impacts will be expected in those mentioned aldeias and areas, as well as other areas outside Lospalos city.**

The total population according to the 2040 projection is 39,873 habitants. It is expected that the said numbers will get the benefit from clean water distribution and sanitary services. The remaining Aldeias from the said 2 Sucos are not included in this project because the DED water supply network cover was based on the approved supply areas from the 2015 Masterplan and also the extent of the urban areas due to significant increment of population numbers.

# 4. PLANS AND TECHNICAL DESIGN OF THE PROJECT

## 4.1 Project Description

### 4.1.1 General Description

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

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

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

Finally, the wastewater produced by each household, in the form of septic tank sludge, will be safely transported and treated at the proposed FSTP.

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

- Inception phase
  The team had finalized the final draft of the Inception Report on February 2020. The said report was aimed on providing all necessary information of the existing components of the project during a preliminary site visit.
- Water Resources Investigation and Reporting
  The underground water investigation for Same, Los Palos and Viqueque were carried out last October 2020 until January 2021. The status of this phase is in pending as this phase is still missing on the Baucau study at the field.
- Survey and Mapping
  Pending conclusion of field work.
- Analysis Options
  In this phase, the team provided the summary of several alternatives for the proposed projects that are to be analysed under the scope of the Preliminary Design report.
- Preliminary Design
  During the Preliminary Design stage, the team also went through the Initial Environmental Examination (IEE) and Environmental Management Plan (EMP) process under the ADB Safeguard Policy Statement (SPS) 2009 for environmental screening and for the purpose of ADB loan process. Throughout this phase, the team also carried out a Public Consultation in each of the 4 cities.
- Final draft of DED
  The inputs from the Public Consultations were collected and then used for improving and finalizing the design based on the preliminary design. The proponent will expect the final DED to be done during the upcoming Simplified Environmental Impact Statement (SEIS) process.

### 4.1.2 Water Supply System

#### A. Existing Water Sources

The Lospalos aquifer is supported by a layer of a very weathered limestone, that behaves as a porous aquifer. The current Public Water Supply source comprehends of 2 actual springs and a lagoon associated to them in one system:

1. Puahopo spring, abstracted into the pumping station;
2. Papapa spring, an emergent spring at the edge of a small lake that directly supplies the Municipal Capital;
3. Intake Lagoon related to Papapa spring, abstracted into the pumping station.
4. Two Boreholes next to Papapa WTP but are not functioning anymore;
5. Existing DNSA borehole in Home, dug up in 2018, reserved for future usage when demands increase;

According to DNSA previous water quality testing, the Papapa source has episodes of biological contamination, mostly from upstream husbandry activities and existing larger wild fauna i.e. freshwater crocodiles. In terms of productivity, the Project team have done investigations in October 2020, aiming to get definite numbers of the production yield. The total yield of the Papapa System (Papapa and Puahopo springs and Papapa Intake) can go up to approx. 131 L/s. The system is also comprised with another 2 existing boreholes (photos not available) not far from the springs, although they are inoperable due to a failure of the pumping system. Overall, water that is produced from all the existing sources can come up to a total of 140 L/s if both wells are in operation.

Water quality testing has been carried out by the Government laboratory and other projects since 2000 through to the 2015 Masterplan and up to January 2020 (Please see results in Appendix 5). Conclusions on these results are:

- For the period between 2000 and 2003, there is bacteriological contamination (total coliforms and Escherichia coli presence) in the distribution system and Papapa intake. There are some samples with high turbidity in the distribution network, but in the Papapa intake the values of turbidity are below the limits. The average of the total hardness in the Papapa intake is above the limit (around 280 mg/l CaCO3, reaching values around 440 mg/l CaCO3) considering TGL-04, but within the range considering the Decree-law n.31/2020. The values of Manganese are above the guide limit considering the Decree-law

n.31/2020, and under the guide limit of TGL-04 (however, there are few samples with manganese measurement);

- Master plan (2014) tests shows that there is bacteriological contamination (total coliforms and Escherichia coli presence) in the distribution system and in the Papapa intake and Puahopo intake. The total hardness is above the limit (around 240 mg/l CaCO3) considering TGL-04, but within the range considering the new legislation (Decree-law No. 31/2020). The turbidity is at the limit in Papapa intake (5 NTU);
- Regarding the water quality tests performed in 2019 and 2020, results confirmed the bacteriological contamination (total coliforms and Escherichia coli presence). The turbidity in the Papapa intake was also very high. There are only 2 values, namely the value from March at 173 NTU and for May at 17,8 NT
- The water temperature is normally high reaching temperatures of 32°C in some samples;
- The other parameters tested are according to the limits from Timor-Leste and of the WHO.

**Figure 5 Lospalos Existing Water Sources**

Puahopo Spring (Southwest View)

Papapa Lagoon (Southwest View)

WTP (East View)

Existing DNSA Borehole Home (East view) in 2018

## B. Distribution System.

Most of the transmission and distribution pipes are galvanized steel pipelines of varying age from the period of Indonesian administration, old Portuguese pipes particularly in the old town area, and newer pipes installed by DNSA or by rural projects such as i.e. under the National Program for Suco Development (PNDS) project. According to the 2015 Masterplan, there are also numerous duplicate mains identified. The distribution system requires rationalization and simplification as well as decommissioning and removal of all existing, inoperational pipes.

The only operating reservoir is a concrete tower constructed in an elevated ground adjacent to the Papapa spring and the WTP. There is also an adjacent ground level reservoir but it is unclear why it has never been use.

The distribution zone in Lospalos comprises of 3 different zones with manual rotation in terms of supplying to the customers on an intermittent basis. The service levels are very poor with low coverage, intermittent supply and low pressure. According to the test results and field observations, contamination of the water in the distribution occurs due to low pressure during periods when the supply is not operational. Depending on a single reservoir

for distribution is considered ineffective as Lospalos is relatively flat and the town has grown substantially. The pumped system, pump maintenance issues and daytime operation exacerbate the poor service levels.

Most of the connections are unmetered with less sharing of piped water supply. The community mostly depends on sharing alternative sources including dug wells and tube wells. The 2015 Masterplan states that only 33% are registered and supplied to the houses in the urban area with low quantity and poor service quality.

**Figure 6 Example of Distribution areas and existing installation**

Suco Fuiloro (Zone 3.2.) Pre-existing pipelines to be rehabilitated along existing roads

Suco Home (Zone 1.1) pipeline for rehabilitation

One of Several Private wells in Suco Home

Water tanks, a project done by the PNDS – Suco Home

Suco Home (Zone 1.2) pipeline to be rehabilitated in RoW

## C. Gaps in the Water Supply

**Water Balance: Demand vs supply.**

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

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

The project identified 7 potential borehole source areas (5 in the North System, in Home Suco and 2 in the South System) and to date have carried out bore exploration for 3 of them, with success in retrieving water. 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. Table 5 presents the water demands versus water flow October investigation results. Please note that Boreholes #7, #8 and #9 are not executed yet but given the production restrictions in the Papapa WTA, are accounted for as indispensable in the 2040 plan.

These preliminary results show that the Papapa system would have more than enough water flow to supply the current and future demands for Lospalos Municipal Capital, estimated at one and half times the 2040 water demand to cover all the proposed households within the supply zones.

However, as per SMASA-Lautem, the water treatment plant at Papapa is planned for a limited production of 20 lps, due to restrictions of physical expansion of the current WTP because the papapa area is sacred and does not accommodate for more infrastructure. Puahopo spring can produce up to 56 l/s of water according to pump test result on October 2020 (See Appendix 9), but given the previous issue stated, hence water will only be extracted 20 l/s. These preliminary results must also take into account the downstream social and ecological needs flow for the sources, including agriculture and other activities identified during the IEE characterisation. For more details on the water productivity of the proposed water sources please refer to Table 5 below.

The Ecological flow considered for Papapa source provides for the variability of rain and flow between dry and wet season and has been determined, at a minimum, of 30% average monthly flow for Wet Season and 10% for Dry Season. Given the papapa system would only account for 20 lps for water distribution (15% of the whole system flow), in this case the environmental flow would be at 47% in 2020, well above the suggested flow threshold (30%). However, the environmental flow provided in 2030 and 2040 will be lowered exactly to 30% to anticipate the alteration on the water spring capacity, in case one day SMASA is authorized for the WTP production expansion or increasing demand for agriculture irrigation in the future (social flow).

Additionally, boreholes were drilled and tested in several prospection points from 30$^{th}$ September to 10$^{th}$ October 2020, at the end of the Dry season. 2 pilot wells were indicated and successfully drilled in Aldeia Chenoloru, Suco Home, and an additional 2 boreholes were drilled, one in Aldeia Savarika, and another in Aldeia Kuluhun, in Suco Fuiloro. Of all these boreholes only three have been pressure tested and confirmed production at the yield required (15 to 20 lps), while the remaining await pump testing. The project intends to use the boreholes as top-up and backup sources, especially during the dry season when the papapa source has less flow due to seasonal water variability, which supports the system to avoid any water usage and/or quantity impacts.

The tests have determined a sustainable yield (production rate) for all three boreholes, which, together with the proposed papapa system available water for consumption, sums to an amount of water for supply that surpasses the requirement (demand) up to the horizon year 2040.

Additionally, the maximum extraction rate defined for each executed boreholes is below the tested sustainable groundwater availability, and acts as a precaution measure from aquifer over extraction. For instance, the sustainable yield for borehole No. 2 is 15 l/s at 24 hours but the system will extract a flow of 10 l/s for of up to 10 hours at a time, which represents approximately 30% less water extracted than the sustainable yield, for an equivalent 24 hour period. This extraction method is planned for all boreholes, up to year 2040 (see Table 5).

## Table 5 Water Demands & Deficits with Existing and Future Sources

| LOS PALOS | Existing Assessment | 2020 | | | 2030 | | | 2040 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Demands for water supply network | | Lps | hours | Volume ($m^3$/day) | Lps | hours | Volume ($m^3$/day) | Lps | hours | Volume ($m^3$/day) |
| Water Supply Demand (Total area) | | 42.3 | 24.0 | 3655 | 62.7 | 24.0 | 5416 | 88.4 | 24.0 | 7638 |
| Water Supply Demand (South area) | | 14.2 | 24.0 | 1227 | 18.42 | 24.0 | 1591 | 23.64 | 24.0 | 2042 |

| Existing Spring Sources | | Flow Measurement | | Flow to be extracted | | | | Flow to be extracted | | | | Flow to be extracted | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lps | % | Lps | % | hours | Volume ($m^3$/day) | Lps | % | hours | Volume ($m^3$/day) | Lps | % | hours | Volume ($m^3$/day) |
| Papapa System | | 131.9 | 100% | 131.9 | 100% | | | 131.9 | 100% | | | 131.9 | 100% | | |
| | Water supply | 72.0 | 55% | 20.0 | 15% | 24.0 | 1728 | 20.0 | 33% | 24.0 | 1728 | 20.0 | 33% | 24.0 | 1728 |
| | Social Demand (w/Agriculture) | 49.4 | 37% | 49.4 | 37% | | | 72.3 | 37% | | | 72.3 | 37% | | |
| | Remaining Flow | 10.5 | 8% | 62.5 | 47% | | | 39.6 | 30% | | | 39.6 | 30% | | |
| Potential Sources (Boreholes North) | | Tested Maximum Yield | | Planned Extraction | | | | Planned Extraction | | | | Planned Extraction | | | |
| | | Lps | | Lps | hours | | Volume ($m^3$/day) | Lps | hours | | Volume ($m^3$/day) | Lps | hours | | Volume ($m^3$/day) |
| Borehole #2 - Home 1 (RN438) | | 15 | | 10 | 10 | | 368 | 10 | 11.9 | | 428 | 10 | 23.3 | | 837 |
| Borehole #3 - Home 2 (RN439) | | 20 | | 10 | 10 | | 368 | 10 | 11.9 | | 428 | 10 | 23.3 | | 837 |
| Borehole #8 - Home 3 | | | | | | | | 10 | 11.9 | | 428 | 10 | 23.3 | | 837 |
| Borehole #7 - Home 4 | | | | | | | | 10 | 11.9 | | 428 | 10 | 23.3 | | 837 |
| Borehole #6 - DNSA 2018 | | 9 | | 9 | 10 | | 332 | 9 | 11.9 | | 385 | 9 | 16.0 | | 518 |
| TOTAL | | | | | | | 700 | | | | 2097 | | | | 3867 |
| Potential Sources (Boreholes South) | | Tested Maximum Yield | | Planned Extraction | | | | Planned Extraction | | | | Planned Extraction | | | |
| | | Lps | | Lps | hours | | Volume ($m^3$/day) | Lps | hours | | Volume ($m^3$/day) | Lps | hours | | Volume ($m^3$/day) |
| Borehole #5 - Sawarica (RN441) | | 21 | | 10 | 17 | | 613 | 10 | 22.1 | | 796 | 15 | 18.9 | | 1021 |
| Borehole #9 | | | | 10 | 17 | | 613 | 10 | 22.1 | | 796 | 15 | 18.9 | | 1021 |
| TOTAL | | | | | | | 1227 | | | | 1591 | | | | 2042 |
| Total Production | | Tested Maximum Yield | | Planned Extraction | | | | Planned Extraction | | | | Planned Extraction | | | |
| | | Lps | | Lps | | | % | Lps | | | % | Lps | | | % |
| Total Bore Production (North) [1] | | 74 | | 19 | | | 26% | 49 | | | 66% | 49 | | | 66% |
| Total Bore Production (South) [2] | | 63 | | 20 | | | 32% | 20 | | | 32% | 30 | | | 48% |
| Total Bore Production (North & South) | | 137 | | 39 | | | 28% | 69 | | | 50% | 79 | | | 58% |
| Total Spring Production | | 131.9 | | 20.0 | | | 15% | 20.0 | | | 15% | 20.0 | | | 15% |
| Total Production Capacity (Bores + Springs) | | 268.9 | | 59.0 | | | 22% | 89.0 | | | 33% | 99.0 | | | 37% |

[1] Assuming lowest sustainable yield on nearby bores (15 lps)

[2] Assuming lowest sustainable yield on nearby bores (21 lps)

Therefore, if the remaining boreholes are to be augmented in the system, there is a promising provision of water for the system, as shown in Figure 7 below, particularly during dry season when water is at its lowest productivity.

**Figure 7 - Water Resources Extraction versus Water Demand and Yearly Service Area Total Population**

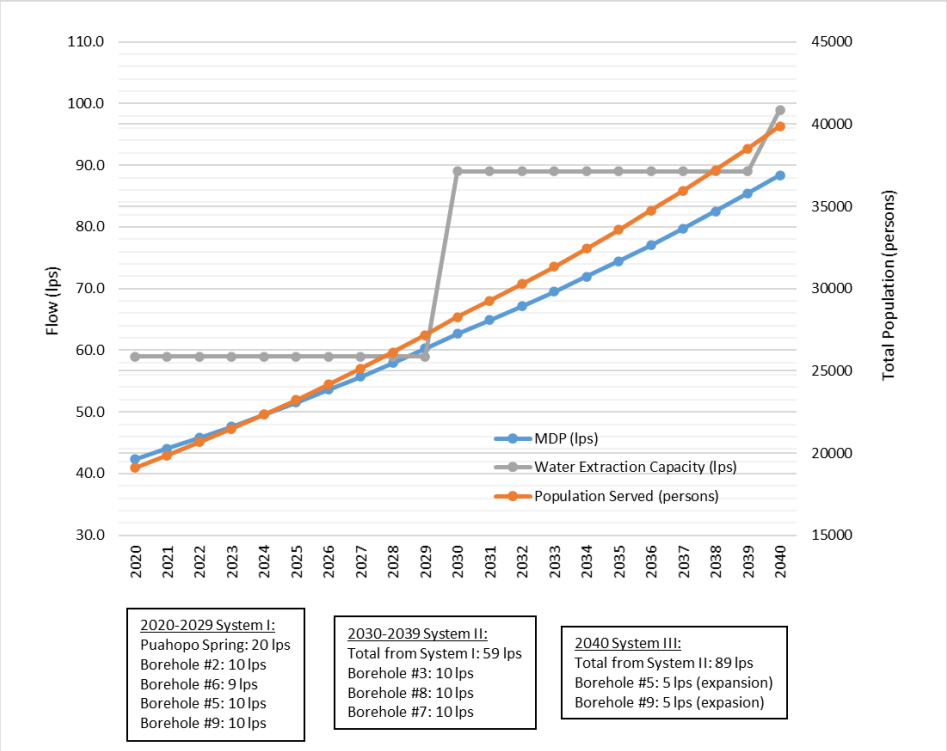
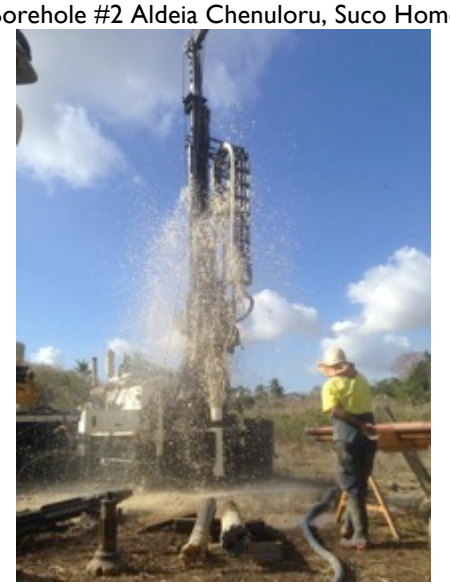


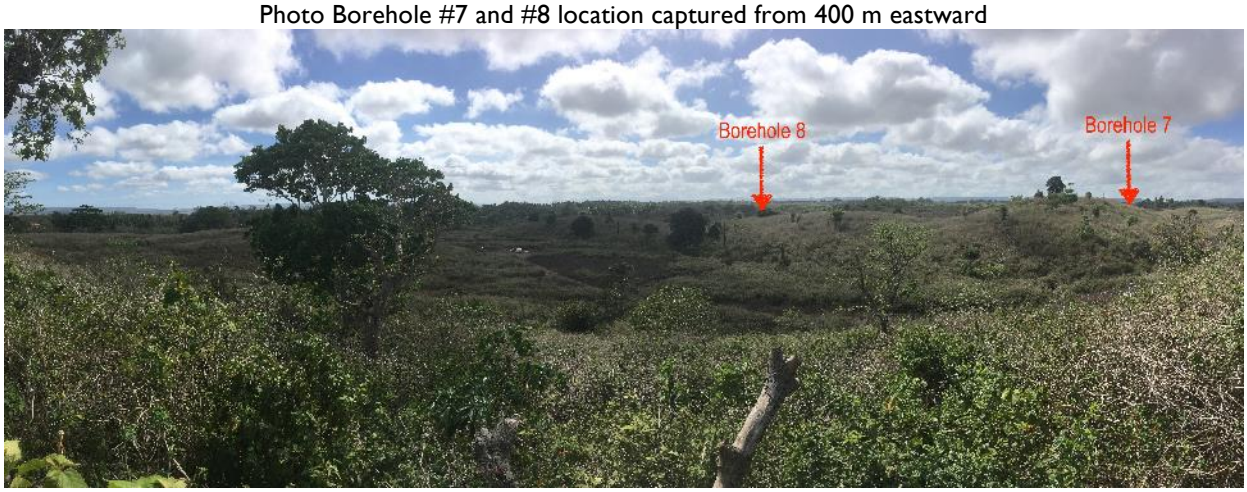

**Figure 8 New Boreholes and pump testing**

| Borehole #2 Aldeia Chenuloru, Suco Home | Borehole #3 Aldeia Chenuloru, Suco Home |
|---|---|
|  |  |

Borehole #2 landscape vicinity

Borehole #3 Post pump testing

Photo Borehole #7 and #8 location captured from 400 m eastward




Borehole #5 Post Pump Testing

### 4.1.3 Sanitation System

Based on 2016 Masterplan, the National 2030 target for household sanitation is 80% urban sanitation coverage, defined for 2015, as in the Government Resolution No. 8/2012 - Sanitation policy. However, major deficiencies of current toilets in school are mostly open defecation practice, lack of cleanliness, insufficient water supply, poor construction standards and inadequate lighting, schools are not "User friendly" where none of the toilets cater for the special infrastructural requirement of children, physically handicapped persons and menstruating girls, and nevertheless inadequacy of funds for operation and maintenance. No schools have been conducting regular water quality sampling and testing on regular basis and none of the school's chlorination system is done.

In addition, all the houses that do not practice open defecation are contributing with septage, through their own toilets or shared toilets. According to the Masterplan, only 19% households in Lospalos practice open defecation.

Lastly it is presumed that all the leaching pits provided in the households are functioning as septic tanks for all practical purposes. Hence all these sanitation facilities are producing digested sludge which needs to be removed once in two years.

## 4.2 Proposed Water Supply and Sanitation System

### 4.2.1 Water Supply System

#### A. Water Sources

As mentioned in Sub-chapter 4.1, water sources in Lospalos comprise of 2 actual springs and an intake lagoon, as well as new bore holes. The detailed investigations for the existing springs and lagoons were carried out in October 2020 by the water resource team. Moreover, the team also has done the underground water investigations for proposed boreholes in 5 different sites in total, however, only three sites meet the requirements. Thus, the results showed that the current yield capacity in total (existing origin (springs & lagoons) and proposed boreholes) is 84 Lps which is shy of the 2040 water demand requirement for Lospalos.

As the future boreholes are expected to surpass the 88 lps as soon as they come online, the table below shows the only scenario possible for Lospalos to guarantee supply and maintain sustainability up to 2040:

**Table 6 - Water Sources Scenarios**

| | | | |
|---|---|---|---|
| Lospalos | Scenario 2040 | Proposed Water Sources | Papapa Intake, Boreholes #2, #3, #6, #7 and #8 (in Suco Home at west of the Municipal Capital) and Boreholes #5 and #9 (in Suco Fuiloro) |

The existing springs will be analysed for their current productivity and the other concurrent water uses. Regarding new boreholes, the scope of the current project will consider the construction of the infrastructure needed to assure the estimate consumption for the next 10 years. The image of proposed boreholes construction layout and working procedure are presented in Appendix 6 – D4 Preliminary Design Report.

#### B. Water Storage, Treatment and Conveyance

As the water investigations are already commenced, there is information that allows a reasoned analysis regarding the availability of water at the sources. Based on the information about the springs and boreholes reliable yields, it is possible to establish the final systems frame, however, the analysis made was focussed in possible layout of the systems (different Scenario), as shown in table below.

In **Scenario I**, the water supply would be assured by two water sources:

1. The old Indonesia borehole to be rehabilitated and a set of new boreholes nearby;
2. The borehole that exists at the west of the Municipal Capital (Suco Home) which was also built during the Indonesian administration will be rehabilitated.

Previously it was planned that if the results of hydrogeological investigations determined that those boreholes yield is not sufficient to meet the water demand, then it should be foreseen to reinforce with a third water source by rehabilitation of the two existing boreholes of the Papapa WTP, and if necessary, another reinforcement by building a new borehole 900 m from that area. If a fourth water source will be necessary, three more locations at south of the Municipal Capital were identified as possible potential areas to conduct bore tests. However, based on the result of the water investigation shows that even the Indonesian Borehole which is located in Suco Home Aldeia Tchenuloru does not meet the requirement giving zero availability but the other 3 boreholes mentioned in Section A are possible to be foreseen to reinforce other existing sources.

Hypothetically, it will be necessary to build another water treatment facility in the two existing boreholes at the actual Papapa WTP, with softening (Calgon dosing) and disinfection treatment lines and the treated water will be stored in the Papapa West Tank. A fourth water source is necessary, which is located in Suco Fuiluro Aldeia Sawarica (in the South Municipal Capital) to be explored, given the distance from the location to the other

treatment facilities is quite far, hence, it is considered to build another water treatment facility with the same treatment lines near the South Tank which will store the treated water.

**Figure 9 Lospalos Water Sources Scenario I**


Therefore, a **Scenario II** was chosen, where the 2040 water supply would be assured by the following water sources:

1. Papapa lagoon and Puahopo spring;
2. Boreholes #2, #3, #6, #7 and #8 (in Suco Home at west of the Municipal Capital);
3. Boreholes #9 and #5 (in Suco Fuiloro);

In this scenario, Lospalos water system will be supplied by Puahopo spring, in addition of using surface water in the Papapa area. The water from Puahopo spring will be collected and treated in the WTP for water hardness correction (Calgon addition), sedimentation and filtration steps, and chlorination.

The existing boreholes at west of the Municipal Capital will be rehabilitated and the extracted water will be pumped to a WTP near the Northwest Tank at 427 meters above mean sea level. The treatment facility will include treatment lines with addition of Calgon to water hardness correction and chlorination. If necessary, the system water sources will be reinforced with more boreholes near Papapa area, as first priority, and near the South Tank area, as a second priority.

**Figure 10 Lospalos Water Sources Scenario II (North System)**

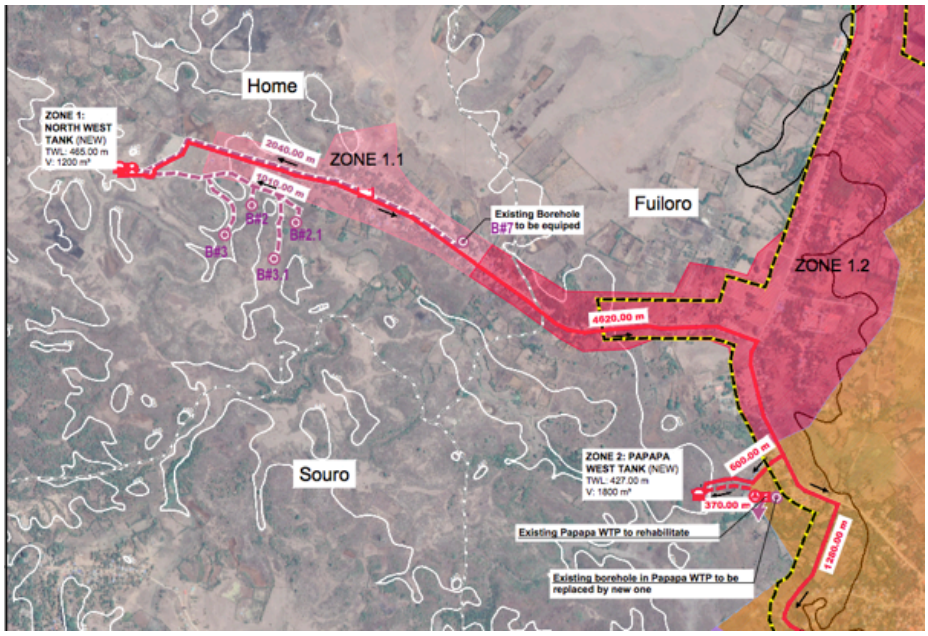


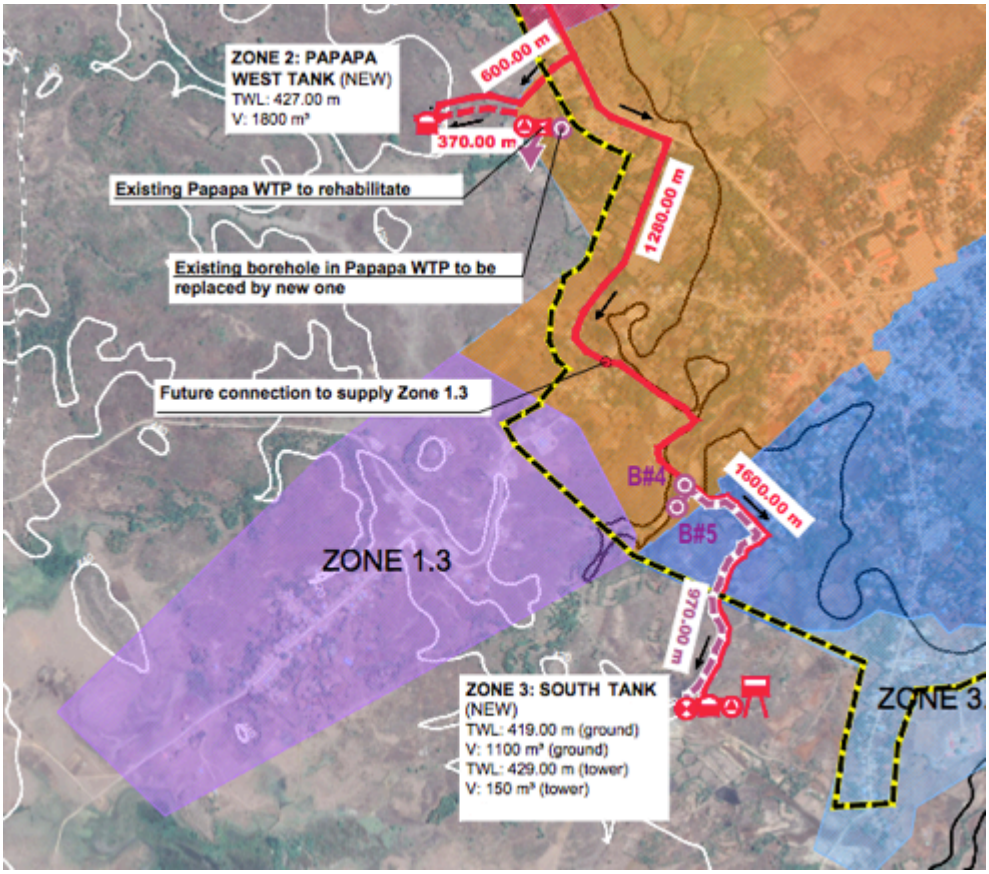
Table 7 lists the proposed water tanks storage calculated according to the water demands projection for 2040. See also Appendix 6 for the Water tanks design.

