DEMOCRATIC REPUBLIC OF TIMOR-LESTE

ENVIRONMENTAL IMPACT STATEMENT (EIS) OF THE DEVELOPMENT OF SOLAR IPP IN TIMOR-LESTE

July 2024

Revision History

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AEP	Annual Exceedance Probability
ANLA	Agencia Nacional de Licensiamento Ambiental
AQ	Air Quality
BESS	Battery Energy Storage System
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
CSR	Corporate Social Responsibility
EDTL	Electricidade de Timor-Leste
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPC	Engineering, Procurement and Construction
E&S	Environment and Social
GoTL	Government of Timor Leste
GRM	Grievance Redress Mechanism
IBAT	Integrated Biodiversity Assessment Tool
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IPP	Independent Power Producer
IQR	Interquartile Range
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
Km	Kilometer
kV	Kilo Volt
MPA	Marine Protected Area
MPW	Ministry of Public Works
MW	Mega Watt
NAPA	National Adaptation Programme
NDC	National Dispatching Center
O&M	Operation & Maintenance

PCR	Physical Cultural Resources
PM	Particulate Matter
PV	Photovoltaic
RFQ	Request for Quotation
SIAMP	Social Impact Assessment and Management Plan
SPS	Safeguard Policy Statement
Suco	Village
TA	Technical Assistance
TL	Timor-Leste
ToR	Terms of Reference
TSS	Total Suspended Solids
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
USD	United States Dollar
WHO	World Health Organization

1 Executive Summary

1.1 Project Overview

The Government of Timor-Leste (GoTL), through EDTL-EP proposes to construct a new 100 MW solar photovoltaic (PV) based grid connected IPP project which will be connected to the EDTL-EP network and will potentially include a Battery Energy Storage System (BESS). EDTL-EP is seeking to supplement some of this diesel requirement by sourcing lower cost solar PV generation from an IPP under this project. There is a significant opportunity for Timor-Leste to utilize renewable energy to build resilience and place downwards pressure on electricity supply in the country.

The GoTL is being assisted by the Asian Development Bank (ADB) through a team of consultants to assess and develop the technical and safeguards aspects of the project, such as site selection, preparation of technical design and preparation of the project document and the ToRs for EIA as well as preparation of the EIA study and EMP as required by ANLA for issuance of the license.

The proposed project site is located in Timor-Leste, approximately 14 km east of Manatuto municipality, directly adjacent to the Manatutu to Baucau national road and is located at co-ordinates of -8.519374°S and 126.135046°E. The project will be constructed on land selected and acquired by EDTL-EP. The final size of the solar PV plant, BESS and the nature of the grid connection are to be selected to provide optimum cost benefit for EDTL-EP and its stakeholders.

The site is a broad valley approximately 2.3 km long and 1 km wide between the main road (to the south) and the coast (to the north). The site consists of a large central flat area, surrounded by hills to the east and to the west. There are significant water flows and channels evident through the site, towards a seasonal pond and temporary inlet to the sea as can be seen in Figures 1.1 to 1.3 below.

The site is moderately to sparsely vegetated. The hills tend to be rocky with the central area composed of eroded material of a more gravelly / clayey mix. There is little initial indication of use by local communities, aside from some occasional fishing / recreation at the coast.

The feasibility study for the project was prepared by the design firm engaged for this project, Entura in August 2022 and submitted to ADB and EDTL for review. This study included a concept design for the project. The project will be tendered on this basis with the successful tender responsible for preparation of a detailed design for the project.

1.2 Study Methodology

The following methodology was employed for this EIS study:

▪ Understanding of the Proposed Operation

This involved collecting information from the EDTL E.P and Engineering Design and Construction Management technical team on the proposed project activities and understanding the activities to identify potential impacts of implementing them.

▪ Review of Legislation and Guidelines

National legislation for Timor Leste, international agreements, environmental guidelines and best industry practices have been reviewed to set environmental standards that the Concessionaire will adhere to during the implementation and operation phases of the project.

▪ Secondary Data Collection

Available published and unpublished information related to the background environment was obtained and reviewed. All data sources have been carefully reviewed to collect the following information:

- Physical environment – topography, geology, seismology, geomorphology, soils, surface and groundwater resources and climate;
- Biological environment – habitat types, flora and fauna (particularly rare or endangered species), critical habitats, vegetation and communities within the area;
- Physical cultural resources – sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance; and
- Socio-economic environment – settlements, socio-economic conditions, infrastructure and land use.

▪ Field Data Collection (Baseline Survey)

The principal field visits were undertaken in the months of October and November 2022 consisting of preliminary scoping through survey and assessment activities to establish the potential impacts and categorization of activities. The key receptors and stakeholders within the project area were identified. Some additional surveys and investigations were conducted in the first three quarters of 2023 to gather further information in relation to specific issues, such as subsurface conditions.

Baseline surveys required to identify and establish physical and biological conditions and ecosystems in the project area were carried out by the EIS team and results have been incorporated in this report. The socio-economic environment in the project area

has been obtained through the socio-economic profiles and social impact assessment carried out by the social safeguards team.

Primary data collected was generally as follows:

- Primary data collection in the project area, such as ambient noise levels, ambient air quality and surface water quality at the key receptor locations in the project area and particularly in close proximity to the project site were conducted.

Review of secondary information on the physical, biological and ecological aspects, physical cultural resources and infrastructure utilities in the project areas were also conducted.

▪ Public Consultations

Public consultations were carried out with all key stakeholders, particularly local communities residing in the project area, local businesses and government and local government bodies. In this EIS study, the public consultation process was carried out, including verbal explanation of the project development with stakeholders to brief them about project and to seek their response/recommendation.

▪ Impacts Identification and Assessment

Potential impacts arising from each phase of the proposed project have been identified and assessed based on field data, secondary data, expert opinions and examining previous similar projects in Timor Leste. These include effects on physical, biological and socio-economic environment.

▪ Recommendations for Mitigation Measures

Mitigation measures to minimise, eliminate or compensate for the potential environmental impacts have been recommended. The mitigation measures have been recommended based on past experiences, best industry practices, legislative requirements and professional judgement.

▪ Development of Environmental Management Plan (EMP)

An Environmental Management Plan (EMP) has been developed for effective implementation of the recommended mitigation measures. The EMP includes controls to minimise the identified impacts and monitoring programme to monitor the effect of mitigation measures implemented and residual impacts, if any, during implementation. The EMP has identified roles and responsibilities for all concerned parties during the implementation of the project.

1.3 Analysis of Alternatives

The 'No project' scenario is not a viable option since Timor Leste is facing an energy deficit and needs to urgently switch from the cost intensive and environmentally unfriendly diesel-based power generation and move towards developing renewable based cheap and reliable energy on a long-term basis.

In addition, four different sites (three in the vicinity of Manatuto and one in Baucau) were considered as possible options for development of the proposed solar IPP project. However, based on detailed environmental and due diligence assessments in addition to discussions with the project technical design team, the proposed site at Manatuto was assessed to be the most feasible and was selected for development of the proposed solar project.

Also, in terms of technology selection, different types of solar PV modules were considered, such as monocrystalline bifacial, CdTe thin film and CIGS thin film and based on the pros and cons of each module type, the bifacial monocrystalline modules were selected for this project since they have a longer lifetime, if maintained properly. Also, Crystalline modules pose little to no risk to the environment in terms of toxicity since most of the module is made of common construction materials such as tempered glass and aluminium. Furthermore, the PV cell is made from silicon, which is a common earth element. Some panels contain a small amount of lead, however; it is sealed in a panel to reduce the risk of environmental release.

1.4 Description of Environment

1.4.1 Physical Environment

Air Quality and Noise

The location for noise level and air quality monitoring was selected and agreed upon with the ADB technical experts.

Two monitoring locations at the project site were selected for conducting the air quality and noise monitoring as follows:

Location No.1: Adjacent to the main road connecting Manatutu to Baucau.

Location No.2: About 200 meters from the beach.

The noise and air quality was monitored on three different days, two weekdays for a 24 hour period and on a weekend day, for a 12 hour period.

Comparisons across the three days emphasized consistently higher and more variable noise levels at Location No. 1, attributed to its proximity to a main road. Day 3

highlighted non-compliance with IFC nighttime guidelines for Location No. 1, whereas Location No.2 consistently met both nighttime and daytime guidelines.

Air quality assessments conducted at both Locations 1 and 2 consistently indicated good air quality throughout the three-day data collection period. These favorable findings underscore the environmentally favorable conditions in the project area, with air quality parameters well below established IFC-EHS and/or WHO guidelines and standards.

1.4.2 Biological Environment

Terrestrial Flora and Fauna

The terrestrial flora within the project site exhibits a variety of plant species. The dominant tree species identified in the area is the Tamarind tree (*Tamarindus indica*), accounting for an estimated 90% (subjective probability) of the trees in the project area. Another prominent plant species observed in clusters across the site is the Aloe Vera (*Aloe barbadense miller*). These succulent plants are known for their medicinal properties and were found to thrive in specific locations. Cacti were also present, although not as abundant as the Aloe Vera plants.

In terms of terrestrial fauna, there were some birds that were observed during the survey since Timor Leste is home to a diverse range of bird species. One notable species is the Timor Bush Warbler (*Locustella Timorensis*), classified as "Near Threatened" by the International Union for Conservation of Nature (IUCN), was rediscovered on the islands of Alor and Timor (Trainor et al., 2011). Other bird species such as Timor Friarbird (*Philemon Inornatus*) is one of the seven endemic bird species widely distributed in Timor Island (Paga et al., 2021). Other notable bird species in the area are Owl, Beach Thick-knee, Orange-Banded Thrush, Timor Sparrow, and Pink Headed Imperial Pigeon.

Other birds observed consisted of a Beach Thick-Knee bird, which was sighted perched on a tree. Nighttime observations indicated the presence of owls in the area. The project area supports a diverse array of livestock, primarily consisting of goats, cows, sheep, and buffalo. It is estimated that there are more than 300 livestock animals within the project area.

Aquatic Flora and Fauna

The fish fauna of Timor-Leste is primarily comprised of species closely associated with coral reefs. The most prevalent families in terms of the number of species are shads (*Alosidae*), damselfishes (*Pomacentridae*), gobies (*Gobiidae*), groupers (*Serranidae*),

cardinalfishes (*Apogonidae*), butterflyfishes (*Chaetodontidae*), surgeonfishes (*Acanthuridae*), snappers (*Lutjanidae*), parrotfishes (*Scaridae*), and blennies (*Blenniidae*). Together, these ten families account for 553 species, or approximately 57 percent of the total reef fish species currently documented in Timor-Leste. It is worth noting that coral and rocky reefs are the most biodiverse habitats in terms of fish species.

Also, information gathered from local fishermen revealed the presence of a diverse range of fish species in coastal waters. The most frequently caught sardine species include *Sardina pilchardus* and *Sardinops Caeruleus*, while *Restrelliger Kanagurta* is frequently caught by local fishermen. On rare occasions, species such as *Lutjanus Gibbus, Pseudanthias Huchtii, Dascyllus Trimaculatus*, and others have also been reported as catches. This information suggests the existence of varied fish fauna in the area, with both pelagic and demersal species contributing to the local fishery. During the survey there was also mentioned that local fishermen also frequently catch *Octopoda* (octopus), which are soft-bodied, eight-limbed mollusks, and *Decapodiformes* (squid fish).

It was also revealed that fishermen occasionally encounter turtles in the area. In the Laleia region, two specific types of turtles are frequently encountered: *Eretmochelys imbricata*, commonly known as the hawksbill turtle, and *Chelonia mydas*, known as the green sea turtle. These species are particularly vulnerable, and efforts to protect and preserve their habitats are crucial to their survival in the region. However, the habitat for these turtles in Timor-Leste is gradually diminishing, and the Timor-Leste government has classified them as rare and protected animals.

During the survey, no marine mammals such as whales or dolphins were observed along the coast. It is important to note that the absence of such sightings during the survey period does not necessarily imply their complete absence in the region, as the presence of marine mammals can be seasonal or dependent on various factors.

In the vicinity of the river mouth, the survey identified several benthic fauna species. The fiddler crab, *Uca Acuta*, was among the notable benthic organisms observed. These small crabs are adapted to intertidal zones and play a significant role in the ecosystem. Additionally, the survey also showed the presence of benthic fish species, *Boleopthalmus Bodderti*, known for their ability to thrive in muddy or freshwater environments that is near the beach.

Another marine fauna worth mentioning is saltwater crocodile. The saltwater crocodile (Crocodylus Porosus) has been mentioned by locals as an occasional visitor to the

shore in search of food. These reptiles are typically observed during the dry season, which spans from June to November, and the sightings are limited to about 4 to 5 crocodiles on average. During the site visit conducted by the Halona Team, no crocodile activity was encountered or observed in the area.

1.4.3 Environmental Impact Assessment and Management Plan

Environmental impacts were assessed for the project area of influence across all stages of project implementation, i.e. (i) design and pre-construction stage, (ii) construction stage, (iii) operation stage and (iv) decommissioning stage.

Impacts during Design and Pre-Construction. The potential adverse environment impacts associated with the project shall be avoided or minimized through careful site selection of the solar park. The mitigation measures are included in the engineering design. Measures include:

(i) ensuring final site and route selection avoids sensitive receptors including protected areas, habitats and species of conservation value, hospitals/clinics/schools and physical cultural resources (PCRs) as well as minimizing impacts on human health, households and crops and trees of economic value,
(ii) an efficient project implementation and grievances redress mechanism (GRM) set up,
(iii) training and capacity building for the Contractors;
(iv) timely permits and clearances,
(v) integration of design features for climate risks and effective environmental management, and
(vi) conducting meaningful consultations, environmental baseline and seasonal surveys.

Impacts during Construction Stage: There will be temporary localized impacts during peak construction such as increased noise and dust levels, potential interruption to existing utilities (e.g. power outages), waste generation, disrupted access to properties and agricultural land, presence of workers at construction camps and work sites as well as loss of vegetation, trees etc. An ecological assessment was carried out for the project; no habitats of or protected species of special significance have been identified within the project area of influence.

Impacts during Operation Stage: There will be minor impacts during operation such as due to use of transformer oil at the substation, visual impacts (solar park in rural

setting), risks to occupational health and safety (electrocution), water usage for PV panel cleaning and waste generation from the site.

Mitigation Measures: The identified potential adverse environmental impacts can be managed through effective implementation of the EMP. However, the main project risks include the low institutional capacity of the Contractors and their failure to implement the EMP effectively during construction and operation stages. These risks will be mitigated by:

(i) Provisions for providing training and capacity building on environmental and social safeguards to the PMU and Contractors,
(ii) Developing and implementing site specific construction EMPs
(iii) Following appropriate project implementation mitigation, monitoring and reporting arrangements, and
(iv) Adequate site supervision, including audits of contractor's environmental, health and safety (EHS) performance. Monitoring parameters have been identified in the environmental monitoring plan (EMP) to check the effectiveness of EMP measures and to ensure any unidentified impacts can be readily addressed. The project risks will also be mitigated through inclusion of environmental specifications in construction contracts, such as recycling and/or disposal of component parts of solar PV plants and restoring and maintaining landscape, hedges etc. at the solar park site.

1.4.4 Public and Community Consultation

Stakeholders' consultations were carried out informally and formally during the social impact assessment that includes local people, government officials from line agencies, traditional heads of communities in Haraluton Suco and Lifao Suco and women groups. People are supportive of the Project as it will improve the power situation of the whole area and also provide employment opportunities to the local people and bring about economic development of the area.

The findings of the consultations revealed that the Project shall adopt adequate mitigation measures if any negative impacts occur and there will be no loss of access to the sea. EDTL will provide relevant information such as construction schedule, environment management plan, social management plan, GRM details in a timely manner, in an accessible place, and in a form and language (English/Tetum) understandable to affected persons and other stakeholders. The summary of EMP will be made available in local language along with the English version.

1.5 Economic Assessment of Environmental & Social Impacts and management

The project development in the municipality will result in job opportunities for locals, market opportunities, rural road development and other social development activity that could be improved through corporate social responsibility (CSR).

Also, the solar IPP project will generate several positive economic impacts in the form of employment and income generation for the workers as well as tax contribution to the government. For employment generation, the facility will generate two types of employments – permanent and temporary ones during its course from site preparation, construction and O&M phases. It is estimated that there will be 10 permanent employees and 5 temporary employees who will work in various section of the proposed facility. Permanent employees will be paid USD 300 to 1000 per month while temporary employees will be paid USD 150 to 300 per month with a total estimated investment of 70 million USD for the project development.

1.6 Recommendations from EIS

The proposed project is of high significance for Timor Leste considering the urgent need for developing a sustainable and economical source of power generation that is also environmentally friendly. An action plan, for different stakeholders, with roles and responsibilities has been developed to make the project sustainable. Based on findings of the EIS, the proposed project is unlikely to cause any significant, irreversible or unprecedented environmental impact. The potential impacts are localized, temporary in nature and can be addressed through proven mitigation measures.

This EIS has confirmed that potential social and environmental impacts can be reduced to acceptable levels with effective implementation of mitigation measures. Impacts for instance on air/noise disturbance, terrestrial and aquatic flora and fauna, water quality, are well identified and management measures are proposed to keep impacts under control. The EMP has specified mitigation measures to address identified impacts, responsible parties and monitoring during construction and operation.

No further study or assessment is required at this stage. The requirements as per EMP and based on the license issued by ANLA shall be communicated to the Concessionaire and his Contractor by PMU EDTL to control any adverse impacts on the environment. The Contractor will manage the site-specific impacts by developing and implementing the Site-Specific Environmental Management Plan (SSEMP).

The project is expected to improve electricity supply and increase access to clean and reliable energy that will encourage additional investment and economic growth. A transition to cleaner energy sources will avoid thermal generation and imports. This

will have significant environmental benefits, contributing to national emission reduction targets and reduced pollution impacts. Thus, it is in the interest of the Timor Leste people that this project is developed and implemented at the earliest to make clean, affordable and reliable electricity available in Timor Leste.

Figure 1.1: Key Landmarks in Project Site

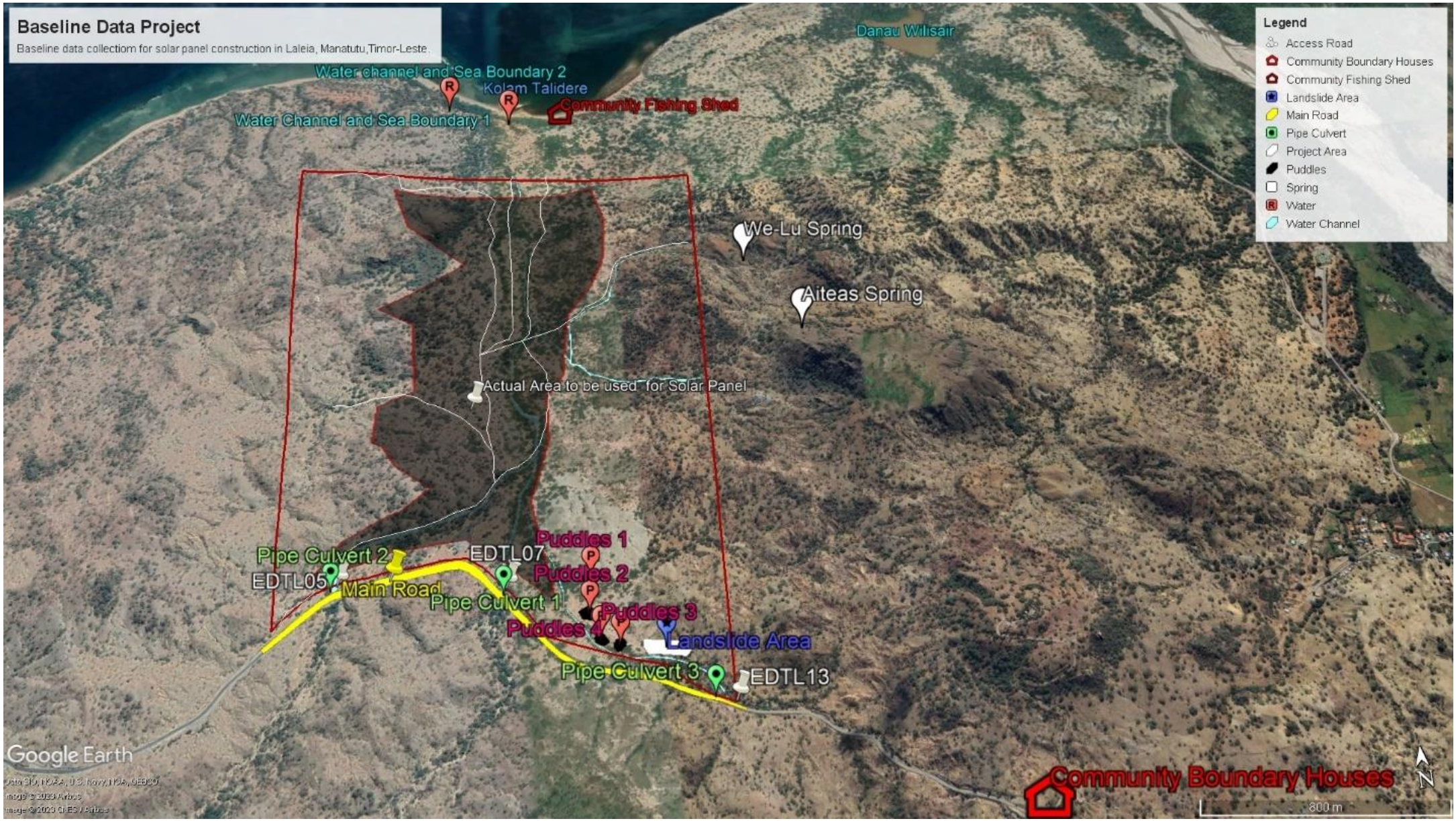


Figure 1.2: Layout of Proposed Site for Solar IPP development

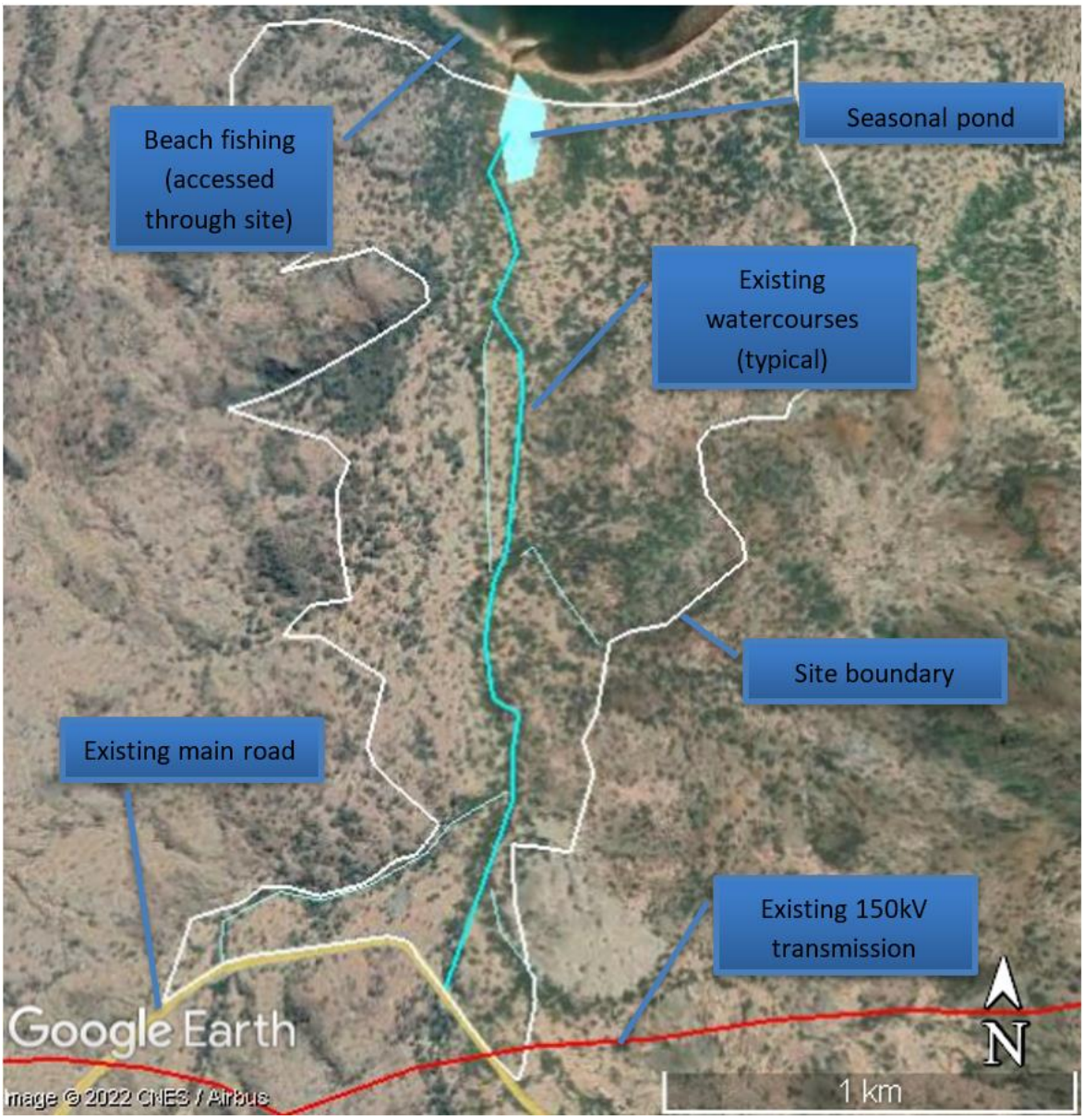


Figure 1.3: Site Overview

2 Details of Project Proponent

2.1 Introduction of Project Proponent

The Ministry of Public Works (MPW) is responsible for planning and oversight of the Energy sector and is the Proponent for the Solar IPP Project, supported by Electricidade de Timor-Leste Empresa Pública (EDTL, E.P.), responsible for the overall management, implementation and monitoring of the project.

The project proponent and representative details/contacts for the Project are as follows:

Proponent	**Proponent Primary Contact**
Electricidade de Timor-Leste (EDTL)	Dr. Paulo da Silva Email: psilva@edtl-ep.tl Telephone: +670 7850 6581 **Proponent Secondary Contact** Lizete Mevina Jessica Soares Program Officer for DPER/Focal point for Solar IPP, EDTL E.P. Mobile: +67078661645

2.2 Proponent Details

EDTL, E.P. is the Timor-Leste's State-Owned Company in Electricity and Energy Sector, established based on the Decree Law No. 29/2020, of 22 July. EDTL, E.P. was established with the main objective to:

- Oversee and ensure the functioning of electricity sector based on the Timor-Leste's Government Policy to accelerate public access to the electricity and supply of electricity in a large part of the national territory;
- Create a set of structuring measures for a reform of the electricity sector aimed at the expansion and modernization of the National Electricity System;
- Management implementation to improve public services provided, raising standards of quality and reliability at the affordable prices, taking into account the feasibility and sustainability of its operations.

EDTL, E.P.'s business operation consists of generation, transmission and distribution of electricity and in planning for the energy diversification to renewables in the energy sector.

2.3 Proponent Services

- **Production and Renewable Energy**

The role of this department is to ensure energy and electricity production through Operations and Maintenance Services at Electricity and Power Generation Centers at Hera, Betano, Atauro and Comoro. Provide coordination services, inspection and monitorization of fuel supplies at those Electricity Centers. Conduct surveys and data collection for source of renewable energy and solar panels installations in remote areas and distance from national electricity lines, improvement of biogas, biodiesel, hydropower and photovoltaic panel.

- **Transmission Line**

This business department manages National Dispatching Center (NDC), Maintenance of Sub-Station and conduct Inspection, Monitorization and Maintenance of Transmission Line. The key role of this department is to ensure 150kV Transmission Line to transport energy electric from Electricity Centers at Hera and Betano with quality and secure throughout the national territory. To achieve this, Transmission Line Department is responsible for conducting Operation and Maintenance (O&M) to National Power Grid. Currently, O&M is outsourced and operated by an international company while preparing EDTL, E.P. Technical Staff with adequate knowledge and skills in order to reduce dependency and be able to perform the job in the future.

- **Planning and Electrical System**

This department has responsibilities to oversee and manage three divisions, namely; Division of Planning System and Design, Division of Economic and Statistic and Division of Health, Safety and Environment.

- **Finance and Commercial**

Finance Department is responsible to manage Company's financial control, cash flow management, tax management, accounting, budget preparation and forecasting, payments, commercial, asset management, billings and revenue collections.

- **Corporate Services**

Corporate Services is an essential business department with the responsibility to manage business function such as Procurement, Human Resources, Information,

Technology and Communication (ICT), General Administration and Facilities and Logistics.

3 Details of EIA Consultant

EDTL, on behalf of the Government of the Democratic Republic of Timor-Leste (GoTL), are receiving technical support by the ADB, who have provided the technical experts for conducting the technical and safeguard assessments to meet ANLA's licensing requirements. In this regard, the following team of consultants was engaged for preparation of the EIS study:

- **Saad Malik**

  He has a Master's degree in Environment and Energy and also a Bachelor's degree in Chemical engineering, both degrees were awarded by the world reputed McGill University in Montreal, Canada. Furthermore, he has over 18.5 years of highly rich and diverse experience in preparing environmental assessments for projects of high levels of complexity across Asia, Central Asia and the Pacific across different sectors such as clean and conventional energy, urban sector, water resources and health systems, to name a few. He also has extensive experience in providing support to different governments in project development and specializes in sovereign and multilateral agency financed projects.

- **Halona Serena Consultant Firm**
  - **Maria do Ceu Rosales**

  Maria is a graduate from the University of Western Australia majoring in Environmental Science and Business Law. She is an Environmental Scientist with more than 5 years' experience predominantly in the area of environmental assessment, management and public procurement.

  She has led environmental studies on variety of environmental assessments and feasibility studies specifically for water resources management and has worked on a variety of projects from small-scale to large projects. Maria has also involved extensively in drafting, review the laws and policy related to the procurement. She has more than 3 years of working experience in public procurement and preparation of contract and documents relating to Prequalification (PQ) of Bidders, Request for Quotation (RFQ) and Bidding Documents for the procurement of Goods and Works for ICB and NCB Contracts.

  - **Pedro Pinto**

  He has 20 years' experience as an ornithologist and flora and fauna specialist. He has been working under Indonesian and Timor - Leste governments for Flora and Fauna Conservation. He holds a degree in Bachelor Science of Forestry.

- **Eufragio Xavier**

He has over five years of experience in oil and gas sector, undertaking intense training and internship on HSE-related programs with ConocoPhillips Timor- Leste in Australia. He holds a degree in Petroleum Management.

- **Januario Ribeiro da Costa, MS**

Januario is an engineer with more than 5 years of experience in environmental work including environmental impact assessment (EIA), environmental management planning (EMP), water and waste treatment plant and design. Januario has involved in various projects including support in preparing environmental impact assessments for oil drilling in Betano by Timor Resources, several EIS and EMP for construction building in Dili such as Timor Plaza, conducted environmental baseline study for ADB's east to west road from Com to Lospalos. Januario is currently doing Doctor of Philosophy (PhD) in chemical engineering at Worcester Polytechnic Institute (WP).

- **Mario Marques Cabral**

A marine biologist who has more than 20 years of experience in environmental assessment and management. Also, he was chosen to become The Nominators of the candidates for Blue Planet Prize in 2022 (af:011785). The 31st Blue Planet Prize nomination process was organized by The Asahi Glass Foundation since the early of August 2021 under the supervision of Director, Commendation "Blue Planet Prize" (Toshihiro TANUMA, Ph.D.) in Tokyo-Japan. The Blue Planet Prize is an award presented to individuals or organizations from around the world in recognition of outstanding achievements in scientific research and its application that have helped provide solutions to global environmental problems. The Prize is offered in the hope of encouraging efforts to bring about the healing of the Earth's fragile environment.

- **Filemo Soares Moreira**

Filemo is a Geologist and Health and Safety specialist with more than 8 years' experience in Environmental Impact Assessment (EIA), socio-economic and resettlement, related issues, sanitation, occupational health & safety at work. He has been involved in various projects in both Timor-Leste and Phillipines.

- **Laboratory Testing Expertise**
  - **Mr. Mario Soares**

He is a highly esteemed technical expert representing the Autoridade Nacional Agua e Saneamento (ANAS, I.P). ANAS, I.P is a prominent government institution dedicated to water and sanitation matters, making Mr. Soares an invaluable asset to the data collection

process. His expertise in the field is impeccably substantiated by the attached certification (see Annexure III), meticulously detailing his qualifications and competency in surface water assessment.

With his profound knowledge and extensive experience, Mr. Soares plays a pivotal role in ensuring the accurate and reliable collection of surface water samples for this crucial environmental project.

- **Autoridade Nacional Agua e Saneamento (ANAS)**

As the field-based data collection firm, Halona Lda, does not possess its own water quality laboratory, the testing and analysis of collected water samples was conducted at the reputable laboratory of in Dili represented by Mr. Soares for field collection as mentioned above.

While ANAS I.P performed the field testing, certain crucial parameters such as BOD, COD, TSS, Total Phosphorus, Total Coliform, and Total Nitrogen were not locally available in Dili for quality testing. To address this, samples containing these parameters were securely sent to accredited laboratories in Indonesia, renowned for their expertise and proficiency in water quality analysis.

- **Dinas Lingkungan Hidup dan Kebersihan (DLHK)**

The essential parameters, including BOD, COD, TSS, Total Phosphorus, and Total Coliform, were tested and analyzed at the reputable UPTD Environmental laboratory. Situated in the city of Kupang, province of Nusa Tenggara Timur (NTT), Indonesia, DLHK was founded in 2016 under the auspices of the local government. The primary objective of DLHK is to support environmental initiatives within the city of Kupang, encompassing the collection and analysis of vital environmental parameters.

4 Description of the Project

4.1 Project Overview

EDTL-EP is seeking to source up to 100 MW solar PV generation connected to the EDTL-EP network from an IPP, potentially including a Battery Energy Storage System (BESS). The Project will be constructed on land selected and acquired by EDTL-EP. The final size of the solar PV plant, BESS and the nature of the grid connection are to be selected to provide optimum cost benefit for EDTL-EP and its stakeholders.

4.2 Identification of the Project

The MPW in collaboration with EDTL-EP envisaged the need to develop a solar PV based grid connection power generation plant in order to meet the energy requirements of Timor Leste in a sustainable and environmentally friendly manner while also ensuring that the reliance on diesel for power generation is reduced.

As a result, MPW and EDTL-EP obtained the support of ADB to engage the technical design firm along with a team of individual experts to prepare the technical and economical assessments of the project along with the environmental and social safeguard due diligence assessments along with the EIS and EMP documents to obtain the required licenses for project development, including the license from ANLA.

4.3 Project Category

The proposed solar IPP development may have significant environmental impacts, thus the project development falls under category 'A' according to the Decree Law No. 5/2011 of Environmental Licensing. Therefore, EDTL has submitted the Terms of Reference (ToR), Environmental Impact Statement (EIS) and Environmental Management Plan (EMP) seeking for ANLA and other relevant entities' approval before the project construction works can commence.

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

4.4.1 Nature

The Project will include the following physical equipment and works.

- **Solar PV array**: approximately 66 hectares of solar PV modules mounted on steel or aluminium framing, connected via low voltage direct current electrical cabling to power conversion units (a ground mounted kiosk or skid), which are then connected via medium voltage alternating current electrical cabling to the substation.

- **BESS**: approximately 2 hectares of external ground mounted battery racks (kiosk or container style), connected via low voltage direct current electrical cabling to power conversion units (a ground mounted kiosk or skid), which are then connected via medium voltage alternating current electrical cabling to the substation.
- **Substation**: a high voltage alternating current facility that includes electrical switchgear and power transformers, and towers / gantry structures, to connect the solar PV array and BESS to the existing electrical conductors of the 150 kV transmission system.
- **Balance of plant**: other works and equipment required to complete the installation, including fencing, operation and maintenance buildings, internal access roads, drainage, security, etc.

The project components will interface with the existing main road with a new site entry, and via a cut-in to the existing 150 kV transmission network. Otherwise, no work external to the site is expected. The indicative site layout and location of key technical equipment is provided in Figures 4.3 and 4.4 below.

4.4.2 Size

The Project is expected to be developed over a total area of 350 hectares and will consist of an estimated constructed area of 82 hectares. The site is a broad valley approximately 2.3 km long and 1 km wide between the main road (to the south) and the coast (to the north).

4.4.3 Location

The proposed Project site is located in Timor-Leste, approximately 14 km east of Manatutu Municipality, directly adjacent to the Manatutu to Baucau national road and is located at co-ordinates of -8.519374°S and 126.135046°E. The site layout and key site features are provided as Figures 4.1 and 4.2 below.

4.5 Justification and need for Project

Electrification rates in Timor-Leste are relatively high (well over 90%). Power is distributed to customers around the country via a 150 kV transmission network and 20 kV distribution network. Local customer services are provided at 400/230 V. Most customers and load types are domestic, with some small commercial and industrial loads. Current average load on the electricity network is approximately 60 MW, projected to grow to around 89 MW by 2025 with a peak load of approximately 128 MW.

However, like many SIDS, Timor-Leste has some of the highest costs of electricity generation globally. This is largely due to a reliance on fossil fuel imports (diesel) for almost all electricity generation. Currently, the total operational generation capacity in Timor-Leste main island grid is 262.4 MW of thermal synchronous generation utilizing diesel fuel.

EDTL-EP is seeking to supplement some of this diesel requirement by sourcing lower cost solar PV generation from an IPP under this project. There is significant opportunity for Timor-Leste to utilize renewable energy to build resilience and place downwards pressure on electricity supply in the country.

4.6 Proponent's endorsement of EIS

There have been discussions with the proponent, EDTL, regarding the contents of the EIS and hereby, EDTL endorses the EIS and EMP.

Name	Position	Signature
Dr. Paulo da Silva	Chair of the Executive Committee and Presidente of the Board of Directors, EDTL, E. P.	

4.7 EIS Structure

The structure of EIS, as presented in the table of content, follows standard guidelines released by ANLA, as follows:

- Executive Summary
- Detail of project Proponent
- Detail of EIS Consultants
- Description of project
- Policy, Legal and Institutional Framework
- Description of Environment
- Climate Change
- Alternative options
- Impact Assessment and Mitigation Measures
- Social Impact Assessment
- Economic Assessment
- Summary of Environmental Management Plan (EMP)
- Public Consultation and Information Disclosure
- Difficulties encountered

- Conclusion and recommendations
- Non-Technical Summary

Figure 4.1: Layout of Proposed Site for Solar IPP development

Figure 4.2: Site Overview

Figure 4.3: Site southern area, including entry, BESS, substation and connection

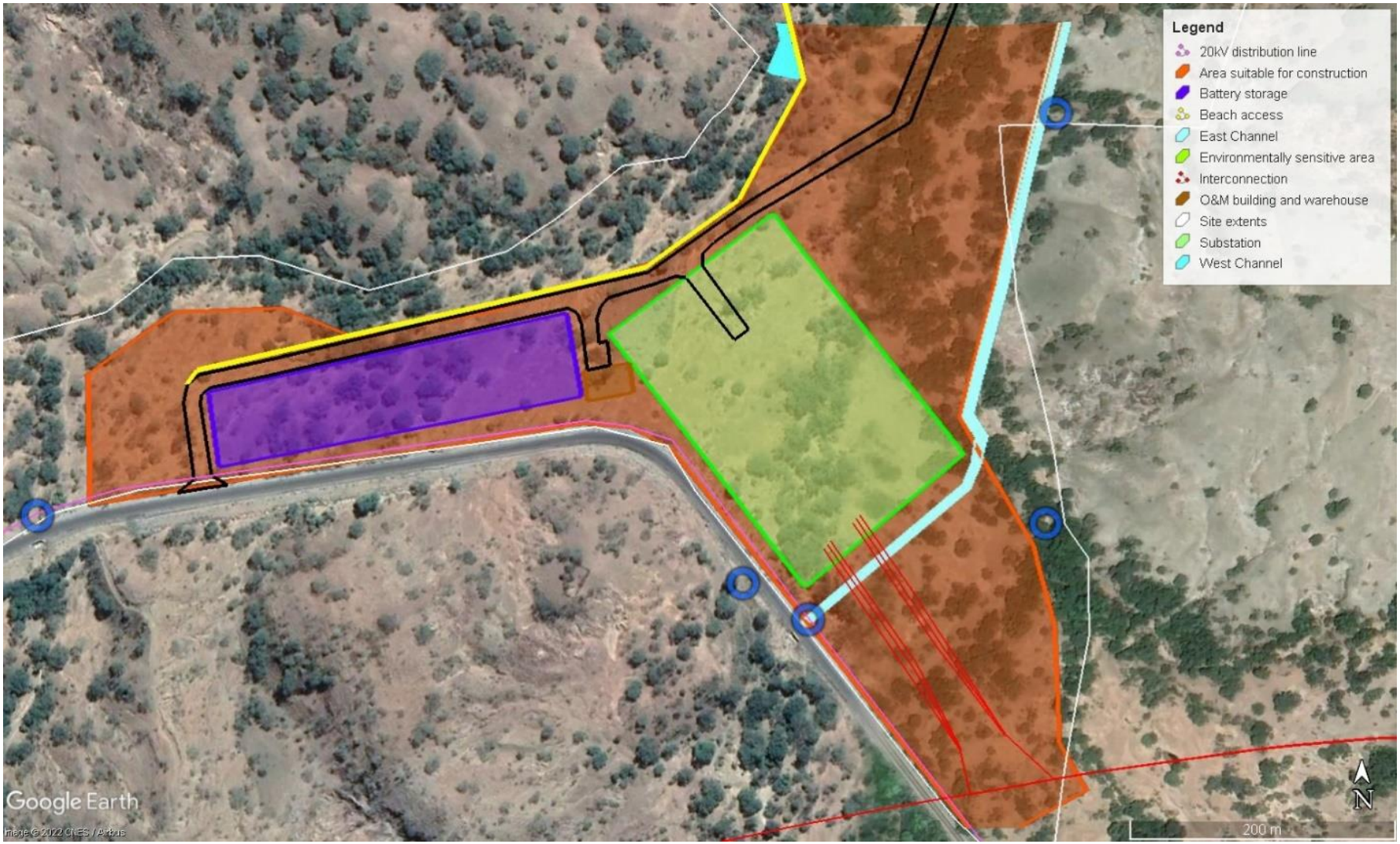
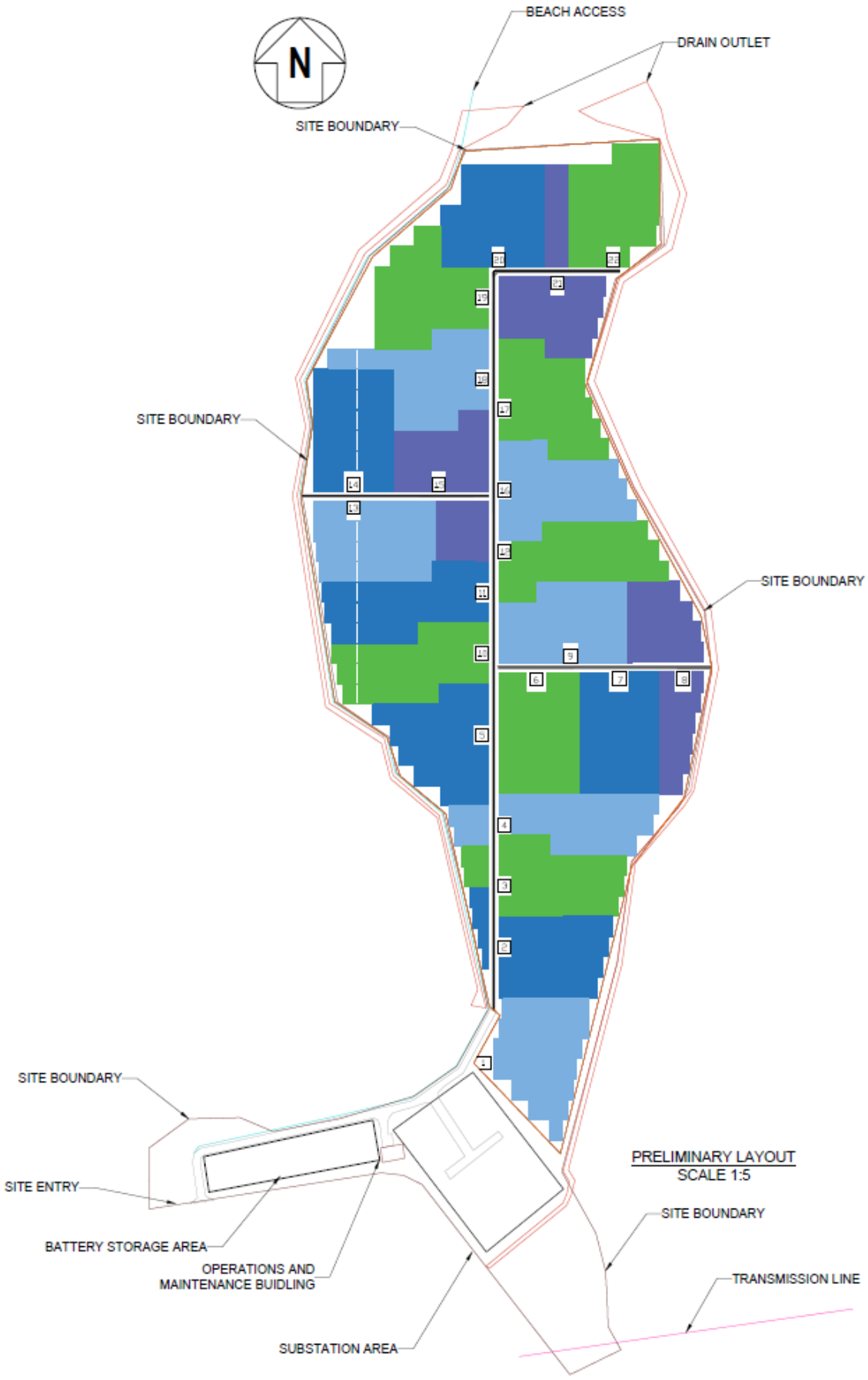


Figure 4.4: Indicative Site Layout



5 Policy, Legal and Institutional Framework

5.1 Legislation

Applicable national legislation and industry guidance are referenced in Table 5-1 which provides a summary of the principal legislation and regulations applicable to the project, in addition the table includes relevant International and Industry Guidance that has been consulted in the course of the study.