**Table 7 – Proposed Water Tanks Storage**

| Municipal Capital | 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(*) |
| Lospalos (Scenario 1) | North West Tank | 958 | 1 367 | 2 538 | 740 | 1 375 | 700 | 700 |
| | Papapa West Tank | 1 091 | 1 669 | 2 813 | 904 | 1 524 | 1 000 | 500 |
| | South Tank - Tower Tank | 1 136 | 1 443 | 1 948 | 782 | 1 055 | 150 | - |
| | South Tank - Ground Tank | | | | | | 800 | 300 |
| | Total | 3 185 | 4 479 | 7 299 | 2 426 | 3 954 | 2 650 | 1 500 |
| Lospalos (Scenario 2) | North West Tank | 1 215 | 1 871 | 3 258 | 1 014 | 1 765 | 1 000 | 800 |
| | Papapa West Tank | 834 | 1 165 | 2 093 | 631 | 1 134 | 700 | 400 |
| | South Tank - Tower Tank | 1 136 | 1 443 | 1 948 | 782 | 1 055 | 150 | - |
| | South Tank - Ground Tank | | | | | | 800 | 300 |
| | Total | 3 185 | 4 479 | 7 299 | 2 426 | 3 954 | 2 650 | 1 500 |

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

**Figure 11 Lospalos Water Sources Scenario II (South System)**




## C. Rehabilitation of the Transmission and Distribution Mains

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

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

Transmission Lines (HPDE and Ductile Iron):

- Transmission lines with nominal pressure below 16 bar and nominal diameters below 315 mm – use of HPDE;
- Transmission lines with nominal diameters equal or above 300 mm - use of ductile iron;

- All transmission lines with nominal pressure equal or above 16 bar (regardless of the diameter) – use of ductile iron.

Distribution Network (HPDE):

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

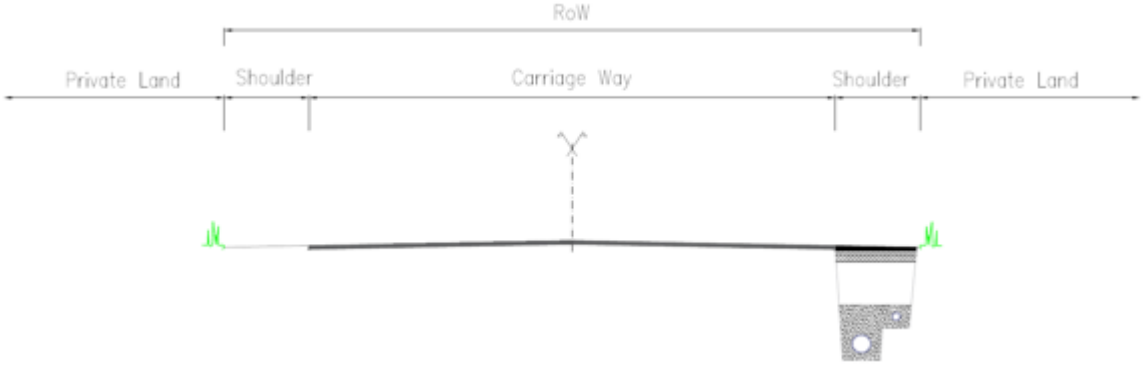
During the Preliminary Design, the project proposed various diameters of pipeline between 60 mm and 250 mm for the distribution network with total length of distribution network 53,487 m and transmission mains 13,428 m. Table below reflects the total populations per total length of the distribution pipelines in each supply zones.

It is assumed that pipes will be buried underground, laid along and within the road Right of Way (RoW) or outside the RoW for the purpose of replacing/rehabilitating existing pipes. Inside the Municipal Capital area, transmission mains will be laid below the distribution network level, as shown in Figure 12. In order to allow the construction of the service connections on each side of the roads without interference with transmission mains and, also, to become more difficult to do illegal connections.

**Table 8 - Total Population versus Distribution Network Length versus Supply Zones – Lospalos City**

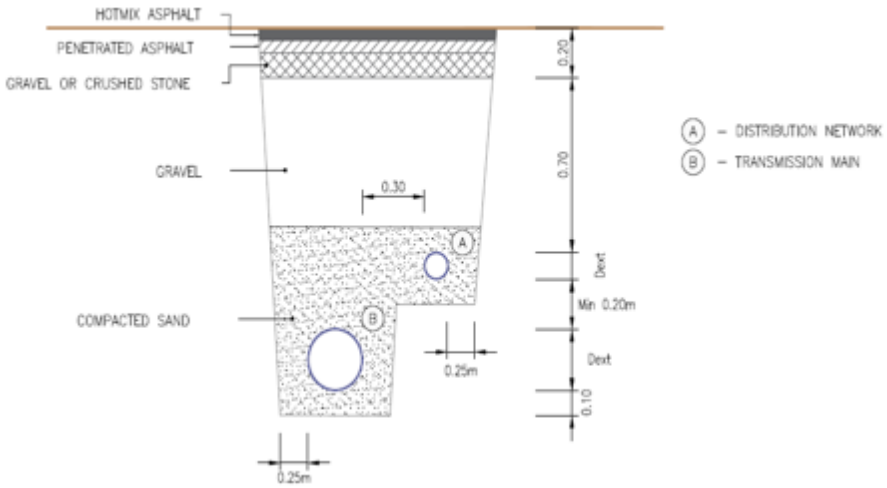
| Tank | Zone | Population | | | Proposed Distribution Network |
|---|---|---|---|---|---|
| | | 2020 | 2030 | 2040 | km |
| North West Tank | 1 | 5358 | 8251 | 11935 | 14,4 |
| Papapa West Tank | 2 | 7336 | 11711 | 17279 | 22,3 |
| South Tank | 3 | 6403 | 8305 | 10659 | 16,8 |

**Figure 12 - Laying of Transmission and Distribution Lines along the Road. Typical Cross Sections**




Typical trench details are presented in the following figure:

**Figure 13 - Typical Double Trench**



Land that is excavated for trenching activity will all be reutilized in order to avoid extracting more materials from other resources and so that the activity will be more efficient in terms of its cost. Table below is the volume of materials to be reused once the pipes are replaced.

Table 9 – Materials for Reutilizing

| | Unit | Same |
|---|---|---|
| Excavation | $m^3$ | 64.435 |
| Gravel (Bedding, Embedment and Top Embedment) | $m^3$ | 11.152 |
| Pipe | $m^3$ | 589 |
| Backfill | $m^3$ | 52.694 |
| Landfill | $m^3$ | 11.741 |

Transmission Mains Service

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

Gravity Transmission Mains Operation

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

Distribution Network Pressure Zones

In each distribution zone, the pressure in the network can vary between 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). Advantages of BPTs vs PRVs:

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

Disadvantages:

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

### 4.2.2 Sanitation System

The proposed sanitation treatment sector is composed of 4 pilot test sites for public toilets (with septic tank and effluent soak pit system) and the construction of the Faecal Sludge Treatment Plant (FSTP) to receive the septage from these pilots, as well as all buildings and households located within 15 km of the Lautem Municipal capital. According to the Masterplan, it is inferred that National 2030 target for household sanitation is 100% access to hygienic toilets and improved hygiene behaviour as in consistent with the Government Resolution No. 8/2912 regarding to the Sanitation policy. The public toilets' pilot test locations will be chosen per the location and conditions of current sanitation infrastructure, users, as well as and specifically regarding schools, on the number of students, teachers and other school personnel, as well as the state of the toilet facilities

## A. Public Toilets

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

| | |
|---|---|
| 1. Male Toilets:<br>• Adult: 3 urinal stalls<br>• Adult & Children: 3 latrines (each with 1.2 $m^2$[approx.]);<br>• Children: 1 small urinal | 2. Female Toilets:<br>• Adults & Children: 5 latrines (each with 1.2 m2[approx.]);<br>• Facilities for menstruating girls. |
| 3. Physically disabled Toilets:<br>• Adults & Children: A common latrine for physically disabled person shall be provided at the centre of men's and women's section. Area of latrine with a ramp etc. for a handicapped person=3.70 m2 [approx.] | |

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

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

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

**Figure 14 - Septic tank for up to 50 persons capacity**

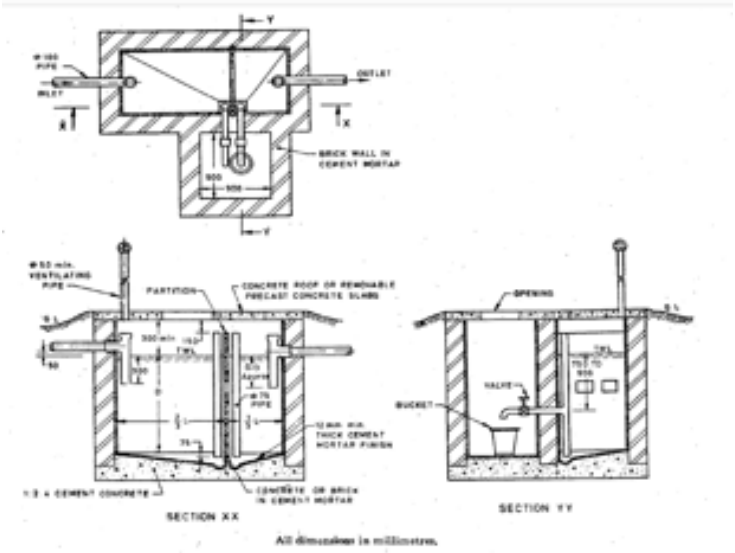



**Figure 15 - Septic tank for up to 200 persons capacity**

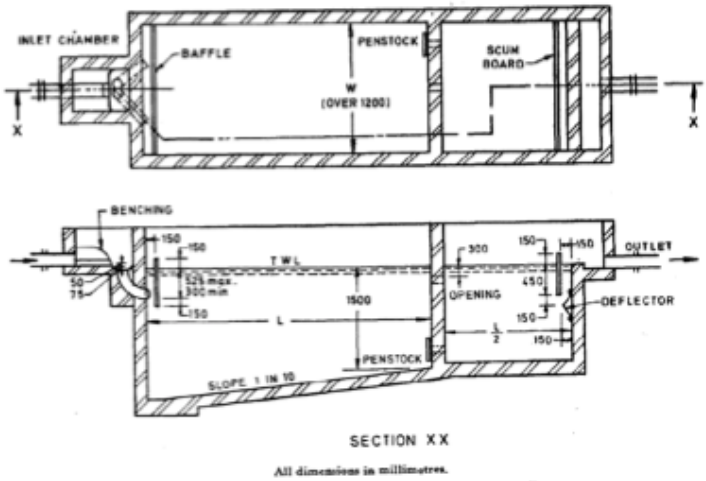
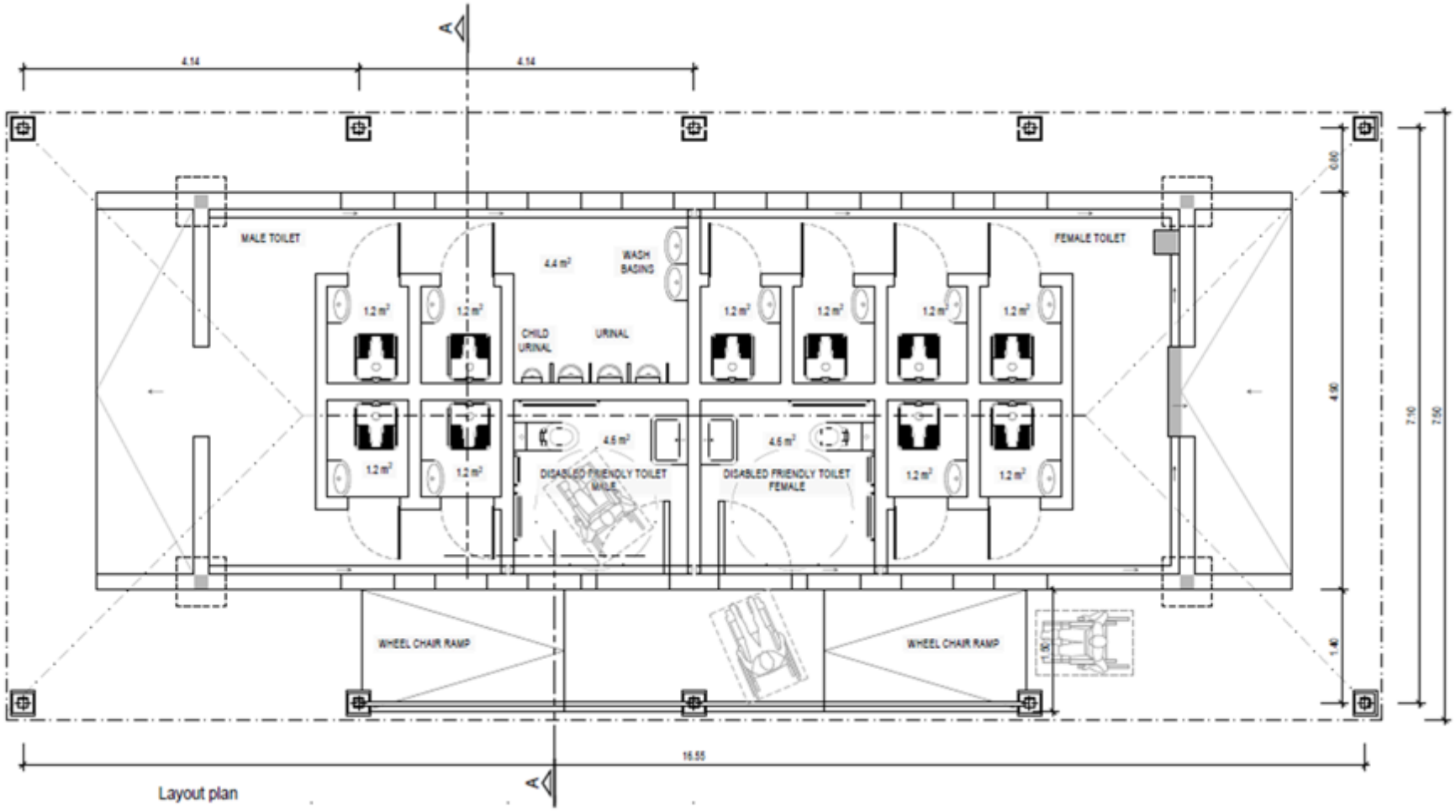


**Figure 16 - Public Toilet layout**



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

**Figure 17 - Public Toilets Proposed Location Lospalos**


**Figure 18 - Aerial Image of Public Toilets Proposed Locations**

| Public Toilets | Remarks |
|---|---|
| #1 |  Rehabilitation of existing toilet facilities, Traditional Market, Suco Fuiloro, Aldeia Bee Moris |
| #2 |  Lautem Cultural Centre, Suco Fuiloro, Aldeia Central |

| | |
|---|---|
| #3 |   Campo 28 de Novembro, Suco Fuiloro , Aldeia 30 de Agosto |
| #4 |   Behind ChildFund Health Centre (Offered by Chief of Suco Home), Suco Home |

**B. Faecal Sludge Treatment.**

The FSTP was designed considering the future users of the sanitation system up to 2040, namely public buildings, households and schools. The FSTP will be supplied with septage collected by vacuum trucks from domestic and non-domestic sources and the estimated daily volume collected in Lospalos can be viewed in Table 10.

**Table 10 - Total Septage Volume to be collected daily projections**

| Lospalos | 2020 | 2030 | 2040 |
|---|---|---|---|
| No. of Households-[6.16 avg HH size] -DED | 3,100 | 4,589 | 6,473 |
| Septic tank coverage assumption | 62% | 74.7% | 90% |
| No. of septic tanks | 1,922 | 3,428 | 5,826 |
| Total sludge produced ($m^3$/year) | 475 | 840 | 1,424 |
| Total sludge produced ($m^3$/d) | 1.3 | 2.3 | 3.9 |

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 access
- The land should be relatively flat to facilitate the construction of lagoons without excessive earthworks
- The lagoons will be constructed using earthen embankments. Site is assumed to be on soil.

The proposed FSTP will be placed in Suco Parapata (See Figure 21), since it has all the requirements needed comparing to other alternatives provided and the surrounding area is a "brownfield project" adjacent to a pre-existing Municipal Capital Solid Waste Dumpsite. The proposed area has been acknowledged and approved by the local Municipal Administration as referred in Appendix 8. This also means that the area is assured for its availability and that the project proponent is permitted to use the land for future construction, without any hindrance from other parties or vice versa.

**Figure 19 FSTP Lospalos installation and segments**

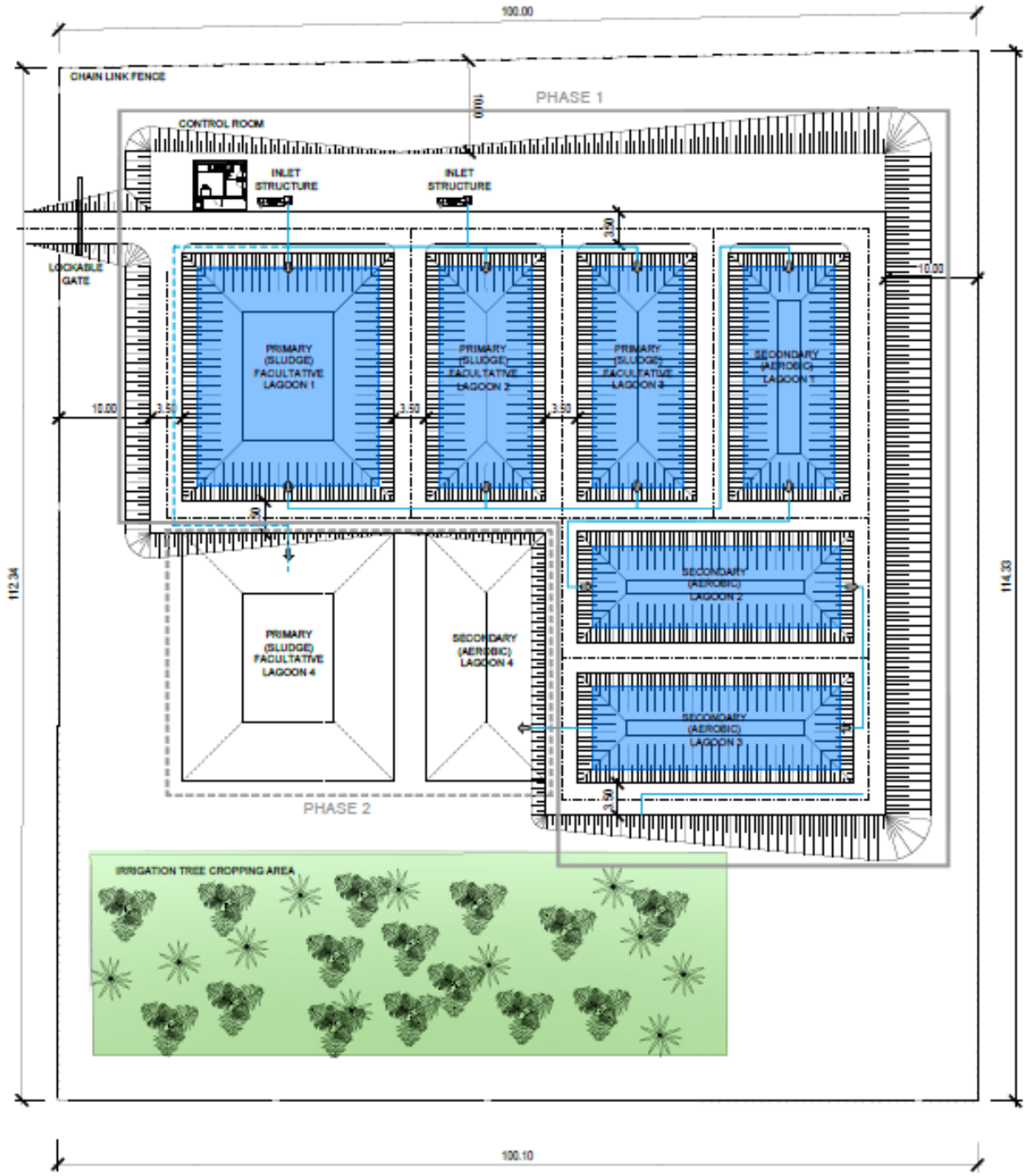


**Figure 20 Photographs of Proposed FSTP Site and surroundings**

Proposed FSTP site (North View)

Surrounding of Proposed FSTP site (North East view)

Proposed FSTP site (East view) Farmland

Lospalos SW Dumpsite (South of proposed FSTP site)

Proposed FSTP Site (South View) Surroundings

Proposed FSTP site (South) Farmland

**Figure 21 Proposed FSTP Site (Parapata) location**

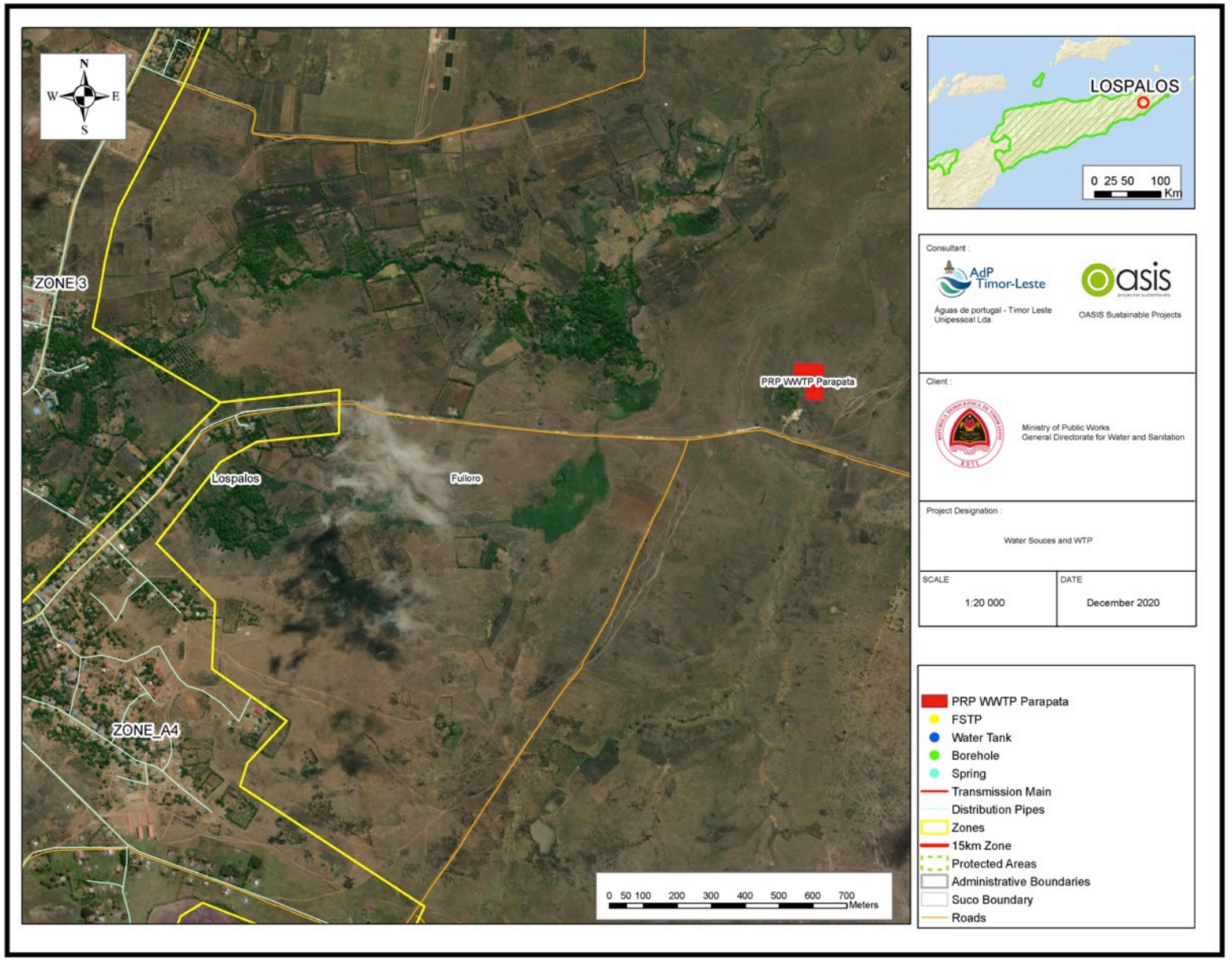
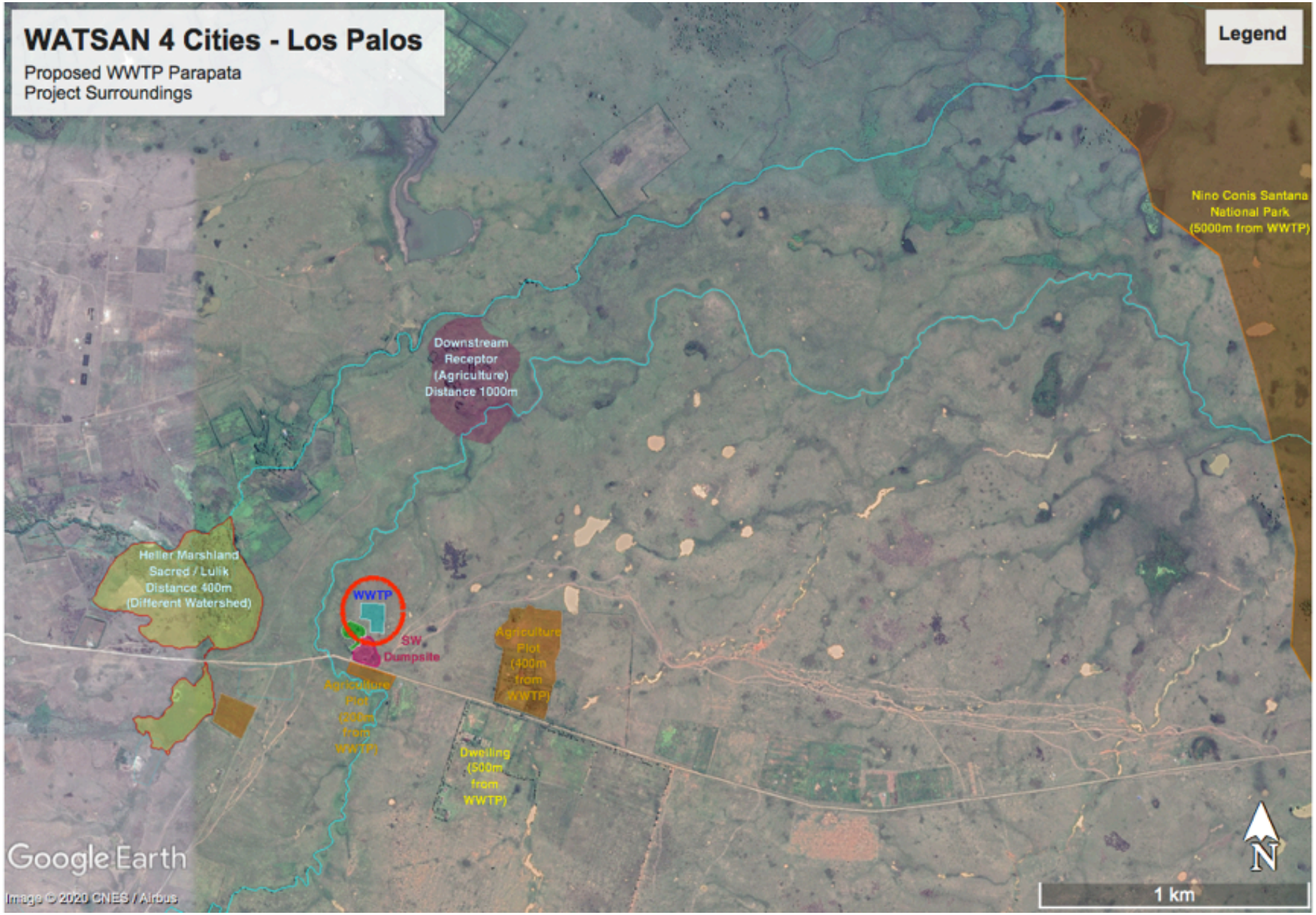


**Figure 22 - Parapata FSTP and Characteristic of the Area**



## Table 11 FSTP Possible Locations and description

| Municipality | FSTP | Coordinates | Actual Area Available (m2) | Distance from (m) | | Site elevation above MSL (m) | Description | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | Habitation | Water Body | | | |
| Lautem | 1 | Lat: -8.513230°<br>Long: 127.024619° | 8000 | 190 | 140 | 370 | Location characteristics:<br>– Flat area, declining is the dumpsite area<br>– distance from the highway about 150 meters,<br>– 190 meters from community settlements and<br>– 140 meters from the river.<br>– 1.5Km from the city<br>– Next to existing Waste dumpsite | Recommended |
| | 2 | Lat -8.483777°<br>Long - 126.941617° | 15000 | 420 | 3000 | 447 | Location characteristics:<br>– located on grassland, pristine i.e. Greenfield<br>– flat area,<br>– distance from the residential road about 1700 meters<br>– 420 meters from community settlements<br>– 3000 meters from the river.<br>– High up from the watershed. | Not recommended |

# 5. FEASIBILITY STUDY OF THE PROJECT

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

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

A preliminary, non-in-depth feasibility study has been conducted regarding hydrogeological, topography and Water study (See Table 12). The aim of the study is to understand the Karst System in order to define water sources, water flow capacity, geospatialize the project area and to ensure the quality of the water is suitable for human consumption. Some of the technical studies are still in pending and the results are rudimentary particular on the water and geological sector.

**Table 12 – Summary and Timetable of Feasibility Studies Conducted**

| Study | Date | Description Activities |
|---|---|---|
| 1. Geological Study | TBC | Identify the local geology and geomorphology for Lospalos Municipal as well as its geotechnical implications for the works engineering design. Given that site investigation works haven' t yet started, very little information is available, essentially concerning bibliographical data coming from diverse sources, namely Instituto do Petróleo e Geologia, Private investigation works and scientific papers. |
| 2. Hydrogeological Study | - 30th September – 15th October 2020 (Pumping Tests to Boreholes)<br>-6th October 2020 (Pumping Tests to the springs) [See Appendix 9] | Five boreholes were built. Pumping tests were conducted by the research team to the existing springs and the boreholes sites, in order to estimate the hydraulic properties of aquifers, evaluate well performance and identify aquifer boundaries. The test activity includes a field experiment in which a well is pumped at a controlled rate and water-level response is measured in one or more surrounding observation wells and optionally in the pumped well (control well) itself. |
| 3. Topography Survey | - 11 October 2020 | From May to August 2020, the project area was surveyed through Classic topographical surveys to gather information on the topographical development of project sites with special emphasis on the proposed locations of water and sanitation infrastructure (reservoirs, water and wastewater treatment works, pumping stations, etc). Additionally, topographical surveys have been done along roads to allow the deployment of pipe profiles in future stages of the Detailed Engineering design development.<br>Also, updated aerial imagery was acquired via drone survey to allow for the identification of the location of households and dwellings as possible future household connections. |
| 4. Water quality Testing | -30th October 2014<br>-14th March 2019<br>- 23rd May 2019 | - Water quality testing conducted by Aurecon under the 2015 IEE exercise (See Appendix 5);<br>- Two recent water quality testing from the National Directorate for Sanitation and Water (now SMASA), to register any occurrence of contamination to water for human consumption. Types of considered parameters that were analysed are physical, chemical and Bacteriological test under the WHO Standards.<br>- Water quality testing planned for all water sources. |
| 5. Preliminary Design for the Detailed Engineering Design of Timor-Leste Four Municipal Capitals Water Supply & Sanitation Project – Lospalos Municipal Capital | March to present, 2020 | Definition of final solutions will be detailed in the Detail Engineering Design Final Report. However, a preliminary study has been prepared by BTL in the form of the D4 preliminary design report, defining the locations, layouts and main characteristics of the proposed systems and infrastructures, including the water supply systems and the faecal sludge treatments plants, and review of the demands estimation and a preliminary cost estimate of all infrastructures including |

| Study | Date | Description Activities |
|---|---|---|
| | | different scenarios and options (see appendix 6). |
| 6. Initial Environmental Examination (IEE) under ADB SPS 2009 (see appendix 7). | March to present, 2020 | The environmental assessment was conducted for the Lospalos Municipal Capital water supply and sanitation project, based on (i) the preliminary engineering design, and (ii) most likely environmentally sensitive components.<br>The IEE report itself describes this process, where it (i) provides project information and environmental requirements; (ii) provides baseline physical, ecological, cultural and socioeconomic information surrounding the project's area; (iii) identifies and assesses potential environmental impacts from the project's implementation; (iv) includes recommendations for measures to avoid, mitigate, and compensate adverse impacts; (v) informs on stakeholder consultations and participation activities during project preparation; (vi) provides an environmental management plan; and (vii) presents a grievance redress mechanism for the project. |
| 7. Social Survey | June 2021 to present | This study is consisted of two activities. Firstly, to calculate the number of consumers that are currently and will be served with water working system in this project by 2040. The team has been referencing from the 2015 Census and 2015 Masterplan for Project analysis.<br>Secondly, a field survey was carried out to the affected community within the project area by registering and preparing lists of landlords and farmers that will be affected by this project. The social team is also encouraging women as part of Action Plan during the implementation plan, for them to take parts in the working field, as a women's group/association aiming to support l sustainable water usages..<br>The upcoming activity during pre-construction phase is to undergo a survey in the affected area on the third week of February 2021. This program is aimed on registering any reclamations from the community in regards to the affected commodity, up to the end of the construction phase. Grievance redress form will be provided by the team. |

# 6. LAND AND WATER USE

## 6.1 Land Use

Given there are still no established Land Use Plans for the city of Lospalos, the current land use description is based on the technical team site visits to the Project Area and the definition of most of the Suco Fuiloro as "Urban Area" (DGE, 2018). From these sources, it was possible to assess that, in general, Lautem Municipality consists of tropical rainforest in where in the Northern areas and around Lake Iralalaro, extensive agriculturally suitable soils developed from weathering of calcareous rocks have developed in Lautem Municipality. These are characterised as dark, moderately deep, well-drained and reasonable fertility.

The predominant form of livelihood for households in the project area and Lospalos city (Lospalos Administrative Post) is a mix of urban services and agriculture practices coincident with regular flood areas (see Figure XX) while beyond the urban fringes it is assumed the predominant land use activities are 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 area from the outskirts of Lospalos town to the Iralalaro plain and lake area.

Within the Municipality central area, especially along Lospalos on the plateau and lower ranges, these soils support mixed lowland forest, moist lowland forest, dry lowland forest and grassland and a wide range of agricultural activities from animal husbandry (cattle and buffalo) to cropping (corn, maize, rice and others), up to the urban boundaries of the Municipal Capital of Lospalos, in the Fuiloro Suco. In the higher areas towards the Paitchau range the soils have formed on raised limestone, which limits agricultural use, as well as remaining under forest cover.

As a part of the project, it is found that the supply zone for 2 sucos within the 15 km diameter project limit for the Lautem Municipality WATSAN project (see Figure 2).

Suco Fuiloro borders the protected area (The Nino Conis Santana National Park) exactly at its western border, while Suco Maupitine, Bauro and Lore present a small overlap of their administrative border into the protected area limit. However, the project components are planned to be implemented within Sucos Fuiloro and Home, within the urbanised area of Lospalos and therefore, the project components are not expected to come within any proximity of the Protected Area (see Figure 23).

The proposed project also includes Faecal Sludge Treatment (FSTP) Plan which will use the specific land that has been identified (Parapata – Name of the location) and while in the field the team was informed locally that it has been local government land for decades. As previously mentioned in Sub-chapter 4.1.3 and reflected in Appendix 8, Lautem Municipality has presented a "No Objection" letter referring that the area will not be used in the future by the local government for any sort of development or agricultural activity, and therefore the Project Proponent has been given clearance to construct the FSTP in that location when the implementation phase comes into effect.

## 6.2 Water use

The majority of the Lautem population is mostly composed of farmers, consisting of 41% of the active population (15 to 64 years old) municipality population and water has been an important source for securing their activity so as to have a sustainable income. Farmers are heavily dependent on both irrigation and rainfall.

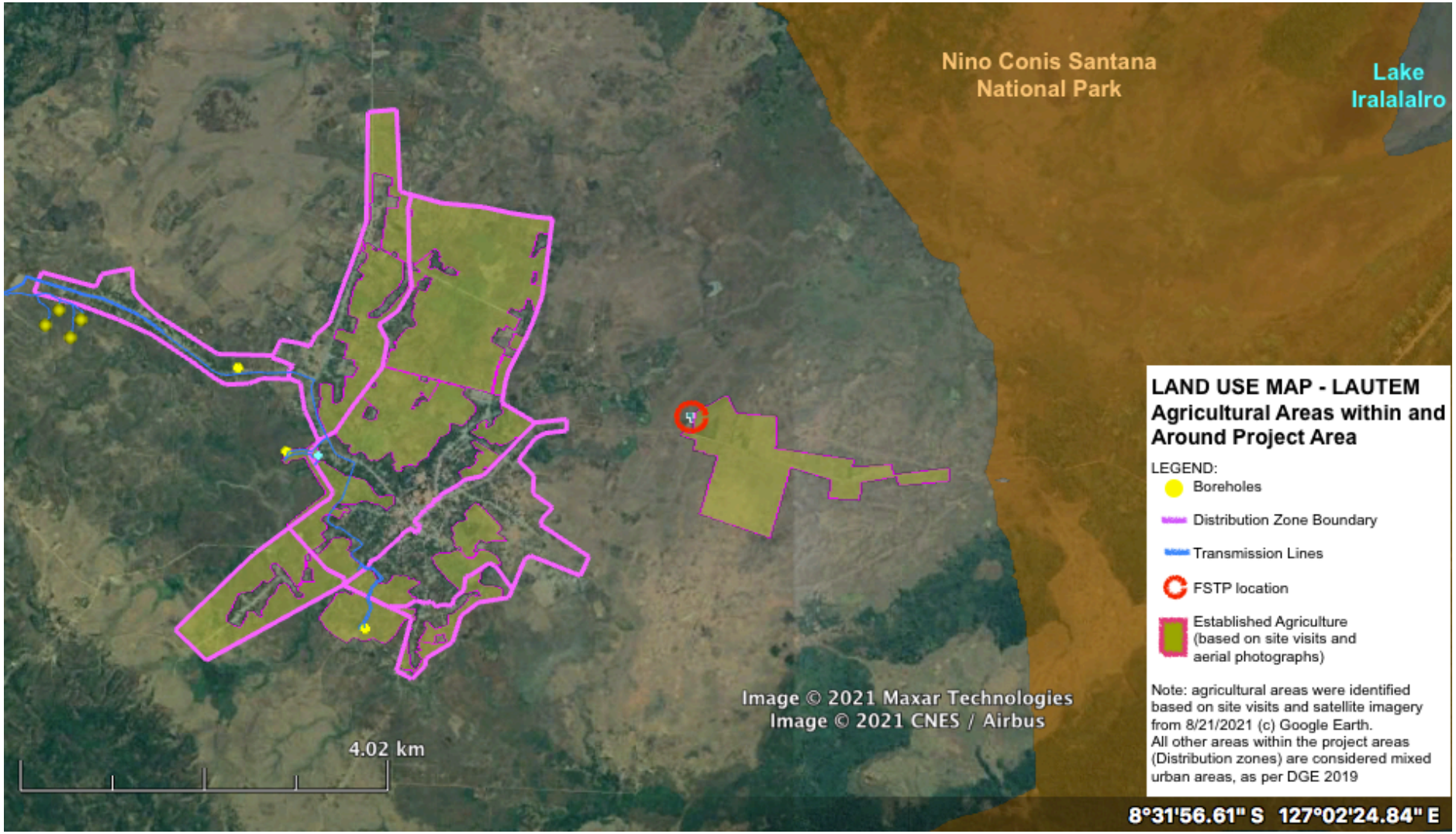
At present Lautem SMASA provides around 3,758.4 cubic meters of water per day to its population through an aggregate transmission and distribution network length of around 44 km. The water supply has not been able to meet the growing demand for water from the consumers because the water springs are not producing sufficient flow and the capacity of water storages is very small.

There are numerous groups and communities with existing pipelines but the water cannot be supplied due to the poor condition of the pipelines. The existing distribution pipelines 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 Lospalos population.

During multiple field studies for preliminary design through interviews and on-site observation of several designated local schools' sanitation facility, the project team concluded that most schools have similar concerns e.g. no clean water access, inoperable toilets and faucets, lack of hygiene and maintenance.

The 4 MCWSSP is expected to benefit a base year population of Lospalos Municipal Capital of 19,096 (2020) and design year population of 39,873 (2040) by providing a reliable and adequate supply of safe and potable water.

**Figure 23 Land Use in Project Area**



# 7. ENVIRONMENTAL IMPACTS

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

Most of the potential environmental impacts will occur in the *Construction phase*, particularly during the civil works, but it is expected to have short term duration and mitigated. The majority of previously identified environmental impacts (ADB, 2015) have not been concluded as significant and the proposed construction management safeguards and operational regimes defined therein provide a sound basis to address the range of potential environmental impacts identified, actioned through the Project EMP and checked in the environmental monitoring program. It is essential to acknowledge the geological condition in Lospalos Municipal Capital i.e., flood prone area and some sensitive areas within the 15 km of the project zone.

The evaluation of potential impacts with its nature, time scale and significance are analysed and estimated in Table 13, including the estimation of the residual impacts after application of mitigation measures.

## 7.1 Biophysical impacts

Biophysical impacts are associated with water quality, air quality and noise, climate, topography, flora and fauna as mentioned below. The related impacts are not expected to occur outside the cross-border given that the impacts are localized in nature and temporary in extent.

### 7.1.1 Water Quality

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

During operation, the upstream spring areas i.e. Papapa system, have human activity mostly surrounded by agricultural activities, which can indirectly lead to bacteriological contamination in the springs downstream. Likewise, slash and burn activity is a low-cost mechanism used by the local community to fulfil their agriculture needs and happens very frequently before the wet season, which has an immense impact to the springs' water quality and available yield.

To preserve the sustainability of the proposed water collection and distribution system, the project can consider designing and implementing an Upstream Watershed Protection Programs, with restriction to water quality impacting activities i.e. animal husbandry, slash and burn, etc, or an Improvement Program for all existing and future dwelling sanitary infrastructure i.e. SMASA septic tank design template, to implement in the community surrounding the water source. Construction works of pipe replacement due to trenching, water storage remodelling and FSTP installation would likely generate silt run offs and therefore enter the nearby surface water i.e. river and drainage system that ends in the water body, if temporary drainage system is not applied. However, the said activity won't give adverse impacts to the water ecosystem and the duration is considered temporary in nature as long as the flow is not unceasing.

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

## Table 13 - Summary of Potential Environmental and Social Impacts of the Project

| Activities | Types of Components | Potential Impacts | Nature | Incidence | Time-Scale | Significance | Residual Impact (After Mitigation Measures) |
|---|---|---|---|---|---|---|---|
| **Pre-Construction Phase** | | | | | | | |
| Use water sources (springs and boreholes | Water quantity | Insufficient debit due to environment and social flow (illegal connection, agriculture necessity, etc) | Negative | Direct | Medium-term | High | Moderate |
| | Socioeconomic | Water conflicts between communities | Negative | Direct | Short-term | High | Moderate |
| | Cultural | Social and ecological disruption due to project activities intruding the tara bandu and sacred area components e.g. hydrogeological study and water investigation i.e. bore well testing | Negative | Direct | Short-term | Moderate | Low |
| Protection of the water source for distribution purposes | Water quality & quantity | Inadequate protection of intake works or wells, leading to pollution of water supply & drying up of the SMASA boreholes & private wells due to over extraction | Negative | Direct | Medium-term | High | Low |
| Basecamp/place for storing project maintenance equipment | Land use & spoil management | Consume large space in the selected site where construction and operational activity will be carried out, spoil generation, cause damages to the equipment which will result in accidents towards the workforces and community, and also possibility on soil and water contamination if the referred equipment contains chemical and hazardous substances | Negative | Direct | Short-term | Moderate | Low |
| Site clearances and consultations with related entities | Land use, socio-economic & ecology | Social disruptions, vegetation loss, ecological imbalance, and inadequate management plan | Negative | Direct | Medium-term | Moderate | Moderate |
| Backfilling on the excavated land for pipe replacement | Soil materials, Safety, traffic and spoil management | Silt runoffs during wet season causing clogging on the drainage system, safety risk to the workers, dust and noise disruption, and traffic along the construction area | Negative | Direct | Short-term | Moderate | Low |
| New installation of disinfectant system in the proposed or selected storage | Occupational health & safety | Health hazard arising from inadequate design and/or handling of facilities for receiving, storing and handling of chlorine and other hazardous chemicals | Negative | Direct | Medium-term | High | Low |
| Remodelling / rehabilitation of existing water tanks | Water quantity | Poor infrastructure and insufficient capacity of water storages can lead to impendence of water delivery | Negative | Direct | Medium-term | High | Low |
| Baseline study on the technical, environmental and social components | Water supply and sanitation design, air and noise quality, socio-economic | Impediment to the project activities due to inadequate designs and magnitude of impacts that are unexpected and not anticipated | Negative | Direct | Short-term | High | Low |
| Location for proposed FSTP | Soil, odour, traffic management & land use | Inadequate designation of buffer zone around FSTP | Negative | Indirect | Medium-term | Moderate | Low |

| Activities | Types of Components | Potential Impacts | Nature | Incidence | Time-Scale | Significance | Residual Impact (After Mitigation Measures) |
|---|---|---|---|---|---|---|---|
| | Soil & land use | Land use change for temporary sites used for contractor's camp site | Negative | Direct | Medium-term | Moderate | Low |
| Wastewater disposal from FSTP | Wastewater, soil & water quality | Inadequate design causing increased runoff volume of untreated sullage and contamination to soil and water sources | Negative | Direct | Medium-term | High | Low |
| **Construction Phase** | | | | | | | |
| Activities related to Infrastructure Construction | Noise | Increase in noise level from construction works | Negative | Direct | Short-term | High | Moderate |
| | Air quality | Deterioration in air quality (dust) | Negative | Direct | Short-term | High | Moderate |
| Construction Activities – Macro Benefits | Socioeconomic | Job creation to local community and enhance workers' skills | Positive | Direct | Medium-term | High | Moderate |
| Construction Work Front: All Infrastructure | Socio-cultural | Impairment to the cultural heritage properties due to pipe replacement | Negative | Direct | Short-term | High | High |
| | Vehicular access and movement of construction vehicles | Traffic hindrance and amenity value to urban dwellers | Negative | Direct | Short-term | Low | Low |
| | Soil & land use | Vegetation loss | Negative | Direct | Medium-term | Moderate | Low |
| | Soil & land use | Silt runoffs can cause traffic accident & increasing volume of soil wastes (spoils, spare materials, etc) can lead to possible soil contamination, attract pests and serve as vectors for disease carrying insects, and negative visual impact | Negative | Direct | Short-term | Moderate | Low |
| | Occupational health & safety | Accidents and even mortality for worst scenario towards the workforces and community | Negative | Direct | Short-term | High | Moderate |
| **Operational & Maintenance Phase** | | | | | | | |
| Protection of the water source quality | Water quality | Expansion of housing in the upstream with inadequate sanitation facility leading to water deterioration in the sources | Negative | Indirect | Long-term | High | Low |
| Operation of FSTP | Wastewater | Inadequate management of the treated sludge from the FSTP causing odour and excessive plot space consumption | Negative | Direct | Short-term | Moderate | Low |
| Drinking water supply system | Water quantity | Achieve consumer water demands for consumption | Positive | Direct | Long-term | High | High |
| Mishandling of chlorine | Water quality | Water quality deterioration due to inadequate chlorination and irregular water quality testing | Negative | Direct | Short-term | High | Low |
| | Occupational health & safety | Health hazards due to chlorine exposure | Negative | Direct | Short-term | High | Low |
| Sound Operation of FSTP and Clean Water Distribution System | Public Health | Improvement of community's health and reduce mortality due to clean water and sanitation access | Positive | Direct | Long-term | High | High |

### 7.1.2 Air quality and noise

While the current air quality in the project area is difficult to ascertain given the unavailability of historical data for previous environment related projects i.e. Category A and B in the project area, the site visits have demonstrated that, under normal urban conditions, the air and noise quality is that of a semi-urban, medium-to-low density city and thus the nature and characteristics of the project leads the proponent to estimate that the impacts from these components are textbook construction activity, to be focussed upon mainly during the construction phase, regarding the implementation of applicable mitigation measures.

The construction activities will likely produce negative impacts towards the environment and the local community but these are considered temporary, such as air pollution that causes disturbance to the nearby dwellings and commercial buildings, construction waste (solid and liquid), traffic, flood due to lack of outlet system and slope instability. Earthwork construction, stockpiling of natural aggregates, transport loading and unloading or heavy vehicles mobilizing, tend to generate dust and its dispersion, which can affect the respiratory system and eye visioning. These types of activities can also have a potential impact on noise emission, which will be significant in areas of noise-sensitive institutions or buildings such as health care and educational facilities. The health and safety risk of the workers and local communities, declining of the water quality, soil erosion, etc. are also considered as main impacts. Besides Health & Safety & Environment (HSE) measures in the construction Right of Way and/or area, such as proper traffic or road signage and warning signs or disseminating HSE information to the community, other measures such as limiting noisy works to daytime hours and reducing the speed limit in the work site will minimize the risk of occurrence of these impacts.

### 7.1.3 Climate

It is not foreseen that, due to its nature, the project components will contribute to Climate change. However, on the contrary, the project may suffer from climate change related impacts and will require adaptation.

Climate Change Towards Water Supply System

Annual values of rainfall are quite dispersive in the project area. This fact combined to the poor resilience of the aquifer increases uncertainty regarding the water availability for the whole project horizon and will require realistic monitoring to foresee any problems faced by the project in this regard. The impact may be stronger in the sources located in high transmissive geological formations with low storage capacity, i.e. systems with poor resilience and thus impact on the water availability in the surface and ground sources.

The topography of Lospalos is quite flat with infrequent flooding occurrence and landslide risk free. However, the future infrastructures are designed with climate change resilient materials and methods, in such a way to prevent any climate-related damages. Water level monitoring regarding water flow will be carried out, as well as review of water quantities to correlate with seasonal meteorological variations and estimate source productivity. Given that the project area is predominantly drought prone, there will be a requirement to look into a more temperature resistant piping infrastructure and fill-in materials i.e. pipe trenching, in order to guarantee the quality integrity of the distributed water quality. Implanting pipelines under the ground will not influence the effectiveness of chlorine concentration and will preserve the quality of the pipes from climate change risk (floods, landslides, timber or other men-made infrastructures collapsing due to strong wind induced).

Climate Change Towards Sanitation

Another example of this would be the planning of the operation of the faecal sludge treatment facility which will 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 two seasons; the cold period (typical July to October) and the hotter period.

FSTP design is calculated to the consideration of rainwater volume from infrequent rainfall events since excessive rainwater volume would cause overflow of the runoff and allow untreated wastewater entering the ground.

### 7.1.4 Topography

The topography of the project site is quite flat and landslide risk free and restricted to the urban area so location and routing is not considered to be a substantial problem.

Regarding the FSTP (faecal Sludge Treatment Plant), the best potential location for the Los Palos FSTP (faecal Sludge Treatment Plant) (Parapata site, on the side of the existing Solid Waste Dumpsite), is deprived of hazardous conditions in the immediate surrounding area and is outside the flood plain risk area.

The access road from the public road to the treatment plant site should be paved, without steep gradients. It should preferably have sufficient width to allow two tankers to pass. Where this is not possible, frequent passing places should be provided.

### 7.1.5 Flora and Fauna

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 1 location that is deemed sensitive and should other areas be encountered during the construction activities, the contractors must ensure to establish a Sensitive Areas Management Plan to make sure no impacts occur in this regard, namely vegetation and trees removal are avoided and no fauna is destroyed.

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

### 7.1.6 Socio-Cultural Impacts

It is important to understand that almost all springs, new and currently in use i.e. Papapa/Paupopo Spring and Stream area, are and have always been involved in and have a spiritual importance to the community, under cultural/animistic protection.

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

### 7.1.7 Health and Economic Impacts

The water supply system repair and improvement in the Municipality of Lautem will alleviate the district's populace from their present economic condition where people will be opened to economic activities with an influx of investors. The whole district is expected to get 24/7 access to clean and potable water; therefore, health condition, sanitation and hygiene practices of the people will improve. Given the condition that the Lospalos National Hospital will be supplied with clean water, it will also benefit on reducing the number of mortalities in the medium to long term.

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

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

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

### 7.1.8 Socio-Cultural and Heritage Buildings

Lautem society follows a variation albeit still 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.

During the site visit, the team identified and received information from the Chief of Cultural Center of Lautem related to historical and other cultural sites, which lie nearby the distribution pipelines. These 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.

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.

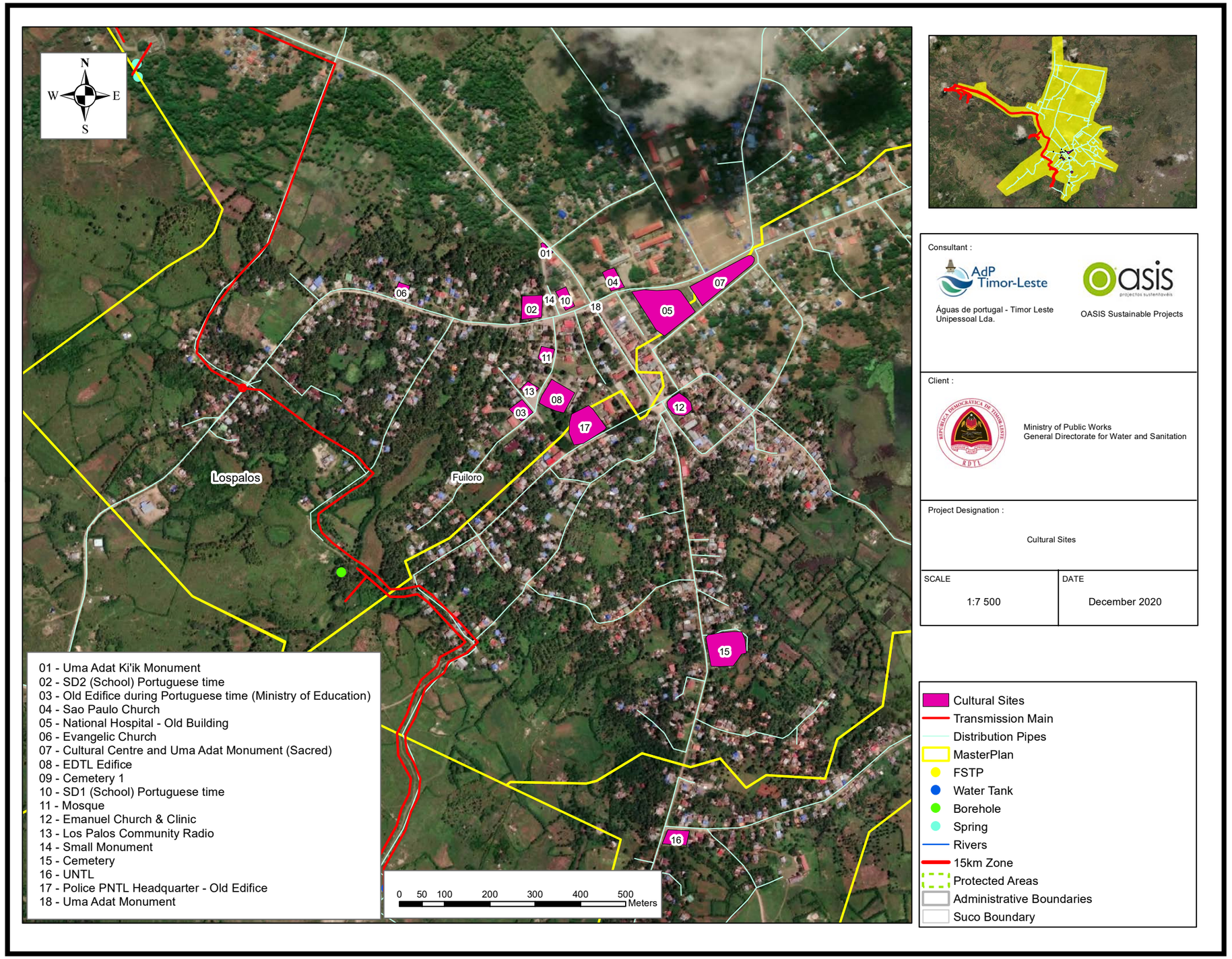
**Table 14 - Identified Cultural, Historical & Touristic Sites in Lospalos**

| No. | Name of Site | Type | Coordinates |
|---|---|---|---|
| 1. | Uma Adat Kiik Monument | Socio-cultural, heritage | 8°31'17.43" S / 126°59'42.18" E |
| 2. | SD2 School | Heritage | 8°31'21.66" S / 126°59'41.41" E |
| 3. | Edifice of Ministry of Education | Heritage | 8°31'28.75" S / 126°59'40.77" E |
| 4. | Sao Paulo Church | Socio-cultural | 8°31'20.21" S / 126°59'47.19" E |
| 5. | National Hospital | Heritage | 8°31'20.62" S / 126°59'50.42" E |
| 6. | Evangelic Church | Socio-cultural | 8°31'20.97" S / 126°59'31.63" E |
| 7. | Centro Cultural & Uma Adat | Heritage | 8°31'18.82" S / 126°59'55.83" E |
| 8. | EDTL edifice | Heritage | 8°31'27.61" S / 126°59'42.54" E |
| 9. | Cemetery | Socio-cultural | 8°30'55.64" S / 126°59'15.48" E |
| 10. | SD1 School | Heritage | 8°31'21.07" S / 126°59'43.08" E |
| 11. | Mosque | Socio-cultural | 8°31'25.04" S / 126°59'42.96" E |
| 12. | Emanuel Church & Clinic | Socio-cultural | 8°31'28.78" S / 126°59'50.76" E |
| 13. | Lospalos Community Radio | Heritage | 8°31'27.76" S / 126°59'40.83" E |
| 14. | Small Monument | Heritage | 8°31'21.32"S / 126°59'34.36"E |
| 15. | Cemetery 2 | Socio-cultural | 8°31'46.18"S / 126°59'54.09"E |
| 16. | UNTL | Heritage | 8°31'59.11"S / 126°59'51.60"E |
| 17. | Police PNTL Headquarter Lospalos- | Heritage | 8°31'30.84" S / 126°59'45.63" E |
| 18. | Uma Adat Monument | Heritage | 8°31'21.45" S / 126°59'45.78" E |

Socio-cultural and heritage building above mentioned are adjacent to the distribution pipeline (see Figure 24) in which contractor should be aware of during the construction phase so that it will not damage or interfere to the heritage building as according to decree law no. 33/2017 which states that immovable assets should have a protection zone of 50 metres radius and take into account the established mitigation measures.