Table 5.1: National Legislation and International and Industry Guidance Documents

Title	Description	Relevancy to the Project
Timor-Leste National Legislation and Regulation		
Constitutions of the Republic Democratic of Timor-Leste Article 61 (Environment)	The article specifies provisions for state including the proponent shall undertake to defend, and safeguard the environment recognizes the right of all citizens to a humane, health and ecologically balances environment while also specifying the duty of everyone to preserve and protect the environment for the benefit of future generation.	Provide the basis for environmental protection and safeguarding in the Country.
DL No. 39/2022: Environmental Licensing	Under this Decree-Law, Regulatory approval of development projects is undertaken by ANLA, as the regulator, under Decree-Law 39/2022 Environmental Licensing that defines the environmental licensing system for public and private projects that are likely to produce	In accordance with Decree-Law 39/2022, the solar IPP project is classified as a Category A development as it has “the potential to cause significant adverse impacts”, and therefore requires a detailed EIA/EIS. For Category A projects, the proponent must prepare the Draft ToR for the EIA for review by GoTL. The GoTL has a maximum of 10

	environmental and social impacts. The licensing system sets out the process, procedures, roles and responsibilities of the Project Proponent. The Project 'proponent' is defined as "a person, including a legal person, both public and private, who requires a license to carry out a project" in the Decree. The proponent will be the private sector entity awarded the concession by GoTL to design, build and operate the project (the 'Concessionaire').	Business Days to review the ToR and provide comments to the proponent.
DL No. 6/2020 - Legal Framework for Protection and Conservation of Biodiversity	Defines the legal framework for biodiversity conservation and sustainable use of its components to meet the current needs of protection of biodiversity in Timor-Leste, for special areas inside and outside of the National Protected Areas System (Article 26), especially management measures for a list of special/priority ecosystems (swamps, estuaries, mangroves, corals and coral reefs, marine grasses and sacred Lulik sites. Includes the List of Protected (Annex I) and Exotic/Invasive Species (Annex II) and the rules and	Relevant to any project activities or aspects which might result in any impacts on biodiversity aspects, such as the crocodiles visiting the pond from the sea on the northern tip of the proposed site.

	prohibited activities for their management (Chapters IV and V). Establishes the considerations to be taken in Environmental Impact Evaluations (Chapter VII), namely identification and description of adverse effects and appropriate measures proposed to prevent, minimize and mitigate the identified impacts.	
DL No. 5/2016 – National System for Protected Areas (PA)	Establishes the necessary legal instruments for the protection of declared sensitive ecological areas in Timor-Leste (Article 11) and their allowed and prohibited activities. Provides for a List of Established Protected Areas (Article 50 and Annex I), their typology (Article 12) and geographical demarcation (Article 17) and management instruments (Article 23) for approved activities within Areas (Article 32) such as Land Use Zone i.e., allows infrastructure installation for human use.	Not relevant to project as none of the components are within a Protected area.
Law no. 14/2017 – General Framework for Forestry	Defines the fundamental principles and norms regarding management, protection, conservation and sustainable use of	Relevant to project components that traverse or are located within any type of forest in the project area. EMP implementation is the overall

	forests and watersheds (Article 1), Forest Classification [State, Community and Private] (Article 8) and Forest (Article 14) and River Basin (Article 17) Management Plans and Forbidden Activities in these areas (Article 24). It also includes Climate Change requirements for Forest development (Article 28), for emissions reduction and conservation of carbon stocks.	measure to mitigate adverse impacts.
Regulation UNTAET no.17/2000 – Prohibition of Logging operations and Export of Wood	Provided for in Law 14/2017, establishes the prohibition for felling, burning or destroying trees or forests (Article 2) and the activities exempt of these prohibitions (Article 3)	Relevant to project components that will require cutting trees within the project site and/or project area for the project development. EMP implementation is the overall measure to mitigate adverse impacts.
Government Resolution No. 33/2011 – National Adaptation Plan of Action (NAPA) for Climate Change	Adopts tran-sectoral measures to reduce Climate Change vulnerability in essential sectors in Timor-Leste (Agro-forestry, Water supply, Biodiversity, Health, Infrastructure, Natural Disasters). Definition and Prioritization of Proposed Adaptation measures for said sectors (NAPA Table 13), particularly those indicated in Annex 2 - Adaptation measures for	Relevant to project in the implementation of adaptation measures for biodiversity aspects and in the case of natural disasters.

	the Water Sector (no. 1, 4, 5, 6, 9, 11 and 13) and for Natural Disasters (no. 3 – avoidance of landslides and 4. Early warning systems i.e., droughts or storms).	
Government Resolution No. 8/2012 – Sanitation Policy	Clarifies the sanitation responsibilities and encouragement on improving the sanitary section, including that each family and institution is responsible for the construction, use and maintaining their own hygienic and sanitary facilities, hand washing facilities and others. Also includes Strategies to follow such as Component 2 - Improved Sanitation: b) and c) management and safe integrated management, treatment and elimination of human excreta; Component 3 – Sanitation Financing: Institutional Sanitation (1) investment in public toilets; (2) financed by the user (per use); Urban Sanitation (1) Direct Investment in Urban Sanitation Infrastructure i.e., FSTP; (2) with user payment for O&M costs; (3) based on integrated Urban Planning. Defines the MOPW responsibilities (Section 3) in strengthening, planning,	Relevant to the Proponent responsibility for implementation of the required sanitation arrangements and meeting the standards at the project site.

	developing and managing urban sanitation services to a) collect sludge from septic tanks and b) operate centralized / decentralised sewer systems.	
Decree Law No. 33/2008 – Hygiene and Public Order	This law establishes the administrative policy measures for Districts regarding hygiene and public order, defining the relations between Public Administration and Citizens, applicable to urban areas in the Districts and specific locations in districts. Defines the prohibitions in general (Article 5) regarding impact to public infrastructure and land, from 1.a) discharge polluted waters i.e., faecal sludge/sludge; b) Waste in streets; c) drainage obstruction; e) spoils and construction material on sidewalks; and h) noise to community.	Relevant regarding project Work Camps and construction site. EMP implementation is the overall measure to mitigate adverse impacts.
Decree Law No. 33/2017 – Legal Framework for Cultural Heritage	Defines the concept of cultural heritage and the measures for its support, protection, preservation and conservation in Timor-Leste (Article 1) and its different cultural classification (Article 21). It also defines and regulates a 50 metre Protection Zone around immovable Heritage	Not applicable to the project site or area since no cultural heritage sites are expected to be impacted. However, in case any such sites are uncovered during the project works, this Law may become applicable.

	(Article 23) and the rules and licensing requirements for general work within these Zones (Article 26).	
Decree-Law no. 4/2012 – Labour Code	Describes the duties and obligations of the private employer and employee while exercising their function within the scope of work, or within the bounds of a work contract (Chapter 1), with the aim of creating good working conditions (Article 20) and a fair, safe and healthy working environment (Article 35).	Environmental management plan (EMP) provides measures to mitigate workers' health and safety hazards.
Law no. 6/2017 – Base Law for Planning	Base rules for Territorial Planning in Timor-Leste. Intends for (Article 3) sustainability of urban areas, with improvement of living conditions for citizens. Establishes the different soil uses (Article 8) and the Municipal Territory Plan and the Land Use Plan (Article 17).	Relevant to the different aspects of the project development.
Law no. 8/2017 – Public Expropriation	Rules on land expropriation for public interest reasons, responsibilities, procedures, fair compensation, respect for vulnerable groups (Article 10) and project planning requirements that include expropriation, such as public consultation (Article 22), environmental licensing [if applicable] and	Relevant to the works at the project site and the project area to ensure the aspects of this law are fulfilled.

	social or economic impact assessment studies (Article 19).	
Decree-Law no. 3/2016 – Municipal Administration Statutes	The DL gives local government the functions, duties and powers to, among others: (i) conserve and protect their local environment and natural resources; (ii) plan, implement and/or operate and maintain local water supply projects; (iii) implement or arrange for implementation local sanitation/sewerage/solid waste and drainage projects; (iv) protect cultural heritage and religious sites; and/or (v) monitor project activities within their jurisdictions.	To monitor the environmental performance of the project across the applicable aspects of this law i.e. conservation and protection of environment and natural resources, sewerage and waste management etc.
Decree-Law no. 2/2017 – Urban Solid Waste Management System	Defines the rules that the urban solid waste management system abides by in Timor-Leste, led by the Municipal Authority (Article 2), the typology of Urban Solid Waste (Article 6), as well as the obligations of all users of the system (Article 16), especially the management and collection of waste from construction works (Article 33)	EMP implementation is the overall measure to mitigate adverse impacts and all projects to manage generated solid wastes accordingly.
International Standards and Guidelines		
IFC EHS Guidelines	The Environmental, Health, and Safety (EHS)	Provide guidance on the application of good

	Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP) and are referred to in the World Bank's Environmental and Social Framework and in IFC's Performance Standards. The EHS Guidelines contain the performance levels and measures that are normally acceptable to the World Bank Group, and that are generally considered to be achievable in new facilities at reasonable costs by existing technology. The World Bank Group requires borrowers/clients to apply the relevant levels or measures of the EHS Guidelines. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects will be required to achieve whichever is more stringent.	environmental practice. Applicable during both project construction and operational phases.
United Nations Convention on Biological Diversity (UNCBD)	The Convention on Biological Diversity (CBD) entered into force on 29 December 1993. It has 3 main objectives:	Timor-Leste is rich in biodiversity with significant ecosystem and endemic species. The country signed the convention in 2001. As the project could have impacts on

	1. The conservation of biological diversity 2. The sustainable use of the components of biological diversity 3. The fair and equitable sharing of the benefits arising out of the utilization of genetic resources.	the flora and fauna or risk to the loss of the biodiversity, it is fundamental principle for the project proponent to prevent or minimise the risk of biodiversity loss during the project implementation.
United Nations Framework for Climate Change Convention (UNFCCC)	The United Nations Framework Convention on Climate Change (UNFCCC) provides a framework for intergovernmental efforts to reduce greenhouse gas emissions and adapt to the expected impacts of climate change. It also provides guidance to member states on developing and implementing national climate change strategies, incorporating both adaptation and mitigation actions. Timor-Leste became a signatory to the UNFCC in October 2006.	The project activities release GHG emissions which could be one of the contributing factors to the country's climate change issue. Minimisation climate change risks by reducing the GHG emissions are an essential part of the project environmental objective and target. This convention is the principle guidance for the project proponent to prevent the air pollutions and reduce the GHG emissions as much as possible.
WHO Guidelines for Drinking Water Quality	The primary purpose of the Guidelines for drinking-water quality is the protection of public health. The Guidelines provide the recommendations of the World Health Organization (WHO) for managing the risk from hazards that may compromise the safety of drinking-water.	Applicable during both project construction and operational phases.

Forestry, Aquaculture and Fishing Legislation: International Union for Convention of Nature (IUCN)	This international convention is and international organisation focus on the nature conservation and sustainable of utilising the natural resources. The IUCN works in the field to promote ecological conservation in order to ensure the sustainable development concepts.	Timor-Leste is a signatory member of the IUCN convention, which has responsibility to protect its ecological components to ensure the economic sustainable development. Therefore, baseline survey was used to identify any species categories listed under the IUCN red list which can be impacted by the project activities.
Cultural Heritage Legislation: UNESCO Convention on Natural and Cultural Heritage	The convention mandates each signatory party to identify, protect, conserve, transmit and present to the future generations of the cultural and natural heritage	As Timor-Leste is a signatory member of this convention, therefore the project activities will ensure the protection and conservation of any cultural and natural heritage around the project locations.
Noise Standards and Regulations: WHO guidelines for community noise.	This WHO guideline is used to measure the noise level around the community areas and ensure the protection of people from discomfort environment and potential noise induce hearing loss.	This guidance is used to ensure the noise levels arising from the project activities are contained or maintained between the WHO set values to protect everyone at or near the project locations are affected by unwanted sound caused by the project activities.
WHO/IFC Global Air Quality Guidelines	After years of intensive research and deliberations with experts across the globe, the World Health Organization (WHO) updated its 2005 Global Air Quality Guidelines (AQG) in September 2021. The new air quality guidelines (WHO	Applicable during both project construction and operational phases.

	AQG) are ambitious and reflect the large impact that air pollution has on global health. They recommend aiming for annual mean concentrations of $PM_{2.5}$ not exceeding 5 µg/m^3 and NO_2 not exceeding 10 µg/m^3, and the peak season mean 8-hr ozone concentration not exceeding 60 µg/m^3. For reference, the corresponding 2005 WHO guideline values for $PM_{2.5}$ and NO_2 were, respectively, 10 µg/m^3 and 40 µg/m^3 with no recommendation issued for long-term ozone concentrations.	

5.2 Pollution Control Standards in Timor Leste

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

6 Description of the Environment

This section provides the description of not only the related environmental components, but also economic, social and cultural aspects that could be potentially impacted by the proposed project development. The description will also provide the method of study, the literature review used for the study and the scope and limitations of the environmental aspects studied during the EIS.

6.1 Physical Components

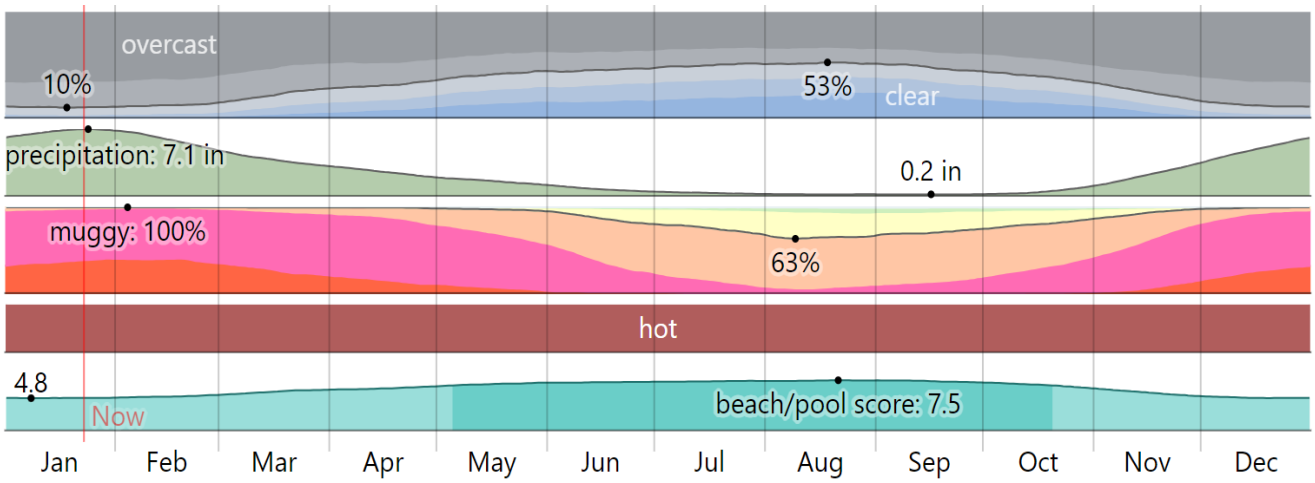
6.1.1 Climate

The climate in northern Timor-Leste and is tropical, hot and humid and temperature varies within a narrow range over the whole year. The average temperatures are largely affected by altitude since there is little temperature variation on either a diurnal or a seasonal basis under the tropical climate conditions in Timor-Leste.

In Manatuto, the wet season is oppressive and overcast; the dry season is muggy, windy, and partly cloudy; and it is hot year-round. Over the course of the year, the temperature typically varies from 74°F to 94°F and is rarely below 72°F or above 96°F.

Based on the beach/pool score, the best time of year to visit Manatuto for hot-weather activities is from early May to mid October as can be seen in the Figure 6.1 below.

Figure 6.1 – Climate in Manatuto



Source: Weatherspark, (January 2024).

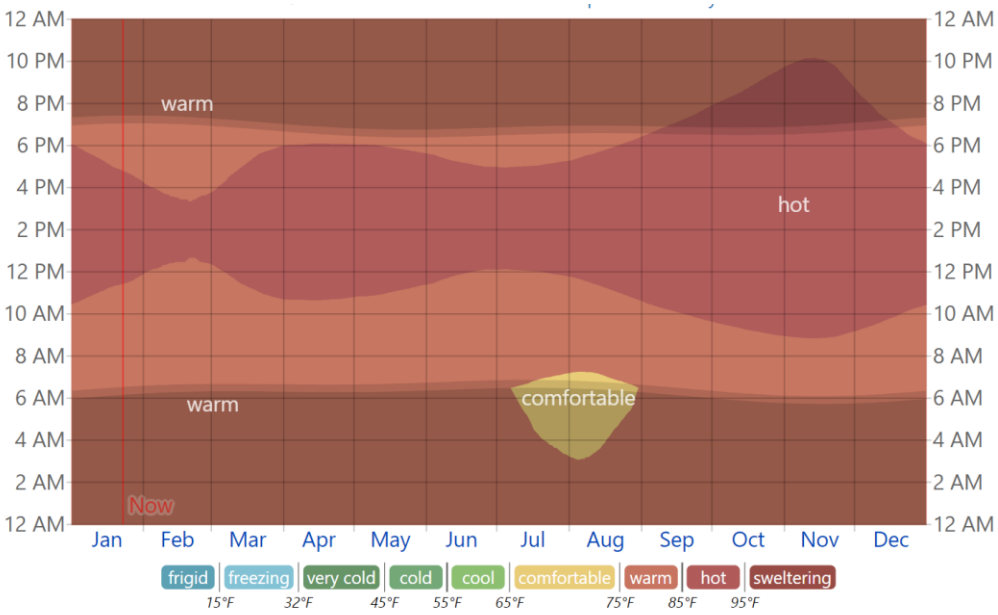
Temperature

Variations in rainfall and temperature can occur over short distances due to the steep topography. The hot season lasts for 1.8 months, from September 26 to November 21,

with an average daily high temperature above 92°F. The hottest month of the year in Manatuto is November, with an average high of 93°F and low of 81°F.

The cool season lasts for 2.5 months, from January 6 to March 24, with an average daily high temperature below 87°F. The coldest month of the year in Manatuto is July, with an average low of 75°F and high of 87°F as can be seen in the Figures 6.2 and 6.3 below.

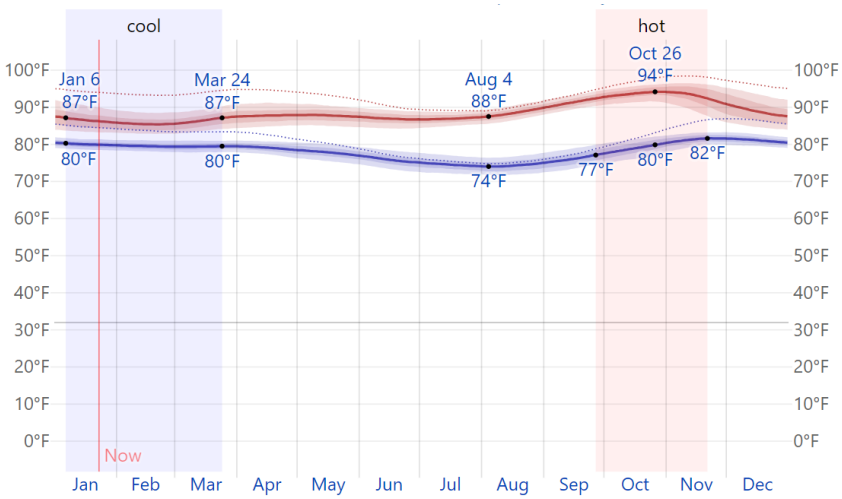
Figure 6.2 – Average hourly temperature in Manatuto



The average hourly temperature, color coded into bands. The shaded overlays indicate night and civil twilight.

Source: Weatherspark, (January 2024).

Figure 6.3 – Average high and low temperatures in Manatuto



The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

Source: Weatherspark, (January 2024).

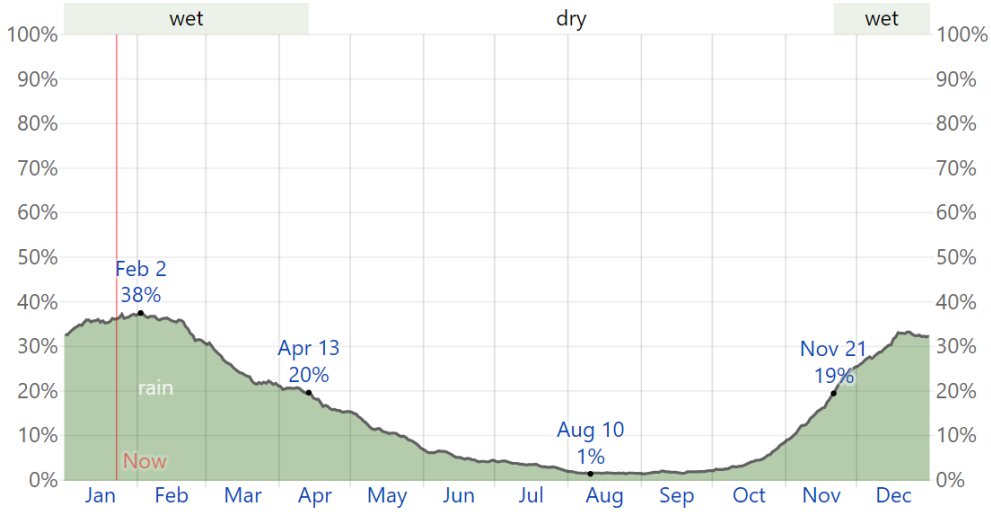
Rainfall

Topography has a strong influence on rainfall quantity, with marginal to low rainfall observed along the northern coast of Timor-Leste (<1000mm/year). There are two annual seasons. The main rainy season is from December to March but varies in length according to location as can be seen in Figure 6.4 below.

Rainfall is characterized by tropical strong showers. Heavy downpours in combination with steep terrain often increase surface runoff and cause extensive soil erosion/landslides. An unusually heavy rain hit the central and western part of the county in June 2010, causing serious damage to roads and pathways in the mountainous area. Strong winds occasionally hit the rural areas destroying houses and farm crops.

The monsoon type climate characterized by a clear distinction between wet and dry seasons. Northwest monsoon winds prevail from December to March, bringing the principal wet season to most parts of the country. At other times of the year, the dry season is caused by southeast trade winds which prevail from May until October, except for the south coast and southern slopes where the wet season persists until July. The average annual rainfall is typically between 900mm and 1200mm.

Figure 6.4 – Daily chance of Precipitation in Manatuto



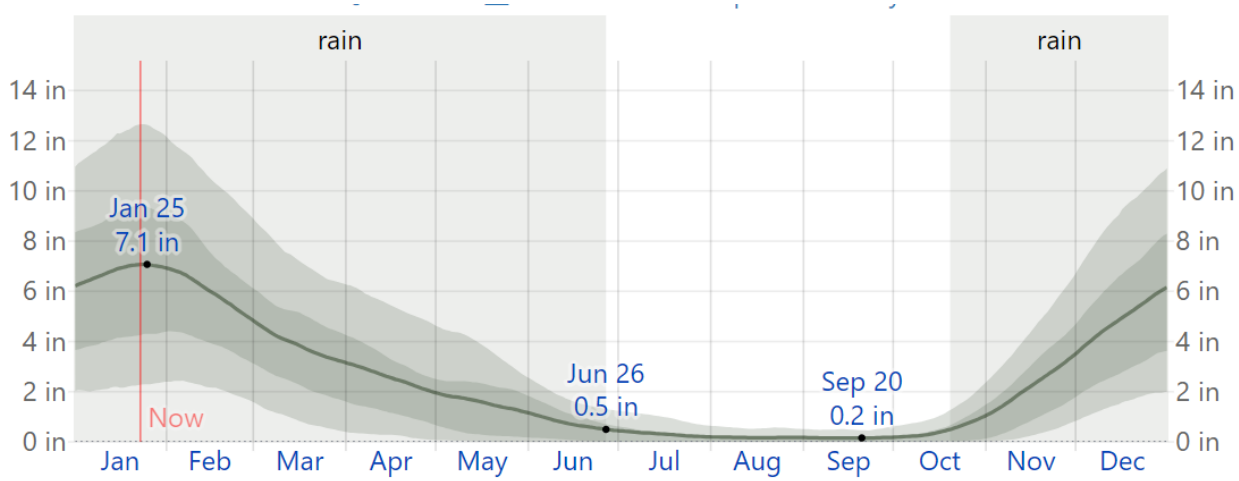
The percentage of days in which various types of precipitation are observed, excluding trace quantities: rain alone, snow alone, and mixed (both rain and snow fell in the same day).

Source: Weatherspark, (January 2024).

The rainy period of the year lasts for 8.2 months, from October 20 to June 26, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Manatuto is January, with an average rainfall of 6.9 inches.

The rainless period of the year lasts for 3.8 months, from June 26 to October 20. The month with the least rain in Manatuto is September, with an average rainfall of 0.2 inches as can be seen in Figure 6.5 below.

Figure 6.5 – Daily chance of Precipitation



The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average snowfall.

Source: Weatherspark, (January 2024).

Therefore, although severe rainfall events have generally been less in the subject areas in northern Timor-Leste, with lower rainfall along the northern coast (<1,200 mm/year) than the south it has been noted that on some occasions as much as a quarter of the total annual rainfall can be received in a single day.

This type of rainfall not only causes extremely high rates of erosion and agricultural and infrastructure damage, it also runs off rapidly and may not effectively recharge groundwater sources. Given the rainfall pattern over the region of the subproject, it is important that season be considered in planning the implementation of the project. Major earthworks should be planned for the dry season (May to November) particularly for areas susceptible to flooding and landslides and considering the proximity to the sea and the overall drainage pattern in the project area.

The average minimum temperature in Manatuto ranges from 22ºC (September) to 25ºC (December, January, February) while the average maximum temperature ranges from 30ºC (September) to between 32ºC and 34ºC. Highest temperatures have been recorded as 35ºC to 41ºC (April).

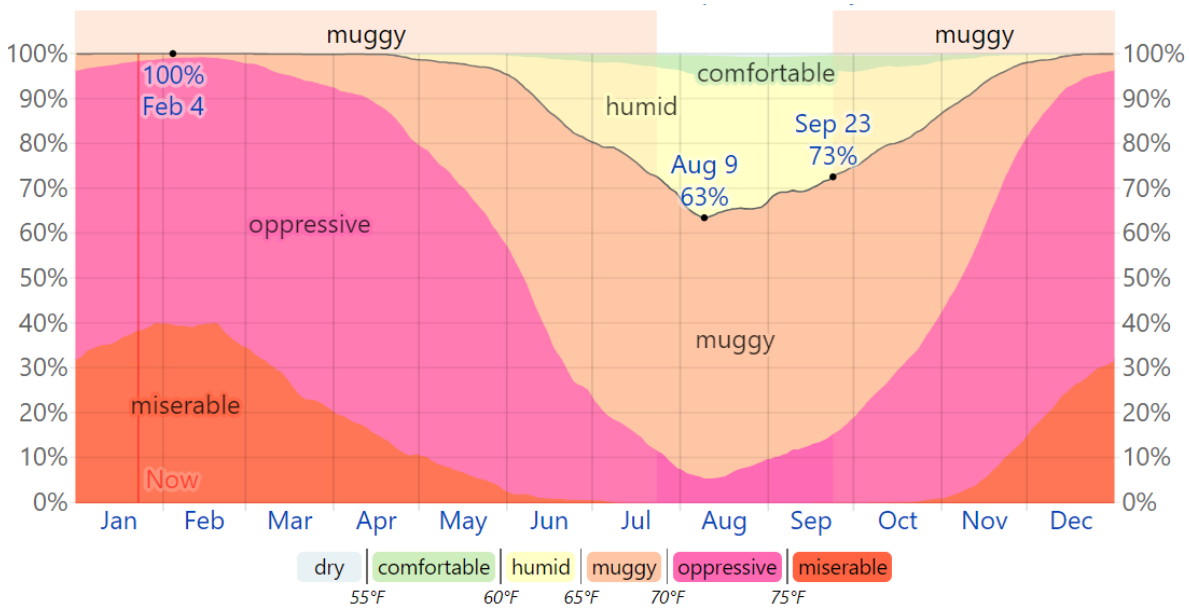
Humidity

Manatuto experiences significant seasonal variation in the perceived humidity. The muggier period of the year lasts for 10 months, from September 23 to July 23,

during which time the comfort level is muggy, oppressive, or miserable at least 73% of the time. The month with the most muggy days in Manatuto is January, with 31.0 days that are muggy or worse.

The month with the fewest muggy days in Manatuto is August, with 20.2 days that are muggy or worse as can be seen in Figure 6.6 below.

Figure 6.6 –Humidity Comfort Levels in Manatuto



The percentage of time spent at various humidity comfort levels, categorized by dew point.

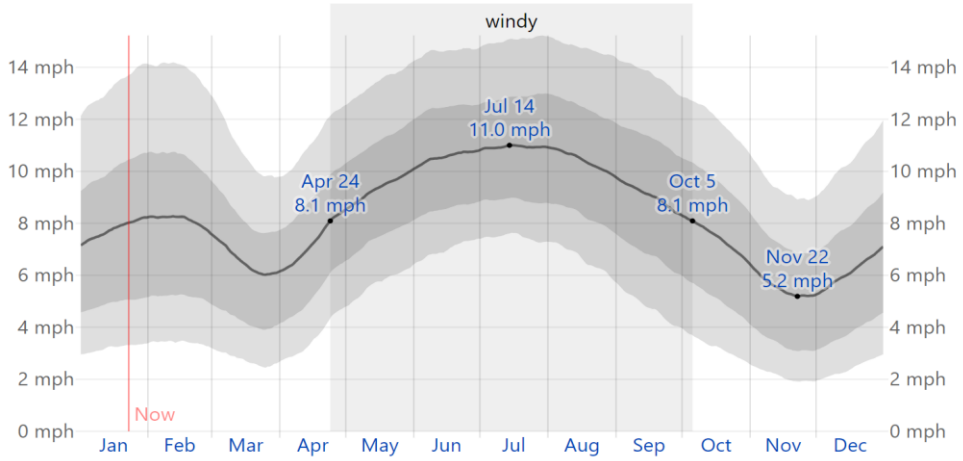
Source: Weatherspark, (January 2024).

Wind Speed and Direction

The average hourly wind speed in Manatuto experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 5.4 months, from April 24 to October 5, with average wind speeds of more than 8.1 miles per hour. The windiest month of the year in Manatuto is July, with an average hourly wind speed of 10.9 miles per hour.

The calmer time of year lasts for 6.6 months, from October 5 to April 24. The calmest month of the year in Manatuto is November, with an average hourly wind speed of 5.5 miles per hour as can be seen in Figures 6.7 and 6.8 below.

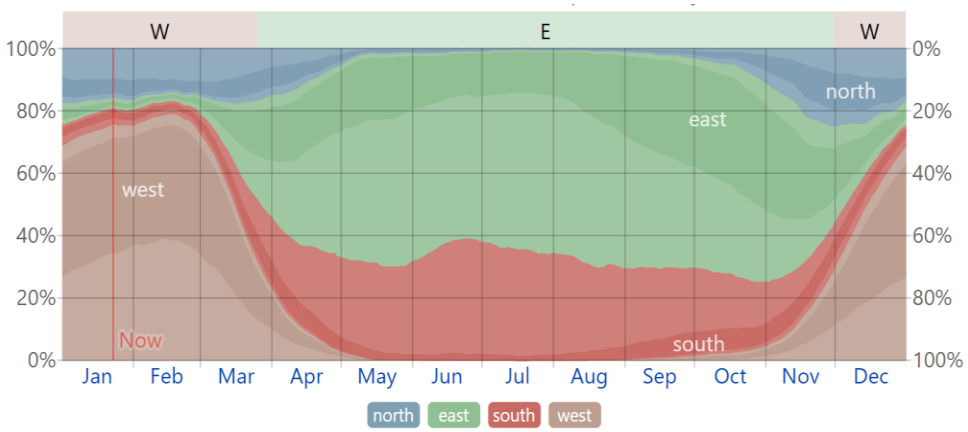
Figure 6.7 – Average Wind Speed in Manatuto



The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands.

Source: Weatherspark, (January 2024).

Figure 6.8 – Wind Direction in Manatuto



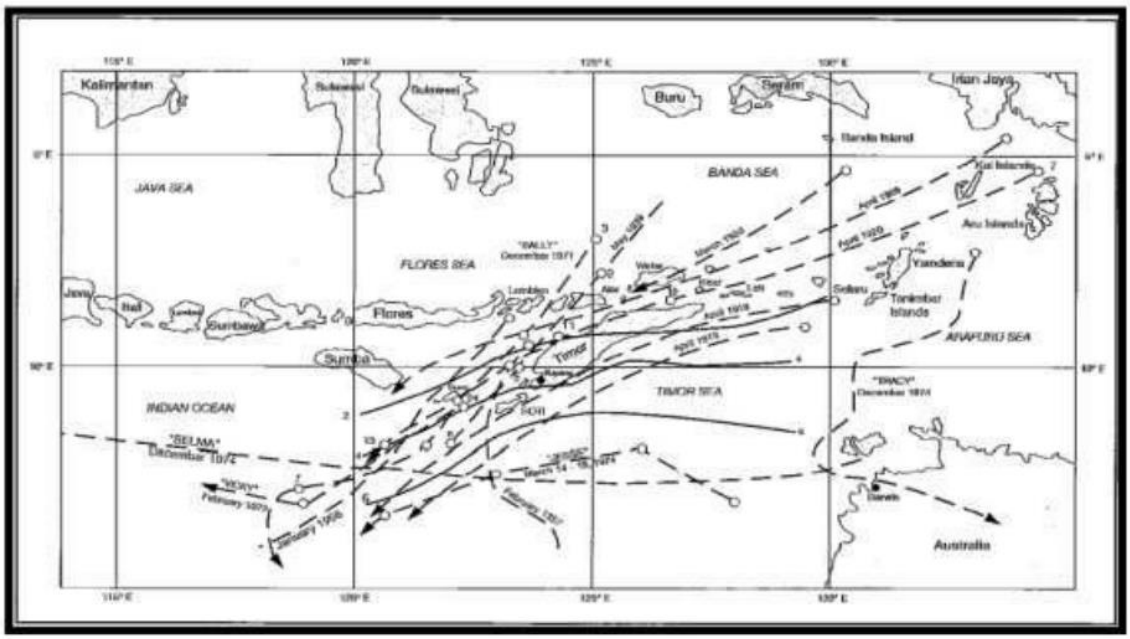
The percentage of hours in which the mean wind direction is from each of the four cardinal wind directions, excluding hours in which the mean wind speed is less than 1.0 mph. The lightly tinted areas at the boundaries are the percentage of hours spent in the implied intermediate directions (northeast, southeast, southwest, and northwest).

Source: Weatherspark, (January 2024).

Cyclones

The tropical cyclone season in East Timor normally occurs from November to April. The mean occurrence over the Timor-Leste region is around 0.2 per year (Kirono 2010). A severe cyclone has not been recorded since January 1993, when 400 houses were destroyed. The Figure 6.9 below shows the tropical cyclone path.

Figure 6.9 – Tropical Cyclone Path in Timor-Leste



ure 5: Occurrence of tropical cyclones in the past over Timor-Leste region (Crippen International
0, quoted in Monk et al. 1997).

Flooding

Flooding is a common problem in Timor-Leste, especially in the low-lying coastal plains along the southern shores. On a smaller scale, flooding from overflowing rivers also occur in the project area, especially in low-lying areas like Manatuto Town. Large amounts of sediments and gravel washed out from the upper catchments, during high intensity rainfalls, are deposited in low-lying downstream river sections.

Anthropogenic effects, such as deforestation, shifting cultivation, and subsequent soil erosion, are contributing to increased sediment loading of rivers and have a multiplier effect on flooding. This was confirmed in Manatuto town as some residents expressed that they experienced flooding every year or every rainy season with the inundation reaches up to 1m level. The floodwater, however, subsides in 2-3 hours.

Flood modeling was conducted for the proposed site. Storm durations of 3 hours were modelled for each Annual Exceedance Probability (AEP)[1] scenario, with the peak flood conditions derived by calculating the envelope of maximum values across all the storm durations. With respect to floodplain management, flood hazard is a measure of potential harm or a situation with potential to result in loss of property or life. There are numerous factors that can be used to assess flood hazard, but typically it is determined as a measure of flow depth and flow velocity.

[1] The probability of a flow of a certain size occurring in any river or stream.

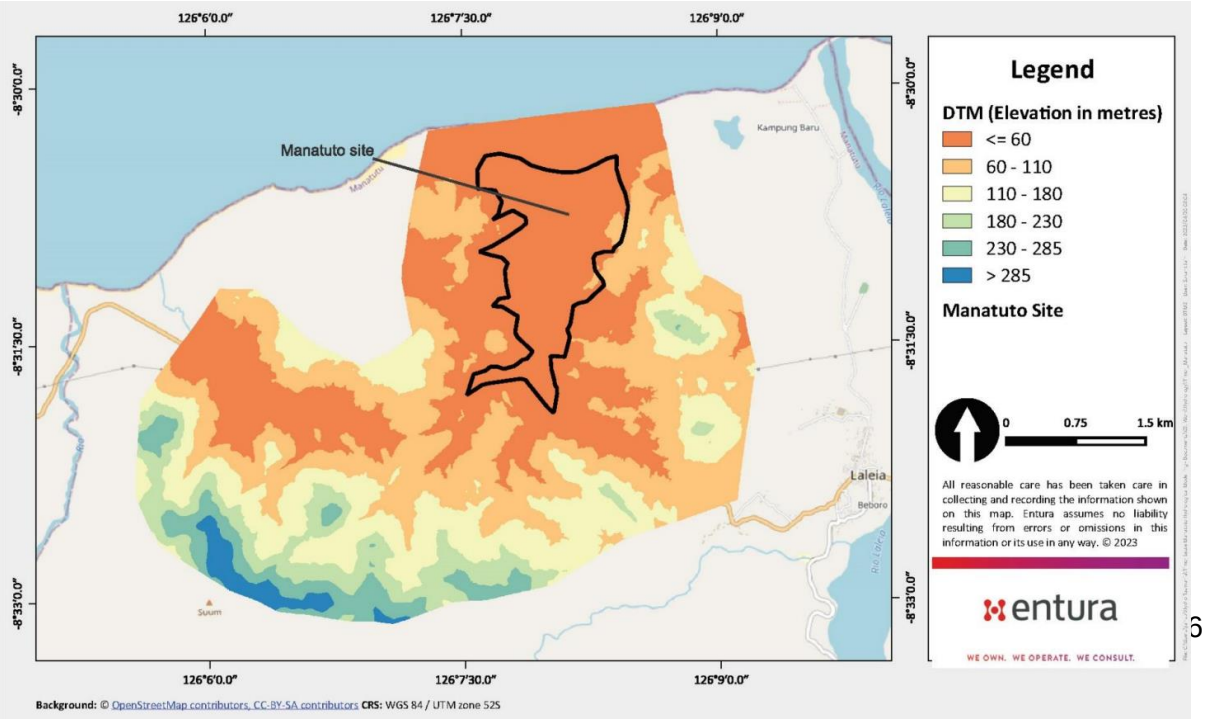
From the flood depth and velocities maps it is clear that the upper (southern) part of the proposed site are more prone to the flood with maximum depth to 2.39 m and 2.96 m for 10 % and 1% AEP respectively. The central portion nearby to the creek are experiencing some lesser maximum flood depth. Majority of Eastern part of the site are getting negligible (lesser than 0.1 m) amount of flood depth for both flood event. Along the creek the maximum velocity is observed in southern portion with the value of 2.9 m/s for 10 % AEP and 3.2 m/s for 1 % AEP event.