It is also important to involve the Lia na'in and communities for cultural ceremony preparation and Tara Bandu protection of the water sources, to strengthen acceptance and avoid ill-feelings towards the project.

**Figure 24 Lospalos identified Cultural Sites**



# 8. PUBLIC CONSULTATION

The IEE 2020 process undertook Public Consultation for Lospalos in Lautem Municipal Cultural Centre on the 19th of November 2020 and was participated by local government agencies and authorities (Chief of Suco and Village), and representative members of the communities within the project area, where the issues of significant social concern, its predicted environmental impacts and proposed mitigation measures were presented, in order to collect all useful and relevant inputs from them, for the project construction phase.

The stakeholders gave their concern, suggestion and recommendation for the project implementation, focussing mainly on issues such as Coverage area of the project, Design of the public Toilets, Water distribution system that does not cover or serve all villages, Misuse by consumers (and direct impact on water availability in the distribution system and Cultural sites and new constructions within project area.

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 25 – Lospalos Public Consultation; participation of the Local Community and Other Stakeholders.**

In addition, 2 other Public Consultations, carried out under the social component in Suco Fuiloro and Suco Home (7th December 2020). All PCs registered a significant attendance especially with a strong female participation. After the non-technical presentation of the project, the floor was given to the attendees to discuss water supply and sanitation issues related to the project. Suco community deliberated on the location and the layout of the future Public Toilets. A layout with gender segregation was generally accepted by the community.

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

The community is 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 number of SMASA employees.

These Public consultations 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.

**Figure 26 Suco Fuiloro Social Public Consultation**

**Figure 27 Suco Home Public Social Consultation**

# 9. CONSULTATION WITH OTHER AUTHORITIES

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

Some of the various consultation meeting are highlighted below for their importance in terms of the project implementation process and to clarify on the communication process with Relevant Stakeholders.

- 2020 June 2nd – 4th – Meeting with Lautem Local Institutions

  ***Culture Representative for Lautem:*** A brief meeting with Lautem's entity was conducted by the consultant environmental team during the site visit. The first meeting was conducted with Head of Centro Cultural of Lautem with the main objective of informing about the project aim and locations and also gathering information regarding the cultural and sacred sites of Lospalos Municipal Capital. The sites mentioned were Uma Lulik, historical monuments, caves, any kinds of sacred trees, or any other sites which are forbidden by the Lia Nai'n to the community to have access to, taking in consideration applicable mitigation measures as Lautem municipality has many sensitive areas such as protected biodiversity, sacred or cultural areas.

  ***Lautem Department of Environment:*** The consultant team also conducted a meeting with the Department of the Environment of Lautem. The objective of the meeting was to inform and explain about the WATSAN project in Lospalos and also gather references from previous studies by government or any local or international organizations on biodiversity of Lospalos. However, there was no information that the Department of the Environment of Lautem could provide, as the Department has not conducted any study or research about the environment yet.

  ***SMASA Director:*** The team also had a brief meeting with the Director of SMASA regarding the environmental component of the project and the summary of the site characterisation carried out during the IEE survey. The prospection point, transmission line and water distribution, and cultural sites were also discussed during the meeting.

- 2020 July 06th – Meeting with Director General of DGAS (Direção Geral Agua e Saneamento)

  This meeting was conducted between the representatives of the consultant team and Director General of DGAS. The main purposes of the meeting was to discuss issues regarding:

  i. Illegal water connections;
  ii. Laying water pipeline and
  iii. Coverage area of Water Supply & Sanitation subprojects.

- 2020 September 22nd – Meeting with the Secretariat of State for Arts and Culture

  A meeting was conducted between the representative of Secretary of State for Arts and Culture and environmental consultants, which was represented by the National Environmental Technician. The meeting took place in Secretary of State for Arts and Culture Office in Pantai Kelapa. The objective of the meeting was to request cultural heritage sites data in all 4 Municipals in adherence to a request letter sent from the General Directorate of Water and Sanitation Service (BTL) with a reference number 172/C50605/Gab.DGAS/MOP/VII/2020. This is aiming to identify whether or not the sites are located adjacent to the project components and how they will impact on the related sites.

# 10. PROPOSED CLASSIFICATION OF THE PROJECT

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

Based on the extension of proposed water extraction and the nature of the proposed rehabilitation works for Papapa Spring and the Borehole System, and because it is a rehabilitation of the water network i.e. a brownfield

project, with pre-existing pipelines and zones that have undergone previous impacts during the first installation (thus leading to the new intervention being less significant and of temporary duration, with very small portions of the project components requiring new infrastructure i.e. greenfield project áreas), the project was classified as Category B under the ADB SPS 2009 (ADB, 2016) in the 2015 Masterplan, for the Lospalos area.

This year (2021) Environmental assessment has been conducted for the Lospalos water supply and sanitation Project based on (i) Preliminary engineering design, and (ii) most likely environmentally sensitive components, applying ADB's rapid environmental assessment (REA) checklist and the field review in June 2020 to help guide the probable classification. This exercise showed that the Lospalos Water supply and sanitation project is not likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, or that potential impacts are unlikely to affect areas larger than the sites or facilities subject to physical works. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors.

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

**Table 15 - Estimated Environmental Classification for Lospalos Project Components**

| Proposed Components | Proposed Capacity | Estimated Classification | Included in XII. Location Factors? |
|---|---|---|---|
| Sanitation | | | |
| Public Bathrooms Septic Systems | N/A | N/A | No |
| Feacal Septage Treatment Plant | 5,592 HH | B | No |
| Water Distribution | | | |
| Rehabilitation (Mains and Distribution) | 66,915m | B(1) | No |
| Water Sources (Existing and/or New) | | | |
| Papapa System | 20 L/sec / 630 720 $m^3$/year | B(1) | No |
| Borehole #3,7,8 | 15 L/sec (each borehole) / 1,296 $m^3$/day | B(1) | No |
| Borehole #2,5,9 | 20 L/sec (each) / 1,728 $m^3$/day | B(1) | No |
| Borehole #6 (DNSA) | 9 L/sec (777 $m^3$/day) | B(1) | No |

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

This assumption is further justified based on the ANLA previously attributed Category B Environmental License for the Government Projects for Rehabilitation of Water Distribution Infrastructure in the District Capital Water Supply Project for Manatuto and Pante Macassar 2014 (see Appendix 2 and 3).

Given this project has all the favourable conditions to be classified as a Category B project, as it is concurrent with both ADB SPS 2009 requirements and the Timorese legislation, ***the proponent hereby requests the Environmental Regulator to consider a Category B for this project,*** in accordance with the Regulator's choice of classification prerogative outlined in item 2 b) of article 4 of Decree-Law no. 05/2011, since the Decree Law and its Ministerial Diplomas provide flexibility of project Category choice to the Environmental Regulator, when duly justified, especially when the relative scale and gravity of the project's impacts and conditions are similar to the above-mentioned Category B.

# 11. EXECUTIVE SUMMARY

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

The primary objective of this Project Document' s is to provide clear and relevant information on the proposed Water and Sanitation System Improvement Project for ***Lautem Municipal Capital only***, taking into account that its rehabilitation will be carried out under a future ADB loan to the Government of Timor-Leste.

The preliminary cost of the 4MCWSSP for Lautem Municipality is estimated around $16,112,852 for proposed water supply and sanitation expenses. It will include all the areas that will be required to implement the Abstraction, Treatment and Distribution of Water for Human Consumption, as well as provide designs and solutions for Sanitation for Buildings, Schools and Housing within a diameter area of 15 Km around the Municipal Capital.

The 4 MCWSSP is expected to have numerous beneficial and negative impacts towards the environment and social aspects due to various project activities. The project also will provide improvements and opportunities in several ways regarding employment generation, skill enhancement, improved Health and Hygiene as well as Women empowerment. Furthermore, it will directly generate employment opportunities either skilled or non-skilled work for the local people. This type of employment opportunities will increase the skill of the workforce in terms of technical proficiency. By the end of the project, safe and reliable water supply will be provided to the municipal town (sucos and aldeias), and all households will have improved hygienic toilets as well as toilets available in public places. The improved water supply and sanitation facilities in the pilot schools will provide children with safe and reliable water supply and toilets operated by competent operators in each pilot school, providing a template in other schools to improve water supply and toilets.

To improve the efficiency, transparency and public involvement, the ADB (IEE) conducted the Public Consultation for Lautem Municipality in the Municipal Cultural Centre on the 19th of November 2020 and was participated by local government agencies and authorities (Chief of Suco and Village), and representative members of the communities within the project area and was participated by local government agencies and authorities (Chief of Suco and Village), and representative members of the communities within the project area, as well as 2 additional Public Consultation under the Social component (on the 7th December 2020). All the PCs confirmed the acknowledgement of the Project as being fundamental to the improvement of their livelihoods and reassured the team that there is generalised acceptance of the project and very little risk of any water conflicts or impacts felt by the community during the implementation and operation of the future system.

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

As based on DL no. 05/2011 – Environmental licensing, outlined in item 2 b) of article 4, it can be concluded that, overall, the project was not likely to have significant adverse environmental impacts and in most cases mitigation measures can be designed to for them, and therefore the project is proposed to be a Category B project.

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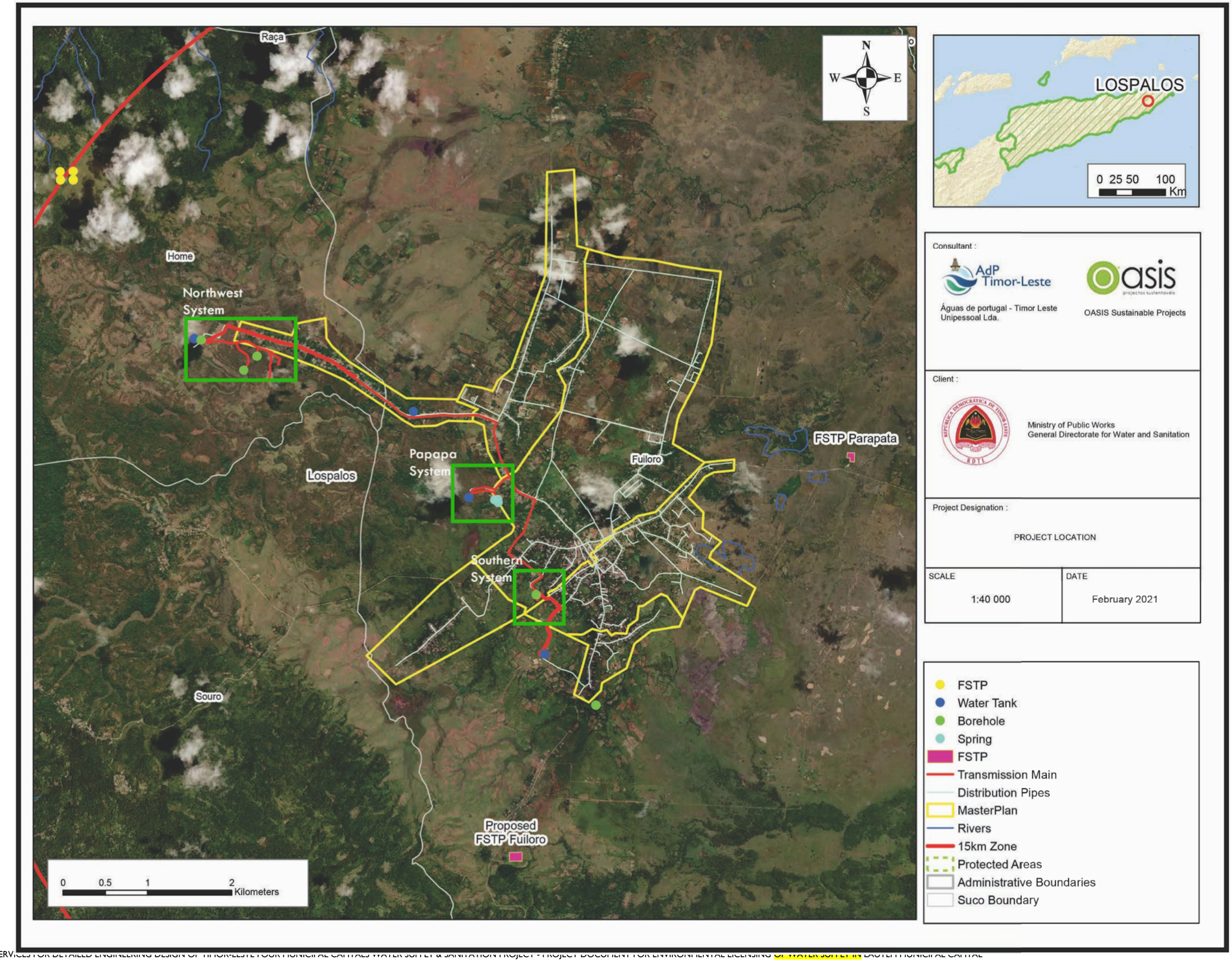
# APPENDIXES

# Appendix 1. Map of Lautem Municipality and the Project


Raça
Home
Northwest System
Lospalos
Papapa System
Southern System
Souro
Fuiloro
FSTP Parapata
Proposed FSTP Fuiloro
N
W
E
S
0 0.5 1 2 Kilometers
LOSPALOS
0 25 50 100 Km
Consultant :
AdP Timor-Leste
Águas de portugal - Timor Leste Unipessoal Lda.
oasis projectos sustentáveis
OASIS Sustainable Projects
Client :
Ministry of Public Works
General Directorate for Water and Sanitation
Project Designation :
PROJECT LOCATION
SCALE
1:40 000
DATE
February 2021
FSTP
Water Tank
Borehole
Spring
FSTP
Transmission Main
Distribution Pipes
MasterPlan
Rivers
15km Zone
Protected Areas
Administrative Boundaries
Suco Boundary

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

**REPÚBLICA DEMOCRÁTICA DE TIMOR-LESTE**

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

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

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

***Schedule***

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

**Notes**

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

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

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

***Annex - Conditions of Environmental License***

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

**General Conditions**

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

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

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

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

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

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

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

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

**Additional requirements and modifications**

***2. Construction phase***

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.16 Rehabilitate eroded areas that caused by the construction activity;

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

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

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

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

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

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

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

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

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

**Dili, 07th ofAugust 2014**
**Approved by:**

**Numinando Soares Martins "BURAS"**
**Secretary of State for Environment**

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

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

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

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

***Schedule***

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

Notes

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

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

***Annex - Conditions of Environmental License***

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

**General Conditions**

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

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

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

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

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

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

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

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

**Additional requirements and modifications**

2. ***Construction phase***

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.16 Rehabilitate eroded areas that caused by the construction activity;

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

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

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

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

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

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

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

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

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

**Dili, 07th ofAugust 2014**
**Approved by:**

**Numinando Soares Martins "BURAS"**
**Secretary of State for Environment**

# Appendix 4. Transcripts of Public Consultation (12 October 2020)

## 4MCWSP Public Consultation

## Lospalos (5 October 2020)

### 1. Questions, Recommendation, Complaints, Responses and Discussion (Q&A session)

1.1 Elio da Silva – Lapuru Aldeia Chief (Suco Fuiluro)

- Questions & Suggestion: Master Plan

Mr. Elio stated that the presentation is really beneficial to the local community because it can help them to understand the project benefit. From Master Plan it is clearly seen that the WATSAN project only cover some aldeias, why it is happen?

He is also suggest that we should not change the design inside the master plan, as it has been gone through several verifications.

1.2 Helio da Silva – Titilario Aldeia Chief (Suco Fuiluro)

- Questions and Concern: Master Plan & Coordination

He appreciates the presentation and said it really helpful. He is questioned the master plan as it doesn't include some aldeias. Why some aldeias does not include in Master Plan?

He is also concern about time management and coordination for the next meeting

1.3 Delfin de Jesus – Planning Director of Lautem Municipality

- Concerns, Recommendation and Comments – Water demands, Cultural Site, Public Toilets

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 water demands and we have been talk about that with some engineers. He also said that the soil test related to two constructions are already finalized, thus there are water demands that comes from those constructions as well. On the other hand he also stated that there will have 5 project constructions in Lautem Municipality. Therefore the project proponents also need to consider it regarding technical issues.

He also concerns about the design as Lautem Municipality already planned to rehabilitate Uma Lulik – Sacred House and construct 3 public gardens with outdoor water fountain included. On the other hand one of the main concerns from him in regards the design of Public Toilets. As mentioned in presentation it does not include the design for people with disabilities. He said that it can raise concern from the NGO and also from community. Therefore he recommended to consider also the designs.

He recommends that public toilets should also installed in some specific location as it presents higher demands of toilet.

1.4 Luis do Santos – Home Suco Chief

- Questions, concerns & Recommendation – Cost estimation & Public Toilets

As local leader he appreciated and supports the Watsan project to continue and implement in near time. In regards about the contract of the project, does the project has a cost estimation? How about the development of the project, is it for short, medium or long term?

He recommends to the project proponents to define the cost estimation for Home Suco with its expenditure mechanism and publish it to the local leader and also community to know about it. He also said that if possible, project owner can consider to install toilets for Suco's Building as at the moment they don't have any toilet yet.

1.5 Elio Pereira – Aldeia Chief, Suco Home

- Question & Recommendation – Project Impacts & Public Toilets

Mr. Pereira asks about the impact to the existing boreholes when the construction begins. If it has an impact what should we do? He also stated about water tank dimension, Can you explained more about water tank dimension for Home Suco? He also recommends to construct public toilet in their Suco.

1.6 João Piedade – National Director for Basic Sanitation

- Comments – Coverage Area & Master Plan

Mr. Jose stated that the situation in 2015 is not the same in 2020, therefore there are a lot of community that ask and questioning to enlarge the coverage area of the project. He also add that, there are some areas that considered as an urban area, however the project is not cover till that area. For example Titilari, the project is not cover that place. He hoped that the project owner can take into consideration some of the requirements that comes from the community.

At the same time Mr. Jose also introduced Ms. Joanina from AdP to the community in general as she is always work in close cooperation with Local Authority and Community.

He also considered comment that comes from planning Director of Lautem Municipality (sub-section 1.3) about the construction of public gardens with outdoor water fountain included and said that when we have resources than we can do that, however he asks to the local authority and community to support the implementation of the project.

He outlined that the objective of the public consultation is to collect all the concerns, recommendation, constructive ideas from all the stakeholders, local authorities and community so that the project proponents can take it into consideration before the construction begin.

Regarding concerns from sub-section 1.4 about the short, medium and long term, he argue that it has already finished when published the final report of Master Plan. At the moment we already begin Detail engineering design to find out the source of the potential springs in order to add the water volume and its flow.

Appreciated local authorities and communities because they can work together in order to develop their mother land. He recommends to informed AdP Consultant representation Mr. Jose Serafin (Former DNSA staff) if they have or get some issues related to the project.

- Consultant's Clarification to Respond sub-section 1.5:

Aguas de Portugal - Mario Santos : As it has been explained during the presentation regarding sustainability of the water boreholes, we have an equipment that help us to do the test in order to guarantee water sustainability in Home Suco' s and others suco's as well. That equipment's also will allow us to understand wether new boreholes that we planned to do will affect the springs or not.

- Consultant's Clarification to Respond sub-section 1.5:

Aguas de Portugal - Julio : Regarding water tank, it will consist of concrete wall in which will installed in four different areas with one tower respectively. In Suco Home will install one concrete tank with capacity for 700 cubic meters. These tanks also will provide with treatment facilities and security guards.

He also outlined the restricted area for the participants. He said that when all the water tanks and tower are already installed than those areas will prohibited to community in general and also animals to approach in order to avoid any possible damage to the installation site. The installation area for water tanks will cover approximately 4892 square meters.

# Appendix 5. Water Quality Test Report (JICA & Masterplan)

**District: Lautem**

**Town: Los Palos**

Tested by: Alvaro Godinho, technician, 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 | 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) | (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 |
| LP-1 | Papapa, intake | 23/mar/00 | 24/mar/00 | 7.1 | 26.1 | 518 | 251 | 0.2 | 1.7 | 258 | 264 | NT | 0.1 | 0.6 | 0.012 | ND | 0.10 | 0.1 | NT | NT | ± | + |
| LP-2 | KOR BATT, Spring | No Sample | | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT |
| LP-3 | Kauto, Old pump house | 23/mar/00 | 24/mar/00 | 6.8 | 26.0 | 523 | 253 | 0.3 | 1.4 | NT | NT | NT | ND | NT | NT | NT | 0.16 | NT | NT | NT | + | +++ |
| LP-4 | Perekiki | No Sample | | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT |
| LP-5 | Kartini-1 | No Sample | | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT |
| LP-6 | Sawarika | No Sample | | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT |
| LP-7 | Motarlori | 23/mar/00 | 24/mar/00 | 7.0 | 26.5 | 522 | 253 | 0.2 | 1.0 | NT | NT | NT | ND | NT | NT | NT | 0.17 | NT | 1 | NT | +++ | +++ |
| LP-8 | Natura, shallow well | No Sample | | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT |
| LP-9 | Central 2 | 23/mar/00 | 24/mar/00 | 7.1 | 26.8 | 534 | 259 | 0.3 | 1.0 | NT | NT | 273 | ND | NT | NT | NT | 0.21 | NT | 2 | NT | ++ | ++ |
| LP-10 | Central 3 | 23/mar/00 | 24/mar/00 | 7.0 | 27.5 | 537 | 260 | 0.3 | 1.5 | 290 | 297 | NT | ND | 0.9 | 0.010 | ND | 0.25 | 0.1 | NT | 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

**District: Lautem**

**Town: Los Palos**

Tested by: Alvaro Godinho, technician, WSS 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) | ($\mu$S/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 | NS | 1.5 | NS | 200 | 10 | 1 | 0.3 | 0.5 | 0 | 0 |
| 1 | Papapa, intake | 08/mai/00 | 09/mai/00 | 7.1 | 26.0 | NT | 532 | 258 | 0.3 | 2.12 | 0.4 | 0.12 | 289.0 | NT | 0.80 | 0.007 | 0.02 | 0.0 | ± | + |
| 2 | Central 2 | 08/mai/00 | 09/mai/00 | 7.1 | NT | NT | 526 | 255 | 0.3 | 12.3 | 0.30 | 0.2 | 286.0 | NT | 0.60 | 0.003 | 0.02 | 0.3 | ++ | ++ |
| 3 | Central 3 | 08/mai/00 | 09/mai/00 | 7.0 | 26.0 | NT | 518 | 251 | 0.2 | 10.9 | 0.3 | 0.10 | NT | NT | 0.50 | 0.003 | 0.00 | 0.3 | | |
| 4 | Motarlori | 08/mai/00 | 09/mai/00 | 7.0 | 26.0 | NT | 516 | 250 | 0.2 | 1.48 | 0.5 | 0.12 | 288.0 | NT | 0.40 | 0.002 | 0.02 | 0.1 | +++ | +++ |
| 5 | Kauto, Old pump house | 08/mai/00 | 09/mai/00 | 6.8 | 26.0 | NT | 517 | 250 | 0.2 | 2.03 | 0.2 | 0.19 | NT | NT | 0.40 | 0.002 | 0.02 | 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

**Suggestions**

Boil water before drinking

## District: Lautem
## Town: Los Palos

Sample by Eurico Da Costa,WSS Lospalos,Tested by Alvaro Godinho,Mario soares WSS Laboratory

| No. | Sampling Point | Date | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Alkali. | Hdns. | $NH_3$-N | $NO_3$-N | $NO_2$-N | Fe | Fluoride | Mn | $SO_4^{2-}$ | T.Coli | E.Coli |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | sample | test | | ℃ | (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 |
| Timor Loro sa'e Guidelines | | | | 6.5-8.5 | NS | NS | 1000 | NS | 5.0 | NS | 200 | 1.5 | 10 | 1 | 0.3 | 1.5 | 0.5 | 250 | 0 | 0 |
| LP-1 | Papapa, intake | 30/out/00 | 01/nov/00 | 7.5 | 28.7 | 539 | 261 | 0.3 | 1.4 | 280 | 268 | ND | 0.9 | 0.011 | ND | 0.12 | ND | 1.0 | 170 | 0 |
| LP-2 | KOR BATT, Spring | 30/out/00 | 01/nov/00 | 7.4 | 26.8 | 546 | 264 | 0.3 | 0.4 | 281 | 222 | 1.0 | 1.3 | 0.006 | ND | 0.15 | ND | ND | 10 | 0 |
| LP-3 | Kauto, Old pump house | 30/out/00 | 01/nov/00 | 7.4 | 30.0 | 544 | 264 | 0.3 | 1.6 | NT | NT | ND | NT | 0.009 | NT | 0.11 | NT | NT | 225 | 0 |
| LP-4 | Perekiki | 30/out/00 | 01/nov/00 | 7.5 | 27.0 | 545 | 264 | 0.3 | 3.5 | 280 | 282 | ND | 0.9 | 0.005 | ND | ND | 0.3 | 1.0 | 100 | 0 |
| LP-5 | Kartini-1 | 30/out/00 | 01/nov/00 | 7.4 | 27.6 | 547 | 265 | 0.3 | 4.4 | NT | NT | 0.6 | NT | ND | NT | 0.07 | NT | NT | 145 | 0 |
| LP-6 | Sawarika | 30/out/00 | 01/nov/00 | 7.3 | 30.3 | 554 | 269 | 0.3 | 1.5 | 281 | 285 | 1.1 | 1.0 | 0.003 | ND | 0.18 | ND | ND | 130 | 0 |
| LP-7 | Motarlori | 30/out/00 | 01/nov/00 | 7.4 | 27.8 | 545 | 264 | 0.3 | 2.3 | NT | NT | ND | 0.8 | 0.004 | ND | ND | ND | 1.0 | 115 | 5 |
| LP-8 | Natura, shallow well | 30/out/00 | 01/nov/00 | 7.6 | 25.7 | 440 | 212 | 0.2 | 1.6 | NT | 219 | 1.4 | 0.4 | 0.007 | ND | ND | ND | ND | TNC | 130 |
| LP-9 | Central 2 | 31/out/00 | 01/nov/00 | 7.5 | 25.9 | 541 | 262 | 0.3 | 6.5 | 280 | 283 | ND | 0.9 | 0.009 | 0.03 | 0.08 | ND | 2.0 | 85 | 35 |
| LP-10 | Central 3 | 31/out/00 | 01/nov/00 | 7.5 | 26.6 | 541 | 262 | 0.3 | 4.3 | NT | NT | 0.3 | NT | 0.008 | NT | 0.12 | NT | NT | 220 | 5 |

**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: Lautem
## Town: Lospalos

Sampled by Eurico Da Costa, DWSS Lospalos, Tested by : Alvaro Godinho,Mario Soares WSS Laboratory.

| No. | Sampling Point | Date | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | T.Coli | E.Coli |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | sample | test | | (℃) | (µS/cm) | (mg/L) | (‰) | (NTU) | CFU | CFU |
| Timor Loro sa'e Guidelines | | | | 6.5-8.5 | NS | NS | 1000 | NS | 5.0 | 0 | 0 |
| LP-1 | Papapa, intake | 22/jan/01 | 23/jan/01 | 8.2 | 22.0 | 511 | 247 | 0.2 | 3.4 | TNC | 58 |
| LP-2 | KOR BATT, Spring | 22/jan/01 | 23/jan/01 | 8.2 | 25.2 | 534 | 259 | 0.3 | 0.5 | 10 | 4 |
| LP-3 | Kauto, Old pump house | 22/jan/01 | 23/jan/01 | 8.2 | 27.7 | 409 | 198 | 0.2 | 7.0 | 300 | 58 |
| LP-4 | Perekiki | 22/jan/01 | 23/jan/01 | 8.2 | 27.4 | 423 | 204 | 0.2 | 9.1 | TNC | 66 |
| LP-5 | Kartini-1 | 22/jan/01 | 23/jan/01 | 8.2 | 27.7 | 464 | 224 | 0.2 | 15.5 | 225 | 40 |
| LP-6 | Sawarika | 22/jan/01 | 23/jan/01 | 8.2 | 27.7 | 468 | 226 | 0.2 | 4.5 | TNC | 2 |
| LP-7 | Motarlori | 22/jan/01 | 23/jan/01 | 8.2 | 27.5 | 443 | 214 | 0.0 | 5.2 | 550 | 2 |
| LP-8 | Natura, Shalow Well | 22/jan/01 | 23/jan/01 | 8.2 | 27.2 | 457 | 221 | 0.2 | 3.3 | TNC | 8 |
| LP-9 | Central 2 | 22/jan/01 | 23/jan/01 | 8.2 | 26.7 | 393 | 189 | 0.2 | 3.5 | TNC | 18 |