As per the modeling results, during 1% and 10% of the AEP floods, the small cross sectioned water course through the development site is not expected to be able to contain the flood waters. It breaks out to fill the flood plains in the low-lying areas. During these floods, there are large areas of the flood plain that are unsafe for people and vehicles, and during a 1 % AEP flood, some areas may be unsuitable for vulnerable buildings.

6.1.2 Topography

The physiographic features of Manatuto are characterized by a combination of coastal plains and mountainous terrain. The coastal plain is relatively flat and low-lying, with some small bays and coves. The plain is also home to several wetlands and estuaries. The plain is also low-lying and vulnerable to flooding during heavy rain. The higher elevations of the municipality are covered by tropical rainforest, which is rich in biodiversity and serves as an important water catchment area for the region. The mountainous terrain can also be a source of landslides in the area, especially during heavy rains. The highest point in the municipality is located at an elevation of around 600 meters as can be seen in Figure 6.10 below.

Figure 6.10 - Manatuto solar site over Digital terrain Model (DTM)



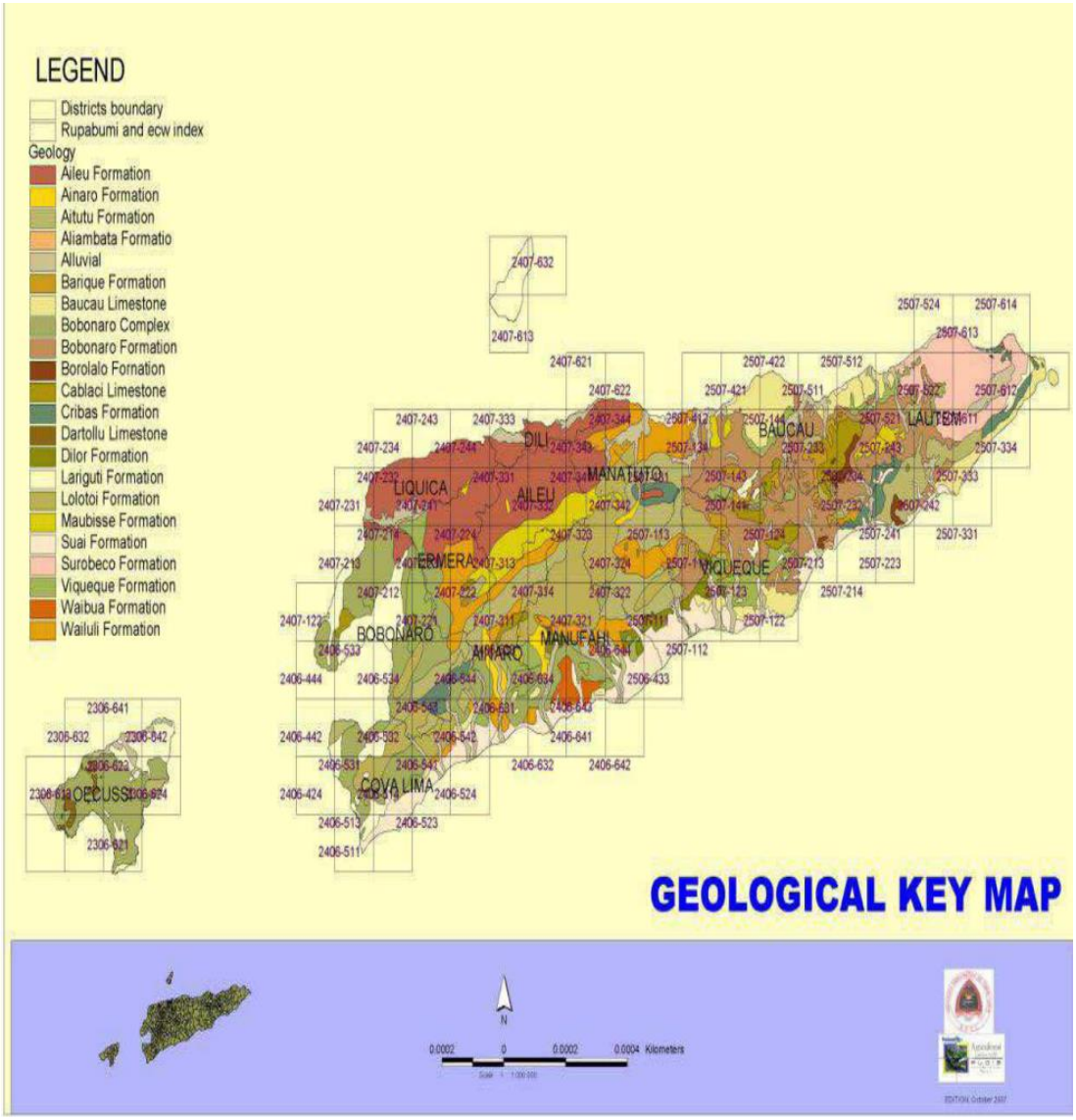
6.1.3 Geology

Timor Island is located in a tectonic region known as the Banda Arc. The Banda Arc is a west facing horse-shoe shaped tectonic boundary to the east of Indonesia which marks the collision zone of the Indo-Australian Pate, the Pacific Plate and the Eurasian Plate. Timor Island originated due to the collision between the northwestern edge of the Australian continent and a former oceanic subduction zone and it is an aggregation of continental fragments (part of Australian plate), deep marine sediments, oceanic crust and Quaternary sediments. Seismic data suggests that Timor Island is an accretionary prism (or wedge) formed from marine sediments and slices of the old Australian cratonic rocks.

In this area, geological basement consist of the Pre-Permian Lolotoi Complex which has thrusted over the younger formations, Permian Atahoc and Cribas FM, Triassic Aitutu FM, Jurassic-Cretaceous Wailuli FM and Middle Miocene Bobonaro Scaly Clay. The Lolotoi Complex is composed mostly of basic schist and amphiborite (Laclubar metamorphic massif). Atahoch and Cribas Formation are black pyritic shale, silty shale, limestone and sandstone etc. exposed in only small area around Atahoc village. Aitutu Formation includes a calcilutite, shale and sandstone sequence and contains a basal radiolarian limestone. Wailuli Formation is predominantly clay, marine shale, marl and fine-grained limestone.

The origin that preceded the deposition of the Viqueque Formation (upper Miocene) resulted in the placement Scaly Clay of large thrust sheets of Permian rocks and the placement of a huge gravity-slide deposit, the Bobonaro Scaly Clay. The Figure 6.11 below provides the geologic map of Timor-Leste.

Figure 6.11 – Geological Map of Timor-Leste



The young geological age and the high rate of tectonic uplift, combined with the presence of weak, poorly consolidated strata, produces intractable stability, slope failure, and erosion problems in many areas. Landslides and erosion are one of the most common environmental risks in the project area, resulting from interactions between water flow and soil.

Intermittent occurrence of heavy rain, slow erosion-deposition, rapid mass washing processes, including rock falls and landslides, the weaknesses underlying in the rocks coupled with the steep terrain, make erosion and sedimentation significantly active geological processes in Timor-Leste. The main cause of landslides is the nature of the sedimentary rocks, low mechanical strength of the underlying strata during spells of persistent torrential rain, topography and intensity of rainfall as well as saturation and poor drainage and undercutting and erosion of the road earthworks.

Other significant factors that contribute to soil erosion in the mountainous and hilly parts of the subproject area are grazing and burning. Old pasture is not so palatable or nutritious to cattle and goats and therefore farmers periodically burn old pasture grass to stimulate growth of new green pasture for grazing. In combination the frequent over grazing of the slopes by cattle and goats and the periodic burning of established grass cover will hasten soil erosion in times of heavy precipitation, especially in spaces where cattle and goats have grazed out local areas and burning exposes soils to erosion.

6.1.4 Air and Noise

Air Quality

It is worth mentioning that our team initially attempted to collect data on sulfur oxides (SOx) and nitrogen oxides (NOx) during the first day of fieldwork but recorded zero concentrations for both pollutants. We decided not to continue to collect data for SOx and NOx on the next field visit. SOx and NOx are significant contributors to air pollution and can have adverse effects on human health and the environment. The absence of detectable concentrations of these pollutants at the site is indeed an interesting finding and suggests that the air quality in that specific location is exceptionally clean and pristine.

Monitoring Locations

The air quality and noise levels were monitored at the following two locations in Figure 6.12 below:

Location 1 – shown as EDTL 13

Location 2 – shown as Proposed Location 2

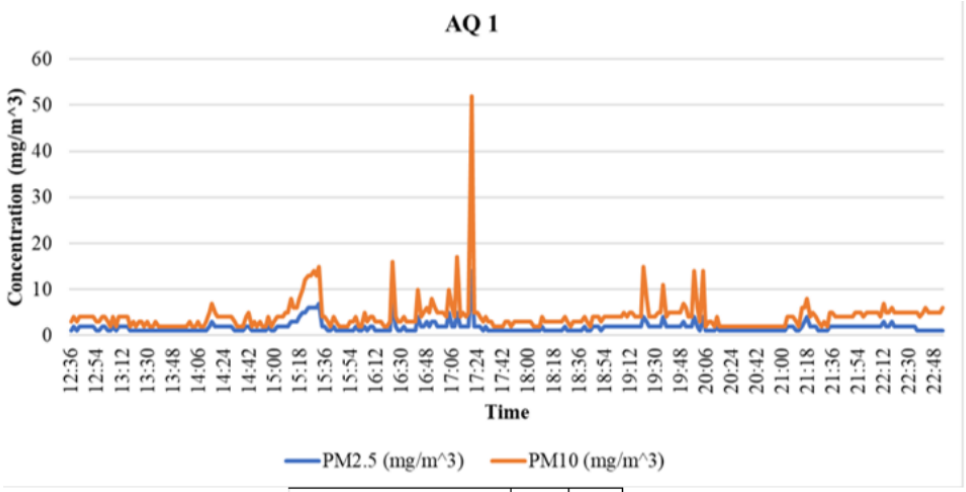
Air Quality – Day 1

Figures 6.13 and 6.14 illustrate the overall trends in air quality at AQ1 and AQ4, respectively. At AQ1, the mean concentration for PM2.5 is calculated at 1.76 mg/m³ with a standard deviation of 1.24 mg/m³, while for PM10, the mean concentration stands at 2.47 mg/m³ with a standard deviation of 2.57 mg/m³. At AQ4, the mean concentration for PM2.5 is calculated at 3.78 mg/m³ with a standard deviation of 3.95 mg/m³, while for PM10, the mean concentration stands at 4.20 mg/m³ with a standard deviation of 3.50 mg/m³. Most of the data indicated by twice the standard deviation (representing the 95% upper boundary) are as follows: At AQ1, air quality concentrations typically remain below 4.24 mg/m³ for PM2.5 and below 7.61 mg/m³ for

Figure 6.12 – Monitoring Locations for ambient Air Quality and Noise Monitoring

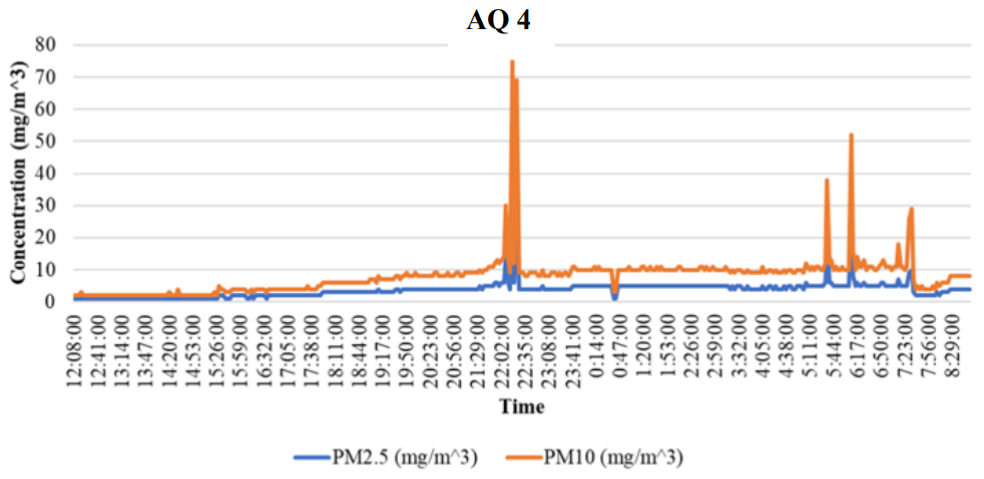
PM10. At AQ4, air quality concentrations typically remain below 9.68 mg/m³ for PM2.5 and below 11.19 mg/m³ for PM10.

Figure 6.13 – Overall trends in air quality at AQ1



	PM2.5	PM10
Mean	1.76	2.47
Standard Deviation	1.24	2.57
95% Upper Boundary	4.25	7.61

Figure 6.14 – Overall trends in air quality at AQ4



	PM2.5	PM10
Mean	3.78	4.20
Standard Deviation	2.95	3.50
95% Upper Boundary	9.68	11.19

Based on the boxplot of air quality observed at day 1, we have an outlier in the distribution of the data. If Air Quality is greater than Quartiles 3 + 1.5 x IQR then concentration is an outlier. An outlier is an abnormal concentration of the air quality that does not reflect overall PM 2.5 and PM 10 concentration but at an extreme value that is caused by specific event during data collection. For AQ 1, concentration of PM 2.5 greater than 3.5 mg/m³ and PM 10 greater than 6 mg/m³ is considered and outlier.

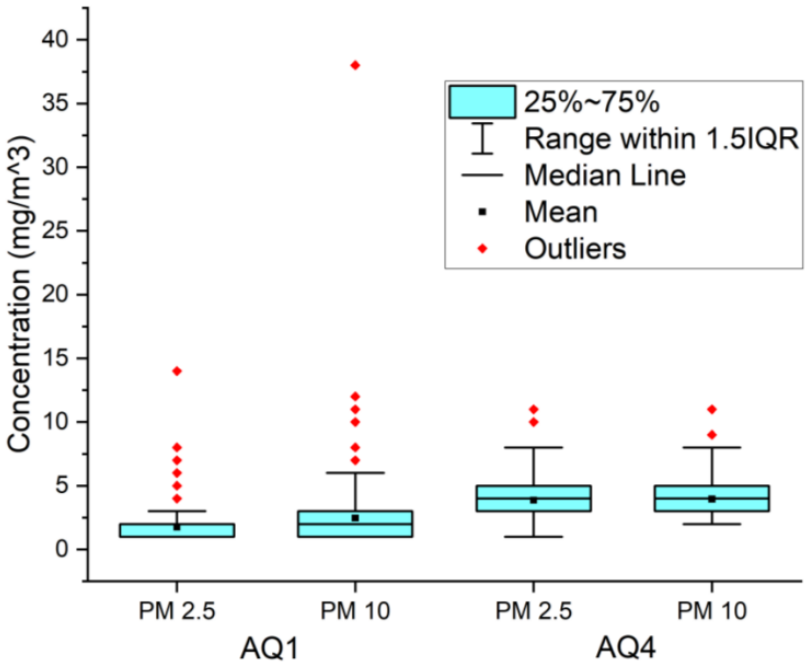
Similarly, for AQ 4 concentration of PM 2.5 greater than 8 mg/m³ and PM 10 greater than 8 mg/m³ is considered and outlier.

At AQ1, outliers are suspected to have been correlated with heavy smoke from passing vehicles or occasional smoke from travelers parking near the air quality equipment. At AQ4, outliers are related to dust and smoke resulting from windy conditions, as well as occasional smoke from the local community going to the beach who passes near the equipment.

Table 6.1: Number summary of Air Quality at Day 1

	AQ1 (mg/m³)		AQ4 (mg/m³)	
	PM2.5	**PM10**	**PM2.5**	**PM10**
Minimum	1	1	1	2
Quartiles 1	1	1	3	3
Quartiles 2	2	2	4	4
Quartiles 3	2	3	5	5
Maximum	14	38	11	11
Interquartile Range (IQR)	1	2	2	2
1.5 x IQR	1.5	3	3	3
Quartile 3 + 1.5x IQR	3.5	6	8	8

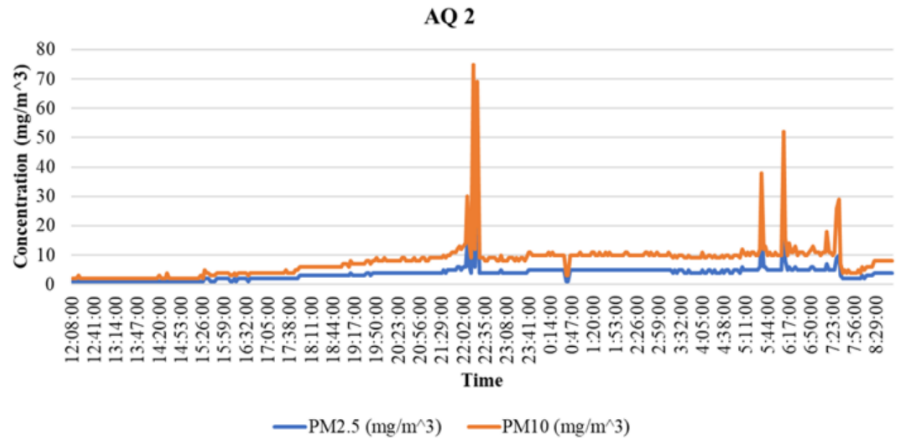
Figure 6.15 – Box Plots for Air Quality



Air Quality – Day 2

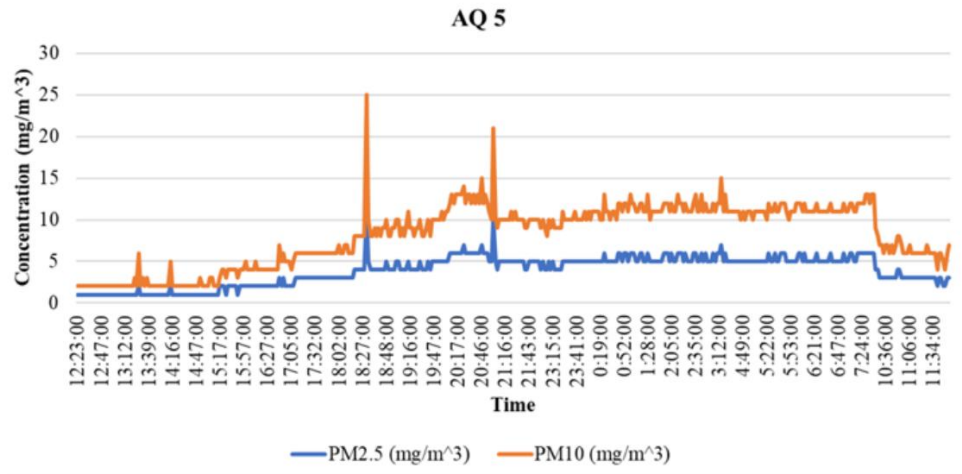
Figures 6.16 and 6.17 illustrate the overall trends in air quality at AQ2 and AQ5, respectively. In AQ 2, the mean concentrations are 3.78 mg/m³ for PM2.5 and 4.20 mg/m³ for PM10. The standard deviations are 2.95 and 3.50 for PM2.5 and PM10, respectively. The 95% upper boundaries, which provide a range within which 95% of the data is expected to fall, are 9.68 mg/m³ for PM2.5 and 11.19 mg/m³ for PM10. For AQ 5, the mean concentrations are slightly higher, with values of 3.88 mg/m³ for PM2.5 and 4.29 mg/m³ for PM10. The standard deviations are lower than those of AQ 2, standing at 1.78 for PM2.5 and 2.01 for PM10. The 95% upper boundaries for AQ 5 are 7.44 mg/m³ for PM2.5 and 8.30 mg/m³ for PM10.

Figure 6.16 – Overall trends in air quality at AQ2



	PM2.5	PM10
Mean	3.78	4.20
Standard Deviation	2.95	3.50
95% Upper Boundary	9.68	11.19

Figure 6.17 – Overall trends in air quality at AQ5



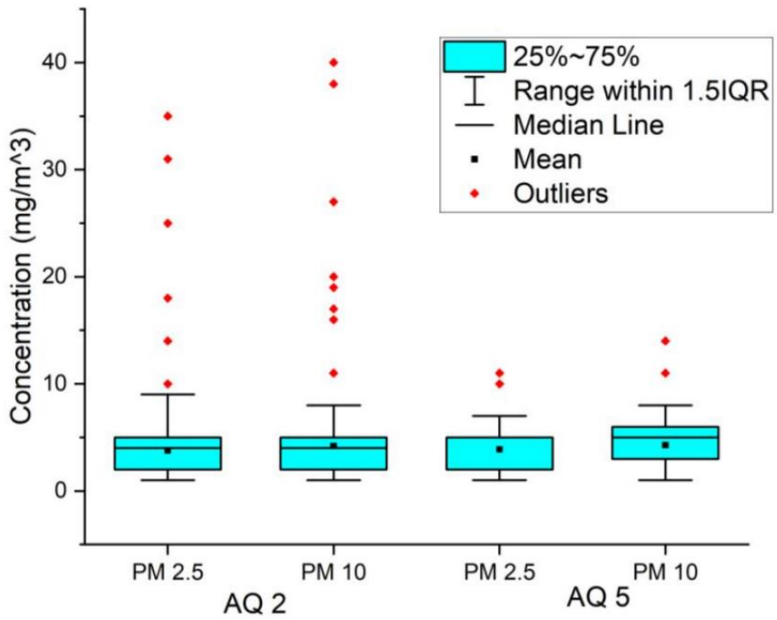
	PM2.5	PM10
Mean	3.88	4.29
Standard Deviation	1.78	2.01
95% Upper Boundary	7.44	8.30

Like day 1, particulate matter concentrations at day 2 also show outliers. The outliers are caused by similar occurrences as described in day 1. For AQ 2, concentration of PM 2.5 greater than 9.5 mg/m³ and PM 10 greater than 9.5 mg/m³ is considered and outlier. Similarly, for AQ 4 concentration of PM 2.5 greater than 8 mg/m³ and PM 10 greater than 10.5 mg/m³ is considered and outlier.

Table 6.2: Number summary of Air Quality at Day 2

	AQ1 (mg/m³)		AQ4 (mg/m³)	
	PM2.5	**PM10**	**PM2.5**	**PM10**
Minimum	1	1	1	1
Quartiles 1	2	2	2	3
Quartiles 2	4	4	5	5
Quartiles 3	5	5	5	6
Maximum	35	40	11	14
Interquartile Range (IQR)	3	3	3	3
1.5 x IQR	4.5	4.5	4.5	4.5
Quartile 3 + 1.5x IQR	9.5	9.5	9.5	10.5

Figure 6.18 – Box Plots for Air Quality at day 2

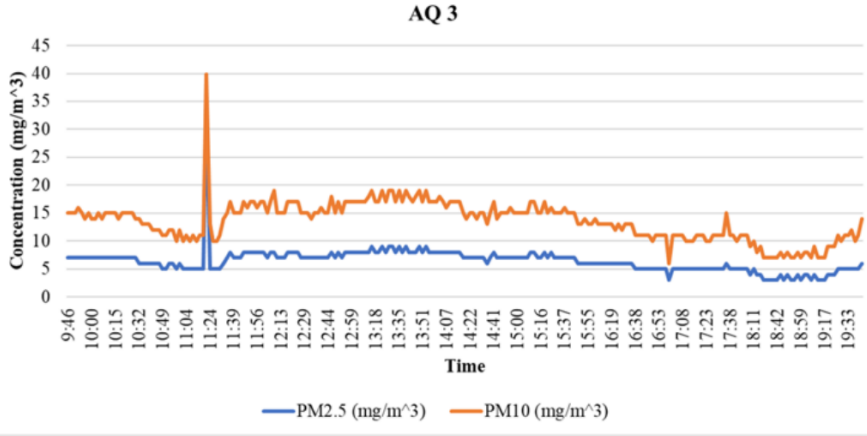


Air Quality – Day 3

On day 3 (figures 6.19 and 6.20), air quality data reveals notable distinctions between AQ3 and AQ6. For AQ3, the mean concentrations are 6.41 mg/m³ for PM2.5 and 7.18 mg/m³ for PM10, with standard deviations of 2.40 and 1.71, respectively. The 95% upper boundaries are 11.21 mg/m³ for PM2.5 and 10.59 mg/m³ for PM10. In contrast, AQ6 displays lower mean concentrations, with values of 5.27 mg/m³ for PM2.5 and 6.05 mg/m³ for PM10. The standard deviations for AQ6 are also lower, standing at 1.71 for PM2.5 and 1.91 for PM10. The 95% upper boundaries for AQ6 are 8.69 mg/m³ for PM2.5 and 9.87 mg/m³ for PM10.

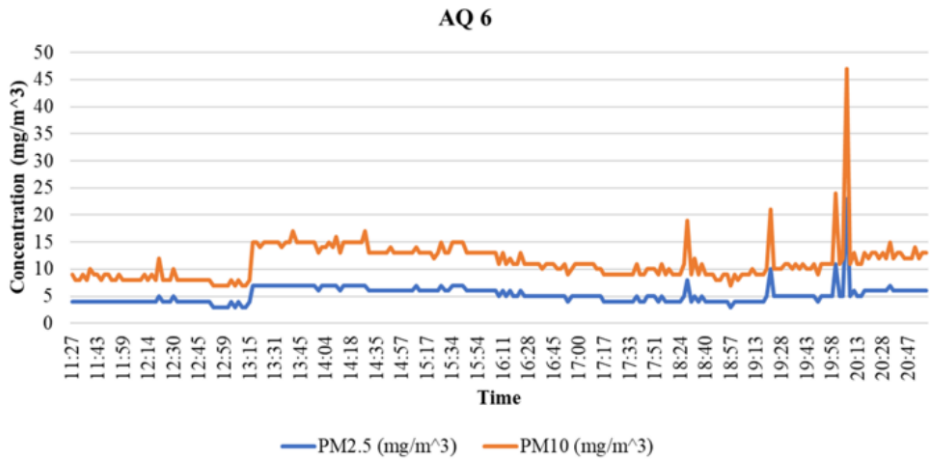
The 95% upper boundaries provide a range within which we can expect 95% of the data to fall. In AQ3, the 95% upper boundary for PM2.5 is 11.21 mg/m³. This means that, under normal circumstances, 95% of the observed PM2.5 concentrations would be expected to be below this value.

Figure 6.19 – Overall trends in air quality at AQ3



	PM2.5	PM10
Mean	6.41	7.18
Standard Deviation	2.40	1.71
95% Upper Boundary	11.21	10.59

Figure 6.20 – Overall trends in air quality at AQ6



	PM2.5	PM10
Mean	5.27	6.05
Standard Deviation	1.71	1.91
95% Upper Boundary	8.69	9.87

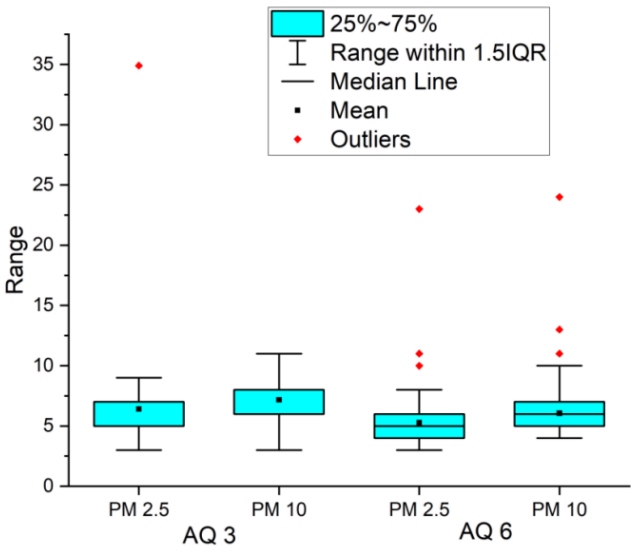
Like day 1 and day 2, concentration of particulate matter collected also shows outliers but not as intense. As we can see from figure 28, outliers (represented by red square) are not as many as compared to day 1 and day 2 outliers. This might be because day is only observed for 12-hr period and has less data points or the air quality on that day was somehow consistent overall.

For AQ 3, concentration of PM 2.5 greater than 10 mg/m³ and PM 10 greater than 11 mg/m³ is considered and outlier. Similarly, for AQ 6 concentration of PM 2.5 greater than 9 mg/m³ and PM 10 greater than 10 mg/m³ is considered and outlier.

Table 6.3: Number summary of Air Quality at Day 3

	AQ3 (mg/m³)		AQ6 (mg/m³)	
	PM2.5	**PM10**	**PM2.5**	**PM10**
Minimum	3	3	3	4
Quartiles 1	5	6	4	5
Quartiles 2	7	8	5	6
Quartiles 3	7	8	6	7
Maximum	34.9	11	23	24
Interquartile Range (IQR)	2	2	2	2
1.5 x IQR	3	3	3	3
Quartile 3 + 1.5x IQR	10	11	9	10

Figure 6.21– Box Plots for Air Quality at Day 3



Looking at the progression of PM2.5 concentrations over the three days, AQ1 recorded a mean concentration of 1.76 mg/m³, AQ2 had a mean of 3.78 mg/m³, and AQ3 showed a higher mean of 6.41 mg/m³. Despite the increase, all three days remained significantly below the IFC/WHO interim target of 25 mg/m³, indicating consistently favorable air quality. The PM10 concentrations displayed a similar pattern, with AQ1, AQ2 and AQ3 reporting means of 2.47 mg/m³, 4.20 mg/m³, and 7.18 mg/m³, respectively—all below the IFC/WHO interim target of 50 mg/m³.

Comparing the two locations, AQ1 at EDTL 13 and AQ4 at Proposed Location 2, the PM2.5 concentrations were 1.76 mg/m³ and 3.78 mg/m³, respectively. Both locations demonstrated concentrations well below the IFC/WHO interim target of 25 mg/m³. Similarly, the PM10 concentrations for AQ1 and AQ4 were 2.47 mg/m³ and 4.20 mg/m³, again remaining within the acceptable range.

The identification of outliers is crucial in understanding abnormal concentrations that deviate from the overall air quality patterns. On Day 1, both AQ1 and AQ4 exhibited outliers, primarily attributed to events such as heavy smoke from passing vehicles, occasional smoke from travelers parking near the air quality equipment, and dust and smoke resulting from windy conditions. Day 2 continued to show outliers in AQ2 and AQ5, associated with similar occurrences as on Day 1. However, Day 3 displayed fewer outliers in AQ3 and AQ6, possibly due to a shorter observation period or more consistent air quality during that day.

In conclusion, the air quality data analysis reveals a generally positive picture, with particulate matter concentrations consistently meeting or surpassing the IFC/WHO interim targets. The occasional outliers, while indicative of specific events affecting concentrations, do not significantly impact the general trend.

Noise

Noise Level-Day 1

Table 6.4 below shows noise level data for EDTL 13 at day 1 (NL1). When analyzing the noise level data for EDTL13 on Day 1, we observed distinct variations between nighttime and daytime periods. During the overall 24-hour period, the mean noise level was approximately 54.92 dB, with a standard deviation of 4.58 dB. Nighttime noise levels were characterized by a slightly lower mean of around 53.61 dB and a narrower range, with a minimum of 48.97 dB and a maximum of 57.97 dB.

In contrast, daytime noise levels exhibited a slightly higher mean of approximately 56.23 dB and a broader range, with a minimum of 41.77 dB and a maximum of 64.35 dB. These findings highlight the diurnal variations in noise levels, with noise being

generally quieter during nighttime hours and more variable and intense during the daytime.

Table 6.4. NL1 (EDTL13-Day 1):

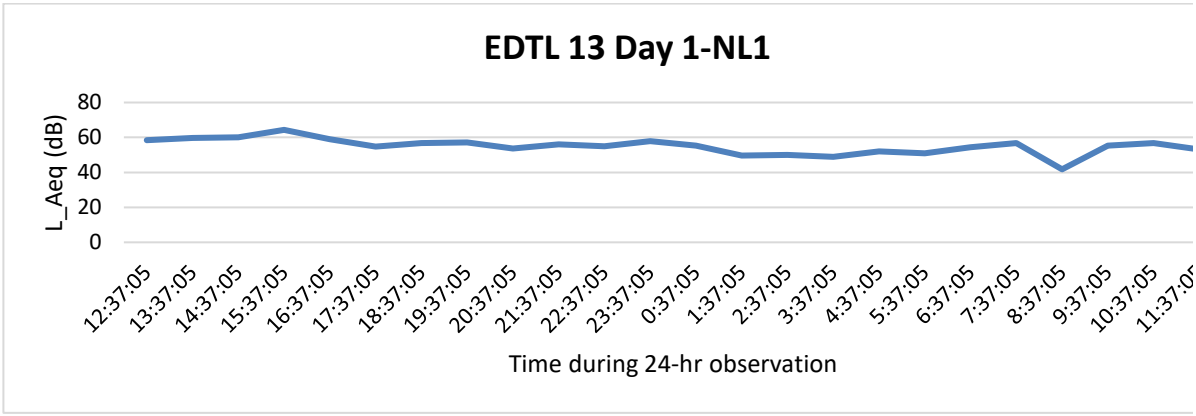
	Overall (24-hr)	Nighttime	Daytime
Mean (dB)	54.92	53.61	56.23
Median (dB)	55.38	54.25	56.81
Std. Deviation (dB)	4.58	3.18	5.48
Minimum (dB)	41.77	48.96	41.77
Maximum (dB)	64.35	57.97	64.35
Range (dB)	22.58	9.01	22.58

Table 6.5 below shows noise level data for proposed location 2 on day 1 (NL4). When analyzing the noise level data for Proposed Location 2 on Day 1, clear distinctions emerged between nighttime and daytime noise patterns. The overall mean noise level for the 24-hour period was approximately 39.87 dB, with a standard deviation of 8.21 dB. During nighttime hours, the mean noise level was lower at about 35.60 dB, displaying relative consistency, while daytime hours showed a notably higher mean noise level of approximately 44.15 dB, with greater variability. Nighttime periods also had a narrower range of noise levels, ranging from 27.77 dB to 46.84 dB, whereas daytime levels spanned from 33.37 dB to 58.99 dB. This analysis underscores the diurnal variations in noise levels, highlighting quieter nights and more variable, intense noise during the day.

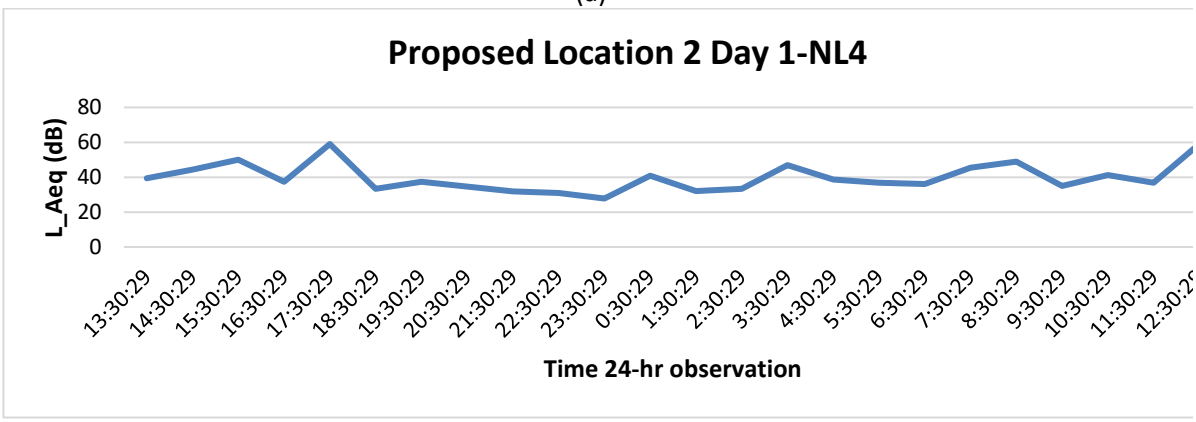
Table 6.5. NL4 (Proposed Location 2-Day 1)

	Overall (24-hr)	Nighttime	Daytime
Mean (dB)	39.87	35.60	44.15
Median (dB)	37.35	35.33	42.79
Std. Deviation (dB)	8.21	5.08	8.67
Minimum (dB)	27.77	27.77	33.37
Maximum (dB)	59.00	46.84	59.00
Range (dB)	31.23	19.07	25.63

Figure 6.22 indicates that EDTL13 exhibits a consistently higher noise level over a 24-hour observation period in comparison to proposed location 2. Additionally, it is evident that EDTL13 displays less variation, with a standard deviation of 4.58 dB, whereas proposed location 2 demonstrates considerably greater variability with a standard deviation of 8.21 dB. The lower variation observed in EDTL13 can be attributed to its proximity to a main road, which experiences a constant flow of vehicle traffic. In contrast, proposed location 2 is situated far from the main road, where vehicle traffic is infrequent, and other sources of noise, such as animal sounds and people cutting tree branches, contribute to the greater variability in noise levels.



(a)



(b)

Figure 6.22. Noise Level at Day 1-NL1 and NL4

The analysis reveals that noise levels at EDTL13 frequently surpass the IFC guidelines of 55 dB during daytime hours. In contrast, Proposed Location 2 consistently maintains lower noise levels, aligning with the IFC daytime guidelines. During nighttime hours, noise levels at EDTL13 consistently exceed the IFC guidelines, while Proposed Location 2 maintains significantly lower noise levels, adhering to the IFC guidelines. It is important to note that these IFC guidelines are designed to ensure that the noise impact of a specific project on residential and commercial areas does not exceed 45 dB during nighttime and 55 dB during daytime. Given that the data collected is intended to establish a baseline for noise levels, it does not violate any regulatory standards. Furthermore, it's worth mentioning that the noise levels at EDTL13 that exceed the IFC guidelines are primarily attributed to vehicle traffic rather than the project itself.

Noise Level-Day 2

Table 6.6 below presents noise level data for EDTL13 on day 2 (NL2). When analyzing the noise level data for EDTL13 on Day 2, we observed notable distinctions between nighttime and daytime periods. Over the entire 24-hour span, the mean noise level stood at approximately 53.64 dB, with a standard deviation of 5.94 dB. During the nighttime hours, noise levels exhibited a slightly lower mean of around 50.82 dB,

accompanied by a narrower range, with a minimum of 35.04 dB and a maximum of 58.59 dB. In contrast, daytime noise levels showed a slightly higher mean of approximately 56.45 dB and a broader range, with a minimum of 53.13 dB and a maximum of 59.60 dB.

Table 6.6. NL2 (EDTL13-Day 2)

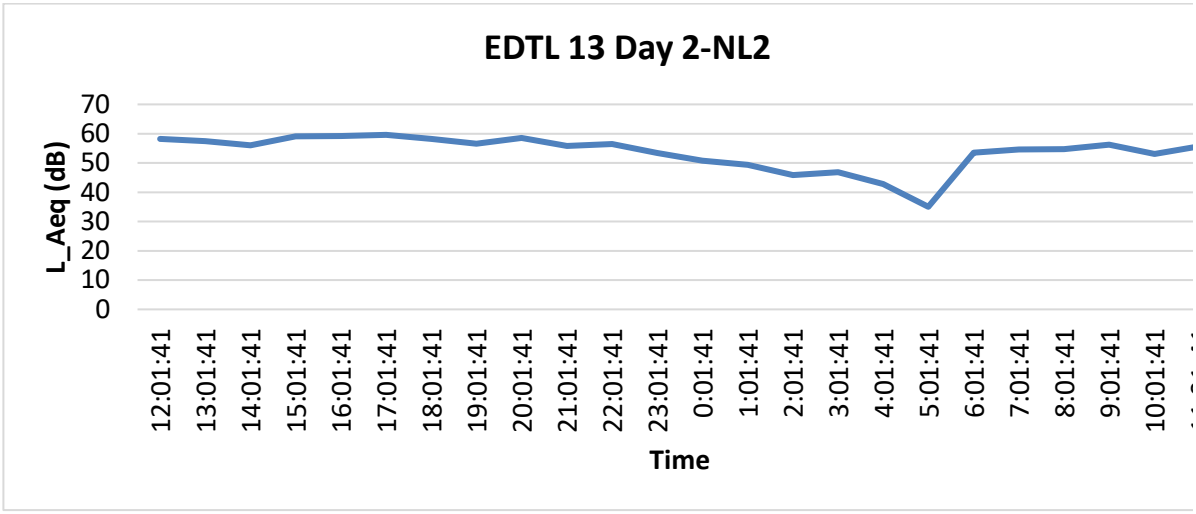
	Overall (24-hr)	Nighttime	Daytime
Mean (dB)	53.64	50.82	56.45
Median (dB)	55.74	52.09	56.10
Std. Deviation (dB)	5.94	7.18	2.24
Minimum (dB)	35.04	35.04	53.13
Maximum (dB)	59.60	58.59	59.60
Range	24.56	23.55	6.47

Table 6.7 below presents noise level data for Proposed Location 2 on day 2 (NL2-PL2). When analyzing the noise level data for Proposed Location 2 on Day 2, we observed notable distinctions between nighttime and daytime periods as well. Over the entire 24-hour period, the mean noise level was approximately 43.61 dB, with a standard deviation of 10.21 dB. During the nighttime hours, noise levels had a slightly lower mean of around 39.09 dB, accompanied by a narrower range, featuring a minimum of 31.94 dB and a maximum of 53.95 dB.

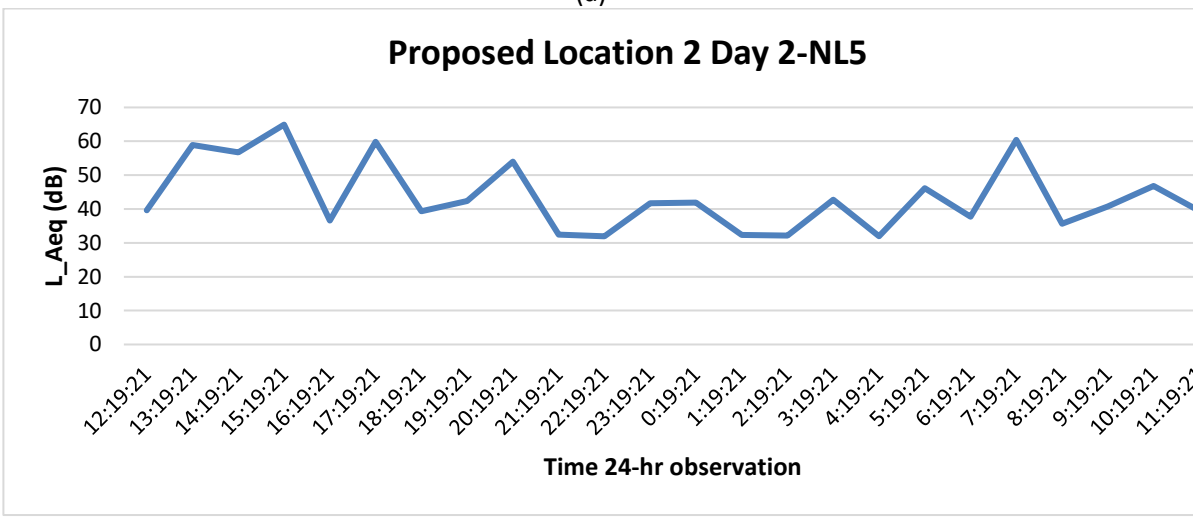
In contrast, daytime noise levels showed a slightly higher mean of approximately 48.13 dB and a broader range, with a minimum of 35.68 dB and a maximum of 64.92 dB. These findings emphasize the diurnal variations in noise levels at Proposed Location 2, with nighttime hours generally experiencing quieter conditions and daytime hours characterized by greater variability and heightened noise levels.

Table 6.7. NL5 (Proposed Location 2-Day 2)

	Overall (24 hr)	Nighttime	Daytime
Mean (dB)	43.61	39.09	48.13
Median (dB)	41.23	40.55	43.78
Std. Deviation (dB)	10.21	7.06	11.10
Minimum (dB)	31.94	31.94	35.68
Maximum (dB)	64.92	53.95	64.92
Range (dB)	32.97	22.00	29.23



(a)



(b)

Figure 6.23. Noise Level at Day 2-NL2 and NL5

Figure 6.23 reveals distinct noise level differences between EDTL13 and Proposed Location 2. EDTL13 records a consistently higher mean noise level, approximately 53.64 dB, compared to Proposed Location 2, which reports a lower mean of about 43.61 dB. Nighttime noise levels at EDTL13 are comparatively higher, with a mean of around 50.82 dB, while Proposed Location 2 boasts quieter nighttime conditions with a mean of approximately 39.09 dB.

In the daytime, EDTL13 exhibits a mean noise level of roughly 56.45 dB, whereas Proposed Location 2 maintains a lower mean of about 48.13 dB. The standard deviation in EDTL13 is notably lower, at 5.94 dB, indicating less variability in noise levels. This variability is consistent with day 1 data. Lower variation in EDTL13 can be attributed to its proximity to a main road with constant vehicle traffic. In contrast, Proposed Location 2, situated farther from the main road, experiences infrequent vehicle traffic and higher variability in noise levels.

EDTL13 demonstrates nighttime noise levels with a mean of approximately 50.82 dB, which comfortably falls below the IFC guideline for nighttime noise (55 dB), suggesting compliance with these standards. Its daytime noise levels, though slightly exceeding the guideline, align with the understanding that this data serves as a baseline, not indicating a violation of regulatory standards.

In contrast, Proposed Location 2 maintains quiet nighttime conditions with a mean of around 39.09 dB, well below the IFC nighttime guideline. Its daytime noise levels, with a mean of approximately 48.13 dB, also adhere to the IFC guidelines. Both locations, therefore, exhibit noise levels that are in line with the IFC standards, with Proposed Location 2 consistently meeting the guidelines for both nighttime and daytime noise levels.

Noise Level-Day 3

Unlike day 1 and day 2 noise level data, day 3 noise level is only observed for 12-hr period. Table 6.8 presents the noise level data for EDTL13 on Day 3 (NL3). When evaluating the noise data for EDTL13 on Day 3, distinct differences between nighttime and daytime periods become evident. Over the entire 24-hour duration, the mean noise level registers at approximately 57.06 dB, accompanied by a standard deviation of 4.89 dB.

During the nighttime hours, the noise levels are characterized by a slightly higher mean of around 61.33 dB and a more confined range, with a minimum of 57.14 dB and a maximum of 68.84 dB. Conversely, daytime noise levels exhibit a slightly lower mean of approximately 55.64 dB and a broader range, with a minimum of 49.26 dB and a maximum of 62.22 dB. These findings underscore the diurnal variations in noise levels at EDTL13, with nighttime hours being noisier yet less variable and daytime hours showing quieter conditions but with increased variability.

Table 6.8. NL3 (EDTL13-Day 3)

	Overall (12 hr)	Nighttime	Daytime
Mean (dB)	57.06	61.33	55.64
Median (dB)	56.51	58.00	55.46
Std. Deviation (dB)	4.89	6.52	3.63
Minimum (dB)	49.26	57.14	49.26
Maximum (dB)	68.84	68.84	62.22
Range (dB)	19.58	11.69	12.96

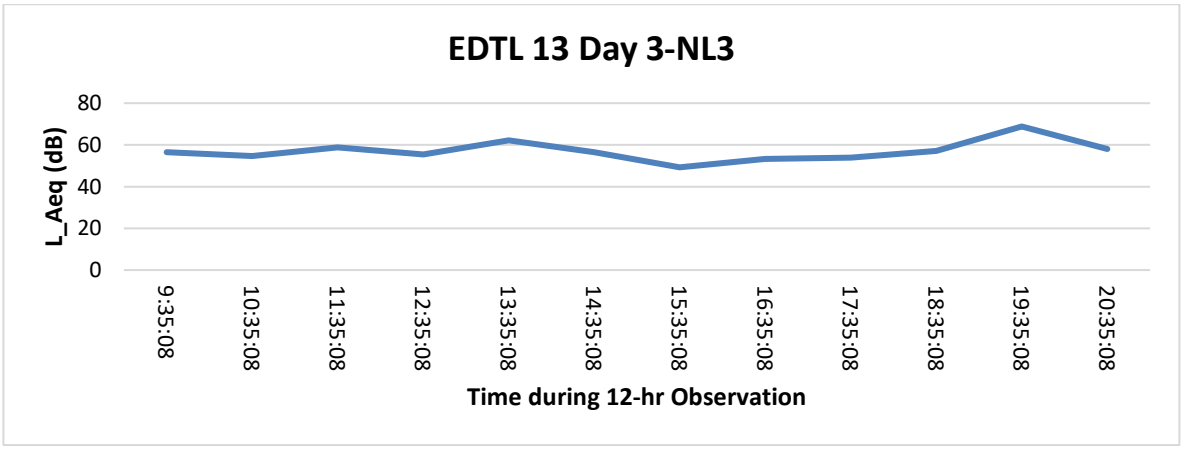
Table 6.9 provides the noise level data for Proposed Location 2 on Day 3 (NL3-PL2). Analyzing the noise data for Proposed Location 2 on Day 3, significant differences between nighttime and daytime periods become apparent. Over the 12-hour period,

the mean noise level is approximately 44.26 dB, with a standard deviation of 9.03 dB, indicating moderate variability. During the nighttime hours, the noise levels are characterized by a lower mean of about 40.27 dB and a narrower range, with a minimum of 34.53 dB and a maximum of 46.01 dB.

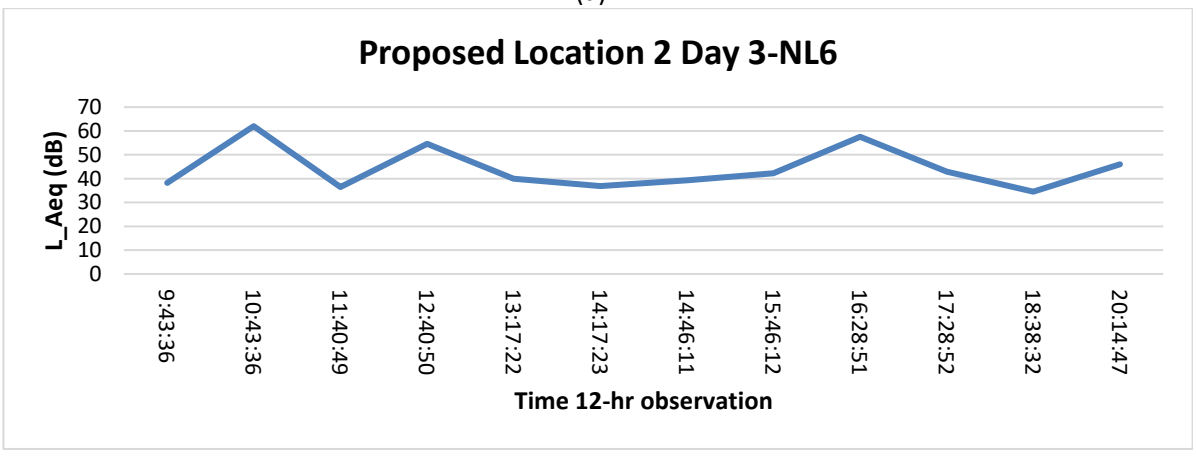
Conversely, daytime noise levels exhibit a slightly higher mean of approximately 45.06 dB and a broader range, with a minimum of 36.43 dB and a maximum of 62.00 dB. These findings highlight the diurnal variations in noise levels at Proposed Location 2, with nighttime hours generally being quieter and less variable, while daytime hours are noisier and more variable, showcasing the contrast in noise characteristics throughout the 12-hour day.

Table 6.9. NL6 (Proposed Location 2-Day 3)

	Overall (12 hr)	Nighttime	Daytime
Mean (dB)	44.26	40.27	45.06
Median (dB)	41.16	40.27	41.16
Std. Deviation (dB)	9.03	8.12	9.38
Minimum (dB)	34.53	34.53	36.43
Maximum (dB)	62.00	46.01	62.00
Range (dB)	27.47	11.48	25.57



(a)



(b)

Figure 6.24. Noise Level at Day 3-NL3 and NL6

EDTL13 records a mean nighttime noise level of approximately 61.33 dB, notably exceeding the IFC nighttime guideline of 55 dB, indicating non-compliance during nighttime hours. Conversely, its daytime mean noise level, around 55.64 dB, falls within the IFC daytime guideline of 55 dB, demonstrating adherence during the daytime. In contrast, Proposed Location 2 maintains peaceful nighttime conditions with a mean noise level of approximately 40.27 dB, well below the IFC nighttime guideline of 55 dB, showcasing compliance during nighttime hours. Its daytime mean noise level, approximately 45.06 dB, aligns with the IFC daytime guideline of 55 dB, indicating consistency with IFC standards throughout the day.

In summary, on Day 3, EDTL13 exhibits non-compliance with the IFC guideline for nighttime noise levels but adheres to the guideline during the daytime. In contrast, Proposed Location 2 consistently meets IFC standards for both nighttime and daytime noise levels, ensuring that noise levels align with recommendations for residential and commercial areas.

To summarize and compare between different days:

- **Day 1:**

  EDTL13: On Day 1, EDTL13 experienced a mean noise level of approximately 53.64 dB over the 24-hour period. During nighttime, the mean noise level was 50.82 dB, and during daytime, it was 56.45 dB. Nighttime noise levels were quieter compared to daytime, showing a clear diurnal pattern.

  Proposed Location 2: On the same day, Proposed Location 2 exhibited a lower mean noise level of approximately 43.61 dB. Nighttime noise levels were quieter at 39.09 dB, while daytime levels were at 48.13 dB. Like EDTL13, daytime noise levels at Proposed Location 2 exceeded nighttime levels.

- **Day 2:**

  EDTL13: On Day 2, EDTL13 recorded a mean noise level of approximately 53.64 dB over the 24-hour period. During nighttime, the mean was 50.82 dB, and during daytime, it was 56.45 dB, following the same diurnal pattern as Day 1.

  Proposed Location 2: On Day 2, Proposed Location 2 displayed a lower mean noise level of approximately 43.61 dB. Nighttime noise levels were quieter at 39.09 dB, while daytime levels were at 48.13 dB, mirroring the pattern observed on Day 1.

- **Day 3:**

EDTL13: On Day 3, EDTL13 had a mean noise level of approximately 57.06 dB over the 12-hour period. Nighttime noise levels increased to 61.33 dB, while daytime levels were 55.64 dB, indicating noisier nighttime conditions.

Proposed Location 2: On the same day, Proposed Location 2 recorded a mean noise level of approximately 44.26 dB over the 12-hour period. Nighttime noise levels were quieter at 40.27 dB, and daytime levels were at 45.06 dB, showing a similar diurnal pattern to Day 2.

In summary, the comparisons reveal that EDTL13 consistently experienced higher noise levels than Proposed Location 2 across all three days. Daytime noise levels were generally noisier compared to nighttime at both locations, and the extent of daytime noise variation was higher at EDTL13. However, it's essential to note that on Day 3, EDTL13 experienced nighttime noise levels that exceeded the IFC guideline, while Proposed Location 2 consistently met the IFC standards for both nighttime and daytime noise levels.

6.1.5 Surface and Ground water

Surface Water

Water sampling was conducted by the Halona Serena field survey team at the "AITEAS" and "We-Lu" Springs, which greatly helped in understanding the environmental health of these vital water sources and contribute to the safeguarding of the local ecology. These Springs are located outside the boundary of the project site as seen in Figure 6.12 above. In the past, Spring water was used drinking purposes by the local community but since recent times, it has not been used for drinking purposes as local communities now have water directly pumped into their homes.

Table 6.10: – Coordinates for Surface water sampling

Location	Latitude	Longitude
Aiteas Spring	8 ° 31′ 15.79320" S	126° 8 ′ 36.19" E
We-Lu Spring	8 ° 31′ 2.54670" S	126° 8 ′ 30.43" E

These Springs are situated beyond the project boundary (approximately 300 meters uphill), and this geographical location is clearly illustrated in Figure 6.12 above. Due to their placement outside the defined project area, these springs will not pose any obstacles or hindrances to the implementation of the construction plan for the project. Thus, other, the project's development and construction activities will not be affected

by the presence of these springs since they are located beyond the project's designated boundaries.

The selected parameters to be analyzed for each water source include Conductivity, Total Suspended Solid (TSS), pH, Total Nitrogen, Total Phosphorus, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Dissolved Oxygen (DO), and Total Coliform. By rigorously evaluating these parameters, the study aims to comprehensively assess the quality of surface water resources.

As per IFC-EHS standards, discharge of water utility to groundwater and surface water should not result in contamination higher than local water quality. Table 6.11 outlines several important water quality parameters that are used to indicate allowable for discharging to ground and surface water. It is also important to note that some standards like using CFU for measuring of micro bacteria in water to correlate with IFC-EHS standard 1CFU = 1 MPN. In addition, IFC-EHS also emphasizes that temperature of wastewater prior to discharge does not result in an increase greater than 3°C of ambient temperature.

Both springs have TSS levels significantly below the IFC guideline value of 50 mg/L. This indicates low levels of suspended solids in the water, suggesting good water clarity. The pH values for both springs are within the IFC recommended range of 6-9, indicating water quality suitable for various aquatic life forms. Nutrients (Total Nitrogen and Total Phosphorus), both springs have nutrient levels well below the IFC guideline values of 10 mg/L for total nitrogen and 2 mg/L for total phosphorus. This is positive for preventing eutrophication.

Both springs have BOD and COD values significantly below the IFC guideline values of 30 mg/L and 125 mg/L, respectively. Low BOD and COD levels indicate minimal organic pollution in the water. The total coliform count for Aiteas Spring is well below the IFC guideline of 400 CFU/100 mL. However, We-Lu Spring exceeds this guideline.

Table 6.11: – Laboratory Result of Surface Water Parameter for Aiteas and We-Lu Spring

Parameter	Unit	We-Lu Spring	Aiteas Spring	IFC Guidelines	Notes
Conductivity	µS/cm	1058	1144	<1500	Below
Total Suspended Solid (TSS)	mg/L	3	7.5	50	Below
pH	-	8.1	8	6-9	Acceptable

Total Nitrogen	mg/L	0.76	0.54	10	Below
Total Phosphorus	mg/L	0.023	0.011	2	Below
Biological Oxygen Demand (BOD)	mg/L	2.90	3.08	30	Below
Chemical Oxygen Demand (COD)	mg/L	3.28	3.43	125	Below
Dissolved Oxygen (DO)	mg/L	7.62	7.71	>9	Below
Total Coliform	CFU/100 mL	1300	<18	400	Above

Both springs generally meet or surpass the IFC guideline values for treated sanitary sewage discharge for most parameters. The primary concern is the high total coliform count in We-Lu Spring, indicating potential microbial contamination. As both springs are located outside the proposed project area. The water parameters here are presented as baseline. High total coliform in We-Lu spring is of no concern relative to construction plan and development of the project.

Ground water

No ground water sampling and testing has been conducted so far since no ground water wells/bores are present in the project area at present. However, prior to commencement of construction, it shall be ensured that as a part of establishment of the pre-construction baseline, ground water sampling in the project site is conducted.

Furthermore, as mentioned earlier, the underlain geological formation in Manatuto municipality is the Quarternary River Valley Alluvium (Qa), a shallow formation about 1 to 10 metres deep deposited by river water. From a hydrogeological standpoint, inter-granular groundwater flow is likely to be high but the small horizontal and vertical scopes of the aquifer limit the potential groundwater yield. Higher groundwater yield may be found in this type of aquifer when the aquifer is interacting with larger ones.

6.1.6 Coastal and Sea Water

Sea water quality is generally good in many areas based on observation but heavy rains in the wet season result in large quantities of nutrients, silt, soil and gravel being released into rivers and transported to the coast as a result of removal of vegetation from land due to poor farming practices and illegal logging. This results in poor coastal water quality, particularly near the estuaries of rivers, and brown sediment plumes can

be observed many hundreds of meters out to sea and up and down the coasts. This potentially has severe effects on corals and the coastal reef communities in those areas. Rains also erode nutrients, silt and soil from areas where vegetation has been removed along the coast but these materials are often retained within the mangrove communities and salt flats that proliferate along the coast.

6.1.7 Soil

The geotechnical assessment shows that the alignment traverses several soil types; scaly clay, river terrace deposits and alluvial sediments, through very condensed gravel and sand sequences. The fluvial fan is mainly composed of coarse (gravel and sand) granular deposits. In the high mountain area, the soil is underlain by Aitutu Formation and talus deposits.

Timor-Leste is unique among the major islands of the Sunda archipelago in that it is not of volcanic origin. Timor-Leste is a continental fragment, composed largely of limestone and other sedimentary deposits. The island is geologically young, with steep and unstable slopes, deep valleys and prone to flash floods.

A detailed geotechnical investigation on the proposed site was conducted that showed that the site consists of ‘*’Very stiff to hard dark brown Lean CLAY with Sand (CL) with low plasticity / Medium dense to very dense dark brownish grey Silty fine to coarse SAND with Gravel (SM) / Medium dense to very dense dark greyish brown Sandy SILT with Gravel (ML) with low plasticity up to maximum exploration depths +5 m”*.

6.1.8 Data collection Methodology

Flora and Fauna

The ecological surveys to collect the required data on flora and fauna present in the project area were conducted through direct observation of the project site, allowing the field survey team of Halona Serena to carefully identify and capture images of the diverse aquatic and terrestrial flora and fauna present in the area. The field team also carefully observed the natural habitat and documented the different types and species of aquatic plants and animals thriving in the water bodies. They also explored the terrestrial landscape, recording the various flora and fauna, including mammals and birds.

For the assessment of marine flora and fauna, direct underwater observation was not part of the methodology. Instead, data was gathered by engaging with the local population and local fishermen through collaboration with these stakeholders to collect

valuable information and insights related to marine life, including species, habitats, and ecological characteristics in the Laleia area.

Ecological surveys for marine flora were carried out primarily through visual observations and by conducting interviews with local community members and fishermen residing along the shoreline.

In addition, extensive review and analysis of existing environmental reports and government records, scientific publications and community-generated data relevant to the study area were conducted. This desk research provided historical context and baseline ecological information, aiding in the preparation of the ecological assessment and also helped identify any previous environmental concerns, potentially sensitive areas and local species of significance.

Through this hands-on approach, valuable insights were gained into the ecological diversity and richness of the project site. The collected images served as a visual record, showcasing the vibrant biodiversity and highlighting species of special importance within the area.

Air Quality

For the comprehensive assessment of air quality, the handheld HT9600 Air Quality Monitor Detector Humidity and Temperature Meter Tester was used, renowned for its versatility and multifunctionality. This state-of-the-art device allowed the field data collection team to gather critical air particle data, including measurements of PM2.5 and PM10, temperature, and humidity levels. The HT9600's exceptional performance was evident in its wide test ranges, spanning from 0 to 1000 $\mu g/m^3$, enabling precise and accurate readings across a broad spectrum of air quality conditions.

An inherent advantage of the HT9600 lies in its high efficiency, delivering not only exceptional measurement precision but also maintaining stable performance throughout our data collection process. The device's user-friendly design facilitated seamless operation, ensuring ease of use for our data collection team. With the aid of the HT9600 Air Quality Monitor Detector, we gained valuable insights into the concentrations of fine particulate matter (PM2.5 and PM10) as well as vital meteorological parameters such as temperature and humidity. Armed with this extensive air particle data, we are equipped to assess potential impacts on human health, ecosystem integrity and the environment.

The primary aim of this study is to gather sufficient data for the estimation of average concentrations of PM2.5 and PM10. The procedure encompassed the measurement

of particulate matter (PM2.5 and PM10) and the gaseous pollutants Sulfur Dioxide (SOx) and Nitric Oxide (NOx) are as follows:

- **Step 1: Equipment Setup and Calibration:** The data collection team ensured that all air quality monitoring equipment, including the handheld HT9600 Air Quality Monitor Detector, was appropriately set up and calibrated prior to each observation. Calibration checks were performed to ensure the accuracy and reliability of the measurements.
- **Step 2: Monitoring Locations:** Carefully selected monitoring locations, EDTL 13 and proposed location 2 represented key points within the solar farm project area, capturing varying environmental conditions and potential pollution sources. The sites were strategically positioned to encompass outdoor air particle settings, considering the proximity to the main road, coastal areas, and community settlements.
- **Step 3: 24-Hour Observance:** Air quality data collection was conducted over 24-hour cycles, spanning different periods during weekdays and weekends. This comprehensive approach aimed to capture diverse scenarios and temporal variations in air pollution levels.
- **Step 4: Parameters Monitored**: The data collection focused on monitoring PM2.5 and PM10 as crucial indicators of particulate matter pollution. Additionally, SOx and NOx were considered to evaluate the presence of gaseous pollutants in the project area.
- **Step 5: Continuous Monitoring**: The HT9600 Air Quality Monitor Detector enabled continuous monitoring throughout the observation periods, ensuring a continuous stream of data capturing fluctuations in pollutant levels.
- **Step 6: Analysis and Interpretation**: Collected air quality data were analyzed and interpreted, comparing them with the IFC guidelines and WHO Air Quality Guidelines. This analysis allowed us to assess potential impacts on human health, environmental integrity, and the local community.

  Currently, Timor-Leste lacks national ambient air quality standards, air quality policy, and legislation within its environmental policies. As a result, air quality assessments have typically followed international standards, such as those set by the World Health Organization (WHO) and other global organizations. Given the absence of national standards for air quality monitoring, this study adopts IFC standards as a guideline.

The IFC-EHS air quality standard is derived from WHO's Air Quality Guidelines (AQG) updated in 2005, which have served as an internationally recognized benchmark for understanding the health impacts of air pollution. Although not legally binding criteria,

AQG are expert-derived guidelines based on current scientific evidence, aimed at mitigating the health consequences of air pollution exposure.

A working group on air quality guidelines, established by WHO in October 2005, determined that no threshold level exists for air quality to be considered entirely safe without adverse health effects. Consequently, no specific guideline values can fully protect human health. Instead, AQG provides distinct guideline values for individual pollutants and outline associated health risks.

Noise

The location for noise and air particle monitoring has been thoughtfully devised to comprehensively assess the potential impacts of the solar farm project on the acoustic environment and air quality. Collaborating with the Asian Development Bank (ADB) technical experts, we secured their approval for the selection of two designated locations: EDTL13, positioned adjacent to the main road connecting Manatutu to Baucau, and proposed location 2, an area of about 200 meters from the beach. See Figure 1 above.

Having received the stamp of approval from ADB's technical experts, we proceed with data collection of these chosen locations. At EDTL13, strategically placed by the roadside, we continuously monitor the noise levels, utilizing calibrated noise equipment. This location grants us insights into the dynamics of vehicular activity and human interventions, facilitating a comprehensive evaluation of the acoustic environment in the project area. Simultaneously, at proposed location 2, nestled near the beach about 200 m, our 24-hour air quality monitoring was conducted using calibrated air particle equipment. This location's selection aligns with our commitment to understanding air particle concentrations in the vicinity of the coastal area, shedding light on potential implications for the environment and the well-being of local ecosystems.

The two designated locations for noise and air particle monitoring, EDTL13 and Proposed Location 2, have been precisely defined using geographic coordinates, as shown in table 6.12 below.

Table 6.12 Coordinates where Noise and Air Particle equipment placed

Location	Latitude	Longitude
EDTL13	$8^\circ\ 32'\ 3.60"\ S$	$126^\circ\ 8'\ 19.71"\ E$
Proposed Location 2	$8^\circ\ 30'\ 43.06"\ S$	$126^\circ\ 7'\ 58.05"\ E$

Since, noise level and air quality will be collected in the same locations they have been labeled as shown in Table 6.13 below.

Table 6.13. Label of Noise Level and Air Quality at EDTL13 and Proposed Location 2

Location	Noise Level	Air Quality
EDTL 13:	Labels	
Day 1	NL1	AQ1
Day 2	NL2	AQ2
Day 3	NL3	AQ3
Proposed Location 2		
Day 1	NL4	AQ4
Day 2	NL5	AQ5
Day 3	NL6	AQ6

The noise monitoring methodology for the solar farm project was designed to capture comprehensive data on noise levels in the project area. This involved the use of a high-precision Class 1 Lutron SL-4033SD sound level meter, which boasts a wide Measuring Range of 30 to 130 dB and a Frequency Range between 31.5 to 16 KHz. Our data collection process spanned a 24-hour cycle, enabling us to gain insights into the daytime and nighttime noise patterns.

An overview of the noise collection methodology are as follows:

Step 1: Equipment Setup and Calibration. Before commencing the noise monitoring, we ensured that the Class 1 Lutron SL-4033SD sound level meter was appropriately set up and calibrated in accordance with the manufacturer's guidelines. Calibration checks were performed to validate the accuracy of the equipment, ensuring the reliability and precision of our noise measurements.

Step 2: Selection of Monitoring Locations. Two designated locations were chosen for noise monitoring: EDTL 13, situated adjacent to the main road connecting Manatutu to Baucau, and proposed location 2, which was positioned at the exact coordinates provided. At EDTL 13, the noise sensor was placed approximately 5 meters away from the main road to capture noise levels resulting from vehicular activity and human interventions.

Step 3: Data Collection. Our noise monitoring commenced, and the Class 1 Lutron SL-4033SD sound level meter was positioned at each designated location for a 24-hour cycle. Throughout this period, the device continuously measured and recorded noise levels at regular intervals, capturing fluctuations in noise intensity throughout the day and night.

Step 4: Data Analysis. Once the data collection phase was completed, we meticulously analyzed the recorded noise measurements to derive meaningful

insights. This involved organizing the data in a tabular and graphical format, enabling us to visualize noise patterns and trends over the 24-hour cycle.

Step 5: Interpretation and Reporting. With data analysis completed, we interpreted the findings and identified key observations and trends at each monitoring location. We assessed the recorded noise levels in comparison to relevant noise standards and guidelines, such as those provided by the World Health Organization (WHO) and the International Finance Corporation (IFC).

Figure 13. Lutron SL-4033SD sound level meter.

In the absence of specific Noise Level impact standards set by the Timor-Leste government, the solar farm project will adhere to the International Finance Corporation (IFC) guidelines for noise assessment, as shown in table 3. Following IFC standards ensures a comprehensive evaluation of noise levels, potential impacts on local communities, and the environment.

Table 6.14. IFC standard for noise level assessment

	One Hour L_{Aeq} (dBA)	
Receptor	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational[55]	55	45
Industrial; commercial	70	70

The Average Equivalent Sound Level (LAeq) is the parameter that is used in the IFC standard for noise assessment. It represents the continuous average of sound levels over a specified period, usually measured in decibels (dB). LAeq provides a comprehensive and more representative assessment of noise exposure compared to instantaneous sound pressure level (SPL) measurements.

Unlike SPL, which captures the instantaneous sound intensity at a specific moment, L_{Aeq} considers sound levels over a predetermined time interval, in this case at every hour. This time-averaging approach allows for a more accurate representation of noise exposure experienced by individuals or communities over a given period, such as a 24-hour cycle or during specific activities.

$$L_{Aeq} = 10 * \log_{10}\left(\sum_{i=1}^{n}(10^{\frac{L_i}{10}}) * t_i\right)$$

$L_{Aeq} = average\ equivalent\ sound\ level$
$n = total\ number\ of\ sample\ in\ given\ period$
$L_i = noise\ level\ in\ dB\ in\ i^{th}\ sample$
$t_i = fraction\ of\ total\ sample\ time\ for\ a\ given\ period$

Surface Water

As the consultant, Halona Lda, does not possess its own water quality laboratory, the testing and analysis of collected water samples was conducted at the reputable laboratory of Autoridade Nacional Agua e Saneamento (ANAS) in Dili represented by Mr. Soares for field collection.

While ANAS I.P performed the field testing, certain key parameters such as BOD, COD, TSS, Total Phosphorus, Total Coliform, and Total Nitrogen were not locally available in Dili for quality testing. To address this, samples containing these parameters were securely sent to accredited laboratories in Indonesia, renowned for their expertise and proficiency in water quality analysis.

The essential parameters, including BOD, COD, TSS, Total Phosphorus, and Total Coliform, were tested and analyzed at the reputable UPTD Environmental laboratory, Dinas Lingkungan Hidup dan Kebersihan (DLHK). Situated in the city of Kupang, province of Nusa Tenggara Timur (NTT), Indonesia, DLHK was founded in 2016 under the auspices of the local government. The primary objective of DLHK was to support environmental initiatives within the city of Kupang, encompassing the collection and analysis of vital environmental parameters.

Table 6.15: – Methods for Surface Water Parameters Testing

Water Quality Parameter	Sample locations	Method of testing	Place of testing
Conductivity	Aiteas Spring	Conductivity Meter	ANAS I.P.
Total Suspended Solids (TSS)	We-Lu Spring	SNI 6989.31-2021	DLHK

pH		pH Meter	ANAS I.P.
Total Nitrogen		Kjeldahl	ITSN
Total Phosphorus		SNI 6989.31-2021	DLHK
Biological Oxygen Demand (BOD)		SNI 6989.72-2009	DLHK
Chemical Oxygen Demand (COD)		SNI 6989.2-2019	DLHK
Dissolved Oxygen (DO)		DO meter	ANAS I.P.
Total Coliform		Petri film	DLHK

*SNI: Standard Nacional Indonesia

For the assessment of Total Nitrogen in the surface water samples, the prestigious Institut Teknologi Sepuluh Nopember (ITS) in Surabaya, Indonesia, played a crucial role.

6.2 Ecological Components

The ecological survey was conducted through direct observation of the project site, allowing our team to meticulously identify and capture images of the diverse Terrestrial and Aquatic Flora and Fauna present in the area. The field team of ecologists carefully observed the natural habitat, documenting the different types and species of terrestrial and aquatic plants and animals thriving in the project area. They also explored the terrestrial landscape, recording the various flora and fauna, including mammals and birds.

For the assessment of marine flora and fauna, direct underwater observation was not part of the methodology. Instead, data was gathered by engaging with the local population and local fishermen. Through collaboration with these stakeholders, valuable information was collected and insights related to marine life, including species, habitats, and ecological characteristics were obtained in the Laleia area. Ecological surveys for marine flora were carried out primarily through visual observations and by conducting interviews with local community members and fishermen residing along the shoreline.

In addition, extensive review and analysis of existing environmental reports, government records, scientific publications, and community-generated data relevant to the study area was conducted. This desk research provided historical context and baseline ecological information, aiding in the ecological assessment. It will helped

identify any previous environmental concerns, potentially sensitive areas and local species of significance.

6.2.1 Protected Areas and National Parks

There are no protected areas and/or national parks in the project area of the proposed project site. The proposed site does not traverse any area of special significance from an environmental perspective, such as any protected areas, key biodiversity areas (KBA), marine protected areas (MPA) etc.

The nearest boundary of the Laleia KBA is located 2 km from the preferred site and has been reported by IBAT to contain the Javan Rusa (*Rusa timorensis*) and Sandalwood (*Santalum album*) as species of importance. The Perairan Subaun KBA is located 5.7 km from the site and as per IBAT, contains the Green Turtle along with six different types of invertebrates, such as the Blue and Lettuce Coral. The Subaun important bird and biodiversity area (IBA) is located 12.3 km from the site and as per IBAT, it contains seventeen different types of bird species along with Sandalwood as the only plant species of interest.

In addition, IBAT was also run by applying buffers for 1, 3 and 5 km. Please refer to Annex XIV which provides the IBAT screening results for the site and as can be observed, this plot of land does not traverse any environmentally sensitive areas and the IBAT outputs for each of the neighboring KBAs is also provided.

6.2.2 Flora and Fauna

Terrestrial Flora and Fauna

The terrestrial flora within the project site exhibits a variety of plant species. The dominant tree species identified in the area is the Tamarind tree (Tamarindus indica), accounting for an estimated 90% (subjective probability) of the trees in the project area. Tamarind trees are characterized by their distinctive canopy and are of considerable ecological significance, providing habitat and sustenance for various species.

Figure 6.22. Tamarind tree (Tamarindus indica)

Another prominent plant species observed in clusters across the site is the Aloe Vera (Aloe barbadense miller). These succulent plants are known for their medicinal properties and were found to thrive in specific locations. Cacti were also present, although not as abundant as the Aloe Vera plants.

(a) Aloe Vera (Aloe barbadensis miller)

(b) Cacti

Figure 6.23. Aloe Vera (Aloe barbadense miller) and Cacti on Project Area

In terms of terrestrial fauna, there were some birds that were observed during the survey. Timor-Leste, located in Southeast Asia, is home to a diverse range of bird species. One notable species found in Timor-Leste is the Timor Bush Warbler (Locustella Timorensis). This bird, classified as "Near Threatened" by the International Union for Conservation of Nature (IUCN), was rediscovered on the islands of Alor and Timor (Trainor et al., 2011). The Timor Bush Warbler is known for its distinct habitat preferences and ecological requirements, making it an important species to study and conserve.

In addition to the Timor Bush Warbler, Timor-Leste is also home to other bird species such as Timor Friarbird (Philemon Inornatus). The Timor Friarbird is one of the seven endemic bird species widely distributed in Timor Island (Paga et al., 2021). Another notable bird species in the area are Owl, Beach Thick-knee, Orange-Banded Thrush, Timor Sparrow, and Pink Headed Imperial Pigeon.

(a)Timor Bush Warbler (*Locustella timorensis*)

(b) Timor Friarbird (*Philemon Inornatus*)

Figure 6.24. Birds observed.

While some of these bird species tend to travel in groups, others were observed singly. Notably, a Beach Thick-Knee bird was sighted perched on a tree, as depicted in figure

38 below. Nighttime observations indicated the presence of owls in the area, although visual confirmation of the species was not possible during the survey.

Figure 6.25. Beach Thick-Knee bird

The project area supports a diverse array of livestock, primarily consisting of goats, cows, sheep, and buffalo. These animals belong to various community members who release them into the fields during the day and retrieve them to their respective pens in the afternoon. It is estimated that there are more than 300 livestock animals within the project area. Their diet primarily consists of grasses and leaves from Tamarind trees, which are abundant in the region.

Figure 6.26. Sheep

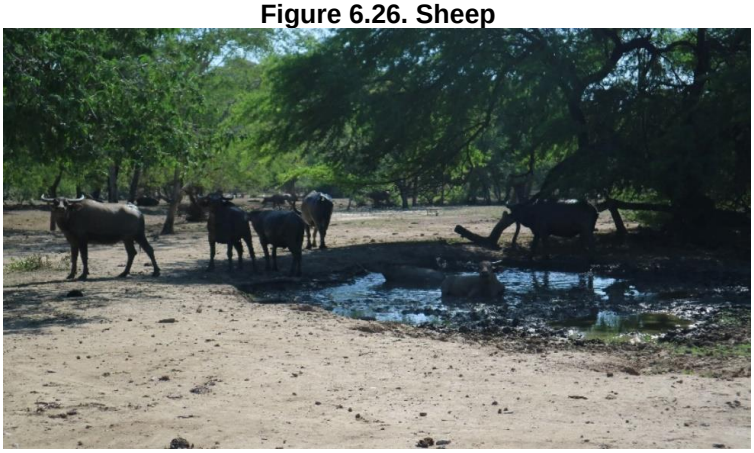


Figure 6.27. Buffalo

Figure 6.28. Goats

Figure 6.29. Cows

Aquatic Flora and Fauna

The fish species data for the surveyed area primarily relies on information collected from local fishermen and secondary sources. Approximately 3-4 fishermen traverse the project area daily for fishing purposes. Their fishing activities are typically observed in the early morning, usually between 5-6 AM, and in the later afternoon, typically between 6-7 PM. These observations provide valuable insights into the fishing patterns and schedules of the local fishermen in the area.

In August 2012, with the assistance of USAID, the Timor-Leste government conducted a significant marine survey to assess the biodiversity and the current conditions of coral reefs and associated ecosystems. The findings of this survey are documented in a report titled "Rapid Marine Biological Assessment of Timor-Leste." According to this report, the fish fauna of Timor-Leste is primarily comprised of species closely associated with coral reefs. The most prevalent families in terms of the number of species are shads (Alosidae), damselfishes (Pomacentridae), gobies (Gobiidae), groupers (Serranidae), cardinalfishes (Apogonidae), butterflyfishes (Chaetodontidae), surgeonfishes (Acanthuridae), snappers (Lutjanidae), parrotfishes (Scaridae), and blennies (Blenniidae). Together, these ten families account for 553 species, or

approximately 57 percent of the total reef fish species currently documented in Timor-Leste. It's worth noting that coral and rocky reefs are the most biodiverse habitats in terms of fish species.

Furthermore, during the Halona team's fieldwork, information gathered from local fishermen revealed the presence of a diverse range of fish species in coastal waters. The most frequently caught sardine species include Sardina pilchardus and Sardinops Caeruleus, with lengths ranging from 13.0 to 40 cm and weights ranging from 16.72 g to 51.45 g. Additionally, Restrelliger Kanagurta is frequently caught by local fishermen. On rare occasions, species such as Lutjanus Gibbus, Pseudanthias Huchtii, Dascyllus Trimaculatus, and others have also been reported as catches. This information suggests the existence of varied fish fauna in the area, with both pelagic and demersal species contributing to the local fishery.

Figure 6.30. Fishes Caught by Local Fisher

Table 6.16. Most commonly observed reef species in Timor-Leste (seen at 90% or more)

Fish Species	Probability of Finding Fish	Fish Species	Probability of Finding Fish
Pseudanthias huchtii	100%	*Variola albimarginata*	90%
Dascyllus trimaculatus	100%	*Chaetodon kleini*	90%
Lutjanus carponotatus	95%	*Chaetodon vagabundus*	90%
Lutjanus decussatus	95%	*Centropyge vroliki*	90%
Scolopsis bilineatus	95%	*Chromis ternatensis*	90%
Parupeneus multifasciatus	95%	*Neoglyphidodon nigroris*	90%
Forcipiger flavissimus	95%	*Plectroglyphidodon lacrymatus*	90%
Heniochus varius	95%	*Pomacentrus coelestis*	90%
Centropyge bicolor	95%	*Pomacentrus lepidogenys*	90%
Centropyge tibicen	95%	*Pomacentrus philippinus*	90%
Amblyglyphidodon leucogaster	95%	*Bodianus dyctynna*	90%
Amphiprion clarkii	95%	*Coris gaimardi*	90%
Dascyllus reticulatus	95%	*Gomphosus varius*	90%
Pomacentrus amboinensis	95%	*Thalassoma amblycephalum*	90%
Labroides bicolor	95%	*Parapercis clathrata*	90%
Labroides dimidiatus	95%	*Zanclus cornutus*	90%
Thalassoma lunare	95%	*Ctenochaetus striatus*	90%
Balistapus undulatus	95%	*Zebrasoma scopas*	90%
Lutjanus gibbus	90%	*Odonus niger*	90%

Sargocentron caudimaculatum	90%	*Sufflamen bursa*	90%

Source: "Rapid Marine Biological Assessment of Timor-Leste" USAID and Gov of Timor-Leste (2012)

During the survey there was also mentioned that local fishermen also frequently catch Octopoda (octopus), which are soft-bodied, eight-limbed mollusks, and Decapodiformes (squid fish). However, there wasn't any fresh catch available for the Halona team to take picture.

(a) *Octopoda*

(b) *Decapodiformes*

Figure 6.31. Figures of Octopus and Squid Fish

It was also revealed that fishermen occasionally encounter turtles in the area. In the Laleia region, two specific types of turtles are frequently encountered: Eretmochelys imbricata, commonly known as the hawksbill turtle, and Chelonia mydas, known as the green sea turtle. These species are particularly vulnerable, and efforts to protect and preserve their habitats are crucial to their survival in the region.

However, the habitat for these turtles in Timor-Leste is gradually diminishing, and the Timor-Leste government has classified them as rare and protected animals. This decline can be attributed to local economic activities where turtles are often hunted, and their skins used for crafting jewelry items such as bracelets and other accessories.