**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 : Lautem**
**Town : Lospalos**

Sample by Eurico Da Costa ,WSS Lospalos 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 |
| LP-1 | Papapa, intake | 14/mar/01 | 15/mar/01 | 8.3 | 20.6 | 526 | 255 | 0.3 | 3.0 | TNC | 6 |
| LP-2 | KOR BATT, Spring | 14/mar/01 | 15/mar/01 | 8.5 | 6.7 | 169 | 81 | 0.1 | 3.8 | TNC | 0 |
| LP-3 | Kauto, Old pump house | 14/mar/01 | 15/mar/01 | 8.2 | 20.7 | 564 | 276 | 0.3 | 3.7 | 5 | 0 |
| LP-4 | Perekiki | 14/mar/01 | 15/mar/01 | 8.3 | 20.3 | 512 | 248 | 0.2 | 5.7 | 280 | 2 |
| LP-5 | Kartini-1 | 14/mar/01 | 15/mar/01 | 8.2 | 20.2 | 402 | 194 | 0.2 | 4.7 | 60 | 0 |
| LP-6 | Sawarika | 14/mar/01 | 15/mar/01 | 8.2 | 21.2 | 518 | 251 | 0.2 | 4.5 | 60 | 0 |
| LP-7 | Motarlori | 14/mar/01 | 15/mar/01 | 8.3 | 20.4 | 517 | 250 | 0.2 | 2.2 | 225 | 0 |
| LP-8 | Natura, Shalow Well | 14/mar/01 | 15/mar/01 | 8.1 | 18.2 | 450 | 217 | 0.2 | 0.9 | 345 | 0 |
| LP-9 | Central 2 | 14/mar/01 | 15/mar/01 | 8.2 | 21.3 | 519 | 252 | 0.2 | 1.0 | 195 | 4 |
| LP-10 | Central 3 | 14/mar/01 | 15/mar/01 | 8.2 | 21.9 | 482 | 233 | 0.2 | 1.9 | 190 | 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 : Lautem**

**Town : Lospalos**

Sampling Date :18-April-2001

Testing Date :19-April-2001

Received by : X. Wang

Sampled by : Eurico da Costa DWSS Lospalos

Tested by : Alvaro Godinho .Mario Soares WSS Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Ca.Hardness | Hardness | 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 | NS | 200 | 0 | 0 |
| LP-1 | Papapa, intake | | 09:30 | 8.3 | 21.7 | 512 | 248 | 0.2 | 2.7 | 230 | 275 | 60 | 70 |
| LP-2 | KOR BATT, Spring | | 09:32 | 8.2 | 7.5 | 303 | 146 | 0.1 | 7.1 | NT | NT | 50 | 18 |
| LP-3 | Kauto, Old pump house | | 09:35 | 8.3 | 22.0 | 512 | 248 | 0.2 | 3.3 | NT | NT | 0 | 0 |
| LP-4 | Perekiki | | 09:47 | 8.0 | 16.1 | 394 | 190 | 0.2 | 3.7 | NT | NT | TNC | TNC |
| LP-5 | Kartini-1 | | 09:48 | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |
| LP-6 | Sawarika | | 09:49 | 8.3 | 23.7 | 315 | 248 | 0.2 | 8.4 | NT | NT | 73 | 0 |
| LP-7 | Motarlori | | 10:02 | 8.3 | 22.1 | 512 | 248 | 0.2 | 2.3 | NT | NT | 100 | 6 |
| LP-8 | Natura, Shalow Well | | 10:04 | 8.0 | 11.2 | 835 | 40 | ND | 76.5 | NT | NT | 80 | 6 |
| LP-9 | Central 2 | | 10:14 | 7.8 | 11.2 | 79 | 37 | ND | 27.8 | NT | NT | 123 | 82 |
| LP-10 | Central 3 | | 15:15 | 8.2 | 18.9 | 497 | 240 | 0.2 | 15.8 | NT | NT | 140 | 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 : Lautem**
**Town : Lospalos**

Sampling Date :22-May-2001
Testing Date :25-May-2001
Received by : Alvaro Godinho

Sampled by : Eurico da Costa DWSS Lospalos
Tested by : Mario Soares WSS Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Ca.Hardness | Hardness | 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 | NS | 200 | 0 | 0 |
| LP-1 | Papapa, intake | | 11:17 | 8.3 | 16.7 | 334 | 161 | 0.2 | 0.8 | NT | 176 | - | ++ |
| LP-2 | KOR BATT, Spring | | 11:19 | 8.2 | 15.0 | 340 | 163 | 0.2 | 0.6 | NT | NT | ± | + |
| LP-3 | Kauto, Old pump house | | 11:22 | 8.3 | 15.1 | 334 | 161 | 0.2 | 0.7 | NT | NT | - | +++ |
| LP-4 | Perekiki | | 11:24 | 8.2 | 15.1 | 338 | 163 | 0.2 | 0.6 | NT | NT | - | ± |
| LP-5 | Kartini-1 | | 11:26 | 8.3 | 14.4 | 320 | 154 | 0.2 | 0.9 | NT | NT | - | +++ |
| LP-6 | Sawarika | | 11:31 | 8.4 | 14.3 | 317 | 153 | 0.2 | 3.5 | NT | NT | - | ± |
| LP-7 | Motarlori | | 11:32 | 8.4 | 14.2 | 293 | 141 | 0.1 | 1.1 | NT | NT | - | + |
| LP-8 | Natura, Shalow Well | | 11:37 | 8.2 | 14.7 | 340 | 164 | 0.2 | 0.7 | NT | NT | - | +++ |
| LP-9 | Central 2 | | 11:39 | 8.1 | 24.6 | 339 | 163 | 0.2 | 1.1 | NT | NT | - | +++ |
| LP-10 | Central 3 | | 11:45 | 8.2 | 24.8 | 299 | 144 | 0.1 | 1.0 | NT | NT | - | + |

**Legend:**

ND: not detectable NT: not tested NS: not set CFU: colony formed unit; TNC: Too Numerous To Count.

For Paper Slip ( - ) : 0 - 3 ( ± ) : 3 - 10 ( + ) : 10 - 20 ( ++ ) : 20 - 30 ( +++ ): more than 30

## Suggestions

Boiling Water Before Drinking

**District : Lautem**
**Town : Lospalos**

Sampling Date :19/ June/2001
Testing Date :19 /june/2001
Received by : Miguel Quintao

Sampled by : Eurico da Costa DWSS Lospalos
Tested by : Miguel Quintao & Mario Soares WSS Laboaratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Alkalinity | Hardness | 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 | NS | 200 | 0 | 0 |
| LP-1 | Papapa, intake | | 11:41 | 8.3 | 27.1 | 525 | 254 | 0.3 | 2.0 | NT | 1604 | ++ | +++ |
| LP-2 | KOR BATT, Spring | | 11:44 | 8.2 | 27.0 | 528 | 256 | 0.3 | 1.8 | NT | NT | ++ | +++ |
| LP-3 | Kauto, Old pump house | | 11:46 | 8.2 | 26.8 | 529 | 256 | 0.3 | 1.8 | NT | NT | ++ | +++ |
| LP-4 | Perekiki | | 11:48 | 8.2 | 26.6 | 527 | 255 | 0.3 | 1.8 | NT | NT | +++ | +++ |
| LP-5 | Kartini-1 | | 11:51 | 8.2 | 26.4 | 529 | 256 | 0.3 | 1.8 | NT | NT | ++ | +++ |
| LP-6 | Sawarika | | 11:54 | 8.2 | 26.3 | 526 | 255 | 0.3 | 1.7 | NT | NT | ++ | +++ |
| LP-7 | Motarlori | | 11:56 | 8.2 | 26.2 | 528 | 256 | 0.3 | 1.4 | NT | NT | +++ | +++ |
| LP-8 | Natura, Shalow Well | | 11:58 | 8.3 | 25.9 | 524 | 254 | 0.3 | 1.7 | NT | 1514 | ++ | +++ |
| LP-9 | Central 2 | | 11:59 | 8.3 | 25.5 | 526 | 255 | 0.3 | 1.8 | NT | NT | ++ | +++ |
| LP-10 | Central 3 | | 12:01 | 8.3 | 25.5 | 525 | 254 | 0.3 | 1.8 | NT | NT | +++ | +++ |

**Legend:**
ND: not detectable NT: not tested NS: not set CFU: colony formed unit; TNC: Too Numerous To Count.
Weather Report : Sunny / Cloudy / Rain

## Suggestions
Boiling Water Before Drinking

**District : Lautem**
**Town : Lospalos**

Sampling Date :16-07-2001
Testing Date :17-07-2001
Received by : Mario Soares

Sampled by : Eurico da Costa,DWSS Lospalos
Tested by : Mario Soares WSS Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Alkalinity | Hardness | 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 | NS | 200 | 0 | 0 |
| LP-1 | Papapa, intake | 15:05 | 15:17 | 8.1 | 26.5 | 530 | 257 | 0.3 | 2.9 | NT | NT | 15 | 4 |
| LP-2 | KOR BATT, Spring | 15:09 | 15:19 | 8.1 | 26.5 | 511 | 247 | 0.2 | 2.7 | NT | NT | 95 | 0 |
| LP-3 | Kauto, Old pump house | 15:18 | 15:23 | 8.1 | 26.1 | 515 | 249 | 0.2 | 2.7 | NT | NT | NT | NT |
| LP-4 | Perekiki | 18:45 | 15:26 | 8.1 | 25.9 | 503 | 244 | 0.2 | 3.5 | NT | NT | NT | NT |
| LP-5 | Kartini-1 | 18:55 | 15:30 | 8.2 | 26.0 | 507 | 245 | 0.2 | 3.2 | NT | NT | NT | NT |
| LP-6 | Sawarika | 10:55 | 15:35 | 8.0 | 26.0 | 549 | 266 | 0.3 | 1.5 | NT | NT | NT | NT |
| LP-7 | Motarlori | 15:30 | 15:37 | 8.1 | 25.9 | 513 | 249 | 0.2 | 1.4 | NT | NT | NT | NT |
| LP-8 | Natura, Shalow Well | 10:40 | 15:42 | 8.1 | 25.1 | 448 | 216 | 0.2 | 0.7 | NT | NT | NT | NT |
| LP-9 | Central 2 | 09:04 | 15:46 | 8.1 | 26.1 | 514 | 249 | 0.2 | 1.5 | NT | NT | NT | NT |
| LP-10 | Central 3 | 16:30 | 15:47 | 8.1 | 26.1 | 513 | 248 | 0.2 | 2.3 | NT | NT | NT | NT |

**Legend:**
ND: not detectable NT: not tested NS: not set CFU: colony formed unit; TNC: Too Numerous To Count.
Weather Report : Sunny Cloudy Rain

## Suggestions
Boiling Water Before Drinking

**District : Lautem**
**Town : Lospalos**

Sampling Date :15 - 08 - 2001
Testing Date :17 - 08 - 2001
Received by :Miguel Quintao

Sampled by : Eurico Da Costa DWSS Lospalos
Tested by : Miguel Quintao WSS Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Alkalinity | Hardness | 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 | NS | 200 | 0 | 0 |
| LP-1 | Papapa, intake | 14:03 | 14:57 | 8.3 | 28.0 | 527 | 255 | 0.3 | 0.8 | 234 | 208 | TNC | 10 |
| LP-2 | KOR BATT, Spring | 14:08 | 14:59 | 8.2 | 27.2 | 525 | 254 | 0.3 | 0.8 | 232 | 258 | TNC | 45 |
| LP-3 | Kauto, Old pump house | 14:27 | 15:02 | 8.2 | 26.8 | 524 | 254 | 0.3 | 0.8 | NT | NT | TNC | 45 |
| LP-4 | Perekiki | 18:31 | 15:04 | 8.1 | 26.8 | 525 | 254 | 0.3 | 0.9 | NT | NT | TNC | 25 |
| LP-5 | Kartini-1 | 18:36 | 15:07 | 8.2 | 26.6 | 525 | 284 | 0.3 | 0.8 | NT | NT | TNC | 5 |
| LP-6 | Sawarika | 09:10 | 15:10 | 8.2 | 26.5 | 566 | 274 | 0.3 | 0.9 | NT | NT | TNC | 20 |
| LP-7 | Motarlori | 08:10 | 15:12 | 8.2 | 26.5 | 526 | 255 | 0.3 | 0.8 | NT | NT | TNC | 10 |
| LP-8 | Natura, Shalow Well | 08:16 | 15:15 | 8.1 | 26.3 | 523 | 253 | 0.3 | 1.0 | NT | NT | TNC | 5 |
| LP-9 | Central 2 | 11:13 | 15:17 | 8.1 | 26.7 | 552 | 267 | 0.3 | 0.8 | NT | NT | TNC | 5 |
| LP-10 | Central 3 | 08:56 | 15:19 | 8.2 | 26.4 | 524 | 254 | 0.3 | 0.9 | NT | NT | TNC | 45 |

**Legend:**
ND: not detectable NT: not tested NS: not set CFU: colony formed unit; TNC: Too Numerous To Count.
Weather Report : Sunny Cloudy Rain

## Suggestions
Boiling Water Before Drinking

**District : Lautem**
**Town : Lospalos**

Sampling Date : 15/ 10/ 2001
Testing Date : 17/10/2001
Received by : Miguel Quintao

Sample by :Eurico da Costa DWSS Lautem
Testing by : Miguel Quintao WSS Lab

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Hard | Alkal | 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 |
| LP-1 | Papapa, intake | 14:30 | 15:18 | 8.1 | 25.1 | 393 | 190 | 0.2 | 1.2 | 266 | 1964 | TNC | 2 |
| LP-2 | KOR BATT, Spring | 14:35 | 15:19 | 8.1 | 24.5 | 457 | 221 | 0.2 | 1.7 | NT | NT | TNC | 112 |
| LP-3 | Kauto, Old pump house | 14:45 | 15:20 | 8.0 | 24.5 | 437 | 211 | 0.2 | 1.0 | NT | NT | TNC | 2 |
| LP-4 | Perekiki | 18:35 | 16:58 | 8.0 | 24.6 | 429 | 207 | 0.2 | 1.2 | NT | NT | 56 | 0 |
| LP-5 | Kartini-1 | 18:40 | 16:00 | 8.0 | 24.9 | 427 | 206 | 0.2 | 1.2 | NT | NT | 26 | 0 |
| LP-6 | Sawarika | 09:30 | 16:01 | 8.0 | 25.2 | 416 | 201 | 0.2 | 0.9 | NT | NT | 16 | 0 |
| LP-7 | Motarlori | 08:03 | 16:10 | 8.0 | 25.4 | 423 | 204 | 0.2 | 0.8 | NT | NT | 42 | 0 |
| LP-8 | Natura, Shalow Well | 15:30 | 16:11 | 7.9 | 25.6 | 431 | 208 | 0.2 | 1.0 | 260 | 2182 | 52 | 0 |
| LP-9 | Central 2 | 10:21 | 16:12 | 8.0 | 25.9 | 427 | 206 | 0.2 | 1.0 | NT | NT | 120 | 0 |
| LP-10 | Central 3 | 10:25 | 16:20 | 8.2 | 26.8 | 494 | 239 | 0.2 | 1.1 | NT | NT | 72 | 0 |

**Legend:**
ND: not detectable NT: not tested NS: not set CFU: colony formed unit; TNC: Too Numerous To Count.
Weather Report : Sunny Cloudy Rain

## Suggestions
Boiling Water Before Drinking

**District : Lautem**
**Town : Lospalos**

Sampling Date : 12 / December / 2001
Testing Date : 13 / December / 2001
Received by : Mario Soares

Sample by : Eurico da Costa DWSS Lospalos
Testing by : Miguel Quintao and Mario Soares WSS Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Hard | Alkal | $NH_3$-N | $NO_3$-N | $NO_2$-N | Fe | Fluoride | Mn | $SO_4^{2-}$ | 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 | 1.5 | 0.5 | 250 | 0 | 0 |
| LP-1 | Papapa, intake | 15:00 | 14:43 | 7.9 | 27.0 | 508 | 246 | 0.2 | 1.1 | 440 | 305 | 0.9 | 0.5 | 0.016 | 0.03 | 0.8 | NT | 2 | TNC | 490 |
| LP-2 | KOR BATT, Spring | 15:05 | 14:44 | 8.0 | 27.0 | 411 | 199 | 0.2 | 15.1 | 330 | 250 | 0.6 | 0.3 | 0.013 | 0.25 | 0.16 | NT | 6 | TNC | 542 |
| LP-3 | Kauto, Old pump house | 15:20 | 14:45 | 8.0 | 27.0 | 412 | 199 | 0.2 | 14.3 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 182 | 2 |
| LP-4 | Perekiki | 15:25 | 14:55 | 7.9 | 27.0 | 398 | 192 | 0.2 | 19.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 466 |
| LP-5 | Kartini-1 | 15:30 | 14:56 | 8.0 | 27.0 | 397 | 192 | 0.2 | 16.9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 484 |
| LP-6 | Sawarika | 16:00 | 14:57 | 8.0 | 27.0 | 380 | 183 | 0.2 | 17.6 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 476 |
| LP-7 | Motarlori | 15:31 | 15:05 | 8.0 | 27.0 | 398 | 192 | 0.2 | 16.6 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 488 |
| LP-8 | Natura, Shalow Well | 14:40 | 15:06 | 8.1 | 27.0 | 398 | 192 | 0.2 | 18.6 | 195 | 240 | 0.9 | 0.4 | 0.027 | 0.29 | 0.15 | NT | NT | TNC | 426 |
| LP-9 | Central 2 | 14:45 | 15:07 | 8.0 | 27.0 | 399 | 193 | 0.2 | 18.9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 510 |
| LP-10 | Central 3 | 14:00 | 15:16 | 8.0 | 27.0 | 399 | 192 | 0.2 | 17.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |

**Legend:**
ND: not detectable NT: not tested NS: not set FU: colony formed ur NC: Too Numerous To Coun
Weather Report : Sunny Cloudy Rain

Inspected by :

## Suggestions

1. Bacteriological Is Problem
2. Boiling Water Before Drinking

Mario Soares Laboratory Manager

**District : Lautem**
**Town : Lospalos**

Sampling Date : 15/February /2002
Testing Date : 18/ February /2002
Received by : Miguel Quintao

Sample by : Eurico da Costa DWSS Lautem
Testing by : Miguel Quintao WSS Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Hard | Alkal | $NH_3$-N | $NO_3$-N | $NO_2$-N | Fe | Fluoride | Mn | $SO_4^{2-}$ | 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 | 1.5 | 0.5 | 250 | 0 | 0 |
| LP-1 | Papapa, intake | 14:30 | 11:05 | 8.2 | 25.1 | 563 | 224 | 0.2 | 1.5 | 430 | 300 | 0.9 | 0.3 | 0.006 | 0.01 | 0.1 | NT | ND | TNC | 174 |
| LP-2 | KOR BATT, Spring | 14:32 | 11:06 | 7.9 | 25.2 | 485 | 234 | 0.2 | 1.1 | 245 | 280 | 0.3 | 0.5 | 0.016 | ND | ND | NT | 1 | 94 | 0 |
| LP-3 | Kauto, Old pump house | 14:25 | 11:07 | 8.1 | 21.1 | 487 | 236 | 0.2 | 1.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 82 |
| LP-4 | Perekiki | 18:30 | 11:16 | 8.2 | 19.4 | 485 | 234 | 0.2 | 1.4 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 166 |
| LP-5 | Kartini-1 | 18:36 | 11:17 | 8.0 | 21.8 | 488 | 236 | 0.2 | 1.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 164 |
| LP-6 | Sawarika | 10:25 | 11:19 | 8.1 | 22.3 | 491 | 238 | 0.2 | 1.1 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 138 |
| LP-7 | Motarlori | 08:15 | 11:30 | 8.2 | 21.3 | 487 | 236 | 0.2 | 1.1 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 178 |
| LP-8 | Natura, Shalow Well | 16:30 | 11:31 | 8.2 | 25.6 | 443 | 214 | 0.2 | 0.6 | 210 | 315 | 0.4 | 0.6 | 0.005 | 0.02 | ND | NT | ND | TNC | 68 |
| LP-9 | Central 2 | 11:00 | 11:32 | 8.0 | 22.6 | 489 | 237 | 0.2 | 1.1 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 98 |
| LP-10 | Central 3 | 11:20 | 11:42 | 8.2 | 22.6 | 475 | 230 | 0.2 | 1.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 0 |

**Legend:**
ND: not detectable NT: not tested NS: not set 'U: colony formed u C: Too Numerous To Cou

Weather Report : Sunny Cloudy Rain

Inspected by :

## Suggestions

1. Bacteriological Is Problem
2. Boiling Water Before Drinking

Mario Soares Laboratory Manager

**District : Lautem**
**Town : Lospalos**

Sampling Date : 15/February /2002
Testing Date : 18/ February /2002
Received by : Miguel Quintao

Sample by : Eurico da Costa DWSS Lautem
Testing by : Miguel Quintao WSS Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Hard | Alkal | $NH_3$-N | $NO_3$-N | $NO_2$-N | Fe | Fluoride | Mn | $SO_4^{2-}$ | 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 | 1.5 | 0.5 | 250 | 0 | 0 |
| LP-1 | Papapa, intake | 14:30 | 11:05 | 8.2 | 25.1 | 563 | 224 | 0.2 | 1.5 | 430 | 300 | 0.9 | 0.3 | 0.006 | 0.01 | 0.1 | NT | ND | TNC | 174 |
| LP-2 | KOR BATT, Spring | 14:32 | 11:06 | 7.9 | 25.2 | 485 | 234 | 0.2 | 1.1 | 245 | 280 | 0.3 | 0.5 | 0.016 | ND | ND | NT | 1 | 94 | 0 |
| LP-3 | Kauto, Old pump house | 14:25 | 11:07 | 8.1 | 21.1 | 487 | 236 | 0.2 | 1.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 82 |
| LP-4 | Perekiki | 18:30 | 11:16 | 8.2 | 19.4 | 485 | 234 | 0.2 | 1.4 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 166 |
| LP-5 | Kartini-1 | 18:36 | 11:17 | 8.0 | 21.8 | 488 | 236 | 0.2 | 1.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 164 |
| LP-6 | Sawarika | 10:25 | 11:19 | 8.1 | 22.3 | 491 | 238 | 0.2 | 1.1 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 138 |
| LP-7 | Motarlori | 08:15 | 11:30 | 8.2 | 21.3 | 487 | 236 | 0.2 | 1.1 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 178 |
| LP-8 | Natura, Shalow Well | 16:30 | 11:31 | 8.2 | 25.6 | 443 | 214 | 0.2 | 0.6 | 210 | 315 | 0.4 | 0.6 | 0.005 | 0.02 | ND | NT | ND | TNC | 68 |
| LP-9 | Central 2 | 11:00 | 11:32 | 8.0 | 22.6 | 489 | 237 | 0.2 | 1.1 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 98 |
| LP-10 | Central 3 | 11:20 | 11:42 | 8.2 | 22.6 | 475 | 230 | 0.2 | 1.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 0 |

**Legend:**
ND: not detectable NT: not tested NS: not set 'U: colony formed u C: Too Numerous To Cou

Weather Report : Sunny Cloudy Rain

Inspected by :

## Suggestions

1. Bacteriological Is Problem
2. Boiling Water Before Drinking

Mario Soares Laboratory Manager

**District : Lautem**
**Town : Lospalos**

Sampling Date : 20 - 04 - 2002
Testing Date : 22 - 04 - 2002
Received by :Mario Soares

Sample by :Eurico Da Costa DWSS Lautem
Testing by : Miguel Quintao WSS Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Hard | Alkal | $NH_3$-N | $NO_3$-N | $NO_2$-N | Fe | Fluoride | Mn | $SO_4^{2-}$ | 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 | 1.5 | 0.5 | 250 | 0 | 0 |
| LP-1 | Papapa, intake | 16:10 | 16:03 | 8.4 | 28.9 | 324 | 156 | 0.2 | 1.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 220 | 0 |
| LP-2 | KOR BATT, Spring | 16:15 | 16:04 | 7.9 | 28.2 | 386 | 186 | 0.2 | 0.8 | 300 | 176 | NT | NT | NT | NT | NT | NT | NT | 765 | 0 |
| LP-3 | Kauto, Old pump house | 16:30 | 16:05 | 7.9 | 28.3 | 397 | 191 | 0.2 | 0.9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 830 | 2 |
| LP-4 | Perekiki | 19:30 | 16:11 | 7.9 | 28.0 | 265 | 127 | 0.1 | 0.9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 0 |
| LP-5 | Kartini-1 | 19:39 | 16:12 | 7.8 | 28.3 | 378 | 187 | 0.2 | 0.8 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 1245 | 14 |
| LP-6 | Sawarika | 16:45 | 16:13 | 7.8 | 28.1 | 388 | 187 | 0.2 | 1.0 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 4 |
| LP-7 | Motarlori | 18:20 | 16:16 | 7.8 | 28.0 | 398 | 192 | 0.2 | 0.8 | 210 | 225 | NT | NT | NT | NT | NT | NT | NT | TNC | 8 |
| LP-8 | Natura, Shalow Well | 15:30 | 16:17 | 7.7 | 26.8 | 292 | 140 | 0.1 | 5.7 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 1060 | 4 |
| LP-9 | Central 2 | 10:10 | 16:18 | 7.7 | 27.5 | 388 | 187 | 0.2 | 2.0 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 4 |
| LP-10 | Central 3 | 10:25 | 16:25 | 7.6 | 27.8 | 362 | 175 | 0.2 | 2.1 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 186 | 0 |

**Legend:**
ND: not detectable NT: not tested NS: not set FU: colony formed urTNC: Too Numerous To Count

Weather Report : Sunny Cloudy Rain

Inspected by :

## Suggestions

1. Bacteriological Is Problem
2. Boiling Water Before Drinking

Mario Soares Laboratory Manager

**District : Lautem**

**Town : Lospalos**

Sampling Date : 01/07/2002

Testing Date : 02/07/2002

Received by : Mario Soares

Sample by : Eurico da Costa DWSS Lospalos

Testing by : Mario Soarres and Miguel Quintao WSS Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Hard | Alkal | $NH_3$-N | $NO_3$-N | $NO_2$-N | Fe | Fluoride | Mn | $SO_4^{2-}$ | 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 | | Hours And | | 6.5-8.5 | NS | NS | 1000 | NS | 5.0 | 200 | NS | 1.5 | 10 | 1 | 0.3 | 1.5 | 0.5 | 250 | 0 | 0 |
| LP-1 | Papapa, intake | 18:15 | 09:32 | 8.5 | 24.8 | 460 | 222 | 0.2 | 0.9 | 165 | 180 | NT | NT | NT | NT | NT | NT | NT | TNC | 68 |
| LP-2 | KOR BATT, Spring | 18:17 | 09:33 | 8.5 | 24.4 | 490 | 237 | 0.2 | 0.6 | 295 | 280 | NT | NT | NT | NT | NT | NT | NT | 18 | 0 |
| LP-3 | Kauto, Old pump house | 18:00 | 09:40 | 8.3 | 24.1 | | 238 | 0.2 | 0.7 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 10 | 2 |
| LP-4 | Perekiki | 18:23 | 09:41 | 8.1 | 24.1 | 492 | 224 | 0.2 | 0.6 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 12 |
| LP-5 | Kartini-1 | 18:23 | 09:46 | 8.2 | 24.1 | 498 | 241 | 0.2 | 0.6 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 30 | 2 |
| LP-6 | Sawarika | 18:50 | 09:47 | 8.2 | 24.1 | 507 | 245 | 0.2 | 0.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 56 | 0 |
| LP-7 | Motarlori | 18:45 | 09:55 | 8.4 | 24.1 | 495 | 239 | 0.2 | 0.5 | 270 | 275 | NT | NT | NT | NT | NT | NT | NT | 9 | 3 |
| LP-8 | Natura, Shalow Well | 18:30 | 09:56 | 8.2 | 24.1 | 394 | 190 | 0.2 | 0.8 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 28 | 22 |
| LP-9 | Central 2 | 18:40 | 10:05 | 8.3 | 24.1 | 496 | 240 | 0.2 | 0.7 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 15 | 16 |
| LP-10 | Central 3 | 18:21 | 10:06 | 8.2 | 23.9 | 496 | 240 | 0.2 | 0.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 20 | 12 |

**Legend:**

ND: not detectable NT: not tested NS: not set CFU: colony formed unit TNTC: Too Numerous To Count

Weather Report : Sunny Cloudy Rain

Inspected by :

## Suggestions

1. Bacteriological Is Problem
2. Boiling Water Before Drinking

Mario Soares Laboratory Manager

**District : Lautem**

**Town : Lospalos**

Sampling Date : 15 - 03 - 2003

Testing Date : 16 - 03 - 2003

Received by : Miguel Quintao

Sample by : Eurico da costa Dwss Lospalos

Testing by : Miguel Quintao Wss Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Hard | Alkal | $NH_3$-N | $NO_3$-N | $NO_2$-N | Fe | Fluoride | Mn | $SO_4^{2-}$ | 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 | | Hours And | | 6.5-8.5 | NS | NS | 1000 | NS | 5.0 | 200 | NS | 1.5 | 10 | 1 | 0.3 | 1.5 | 0.5 | 250 | 0 | 0 |
| LP-1 | Papapa, intake | 09:10 | 10:36 | 8.6 | 29.3 | 292 | 140 | 0.1 | 0.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 4 |
| LP-2 | KOR BATT, Spring | 09:15 | 10:37 | 8.5 | 29.3 | 257 | 123 | 0.1 | 0.4 | 250 | 120 | NT | NT | NT | NT | NT | NT | NT | TNC | 30 |
| LP-3 | Kauto, Old pump house | 09:00 | 10:44 | 8.2 | 29.1 | 285 | 131 | 0.1 | 0.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 14 |
| LP-4 | Perekiki | 10:19 | 10:45 | 8.5 | 29.0 | 249 | 121 | 0.1 | 0.1 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 48 |
| LP-5 | Kartini-1 | 10:25 | 10:46 | 8.4 | 29.1 | 290 | 139 | 0.1 | 0.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 54 |
| LP-6 | Sawarika | 11:15 | 10:55 | 8.5 | 29.0 | 275 | 132 | 0.1 | 0.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 60 |
| LP-7 | Motarlori | 10:40 | 10:54 | 8.5 | 29.0 | 270 | 131 | 0.1 | 0.1 | 150 | 165 | NT | NT | NT | NT | NT | NT | NT | TNC | 54 |
| LP-8 | Natura, Shalow Well | 11:14 | 10:55 | 8.5 | 29.3 | 290 | 141 | 0.1 | 0.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 34 |
| LP-9 | Central 2 | 12:00 | 10:57 | 8.5 | 29.3 | 250 | 121 | 0.1 | 0.3 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 28 |
| LP-10 | Central 3 | 12:15 | 10:58 | 8.6 | 29.1 | 270 | 135 | 0.1 | 0.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 150 | 2 |

**Legend:**

ND: not detectable NT: not tested NS: not set CFU: colony forming unit TNC: Too Numerous To Count.