(a) Eretmochelys imbricata

(b) Chelonia mydas

Figure 6.32. Figures of turtles

During the survey, no marine mammals such as whales or dolphins were observed along the coast. It is important to note that the absence of such sightings during the

survey period does not necessarily imply their complete absence in the region, as the presence of marine mammals can be seasonal or dependent on various factors.

In the vicinity of the river mouth, the survey identified several benthic fauna species. The fiddler crab, Uca Acuta, was among the notable benthic organisms observed. These small crabs are adapted to intertidal zones and play a significant role in the ecosystem. Additionally, the survey also showed the presence of benthic fish species, *Boleopthalmus Bodderti*, known for their ability to thrive in muddy or freshwater environments that is near the beach.

Figure 6.33. Fiddle Crap, Uca Acuta

Figure 6.34. Fiddle Crap, Uca Acuta Lives inside this hole.

Figure 6.35. Boleopthalmus Bodderti

Another marine fauna worth mentioning is saltwater crocodile. The saltwater crocodile (Crocodylus Porosus) has been mentioned by locals as an occasional visitor to the shore in search of food. These reptiles are typically observed during the dry season, which spans from June to November, and the sightings are limited to about 4 to 5

crocodiles on average. During the site visit conducted by the Halona Team, no crocodile activity was encountered or observed in the area.

While interviewing local fishermen, there was a mention of an unfortunate incident in which one of the locals was reportedly attacked by a crocodile. However, the exact details of this incident remain unclear.

In terms of reptile activity and their presence in the project area, it is important to note that the existence of crocodiles is not expected to impact the construction of the solar panel project. This is because the area where crocodiles occasionally come ashore is situated far from the project's boundaries, and their presence is limited to a specific season. Therefore, the construction project is unlikely to be affected by these reptiles.

Crocodylus Porosus, the saltwater crocodile, holds the distinction of being the largest predator in Timor-Leste. Despite its significant role in local culture as an 'ancestor figure' in the 'creation myth,' there have been no population surveys conducted for this species in the country. Consequently, there are no population estimates available, nor critical information about known nesting sites for saltwater crocodiles in Timor-Leste.

It's noteworthy that *Crocodylus Porosus* is presently protected and classified as an endangered species under national *legislation* (as per joint ministerial order No.18/MAP/MCIA/II/2017). However, there is currently no established management plan in place for the conservation and protection of these crocodiles in Timor-Leste. This underscores the importance of developing a comprehensive management strategy to safeguard this unique and culturally significant species, along with its habitat and nesting sites.

Figure 6.36. Crocodylus Porosus

While no population surveys have been undertaken in Timor-Leste, Crocodylus Porosus can be found in coastal rivers and swamps, as well as open sea and island shorelines, particularly along the south coast. Crocodiles' habitat appears limited to

coastal estuaries, freshwater swamps, and small rivers. Most substantial habitat is found along the coastal lowlands of the southern coast, as the northern coast is much drier due to lower annual rainfall.

The only marine floral observed during the survey was Seagrass. Seagrass is a valuable marine floral resource with commercial potential, and it has become an increasingly important marine resource that cannot be overlooked. Currently, in Laleia, seagrass is primarily harvested for personal consumption rather than being cultivated as a commercial enterprise. In the region, two specific types of seagrasses are prevalent, namely Eucheuma Spinosum and Eucheuma Cottoni, both belonging to the Solierisceae family. These seagrasses offer promising opportunities for sustainable economic development and should be considered for cultivation and commercial utilization in the future. The survey did not reveal the presence of any other notable aquatic plant species in the coastal area.

Figure 6.37. Sea grass observed during the survey

(a) Eucheuma Spinosum **(b) Eucheuma Cottoni**

Figure 6.38. Types of sea grasses species

6.3 Economic Components

6.3.1 Employment Sector

Most of the population relies on agriculture. However, low output, high post-harvest losses and limited alternative sources of income have resulted in rising numbers of poor people in rural areas. High population growth (about 3% annually) rapid urbanization and a small formal sector have resulted in slow rates of job creation in urban areas and have contributed to poverty rates rising.

Large livestock, which typically includes cattle, buffalo, ponies, pigs and goats with a population of 20,100 heads giving an average of 2.4 heads per household. About 6,063 households in Manatuto raise large livestock. The agricultural sector accounts for 81% of the labor force aged between 15 and 64 years.

6.3.2 Public Infrastructure

The only public infrastructure present in the project area consists of the transmission line passing in the southern tip of the site along with the road which is passing along the southern border of the site.

6.3.3 Land Use

The nearest settlement i.e. Sede Suco (village) Hatularan is located at an aerial distance of 4 km away with no receptors of any kind such as communities, settlements etc. located in the project area and thus there is no existing land use for the project site or the land in its surrounding areas. Any fishermen that might visit the coast through traversing the site visit it from the neighboring areas with the closest being 4 km away as stated above. The site consists of barren land with no productive use at present and no agriculture etc. being practiced.

6.3.4 Fishing

Total area of Timor-Leste is 16,000 km^2 with a coastline around 706 km length and marine economical jurisdictions area of approximately 75,000 km^2. Despite its long coastline and apparent abundant fishery resources, this sector is still deemed underdeveloped. There are currently only a few large-scale commercial activities with only several semi-industrial licenses being issued. There is only one key village fishery community identified by Ministry of Agriculture and Fisheries (http://www.peskador.org) near the beaches along the coast near Baucau town.

Smaller scale fishing communities are generally found in the coastal areas with fishermen launch their boats from almost every community along project location. Local

fishermen use nets, hooks and line to fish and haul their boats on to the shore when not in use.

6.3.5 Agriculture

About two-thirds of households in Manatuto are engaged in some form of subsistence production: 61% growing cassava, 57% growing coconut, and 62% growing maize. About 30% of the households are involved in production of higher-value crops such as rice, some 56% grow various fruits and 51% grow vegetables, with only a third of households growing coffee.

6.3.6 Tourism

Manatuto municipality is located to the east of Dili and stretches across the entire country from a beautiful north coast of idyllic white sandy beaches, steep cliffs and mangroves bordering the Wetar Strait, to the wilder Timor Sea in the south. It is one of the country's least populated and most rugged municipalities with large braided rivers and a very mountainous hinterland. Much of the landscape and its villages have remained virtually unchanged for centuries. The majority of local people speak Galoli.

The large regional town of Manatuto, lying beside the Laclo River on the north coast, is regarded for its bustling Sunday market and also for terracotta pottery produced in local kilns. Further to the east, the small town of Laleia has a pretty pastel pink twin towered church, considered one of the most beautiful In Timor-Leste.

6.3.7 Other Industries

There are no industrial units present in the project area, which is a remote part of the municipality and does not contain any settlements or industrial installations of any kind.

6.4 Social Component

6.4.1 Population and Communities

Manatuto is comprised of six sub-districts and a total of 29 sucos. The population of Manatuto district in 2010 is 43,246 with an average density across the district of 24.3 people per km^2 while the sub-district of Manatuto Vila has a higher population density of 45.5people per km^2. The average household size in Manatuto is 6.0.

Table 6.17: – Population Data of Manatuto

Administrative Unit (sub-district)	Area Sq. km	Population (2010)
Barique/ Natarbora	397	5077
Lacio	368	7939
Laclubar	391	11,376
Laleia	226	3470
Manatuto (Town)	271	12,339
Soibada	130	3051
Total Manatuto District	1783	43,246

Source: Census Report (2010)

6.4.2 Language

Education and Literacy

About 47% of the population (18 years and older) of Timor Leste have not received an education. Considering Manatuto district, about 14% have completed secondary school. The proportion of females without education in the district without education is 58% which is higher than that of males compared with (42%) of males.

6.4.3 Health Profiles of the Communities

The morbidity rate in Manatuto is 31% which is the highest in the country. Among those with ailments, 97% reported the ailment was serious enough to disrupt daily activities while some 81% sought treatment. Of those not seeking treatment, a third reported the reason was the health facility was too far. For those visiting a health care facility, the main means of transportation is by walking (for 86%) and the average one-way travel time is 42 minutes which is lower than the average national travel time to the nearest healthcare facility of 47 minutes.

6.4.4 Institution, School and Health Facilities

School Institutions

There are 39 primary schools, eight junior high schools and five secondary schools in Manatuto.

Health Care Facilities

There are 13 health posts and six community health centers in Manatuto district. The nearest hospital is located in Dili. Majority of the population located closest to the project area has access to basic sanitation (pit latrine, septic tank, flush toilet).

6.4.5 Community and Family Structures

Family Planning

Physical remoteness and the poor quality of service delivery have been found to reduce women's access to family planning services, ante-/post-natal care, and vaccination (Provo et al. 2017).

Marital Status and Fertility

Half of the women in Timor-Leste do not deliver in a healthcare facility or have access to a skilled birth attendant (UNICEF 2021). Maternal mortality is high and accounts for 42 per cent of deaths in women aged 15–49 years (UNICEF 2021). Access to reproductive healthcare is low in rural areas, with less than half (45 per cent) of births being delivered by a skilled birth attendant (WHO 2018).

Urban women have higher access to skilled birth attendance (87 per cent) (WHO 2018). Short timespans between births and insufficient caloric and nutrient intake increase the risk of adverse maternal health (and child) outcomes. The risk of pregnant women experiencing dehydration, micronutrient deficiencies and infections (e.g. with Dengue Fever) is expected to be increased by climate change, heightening the chance of complications (e.g. preterm birth, eclampsia and low-weight births among others) (Women Deliver 2021).

Fertility

Studies show that a lack of nutritious food has led to Anaemia in 40 per cent of women of reproductive age, pregnancy issues, increased intrauterine growth retardation, low birth weight and perinatal mortality.

6.4.6 Ownership of land

The proposed site is located on state-owned land and no private occupation is there in the land and thus no land acquisition and/or physical displacement will be required.

Site visits and initial due diligence confirmed that the land is not under any use for cultivation or productive use and there are no houses or habitats reside on the proposed land. Also, no informal settlers or informal use of the land has been reported.

EDTL will obtain necessary permission and possession from the ministry of justice through general directorate of land and property. The national cadastral services will be involved in the land surveys and verification following which the land will be allotted to EDTL for the development of this project.

6.4.7 Gender Specific Aspects

Women's Involvement Economic / Non-economic activities

In the project area communities in the Sucos, besides household works, the women are engaged in different economic activities. In about 46% of the households, women are engaged directly in cultivation and in 42% households, they are working as agricultural laborers. In majority of the households (51%), the women are directly involved in animal husbandry and in 6% of the households, they are engaged in fishery. In one fifth of the households, women are engaged in both trade and business and in small home-based enterprises as shown in Table 6.18 below.

Table 6.18: Women Involvement in economic and non-economic activities

#	Women Involvement	Number of HH	Percent
1	Cultivation	141	46
2	Trade & Business	65	21
3	Agricultural Labour	130	42
4	Non-Agricultural Labour	70	23
5	Small, home based enterprises run by women	60	19
6	Service	60	19
7	Households Work	247	80
8	Animal Husbandry	157	51
9	Fishery	18	6

Source: Base line socio-economic survey, Nov-Dec, 2022

Women's contribution to the family income

The women in the project area on an average contributes to 31% of the household income to the total household income. About 22% households reported that women contribute up to 10% to the total household income and in 16% households, their contribution is in the range of 10.1% to 20%. In 42% of the households' women contribute more than 31% of the total household income to their household income as shown in Table 6.19 below.

Table 6.19: Women's contribution to the family income

#	Contribution	Number of HH	Percent
1	Up to 5 %	33	11
2	5.1 to 10 %	33	11
3	10.1 to 20 %	47	16
4	20.1 to 30 %	54	19
5	31 to 50 %	90	31
6	51 to 75 %	27	9

#	Contribution	Number of HH	Percent
7	More than 75 %	5	2
	Total	289	100
8	Average contribution	31%	

Source: Base line socio-economic survey, Nov-Dec, 2022

Women's Participation in household's decision making

The women in the project area have an almost equal say as that of men in the household decision making process as shown in Table 6.20 below.

Table 6.20: Women's participation in household's decision making

#	Participation of Women	Number of HH	Percent
1	Yes	302	98
2	No	7	2
	Total	309	100

Source: Base line socio-economic survey, Nov-Dec, 2022

In almost all the households, the women participate in all the major decision of the family like financial matters, education and health care of the children, purchase of household assets and day to day activities. However, regarding social functions and marriages, only about 64 % of the households stated that their women have a say as shown in Table 6.21 below.

Table 6.21: Women's participation in different decision making

#	Types of Participations	Number of HH	Percent
1	Financial matters	294	95
2	Education of child	299	97
3	Health care of child	301	97
4	Purchase of assets	302	98
5	Day to day activities	302	98
6	On social functions and marriages	198	64

Source: Base line socio-economic survey, Nov-Dec, 2022

6.5 Cultural Components

6.5.1 Cultural Heritage & Sacred Sites

In the project area, while there are generally no prominent physical or cultural heritage sites, one exception stands out. The "We-Lu Spring" holds significant cultural importance for the local community. This spring was not only a source of freshwater in the past but presently is also regarded as sacred by the residents of the region, making it a culturally significant site. The "We-Lu Spring" is deeply rooted in the local culture and traditions. It holds special importance as it is believed to have spiritual significance among the community members. We-Lu Spring is considered sacred and is associated with various cultural practices and beliefs that have been passed down through generations.

Given its cultural significance, the We-Lu Spring plays a vital role in the life of the local community. It is essential to recognize and respect the cultural heritage associated with the spring while also ensuring its long-term conservation and protection. Any development activities in the project area should be carried out with consideration for the We-Lu Spring and the cultural practices associated with it. However, since this spring is located is located outside of the project area, construction will not be affected. Cultural practices can only be performed if the implemented company is somehow planning to use that water. Furthermore, the existence of this spring will not require the project to undergo certain cultural rituals prior to the commencement of civil work.

Although there are no prominent physical or cultural heritage sites in the project area, the We-Lu Spring stands as an exception. This freshwater spring holds significant cultural importance, serving as a sacred site for the local community. The location of this spring is about 300 m uphill from the project boundary. See figure 6.12 for clear location of the spring.

6.5.2 Archaeological Sites

There are no archaeological sites present in the project area. However, a Chance Find Procedure, provided as Annexure VIII, will be available for implementation in case any archeological find is made during the project construction and/or operation.

7 Climate Change

This section describes relevant climate change to the solar IPP plant operations and decommissioning of the plant. All relevant data and information on climate in this section are secondary sources and mostly taken from the national adaptation programme of action on climate change (NAPA) adopted in 2010.

7.1 Observation and Historical Weather Trends

Timor-Leste extends from 124°E to 127°30'E longitude and 09°40'S to 08°00' S latitude. The country has a tropical monsoon climate characterized by wide seasonal variations in rainfall, high temperatures and high humidity. Regional climatic differences are substantial in the country because of the varying elevation and coastal effects. The country has two main seasons, the dry season from June to October and the wet season from November/December to May/June.

According to NAPA there is no national country-specific studies and insufficient historical data for Timor-Leste to provide comprehensive analysis and evidence of how its climate has changed. A number of preliminary studies, including analysis of data from West Timor, can be used to provide indication of possible changes in climate in the region, and in addition, global models are also used to extrapolate information to Timor-Leste level. IPCC global models indicate that in South-East Asia extreme weather events associated with El-Niño have been both increasing in frequency and intensity in the past 20 years. This has had an impact on Timor-Leste climate patterns with estimated decreases in mean rainfall indexes, in particular for the dry season and increased incidences of extreme weather events.

7.2 Future Projections under Projected Climate Change

There are number of models used to provide various projections of climate change in Timor Leste. Those climate change projections, however, do not represent a value specific to any actual location of a town or village in the country; it instead portrays the average change over the broad geographic region within the country and the surrounding oceans.

The temperature projection indicates Timor-Leste will experience increasing annual average air temperature and sea-surface temperature in the future according to emission projection scenarios, which are analyzed for 30 interval years started from 2020, 2050 and 2080 and changes were calculated relative to the reference period 1961 – 1990. The increases of temperature for the years mentioned is in order of 0.8 ºC, 0.5 ºC and 2.2 ºC respectively. Extreme temperature events are also expected to

increase, i.e. by 2050, a 7-day or 30-day heat wave event can be expected to increase by up to 2.3 ºC and that length of such event can be expected to increase by two days.

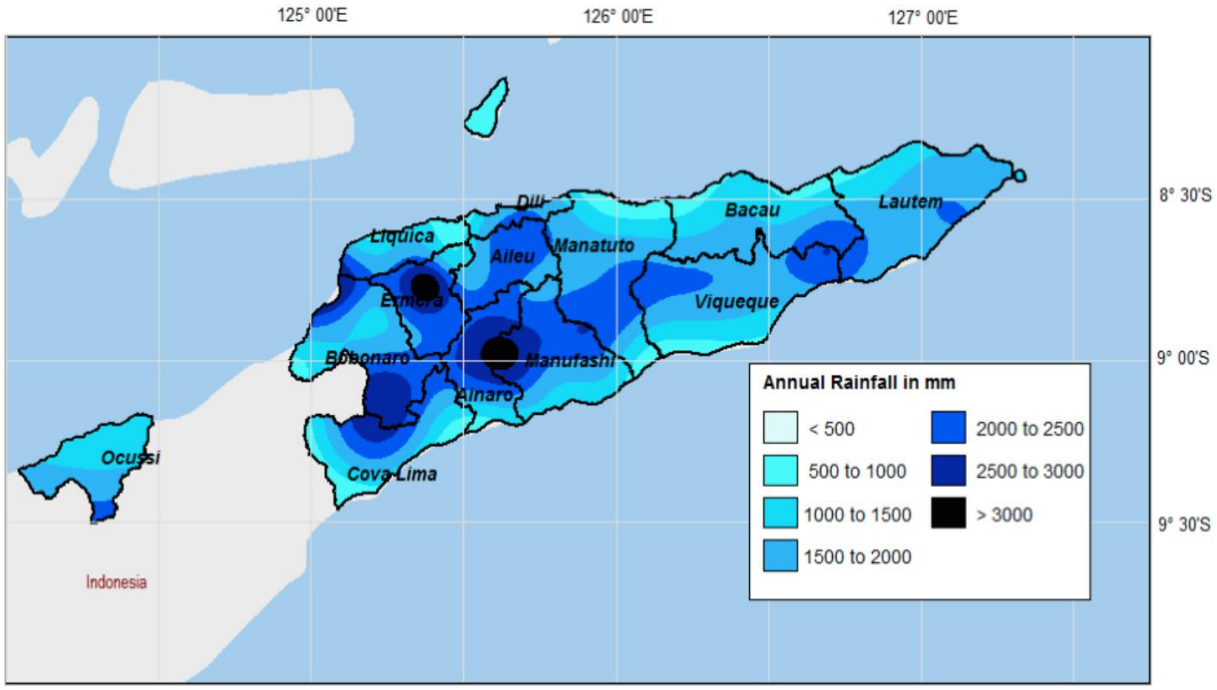
7.2.1 Rainfall

The spatial distribution of annual rainfall in Timor-Leste is presented in Figure 7.1. Northern coast receives less than 1000mm; central and elevated areas receive 1500 to 2000mm; and western high-altitude areas receive relatively higher rainfall with more than 2500 mm/annum (Barnett, 2003). The Northern area of the country is influenced by a single rainfall season where a wet season prevails from December to April/June and the peak is during the period of December to January.

On the other hand, the bimodal rainfall pattern influences the Southern part of the country where the wet season lasts for seven to nine months. There are two rainfall peaks – one from December to January and another from May to June. The dry season, in the southern part of Timor-Leste, is experienced for about three to five months.

Timor-Leste receives greater rainfall intensity during the Northwest Monsoon period and less intense rain during the southeast monsoon period. But rainfall during the southeast monsoon period is more reliable for agriculture than during the northeast monsoon period (Keefer 2000).

Figure 7.1: Annual rainfall distribution in Timor-Leste



Rainfall is also expected to increase in relation to the reference period 1961 – 1990, by 2%, 4% and 6% by 2020, 2050 and 2080 respectively. This overall rainfall projections, though is different from the current rainfall projection for Indonesia, but showing similar rainfall increase trends to northern part of Australia. According to NAPA, these differences in the rainfall projection trends may have been due to a poor resolution of the current model used; and hence this data analysis may need to be considered wise perspective. In addition to an expected overall increase in rainfall for Timor-Leste, extreme rainfall event are expected to increase across the different monthly period. Overall, the rainfall events are expected to become less frequent but more intense.

7.2.2 Sea level rise and ocean acidification

NAPA 2010 document indicates that sea level rise for Timor-Leste is expected to be same as global averages, with a variation of only minus 0-1cm after analysing 17 global climate models (O'Farrell, 200813 cited in GoT, 2010). Another study indicates that sea level rise is likely to be 3.2 to 10 cm by 2020, 8.9 – 27.8cm by 2050, and 18-79cm by 2095 (CSIRO,201014 and Hunter, 201015). There is a possibility that sea level rise could be larger than the 0.5 – 1.0 m range by 2100 (Steffen, 200916).

NAPA further denotes that there is possibility of sea level rise larger than 0.5 – 1.0 m range by 2100 relative to the 1990 reference period data. This projection cannot be ruled out since there is considerable uncertainty within the estimation of future sea level rise and the uncertainties indicate that the corrections could be supporting higher rather than lower estimates.

It is also expected that given an increase in absorption of Carbon Dioxide (CO_2), the sea water pH level in Timor-Leste will decrease and lead to ocean acidification, which would have impact on marine ecosystem. The projection scenario indicates that by 2070s relative to 1990 reference period data, the ocean pH level would decrease by -0.16 – 0.17.

7.3 Climate Implications of the Proposed Project or the Environment

Climate change data is extremely limited in Timor-Leste and has been reviewed in identification of the site and developing the project. Also, a review of the draft Timor's National Adaptation Programme of Action to Climate Change (NAPA) was undertaken to understand better how the change in variability due to future climatic conditions may affect the project's activities. Commentary taken from the NAPA is provided below in

italics, with commentary on how this could relate to the solar IPP project added, where necessary.

Due to its recent history, there is a limited store of scientific knowledge and research specific to Timor-Leste which might help to characterise the likely impacts of climate change. However, in common with its neighbours in South East Asia and the Pacific, it is anticipated that Timor-Leste will face significant challenges as a result of climate change. In particular, it is anticipated that the nation's vulnerability to climate change will be intensified by its extremely high dependency on the natural resource base, inadequate infrastructure and lack of institutional capacity.

The fresh water resources of Timor-Leste comprise both surface water and groundwater. There are 28 major river basins in Timor-Leste. Little is known of the flows in each river as data from the six hydrometric stations constructed in the 1980's has been lost (ADB: 2004). Small amounts of water are stored in one major lake (Iralalaro) in the east, and a number of small lakes, mainly in the south. Groundwater resources are contained in a variety of aquifers, covering about 50% of the country. Groundwater in storage is over 100 years of recharge and may be considered as drought-proof. The water demand comprises; domestic water (drinking and sanitation), irrigation, and other uses (coffee processing, fisheries, water bottling, tourism and petrochemicals).

In both Pante Macasar and Manatuto, part of the supply is provided by groundwater sources. This provides a level of certainty against climate or seasonally variable rainfall dependent sources.

Monk et al (1997) also note that year-to-year variability in total rainfall can be large and that rainfall is not equally distributed during the wet seasons, with great variability in intensity and most of the rain falling in torrential downpours. Studies conducted on Indonesian average rainfall for the periods of 1961-1990 (Hulme and Sheard, 1999) and of 1879-1999 (Kirono, 2002) indicate that there is a reduced rainfall index for both the dry and wet seasons, though the decline in the wet season rainfall is statistically insignificant (Kirono, 2002).

Analysis of total rainfall in Timor-Leste indicates a reduction in mean annual rainfall from 1961-1990 as compared to the 1931-1960 period, the decrease being mostly felt in the December-February rain period (Kaimuddin 2002, cited in Lasco and Boer 2006). This analysis is further supported by other studies reviewed by Chang et al (2004), indicating that since 1976 there has been a tendency for the El Niño - La Niña normal

alternation to be dominated by El Niño events that have a known negative correlation with Indonesia monsoon rainfall.

Rainfall is also expected to increase, in relation to the 1961-1990 reference period, by 2%, 4% and 6% by 2020, 2050 and 2080, respectively. The AK-2010 analysis indicates seasonal differences with mild drying effect for Timor-Leste over the June-August period by 2080 as indicated in figure 8. These projections are again in agreement with the IPCC 2007 report, based on the changes between 1980 and 1999. Kirono (2010) notes here that an overall increase in rainfall contradicts the current projections for Indonesia but is in agreement with a trend showing an increase in rainfall in the northern part of Australia (see Smith, 2004). Given limited information on observed rainfall trends in Timor-Leste, these differences may be attributed to the poor resolution of current models and this analysis should be treated with caution.

As rainfall is expected to increase, the volumes of water available from the river sources could be expected to increase as well. In the short term this means that the projects described should be reliable, especially for the relatively small volumes that are required. In the longer term (beyond the 20-year design horizon of this project), provision of additional storage may need to be considered to help balance the differential between wet and dry season flows.

The following tables are abstracted from NAPA and give a summary of the conditions and concerns relating to water supply in Timor-Leste.

Table 7.1– Climate Impacts and associated impacts (NAPA Report, December 2010)

Phenomena and events of climatic nature	Climate change impacts
Changes in rainfall pattern and intensity	▪ Limited water infiltration to the soil due to the steep terrain, shallow and thin soils and sparse vegetation, increasing risk factor with climate change. ▪ Domestic water sources (springs, wells, storage and treatment tanks, piping) can be contaminated. ▪ Increase in flooding will damage land, crops, infrastructure (including homes, schools and roads) and irrigation systems - reducing farming viability, profitability, employment, livelihoods and food security; and will increase food prices,

	malnourishment, health, poverty and urban migration.
Increased air temperature	▪ Evaporation which is already high will increase. Relatively little water lies on the surface (in streams, rivers, lakes) and rapid run-off will increase with climate change conditions. ▪ Will reduce availability of water supplies for irrigation and watering of crops, and for livestock and fishponds. ▪ Increased air temperatures will increase the water requirements of crops, livestock and fish-farms. ▪ Water storage – reservoirs, tanks – can lose large volumes through evaporation under climate change conditions. ▪ The development of some industries: food processing; hydropower generation; large-scale tourism – may not be feasible or acceptable in some locations because of water scarcity and costs.
Sea Level Rise	Increased ground water contamination by salt-water intrusion.
More intense storm activity	▪ Sewage systems can also be damaged and may also contaminate the domestic water supply. ▪ Domestic infrastructure/ plumbing can be damaged, resulting in loss of water supply and contamination of water. ▪ Reduced pressure in water supply systems can increase infiltration by contaminants. ▪ Water treatment and monitoring costs may increase. ▪ Water scarcity and increased costs of development, operation and maintenance of water systems and infrastructure which will increase the costs of supplying water to consumers and reduce access to water for users.

7.4 Climate Change Adaptation Measures

The climate adaptation measures for the proposed project development are provided in Table 7.2 below.

Table 7.2 - Proposed adaptation options

Climate Aspect	Proposed key adaptation options
Sea Level Rise	▪ Drainage infrastructure. An appropriate drainage infrastructure will be developed to ensure that flood water can be collected and drained quickly in order to safeguard the project site from flooding as much as possible. ▪ Safety of critical infrastructure, communication. Essential infrastructure in the project site must be constructed in such a way that it can withstand extreme conditions without being disrupted. This primarily concerns communication infrastructure (Internet) and essential facilities such as drinking water and electricity must be protected. ▪ Early warning organization, responsibilities, support systems. Early warning is essential so that timely precautionary measures can be taken to limit loss of life and damage. This early warning task requires adequate resources and clear protocols. ▪ Evacuation plan, rescue places. In case of high-risk levels, an evacuation plan must be available and places of refuge must be established. Regular practice will be necessary to ensure that early warning and precautionary measures are carried out flawlessly in emergency situations. ▪ Rescue organization, responsibilities and support systems. Precautionary measures cannot rule out the risk of fatalities and the failure of essential services. In this case, a fast rescue operation will be necessary to provide assistance in emergency situations. For this, a trained organization with clear leadership and appropriate equipment must be ready for deployment. ▪ SOPs must be in place to ensure in case of flooding, the connection to the main grid is cut off to prevent short circuiting and potentially damaging the grid.
Heat Stresses	▪ Workers should be provided with adequate shade, water and appropriate clothing including wide-brimmed hats and long sleeves.

	▪ Workers should be closely monitored for symptoms of heat sickness and dehydration. ▪ During extreme heat events, working hours should be adjusted to avoid the hottest parts of the day. ▪ First aid facilities and clinic available for treatment of heat stroke cases.
Spread of Climate related diseases	▪ Spraying of insecticides to prevent growth of mosquitoes, particularly to prevent spread of malaria and dengue. ▪ Implement a vaccination program to protect staff against possible heat related infectious diseases. ▪ Prevent stagnant pools in project site and its surroundings to minimize/prevent growth of mosquitoes.
Water Scarcity	Build climate consideration and environmentally friendly infrastructure to protect water sources (springs, streams, wells, etc.) to provide safe water supply during climate change extreme event periods.
	Creating/enhancing water harvesting model and water distribution system as well as management system at all levels to avoid water shortage due to climate change.
	Control of quantity of water use by industry, and water pollution control standardization in a climate change context.

8 Alternatives

Alternative analyses of proposed project development consist of alternative locations, alternative technologies and the no-development alternative. The purpose of alternative analysis is to provide various options that are potential and feasible from different perspectives to come up with an optimal choice that will be beneficial to the economy, profitable to EDTL, all the while technically, environmentally and socially feasible.

8.1 'With' and 'Without' Project Scenario

The 'No project' scenario is not a viable option since Timor Leste is facing an energy deficit and needs to urgently switch from the cost intensive and environmentally unfriendly diesel-based power generation and move towards developing renewable based cheap and reliable energy on a long-term basis.

Also, the benefits from the addition of this solar IPP project are primarily in terms of offsetting energy production from the diesel generators (resulting in fuel savings), but also include significant benefits from more efficient operation of diesel generators, less diesel generator maintenance and depreciation and delayed purchase of new generator capacity in later years.

The Table 8.1 below presents a comparison of the 'with project' and 'without project' scenario.

Table 8.1 – 'With' and 'Without' Project Scenario

No.	Parameter	With Project Scenario	Without Project Scenario
1	Electricity	Major benefits are as follows: ▪ Improve the electricity supply and stability of the national grid; ▪ Diversify power generation mix; ▪ Increase percentage of clean energy; ▪ Supply less expensive than current oil-based generation; ▪ Improve electricity supply and stability of the national grid.	Negative effect, increase in greenhouse gas (GHG) emissions due to continued reliance on inefficient oil-based energy generation.
Environment			

2	Effect on protected, sensitive or forest areas	No effect, avoids national protected areas, environmentally sensitive and forest areas.	No effect.
3	Effect on endangered species	No endangered species identified in project area.	No effect.
4	Tree Cutting, vegetation removal.	No major effect anticipated.	No effect.
5	Air emissions	Minor effect during construction; increase in air emissions because of construction activities / trenching, dust generation. Major effect during operation: Decrease in GHG emissions.	Negative effect, Increase in GHG emissions due to continued reliance on fossil-fuel based energy generation.
6	Water Supply	Minor effect during construction and operation; Increase in groundwater withdrawal compared to without project scenario. Shall comply with project EMP as prescribed in clearances, permits and licenses obtained from relevant authorities. Major effect during operation; improved water accessibility for different purposes due to relevant power available for pumping etc. as required.	No effect.
Social			
7	Disturbances to people/ communities.	Minor effect during construction phase; temporary and localized impact due to power outage, dust and noise due to movement of machinery and construction vehicles; shall comply with project EMP (community health and safety plan, traffic control and road management plan, noise and dust control plan) Influx of migrant workers;	No issue.

		shall comply with project EMP (emphasis on local hiring).	
8	Effect of business.	Construction activities may employ local populace generating economic and livelihood generation opportunities	No issue.
9	Status of living.	Major effect, improved access to electricity, reduced domestic load for persons such as women involved in cooking activities or in accessing water supplies.	No change.
Economic			
10	Economic Development	Greater rate of economic development expected.	Slow development.

8.2 Site Alternatives and Selection

Detailed site visits were conducted by the team of Environment and Social safeguard experts to the potential sites that had been identified for development of the project during July and August'22.

The following sites were considered:

- Manatuto 'Modified' Site
- Baucau
- Liquica

Detailed scoping activities were conducted during the site visits, consisting of walk-through surveys, collection of pictorial evidence and conducting of interviews with local area chiefs to confirm observations and obtain additional information from the perspective of the project development.

Table 8.2: Description of Proposed Sites

Manatuto 'Modified'	Baucau	Liquica
i. Terrain, Physical features, Land Use & Ownership		
▪ Publicly owned land with 176 hectares of land available. ▪ Largely even terrain requiring minimal leveling. ▪ Vacant piece of land with no productive use such as agriculture etc.	▪ Publicly owned land with 153 hectares of land available. ▪ Large and flat vacant plot of land consisting of hard limestone with rocky outcrops. Barren land with trees and shrubs, however, no productive trees that are owned or grown by any people. Not suitable for cultivation due to soil type of hard rock.	▪ Partly public land and partly owned by private owners. ▪ Site is partly owned by Govt on the hills while rest is owned by ten families. ▪ Small plot of land (30 hectares) is available for the project with a maximum of approximately 10-15 MW of PV to be installed.

	▪ Leveling will entail significant cost (20-30% higher cost) to cut through the hard rock base. ▪ Sufficient land available for installation of up to 100 MW of solar PV. ▪ Site presently being used for dumping of solid waste.	▪ Mostly barren land but claimed to be owned by some family for non-residential use
ii. Accessibility		
Plot of land is located directly next to the existing main road and thus it is highly accessible.	Access road present but not in acceptable condition and will require upgrading for the project.	No access road present. Site can only be accessed by passing through a dry river bed with access to site being quite difficult.
iii. Hydrology		
▪ Dried waterways are present consisting of minor gulleys. ▪ In the rainy season, small rivers of 4-5 meters flow across the site. ▪ Drainage channel will need to be developed around the site to divert and drain the water away since the site gets flooded during the rainy season. However, there will be an additional cost associated with developing this drainage channel to manage the flooding issue since six months of the year is rainy season.	▪ No issue of flooding exists.	▪ Dry, small creeks run through the valley, which are used as walkways and in wet season they turn into shallow creeks. ▪ Access is only possible on foot during the wet season ▪ The site is located up a river valley with villages on both sides.
iv. Ecological Aspects		
▪ Trees seem a mixture of eucalyptus and wild Tamarind and other similar wild species.	▪ Site is not located in a key Biodiversity Area (KBA) or any protected area. ▪ The nearest protected area is the Kaidaba KBA, which is located about 6 km away from the site. ▪ The Kaidaba KBA is habitat to Humphead Wrasse, an endangered fish species. ▪ Considerable tree cutting required. (i.e. Ai bubur in Tetun, or eucalyptus trees) and shrubs).	▪ The protected areas in Liquica are Mount Fatumasin, Lagoa Maubara and Mount Guguleur. There is also one KBA, Fatumasin Important Bird Area, in Liquica. ▪ Considerable forest cover is present consisting of several different species (eucalyptus, tamarinds, Sour sop and shrubs). ▪ Some fruiting trees were also observed.
v. Climate Risk Vulnerability Aspects		
▪ Medium climate risk specifically due to flooding, precipitation increase, landslide and solar irradiation change.	▪ High climate risk specifically due to flooding, precipitation increase, landslide and solar irradiation change. ▪ Medium risk for potential flooding and landslide according to	▪ High climate risk specifically due to flooding, precipitation increase, landslide and solar irradiation change. ▪ Medium risk for potential flooding and landslide

▪ Medium risk for potential flooding and landslide according to climate risk modeling software 'Aware'	climate risk modeling software 'Aware'	according to climate risk modeling software 'Aware'
vi. Power Evacuation Infrastructure		
▪ There will be a substation on the land area and it will connect to the 150 kV transmission line so only a short connection will be required.	▪ 150 kV line crossing the site so a substation will be built and connect directly to it.	▪ Only 20 kV evacuation line will need to be constructed.
vii. Historical/Religious Heritage		
None	None	Not within the site but a cemetery is located approximately 200 m from the border of the proposed area.

Table 8.3: Comparative Risk Analysis of proposed Sites

Site Specific Risks	Manatuto	Baucau	Liquica
Terrain suitability	Flat land mostly, will require minor leveling.	Flat land- no filling required.	Flat land – no filling required.
Suitability of Soil Composition/ Geomorphology at site	Appears to be suitable. Geotechnical tests to be performed to confirm.	Surface consists of hard rock, entailing a high cost (20-30% higher) to drill/perform civil works.	Appears to be suitable. Geotechnical tests to be performed to confirm.
Ecological issues	Site is not located in a key Biodiversity Area (KBA) or any protected area.	Site is not located in a key Biodiversity Area (KBA) or any protected area.	The protected areas in Liquica are Mount Fatumasin, Lagoa Maubara and Mount Guguleur. There is also one KBA, Fatumasin Important Bird Area, in Liquica.
Climate Risks/Vulnerabilities	Medium Risk for flooding, precipitation increase, landslide and solar irradiation change. Medium Risk for potential flooding and landslides.	High Risk for flooding, precipitation increase, landslide and solar irradiation change. Medium Risk for potential flooding and landslides.	High Risk for flooding, precipitation increase, landslide and solar irradiation change. Medium Risk for potential flooding and landslides.
Land Ownership issues	No – publicly owned land.	No – publicly owned land.	Yes - part of site is owned by private parties (six different families).
Land Availability	Sufficient land available.	Sufficient land available	Small plot of land – only 20 MW at most can be installed on available land.
Accessibility Issues	None - Access Road is available	None - Access Road to be upgraded.	Yes – no access road or passage available
Tree cutting for site clearance	Yes	Yes	Yes
Sufficient drainage available	Yes	Yes	Yes
Power evacuation infrastructure available	Yes – 150 kV transmission line passing nearby	Yes – 150 kV transmission line passing nearby	No infrastructure presently available.
Cultural heritage/religious sites	No	No	No

Water bodies present	No – however, seasonal flooding during wet season.	No	No
Existing use of land for productive purposes (agriculture etc.)	No	No	No

Issues of concern

Proposed Ranking of Sites

Based on internal discussions within the environmental safeguards team, it is the general consensus that the Manatuto site is the most suitable since the other two sites have different and complex issues from an environmental safeguards aspect.

In addition, the Manatuto site has been cleared from a technical standpoint by the project consultants, the environmental safeguards team has ranked the three sites on the basis of the information collected by the project team during the recently concluded site visits and subsequent risk analysis presented in the Table 8.3 above.

The ranking of these three sites is provided as Table 8.4 below.

Table 8.4: Ranking of Proposed Sites

Site Name	Ranking	Basis for Ranking
Manatuto-	1 (Highest Priority)	Most suitable site which is mostly level in terrain and has good drainage along with containing the required space available for installation of the project infrastructure. Furthermore, it has good connectivity since it lies next to the main road and the transmission line is also passing along the southern border of the site, ensuring convenient power evacuation.
Baucau	2 (Second Priority)	The two key issues with this site are as follows: ▪ The site consists of a hard rock base, making any civil works cost intensive with an additional 25-30 percent cost to be incurred. ▪ Access road is not suitable at present and needs to be upgraded to be made viable for the project.
Liquica	3 (Least Priority)	▪ No clear access is available to the site. ▪ Land ownership issues exist as entire plot of land is not publicly owned and is partly owned by private owners. ▪ Insufficient land available to scale up with only maximum of 10-15 MW installed capacity possible. ▪ No power evacuation infrastructure available at present.

Based on the observations and information collected during the field visits, the Manatuto 'Modified' site was identified as the most suitable out of the site options that were considered.

8.3 Technology Selection

A number of PV module technologies were assessed for use in the project, and selection was based on minimum environmental impacts and disposal method and procedures as follows:

Monocrystalline bifacial modules. Most manufacturers of crystalline modules have a performance guarantee of 25 years. However, these panels can have a longer lifetime if maintained properly. Crystalline modules pose little to no risk to the environment in terms of toxicity since most of the module is made of common construction materials such as tempered glass and aluminium. Furthermore, the PV cell is made from silicon, which is a common earth element. Some panels contain a small amount of lead, however; it is sealed in a panel to reduce the risk of environmental release. Even though these modules do not pose a significant environmental risk, they should be recycled.

CdTe thin film modules. CdTe modules also have a warranty of 25 years.[2] The modules contain small amounts of cadmium, which is a toxic heavy metal. Tests have shown that in the event that these panels are damaged, only a negligible amount will be leached from the panel. Also, in the event of a catastrophic event such as a fire, the release of cadmium is below human health evaluation levels.[3] Recycling of CdTe modules is the best option after decommissioning due to the potential release of cadmium into the environment. First Solar, a leading CdTe module manufacturer, has a take-back policy to pay for collecting and recycling modules at the end of their life cycle.[4]

CIGS Thin Film Modules: CIGS modules typically have a shorter lifetime than other PV module technologies. These cells consist of copper, indium, gallium and selenium, which are all not considered to be very toxic elements. However, the potential formation of hydrogen selenide from selenium is a concern because it is a carcinogen. Also, some cells contain a thin layer of cadmium, which is toxic to the environment. The release of these compounds into the environment is not a significant risk when the panels are in normal use. However, special disposal is required at the end of the product life. For recycling, CIGS modules can be collected through programs such as PV Cycle.

For the purpose of this proposed solar IPP project, bifacial monocrystalline modules will be utilized in the solar IPP plant. For end of life/failure or at decommissioning, provision

[2]

[3] Centre for Renewable and Sustainable Energy Studies (2015). First Solar's CdTe Module Technology – Performance, Life Cycle, Health and Safety Impact Assessment.

[4] Environment Canada (2012). Assessment of the Environmental Performance of Solar Photovoltaic Technologies.

in tender agreements with suppliers/vendors will ensure proper and safe collection, recycling and/or disposal, as needed.

9 Measures of Impact Assessment and Mitigation

This section is developed with the purpose that EDTL assesses impacts or any significant impacts of the project activities has on in particular to the environmental aspects, such as water, air, biodiversity, vegetation, land and marine ecosystem. The baseline conditions of the factors have been described within section 6 – Description of the Environment. The project impacts will be assessed on every phase throughout its lifecycle, i.e. pre-construction, construction, operation and decommissioning.

9.1 Impact assessment

9.1.1 Impact identification

The study identified the impacts using a matrix table to assess impacts against project activities that potentially affect natural and socio-economic resources.

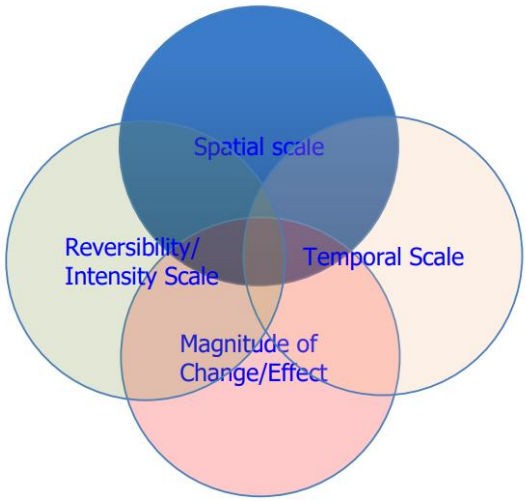
9.1.2 Impact significance assessment

(A) Impact significance

This is done based on three levels of significance (a) Low, (b) Moderate, (c) High in according to each parameter in quantity and quality formats (if quantification is possible). The analysis of the level of impact significance is discussed based on four main criteria as illustrated below:

- Spatial scale examines how much or far the impacts cover;
- Temporal scale identifies the duration of the impacts that can stay in the environment;
- Magnitude of change/effect scale identifies the measures of scale of benefit/disbenefit of an impact or a condition;
- Reversibility scale defines whether the condition can be changed and is a measure of the control over the effect of the condition.

Figure 9.1: Four criteria for assessing the significance of the impact



(B) Procedures for assessing the impacts

Assessing the impacts considers the “livelihood” and possibility of negative and positive impacts and their consequences from project implementation. Key risks were determined and mitigations were proposed to minimize and manage them. Key impact assessment procedures follow the following steps:

- Step 1: Through consultation with experts and local communities, impacts could be identified and assessed based on the four criteria above. These criteria ensured the appropriateness and accuracy of the assessment methods. Score was given 1, 2, or 3 for each impact based on the information and data collected from the fieldwork and the project information, and the field parameter testing.
- Step 2: Estimate and calculate the scores given to identify the level of key impact significance, i.e. low, moderate or high.
- Step 3: Impact significance were further assessed against the “Livelihood” criteria which includes four levels – not likely happen, possibly happen, surely happen, and will happen. Form this step, impact is finally rated as low, moderate or high again.
- Step 4: Impact significance of the whole project was assessed in form of percentage to assure how much impact significance is foreseen as low, moderate or high. Through these steps, impacts are carefully screened and assessed with proven evidence and discussions.

(C) Determining the mitigation measures

Avoidance: Avoiding impacts by modifying the design, process, location, footprint of the project through an iterative process in order to prevent or limit a possible impact. Minimization: Minimizing impacts by implementing decisions or activities that are designed to reduce the undesirable impacts of a proposed activity on the surrounding environment, including measures such as reducing the activity footprint, implementing emissions reduction technology, etc.

Rectification: Continued monitoring to ensure measures continue to be effective at preventing impact and progressively rehabilitating/restoring affected environment. This would include attempts at habitat re-creation, to restore the original land uses and biodiversity values.

Compensation: Compensating for the impact by replacing or providing substitute resources or environment.

(D) Environmental and Social Management Plan (ESMP) for the solar IPP project.

The ESMP covers both the construction, operations and decommission phase of the project. For all the environmental and social risks and potential impacts identified in

the EIS, management measures are recommended in the ESMP to prevent, minimize or offset these impacts. A preliminary budget and work plan for the management and monitoring activities are included in the EMP.

9.2 Project Environmental Benefits

This project is expected to have significant environmental benefits. A transition to clean solar energy generation will limit import dependence on diesel oil for power generation. This will contribute to national emission reduction targets and reduced pollution impacts.

Every unit (kWh) of diesel fueled electricity generation offset by the solar PV power plant is assumed to avoid 0.732 kg of CO_2 emissions (United Nations Framework Convention on Climate Change, 2019). Over the 20 year project life, it is estimated that approximately 2 million tonnes of CO_2 emissions will be avoided.

9.3 Environmental Impact Screening

This section discusses potential environmental in the context of the following factors:

- “Receptor”: the resource (human/natural environment/economic/social) that is potentially going to receive and have to cope with an impact.
- “Sensitivity”: ability to cope with an impact and/or its importance. It is generally accepted that human health is always a high sensitivity receptor, however, in terms of environmental/natural resources, the sensitivity varies according to the receptor e.g. scrubland with no significant biodiversity is considered less sensitive than a water body which may support aquatic ecosystems or the local biodiversity or livelihoods through fishing and/or tourism.
- “Magnitude”: the size of the potential impact. Impacts may be short term and considered low magnitude (e.g. noise, dust or vibration) or high magnitude and long term (e.g. global and regional flyways of migratory birds).
- Where an impact may occur, if there is no receptor to potentially receive the impact, then mitigating actions are not required. This follows the source-pathway-receptor model, whereby in order for there to be an impact, the pollutant or issue (source) needs to be present, the pathway to a receptor is needed (such as water for human consumption) and a receptor must be present to receive the impact, such as humans, flora or fauna.

Environmental impacts were assessed across all stages of project implementation i.e. (i) design and pre-construction stage, (ii) construction stage, and (iii) operation stage. Potential cumulative and induced impacts from further planned development of the project and other sources of similar impacts were also considered.

9.4 Pre-Construction Stage

The potential adverse environmental impacts associated with the project are avoided or minimized by: (i) careful site selection and route alignment; (ii) integrating key measures that will permanently become part of the infrastructure and will be included in the project detailed engineering design; (iii) implementation of environmental mitigation measures for identified impacts; and (iv) ensuring project environment management readiness. These are as follows:

9.4.1 Site and Route Selection

A critical issue for the management of impacts on identified receptors, particularly: a) surface water sources, b) groundwater wells, c) roads, d) global and regional flyways of migratory birds, e) protected areas, habitats and species of conservation value, and f) physical cultural resources (PCRs).

EDTL and ADB undertook a due diligence/scoping study to assess site options for the project. The preferred site was selected to avoid sensitive receptors such as protected areas, habitats and species of conservation value, hospitals/clinics/schools, PCRs as well as to minimize impacts on human health, households, crops and trees of economic value.

9.4.2 Land requirements

The proposed solar IPP project will be developed on publicly owned land that has already been acquired by EDTL. Thus, no land acquisition and/or resettlement will be applicable for this project development and all civil works will be conducted within the acquired land area.

9.4.3 Training and Capacity building

The capacity of the Contractors responsible for developing the project will be strengthened through the following measures:

- Appointment of at least one environment focal person and one social focal person within the PMU to be in charge of ESMP coordination, implementation and site inspections including project GRM;
- Appointment of at least one environment, health and safety officer within the Contractor staff to be in charge of ESMP coordination, implementation, site inspections and information disclosure and consultations;
- Appointment of at least one GRM focal person to be in charge of project GRM coordination, handling complaints, dispute resolution, site visits and information disclosure and consultations.

The PMU safeguards staff will provide training on ESMP implementation, supervision, monitoring and reporting, project GRM, conducting meaningful consultations and relevant

environmental rules and regulation. In addition, orientation and briefing of project staff, all contractors/subcontractors, hired workers will be conducted prior to mobilization on site during construction and operation stages.

9.5 Construction Phase

9.5.1 Physical Landscape

The solar IPP project will involve vegetation clearance and soil compaction for instance. Due to the topographical location of the project and the surrounding generally uneven and hilly terrain, the changes to physical landscape in the project development area will not be visible or have an impact beyond the project's immediate vicinity.

The solar IPP project has been designed to minimize adverse physical impacts to the surrounding landscape by minimizing the project footprint and blending major project components with the surroundings to the extent practicable.

9.5.2 Topography

Land leveling and grading works may alter drainage patterns at the solar plant site that may result in surface erosion, generation of spoil and localized flooding. Impacts will also result from installation of equipment, installation of cable routes (above ground and/or underground) and commissioning of new equipment. These impacts will be temporary and localized at the construction sites within the solar IPP project boundaries.

Mitigation measures

- Clear demarcation of work sites, no encroachment outside the demarcated zone;
- Access to adjacent properties and agricultural land will be maintained, as necessary;
- Construction camp/ workers accommodation set up at least 400 m from natural streams or any other water source at site including drainage/irrigation canals and dykes. Workers' accommodation: processes and standards—a guidance will be referred at the time of construction;
- Use of herbicides/pesticides will be prohibited for vegetation clearing to prevent soil contamination;
- Implement engineering and biological measures to prevent surface erosion such as provision of silt traps or sowing soil-binding grass, as needed;
- Restore loose soil from foundations through ramming, if required;
- Implement the following CEMP sub-plans;
- Spoils Disposal plan;
- Drainage and Storm-water Management Plan

Also, site rehabilitation and clean up plan will be implemented after completion of civil works to restore works site to pre-construction conditions, including landscaping along the fenced perimeter, maintain hedges and field margins to reduce visual and dust impact, re-seeding most or all of the site with native plant species (soil binding grass) to stabilize the soil and restore habitat as far as possible.

9.5.3 Air Quality

Potential air quality impacts during construction include dust emissions associated with earthworks and gaseous emissions from construction activities and heavy vehicles used to support the construction works. Some concerning activities are wind-borne dust emissions from cleared areas, stockpiles, and unpaved site roads; truck-derived dust emissions from traffic on haulage routes and dumping; and dozer- and excavator-derived dust emissions from clearing operations and earthworks.

Moderate temporary air quality impacts during peak construction phase of the project are anticipated because of construction activities scheduled in the dry season and due to fugitive dust generation associated with construction works and transport (of materials, equipment and machinery), loading, unloading and haulage of materials and corresponding increase in vehicular emissions. Use of construction machinery and equipment and movement of transport vehicles may also levels of nitrogen oxides (NOx) and sulfur oxides (SOx), affecting air quality. Building access roads to and within the project site (asphalt road pavement) will produce fumes containing small quantities of toxic and hazardous chemicals such as volatile organic compounds (VOC) and poly-aromatic hydrocarbons (PAH).

Mitigation measures

- Particulate dust generation will be minimized by restricting land clearing to the areas flagged for immediate use, progressively rehabilitating exposed soils as soon as practicable, avoiding clearing and earthworks activities during dry, windy conditions and applying water to all cleared, road and stockpile areas whenever weather conditions have the potential to mobilize fugitive dust.
- Open burning (e.g. of vegetation, waste, hydrocarbons) will be avoided.
- A detailed management and monitoring plan for air quality is provided in the Environmental and Social Management Plan (ESMP) for the Project, which will monitor emissions generated during construction.
- General air quality management and mitigation measures are as follows:
  - Conduct awareness trainings on dust emissions for project employees and workforce;
  - Restrict speed limit on unsealed roads to minimize dust generation;
  - Conduct topsoil stripping when soil is moist to the extent practical;

  - Monitor for air quality impacts near any sensitive receptors identified near construction areas and along the access roads;
  - Use low-sulphur fuels where practical;
  - Source low-emission diesel equipment (e.g. Tier 2 or better), where practical.
- The Contractor(s) will conduct air quality monitoring at the solar IPP site once before start of the civil works to establish the baseline, bi-monthly during the civil works and once after completion of the civil works to monitor and mitigate exceedances (if any) with respect to the applicable ambient air quality standards.
- Air monitoring will be conducted utilizing handheld air monitoring devices at select locations identified on site map.
- Open and exposed land areas at solar IPP plant will be sprayed with water to suppress dust levels particularly during the dry season.
- Use of chemical dust suppressants will be prohibited.
- Aside from this, works sites will be temporarily barricaded to control dust levels.
- Storage areas/warehouse for materials required for construction and civil works will be provided onsite (construction camps at the solar plant) to reduce construction vehicle trips of transporting materials and minimize stockpiling.
- Vehicles transporting materials that generate dust will be covered with tarps. Construction vehicles and machinery will be maintained to a high standard to minimize vehicular emissions and noise.
- Log of monitoring/incidences of non-compliance and rectification will be recorded and maintained.

9.5.4 Noise and vibration

Noise impacts will be temporary and localized at all construction sites as construction machinery and vehicles generate noise as they operate. Other noise sources include loading, unloading and haulage of equipment and materials. Significant noise impacts will be experienced by construction site workers/operators; construction machinery may produce noise levels up to 90 A-weighted decibels (dBA).

For the solar IPP plant, only construction workers will be this close to the machinery for extended periods of time. Measurement of noise levels at the plant site will be conducted once prior to start of the civil works to establish the baseline, bi-monthly during the civil works and once after completion of the civil works (the latter will be conducted at the solar plant only/upon commissioning of the substation) to monitor and mitigate exceedances (if any), with respect to the ambient noise standards. The potential impacts due to noise and vibration will be mitigated by the following measures as set out in the ESMP.

Potential vibration and noise impacts include those associated with vehicle movements, heavy machinery and construction activities. Since there are no nearby residents within 3km around the project, potential noise and vibration impacts are primarily issues for workers onsite. Sources of noise and vibration associated with project construction include:

- Light vehicle movements associated with personnel arrival/departure and onsite activities;
- Earthworks in the Project area using heavy machinery (clearing, grubbing and cutting);
- Earthworks associated with upgrade of the project internal roads;
- Concrete foundation works;
- Building and facility construction;
- Heavy vehicle movements associated with delivery of equipment, building materials and infrastructure.

Mitigation measures

- Noise and vibration associated with vehicles will be minimized by imposing a speed limit on site roads, by scheduling the majority of vehicle movements to daylight hours, minimizing air/exhaust braking where this would cause disturbance, and establishing soil berms or vegetation along roads to reduce the impact of traffic noise.
- Equipment with lower noise levels will be selected where practical and the operation of noisy equipment will be limited to daylight hours where practical.
- Schedule project supply deliveries to daylight hours.
- Maintain road surface to reduce rumble.
- Conduct periodic auditing of noise levels to ensure minimal potential impacts.
- Noise monitoring will be conducted utilizing handheld noise monitors at select locations identified on site map.
- Log of monitoring/incidences of non-compliance and rectification will be recorded and maintained.
- Drivers will be required to observe low speed wherever necessary and no blowing of horns.
- Construction activities utilizing heavy machinery work will be restricted between 8 AM – 6 PM.
- Advance warning to communities will be provided with respect to the timing of noisy activities.
- Construction vehicles and machinery will be maintained to a high standard to minimize emissions and noise.
- All construction workers / operators will use appropriate PPE including ear defenders when operating machinery.
- Implement CEMP sub-plans:
  - The Noise and Dust Control Plan

- Traffic and Road Management Plan

9.5.5 Surface Water Quality

During construction, sediment management will be critical to prevent water quality impacts due to erosion and suspended sediment transport impacts associated with land clearance and major earthworks. The removal of vegetation on site and along watercourses could increase erosion and impact local aquatic biodiversity. Surface and near-surface waters near the project area could become contaminated and would require management and/or treatment.

Any accidental spills of fuel, grey water or septic systems could potentially contaminate receiving waters. Wastes from construction activities have minimal potential to affect the water quality in the water bodies, if unmanaged. Significant generation of construction waste is expected during this phase from land clearance, construction activity and workforce activities. The potential surface water quality impacts associated with the project construction phase and which are to be managed by the project include:

- Erosion and sedimentation as a result of earthworks and land clearing.
- Release of oil, grease and hydrocarbon pollution associated with vehicles and heavy machinery.
- Release of pathogen and nutrient pollution associated with human activity, accommodation, sewage treatment and putrescible waste.

Mitigation measures

- To the extent practical, earthworks will be avoided during the wet season and periods of heavy rain, unless earthworks are needed to prevent erosion.
- Clearance of vegetation from water courses will be avoided wherever practical, leaving a minimum 100m of undisturbed riparian/forest cover on both sides of watercourses within the project area.
- All waste from land clearing, building activities, and accommodation will be collected, stored and disposed of safely in a manner that prevents any release of leachate into the water bodies in the project area.
- All chemicals and hydrocarbons will be handled and stored appropriately according to the ESMP and associated standard operation procedures, with adequate bunding, inspection, auditing and contingency measures.
- Mandatory personnel inductions will include awareness of water pollution issues and management, and project regulations will be enacted to prevent polluting activities that may pose a threat to the water bodies in the project area.
- Furthermore, surface water quality testing will be conducted of the water bodies in close proximity to the project site once prior to start of the civil works to establish the baseline,

once during the civil works and once after completion of civil works to ascertain if any changes have occurred with respect to surface water quality standards.

- Construction camps to be established at least 400 m from any water source.
- No washing or repair of equipment/machinery will take within 400 meters of any water source.
- Provision for a temporary secured hazardous materials handling and waste storage area will be provided across all work sites including site for broken and redundant solar panels.
- Provision for a temporary secured hazardous materials handling and waste storage area will be provided across all work sites including site for broken and redundant solar panels.
- Provide temporary sanitary facilities (e.g. pit latrines/portable toilets) to workers and safe drinking water.
- Groundwater abstraction will be avoided.
- Contractors to include in the construction schedule estimates of anticipated annual water usage and sources of water for construction.
- Implement CEMP sub-plan.
- Drainage and Storm-water Management Plan.

All activities will be supervised by the EDTL PMU's Environment Officer and Social Officer.

9.5.6 Groundwater Quality

There are some potential effluences for groundwater contamination, i.e. contamination of soil and groundwater with oil, grease and hydrocarbon pollution associated with vehicles and heavy machinery and with pathogen and nutrient pollution associated with human activity, accommodation, sewage treatment and putrescible waste.

Mitigation measures

- All chemicals and hydrocarbons will be handled and stored appropriately according to the ESMP and associated standard operation procedures, with adequate bunding, hardstand preparation including lining, concreting or compaction, as well as inspection, auditing and contingency measures.
- Septic tank will be installed to keep wastewater from toilet and kitchen to prevent pollution to groundwater.
- Groundwater quality is to be monitored using groundwater monitoring bores installed up and down gradient of potential contamination zones. Important quality parameters to be monitored as per applicable guidelines.

9.5.7 Hydrology

The predicted impacts on hydrology associated with the project construction phase and which are to be managed by the Project include:

- Increased surface runoff from the developed areas of the catchment.
- Slightly altered flow regime in ephemeral waterways downstream of any water bodies in close proximity to the site.

Mitigation measures

- The project has been designed to minimize long-term negative impacts to surface water drainage, flood risk levels, and local hydrology within and downstream of the project area.
- Surface runoff from developed areas of the project is to be controlled by the installation of drainage channels to minimize erosion and flood risk.

9.5.8 Soil Quality

Vegetation will be cleared in preparation for the construction of project components. Measures are therefore required to minimize soil erosion (by rain and wind) and prevent sediment release to the water bodies in close proximity to the site. Soil compaction within active construction areas is likely due to heavy traffic passage and construction activities. Soil contamination from accidental leaks/spills of hydrocarbons, oil, grease, chemicals and sewage/wastewater effluent is also possible and will require management.

Mitigation measures

- The project has been designed to minimize long-term negative impacts to soil function in the project site by recovering topsoil stripped from clearing and construction activities and subsequently for progressive and final rehabilitation.
- Land clearing is to be limited to the immediate project site required for development to the extent practical.
- Activities involving chemicals or hydrocarbons (including storage of broken and redundant solar panels) are to be restricted to designated areas that have been prepared with appropriate bunding, a concrete or compacted earth base, and fully contained by drainage controls.
- An appropriate sanitation system is to be provided to collect all waste and sewage for proper storage and disposal;
- Strict controls on the use of sanitation facilities will be implemented through education and enforcement.

9.5.9 Waste Generation

Impacts due to waste generation during construction stage have been assessed for all infrastructure types under the solar IPP plant and discussed as follows:

- Impacts on resource use and impacts associated with disposal will arise from waste generated during site preparation and civil works. This includes generation of inert wastes e.g. spoil, biodegradable wastes e.g. cleared vegetation, construction debris, packaging waste, metal scrap, domestic waste.
- Impacts of disposal and wind-blown litter will be seen at the construction areas whereas the impacts of resource use are national and global.

Mitigation measures

- Establish a covered onsite sorting and recycling area away from existing water sources, drainage /irrigation canals or water sources.
- Transport of recyclables, scrap, discarded equipment to depots, dedicated storage yards for resale or auction to authorized dealers. The broken or damaged solar panels will be sold to a solar panel specializing panel recycling.
- For other type of wastes, licensed companies will be hired to collect, transport and dispose of wastes at licensed dump facilities.
- Biodegradable waste such as cleared vegetation may be provided to local communities for use.
- Provide multiple waste containers at construction camps.
- Waste burning will be prohibited.
- No final waste disposal on site.

9.5.10 Biological Impacts

A biodiversity assessment has been carried out for the project; the flora and fauna recorded during the data search, ground surveys and consultations did not reveal the presence of species or habitats of particular conservation value within the project area of influence. There are no protected areas or community forests in or around the solar plant site.

Construction impacts on terrestrial flora and fauna within the solar plant site will be negligible because the site is located in an area that does not contain any terrestrial or aquatic flora of any special significance.

9.5.11 Vegetation impacts

The most significant impact to terrestrial habitats and flora associated with the project is expected to occur during the construction phase when habitats within the project footprint will be cleared. Since the project site is located far away from any areas of note, thus habitat

clearance will not result in the loss of natural or modified habitats and no critical habitats have been found.

Mitigation measures

- Construction camps to be set up at least 400 m from any water source, drainage channels;
- Access to adjacent properties will be maintained, as necessary;
- Vegetation clearances will be strictly restricted to work sites;
- Use of herbicides/pesticides will be prohibited for vegetation clearing to prevent soil contamination;
- Excess spoil will be backfilled onsite or spread out in a manner that causes no disturbance to existing drainage channels or local drainage pattern;
- Implement the following CEMP sub-plans:
  - Strictly implement the Spoils Disposal plan
  - Drainage and Storm-water Management Plan
  - Site Rehabilitation and Clean-up Plan after completion of civil works to preconstruction conditions including vegetation planting to stabilize soil where it does not compromise the intended function.

9.5.12 Fauna Impacts

The significant impact to priority fauna will be the loss of a proportion of their habitat during construction. This impact will largely be localized and restricted to the limited vegetation to be removed from the project site. As preparatory works begin, the on-site species will move into other parts of their range. Other priority birds, reptiles and small mammals have a wide habitat tolerance and are likely to move into similar habitat elsewhere.

Mitigation measures

- The project will design a plant layout to avoid most sensitive habitats including maintaining the buffer zone for instance to keep habitats as possible.
- The project will avoid direct and indirect impacts to any areas of biodiversity sensitivity.
- Habitat clearance will be undertaken in a progressive and sensitive manner to enable priority fauna to move away from the area of works and to avoid isolating fauna in fragmented areas of habitat.
- Adverse impact to habitats, flora and fauna arising from fugitive dust will be minimized through the regular application of water to reduce dust levels in areas of biodiversity sensitivity (particularly during the dry season), the stabilization of landforms and the implementation of erosion prevention measures.
- Raise awareness with workforce and local villagers about importance of protecting forest resources and conservation important species and their habitats.

9.5.13 Fishery and other aquatic biodiversity

Several seasonal minor creeks in and around the project site will be slightly modified for the construction of associated components. Vegetated areas occurring within the project footprint will also be cleared. Potential impacts will include:

- Release of suspended sediment from construction activities
- Clearing or modification of watercourses in the project site
- Accidental spills of diesel fuel

Mitigation measures

- The project design minimizes potential impacts to aquatic habitat by minimizing the construction footprint, which avoids local wetlands and waterways to the extent possible and primarily drains through a single catchment into the sea.
- Proper transport, storage, handling and disposal procedures for hazardous substances will be developed and implemented to prevent spills and leaks entering the water bodies in the project area and the sea.
- Personnel and contractors will be prohibited, as a condition of employment, from fishing and trading in aquatic natural resources.

The potential impacts on ecological resources will be mitigated by the following measures as set out in the ESMP:

- Minimize vegetation clearing confined to the footprint of the solar plant area.
- No use of chemicals (pesticides/herbicides).
- Maintain hedges and field margins along solar plant perimeter.
- After completion of civil works, implement Site Rehabilitation and Clean Up Plan including landscaping along the fenced perimeter of the solar plant, re-seeding most or all of the site with native species of plants.
- Provision for adequate ground clearance under fencing for allowing passage of animals/wild species to prevent habitat fragmentation.
- Restoring temporarily disturbed areas to pre-construction conditions.
- Trees below 3 m will not be cut or felled, minimum lopping and pruning will be undertaken as necessary.
- Any identified bat roosting sites will not be disturbed.
- Restoring temporary land use (used for material storage) to pre-construction conditions.

9.5.14 Local Economic Development

- Despite the generally positive impacts the Project will have on economic development and employment, there is a risk of inequitable employment, training and procurement opportunities or inadequate communication leading to community dissatisfaction.
- The project will implement the preferential local recruitment and procurement policies in place. Implementation of social management and monitoring as per the ESMP and sub-plans: Stakeholder Engagement Plan and Grievance Mechanism.
- Provide a grievance mechanism for the Project.

9.5.15 Forest Resource Use

Project construction will result in the removal of small bushes in the project footprint, exclusion of the public from the project site and its resources, and the potential for increased pressure on forest resources from local villagers.

Management measure

- The project will demarcate the project boundary and avoid the key community forest collection areas when siting infrastructure in the Project design.
- The project will ban on unauthorized collection of forest resources, including plants, and firewood within and around the project areas.
- The project will set up a grievance mechanism.
- The project will monitor the vegetation clearance to avoid any vast and unnecessary clearance.

9.5.16 Water Uses

There is a slight risk to downstream water users related to the possibility of impacts on water quality associated with project construction activities including contamination of water resources with sediment and chemicals such as diesel, grease and oil. Other impacts may arise from modifications to local creeks/drainages. Groundwater is not a significant source of water for the project, and no significant impacts on groundwater quality or availability are expected during the construction phase.

Management measures

- All hydrocarbons, oils and greases will be handled, stored and used in designated areas according to standard operation procedures with adequate bunding, hardstand preparation (e.g. lining, concreting or compaction), inspection, auditing and contingency measure.
- Mandatory personnel inductions will include awareness of water pollution issues and management.

9.5.17 Occupational Health and Safety

During the construction phase, more workers will be employed to support project construction, to be housed on site in the construction camps. The key factors that will pose risks to worker health and safety are movement of heavy machinery and high volumes of traffic on site as well as any potential injuries resulting from electrical and civil works while developing the project infrastructure.

Management measures

- The project will demarcate exclusion and safety zones around any high-risk areas.
- The project will strictly require all workers wear personal protective equipment appropriate to their duties with signage at designated sites.
- Clinical assistance will be available to project personnel and medical emergency evacuation procedures will be developed.
- Fatigue will be monitored and managed during travel and during on site operations.
- Standard Operating Procedures (SOPs) for the safe handling, storage and transportation of associated facilities and materials.
- The project will strictly implement the management and monitoring measures as per ESMP for water quality, waste management, air, health and safety, noise and vibration and transport measures.
- Implement CEMP sub-plan on Occupational Health and Safety (OHS) Plan.
- Provide sanitary facilities and wash areas, safe drinking water and garbage bins.
- Provide health assessments (health and fitness to workers once every two months).
- Periodic training will be provided to workers in all aspects of the ERP and OHS
- Coordinate with nearest hospital for arrangements in case of accidents.
- Provide first aid treatment for construction sites and camp.
- Assess safety risks and safety protocols (such as for electrical works, working at heights, etc.), and implement.
- Workers will be equipped with PPE including proper safety clothes and protection gear/equipment to avoid accidents.
- Provide communication devices to designated site officers / engineers.
- Electrical safety risks will be assessed and safety protocols will be developed and implemented such as for electrical works, working at heights, etc.
- All works at height will be prohibited during night time, periods of fog and strong wind.
- All workers climbing towers will have a Safety Certificate of Class 391 or above.

- All towers, steel structures and equipment will be properly earthed and equipped with lightening protection.
- When testing electrical equipment, all unrelated works in the flagged zone – marked as danger zone- will be stopped and unrelated workers will leave the zone.
- Records of health assessments/incidents/accidents/near-miss/fatalities will be maintained.

9.5.18 Community Health and Safety

Site preparation and civil works, movement of vehicles bringing equipment, materials, supplies and machinery may interfere with road crossings, flow of traffic and may cause an increase in traffic congestion. These activities may pose safety risks to the communities residing in close proximity to the work sites and general public. In addition, construction camps and an influx of workers may cause social conflict or even lead to the spread of any communicable diseases. Contractors will obtain permissions from relevant authorities before commencement of activities. A code of conduct will be developed for all relevant stakeholder and workers to keep the work organized and safe.

The Project may also generate (fugitive) dust mainly from upgrading the access road, clearing the forestland for infrastructure and transportation of materials and equipment. Noise from these activities may also disturb nearby residents at night as well as impact on daily economic/business activities. Also, during the construction phase, the project may lead to a number of key risks for community health, food security and safety, including:

- Safety impacts will be primarily associated with accidents involving company vehicles along the project access road. During construction, in particular, there will be a significant increase in project traffic.
- Potential psycho-social and health impacts among project personnel associated with air quality, noise, and vibration effects.

Management measures

- Security fencing and patrols to prevent safety impacts from any construction activities undertaken during construction.
- Potential noise impacts will be reduced to acceptable levels through scheduled daytime construction, while dust generation will be managed through regular water spraying on major dust sources associated with the project.
- The project will strictly implement the management and monitoring measures as per ESMP for water quality, waste management, air, health and safety, noise and vibration, and transportation; and sub-plans including Emergency Preparedness and Response Plan, Community Health and Safety Plan, Stakeholder Engagement Plan, Traffic and Transport Management Plan, and Waste Management Plan.

- Provide healthcare services for project employees with an appropriately staffed site clinic • Effectively control the risks associated with accidents involving multiple vehicles, interactions between different types of vehicles with consideration for the volume and speed of traffic, and vehicle and person interactions.
- Obeying speed limits and apply additional caution by considering environmental conditions such as time of day, visibility, precipitation.
- Implement an effective site waste management strategy and surface water drainage to prevent the incidence of vector-borne and water-related diseases.
- Develop a management strategy for worker accommodation in line with international/national standards to minimize spread of infectious disease and food-related illnesses.
- Adhere to strict schedule for completion of civil works and avoid prolonged construction and disturbance.
- Implement CEMP sub-plans.
- Community Health and Safety Plan.
- Traffic and Road Management Plan.
- Provide perimeter fencing to mitigate trespassing (fencing will be constructed with adequate ground clearance for passing of wild animals/other species at the solar IPP plant site).
- Provide sufficient lights, clear warning signs and danger signals.
- Assign security personnel to prevent accidents, trespassing and pilferage.
- Warning signs and cones will be installed in and around the transmission tower site and along roads, with clearly marked danger zones.
- Safety flags and flag persons will be used, as needed.
- Record of incidents/accidents/near-miss/fatalities associated with the project will be maintained.
- Records of issues raised will be maintained in accordance with GRMs.
- Outreach to local communities to disseminate knowledge about safety and ERPs at or near solar IPP plant will be provided via information disclosure and consultation activities, project information booklet (PIB) / frequently asked questions (FAQ) flyers.

9.5.19 Physical Cultural Resources (PCRs)

There are no known PCRs in the project area of the solar IPP plant. However, site preparation and civil works during the construction stage have the potential to disturb as yet unknown PCRs. A ‘Chance Find’ Procedure will be implemented as necessary. All activities will be supervised by the EDTL’s PMU Environment and Social Officer.

9.5.20 Interruption to Existing Utilities

In order to reduce impacts on existing utilities (such as power outages), the solar IPP plant construction works will be scheduled in a phased manner. All activities will be supervised by EDTL's PMU Environment and Social Officer.

Use of Existing Access Roads. Delivery of equipment, materials and machinery to work sites at the solar IPP plant may lead to increase in traffic and road congestion. It may cause interference with road crossings during stringing of conductors. Movement of transport vehicles will also result in moderate air quality impacts (dust and increase in vehicular emissions) as well as an increase in noise (due to operation of transport vehicles) during peak construction period (these are discussed under Impact on Air Quality, Noise and Vibration). The potential impacts due to increase in traffic and road congestion will be mitigated through the following measures as set out in the ESMP:

- Implement Traffic and Road Management Plan.
- Follow planned transportation routes and delivery schedule.
- Any traffic detours to have danger and clearly visible warning signs as well as flag persons.
- Compliance with local speed limits vehicle load carrying capacity and other road regulations.
- Any damage to roads to be borne by Contractor(s).
- Record of incidents/accidents/near-miss/fatalities/road damage will be maintained.

9.5.21 Other Risks

Forest/vegetation catching fire in the dry season and flooding of the water bodies in close proximity to the project site during the wet season are risks that need to be accounted for in the planning, design and management of the Project.

Management measures

- The project will construct a fire path break around the project boundary to prevent forest/vegetation fires from reaching the solar IPP plant and other facilities.
- The project will maintain equipment ready for fire-fighting (e.g. water trucks with water cannons) and train personnel to respond to forest fires in the project area.
- Implement and provide inductions to all staff on the Emergency Preparedness and Response Procedures and measures described in the ESMP.
- Ongoing engagement with government authorities and consultation with local communities will form part of a proactive approach to prevent or reduce risk of natural hazards to project activities and communities.

9.6 Operation Phase

9.6.1 Workforce Organization and Orientation

The Concessionaire/Plant Operator will conduct briefing and orientation for all project staff, workers and its turnkey contractor/sub-contractors (facility operators):

- ESMP, GRM, Information disclosure and meaningful consultation, environmental monitoring and reporting requirements
- ADB and Timor Leste labor standards
- Responsibilities of the contractors in implementing SOPs and monitoring environmental compliance with environmental performance indicators and ESMP.
- Responsibility of the Contractors in engaging with affected persons for project GRM.
- Create awareness of sexually-transmitted diseases (HIV/AIDs), child labor, bonded labor or forced labor.
- Searching for an assessing, monitoring and recording keeping of carcass searches (birds/bats).
- Record and maintain briefing and orientation events log with duration and list of attendees.

9.6.2 Landscape Impact

The solar IPP plant will create a visual impact and may result in induced access to the area. The site is not surrounded by habitation or permanent structures. Steps to reduce visual impacts e.g. maintenance of hedges and field margins around the fenced perimeter will be incorporated after completion of civil works and during the start of operation. This project will showcase green development of the power sector in Timor Leste as well as preserve the local biodiversity. Solar panel glare issues are not anticipated for solar PV plants.

9.6.3 Air Quality, Noise and Vibration

Operation of the solar IPP plant will not impact the air quality except for some fugitive dust generation due to movement of transport vehicles. Noise-generating equipment (such as inverters/transformers) at the substation will be enclosed and periodic maintenance of equipment will be conducted to minimize disturbance.

9.6.4 Water Quality

Operation impacts on water quality and resources at the solar IPP plant may result due to excess usage, potential contamination to water sources due to accidental spills and leakage as well as due to accidental discharge of wastewater. Contractor(s) within 60 days of each contract year after the commercial operations date, will be required to provide to the EDTL

PMU reasonable estimates of water usage for purposes of operating and maintaining the solar PV plant for the applicable contract year.

Mitigation measures

The potential impacts on water quality and resources will be mitigated by the following measures as set out in the ESMP:

- Maintain storm water retention pond for use for PV cleaning.
- Periodic cleaning of storm water retention pond to remove debris.
- No use of chemicals/detergents for cleaning purposes.
- Provide and maintain permanent sanitary facilities to workers and safe drinking water.
- Provide and maintain a septic system for wastewater collection and disposal; tank system will be located at least 400 m from any water sources, to avoid contamination.
- Maintain permanent secured ('bunded') areas on impermeable surfaces and dykes capable of carrying 110% volume of materials for accidental spills or leakage.

9.6.5 Waste Generation

While it is not expected that solar PV panels of the solar IPP plant will require replacement since their life span is 25+ years; however, some may fail due to rain, humidity or heat. Inverters at the substation will likely be rebuilt as opposed to replaced. Small amounts of domestic solid waste will also be generated at the solar IPP plant site during operation. Lack of proper handling, storage and disposal of domestic waste and/or broken PV panels may result in adverse impacts. The potential impacts due to waste generation will be mitigated by following the measures as set out in the ESMP:

- Utilize licensed vendors/suppliers for collection, transportation and disposal of broken/unused PV panels.
- Store broken/redundant panels in covered bunded areas.
- Implement SOP for Materials Management and Waste Management.

9.6.6 Ecological Impacts

The large area of PV panels in the solar IPP plant may create a 'lake effect' which could attract birds that mistake the solar panels for a water body and the hot panels could kill or seriously injure birds, which attempt to land on them especially the young inexperienced ones. Visual deterrents and flight diverters will be provided at the solar plant, particularly close to the storm water retention pond.

9.6.7 Occupational Health and Safety

Contractors will comply with the relevant safety measures required by law and as per International Best Practices. The potential impacts to workers will be mitigated through the following measures as set out in the ESMP:

- Implement SOP for Occupational Health and Safety.
- Compliance to relevant national electrical safety standards.
- Provide and maintain signage as per Institute of Electrical and Electronics Engineers standards at dangerous places for warning of electrical hazards.
- Provide and maintain health assessment by a competent medical practitioner for all workers.
- Provide periodic training to all workers with access to electrical and hazardous conditions and workers will be certified to work on site.
- Provide and maintain workers appropriate PPE.
- Equipment and tools will be inspected before use to ensure proper and safe operation.
- Appropriate grounding and deactivation of live power equipment during maintenance work or if working in close proximity to the equipment; provision of lightning arrestors as appropriate.
- Record of health assessments, incidents, accidents, near-miss, fatalities will be maintained.
- EMF levels expected to be below the limits set by International Commission on Non-Ionizing Radiation Protection which is 4.17 kV/m for electric field and 833 miliGauss for magnetic field; periodic EMF monitoring using handheld devices as required.

9.7 Decommissioning

The solar plant facility lifespan is expected to be >20 years, at which point it might be decommissioned. Typical activities during the decommissioning and site reclamation phase include facility removal, breaking up of concrete pads and foundations, removal of access roads that are not maintained for other uses, re-contouring the surface (if required), and land re-vegetation and replantation of trees. Associated impacts include erosion, noise, dust and vehicle exhaust and the need to properly manage large amounts of debris, solar panels, wire and cabling, electronics, etc.

Solar plant and its power production may have a much longer lifespan that the solar PV plants (order of 45 to 60 years), which may be further extended through maintenance and periodic equipment replacement.

The ESMP plan provides a preliminary assessment of potential mitigation measures/safeguards that may be implemented at a minimum of six months prior to plant closure at that time. This will be followed by a detailed decommissioning and site reclamation

plan to be developed at that time. The preliminary assessment will include measures for avoiding and/or minimizing surface erosion, impact to air and water quality, noise and vibration, flow alteration, waste generation, impact to flora and fauna, traffic related issues as well as health and safety of workers and communities.

10 Evaluation of Social Impacts

This section of the EIS provides an insight of the project related social aspects that may or may not be impacted directly or indirectly. This social impact will be evaluated generally to socio-cultural aspects, existing institutional and local political status and participation in addition to fundamental social issues describes in Section 10.4 below.

10.1 Intention and Objective

The main objective of the social impact evaluation is to identify any social aspects, which can be potentially impacted by the development of the proposed project and to design management and control measures to avoid, mitigate and/or compensate any adverse impacts and thus can improve general conditions, such as open an opportunity for positive social development, for instance to enable employment and training.

This social impact assessment is based on secondary information available from desk review of existing reports as well as primary data collected as part of the EIS development. Secondary information provides an overall context of the social characteristics of the Haturalan and Lifao Sucos. Interviews were targeting community members residing close to the project area. The interviews were designed to provide understanding of how the development will affect these subgroups as well as a way of collecting ideas on ways to avoid, mitigate or offset the potential social effects. Both desk review and field work were done during project preparation (pre-construction) phase.

10.2 Description of Socio-Cultural Context, Institutional, and Political History

The proposed site is located on publicly owned land and is situated in Haturalan and Lifao Suco (village) under the Laleia post administrative of Manatuto municipality. The nearby hamlets surrounding the proposed solar PV site to be impacted are Ralan, Uma Luc, Weboro under Hatuaralan Suco (village) and Lenao, Uma Clalan and Uma Rantau under Lifao Suco (village).

Manatuto municipality is located to the east of Dili and it is one of the country’s least populated and most rugged municipalities with large braided rivers and a very mountainous hinterland. Much of the landscape and its villages have remained virtually unchanged for centuries. In addition to the official languages of East Timor (Tetum and Portuguese), a large part of the population of the municipality speaks the Malayo-Polynesian language Galoli, which is designated as a "national language" by the constitution.

Most of the households in the project area are living in urban or semi-urban area and the households are inhabited by only Christian catholic community and there is no presence of indigenous people in the project area.

Majority of the households are a nuclear family and three fourths of the population comes under vulnerable family as either family is headed by a woman, poor households or having a physically challenged person or a landless family or a household having an elderly person. Almost all the houses are electrified in the project area and the main purpose of using electricity is lighting and one fourth of the household also uses it for cooking.

10.3 Consideration of Legislation and Regulations

The project does not entail any land acquisition and does not cause involuntary resettlement and does not impact any indigenous people. This section briefly discusses about various laws and regulations related to land ownership, acquisition and leasing and the policy analysis is also provided for broader understanding of implications of these laws and regulations. The laws and regulation will only be applicable if impacts on land acquisition, involuntary resettlement and indigenous peoples are triggered.

10.3.1 National and Local Policy Framework

For the Democratic Republic of Timor-Leste, compensation principles and policy framework for land acquisition, compensation and supports are governed by Land Law (2003) and relevant decrees. A summary of key legal provisions relevant to land acquisition, compensation and supports is provided below.

Constitution of Democratic Republic of Timor-Leste. Section 141 of the Constitution states that the ownership, use and development of land as one of the factors for economic production shall be regulated by law and Section 54 of the Constitution covers the right to private property and states that:

- Every individual has the right to private property and can transfer it during his or her lifetime or on death, in accordance with the law;
- Private property should not be used to the detriment of its social purpose;
- Requisitioning and expropriation of property for public purposes shall only take place following fair compensation in accordance with the law; and
- Only national citizens have the right to ownership of land.

The first **Land Law** of Timor-Leste was promulgated in March 2003 and was designed to serve as an umbrella law for the rest of the land and property regime. The law established by the National Directorate for Land and Property Cadastral Survey (NDLPCS) as a legal entity and defined its jurisdiction and articulated general rules concerning land tenure and property rights

to be further developed by ensuing legislation[5]. Moreover, this law established a one-year period for both nationals and non-nationals to register their land claims. The Land Law 2003 vests all land that belonged to the Portuguese state, and all state property acquired or built by the Indonesian regime, in the new state of Timor-Leste.