Weather Report : Sunny Cloudy Rain

Inspected by :

## Suggestions

1. Bacteriological Is Problem
2. Boiling Water Before Drinking

Mario Soares Laboratory Manager

**District : Lautem**

**Town : Lospalos**

Sampling Date : 15 - 03 - 2003

Testing Date : 16 - 03 - 2003

Received by : Miguel Quintao

Sample by : Eurico da costa Dwss Lospalos

Testing by : Miguel Quintao Wss Laboratory

| No | Sampling Point | Time | | pH | Temp. | Cond. | TDS | Salinity | Turbid. | Hard | Alkal | $NH_3$-N | $NO_3$-N | $NO_2$-N | Fe | Fluoride | Mn | $SO_4^{2-}$ | 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 | | Hours And | | 6.5-8.5 | NS | NS | 1000 | NS | 5.0 | 200 | NS | 1.5 | 10 | 1 | 0.3 | 1.5 | 0.5 | 250 | 0 | 0 |
| LP-1 | Papapa, intake | 09:10 | 10:36 | 8.6 | 29.3 | 292 | 140 | 0.1 | 0.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 4 |
| LP-2 | KOR BATT, Spring | 09:15 | 10:37 | 8.5 | 29.3 | 257 | 123 | 0.1 | 0.4 | 250 | 120 | NT | NT | NT | NT | NT | NT | NT | TNC | 30 |
| LP-3 | Kauto, Old pump house | 09:00 | 10:44 | 8.2 | 29.1 | 285 | 131 | 0.1 | 0.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 14 |
| LP-4 | Perekiki | 10:19 | 10:45 | 8.5 | 29.0 | 249 | 121 | 0.1 | 0.1 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 48 |
| LP-5 | Kartini-1 | 10:25 | 10:46 | 8.4 | 29.1 | 290 | 139 | 0.1 | 0.2 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 54 |
| LP-6 | Sawarika | 11:15 | 10:55 | 8.5 | 29.0 | 275 | 132 | 0.1 | 0.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 60 |
| LP-7 | Motarlori | 10:40 | 10:54 | 8.5 | 29.0 | 270 | 131 | 0.1 | 0.1 | 150 | 165 | NT | NT | NT | NT | NT | NT | NT | TNC | 54 |
| LP-8 | Natura, Shalow Well | 11:14 | 10:55 | 8.5 | 29.3 | 290 | 141 | 0.1 | 0.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 34 |
| LP-9 | Central 2 | 12:00 | 10:57 | 8.5 | 29.3 | 250 | 121 | 0.1 | 0.3 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 28 |
| LP-10 | Central 3 | 12:15 | 10:58 | 8.6 | 29.1 | 270 | 135 | 0.1 | 0.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | 150 | 2 |

**Legend:**

ND: not detectable NT: not tested NS: not set CFU: colony forming Unit TNC: Too Numerous To Count

Weather Report : Sunny Cloudy Rain

Inspected by :

## Suggestions

1. Bacteriological Is Problem
2. Boiling Water Before Drinking

Mario Soares Laboratory Manager

**District : Lautem**
**Town : Lospalos**

Sampling Date : 01/; 14/03/2019
Testing Date : 02; 15/03/2019
Received by : M: Mario Soares

Sample by : Eurico da Costa DWSS Lospalos
Testing by : Mar;Sidonio X. de Jesus & Estela

| No | Sampling Point | test | pH | Temp. (°C) | Cond. (µS/cm) | TDS (mg/L) | Salinity (‰) | Turbid. (NTU) | Hard (mg/l) | Alkal (mg/l) | $NH_3$-N (mg/L) | $NO_3$-N (mg/L) | $NO_2$-N (mg/L) | Fe (mg/L) | Fluoride (mg/L) | Mn (mg/L) | $SO_4^{2-}$ (mg/L) | T.Coli CFU | E.Coli 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 | 1.5 | 0.5 | 250 | 0 | 0 |
| LP-1 | Papapa, intake | 09;05 | 8.2 | 24.4 | 220 | 110.6 | 0.1 | 173.0 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |
| LP-2 | Puahopu intake, Spring | 07;00 | 7.9 | 24.1 | 559 | 283 | 0.3 | 0.9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 28 |
| LP-3 | Kauto, Old pump house | 09;03 | 8.2 | 24.2 | 198.2 | 99.9 | 0.1 | 176.0 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |
| LP-4 | Uma Seguransa Papapa | 09;10 | 7.9 | 24.2 | 558 | 282 | 0.3 | 0.9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | 36 |
| LP-5 | Eks Edifiso SMASA Kuluhun | 08;38 | 7.8 | 24.2 | 506 | 256 | 0.2 | 2.4 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |
| LP-6 | Edifiso SMASA Lautem | 10;32 | 7.6 | 24.5 | 550 | 277 | 0.3 | 0.9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |
| LP-7 | Central 3/Manuel da Costa | 08;51 | 7.9 | 24.0 | 528 | 268 | 0.3 | 2.4 | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |

**Legend:**

ND: not detectable NT: not tested NS: not set FU: colony formed urTNC: Too Numerous To Count

Weather Report : Sunny Cloudy Rain

Inspected by :

## Suggestions

1. Bacteriological Is Problem
2. Boiling Water Before Drinking

Mario Soares Laboratory Manager

**Distric : Lautem** Sampling Date : 23/05/2019 Sampled by : SMASA LAUTEM

**Town : Lospalos** Testing Date : 24/05/2019 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.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 | NS | 200 | NS | 1.5 | 10 | 1 | 0.3 | 1.5 | 0.5 | 250 | 0 | 0 |
| LP-1 | Puohopou Intake Sp | 15:08 | NT | 8.2 | 19.9 | 512 | 287.0 | 0.3 | 0.8 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |
| LP-2 | Papapa Intake | 15:12 | NT | 8.1 | 19.6 | 466 | 260.0 | 0.3 | 16.8 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |
| LP-3 | Uma Seguransa Papapa | 15:25 | NT | 8.2 | 20.3 | 528 | 291.0 | 0.3 | 2.5 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | 4 | TNC |
| LP-4 | Ex. Edifisio SAS | 09:40 | NT | 8.2 | 20.5 | 501 | 275.0 | 0.3 | 0.8 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | 12 | TNC |
| LP-5 | Sr. Vitor | 09:50 | NT | 8.4 | 21.1 | 511 | 276.0 | 0.3 | 0.9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | 28 | TNC |
| LP-6 | Clinica Imanuel A | 16:08 | NT | 8.5 | 21.5 | 526 | 282.0 | 0.3 | 0.9 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | 5 | TNC |
| LP-7 | Clinica Imanuel B | 16:12 | NT | 8.5 | 21.5 | 458 | 240.0 | 0.2 | 5.0 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT |
| LP-8 | Sr.Gil da Costa | 16:20 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |
| LP-9 | Eurico da Costa | 16:25 | NT | 8.5 | 23.2 | 525 | 278.0 | 0.3 | 0.7 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | TNC | TNC |
| LP-10 | Edifisio SAS | 16:27 | NT | 8.5 | 23.3 | 578 | 295 | 0.3 | 1.1 | NT | NT | NT | NT | NT | NT | NT | NT | NT | NT | 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

Inspected by :

**Suggestions**

1. Turbidity a'as
2. Persiza hadia sistema distribuisaun tamba iha contaminasaun !
3. Nono be'e molok atu hemu !

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**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Town** | LOS PALOS | LOS PALOS | LOS PALOS | LOS PALOS | LOS PALOS | LOS PALOS | LOS PALOS | LOS PALOS | LOS PALOS |
| | | **Date** | 9-May-14 | 9-May-14 | 9-May-14 | 9-May-14 | 9-May-14 | 9-May-14 | 9-May-14 | 13/jun/14 | 13/jun/14 |
| | | **Location** | PAPAPA INTAKE | HOTEL ROBERTO CARLOS | RSS WELL | DISTRICT ADM. OFFICE | BEHIND CHURCH | ALDEIA NATURA/ SAS OFFICE | EX. KODIM LAMA | PUAHOPO | PAPAPA INTAKE |
| **References and parameters** | **Units** | **WHO/TL Guideline** | Sample Reference 4210 | Sample Reference 4211 | Sample Reference 4212 | Sample Reference 4213 | Sample Reference 4214 | Sample Reference 4215 | Sample Reference 4216 | Sample Reference 4330 | Sample Reference 4331 |
| ***Physical tests*** | | | | | | | | | | | |
| **pH** | - | **6.5 - 8.5** | 7.7 | 7.6 | 7.5 | 7.7 | 7.7 | 7.7 | 7.5 | 7.8 | NT |
| **E. Conductivity** | µs/cm | **NS** | 566 | 626 | 520 | 616 | 590 | 610 | 601 | 608 | NT |
| **TSS** | mg/L | **NS** | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | NT |
| **TDS** | mg/L | **1000** | 283 | 313 | 260 | 308 | 295 | 305 | 301 | 304 | NT |
| **Salinity** | % | **NS** | 0.3 | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | NT |
| **Temperature** | oC | **NS** | 28.4 | 28.0 | 27.1 | 28.6 | 28.1 | 32.0 | 28.2 | 20.4 | NT |
| **Turbidity** | NTU | **5** | 5.0 | 0.1 | 0.4 | 0.2 | 5.1 | 0.4 | 0.5 | 0.7 | NT |
| ***Chemical tests*** | | | | | | | | | | | |
| **NH3-N** | mg/L | **1.5** | 0.5 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | NT | NT |
| **NO3-N** | mg/L | **10 (as NO3-N)** | 0.3 | ND | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | NT | NT |
| **NO2-N** | mg/L | **1 (as NO2-N)** | 0.007 | 0.004 | 0.005 | 0.003 | 0.005 | 0.005 | 0.006 | NT | NT |
| **Iron (Fe)** | mg/L | **0.3** | 0.04 | 0.03 | 0.03 | 0.1 | 0.03 | 0.1 | ND | NT | NT |
| **Manganese (Mn)** | mg/L | **0.5** | ND | ND | ND | ND | ND | ND | ND | NT | NT |
| **Fluoride** | mg/L | **1.5** | 0.10 | 0.15 | 0.06 | 0.1 | 0.2 | 0.2 | 0.1 | NT | NT |
| **Free chlorine** | mg/L | **0.5** | ND | ND | ND | ND | ND | ND | ND | NT | NT |
| **Ca hardness** | mg/L | **NS** | 235 | 210 | 200 | 225 | 230 | 175 | 240 | NT | NT |
| **Arsenic** | mg/L | **0.01** | ND | ND | ND | ND | ND | ND | ND | NT | NT |
| **T. Hardness** | mg/L | **200** | 240 | 225 | 230 | 245 | 245 | 245 | 240 | NT | NT |
| **Total alkalinity** | mg/L | **NS** | 225 | 215 | 220 | 240 | 240 | 240 | 230 | NT | NT |
| **Sulphate (SO4 2-)** | mg/L | **250** | 2 | 8 | 2 | 5 | 1 | 5 | 2 | NT | NT |
| ***Bacteriological test*** | | | | | | | | | | | |
| **Total coliform** | CFU/100 mL | **0** | TNC | 0 | TNC | 0 | TNC | 6 | 2 | TNC | TNC |
| **E. Coli** | CFU/100 mL | **0** | TNC | 0 | TNC | 1 | TNC | 6 | 8 | 2 | 2 |

**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 6. D4 Preliminary Design Report

(Stand-alone document)

## Appendix 7. ADB Process Initial Environmental Examination (IEE) – Lospalos

(Stand-alone document)

## Appendix 8. "No Objection" Letter from Lautem Municipal Administration

ADMINISTRAÇÃO MUNICIPAL DE LAUTEM

Administrador do Município de LAUTÉM

OFÍCIO

REF : 139 /AM. LAUTÉM/V/2021

Data : 03 Maio 2021
**Hato'o** : Presidente Conselho Administrativo Bee Timor Leste, E.P
**Eng Carlos Peloi dos Reis**

**Asunto** : ***Nota konfirmasaun.***

Caro Sr. Presidente BTL, E.P.
Bazeia ba karta husi DGAS ho nu. Ref,: 267/680605/GAB- DGAS /2020 datada 23 de Setembro 2020 ne'ebe BTL, E.P re – encaminha ho nu.ref.:104/Gab.P.BTL,.E.P/IV/2021 iha dia 16 Abril 2021 relasiona ho fatin selesinado ba tratamento bee foer (FSTP) iha kapital Municipiu Lautem ne'ebe husu Administrasaun nia opiniaun kona ba fatin refere.
Nune'e liu husi karta ida ne'e, Administrasaun Munisipiu Lautem hakarak konfirma katak fatin refere hanesan fatin ne'ebe prepara nanis ona ba Soe lixu solidu durante ne'e. Tamba ne'e Administrador Munisipiu Lautem hakarak konfirma katak Administrasaun Munisipiu LAIHA OBJESAUN ba fatin selesionado atu estabelese Sistema tratramento bee fo'er (FSTP).

Obrigado barak ba ita nia atensaun.

Melhores Cumprimentos,

**Domingos Savio M.Si**
O Administrador do Municipio de Lautem

Cc:

1. Diretor Servisu Munisipál Registos, Notariado e Cadastrais Municipio Lautem.
2. Diretor Servisu Munisipál Agua Saneamento e Ambiente
3. Diretor Serviso Municipal Planeamento Dezenvolvimento Integrado Municipio Lautem
4. Ponto Vokal Serviso Municipal Meio Ambiente de Lautem
5. Arkivo

# Appendix 9. Pump Test Results

# Los Palos_ETA_Papapa Lake

CLIENTE: AdP Timor-Leste
PROJECTO: Surface Water Monitoring
DISTRITO: Los Palos
NASCENTE: ETA-Papapa Lake
DATE: 7-out-20

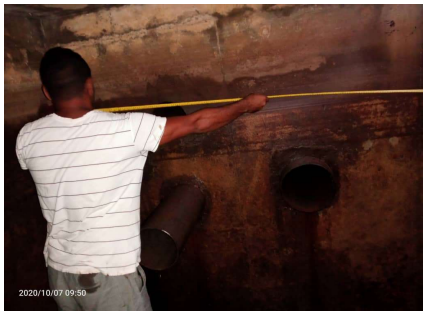
XL CONSTRUÇÕES

**TABELA DE REGISTO DE MEDIÇÃO DE CAUDAL EM NASCENTES**

| MEDIÇÃO Nº | IDENTIFICAÇÃO DA NASCENTE | DATA DA MEDIÇÃO | HORA DE ÍNICIO DOS TESTE | HORA DE FIM DOS TESTES | EQUIPAMENTO UTILIZADO | Nº TESTE | LARGURA DO TANQUE (M) | COMPRIMENTO DO TANQUE (M) | ALTURE DE ENCHIMENTO DE ÁGUA (M) | QUANTIDADE DE ÁGUA (M3) | TEMPO DE ENCHIMENTO DO TANQUE (SEGUNDOS) | CAUDAL MEDIDO (L/S) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ETA-Papapa Lake | 7-out-20 | 10:03:00 | 11:11:00 | Tanque de betão existente com 5,0 m2 de área | 1 | 2,00 | 2,50 | 0,395 | 1,975 | 90,00 | 21,94 |
| | | | | | | 2 | 2,00 | 2,50 | 0,470 | 2,350 | 110,00 | 21,36 |
| | | | | | | 3 | 2,00 | 2,50 | 0,475 | 2,375 | 116,00 | 20,47 |
| | | | | | | 4 | 2,00 | 2,50 | 0,463 | 2,315 | 113,00 | 20,49 |
| | | | | | | 5 | 2,00 | 2,50 | 0,472 | 2,360 | 117,00 | 20,17 |
| 2 | ETA-Papapa Lake | 7-out-20 | 17:01:00 | 17:22:00 | Tanque de betão existente com 5,0 m2 de área | 1 | 2,00 | 2,50 | 0,381 | 1,905 | 91,00 | 20,93 |
| | | | | | | 2 | 2,00 | 2,50 | 0,397 | 1,985 | 97,00 | 20,46 |
| | | | | | | 3 | 2,00 | 2,50 | 0,405 | 2,025 | 97,00 | 20,88 |

**REGISTO FOTOGRÁFICO**

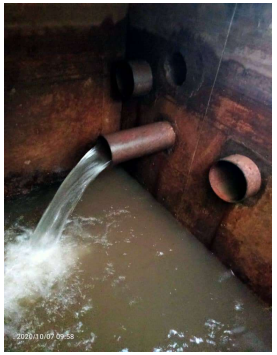
Medição da área do tanque




Instalação da régua para controlo de nível de água

Controlo de válvula de seccionamento

Enchimento do tanque



# Los Palos_ETA_Puahopo Spring

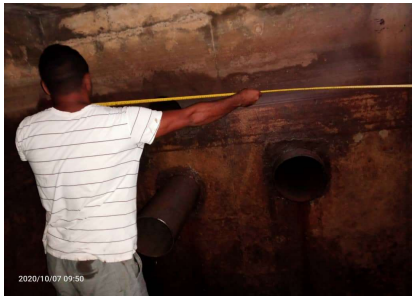
CLIENTE: AdP Timor-Leste
PROJECTO: Surface Water Monitoring
DISTRITO: Los Palos
NASCENTE: ETA-Puahopo Spring
DATE: 7-out-20

**TABELA DE REGISTO DE MEDIÇÃO DE CAUDAL EM NASCENTES**

| MEDIÇÃO Nº | IDENTIFICAÇÃO DA NASCENTE | DATA DA MEDIÇÃO | HORA DE ÍNICIO DOS TESTE | HORA DE FIM DOS TESTES | EQUIPAMENTO UTILIZADO | Nº TESTE | LARGURA DO TANQUE (M) | COMPRIMENTO DO TANQUE (M) | ALTURE DE ENCHIMENTO DE ÁGUA (M) | QUANTIDADE DE ÁGUA (M3) | TEMPO DE ENCHIMENTO DO TANQUE (SEGUNDOS) | CAUDAL MEDIDO (L/S) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ETA-Puahopo Spring | 7-out-20 | 11:24:00 | 12:08:00 | Tanque de betão existente com 5,0 m2 de área | 1 | 2,00 | 2,50 | 0,624 | 3,120 | 61,00 | 51,15 |
| | | | | | | 2 | 2,00 | 2,50 | 0,565 | 2,825 | 53,00 | 53,30 |
| | | | | | | 3 | 2,00 | 2,50 | 0,504 | 2,520 | 50,00 | 50,40 |
| | | | | | | 4 | 2,00 | 2,50 | 0,607 | 3,035 | 56,00 | 54,20 |
| | | | | | | 5 | 2,00 | 2,50 | 0,500 | 2,500 | 47,00 | 53,19 |
| 2 | ETA-Puahopo Spring | 7-out-20 | 17:32:00 | 17:49:00 | Tanque de betão existente com 5,0 m2 de área | 1 | 2,00 | 2,50 | 0,444 | 2,220 | 41,00 | 54,15 |
| | | | | | | 2 | 2,00 | 2,50 | 0,451 | 2,255 | 40,00 | 56,38 |
| | | | | | | 3 | 2,00 | 2,50 | 0,482 | 2,410 | 43,00 | 56,05 |

**REGISTO FOTOGRÁFICO**

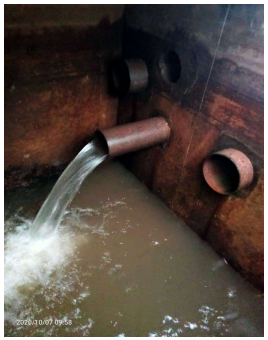
Medição da área do tanque



Instalação da régua para controlo de nível de água

Controlo de válvula de seccionamento

Enchimento do tanque



# Los Palos_ Papapa Spring (B1+B2)

CLIENTE: AdP Timor-Leste
PROJECTO: Surface Water Monitoring
DISTRITO: Los Palos
NASCENTE: Papapa spring (B1+B2)
DATE: 6-out-20

XL CONSTRUÇÕES

**TABELA DE REGISTO DE MEDIÇÃO DE CAUDAL EM NASCENTES**

| MEDIÇÃO Nº | IDENTIFICAÇÃO DA NASCENTE | DATA DA MEDIÇÃO | HORA DE ÍNICIO DOS TESTE | HORA DE FIM DOS TESTES | EQUIPAMENTO UTILIZADO | Nº TESTE | TEMPO DE ENCHIMENTO DO TANQUE (SEGUNDOS) | TANQUE UTILIZADO (L) | CAUDAL MEDIDO (L/S) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Papapa spring (B1+B2) | 6-out-20 | 07:57:00 | 15:14:00 | Motobomba nº1 (4 Polegadas) | 1 | 15,85 | 250,00 | 15,77 |
| | | | | | | 2 | 15,65 | 250,00 | 15,97 |
| | | | | | | 3 | 15,96 | 250,00 | 15,66 |
| | | | | | | 4 | 17,25 | 250,00 | 14,49 |
| | | | | | | 5 | 17,43 | 250,00 | 14,34 |
| | | | | | | 6 | 17,26 | 250,00 | 14,48 |
| | | | | | | 7 | 16,01 | 250,00 | 15,62 |
| | | | | | | 8 | 15,49 | 250,00 | 16,14 |
| | | | | | | 9 | 15,50 | 250,00 | 16,13 |
| 2 | Papapa spring (B1+B2) | 6-out-20 | 07:57:00 | 15:14:00 | Motobomba nº2 (4 Polegadas) | 1 | 16,3 | 250,00 | 15,34 |
| | | | | | | 2 | 16,69 | 250,00 | 14,98 |
| | | | | | | 3 | 16,82 | 250,00 | 14,86 |
| | | | | | | 4 | 15,32 | 250,00 | 16,32 |
| | | | | | | 5 | 17,37 | 250,00 | 14,39 |
| | | | | | | 6 | 15,64 | 250,00 | 15,98 |
| | | | | | | 7 | 16,05 | 250,00 | 15,58 |
| | | | | | | 8 | 15,95 | 250,00 | 15,67 |
| | | | | | | 9 | 15,44 | 250,00 | 16,19 |

REGISTO FOTOGRÁFICO

| Preparação do local de medição | Instalação de moto bombas | Estabilização do nível de água | Registo do teste de medição |
|---|---|---|---|
|  |  |  |  |

# Los Palos_ Papapa Spring (B3)

CLIENTE: AdP Timor-Leste
PROJECTO: Surface Water Monitoring
DISTRITO: Los Palos
NASCENTE: Papapa spring (B3)
DATE: 6-out-20

**TABELA DE REGISTO DE MEDIÇÃO DE CAUDAL EM NASCENTES**

| MEDIÇÃO Nº | IDENTIFICAÇÃO DA NASCENTE | DATA DA MEDIÇÃO | HORA DE ÍNICIO DOS TESTE | HORA DE FIM DOS TESTES | EQUIPAMENTO UTILIZADO | Nº TESTE | TEMPO DE ENCHIMENTO DO TANQUE (SEGUNDOS) | TANQUE UTILIZADO (L) | CAUDAL MEDIDO (L/S) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Papapa spring (B3) | 6-out-20 | 15:15:00 | 18:13:00 | Motobomba (4 Polegadas) | 1 | 12,40 | 250,00 | 20,16 |
| | | | | | | 2 | 13,06 | 250,00 | 19,14 |
| | | | | | | 3 | 13,95 | 250,00 | 17,92 |
| | | | | | | 4 | 14,34 | 250,00 | 17,43 |
| | | | | | | 5 | 14,05 | 250,00 | 17,79 |
| | | | | | | 6 | 13,33 | 250,00 | 18,76 |
| | | | | | | 7 | 13,00 | 250,00 | 19,23 |
| | | | | | | 8 | 13,77 | 250,00 | 18,16 |
| | | | | | | 9 | 13,94 | 250,00 | 17,94 |

REGISTO FOTOGRÁFICO

| Preparação do local de medição | Instalação de moto bombas | Estabilização do nível de água | Registo do teste de medição |
|---|---|---|---|
|  |  |  |  |

# Los Palos_ Papapa Spring (C2)

CLIENTE: AdP Timor-Leste
PROJECTO: Surface Water Monitoring
DISTRITO: Los Palos
NASCENTE: Papapa spring (C2)
DATE: 6-out-20

XL CONSTRUÇÕES

**TABELA DE REGISTO DE MEDIÇÃO DE CAUDAL EM NASCENTES**

| MEDIÇÃO Nº | IDENTIFICAÇÃO DA NASCENTE | DATA DA MEDIÇÃO | HORA DE ÍNICIO DOS TESTE | HORA DE FIM DOS TESTES | EQUIPAMENTO UTILIZADO | Nº TESTE | TEMPO DE ENCHIMENTO DO TANQUE (SEGUNDOS) | TANQUE UTILIZADO (L) | CAUDAL MEDIDO (L/S) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Papapa spring (C2) | 6-out-20 | 18:21:00 | 19:05:00 | Motobomba com válvula (4 Polegadas) | 1 | 26,97 | 250,00 | 9,27 |
| | | | | | | 2 | 25,72 | 250,00 | 9,72 |
| | | | | | | 3 | 31,06 | 250,00 | 8,05 |
| | | | | | | 4 | 17,63 | 250,00 | 14,18 |
| | | | | | | 5 | 26,34 | 250,00 | 9,49 |
| | | | | | | 6 | 20,48 | 250,00 | 12,21 |

REGISTO FOTOGRÁFICO

| Preparação do local de medição | Instalação de moto bombas e válvula | Estabilização do nível de água | Registo do teste de medição |
|---|---|---|---|
|  |  |  |  |

H2O PTY LTD
H2O Trade Centre
15 Henning Road
Coolalinga
NT 0835
Phone: (08) 8983 2611
Fax: (08) 8983 2711

# PUMP TEST SUMMARY



JOB#: 1497

CLIENT: AOP
REGISTERED # (RN): 438
LOCATION: HOME LOSPALOS GPS: 08°30'9.290" S
WELL NAME: HOME II 126°57'4.389" E
RECORDERS NAME: NATALINO MENDES
DATES OF TEST: 4-10-20 TO: 4-10-20

## BORE CONSTRUCTION DATA

| | |
|---|---|
| TOTAL DEPTH: 43 MTRS | DATE DRILLED: 3-10-20 |
| TOTAL DEPTH CASED: 42.5 MTRS | SWL WHEN DRILLED: 8 MTR |
| CASING SIZE: 150 (MM): ID | REG 8 ATTACHED: (YES) NO |
| SCREENS/ SLOTS: FROM 41.24 TO 21.2-15.6 MTRS | SCREEN/SLOTS APERTURE= 2 mm |

WARNING: MINIMUM INTERNAL BORE DIAMETER IS 150 mm

## TEST EQUIPMENT USED

| | |
|---|---|
| PUMP TYPE: SUBMERSIBLE PUMP | PUMP TEST TRAILER USED: Y (N) |
| BRAND/MODEL: GRUNDFOS | GENERATOR SIZE: 50 (KVA) |
| MOTOR KW: 11 KW | POLY SIZE & Length: |
| PUMP OUTLET SIZE: 3" | COLUMN SIZE: 3" |
| DISCHARGE PIPE SIZE: 3" | COLUMN LENGTHS AND NUMBER USED: |
| ORIFICE SIZE: - | 4.2 x 5 + 1 + 2mtr PUMP & MOTOR |
| OTHER DEVICES USED: FLOW METER | |
| | TOP OF PUMP TO INLET: 23 |
| REMARKS: | ACTUAL PUMP INLET DEPTH: 22.5 |
| | MTRS (TOC)/GL |

DRAW DOWN MEASURED FROM (TOC)/GL/OTHER:

| STEPPED TEST | | | | CONSTANT RATE TEST (N/A) | |
|---|---|---|---|---|---|
| DATE OF TEST: | 4-10-20 | | | DATES OF TEST: | TO: |
| SWL AT START: | 8.30 | | | SWL AT START: | |
| STEP ONE: | 7 LPS | 60 | MINS | DISCHARGE RATE: | LPS |
| STEP TWO: | 9 LPS | 60 | MINS | PUMPING DURATION: | MINS |
| STEP THREE: | 11 LPS | 60 | MINS | MAX DRAWDOWN: | MTRS |
| STEP FOUR: | 15 LPS | 60 | MINS | RECOVERY MEASURED TO: | MTRS |
| STEP FIVE: | - LPS | - | MINS | AT | MINS AFTER SHUTDOWN. |
| RECOVERY MEASURED TO: | | | MTRS | | |
| FROM SWL AT | | MINS AFTER SHUTDOWN | | | |

REMARKS:

## OBSERVATION WELLS (N/A)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NAME OF OBSERVATION WELLS: | | | | | | | |
| REGISTERED NUMBERS (RN): | | | | | | | |
| DISTANCE FROM PUMPD WELL: | | | | | | | |
| DIRECTION FROM PUMPED WELL: | | | | | | | |
| STATIC WATER LEVEL (GL OR TOC): | | | | | | | |
| GPS: | | | | | | | |
| SWL AT END OF TEST: | | | | | | | |