Decree No. 6 issued by the Government in February 2011 provides for granting compensation to relocate unlawful occupants of State property based on humanitarian considerations[6].

Decree No. 27 approved on July 6, 2011 allows private property rights registration by landowners/persons in areas where cadastral surveys have been completed (following registration and verification of claims by the government) and confirmed that the claims to land are undisputed.

The Civil Code which was promulgated in 2011 and came into force in March 2012 includes a section that governs day-to-day land decisions such as the sale and lease of land.

The new Land Law (Transitional Land Law 2017) was approved on June 05, 2017 by Timorese Parliament. The Law interprets who owns what land and in the case of conflicting claims, who has the strongest right to the land. The purpose of the Law is to clarify the legal status of land ownership by bringing into effect the different dimensions of the right to private property provided for in the Constitution of Timor-Leste. Clarification of property rights is done through the recognition of prior property rights. In addition, the law creates the concept of informal property rights[7] and recognizes community ownership[8]. Access to land is guaranteed in two ways.

Firstly with the creation of the National Land Registry, intended to allow the emergence of a safe and transparent real estate market, and secondly with the clarification of assets belonging to the State, potentially enabling it to carry out a better management of its assets, which can

[5]Following provisions of the Law, NDLPCS has produced Property/Building Identification Numbers for the land and property owners to register to constitute database on land and property owners for further legalization processing.

[6] The Article 2 of the Decree stipulates criteria establishing for compensations: (a) composition of the household; (b) duration of the occupancy; (c) type of occupancy; (d) type of construction; and (e) depreciations and improvements.

[7] According to the Article 2 (Item g) of the Law, "Informal property rights" means the rights on immovable property arising in the light of customary law and arising from durable, which have the characteristics of property rights. The informal property right corresponds to a traditional and individual right to land, allowing those who have not previously obtained documents regarding their property rights to now be able to invoke them in the same terms as those who previously had their rights formalized. In this field, this law operates the formalization of these rights through its registration.

[8] According to the Article 27 of the Law, the property recognized as the property of the local community is recognized by the community as being of common use and shared by a group of individuals or families, organized according to local customs and practices.

be distributed to those who may not otherwise have access to land. The law also provides criteria for the resolution of disputes and the principle of compensation where there is “duplicity of rights”.

The Expropriation Law 2017 is the most current and relevant law pertaining to involuntary land acquisition and compensation. The Law determines the conditions and establishes the procedures and limits under which the state can take private land for public good and under which it will provide fair compensation. The Expropriation Law recognizes the right to private property and guarantee of fair compensation for expropriated land, as fundamental rights of citizens. Under the Law, the expropriation of property for public purposes will be only possible where it is not possible to acquire it amicably through private negotiations. The Council of Ministers with advice of the Ministry of Justice will be empowered to issue a notice of public purpose for expropriation.

Law No. 13/2017 on special regime for the definition of the Ownership of Property is to clarify the legal status of property and to promote distribution and access to land. Clarifications of property rights are done through the recognition of prior property rights.

10.4 Analysis of Fundamental Social Issues

Potential social impacts foreseen for the projects include (i) permanent land acquisition and involuntary resettlement, (ii) Impact on Indigenous Peoples (iii) Impact on Livelihood, (iv) Impact on Tourism, (v) Impact due to Transmission Line (Right of Way and Tower base), (vi) Temporary impact on land acquisition during Construction. Details are described below in the following sections.

10.4.1 Overall Socio-Economic Benefits

Project beneficiaries are those that will directly benefit from the reliable power supply to be generated from the proposed solar PV which will be harnessed in addition to the existing conventional source of power generation. The beneficiaries in the project are general and will target the country of Timor-Leste as a whole with indirect benefits to local consumers which includes domestic, agricultural, commercial and industrial. Additionally, the project will provide some temporary job opportunities during project construction. The project’s impact will be improved power sector reliability in the country as a whole. The project will indirectly contribute to poverty reduction through more reliable electric services to the households.

Under the project, improved and uninterrupted power supply will result in increased agricultural, commercial and industrial activities contributing to economic growth. It is expected to have positive impact and improve the quality of life of the people, including vulnerable

groups, and minimize power shortage. Adequate electric power supply is essential for achieving sustainable economic growth.

With improved and uninterrupted power supply the project will directly and indirectly contribute to poverty reduction at local level through (i) the creation of unskilled/semi-skilled employment during the construction; (ii) income generation and livelihood activities associated with the business; and (iii) minimization of load shedding. The economic growth, particularly through commercial and industrial activities will contribute to the country's gross domestic product. The project will have a positive long-term impact on the country's economy and living standards of the population.

The project will provide limited short-term employment opportunities for unskilled and semi-skilled workers. There will be opportunities for creation of temporary jobs during the project implementation especially during construction. It is assumed that the construction work will continue over three years of time where and some employment will be generated during construction. Developer and construction contractor will engage local labor during construction where feasible. All those local labors who will be engaged temporarily will be provided with health and safety tools for construction work.

The project is assessed to have limited potential to contribute to local economy through the informal activities of temporary laborers during the project implementation where the developer or the EPC contractor will engage local labor for unskilled and semi-skilled people. There will be some new economic opportunities in project site where the nearby villagers are eager to open small eateries, canteens and small shops which can be used by the construction workers during construction.

Reliable electricity will have direct positive impacts on social infrastructure such as hospitals, schools, community structures etc. Currently, the existing power supply is not enough to sustain the demands of uninterrupted electric supply to such facilities. Therefore, the project will indirectly contribute to better testing equipment in hospitals, eagerness of children for attending the schools etc. where the women and other vulnerable section of people will benefit.

10.4.2 Impact on Land Acquisition and Involuntary Resettlement

Solar PV Site: There will be no land acquisition and physical displacement, therefore, there will be no impact on involuntary resettlement. The land is a state-owned land and no private occupation is there in the land. Site visits and initial due diligence confirmed that the land is not under any use for cultivation or productive use and there are no houses or habitats reside in the proposed land. No informal settlers or no informal use of the land is reported. EDTL will obtain necessary permission and possession from the ministry of justice through general directorate of land and property. The national cadastral services will be involved in the land

surveys and verification following which the land will be allotted to EDTL for the development of solar projects. Details are provided in **Table 10.1** below**.**

Table 10.1: Salient Social Features of Proposed Site

Particulars	Description/Details/Status
Location Details	Municipality – Manatuto Post Administrative- Laleia Suco- Hatuaralan Suco and Lifao Suco Hamlets- Ralan, Uma Luc, Weboro, Lenao, Uma Clalan and Uma Rantau
Whether the land has been identified	Yes, it has been identified
And if identified then whether finalized	Almost finalized which is the Manatuto modified site
Approximate Distance of proposed site from nearby habitats (East-West-North-South)	2 – 3 km
Total Area required for solar project (hectare)	176 ha
Ownership of land (private/ Government/Customary/Community)	Government (State Owned)
If Government, then which department and are there any informal settlers in the government land	Ministry of Justice State Secretary of Lands and Properties General Directorate of Lands and Properties National Directorate of Land and Properties
Is the land used by any indigenous peoples or customary use and does the land have any legacy issue	No, the land is an open land and not used.
Land Use Pattern (Cultivation/Barren)	Barren
If Private, how many land owners?	N/A
Are there any tenants/sharecroppers in the land	No
Are there any houses or building in the proposed land that will be affected? If yes, how many	There are no houses or building in the proposed land.
Are there any religious or cultural structures the proposed land	There are no religious structures, a military observation post from the Indonesia occupation was identified. A potential cultural site identified at the top of the hill needs further investigation.
is there any crop or trees present and if yes what type of crop and what type of trees with approximate Number of Trees to be cut	There are no crops. However, there are hundreds of mixed trees, incl. wild tamarinds and other types of trees (i.e. to be identified) but the land is mostly covered in shrubs.
Will there be any loss of access due to the project	The solar installation will be fenced preventing access to the site. A public road runs through the site.
Are there indigenous peoples to be affected due to project	No indigenous people to be affected due to the project.
Are there indigenous peoples living in the surrounding of proposed project. If yes, provide details such as name, numbers and location etc.	No indigenous people living in the surrounding area.

Particulars	Description/Details/Status
Has EDTL initiated the land procurement process	Feasibility study to be completed before land transfer is initiated.
Are there any concerns of local people related to the solar project	Local people supported the project as it will provide employment and bring about overall development.

Substation Connection and Bay Extension: The power to be generated from the proposed solar PV needs to be connected to a substation. There is already an existing substation which is Manatuto 150kV substation where additional bays will be constructed to connect the power. As far as bay extension in the existing Manatuto substation is concerned, due diligence found that adequate space is available and the construction activities will be confined within the existing substation.

Summary Details: Details on the land acquisition and involuntary resettlement solar PV and substation are given in **Table 10.2** below.

Table 10.2: Impact on Land Acquisition and Involuntary Resettlement

Particulars	Impacts	Remarks
Land Acquisition and Involuntary Resettlement for Solar PV site	No impacts because there will be no land acquisition required and the land is state owned land. • Approximately 176 hectares of state-owned land available • No involuntary land acquisition • No physical displacement and involuntary Resettlement • No productive use of the land • No presence of informal settlers	Land will be transferred to EDTL through interdepartmental mechanism.
Land Acquisition and Involuntary Resettlement for Associated Substations/Bay Extension	• No land acquisition required • No physical displacement and involuntary Resettlement • No productive use of the land • No presence of informal settlers	No additional land required as the connection will be installed within the existing Manatuto substation.

10.4.3 Impact on Indigenous People

Indigenous people in Timor-Leste are not so well defined or recognized. Although there are ethnic people living in Timor-Leste but they are not necessarily indigenous people. As indicated by the socio-economic survey, the project area does not have any presence of indigenous people. The people living in the project surrounding are general Timorese population. Therefore, there will be no impact on indigenous people.

10.4.4 Impact due to Evacuation Line

The Project needs prior evacuation. There will be low or no impacts due to construction of evacuation line. In case of Manatuto, no such new lines are to be constructed as there are existing line passing nearby the proposed solar sites where the evacuation from solar PV will be connected. The existing 150 kV line intersects the proposed site. In addition, the 20kV line runs parallel to the road. Both of these lines can be potentially used to evacuate the power produced9. Nearby substation is Manatuto's Substation. Existing 150 kV line is nearby at 10 to 30 meters length where evacuation of power can be connected with. No potential social impacts are foreseen. Details are provided in Table 10.3 below.

Table 10.3: Evacuation Line Details

PARTICULARS	DETAILS
Name of the Solar Site	Manatuto
Voltage of Evacuation Line and what shall be the Right of Way	The existing 150 kV line intersects the proposed site. In addition, the 20kV line runs parallel to the road. Both of these lines can be potentially used to evacuate the power produced. In case of a new lines, the impacts are to be assessed further based on the final route alignment as confirmed by the technical team which is likely to be minimal
Name of Nearby Substation to be connected and is there adequate land for additional Bay	Manatuto's Substation
Length of Evacuation Line (Km)	Approx. 10-30 meters to connect into the existing evacuation line. (in case of new lines, further assessment required)
Number of settlements/villages /urban pockets through which evacuation line will be passing through and names and GPS coordinates of these settlement	Not known yet. (Full line survey of existing infrastructure is required to confirm)
Approximate Distance of evacuation line from nearby habitation (Left Side and Right Side of Line from the central line)	No habitation identified along the existing evacuation line.
Are there indigenous peoples residing in the evacuation line corridor? Is the area designated as Indigenous people's area?	No No.
Type of Area (Agricultural/Crop Area/ Plantation/Settlement or Residential Area/Along the Road/Commercial Area etc.	Barren land with no activities.
Ownership of land (private/ Government)	Government.
General Land Use Pattern along the Corridor (Current Use)	Barren land
Will the line cross over houses or buildings	No

[9] In case of a new lines, the impacts are to be assessed further based on the final route alignment as confirmed by the technical team which is likely to be minimal.

PARTICULARS	DETAILS
Will the line pass over Religious or Cultural Properties	Already existing line, therefore, no impacts
Are the crops to be affected and if yes, names of the crops	Already existing line, therefore, no impacts
Approximate Number of Trees to be cut	Already existing line, therefore, no impacts
Types and Names of Trees along the Corridor	Already existing line, therefore, no impacts
Observation (Kindly mention if there is any sensitive issues regarding the line and the corridor)	Project can use existing evacuation line.

10.4.5 Impacts on Crops and Trees

There are no crops found in the proposed solar PV site. Also, the evacuation line will not cause any damage to crops or trees because, it is a small connection to the existing line. However, there are hundreds of mixed trees, including wild tamarinds and other types of trees in the solar PV site, otherwise, the land is mostly covered in shrubs. The wild trees are on state-owned land and do not belong to any individual and the trees are not productive except some wild tamarinds where local people use it occasionally for consumption and small scale selling in the market. People also use these trees for their firewood.

There is no formal use of such tamarind trees by any specific individual or group rather than occasional collection of tamarinds randomly by the community. There might be some impact on the loss of income through tamarind collection, however, this is not their primary source of income or livelihood. There are also spare lands where tamarinds trees are found and people can use them. The usage of tamarind trees is informal, seasonal and not significant.

10.4.6 Impact on Income and Livelihood

The land is not used for any productive use. No cultivation is found in the proposed land for solar PV. The land is mostly covered with wild trees and shrubs. However, it has been found that there are some wild tamarinds trees where local people collect the tamarinds for self-consumption and also for selling in the market and especially on the road side. Clearing of these tamarind trees will have indirect impact on loss of income and livelihood.

There will be no specific individual users to any specific trees. It is basically used seasonally by the community as a whole including women. They do not have any legal claim to such trees. Therefore, the impacts on loss of income and livelihood are negligible and generic in nature. Fishing is very minimal in the sea near to the site. The project will not restrict any fishing activities, however, loss of access way to fishing activities might be disturbed.

10.4.7 Impact on Tourism

There is no such big potential in tourism in the project area. Although the site is close to the sea, no such tourist activities occur. No such water sports or activities are found in the sea side. It is also noted that the required land area for the solar will not restrict the movement of the people. There will be enough uninterrupted links to the water bodies. On the other hand, the solar being an innovative and new development, may attract more tourists in the future when the projects are operational and when more infrastructure is developed through the project.

10.4.8 Temporary Impact on land acquisition during construction

It is also assumed that land will be required on temporary basis for assembling the panels, storing the equipment, building the labor camps etc. during the project construction. These will be construction related impacts which the developer will have to find on their own with due consultation and agreement with the local people. These are temporary requirement for the project construction activities. However, anything that requires permanent structure such as office for operation and maintenance etc. will not be considered as temporary rather these will be considered as permanent impact. It is foreseen that all such activities can be managed within the allotted land.

10.4.9 Impact on Loss of Access and other Socio-economic activities

Approach road to the proposed site is available and linked to the existing highway. This will require further upgradation and shall be paved for project use. This will not require any additional land and there will be no temporary impacts. However, there is a pathway which runs in the middle of the proposed site where local people use it for their passage and access from one place to another. This will be restricted which requires alternate access road along the solar PV plant boundary.

There are livestock in the nearby localities where local people occasionally use it for cow resting or bring them for grazing. However, once the site is cordoned off, there are ample areas around the site where the livestock can graze.

10.4.10 Impact on Women and Gender Issues

Women in the project area are generally engaged in household activities and also in agricultural activities including some small-scale business. Women are equally involved in the decisions making of the family and also contribute to family income when feasible. There will be no disproportionate impact on women due to the solar project. Women have been consulted during the public consultations and will be further consulted during the project planning and their concerns will be addressed and clarified.

Future opportunities will be explored to engage women in the project activities and also to include women as beneficiaries under the social development programs to be structured based on the detailed assessment. Women may be trained, and they may find opportunities to take part in the project operation. Any negative impacts occurring during the project will be mitigated and women will be given special attention.

10.4.11 Other Social Impacts

There may be temporary influx of outside workers and in migration in the communities, however, the risk is foreseen to be minimal as far as tensions between outside labor and local population is concerned. The construction camp would be situated within the existing boundary of solar PV boundary that will be allotted to the construction workers. Any potential security issues will be avoided though proper lighting near construction areas and deputing security guards in the construction place. There may be an impact on community health and safety due to exposure to electric currents, hazardous materials etc. which needs attention. There will be issues related to management of community concerns linked to impacts associated with construction phase issues (like air and dust emissions, traffic, influx and community safety/security, noise/vibration, etc.) and adverse impact/inconveniencies resulting from it.

The impacts are not significant and such issues will be addressed as part of the environment management plan. Access to potable water in the project area is not going to be affected by the project setting. Regarding increased risk of community health and HIV/AIDS and other diseases, the risk is minimal due to minimal influx of outside laborers. The project is not anticipated to disrupt social networks and relationships as there is no such permanent influx of in-migrant population except some temporary laborers. The project is not anticipated to create competition between groups for employment and other economic benefits as there is no major or permanent influx of population into the project area. There will be no such social conflicts.

10.4.12 Summary of Impacts

The summary of social impacts are provided in the **Table 10.4** below**.**

Table 10.4: Summary Impacts

PARTICULARS	IMPACT
Land Acquisition	No land acquisition is required and the land is confirmed to be state owned land.
Involuntary Resettlement	No physical displacement and no informal encroachments on the land.
Indigenous Peoples	No impact on indigenous peoples.

Approach Road	Near to the Highways and will be constructed within the demarcated area but needs lots of cutting and filling.
Evacuation Line	Approx. 10-30 meters to connect into the existing evacuation line. Manatuto substation has enough spare space for additional bay to connect the line from solar site.
Loss of Access	People use the land for collection of fuel wood and some forest products which may be restricted and pathways used by locals may be restricted.
Loss of Income and Livelihood	Land is usually not used for any crops. Some forest products such as Tamarind collection is secondary and not significant and is informal in nature. No tourism activities and no fishing. No fishing activities. No loss of primary source of income and no loss of livelihood.
Loss of Crops and Trees	There are no crops found in the proposed solar PV site. Several wild trees are there including wild tamarinds and other types of trees.
Other Concerns	Access around the solar site shall be kept uninterrupted and access to the sea shall not be restricted and some grazing of livestock occasionally.

11 Economic Evaluation

11.1 Economic Loss due to Environmental Impacts

It is known that the latest record of economic activities within the municipality is considerably low; with the community earning less than $40 per month. In addition to this, the employment rate increases rather slow at both national and municipal level. With the presence of this project in the municipality, it could actually and highly likely to increase the local community income or economic opportunities. These include job opportunities for locals, market opportunities, rural road development and other social development activity that could be improved through corporate social responsibility (CSR).

The economic values for environmental impacts of the project will be mitigated through the following acceptable standard approaches:

1. Select plants and equipment that meet the dust and noise quality best practice for the well-being of local employees and communities as well as the environment.

2. Use proper equipment and methodology for site clearance to limit impacts of noise and dust pollution to the nearest community and environment.

3. Ensure local communities have access to employment opportunities in the project implementation phase

4. Select proper construction and decommissioning technology and approach that limit environmental impacts.

5. Develop and implement Grievance Redress Mechanism (GRM) to ensure that any project non-compliances are managed and controlled and establish and maintain a harmonious and workable relationship with the local community.

6. Establish and implement environmental monitoring program control and monitor the project implementation impacts are within standard threshold setup within this EIS document.

7. Develop and implement Biodiversity activities plan to replace or restore any loss forest ecosystem, terrestrial habitats, flora and fauna, wetlands etc.

8. Use all applicable (qualified) local products and services through local shops and companies.

The monetary economic benefits on both the environment and local community as well to the country as whole have been covered under local content.

11.2 Positive Economic Impacts

In addition to the above impacts, the facility will also generate several positive economic impacts in the form of employment and income generation for the workers as well as tax contribution to the government. For employment generation, the facility will generate two types of employments – permanent and temporary ones during its course from site preparation, construction and O&M phases. It is estimated that there will be 10 permanent employees and 5 temporary employees who will work in various section of the proposed solar IPP project.

It is estimated that the total salaries and benefits being paid to the permanent employees will be between USD 300 to USD 1000 per month while for the temporary workers will most likely earn between USD 150 to USD 300 per month. A total private investment of USD 70 million is projected for development of the solar IPP project.

11.3 Qualitative Discussion of Impacts

Besides a discussion on the above potential economic impacts, it is also important to qualitatively discuss several impacts that have not been expressed in financial terms either because it is hard to put a monetary value on it or because it is deemed unnecessary to do so. These types of impacts included impacts related to the protection of the environment from temporary or permanent damage due to project operation.

Other project impacts that are not necessarily converted into monetary values are labour and civic activity and other forms of “collective efficacy” or “social capital” such as building community trust, reciprocity and civic engagement are not included in monetary value (Cahn, 2014). These non-monetary value aspects are not likely to be impacted by any project activities. They are in fact embedded or rooted within the traditional customs and culture of local community.

12 Summary of Environmental Management Plan

12.1 Overview of EMP

The Environmental Management Plan (EMP) is a plan developed in addition to EIS document for the proposed project in order to provide information of the standard operation procedures and processes in implementing of the project activities. The EMP is focused on the safety and healthy perspective of the project in terms of human, plants, animals and the environment as whole that may or may not be impacted as results of the development of the project.

The objective of the EMP is to provide project activities processes and procedures that have mitigation measures based on all identified and related impacts aspects and level specified within the EIS. It is an independent document of the EIS that will act as a tool for ensuring the mitigation of all the identified negative impacts and development of all the positive impacts are carried out effectively throughout the project lifecycle.

The following are the EMP key approaches in control and monitoring of the implementation project activities, include:

- Identify all environmental impacts through environmental impact studies.
- Minimize environmental impacts through engineering and design means.
- Manage risk of ongoing impacts through continuous monitoring and measurement throughout the project lifecycle.

The EMP shall be methodically improved to ensure that best available technologies and methods as well as environmental management practices are implemented in a way that it is cost-effective, pragmatic and efficient.

The project EMP provides the following:

- Environmental impacts and its mitigation measures for all aspects identified and in accordance with the acceptable best practices.
- Monitoring measures and standards
- Threshold of measurement criteria, which are internationally accepted.
- Reporting requirements
- Continuous improvement process.

Further, the EMP will be reviewed based on the following conditions, such as:

- Changes of a plan or activity process or procedure that may pose any detrimental effect to project, human or environmental as whole; it also applicable for any positive changes that consider adding value into the project, social or environment as whole;

- Changes of responsibility towards any social and environmental aspects identified within the project EIS or EMP and its frameworks;
- Changes of any project related country legislation that may require to update the EMP and its frameworks; and
- Changes of monitoring results that may require to update any threshold or environmental limit value identified within project EIS or EMP and its frameworks.

12.2 Environmental Management, Monitoring and Reporting

During the construction phase, the overall responsibility for the implementation and monitoring of the EMP rests with the PMU, EDTL and the Construction Supervision Consultant (CSC), will supervise the implementation of the proposed mitigation measures and monitor the implementation progress in the field.

During the operation phase, the overall responsibility for the implementation and monitoring of the EMP rests with the Concessionaire/PPP Operator for this project with oversight from EDTL.

12.3 Mitigation and Monitoring Plan

This EMP covers the project area of influence and consists of three components: (i) project readiness checks for effective environmental management during design and pre-construction stage and environmental mitigation measures during construction and operation stage; and (ii) environmental monitoring measures during all stages of project implementation.

The summary of environmental and social mitigation and monitoring measures are presented in the Table 12.1 below.

12.4 Inclusion of EMP in Contract documents

In order to make the Concessionaire fully aware and responsible of the implications of the EMP and to ensure compliance, it is recommended that mitigation measures be treated separately in the tender documentation and that payment milestones shall be linked to performance, measured by execution of the prescribed mitigation measures. Such a procedure will help ensure adequate management of project impacts is carried out during the construction and operation phases, where a consistent approach will be expected on behalf of the Concessionaire so that data and information collected from monitoring programs is comparable with baseline monitoring data.

The EPC Contractor shall be made accountable through contract documents and/or other agreements for fulfilling the environmental safeguard obligations and delivering on the environmental safeguard components of the Project. The EPC Contractors shall be prepared

to co-operate with EDTL and supervising consultants and local population for the mitigation of adverse impacts. After the EMP's inclusion in the contract documents, the EPC Contractor will be bound to implement the EMP and will engage appropriately trained environmental and social management staff to ensure the implementation and effectiveness of the mitigation measures.

12.5 Institutional Arrangements and Implementation Responsibilities

12.5.1 Role of PMU EDTL

The PMU will:

- Coordinate activities with all stakeholders, review consultants, proposals, and provide overall guidance during various stages of project preparation;
- Manage and ensure safeguard due diligence and disclosure requirements such as Timor Leste national requirements;
- Have competent staff to manage contractors and ensure implementation of recommended mitigation measures;
- Ensure submission of all EIS requirements as per law by responsible entities; and
- Monitoring of activities of the entire project.

12.5.2 Role of Construction Supervision Consultant (CSC)

The CSC will be responsible for the following items:

- Incorporates into the project design the environmental protection and mitigation measures identified in the EMP for the design stage;
- Hire qualified and experienced staff to monitor;
- Ensure implementation of mitigation measures suggested in the EMP;
- Assists PMU to ensure that all environmental requirements and mitigation measures from the EIS and EMP are incorporated in the bidding and contract documents;
- Review of construction bidding documents;
- Prior to construction, review and approved the Contractor Site Specific Environmental Management Plans (SSEMPs);
- Undertakes environmental management capacity building activities for relevant project focal staff including staff from contractors.

7.1.6 Role of Project Contractor

The project Contractor will be responsible for following items:

- Implementation of, or adherence to, all provisions of the EIS and EMP;

- Preparation of site specific EMPs (SSEMPs) as required. SSEMPs will be prepared by Contractor's Environment Specialist, site in charge, HSE staff and project technical team before their mobilization and it will be submitted to Engineer of construction supervision consultant/PMU for review and approval.
- Contractor's environmental performance will rest with the person holding the highest management position within the contractor's organization. Reporting to their management, the contractor's site managers will be responsible for the effective implementation of the EMP.
- Preparation of monthly environmental monitoring reports.
- The Contractor will be required to have qualified and experienced Environmental Specialists in their team to ensure all mitigation measures are implemented during the different development phases of the project.

12.6 Environmental Capacity Building and Training

Capacity building and training programs are necessary for the project staff in order to control the negative impacts resulting from the project construction and during its operation phase. They will also require trainings on monitoring and inspecting of such a project for environmental impacts and for implementation of mitigation measures.

12.7 Performance Indicators

In order to evaluate the performance of the environmental management and monitoring plan, performance indicators are identified for the efficient and timely implementation of measures/actions proposed in the EMP. The indicators are defined both for the implementation phase and for the operation phase. QA/QC Consultant will be responsible for compiling the information on these indicators and report to EDTL.

In order to measure the overall environmental performance of the project, a list of performance indicators are given below:

- The number of inspections carried out by environmental team of Construction Supervision Consultant (CSC) per month.
- The number of non-compliances observed by CSC.
- Availability of environmental and OHS specialists in CSC.
- Availability of environmental and OHS specialists with Contractors.
- Timely reporting of documents (as defined in EMMP and monitoring plan).
- Number of training imparted to stakeholders/other capacity building initiatives.
- Number of grievances received.
- Number of grievances resolved.
- Number of construction related accidents.

Table 12.1: Summary of environmental and social mitigation and monitoring measures for solar IPP plant

Aspect	Project Phase	Parameters	Actions	Location	Frequency	Responsible Agency	Monitoring Agency
Physical Resources							
Landscape	Pre-construction	Maintain the existing landscape (shrubs etc.)	The project design is to minimize the impacts on the landscape through limiting the clearing where it is not necessary.	Project site	Once before construction	Contractor	CSC, EDTL & PMU, EDTL
	Construction		▪ The project minimizes its footprint and blending major project components with the surroundings to the extent practicable. ▪ The project undertakes required clearing of forested areas in the dry season, where possible, to prevent exposure of ground to erosion by rainfall.		Monthly	Contractor	CSC, EDTL & PMU, EDTL
	Decommissioning	Trees planted on site and existing landscape is improved.	The project restores the landscape through planting trees and habitats.		Once before completion	Solar IPP Operator	EDTL
Air Quality	Construction	Applicable air quality parameters	▪ Particulate dust generation will be minimized by restricting land clearing to the areas flagged for immediate use, progressively rehabilitating exposed soils as soon as practicable, avoiding clearing and earthworks activities during dry, windy conditions and applying water to all cleared, road and stockpile areas whenever weather conditions have the potential to mobilize fugitive dust. ▪ Open burning (e.g. of vegetation, waste, hydrocarbons) will be avoided. ▪ Conduct awareness trainings on dust emissions for project employees and workforce; ▪ Restrict speed limit on unsealed roads to minimize dust generation; ▪ Conduct topsoil stripping when soil is moist to the extent practical;	Project Site	Quarterly	Contractor	CSC, EDTL & PMU, EDTL

			▪ Monitor for air quality impacts near any sensitive receptors identified near construction areas and along the access roads; ▪ Use low-sulphur fuels where practical; ▪ Source low-emission diesel equipment (e.g. Tier 2 or better), where practical. ▪ The Contractor(s) will conduct air quality monitoring at the solar IPP site once before start of the civil works to establish the baseline, bi-monthly during the civil works and once after completion of the civil works to monitor and mitigate exceedances (if any) with respect to the applicable ambient air quality standards. ▪ Air monitoring will be conducted utilizing handheld air monitoring devices at select locations identified on site map. ▪ Open and exposed land areas at solar IPP plant will be sprayed with water to suppress dust levels particularly during the dry season. ▪ Use of chemical dust suppressants will be prohibited. ▪ Works sites will be temporarily barricaded to control dust levels. ▪ Storage areas/warehouse for materials required for construction and civil works will be provided onsite (construction camps at the solar plant) to reduce construction vehicle trips of transporting materials and minimize stockpiling. ▪ Vehicles transporting materials that generate dust will be covered with tarps. Construction vehicles and machinery will be maintained to a high standard to minimize vehicular emissions and noise. ▪ Log of monitoring/incidences of non-compliance and rectification will be recorded and maintained.				

Noise	Construction	Applicable noise parameters	▪ Noise and vibration associated with vehicles will be minimized by imposing a speed limit on site roads, by scheduling the majority of vehicle movements to daylight hours, minimizing air/exhaust braking where this would cause disturbance, and establishing soil berms or vegetation along roads to reduce the impact of traffic noise. ▪ Equipment with lower noise levels will be selected where practical and the operation of noisy equipment will be limited to daylight hours, where practical. ▪ Schedule project supply deliveries to daylight hours. ▪ Maintain road surface to reduce rumble. ▪ Conduct periodic auditing of noise levels to ensure minimal potential impacts. ▪ Noise monitoring will be conducted utilizing handheld noise monitors at select locations identified on site map. ▪ Log of monitoring/incidences of non-compliance and rectification will be recorded and maintained. ▪ Drivers will be required to observe low speed wherever necessary and no blowing of horns. ▪ Construction activities utilizing heavy machinery work will be restricted between 8 AM – 6 PM. ▪ Advance warning to communities will be provided with respect to the timing of noisy activities. ▪ Construction vehicles and machinery will be maintained to a high standard to minimize emissions and noise. ▪ All construction workers / operators will use appropriate PPE including ear defenders when operating machinery. ▪ Implement CEMP sub-plans: ▪ The Noise and Dust Control Plan	Project Site	Quarterly	Contractor	CSC, EDTL & PMU, EDTL

			▪ Traffic and Road Management Plan				
Topography	Construction	▪ Limited clearance of vegetation. ▪ Minimize the impacts on water and land.	▪ Clear demarcation of work sites, no encroachment outside the demarcated zone; ▪ Access to adjacent properties and agricultural land will be maintained, as necessary; ▪ Construction camp/ workers accommodation set up at least 400 m from natural streams or any other water source at site including drainage/irrigation canals and dykes. Workers' accommodation: processes and standards—a guidance will be referred at the time of construction; ▪ Use of herbicides/pesticides will be prohibited for vegetation clearing to prevent soil contamination; ▪ Implement engineering and biological measures to prevent surface erosion such as provision of silt traps or sowing soil-binding grass, as needed; ▪ Restore loose soil from foundations through ramming, if required; ▪ Implement the following CEMP sub-plans; ▪ Spoils Disposal plan; ▪ Drainage and Storm-water Management Plan	Project Site	Quarterly	Contractor	CSC, EDTL & PMU, EDTL
	Operation	Maintained existing landscape	▪ Maintain landscaping along the fenced perimeter of solar IPP plant. ▪ Maintain hedges and trees at field margins. ▪ Employ manual vegetation maintenance methods such as grazing by local cattle or manual trimming of grasses and plants within solar plant site and employ local labor. ▪ Maintain the reseeded site.	Project Site	Annually	Solar IPP Operator	EDTL
Soil Quality	Construction	Soil quality parameters	▪ The project has been designed to minimize long-term negative impacts to soil function in the project site by recovering topsoil stripped from clearing and construction activities and subsequently for progressive and final rehabilitation.	Project Site	Quarterly	Contractor	CSC, EDTL & PMU, EDTL

			▪ Land clearing is to be limited to the immediate project site required for development to the extent practical. ▪ Activities involving chemicals or hydrocarbons (including storage of broken and redundant solar panels) are to be restricted to designated areas that have been prepared with appropriate bunding, a concrete or compacted earth base, and fully contained by drainage controls. ▪ An appropriate sanitation system is to be provided to collect all waste and sewage for proper storage and disposal; ▪ Strict controls on the use of sanitation facilities will be implemented through education and enforcement.				
Hydrology	Pre-Construction	Physical properties of the existing drainage channels and water bodies.	Construction of drainages will be conducted during the dry season to prevent associated impacts such as sediment release into the nearby streams.	Water bodies on and next to project site.	Once before construction	Contractor	CSC, EDTL & PMU, EDTL
	Construction		▪ The project has been designed to minimize long-term negative impacts to surface water drainage, flood risk levels, and local hydrology within and downstream of the project area. ▪ Surface runoff from developed areas of the project is to be controlled by the installation of drainage channels to minimize erosion and flood risk.		Quarterly	Contractor	CSC, EDTL & PMU, EDTL
Surface water quality	Pre-Construction	Water quality parameters and buffer zone to protect water quality.	All project components will be designed to minimize potential impacts on water quality.	Water bodies on and next to project site.	Once before construction	Contractor	CSC, EDTL & PMU, EDTL
	Construction		▪ To the extent practical, earthworks will be avoided during the wet season and periods of heavy rain, unless earthworks are needed to prevent erosion. ▪ Clearance of vegetation from water courses will be avoided wherever practical, leaving a minimum 100m of undisturbed riparian/forest		Monthly	Contractor	CSC, EDTL & PMU, EDTL

			cover on both sides of watercourses within the project area. ▪ All waste from land clearing, building activities, and accommodation will be collected, stored and disposed of safely in a manner that prevents any release of leachate into the water bodies in the project area. ▪ All chemicals and hydrocarbons will be handled and stored appropriately according to the ESMP and associated standard operation procedures, with adequate bunding, inspection, auditing and contingency measures. ▪ Mandatory personnel inductions will include awareness of water pollution issues and management, and project regulations will be enacted to prevent polluting activities that may pose a threat to the water bodies in the project area. ▪ Furthermore, surface water quality testing will be conducted of the water bodies in close proximity to the project site once prior to start of the civil works to establish the baseline, once during the civil works and once after completion of civil works to ascertain if any changes have occurred with respect to surface water quality standards. ▪ Construction camps to be established at least 400 m from any water source. ▪ No washing or repair of equipment/machinery will take within 400 meters of any water source. ▪ Provision for a temporary secured hazardous materials handling and waste storage area will be provided across all work sites including site for broken and redundant solar panels. ▪ Provision for a temporary secured hazardous materials handling and waste storage area will be provided across all work sites including site for broken and redundant solar panels.				

			▪ Provide temporary sanitary facilities (e.g. pit latrines/portable toilets) to workers and safe drinking water. ▪ Groundwater abstraction will be avoided. ▪ Contractors to include in the construction schedule estimates of anticipated annual water usage and sources of water for construction. ▪ Implement CEMP sub-plan. ▪ Drainage and Storm-water Management Plan.				
Ground water quality	Pre-Construction	Water quality parameters.	The project design is to avoid impacts on groundwater quality as much as possible.	Bore hole project site	Once before construction	Contractor	CSC, EDTL & PMU, EDTL
	Construction		▪ All chemicals and hydrocarbons will be handled and stored appropriately according and associated standard operation procedures, with adequate bunding, hardstand preparation including lining, concreting or compaction, as well as inspection, auditing and contingency measures. ▪ Septic tank will be installed to keep wastewater from toilet and kitchen to prevent pollution to groundwater. ▪ Groundwater quality is to be monitored using groundwater monitoring bores installed up and down gradient of potential contamination zones. Important quality parameters to be monitored.		Quarterly	Contractor	CSC, EDTL & PMU, EDTL
Waste generation	Construction	To collect and dispose off waste in an environmentally friendly manner.	▪ Establish a covered onsite sorting and recycling area away from existing water sources, drainage /irrigation canals or water sources. ▪ Transport of recyclables, scrap, discarded equipment to depots, dedicated storage yards for resale or auction to authorized dealers. The broken or damaged solar panels will be sold to a solar panel specializing panel recycling. ▪ For other type of wastes, licensed companies will be hired to collect, transport and dispose of wastes at licensed dump facilities.	Project site	Monthly	Contractor	CSC, EDTL & PMU, EDTL

			▪ Biodegradable waste such as cleared vegetation may be provided to local communities for use. ▪ Provide multiple waste containers at construction camps. ▪ Waste burning will be prohibited. ▪ No final waste disposal on site.				
Water uses	Construction	Ensure efficient use of available water resources.	▪ All hydrocarbons, oils and greases will be handled, stored and used in designated areas according to standard operation procedures with adequate bunding, hardstand preparation (e.g. lining, concreting or compaction), inspection, auditing and contingency measure. ▪ Mandatory personnel inductions will include awareness of water pollution issues and management.	Project site and project area.	Monthly	Contractor	CSC, EDTL & PMU, EDTL
	Operation		▪ Maintain storm water retention pond for use for PV cleaning. ▪ Periodic cleaning of storm water retention pond to remove debris. ▪ No use of chemicals/detergents for cleaning purposes. ▪ Provide and maintain permanent sanitary facilities to workers and safe drinking water. ▪ Provide and maintain a septic system for wastewater collection and disposal; tank system will be located at least 400 m from any water sources, to avoid contamination. ▪ Maintain permanent secured (‘bunded’) areas on impermeable surfaces and dykes capable of carrying 110% volume of materials for accidental spills or leakage.	Project site	Project Site	Annually	Solar IPP Operator
Biological Resources							
Vegetation Impacts	Construction	Maintain the existing vegetation as	▪ Construction camps to be set up at least 400 m from any water source, drainage channels; ▪ Access to adjacent properties will be maintained, as necessary;	Project Site	Quarterly	Contractor	CSC, EDTL & PMU, EDTL

		much as possible.	▪ Vegetation clearances will be strictly restricted to work sites; ▪ Use of herbicides/pesticides will be prohibited for vegetation clearing to prevent soil contamination; ▪ Excess spoil will be backfilled onsite or spread out in a manner that causes no disturbance to existing drainage channels or local drainage pattern; ▪ Implement the following CEMP sub-plans: ▪ Strictly implement the Spoils Disposal plan ▪ Drainage and Storm-water Management Plan ▪ Site Rehabilitation and Clean-up Plan after completion of civil works to preconstruction conditions including vegetation planting to stabilize soil where it does not compromise the intended function.				
	Operation		Planting trees where possible within and around solar plant premises to keep the space greener.	Project Site	Annually	Solar IPP Operator	EDTL
Fauna Impacts	Construction	Maintain the existing habitats on site as much as possible.	▪ The project will design a plant layout to avoid most sensitive habitats including maintaining the buffer zone for instance to keep habitats as possible. ▪ The project will avoid direct and indirect impacts to any areas of biodiversity sensitivity. ▪ Habitat clearance will be undertaken in a progressive and sensitive manner to enable priority fauna to move away from the area of works and to avoid isolating fauna in fragmented areas of habitat. ▪ Adverse impact to habitats, flora and fauna arising from fugitive dust will be minimized through the regular application of water to reduce dust levels in areas of biodiversity sensitivity (particularly during the dry season), the stabilization of landforms and the implementation of erosion prevention measures.	Project Site	Quarterly	Contractor	CSC, EDTL & PMU, EDTL

			▪ Raise awareness with workforce and local villagers about importance of protecting forest resources and conservation important species and their habitats.				
	Operation		Planting trees where possible within to keep the space greener and extend more habitats.	Project Site	Annually	Solar IPP Operator	EDTL
Fishery impacts	Construction	Maintain the existing water bodies and waterways	▪ The project design minimizes potential impacts to aquatic habitat by minimizing the construction footprint, which avoids local wetlands and waterways to the extent possible and primarily drains through a single catchment into the sea. ▪ Proper transport, storage, handling and disposal procedures for hazardous substances will be developed and implemented to prevent spills and leaks entering the water bodies in the project area and the sea. ▪ Personnel and contractors will be prohibited, as a condition of employment, from fishing and trading in aquatic natural resources. ▪ Minimize vegetation clearing confined to the footprint of the solar plant area. ▪ No use of chemicals (pesticides/herbicides). ▪ Maintain hedges and field margins along solar plant perimeter. ▪ After completion of civil works, implement Site Rehabilitation and Clean Up Plan including landscaping along the fenced perimeter of the solar plant, re-seeding most or all of the site with native species of plants. ▪ Provision for adequate ground clearance under fencing for allowing passage of animals/wild species to prevent habitat fragmentation. ▪ Restoring temporarily disturbed areas to pre-construction conditions. ▪ Trees below 3 m will not be cut or felled, minimum lopping and pruning will be undertaken as necessary.	Water bodies and sea	Quarterly	Contractor	CSC, EDTL & PMU, EDTL

			▪ Any identified bat roosting sites will not be disturbed. ▪ Restoring temporary land use (used for material storage) to pre-construction conditions.				
Forest resource use	Construction	Maintain the existing shrub as far as possible.	▪ The project will demarcate the project boundary and avoid the key community forest collection areas when siting infrastructure in the Project design. ▪ The project will ban on unauthorized collection of forest resources, including plants, and firewood within and around the project areas. ▪ The project will set up a grievance mechanism. ▪ The project will monitor the vegetation clearance to avoid any vast and unnecessary clearance.	Project Site	Quarterly	Contractor	CSC, EDTL & PMU, EDTL
	Operation	Maintain the existing shrub and plant new trees where possible (not to block the sunlight).	The project will ban on unauthorized collection of forest resources, including plants, and firewood within and around the project areas.	Project Site	Annually	Solar IPP Operator	EDTL
Socio-Economic Resources							
Occupational Health and Safety	Construction	Minimized work risks for labor force	▪ The project will demarcate exclusion and safety zones around any high-risk areas. ▪ The project will strictly require all workers wear personal protective equipment appropriate to their duties with signage at designated sites. ▪ Clinical assistance will be available to project personnel and medical emergency evacuation procedures will be developed. ▪ Fatigue will be monitored and managed during travel and during on site operations. ▪ Standard Operating Procedures (SOPs) for the safe handling, storage and transportation of associated facilities and materials.	Project Site	Monthly	Contractor	CSC, EDTL & PMU, EDTL

			▪ The project will strictly implement the management and monitoring measures as per ESMP for water quality, waste management, air, health and safety, noise and vibration and transport measures. ▪ Implement CEMP sub-plan on Occupational Health and Safety (OHS) Plan. ▪ Provide sanitary facilities and wash areas, safe drinking water and garbage bins. ▪ Provide health assessments (health and fitness to workers once every two months). ▪ Periodic training will be provided to workers in all aspects of the ERP and OHS ▪ Coordinate with nearest hospital for arrangements in case of accidents. ▪ Provide first aid treatment for construction sites and camp. ▪ Assess safety risks and safety protocols (such as for electrical works, working at heights, etc.), and implement. ▪ Workers will be equipped with PPE including proper safety clothes and protection gear/equipment to avoid accidents. ▪ Provide communication devices to designated site officers / engineers. ▪ Electrical safety risks will be assessed and safety protocols will be developed and implemented such as for electrical works, working at heights, etc. ▪ All works at height will be prohibited during night time, periods of fog and strong wind. ▪ All workers climbing towers will have a Safety Certificate of Class 391 or above. ▪ All towers, steel structures and equipment will be properly earthed and equipped with lightening protection. ▪ When testing electrical equipment, all unrelated works in the flagged zone – marked as danger				

			zone- will be stopped and unrelated workers will leave the zone. ▪ Records of health assessments/incidents/accidents/near-miss/fatalities will be maintained.				
	Operation	Minimized work risks for labor or staff	▪ Compliance to relevant national electrical safety standards. ▪ Provide periodic training to all workers with access to electrical and hazardous conditions and workers will be certified to work on site. ▪ Provide and maintain appropriate PPEs to workers.	Project Site	Annually	Solar IPP Operator	EDTL
Community Health and Safety	Construction	Minimized work risks on related communities	▪ Security fencing and patrols to prevent safety impacts from any construction activities undertaken during construction. ▪ Potential noise impacts will be reduced to acceptable levels through scheduled daytime construction, while dust generation will be managed through regular water spraying on major dust sources associated with the project. ▪ The project will strictly implement the management and monitoring measures as per ESMP for water quality, waste management, air, health and safety, noise and vibration, and transportation; and sub-plans including Emergency Preparedness and Response Plan, Community Health and Safety Plan, Stakeholder Engagement Plan, Traffic and Transport Management Plan, and Waste Management Plan. ▪ Provide healthcare services for project employees with an appropriately staffed site clinic • Effectively control the risks associated with accidents involving multiple vehicles, interactions between different types of vehicles with consideration for the volume and speed of traffic, and vehicle and person interactions. ▪ Obeying speed limits and apply additional caution by considering environmental	Areas around project site	Monthly	Contractor	CSC, EDTL & PMU, EDTL

			conditions such as time of day, visibility, precipitation. ▪ Implement an effective site waste management strategy and surface water drainage to prevent the incidence of vector-borne and water-related diseases. ▪ Develop a management strategy for worker accommodation in line with international/national standards to minimize spread of infectious disease and food-related illnesses. ▪ Adhere to strict schedule for completion of civil works and avoid prolonged construction and disturbance. ▪ Implement CEMP sub-plans. ▪ Community Health and Safety Plan. ▪ Traffic and Road Management Plan. ▪ Provide perimeter fencing to mitigate trespassing (fencing will be constructed with adequate ground clearance for passing of wild animals/other species at the solar IPP plant site). ▪ Provide sufficient lights, clear warning signs and danger signals. ▪ Assign security personnel to prevent accidents, trespassing and pilferage. ▪ Warning signs and cones will be installed in and around the transmission tower site and along roads, with clearly marked danger zones. ▪ Safety flags and flag persons will be used, as needed. ▪ Record of incidents/accidents/near-miss/fatalities associated with the project will be maintained. ▪ Records of issues raised will be maintained in accordance with GRMs. ▪ Outreach to local communities to disseminate knowledge about safety and ERPs at or near solar IPP plant will be provided via information				

			disclosure and consultation activities, project information booklet (PIB) / frequently asked questions (FAQ) flyers.				