REMARKS:

H2O Trade Centre
15 Fenning Road
Coolalinga
NT 0835
Phone:
(08) 8983 2611
Fax:
(08) 8983 2711

# PUMP TEST SUMMARY - COMPOSITE OF BORE

PAGE 2 OF 14

JOB#: 1497

CLIENT: ADP

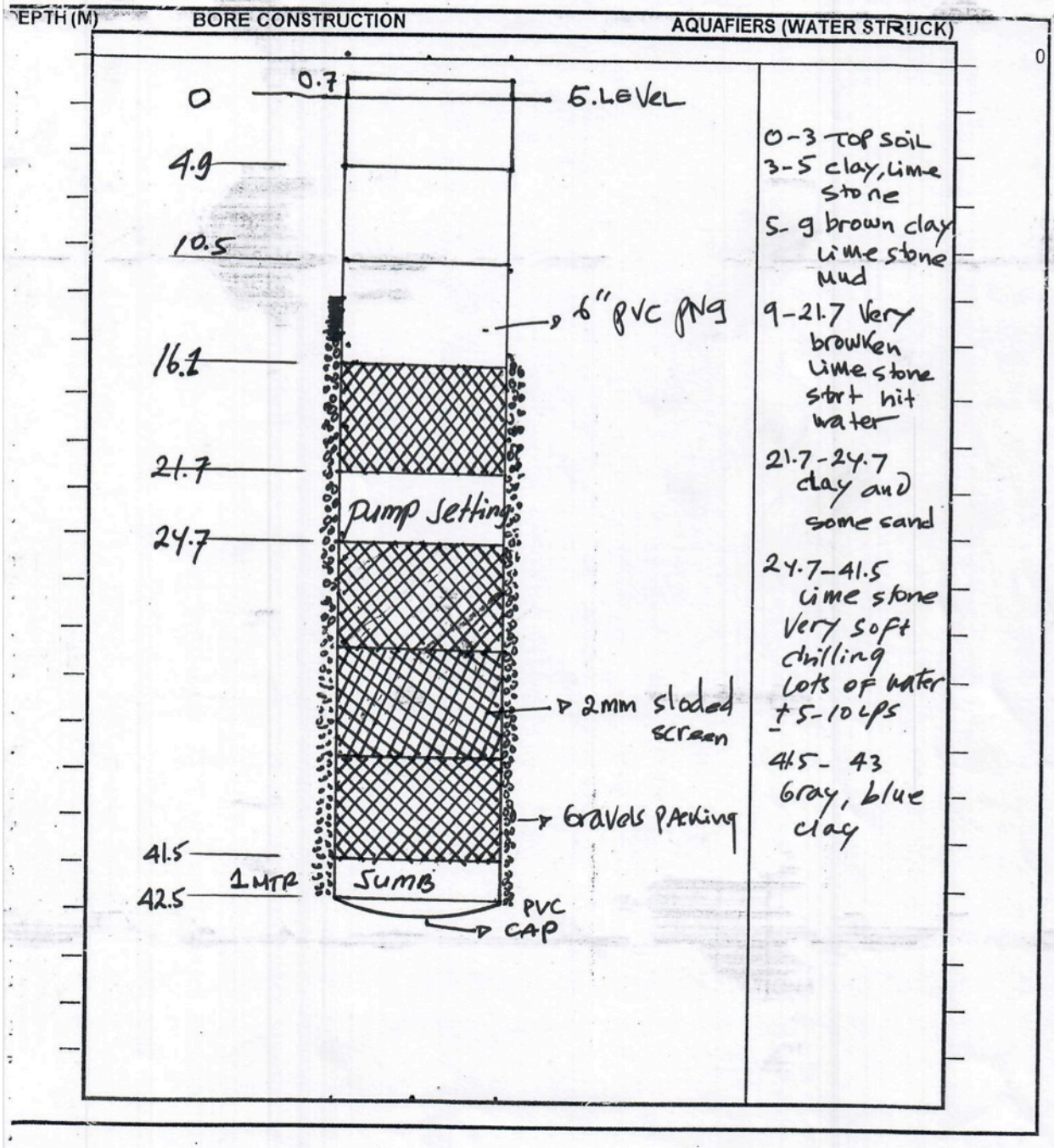
REGISTERED # (RN): 438 0830m 9.290dmx South

LOCATION: HOME, LOSPALOS GPS: 126° 57mid 4.389dmid EAST

WELL NAME: HOME II

RECORDERS NAME: NATALINO MENDES

DATES OF TEST: 4-10-20 TO: 4-10-20




THER BORE DETAILS:

H2O PTY LTD
H2O Trade Centre
15 Henning Road
Coolalinga
NT 0835
Phone: (08)89832611
Fax: (08)89832711

# STEPPED RATE PUMPING TEST

PAGE 3 OF 13

JOB#: 1497

CLIENT: ADP
DATE: 4-10-20
REGISTED NUMBER (RN): 438
LOCATION: HOME LOSPALOS GPS:
WELL NAME: HOME II
PUMP SETTING (INLET DEPTH): 23 TOC/GL
STATIC WATER LEVEL: 8:30 TOC/GL
DISCHARGE RATE: 7, 9, 12, 15 LPS
OTHER DETAILS:

| STEP 1 | | | | | STEP 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NOMINAL INTERVAL (MINS) | TIME 830 | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 7 LPS | NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 9 LPS |
| 0 | 830 | 830 | | | 0 | 930 | 9.~~73~~ | 1.43 | |
| 1 | 831 | 9.29 | 0.99 | | 1 | 931 | 9.80 | 1.50 | |
| 2 | 832 | 9.45 | 1.15 | | 2 | 932 | 9.~~89~~ | 1.~~59~~ | |
| 3 | 833 | 9.51 | 1.21 | | 3 | 933 | 9.95 | 1.65 | |
| 4 | 834 | 9.55 | 1.25 | | 4 | 934 | 10.11 | 1.81 | |
| 5 | 835 | 9.58 | 1.28 | | 5 | 935 | 10.18 | 1.~~88~~ | |
| 6 | 836 | 9.59 | 1.29 | | 6 | 936 | 10.14 | 1.84 | |
| 7 | 837 | 9.61 | 1.31 | | 7 | 937 | 10.13 | 1.83 | |
| 8 | 838 | 9.61 | 1.31 | | 8 | 938 | 10.14 | 1.84 | |
| 9 | 839 | 9.63 | 1.33 | | 9 | 939 | 10.16 | 1.86 | |
| 10 | 840 | 9.64 | 1.34 | | 10 | 940 | 10.17 | 1.87 | |
| 12 | 842 | 9.65 | 1.35 | | 12 | 942 | 10.19 | 1.~~89~~ | |
| 14 | 844 | 9.66 | 1.36 | | 14 | 944 | 10.20 | 1.90 | |
| 16 | 846 | 9.66 | 1.36 | ppt = 0.30 | 16 | 946 | 10.22 | 1.92 | |
| 18 | 848 | 9.66 | 1.36 | ph = 1.02 | 18 | 948 | 10.22 | 1.92 | |
| 20 | 850 | 9.66 | 1.37 | ms = 0.61 | 20 | 950 | 10.23 | 1.93 | |
| 25 | 855 | 9.67 | 1.37 | | 25 | 955 | 10.25 | 1.95 | |
| 30 | 900 | 9.68 | 1.38 | | 30 | 1000 | 10.26 | 1.96 | |
| 35 | 905 | 9.68 | 1.38 | | 35 | 1005 | 10.28 | 1.98 | |
| 40 | 910 | 9.70 | 1.40 | | 40 | 1010 | 10.28 | 1.98 | |
| 45 | 915 | 9.71 | 1.41 | | 45 | 1015 | 10.29 | 1.99 | |
| 50 | 920 | 9.72 | 1.42 | | 50 | 1020 | 10.29 | 1.99 | |
| 60 | 930 | 9.73 | 1.43 | | 60 | 1030 | 10.30 | 2.00 | |
| 70 | | | | | 70 | | | | |
| 80 | | | | | 80 | | | | |
| 100 | | | | | 100 | | | | |

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15 Henning Road
Coolalinga
NT 0835
Phone: (08)89832611
Fax: (08)89832711

# STEPPED RATE PUMPING TEST

PAGE 4 OF 14

JOB#: 1497

CLIENT: ADP
DATE: 4-10-20
REGISTED NUMBER (RN): 438
LOCATION: HOME, LOS PALOS GPS:
WELL NAME: HOME II
PUMP SETTING (INLET DEPTH): 23 TOC/GL
STATIC WATER LEVEL: TOC/GL
DISCHARGE RATE: LPS
OTHER DETAILS:

**STEP 3**

| NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 11 LPS |
|---|---|---|---|---|
| 0 | 1030 | | | |
| 1 | 1031 | 10.57 | 2.27 | |
| 2 | 1032 | 10.63 | 2.33 | |
| 3 | 1033 | 10.72 | 2.42 | |
| 4 | 1034 | 10.78 | 2.48 | |
| 5 | 1035 | 10.85 | 2.55 | |
| 6 | 1036 | 10.95 | 2.65 | |
| 7 | 1037 | 11.04 | 2.74 | |
| 8 | 1038 | 11.08 | 2.78 | |
| 9 | 1039 | 11.10 | 2.80 | |
| 10 | 1040 | 11.08 | 2.78 | |
| 12 | 1042 | 11.14 | 2.84 | |
| 14 | 1044 | 11.20 | 2.90 | |
| 16 | 1046 | 11.23 | 2.93 | |
| 18 | 1048 | 11.27 | 2.97 | |
| 20 | 1050 | 11.31 | 3.01 | |
| 25 | 1055 | 11.35 | 3.05 | |
| 30 | 1100 | 11.38 | 3.08 | |
| 35 | 1105 | 11.41 | 3.11 | |
| 40 | 1110 | 11.43 | 3.13 | |
| 45 | 1115 | 11.45 | 3.15 | |
| 50 | 1120 | 11.47 | 3.17 | |
| 60 | 1130 | 11.49 | 3.19 | |
| 70 | | | | |
| 80 | | | | |
| 100 | | | | |

**STEP 4**

| NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 15 LPS |
|---|---|---|---|---|
| 0 | 1130 | 11.49 | 3.19 | |
| 1 | 1131 | 16.93 | 8.63 | |
| 2 | 1132 | 18.24 | 9.94 | |
| 3 | 1133 | 19.67 | 11.37 | Abstract UWL |
| 4 | 1134 | 19.65 | 11.35 | Abstract VWL |
| 5 | 1135 | 19.00 | 10.7 | |
| 6 | 1136 | 17.00 | 8.7 | |
| 7 | 1137 | 16.97 | 8.67 | |
| 8 | 1138 | 17.89 | 9.59 | |
| 9 | 1139 | 17.24 | 8.94 | |
| 10 | 1140 | 17.13 | 8.83 | |
| 12 | 1142 | 17.17 | 8.87 | |
| 14 | 1144 | 16.93 | 8.63 | |
| 16 | 1146 | 17.03 | 8.73 | |
| 18 | 1148 | 16.89 | 8.59 | |
| 20 | 1150 | 17.10 | 8.8 | |
| 25 | 1155 | 17.29 | 8.99 | |
| 30 | 1200 | 17.15 | 8.85 | |
| 35 | 1205 | 17.10 | 8.8 | |
| 40 | 1210 | 17.20 | 8.9 | |
| 45 | 1215 | 17.20 | 8.9 | |
| 50 | 1220 | 17.22 | 8.92 | |
| 60 | 1230 | 17.10 | | |
| 70 | | | | |
| 80 | | | | |
| 100 | | | | |

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# RECOVERY FROM STEPPED RATE TEST

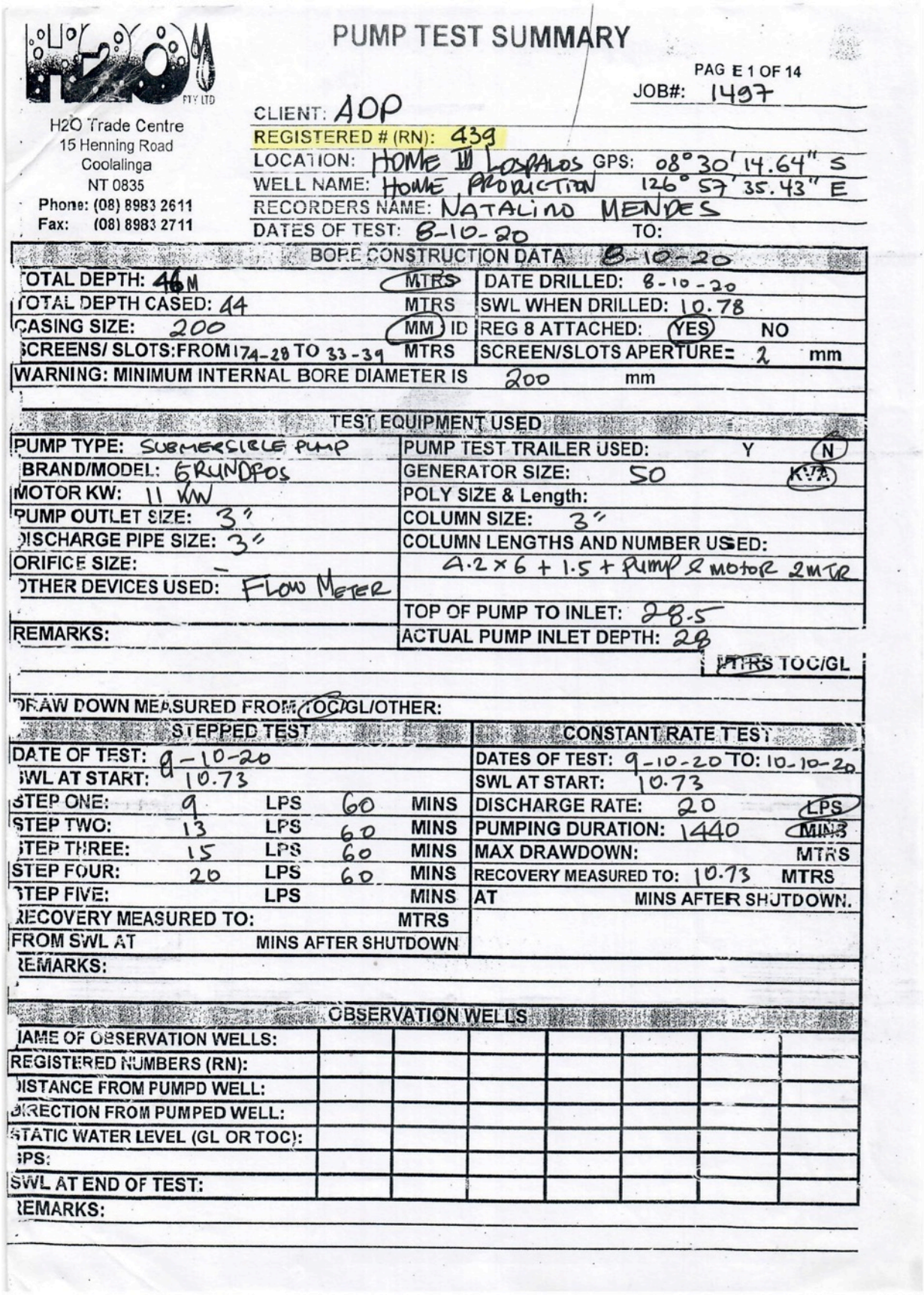
PAGE 5 OF 14

JOB#: 1497

CLIENT: ADP
DATE: 4-10-20
REGISTED NUMBER (RN): 438
LOCATION: HOME, LOSPALOS GPS:
WELL NAME: HOME II
PUMP SETTING (INLET DEPTH): 23 TOC/GL
STATIC WATER LEVEL: 8.30 TOC/GL
DISCHARGE RATE: 7, 9, 11, 15 LPS
OTHER DETAILS:

| NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS |
|---|---|---|---|---|
| 0 | 12.30 | 17.10 | | END |
| 1 | 12.31 | 10.47 | 2.17 | |
| 2 | 12.32 | 9.97 | 1.67 | |
| 3 | 12.33 | 9.63 | 1.33 | |
| 4 | 12.34 | 9.44 | 1.14 | |
| 5 | 12.35 | 9.26 | 0.96 | |
| 6 | 12.36 | 9.11 | 0.81 | |
| 7 | 12.37 | 8.97 | 0.67 | |
| 8 | 12.38 | 8.87 | 0.57 | |
| 9 | 12.39 | 8.78 | 0.48 | |
| 10 | 12.40 | 8.71 | 0.41 | |
| 12 | 12.42 | 8.60 | 0.30 | |
| 14 | 12.44 | 8.53 | 0.23 | |
| 16 | 12.46 | 8.48 | 0.18 | |
| 18 | 12.48 | 8.45 | 0.15 | |
| 20 | 12.50 | 8.42 | 0.12 | |
| 25 | 12.55 | 8.39 | 0.09 | |
| 30 | 13.00 | 8.36 | 0.06 | |
| 35 | 13.05 | 8.34 | 0.04 | |
| 40 | 13.10 | 8.33 | 0.03 | |
| 45 | 13.15 | 8.30 | 0.02 | |
| 50 | | | | |
| 60 | | | | FINISH TEST. |
| 70 | | | | |
| 80 | | | | |
| 100 | | | | |
| 120 | | | | |
| 140 | | | | |
| 160 | | | | |
| 180 | | | | |
| 210 | | | | |
| 240 | | | | |
| 270 | | | | |
| 300 | | | | |
| 360 | | | | |
| 420 | | | | |

# RN439 - Home III



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## PUMP TEST SUMMARY

PAG E 1 OF 14
JOB#: 1497

CLIENT: AOP
REGISTERED # (RN): 439
LOCATION: HOME III LOSPALOS GPS: 08° 30' 14.64" S
WELL NAME: HOME PRODUCTION 126° 57' 35.43" E
RECORDERS NAME: NATALINO MENDES
DATES OF TEST: 8-10-20 TO:

### BORE CONSTRUCTION DATA 8-10-20

| | |
|---|---|
| TOTAL DEPTH: 46M (MTRS) | DATE DRILLED: 8-10-20 |
| TOTAL DEPTH CASED: 44 MTRS | SWL WHEN DRILLED: 10.78 |
| CASING SIZE: 200 (MM) ID | REG 8 ATTACHED: (YES) NO |
| SCREENS/ SLOTS: FROM 24-28 TO 33-39 MTRS | SCREEN/SLOTS APERTURE= 2 mm |
| WARNING: MINIMUM INTERNAL BORE DIAMETER IS 200 mm | |

### TEST EQUIPMENT USED

| | |
|---|---|
| PUMP TYPE: SUBMERSIBLE PUMP | PUMP TEST TRAILER USED: Y (N) |
| BRAND/MODEL: GRUNDFOS | GENERATOR SIZE: 50 (K.V.A.) |
| MOTOR KW: 11 KW | POLY SIZE & Length: |
| PUMP OUTLET SIZE: 3" | COLUMN SIZE: 3" |
| DISCHARGE PIPE SIZE: 3" | COLUMN LENGTHS AND NUMBER USED: |
| ORIFICE SIZE: - | 4.2 x 6 + 1.5 + PUMP & MOTOR 2MTR |
| OTHER DEVICES USED: FLOW METER | |
| | TOP OF PUMP TO INLET: 28.5 |
| REMARKS: | ACTUAL PUMP INLET DEPTH: 28 |
| | ~~MTRS~~ TOC/GL |

DRAW DOWN MEASURED FROM: TOC/GL/OTHER:

| STEPPED TEST | | | | CONSTANT RATE TEST | |
|---|---|---|---|---|---|
| DATE OF TEST: 9-10-20 | | | | DATES OF TEST: 9-10-20 TO: 10-10-20 | |
| SWL AT START: 10.73 | | | | SWL AT START: 10.73 | |
| STEP ONE: 9 | LPS | 60 | MINS | DISCHARGE RATE: 20 | (LPS) |
| STEP TWO: 13 | LPS | 60 | MINS | PUMPING DURATION: 1440 | ~~MINS~~ |
| STEP THREE: 15 | LPS | 60 | MINS | MAX DRAWDOWN: | MTRS |
| STEP FOUR: 20 | LPS | 60 | MINS | RECOVERY MEASURED TO: 10.73 | MTRS |
| STEP FIVE: | LPS | | MINS | AT | MINS AFTER SHUTDOWN. |
| RECOVERY MEASURED TO: | | | MTRS | | |
| FROM SWL AT | MINS AFTER SHUTDOWN | | | | |
| REMARKS: | | | | | |

### OBSERVATION WELLS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NAME OF OBSERVATION WELLS: | | | | | | | |
| REGISTERED NUMBERS (RN): | | | | | | | |
| DISTANCE FROM PUMPD WELL: | | | | | | | |
| DIRECTION FROM PUMPED WELL: | | | | | | | |
| STATIC WATER LEVEL (GL OR TOC): | | | | | | | |
| SPS: | | | | | | | |
| SWL AT END OF TEST: | | | | | | | |
| REMARKS: | | | | | | | |

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# PUMP TEST SUMMARY - COMPOSITE OF BORE

PAGE 2 OF 14

JOB#: 1497

CLIENT: ADP

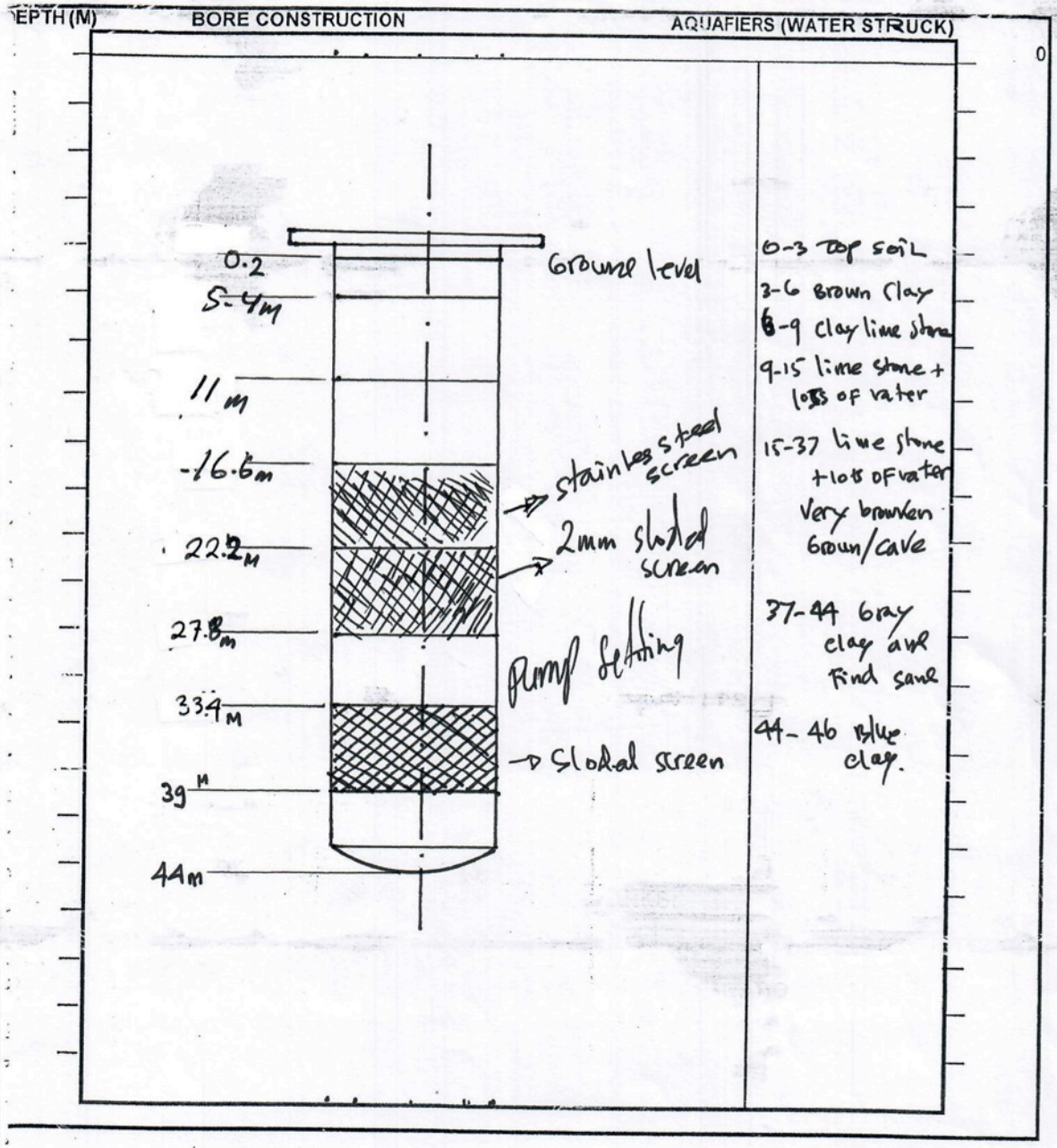
REGISTERED # (RN): 439

LOCATION: HOME, LOSPALOS GPS:

WELL NAME: HOME PRODUCTION

RECORDERS NAME: NATALINO MENDES

DATES OF TEST: 9-10-20 TO: 10-10-20




OTHER BORE DETAILS:

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# STEPPED RATE PUMPING TEST

PAGE 3 OF 13

JOB#: 1497

CLIENT: ADP
DATE: 8-10-20
REGISTED NUMBER (RN): 439
LOCATION: HOME III LOOPLOS GPS:
WELL NAME: HOME 8" PRODUCTION
PUMP SETTING (INLET DEPTH): 26~~0~~C/GL
STATIC WATER LEVEL: 10.73 ~~TOO~~/GL
DISCHARGE RATE: LPS
OTHER DETAILS:

| STEP 1 | | | | | STEP 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NOMINAL INTERVAL (MINS) | TIME 6:00 | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 9 LPS | NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 12 LPS |
| 0 | | 10.73 | | | 0 | 7000 | 10.83 | | |
| 1 | 6001 | 10.81 | | ADJUST VALVE | 1 | 7001 | 10.88 | 0.15 | |
| 2 | 6002 | 10.83 | 0,08 | ADJUST VALVE. | 2 | 7002 | 10.88 | 0.15 | |
| 3 | 6003 | 10.82 | 0,09 | 0.09 | 3 | 7003 | 10.88 | 0.15 | |
| 4 | 6004 | 10.82 | 0,09 | | 4 | 7004 | 10.88 | 0.15 | |
| 5 | 6005 | 10.82 | 0,09 | PH : 1,3 | 5 | 7005 | 10.88 | 0.15 | |
| 6 | 6006 | 10.82 | 0,09 | MS : 0,62 | 6 | 7006 | 10.88 | 0.15 | |
| 7 | 6007 | 10.82 | 0,09 | | 7 | 7007 | 10.88 | 0.15 | |
| 8 | 6008 | 10.82 | 0,09 | | 8 | 7008 | 10.88 | 0.15 | |
| 9 | 6009 | 10.82 | 0,09 | | 9 | 7009 | 10.88 | 0.15 | |
| 10 | 6010 | 10.82 | 0.09 | | 10 | 7010 | 10.88 | 0.15 | |
| 12 | 6012 | 10.82 | 0.09 | | 12 | 7012 | 10.88 | 0.15 | |
| 14 | 6014 | 10.83 | 0.1 | | 14 | 7014 | 10.88 | 0.15 | |
| 16 | 6016 | 10.83 | 0,10 | | 16 | 7016 | 10.88 | 0.15 | |
| 18 | 6018 | 10.84 | 0,11 | | 18 | 7018 | 10.88 | 0.15 | |
| 20 | 6020 | 10.83 | 0,10 | | 20 | 7020 | 10.88 | 0.15 | |
| 25 | 6025 | 10.83 | 0,10 | | 25 | 7025 | 10.88 | 0.15 | |
| 30 | 6030 | 10.83 | 0,10 | | 30 | 7030 | 10.89 | 0.16 | |
| 35 | 6035 | 10.83 | 0,10 | | 35 | 7035 | 10.89 | 0.16 | |
| 40 | 6040 | 10.83 | 0.10 | | 40 | 7040 | 10.89 | 0.16 | |
| 45 | 6045 | 10.83 | 0,10 | | 45 | 7045 | 10.89 | 0.16 | |
| 50 | 6050 | 10.83 | 0,10 | | 50 | 7050 | 10.89 | 0.16 | |
| 60 | 7000 | 10.83 | | | 60 | 7060 | 10.89 | 0.16 | |
| 70 | | | | | 70 | | | | |
| 80 | | | | | 80 | | | | |
| 100 | | | | | 100 | | | | |

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# STEPPED RATE PUMPING TEST

PAGE 4 OF 14

JOB#: 1497

CLIENT: ADP
DATE: 8-10-20
REGISTED NUMBER (RN): 439
LOCATION: HOME III LOSPALOS GPS:
WELL NAME: HOME PRODUCTION
PUMP SETTING (INLET DEPTH): 28 TOC/GL
STATIC WATER LEVEL: 10.73 (11) TOC/GL
DISCHARGE RATE: 9, 12, 15, 20 LPS
OTHER DETAILS:

**STEP 3**

| NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 15 LPS |
|---|---|---|---|---|
| 0 | 8000 | 10.89 | | |
| 1 | 8001 | 10.95 | 0.22 | Adjus Valve |
| 2 | 8002 | 10.94 | 0.21 | |
| 3 | 8003 | 10.94 | 0.21 | |
| 4 | 8004 | 10.93 | 0.2 | Adjust Valve |
| 5 | 8005 | 10.94 | 0.21 | |
| 6 | 8006 | 10.94 | 0.21 | |
| 7 | 8007 | 10.94 | 0.21 | 15 LPS |
| 8 | 8008 | 10.94 | 0.21 | 15 LPS |
| 9 | 8009 | 10.94 | 0.21 | |
| 10 | 8010 | 10.94 | 0.21 | Clear water |
| 12 | 8012 | 10.94 | 0.21 | |
| 14 | 8014 | 10.94 | 0.21 | |
| 16 | 8016 | 10.94 | 0.21 | Clear water |
| 18 | 8018 | 10.94 | 0.21 | |
| 20 | 8020 | 10.94 | 0.21 | Check water |
| 25 | 8025 | 10.94 | 0.21 | |
| 30 | 8030 | 10.94 | 0.21 | |
| 35 | 8035 | 10.94 | 0.21 | |
| 40 | 8040 | 10.94 | 0.21 | |
| 45 | 8045 | 10.94 | 0.21 | |
| 50 | 8050 | 10.94 | 0.21 | |
| 60 | 8100 | 10.94 | 0.2 | |
| 70 | | | | |
| 80 | | | | |
| 100 | | | | |

**STEP 4**

| NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 20 LPS |
|---|---|---|---|---|
| 0 | 9000 | 10.94 | | |
| 1 | 9001 | 11.02 | 0.29 | |
| 2 | 9002 | 11.03 | 0.3 | |
| 3 | 9003 | 11.03 | 0.30 | |
| 4 | 9004 | 11.03 | 0.30 | |
| 5 | 9005 | 11.03 | 0.30 | |
| 6 | 9006 | 11.03 | 0.30 | |
| 7 | 9007 | 11.03 | 0.30 | Raining |
| 8 | 9008 | 11.03 | 0.30 | |
| 9 | 9009 | 11.03 | 0.30 | Raining |
| 10 | 9010 | 11.03 | 0.30 | |
| 12 | 9012 | 11.03 | 0.30 | |
| 14 | 9014 | 11.03 | 0.30 | Raining |
| 16 | 9016 | 11.03 | 0.30 | |
| 18 | 9018 | 11.03 | 0.30 | |
| 20 | 9020 | 11.03 | 0.30 | |
| 25 | 9025 | 11.04 | 0.31 | RAining |
| 30 | 9030 | 11.04 | 0.31 | |
| 35 | 9035 | 11.04 | 0.31 | |
| 40 | 9040 | 11.04 | 0.31 | |
| 45 | 9045 | 11.04 | 0.31 | |
| 50 | 9050 | 11.04 | 0.31 | |
| 60 | 9100 | 11.04 | 0.31 | |
| 70 | | | | |
| 80 | | | | |
| 100 | | | | |

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# RECOVERY FROM STEPPED RATE TEST

PAGE 5 OF 14

JOB#: 1497

CLIENT: ADP
DATE: 8-10-20
REGISTED NUMBER (RN): 439
LOCATION: HOME III LOSPALOS GPS:
WELL NAME: HOME PRODUCTION
PUMP SETTING (INLET DEPTH): 28.5 TOC/GL
STATIC WATER LEVEL: 10.38 TOC/GL
DISCHARGE RATE: 9, 13, 15, 20 LPS
OTHER DETAILS:

| NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 20 LPS |
|---|---|---|---|---|
| 0 | 10.00 | 11.04 | | END |
| 1 | 10.01 | 10.84 | 0.11 | |
| 2 | 10.02 | 10.80 | 0.07 | |
| 3 | 10.03 | 10.79 | 0.06 | |
| 4 | 10.04 | 10.79 | 0.06 | |
| 5 | 10.05 | 10.79 | 0.06 | END OF Recovery. |
| 6 | 10.06 | | | |
| 7 | 10.07 | | | |
| 8 | 10.08 | | | |
| 9 | 10.09 | | | |
| 10 | 10.10. | | | |
| 12 | | | | |
| 14 | | | | |
| 16 | | | | |
| 18 | | | | |
| 20 | | | | |
| 25 | | | | |
| 30 | | | | |
| 35 | | | | |
| 40 | | | | |
| 45 | | | | |
| 50 | | | | |
| 60 | | | | |
| 70 | | | | |
| 80 | | | | |
| 100 | | | | |
| 120 | | | | |
| 140 | | | | |
| 160 | | | | |
| 180 | | | | |
| 210 | | | | |
| 240 | | | | |
| 270 | | | | |
| 300 | | | | |
| 360 | | | | |
| 420 | | | | |

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# CONSTANT RATE PUMPING TEST

PAGE 6 OF 14

JOB#: 1497

CLIENT: ADP
DATE: 9-10-2020
REGISTED NUMBER (RN): 439
LOCATION: HOME III LOSPALOS GPS:
WELL NAME: HOME PRODUCTION
PUMP SETTING (INLET DEPTH): 28.5 (TOC)/GL
STATIC WATER LEVEL: 10.78 (TOC)/GL
DISCHARGE RATE: 20 LPS LPS
OTHER DETAILS:

| NOMINAL INTERVAL (MINS) | TIME 7:00 | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 20 LPS |
|---|---|---|---|---|
| 0 | 7000 | 10.78 | 10.78 | |
| 0.5 | 70005 | 10.99 | 0.21 | |
| 1 | 7001 | 10:99 | 0.21 | |
| 1.5 | 70015 | 10:99 | 0.21 | |
| 2 | 7002 | 10:99 | 0.21 | |
| 2.5 | 70025 | 10.99 | 0.21 | |
| 3 | 7003 | 10.99 | 0.21 | |
| 4 | 7004 | 11:00 | 0.22 | |
| 5 | 7005 | 11.00 | 0.22 | |
| 6 | 7006 | 11.00 | 0.22 | |
| 7 | 7007 | 11.00 | 0.22 | |
| 8 | 7008 | 11 00 | 0.22 | |
| 9 | 7009 | 1100 | 0.22 | |
| 10 | 7010 | 11.01 | 0.23 | |
| 12 | 7012 | 11.01 | 0.23 | |
| 14 | 7014 | 11.02 | 0.24 | |
| 16 | 7016 | 11.02 | 0.24 | |
| 18 | 7018 | 11.02 | 0.24 | |
| 20 | 7020 | 11.02 | 0.24 | |
| 25 | 7025 | 11.03 | 0.25 | |
| 30 | 7030 | 11.03 | 0.25 | |
| 35 | 7035 | 11.03 | 0.25 | |
| 40 | 7040 | 11.03 | 0.25 | |
| 45 | 7045 | 11 03 | 0.25 | |
| 50 | 7050 | 11.04 | 0,26 | |
| 60 | 8000 | 11.04 | 0,26 | |
| 70 | 8010 | 11.05 | 0,27 | |
| 80 | 8020 | 11.06 | 0.28 | |
| 90 | 8030 | 11.05 | 0.27 | OBSERVATION bore NO2 : 10.72 MTR |
| 100 | 8040 | 11.05 | 0.27 | |
| 120 | 9000 | 11.06 | 0.28 | |
| 140 | 9020 | 11.06 | 0.28 | |
| 160 | 9040 | 11.06 | 0.28 | |
| 180 | 9060 | 11.06 | 0.28 | |
| 210 | 1030 | 10.06 | 0.28 | |
| 240 | 1100 | 11.08 | 0.30 | OBSERVATION BORE NO 2 : 8.73 MTR |

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# CONSTANT RATE PUMPING TEST

PAGE 7 OF 14

JOB#: 1497

CLIENT: AOP
DATE: 9-10-200
REGISTED NUMBER (RN): 439
LOCATION: HOME III, LOSPALOS GPS:
WELL NAME: HOME PRODUCTIONS
PUMP SETTING (INLET DEPTH): 28,5 TOC/GL
STATIC WATER LEVEL: 10.78 TOC/GL
DISCHARGE RATE: 20LPS LPS
OTHER DETAILS:

| NOMINAL INTERVAL (MINS) | TIME 1107 | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS |
|---|---|---|---|---|
| 270 | 11.30 | 11.09 | 0,31 | |
| 300 | 12 00 | 11.10 | 0,32 | |
| 360 | 13 00 | 11.11 | 0,33 | |
| 420 | 1400 | 11.13 | 0,35 | |
| 480 | 1500 | 11.14 | 0,36 | |
| 540 | 1600 | 11.15 | 0.37 | Observation 8.73 |
| 600 | 1700 | 11.15 | 0.37 | |
| 660 | 1800 | 11.19 | 0.41 | Lifting bore head to do concrete |
| 720 | 1900 | 11.20 | 0.42 | slab ± 5 cmtr |
| 780 | 20:00 | 11.21 | 0.43 | |
| 840 | 21 00 | 11.22 | 0.44 | |
| 900 | 2200 | 11.23 | 0.45 | |
| 1020 | 2400 | 11.24 | 0.46 | |
| 1140 | 0200 | 11.25 | 0.47 | |
| 1260 | 0400 | 11.27 | 0.49 | |
| 1380 | 0600 | 11.29 | 0.51 | |
| 1440 | 0700 | 11.29 | 0.51 | |
| 1500 | | | | |
| 1620 | | | | |
| 1740 | | | | |
| 1860 | | | | |
| 1980 | | | | |
| 2100 | | | | |
| 2220 | | | | |
| 2340 | | | | |
| 2460 | | | | |
| 2580 | | | | |
| 2700 | | | | |
| 2820 | | | | |
| 2940 | | | | |
| 3060 | | | | |
| 3180 | | | | |
| 2300 | | | | |
| 2420 | | | | |
| 2540 | | | | |

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# CONSTANT RATE PUMPING TEST

PAGE 8 OF 14

JOB#: 1497

CLIENT:
DATE:
REGISTED NUMBER (RN):
LOCATION: GPS:
WELL NAME:
PUMP SETTING (INLET DEPTH): TOC/G L
STATIC WATER LEVEL: TOC/G L
DISCHARGE RATE: LPS
OTHER DETAILS:

| NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS |
|---|---|---|---|---|
| 2780 | | | | |
| 2900 | | | | |
| 3020 | | | | |
| 3140 | | | | |
| 3260 | | | | |
| 3380 | | | | |
| 3500 | | | | |
| 3620 | | | | |
| 3740 | | | | |
| 3860 | | | | |
| 3980 | | | | |
| 4100 | | | | |
| 4220 | | | | |
| 4320 | | | | |

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# RECOVERY FROM CONSTANT RATE TEST-

PAGE 9 OF 14

JOB#: 1497

CLIENT: ADP
DATE: 10-10-20
REGISTED NUMBER (RN): A39
LOCATION: HOME, LOSPALOS GPS:
WELL NAME: HOME, PRODUCTION
PUMP SETTING (INLET DEPTH): 28.5 (TOC)/GL
STATIC WATER LEVEL: 10.78 TOC/GL
DISCHARGE RATE: 20 LPS
OTHER DETAILS:

| NOMINAL INTERVAL (MINS) | TIME 7000 | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS |
|---|---|---|---|---|
| 0 | 7000 | 11.29 | | END |
| 0.5 | 70005 | 11.05 | | |
| 1 | 7001 | 11.05 | | |
| 1.5 | 70015 | 11.04 | | |
| 2 | 7002 | 11.04 | | |
| 2.5 | 70025 | 11.04 | | |
| 3 | 7003 | 11.04 | | |
| 4 | 7004 | 11.03 | | |
| 5 | 7005 | 11.03 | | |
| 6 | 7006 | 11.03 | | |
| 7 | 7007 | 11.03 | | |
| 8 | 7008 | 11.025 | | |
| 9 | 7009 | 11.025 | | |
| 10 | 7010 | 11.025 | | |
| 12 | 7012 | 11.025 | | |
| 14 | 7014 | 11.02 | | |
| 16 | 7016 | 11.02 | | |
| 18 | 7018 | 11.015 | | |
| 20 | 7020 | 11.015 | | End of Recovery |
| 25 | 7025 | 11.01 | | |
| 30 | 7030 | 11.01 | | |
| 35 | 7035 | 11.01 | | |
| 40 | 7040 | 11.00 | | 90% Recovery. |
| 45 | | | | |
| 50 | | | | |
| 60 | | | | Finish TEST. |
| 70 | | | | |
| 80 | | | | |
| 90 | | | | |
| 100 | | | | |
| 120 | | | | |
| 140 | | | | |
| 160 | | | | |
| 180 | | | | |
| 210 | | | | |
| 240 | | | | |

# RN441 - Sawarika

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Email: admin@h2o.tl

## PUMP TEST SUMMARY

PAGE 1 OF 14

JOB#: 1497

CLIENT: AOP
REGISTERED # (RN): 441
LOCATION: SAWARIKA GPS: 08°31'40.05" S
WELL NAME: SAWARIKA PRODUCTION 126°59'27.76 E
RECORDERS NAME:
DATES OF TEST: 15-10-20 TO: 15-10-20

### BORE CONSTRUCTION DATA

| | | | |
|---|---|---|---|
| TOTAL DEPTH: 46 | MTRS | DATE DRILLED: 14-10-20 | |
| TOTAL DEPTH CASED: 42.5 | MTRS | SWL WHEN DRILLED: 5.15 | |
| CASING SIZE: 6" / 150 | ~~MM~~ ID | REG 8 ATTACHED: (YES) NO | |
| SCREENS/ SLOTS: FROM 12.4 TO 18 | MTRS | SCREEN/SLOTS APERTURE: 2 | mm |

WARNING: MINIMUM INTERNAL BORE DIAMETER IS 150 (mm)

### TEST EQUIPMENT USED

| | | | |
|---|---|---|---|
| PUMP TYPE: SUBMERSIBLE PUMP | PUMP TEST TRAILER USED: | Y (N) | |
| BRAND/MODEL: GRUNDFOS | GENERATOR SIZE: 50 | KVA | |
| MOTOR KW: 11 KW | POLY SIZE & Length: | | |
| PUMP OUTLET SIZE: 3" | COLUMN SIZE: 3" | | |
| DISCHARGE PIPE SIZE: 3" | COLUMN LENGTHS AND NUMBER USED: | | |
| ORIFICE SIZE: | 4.2 x 6 + pump + motor and 2 mtr 3" column | | |
| OTHER DEVICES USED: Flow Meter | TOP OF PUMP TO INLET: 29 | | |
| REMARKS: | ACTUAL PUMP INLET DEPTH: 28.5 | | |
| | MTRS ~~TOC~~/GL | | |

DRAW DOWN MEASURED FROM TOC/GL/OTHER:

### STEPPED TEST

| | | | |
|---|---|---|---|
| DATE OF TEST: 15-10-20 | | | |
| SWL AT START: | | | |
| STEP ONE: 14 | ~~LPS~~ | 60 | MINS |
| STEP TWO: 16 | ~~LPS~~ | 60 | MINS |
| STEP THREE: 18 | ~~LPS~~ | 60 | MINS |
| STEP FOUR: 21 | ~~LPS~~ | 60 | MINS |
| STEP FIVE: | LPS | | MINS |
| RECOVERY MEASURED TO: | | | MTRS |
| FROM SWL AT | MINS AFTER SHUTDOWN | | |

### CONSTANT RATE TEST (N/A)

| | | |
|---|---|---|
| DATES OF TEST: | TO: | |
| SWL AT START: | | |
| DISCHARGE RATE: | | LPS |
| PUMPING DURATION: | | MINS |
| MAX DRAWDOWN: | | MTRS |
| RECOVERY MEASURED TO: | | MTRS |
| AT | MINS AFTER SHUTDOWN. | |

REMARKS:

### OBSERVATION WELLS (N/A)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NAME OF OBSERVATION WELLS: | | | | | | | |
| REGISTERED NUMBERS (RN): | | | | | | | |
| DISTANCE FROM PUMPD WELL: | | | | | | | |
| DIRECTION FROM PUMPED WELL: | | | | | | | |
| STATIC WATER LEVEL (GL OR TOC): | | | | | | | |
| GPS: | | | | | | | |
| SWL AT END OF TEST: | | | | | | | |

REMARKS:

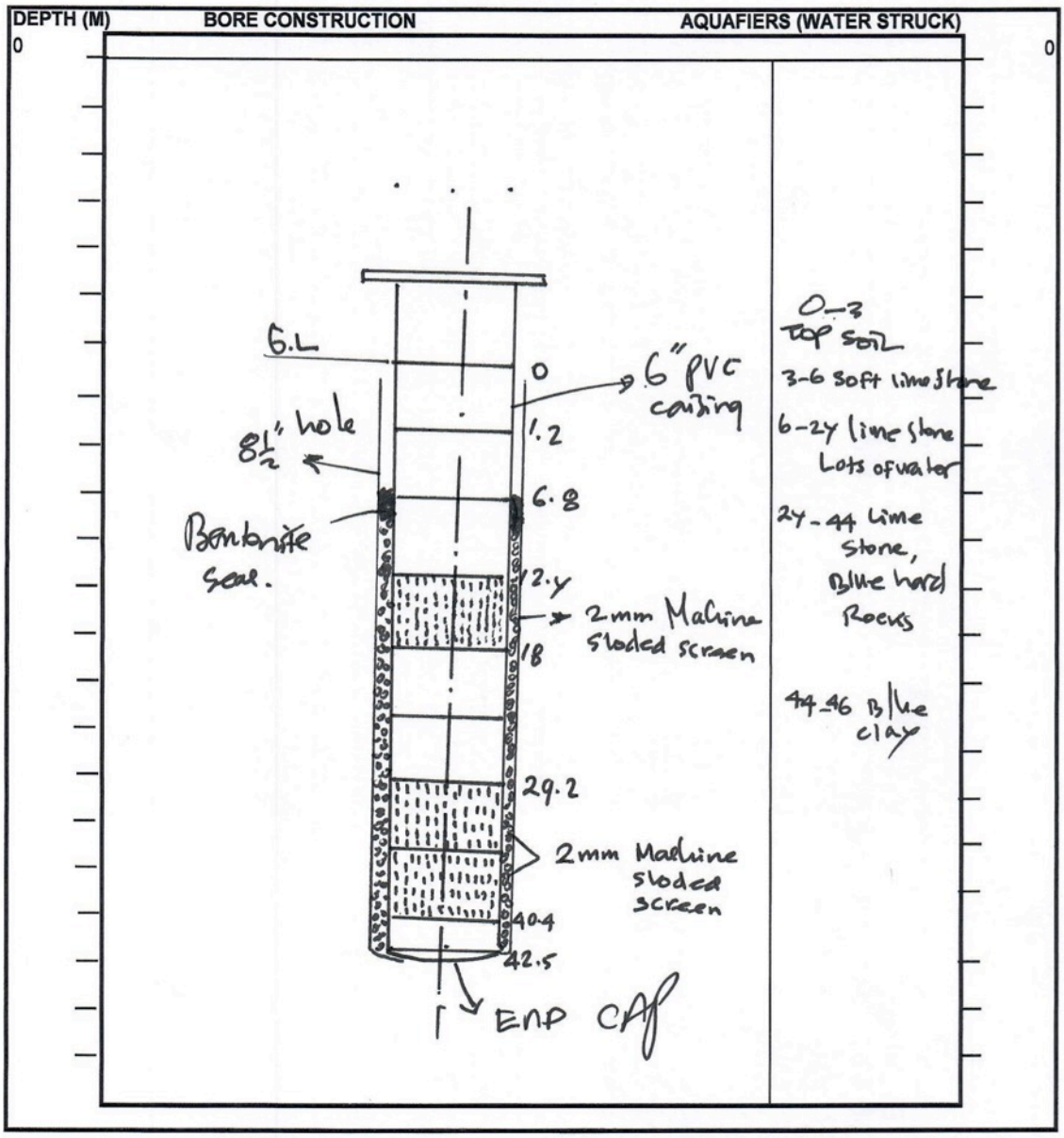
# PUMP TEST SUMMARY - COMPOSITE OF BORE

H2O PUMP & POWER
Comoro River Road
Dili, Timor Leste
Phone: 670 3324497
Email: admin@h2o.tl

PAGE 2 OF 14

JOB#: 1497

CLIENT: AOP
REGISTERED # (RN): 441
LOCATION: SAMARINA GPS:
WELL NAME: SAMARINA PRODUCTION
RECORDERS NAME: NATALINO Mendes
DATES OF TEST: 15-10-20 TO: 15-10-20




OTHER BORE DETAILS:

H2O PTY LTD
H2O Trade Centre
15 Henning Road
Coolalinga
NT 0835
Phone: (08)89832611
Fax: (08)89832711

# STEPPED RATE PUMPING TEST

PAGE 3 OF 13

JOB#: 1497

CLIENT: ADP
DATE: 15-10-20
REGISTED NUMBER (RN): 441
LOCATION: SAWARIKA, LOSPALOS GPS:
WELL NAME: SAWARIKA PRODUCTION I
PUMP SETTING (INLET DEPTH): 29 TOC/GL
STATIC WATER LEVEL: 5.15 TOC/GL
DISCHARGE RATE: 14,16,18,21 LPS
OTHER DETAILS:

| STEP 1 | | | | | STEP 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 14 LPS | NOMINAL INTERVAL (MINS) | TIME 8000 | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 16 LPS |
| 0 | 700 | 5.15 | 5.15 | | 0 | 8000 | 6.03 | 0.88 | |
| 1 | 701 | 5.83 | 0.68 | ADJust Valve | 1 | 8001 | 6.24 | 1.09 | |
| 2 | 702 | 5.98 | 0.83 | ADJust Valve | 2 | 8002 | 6.245 | 1.095 | |
| 3 | 703 | 5.94 | 0.79 | | 3 | 8003 | 6.245 | 1.095 | |
| 4 | 704 | 5.95 | 0.80 | | 4 | 8004 | 6.25 | 1.1 | |
| 5 | 705 | 5.95 | 0.80 | | 5 | 8005 | 6.25 | 1.1 | |
| 6 | 706 | 5.96 | 0.81 | | 6 | 8006 | 6.25 | 1.1 | |
| 7 | 707 | 5.96 | 0.81 | | 7 | 8007 | 6.245 | 1.095 | |
| 8 | 708 | 5.96 | 0.81 | | 8 | 8008 | 6.25 | 1.1 | |
| 9 | 709 | 5.96 | 0.81 | | 9 | 8009 | 6.25 | 1.1 | |
| 10 | 7010 | 5.96 | 0.81 | | 10 | 8010 | 6.25 | 1.1 | |
| 12 | 7012 | 5.98 | 0.83 | | 12 | 8012 | 6.25 | 1.1 | |
| 14 | 7014 | 5.98 | 0.83 | | 14 | 8014 | 6.25 | 1.1 | |
| 16 | 7016 | 5.98 | 0.83 | | 16 | 8016 | 6.255 | 1.105 | |
| 18 | 7018 | 5.99 | 0.84 | | 18 | 8018 | 6.255 | 1.105 | |
| 20 | 7020 | 5.99 | 0.84 | | 20 | 8020 | 6.26 | 1.11 | |
| 25 | 7025 | 5.99 | 0.84 | MS 0.57 | 25 | 8025 | 6.26 | 1.11 | |
| 30 | 7030 | 6.00 | 0.85 | PH 0.9 | 30 | 8030 | 6.26 | 1.11 | |
| 35 | 7035 | 6.00 | 0.85 | | 35 | 8035 | 6.26 | 1.11 | |
| 40 | 7040 | 6.015 | 0.865 | | 40 | 8040 | 6.265 | 1.115 | |
| 45 | 7045 | 6.02 | 0.87 | | 45 | 8045 | 6.265 | 1.115 | |
| 50 | 7050 | 6.02 | 0.87 | | 50 | 8050 | 6.27 | 1.12 | |
| 60 | 8000 | 6.03 | 0.88 | | 60 | 9000 | 6.28 | 1.13 | |
| 70 | | | | | 70 | | | | |
| 80 | | | | | 80 | | | | |
| 100 | | | | | 100 | | | | |

H2O PTY LTD
H2O Trade Centre
15 Henning Road
Coolalinga
NT 0835
Phone: (08)89832611
Fax: (08)89832711

# STEPPED RATE PUMPING TEST

PAGE 4 OF 14

JOB#: 1497

CLIENT: AOP
DATE: 15-10-20
REGISTED NUMBER (RN): 440
LOCATION: SAWARIKA, Lesmanas GPS:
WELL NAME: SAWARIKA PRODUCTION
PUMP SETTING (INLET DEPTH): 29 TOC/GL
STATIC WATER LEVEL: 5.15 TOC/GL
DISCHARGE RATE: 14, 16, 18, 21 LPS
OTHER DETAILS:

| STEP 3 | | | | | STEP 4 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NOMINAL INTERVAL (MINS) | TIME 9000 | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 18 LPS | NOMINAL INTERVAL (MINS) | TIME 1000 | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS 21 LPS |
| 0 | 9000 | 6.28 | 1.13 | | 0 | 1000 | | | |
| 1 | 9001 | 6.46 | 1.31 | | 1 | 1001 | 6.75 | 1.6 | |
| 2 | 9002 | 6.47 | 1.32 | | 2 | 1002 | 6.77 | 1.62 | |
| 3 | 9003 | 6.47 | 1.32 | | 3 | 1003 | 6.77 | 1.62 | |
| 4 | 9004 | 6.47 | 1.32 | | 4 | 1004 | 6.77 | 1.62 | |
| 5 | 9005 | 6.47 | 1.32 | | 5 | 1005 | 6.77 | 1.62 | |
| 6 | 9006 | 6.47 | 1.32 | | 6 | 1006 | 6.77 | 1.62 | |
| 7 | 9007 | 6.47 | 1.32 | | 7 | 1007 | 6.78 | 1.63 | |
| 8 | 9008 | 6.47 | 1.32 | | 8 | 1008 | 6.78 | 1.63 | |
| 9 | 9009 | 6.47 | 1.32 | | 9 | 1009 | 6.78 | 1.63 | |
| 10 | 9010 | 6.47 | 1.32 | | 10 | 1010 | 6.78 | 1.63 | |
| 12 | 9012 | 6.48 | 1.33 | | 12 | 1012 | 6.78 | 1.63 | |
| 14 | 9014 | 6.48 | 1.33 | | 14 | 1014 | 6.78 | 1.63 | |
| 16 | 9016 | 6.49 | 1.34 | | 16 | 1016 | 6.79 | 1.64 | |
| 18 | 9018 | 6.49 | 1.34 | | 18 | 1018 | 6.79 | 1.64 | |
| 20 | 9020 | 6.49 | 1.34 | | 20 | 1020 | 6.79 | 1.64 | |
| 25 | 9025 | 6.5 | 1.35 | | 25 | 1025 | 6.79 | 1.64 | |
| 30 | 9030 | 6.5 | 1.35 | | 30 | 1030 | 6.80 | 1.65 | |
| 35 | 9035 | 6.5 | 1.35 | | 35 | 1035 | 6.80 | 1.65 | |
| 40 | 9040 | 6.5 | 1.35 | | 40 | 1040 | 6.81 | 1.66 | |
| 45 | 9045 | 6.5 | 1.35 | | 45 | 1045 | 6.81 | 1.66 | Ph:0.88 |
| 50 | 9050 | 6.5 | 1.35 | | 50 | 1050 | 6.82 | 1.67 | mc:0.57 |
| 60 | 1000 | 6.5 | 1.35 | | 60 | 1100 | 6.82 | 1.67 | |
| 70 | | | | | 70 | | | | |
| 80 | | | | | 80 | | | | |
| 100 | | | | | 100 | | | | |

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# RECOVERY FROM STEPPED RATE TEST

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JOB#: 1497

CLIENT: ADP
DATE: 15 - 10 - 20
REGISTED NUMBER (RN): 440
LOCATION: SAWARIKA, LOSPALOSGPS:
WELL NAME: SAWARIKA PRODUCTION
PUMP SETTING (INLET DEPTH): 29 TOC/GL
STATIC WATER LEVEL: 5.15 TOC/GL
DISCHARGE RATE: LPS
OTHER DETAILS:

| NOMINAL INTERVAL (MINS) | TIME | WATER LEVEL (MTRS) | DRAW DOWN (MTRS) | REMARKS |
|---|---|---|---|---|
| 0 | 11.00 | 6.82 | | END |
| 1 | 11.01 | 5.36 | | |
| 2 | 11.02 | 5.33 | | |
| 3 | 11.03 | 5.32 | | |
| 4 | 11.04 | 5.31 | | |
| 5 | 11.05 | 5.30 | | |
| 6 | 11.06 | 5.30 | | |
| 7 | 11.07 | 5.29 | | |
| 8 | 11.08 | 5.29 | | |
| 9 | 11.09 | 5.29 | | |
| 10 | 11.10 | 5.29 | | |
| 12 | 11.12 | 5.28 | | |
| 14 | 11.14 | 5.27 | | |
| 16 | 11.16 | 5.27 | | |
| 18 | 11.18 | 5.27 | | |
| 20 | 11.20 | 5.26 | | |
| 25 | 11.25 | 5.25 | | |
| 30 | 11.30 | 5.25 | | |
| 35 | 11.35 | 5.25 | | |
| 40 | 11.40 | 5.24 | | |
| 45 | 11.45 | 5.24 | | |
| 50 | 11.50 | 5.23 | | |
| 60 | | | | |
| 70 | | | | FINISH TEST. |
| 80 | | | | |
| 100 | | | | |
| 120 | | | | |
| 140 | | | | |
| 160 | | | | |
| 180 | | | | |
| 210 | | | | |
| 240 | | | | |
| 270 | | | | |
| 300 | | | | |
| 360 | | | | |

---------- END OF REPORT ----------