13 Disclosure of Information and Public Consultation

13.1 Public Consultation during Baseline Survey

Methodology and Approach

The Public Consultation has been conducted by means of direct meeting between the project owner and the participant. The facilitator and the project owner directly presented the material to the participants with a specific section dedicated to question and answer. Before the actual consultation, the facilitator has directly engaged with the participant informing the rundown of the public consultation itself. Apart from direct engagement there was also invitation formally issued to the participant.

Stakeholders' consultations were carried out informally and formally during the social impact assessment that includes local people, government officials from line agencies, traditional heads of communities in Haraluton Suco and Lifao Suco and women group. People are supportive of the Project because the Project will improve the power situation of the whole area and also provide employment opportunities to the local people and bring about economic development of the area.

The findings of the consultations revealed that the Project shall adopt adequate mitigation measures if any negative impacts occur. There is no loss of access to the sea. EDTL will provide relevant information such as construction schedule, environment management plan, social management plan, GRM details in a timely manner, in an accessible place, and in a form and language (English/Tetum) understandable to affected persons and other stakeholders. The summary of SIAMP and EMP will be made available in local language along with the English version. The draft SIAMP will be disclosed in ADB's website as well as in the website of EDTL.

Various methods have been used during the stakeholder's consultations during the socio-economic assessment studies. Methods used for public consultation and participation with concerned stakeholders are described in **Table 13.1.**

Table 13.1: Method of Consultations

Stakeholders	Purpose	Method
Officials of EA and IAs at Project Site Offices	• To seek their participation in the safeguards planning activities. • To discuss about ADB's broad policy principles, eligibility and entitlements etc.	• Individual meetings and team discussions

Stakeholders	Purpose	Method
Officials of Line Agencies such as Suco/	• To gather information about the land ownership, evacuation lines alignment etc.	• Individual meetings and discussions at offices and at sites
Local People/ Villagers living around the solar project area and especially in the project zone, tourists	• Information sharing about the project • Collecting views on the preliminary project layout and to receive concerns for further improvement • Seeking their views on how to minimize the economic loss • Seeking information on any indigenous population living in the project area • Discuss about potential impact and mitigation measures. • Discuss about Institutional setup and Grievance Redress Mechanism • Seeking their participation during the project implementation	• Informal and formal consultations at various location/ villages around the project area.
Focused Group Discussions among the women in the Project Areas.	• To prepare a gender assessment and to know about the general status of women • To make the women aware about the project and potential impacts	• Focused Group Discussions

13.2 Objective of Public Consultations

Following are the main objectives of the consultations:

- Make people aware about the project and its potential impacts with proposed mitigation measures.
- Share the project layout with the people to minimize adverse impacts.
- Understand the views of the people affected, with reference to loss of land, asset, income, livelihood and other social and environment concerns.
- Develop understanding thorough coordination between all stakeholders for successful implementation of the project.
- To increase awareness about the next steps relating to implementation and operation of project.
- To increase awareness about the mitigation measures and continued participation.

13.3 Public Consultations in the Project Area

Public Consultations were carried out by the social and environment team in two phases, one in August 2022 and the second in November- December 2022. A series of consultations were held with various stakeholders that include villagers and heads of

Haturalan and Lifao Sucos, officials of Laleia Administrative post, Manatuto, Conservation International -Timor Leste (NGO), National Cadastral Service, Ministry of Justice, Ministry of Higher Education, Science and Culture, Secretary of State for Professional Training and Employment and focused group discussions with women. These activities were conducted at project locations through informal and formal public meetings. Details of this Public Consultation, pictures, attendance list and Public Announcement are on Annexure I.

13.3.1 Findings of Consultations conducted in August 2022

A. Consultation with Head of Haturalan Suco

The people are not aware about the proposed solar project except the suco head. Regarding the land ownership, it is confirmed by the suco head that the land is a state-owned land and there are no legal titles to any individuals. The land is used periodically for firewood collection, tamarinds collection, occasional resting and grazing of livestock. No wild animal is found in the project area.

Total number of households in the suco is 240. Ninety percent (90%) of the households are electrified and electricity is mainly used for lighting, rice cooking, television watching, water pumping. Electricity is not used for agriculture. The economic activities are primarily agriculture and small business through shops. Most of the people have land and they do rice cultivation. They perceive that electricity can be used for modern farming for better yielding. There is no houses or habitats in the proposed site. No indigenous people reside in the periphery.

There is a school which is not electrified. However, there is a hospital and church which are electrified. It is viewed that the proposed site does not have any sacred entity such as graveyards or any religious activities.

People are very supportive about the project and they ensure about their participation during project implementation. They urge that the suco and local people shall be consulted at each phase of project development. They expect that local people shall be employed during construction.

According to the suco head, women are proactive both at households works as well at some other economic activities such as agriculture, running small shop, wage earning, etc and they expect that women shall also be involved in the project construction.

The people urge that EDTL shall implement development activities in the local area. Skill development program shall be initiated by the project. They welcome the project and

expect that the project will bring positive impacts to the local people and also to the whole country.

B. Consultation with Head of Lifao Suco

The head of the Suco in Lifao informed that they were aware about the project through media and also informed that he was consulted for finding various land options for solar PV. It has been reported that the land is state owned land. According to him, there is a small place near to the proposed solar site which is of historical importance and was considered to be a hidden place for citizen during Portuguese invasion. However, no such activities take place currently.

Lifao suco has approximately 375 households and most of the households are electrified. It is also stated that the land, sometimes, is used for temporary cow shelter during rainy season, however, they have plenty of alternatives and the project shall not have any problems due to this. The main occupation of the people is agriculture and some people do fishing for self-consumption. Usually, there are power cuts during heavy rain otherwise the power supply is stable. People also use the land sometimes for parking the boat which is very rare and there very few boats in the village. The land is also used for grazing of livestock occasionally during rainy season but alternate grazing place is available.

It is viewed that some people (approximately 20 families especially women) go for tamarinds collection from the land and also collection of firewood. However, these are informal in nature.

It is also stated that there are no indigenous people in the project area. Unemployment is a problem in the area. Women are involved in household work as well as actively participate in agriculture. According to them, they would like to be involved in the project implementation if such opportunities arise.

The people support the project and expect that they shall be consulted and considered as key stakeholders while developing the project. The project is quite beneficial as per the head of the suco as this will generate local employment and also will increase the power reliability. It is observed from the consultation that there are plenty of workforce available in the locality and some of them are skilled also and they expect that the project shall create avenues for temporary employment during project construction.

They expect some development work in the local area as part of social responsibility of the developer. They assure continuous support for the project. They expect that proper rituals are to be performed prior to commencement of the project and the local people

should be invited as it is their customary practice to have rituals for new work as it is considered auspicious.

C. Consultation with the Laleia Administrative Post, Manatuto

Consultation was held with the official at Laleia to gather information on the proposed solar PV site location. According to the administrative post at Laleia, is conformed that the land is state owned land and people do not use it for any cultivation except some temporary use in terms of grazing the livestock, collecting woods and tamarinds etc. They are aware about the project as the department has been consulted earlier by the EDTL team during land searching. No such critical issues have been identified and the site is feasible for solar PV. The department suggested for creation of employment and livelihood opportunities for the local people.

D. Consultation with the Conservation International – Timor-Leste (NGO)

Consultation was undertaken with the Conservation International-Timor-Leste which is a non-government organization working actively in biodiversity conservation and community-based conservation program. Core suggestion from the NGO is to make the project implemented through community participation and to protect and conserve the interest of local people. Also, another suggestion is to have integrated approach to develop the project through adequate participation from relevant ministries and agencies such as agriculture, fisheries, land management and forestry etc. Skill development training can be explored to maximize the project benefits.

E. Consultation with Ministry of Higher Education, Science and Culture

Objective of the consultation is to get their feedback and suggestion for the proposed solar project and to ascertain if any of existing culture or practice is to be impacted. As per the suggestion of the department, it is advised that their ministry shall be consulted and involved in the future planning so that any culturally sensitive concerns of the people will be affected.

The proposed site is free of any culturally sensitive issues, however, according to them, it is noted that people in the project area and people in general in the rural area consider land as sacred and they practice various rituals. However, as recorded during consultation, land is usually considered as sacred in general and no such specific rituals are practiced. According to the people, they wish that there shall be ritual ceremony prior to commencement of construction and inauguration of the project where the villagers should be invited to perform the auspicious rituals.

There was no objection to the land as proposed for the solar project. Consultation revealed that there is no presence of indigenous people in the proposed project location.

The land is a state-owned land. It is noted that there is an ancient cave called LAILI which exists 6 kilometers away from the proposed site. It is considered to be protected are as per their views. Salt extraction used to be taking place earlier in such land, however, it is not a core business and not a regular practice.

It is suggested that EDTL should work closely with environment and cultural ministry during further course of project development. There is no ancestral claim to the proposed land. As such there is no critical issues involved in the proposed solar PV location.

F. Consultation with Secretary of State for Professional Training and Employment

Consultation was held to understand the possible opportunities for skill development training in the project area and to seek their guidance on further planning for livelihood activities. According to them, the project is of national interest and will create employment and livelihood opportunities. They suggested that EDTL through its developer shall commit to some skilled development activities as part of corporate social responsibilities.

There are several potential opportunities which can be explored for skill development and capacity building in the areas such as fisheries, food processing, agriculture and livestock, horticulture, dry meat and prawn processing, and tamarinds processing etc. Women in the project area can be involved in some of these training activities.

It is also learnt that there is already a training institute in Dili which is called TIBAR training center which is a government institute, and they are providing training on solar. The institute can be considered for collaboration if any specific training needs to be provided on solar panel for project construction and operation where some people can be engaged.

G. Consultation with National Cadastral Services, Ministry of Justice

The objective of the meeting was to confirm land status of the proposed solar PV site and to seek further guidance on land procurement for the project. According to them the land is confirmed to be state owned land. EDTL has to work with the land cadastral department for finalization of site and boundary demarcation. There is no issue related to land title as there are no claims to the land ownership. In case of government projects, the land will be allotted to EDTL with some user rights. However, in case of private company or entity, it is usually leased for certain period. The proposed land for solar PV project is free from encumbrances.

13.3.2 Findings of Consultations conducted in November – December 2022

A. Public Consultation at Hatularan Suco

Public consultation was carried out with 3 community groups in the hamlet of Uma Iuk, Weboro and Ralan in the Hatularan Suco (village). The name of the post administrative of all the hamlets covered is Laleia. Theses hamlets are in the municipality of Manatuto. Details of the findings of the consultation is provided in Table 13.2 below.

Table 13.2: Findings of Public Consultations at Hatularan Suco

#	Issues	Participants' Opinion, Comments and Suggestions
1	Are the people aware of the solar project?	Most of the people in the hamlets are partially aware of the Project. The local authority or the Head of the suco have recently informed them about the project. The villagers have come to know about the project through the survey team.
2	What is the opinion of the local people about the Project?	The people of Uma Iuk feel the solar project will provide electricity during power failures. This project will create employment for their village for which they are happy. In Weboro, the community is grateful to the government and aspire that during the implementation of the project the government should involve the local people as a priority. Similarly, in Uma Ralan, people are happy that finally Timor-Leste can use solar power and they will not worry anymore about power cut.
3	Do you support this Project ?	There is 100 % support from the community of all the three hamlets as this project will benefit the local people. Government's efforts to bring new idea such as the IPP solar to increase electricity production are also supported by all the people living in the three hamlets.
4	What is the general demographics of the Project Area?	Among the 3 hamlets covered in this Suco, Weboro is the biggest hamlet with 146 households, followed Ralan with 110 households and Uma Iuk with 65 households. The population of Weboro is 490, Ralan is 419 and Uma IUk is 225. Galolen ethnic groups are there in all the 3 hamlets. The common language is Galolen and Tetum in all the three hamlets and the official language of Tetum and Portuguese are used in all the hamlets.
5	What are the economic activities in the area – farming etc,?	Agriculture is the major economic activity of the people living in the three hamlets. Besides farming, there are also other economic activities such as small business and hired employee in government and non-government sectors. In Weboro some families are engaged in fishing activities.
6	What is the agricultural land available in the project area?	In Weboro the total land available for agriculture is maximum with an estimated availability of 105 hectares and in Uma Iuk the total land for agricultural production is approximately 60-65 hectares. In Uma Ralan only 6-8 hectares is available for agriculture.
7	What are the major crops grown?	Rice is the major crops cultivated by most of the households. In Uma Iuk people also produce corn depending on the weather, and mustard, pumpkin and tamarind for own consumption.

#	Issues	Participants' Opinion, Comments and Suggestions
		In Weboro people also produce corn, vegetables like water spinach, mustard, tomato, but these are based on the weather. Fruits such as mango, banana, and coconut, are also produced in this hamlet. In Uma Ralan people also produce corn and vegetables.
8	What is the power situation in the area and for which purpose is it used?	All the households in the three hamlets are having electricity since the Indonesian occupation. All the hamlets use electricity mostly during the day time on the day of celebration like "lia" or a big day of religion wedding, ceremonies and family events. In Weboro people use electricity mainly for cooking. As all the households have electricity and use it for all the household activities, however some of the households use other energy sources like wood and fuels for cooking and lighting their houses. In the hamlets covered some households use petrol for the cooking stove.
9.	For how many hours power supply is available during a day?	Generally, there is no major problem on the availability of electricity in the three hamlets as found from the discussion. Few incidences of load shedding are there in Uma Rantau in a month and during rainy season or during any natural disaster like landslides or fallen trees power goes off and it takes 12 to 24 hours for restoring electricity. There is no problem during the dry season. The electricity is sufficient. The volume that the households use is based on the standard and is sufficient in the project area. There are no industries in any of the hamlets covered under the study.
10	Is there wild life present in the area?	There is no wildlife present in the project area
11	Are there any protected environmental areas nearby?	There is no protected area nearby the proposed project area.
12	Explain why and do they foresee any problems, e.g. disruption of land and activities during construction?	The proposed project land is used for grazing and people go to the land for collecting tamarind and firewood.
13	Will there be loss of grazing land?	The proposed project land is used for grazing. In Weboro and Uma Ralan, the community members are concerned about their livestocks. In Tinawake location, the local people have requested that fences should be built to prevent animals from entering the area.
14	There would be construction of small transmission line which may pass through your agricultural field. What would be your concern related to the tower footings and lines?	If the construction of transmission lines passes through agricultural fields, the people wanted compensation. The people fear the loss of tamarind trees.
15	What kind of compensation you expect for loss to land or crops or trees (cash or kind)?	The community from Uma Iuk and Uma Ralan stated that the project should protect the environment and for any tree cutting the project should plant more trees. The community members wanted that local people should be considered for providing labor work during construction.
16	Do you think that there will be loss to access to sea?	Yes. The local people fear that they will lose access to the sea, which may impact fishery. The local people requested for an alternative route for reaching the sea for fishing.

#	Issues	Participants' Opinion, Comments and Suggestions
17	Will there be impacts on social and cultural resources due to the construction of the Project?	The community considered the place Laleian, as a sacred place. Tinawaka is also considered as the centre for cultural and ritual activities. In Uma Iuk there is a sacred place, and one stone is united there, when they go there, they have to ask for permission, and they have to bring the elder or traditional leader as in Tetum called "Lia-nain" to guide this process. In Uma Ralan, people have requested to contact their traditional leaders and do the ritual ceremonies before commencing any activity at the proposed site. The project may bring outside people to the area, but the local people do not perceive any threat to socio-cultural resources, but they wish that government should follow their rituals involving the traditional elders before commencing the construction.
18	What are the concerns about community health and safety during the construction of the project?	The people in Uma luk were worried about the air pollution during the construction phase and wanted suitable measures should be taken to mitigate air pollution. As this is an electricity project there is risk of safety, they need to put the signages during the construction about risks and precautions to be adopted by the community. In Weboro, the local people were concerned about the accidents involving cows and wanted measures to be taken during the construction phase to avoid such accidents.
19.	What positive impacts and/or benefits do you think the project will have?	Electricity will be generated without using fossil fuel. Local people hope to get electricity, which will enhance their economic activities. The project will provide employment to the local people.
17	What negative impacts do you think the project will have?	The main concerns of the community are loss of access road to the sea for fishing, loss of open space for animals, and loss of flat plain lands. The community is also concern about loss of tamarind trees and other productive trees used for cooking. In Uma Ralan people suggested if any alternative land can be identified for the project.
18	What suggestions do they have for best implementation of the project?	The people of Weboro people wanted that the project should identify a place and water for animals. The people of Uma Ralan people suggested that the project should try to identify some tourism potential which will provide job opportunities. The people of Uma luk said they are unaware of the project and suggested that the government should appoint an expert to advice and give suggestions.
19	What other organizations of a social nature (NGOs/community-based organizations/civil society) active in the area?	In all the tree hamlets JICA supported the agricultural sector and World Vision created cooperative group for savings and loans. In Weboro local NGO Belun create awareness campaigns on conflict management and gender based-violence.
20	Are there any other Issues the people would like to share with us: (whether they welcome the project, will there be cooperation from the local community	The participants welcomed the project. The local community will be cooperating during the implementation of the project.

#	Issues	Participants' Opinion, Comments and Suggestions
	during the implementation, security measures, etc)?	In Weboro, there is higher unemployment among the youth so the community urge that that this project should prioritize employment for local people.
21	Please provide your views/ suggestions/recommendations	In Uma Iuk, the community says that the land selected for Solar PV is a flat land and if possible, they should consider the hills for the solar PV project instead of the flat land.
22	Others	The project should address all the concerns of the local people.

B. Public Consultation at Lifao Suco (Village)

Public consultation was carried out with 3 community groups in the hamlet of Uma Rentau, Uma Clalan and Lenao in the Lifau Suco (village). The name of the post administrative of all the hamlets covered is Laleia. These hamlets are in the municipality of Manatuto. Details of the findings of the consultation is provided in Table 13.3 below.

Table 13.3: Findings of Public Consultations at Lifao Suco

#	Issues	Participants' Opinion, Comments and Suggestions
1	Are the people aware of the solar project?	The people of Uma Rentau, the people were aware of the project through the Government and EDTL. The people of Lenao have come to know about the project through the survey team. The leaders of Uma Clalan knew about the project but not the local people.
2	What is the opinion of the local people about the Project?	The people of Uma Rentau were proud and happy about the project as they perceive that the project will bring energy from the Sun and thereby reduce the government expenditure. The community in Uma Clalan expect that the electricity will not only cover their village or Laleia alone but also for the whole territory of Timor-Leste. In Lenao, the community had some concerns as they have live stocks and want that the authority should provide alternative habitat for the cattles. They want alternate roads for the community to have access to sea. Further, they feel that many youths go overseas for jobs and if this project commences, it may give employment opportunity to young people.
3	Do you support this Project ?	There is 100 % support from the community of all the three hamlets as this project will benefit the local people. Government's efforts to bring new idea such as the IPP solar to increase electricity production are also supported by all the people living in the three hamlets.
4	What is the general demographics of the Project Area?	Uma Rentau is the biggest hamlet with 175 households, followed by Uma Clalan with 107 households and Lenao with 103 households. Galolen ethnic groups are present in all the 3 hamlets. The common language is Galolen and Tetum in Uma Rentau and only Galolen in the other

#	Issues	Participants' Opinion, Comments and Suggestions
		2 hamlets of Uma Clalan and Lenao. The official language of Tetum and Portuguese are used in Uma Rentau and in Uma Clalan and Lenao, only Tetum is used.
5	What are the economic activities in the area – farming etc,?	Agriculture is the major economic activity of the people living in all the three hamlets. Besides farming, there are other economic activities such as small business and employment in government and non-government sectors. In Uma Clalan, women raise animals like sheep, goats, pigs, dogs, and chickens, while men take care of bulls. In Lenao some people work as fishermen.
6	What is the agricultural land available in the project area?	In Uma Rentau and Uma Clalan all the households have agricultural land and in Lenao about 80 % of the households have agricultural land. In the Uma Rentau village, the community from each family has 4-6 hectares mainly used for rice cultivation. In Uma Clalan, each household have 5-6 hectares and some of the households have 1 or 0.5 hectares of land used for rice cultivation. In Lenao about 80 % of the households have agricultural land and the land size is in the range of 1 to 5 hectares per family.
7	What are the major crops grown?	Rice is the major crops cultivated by most of the households in all the three hamlets. Other crops cultivated are mustard, water spinach, brinjal, and drumsticks, sweet potatoes. Fruits like papaya, mango, coconut and tamarind are also grown in Lenao. In Uma Rentau the villagers cultivate two crops annually.
8	What is the power situation in the area and for which purpose is it used?	All the households in the three hamlets are having electricity since the Indonesian occupation. Besides lighting, electricity is also used for cooking in most of the households. As all the households have electricity and use it for all the household activities, however some of the households use other energy sources like wood and fuels for cooking and lighting their houses. In the hamlets covered some households use petrol for the cooking stove.
9.	For how many hours power supply is available during a day?	Generally, there is no major problem on the availability of electricity in the three hamlets as found from the discussion. The average hour of availability of electricity is 17.5 hours in the wet season and 21 hours during the dry season. In all the hamlets, people use electricity mostly during night-time for 7 to 9 hours. Few incidences of load shedding is there in Uma Rantau in a month and during rainy season or during any natural disaster like landslides or fallen trees power goes off and it takes 12 to 24 hours for restoring electricity.
10	Is there wild life present in the area?	There is no wildlife present in the project area
11	Are there any protected environmental areas nearby?	There is no protected area nearby the proposed project area.
12	Explain why and do they foresee any problems, e.g. disruption of land and activities during construction?	The main concerns of all the three hamlets are that they will lose grazing land for cows and bulls. The proposed land also has tamarind trees and families fear losing their income. Also, the people said they

#	Issues	Participants' Opinion, Comments and Suggestions
		will lose access to go for fishing and collection of tamarind and wood during the construction phase. Also, the people had the concern of losing flat land for future generations to build houses. However, the people said that the loss will not major and said that trees should be planted that can generate income.
13	Will there be loss of grazing land?	The proposed project land in Tinawake is used for grazing by the people in all the three hamlets. The people fear losing land for their animals due to the project.
14	There would be construction of small transmission line which may pass through your agricultural field. What would be your concern related to the tower footings and lines?	If the construction of transmission lines passes through agricultural fields, the people wanted compensation, in case their property is damaged. They also wanted that any damage which occurs during the construction should be fixed.
15	What kind of compensation you expect for loss to land or crops or trees (cash or kind)?	The community from all the three hamlets stated that the project should protect the environment and for any tree cutting the project should plant more trees. The community members wanted that local people should be hired during construction.
16	Do you think that there will be loss to access to sea?	Yes. The local people fear that they will lose access to the sea, which may impact fishery. The local people requested for an alternative route for reaching the sea for fishing.
17	Will there be impacts on social and cultural resources due to the construction of the Project?	The people of Uma Rentau considered the place Laleian, as a sacred place. Tinawaka is also considered as the centre for cultural and ritual activities. The people wanted that the government should have the permission before starting the construction. The local people of all the three hamlets also wanted that the traditional leaders to perform the rituals before the start of the project. The project may bring outside people to the area, but the local people do not perceive any threat to socio-cultural resources, but they wish that government should follow their rituals involving the traditional elders before commencing the construction.
18	What are the concerns about community health and safety during the construction of the project?	There are no major health issues in the project area. The people wanted that the government should put signages about the risks and inform the public. In Uma Clalan, people stated that there should be coordination with the Ministry of Health and Police before the construction and disseminate information to communities about the risks of electrical constructions.
19.	What positive impacts and/or benefits do you think the project will have?	Light will be generated which will improve the electricity conditions. The project will provide employment to the local people.
17	What negative impacts do you think the project will have?	The main concerns of the community are the loss of of open space for animals, loss of access road to the sea for fishing and loss of flat plain lands. The community is also concern about loss of tamarind trees but the impact is seen minimal.
18	What suggestions do they have for best implementation of the project?	In Uma Rentau, people suggested that a place may be dedicated for the animal and there should be fencing of the solar park so that animals do not trespass to the risky zones. The community also

#	Issues	Participants' Opinion, Comments and Suggestions
		want the project to build a "Badebu" – a tank for water. In Uma Clalan, people wanted that local people should be employed during the implementation of the project. The people of Lenao felt that when the solar project commences in Tinawaki, the community will start to build their houses around the project. Hence the project should make provision of clean water, electricity, streetlights, tanks for animals to drink water and access roads to the sea to the community.
19	What other organizations of a social nature (NGOs/community-based organizations/civil society) active in the area?	JICA supported the agricultural sector by providing seeds for paddy rice in Uma Rentau and Lenao. In Uma Clalan there is no NGO, but there exists the PNDS program which builds roads in the village.
20	Are there any other Issues the people would like to share with us: (whether they welcome the project, will there be cooperation from the local community during the implementation, security measures, etc)?	The participants welcomed the project. The local community will be cooperating during the implementation of the project.
21	Please provide your views/ suggestions/recommendations	The people suggested that there should be a consultation process before deciding the alternative route. The project should provide employment to the local people including local engineers and a clause to this effect should be included in the contract documents. The project should establish a village committee as a focal contact for the project.
22	Others	The project should address all the concerns of the local people.

13.3.3 Findings of Gender Consultations

A. Gender Consultations at Haturalan Suco (Village)

Focus Group Discussions (FGDs) with women in the three hamlets of Ralan, Uma Iuk and Weboro in the Hatularan Suco (village) was carried out on. The sex ratio of all the three hamlets is 98.6 females for 100 males. Details of the findings of the consultation is provided in Table 13.4 below.

Table 13.4: Findings of Gender Consultations at Hatularan (Suco)

#	Issues	Participants' Opinion, Comments and Suggestions
1	What kind of economic activities are the women involved in?	Agriculture is the main economic activity in all the three hamlets. The women of Ralan reported that they are involved in the cultivation and plantation process since the initial stages like building fences, preparing the seeds and harvesting the crops. In addition, they also raise animals such as pigs, goats, sheep, dogs, and cows. Some of the women have small shop, or "kiosks", selling biscuits/pastry, and some of them are involved in sewing clothes.

#	Issues	Participants' Opinion, Comments and Suggestions
		Similarly in Uma luk and Weboro, the women are involved in agriculture, animal rearing and have small shops selling cookies/pastries and second-hand clothes. The women of Uma luk reported that during paddy cultivation, they get extremely busy and get only fifteen minutes to rest.
2	What is the daily activity of the women and how do they spend their leisure time?	All the women in the three hamlets are engaged in household works like childcare, getting the children for school, cooking, washing, cleaning. The women also work in farms and run their businesses. The morning activities include frying of pastries for sale, preparing breakfast for the family and feeding animals. The women in these hamlets are early risers and usually wake up at morning 4 am or 5 am and sleep around 8 to 9 pm. Women in all the hamlets participate in church activities such as choir, cleaning, and decoration. Usually there have two hours for rest during midday. The afternoon activities include talking with their children, and neighbors, preparing family dinner, and feeding the animals.
3	What are the current sources of energy and their uses?	In most of the households, electricity is used in cooking. In case electricity goes off, they use firewood or kerosene stove. During night, electric lamps are used for lightening and when the power goes off, candles are used. Some of the women reported using of flash lights when electricity goes off.
4	In your opinion, what are the benefits of electricity?	The women said that electricity supports in the economic activities of their households for baking cakes and cookies and sewing clothes. Health centers and schools have access to electricity. When the power goes off, they use a generator. The women further stated that electricity really helps the community and provides easier life for them. It helped their children to study during the night time. The women use electricity for cooking. During night time, women feel safe when go outside for any work.
5	What is the access to water in the villages?	Majority of the population in all the three hamlets covered has access to clean water from the extended pipes. In case they run out of water, then they buy or fetch water from the river. For agriculture they use canal water for paddy cultivation.
6	What are the safety / security concerns for women and children in the project area?	Domestic violence is common in the society but not to the severe extent. In present time, the number of domestic violence cases has reduced in Ralan due to the training provided by UNDP and World Vision on violence against Women and Girls. In Uma Luk, the community addresses the cases of domestic violence in a cultural way, i.e. imposing fines.
7	Any socio-cultural / environmental resources in the project area?	The land characteristic of the three hamlets is rocky and hard. They have two sacred houses in Ralan and Uma Iuk and three sacred houses in Weboro. There is also a sacred stone that is called Hatu Mara (Yellow Stone) in Weboro. The women recommended to perform cultural ceremonies before starting the construction.

#	Issues	Participants' Opinion, Comments and Suggestions
8	What is the status of girls' education in the area?	All the women in the three hamlets emphasize the importance of girls' education. They feel that education for the girls will make them smart and strong as it is the most powerful weapon for living a better life in the future. In Weboro the women believe that to succeed in future, women should also have a career besides cooking and hence girls have the same right to education as boys.
9	What is the engagement of children in household activities?	In the three hamlets covered, the women reported that the girls actively participate in household and economic activities thereby contributing the family's income. During the dry season, they help their parents with planting seeds and harvesting their goods for sale. They also sell goods, like fried bananas, and Pop Ice, pastries, cookies, vegetables to support their household. At home, girls also help in sweeping, washing dishes, and preparing food for families. They also participate in the religious activity such as choir. In Uma Iuk the women also said that during the exam time, the girls spend most of their time in studies.
10.	What are the existing skills prevalent in the area?	Cooking and sewing are common skills of the women found from all the villages. In Ralan and Uma Iuk the women are also well-versed weaving basket (elderly women) and making biscuits, pastries and cakes. In Weboro besides cooking and sewing women are good in cultural dance and are plays sports like volleyball and futsal. There are no barriers for vocational training as women gets training at the village office or at the church hall in their hamlets.
11.	What is the status of women's rights over properties? Are there any discrimination in wages?	Women said that their society is very traditional where men have the rights to property. Women do not have rights for inheritance as after marriage they join their spouse's clan. Both men and women receive equal wages for their work as reported by all the women in the project area.
12.	What is the women's' participation in decision making?	Decisions in family are made in collaboration where both men and women discuss before taking any decision. Women also have the right to decide what is best for their family and there is no need for any confirmation or acceptance from men. However, when financial expenses are higher, the women mostly rely on their husbands for decision.
13.	What is the status of health of women the health facilities in the project area?	There are no major health issues in the project area. In Ralan and Uma luk, the health center facilities are adequate. The number of newly born babies is very low as every year one to five babies are born. The community receives training from Brazilian nuns, intern students and health center regarding healthy pregnancy, and family planning. However, in Weboro, the health centre present does not have adequate facilities.

#	Issues	Participants' Opinion, Comments and Suggestions
14.	What is the status of presence of NGOs and self help groups pertaining to women?	World Vision provides capacity building for communities in the business area, i.e., establish the Moris Rasik Group (save and loan money) in Ralan and Weboro for giving loan to establish small businesses. in Weboro, an organisation named BELUN advice women on conflict resolution. In Ralan a group called Suku Sumasu or Sewing Pillow is there with 15 women as its members.
15.	What are the major benefits of the proposed project as perceived by the women?	The women were happy that this project, if implemented in the Laleia Post Administrative, will create many opportunities for the local people. In Ralan and Uma Iuk women feel that the proposed project will provide opportunities for small businesses for women that include opening small shops, to sell pastries and grilled meat. In Uma Iuk women said that electricity through the solar project will help in improvement of their businesses as they will be able to use refrigerators for storing beverages for selling.
16.	What are the major concerns of the women regarding the project?	The major concern shown by the women in the area is the impact on the loss of income from collection of tamarind trees. The women are also worried about the loss of grazing land and water for animals. The loss of access to the sea for fishing is also a concern for the women in the project area. In Ralan, the women were concerned about irrigation water, that is used for rice paddy that was built by the Japanese. They hoped that the source will not get affected.
17.	Please provide your suggestions /opinions / views about the project.	The women in the area wanted to protect the tamarind trees as they are the sources of income to the communities. In case a tree is cut, additional trees need to be planted. The project should provide space for communities to access roads so that they can use it to go for fishing at night. They also wanted proper religious ceremonies should be performed before the construction works start. The women also urged that the project should make fences so that the animals do not enter risky zones.
18.	Do you support the project?	Yes. There will be 100 % support to the project stated by all the women. This project will bring development of their locality.

B. Gender Consultations at Lifao Suco (Village)

Focus Group Discussions (FGDs) with women in the three hamlets of Uma Rentau, Uma Clalan and Lenao Ralan in the Lifao Suco (village) was carried out. The sex ratio of all the three hamlets is 101 females for 100 males. Details of the Findings of the consultation is provided in **Table 13.5** below.

Table 13.5: Findings of Gender Consultations at Lifao (Suco)

#	Issues	Participants' Opinion, Comments and Suggestions
1	What kind of economic activities are the women involved in?	The women in all the three hamlets are involved in agriculture, mainly rice paddy cultivation. The women generally prepare, plant the seeds and harvest the crops. They also grow vegetables like mustard and are engaged in preparing seeds, cultivating the grounds, making fences, planting, watering, and taking care of the crops. Women are also engaged in animal husbandry and manage live stocks like pigs, chickens, goats, sheep and dogs. In Uma Rentau, women's involvement in business is limited to only selling second-hand clothes, vegetables, and cookies. In Uma Clalan the main business activities of women are rice production, small shops, selling second-hand clothes, fruits in the market (especially on Thursday), and flowers. They also sew clothes and bake cookies for sale at Café Boali. In Lenao the women in baking and selling bread, cakes, and doughnuts.
2	What is the daily activity of the women and how do they spend their leisure time?	All the women in the three hamlets are engaged in household works like childcare, getting the children for school, cooking, washing, cleaning. The women also work in farms and run their businesses. The women in these hamlets are early risers and usually wake up at morning 6 am or 7 am but during paddy cultivation period, they wake up at 5 am. Some women in Lenao approximately spend around four hours in their cakes/pastries business. They wake up at 5 am to prepare, and then go to sell the goods. Women in all the hamlets participate in church activities, cultural activities and communities. These activities happen thrice a week. The women also attend meetings at their children's school. During free time the women mostly rest for one to two hours. In Lenao the women said that they have free time of more or less than two hours, and they use that for rest, and taking care of their children
3	What are the current sources of energy and their uses?	In most of the households, electricity is used in cooking. In case electricity goes off, they use firewood or kerosene stove. During night, electric lamps are used for lightening and when the power goes off, candles are used. Some of the women reported using of flash lights when electricity goes off.
4	In your opinion, what are the benefits of electricity?	Electricity helps their children to study at night and it helps in cooking. In Uma Clalan the women said that electricity supports in the economic activities of their households for baking cakes and cookies.

#	Issues	Participants' Opinion, Comments and Suggestions
5	What is the access to water in the villages?	The people Uma Clalan use electricity to pump water. In Uma Rentau and Lenao very few pumps are used to draw water.
6	What are the safety / security concerns for women and children in the project area?	There is no safety and security concerns for women and children as the social norms and cultural values and highly valued and observed. Only in Uma Rentanu women reported about few incidences of sexual abuse.
7	Any socio-cultural / environmental resources in the project area?	The women in the three hamlets said that they do not have any sacred places, but they have three sacred houses, which will not be impacted from the project. The women recommended to perform cultural rituals and ceremonies before the start of the project. The women in Lenao said that their cultural place includes one sacred house, however it is distant from the project.
8	What is the status of girls' education in the area?	All the women in the three hamlets emphasize the importance of girls' education. They feel that education for the girls will make them smart and strong as it is the most powerful weapon for living a better life in the future.
9	What is the engagement of children in household activities?	In the three hamlets covered, the women reported that the girls actively participate in household and economic activities thereby contributing the family's income. In Uma Rentau women reported that girls help their families by selling vegetables or planting rice, besides doing household activities. In Uma Clalan the women stated that their children help them depending on their free time. Sometimes they help them with agricultural activities such as feeding animals and running small shops. In Lenao, children are seen helping their mothers in selling fried cakes during the morning time.
10.	What are the existing skills prevalent in the area?	Cooking, baking and sewing are the common skills available with the women in the project area. Baking is sometimes a commercial activity as women sell cakes in their locality. In Lenao women have a cooperative group that cooks traditional food, which they exported to Italy.
11.	What is the status of women's rights over properties? Is there any discrimination in wages?	Women of the community have ownerships of the land and property as both men and women have equal rights. In Lenao, women said that their society is very traditional, where men have the rights to property. Both men and women receive equal wages for their work as reported by all the women in the project area.
12.	What is the women's' participation in decision making?	Decisions in family are made in collaboration where both men and women discuss before taking any decision. However, being in a traditional society, in case of conflicts, the decision of the men only prevails.

#	Issues	Participants' Opinion, Comments and Suggestions
13.	What is the status of health of women the health facilities in the project area?	There are no major health issues in the project area. The women in all the 3 hamlets reported that the health center is located within 15 minutes' walk. The treatment facilities are good and they are accessible at night time also. There is also delivery services available in this facility. Through their Siska Program, which provides awareness about family planning, the community particularly the women are now well understood on the importance small family and the gap between children. For women of Lenao the health centre still lacks good facilities for any major health issues they need to go to the city or Dili instead.
14.	What is the status of presence of NGOs and self help groups pertaining to women?	There are no NGOs/ SHGs present in the project area. However, in Lenao women have a cooperative group for saving and loans.
15.	What are the major benefits of the proposed project as perceived by the women?	The women were happy that this project, if implemented will create many opportunities for the local people. At present, there are no street lights present, and the project will provide street lights and help people to go out in the night. Electricity will help women in their small businesses as they will be able to store goods in their refrigerators.
16.	What are the major concerns of the women regarding the project?	The major concern shown by the women in the area is the impact on. In Uma Chalan, the women worried about loss of access to the sea for fishing. Otherwise, the women in all the three hamlets don't see any other concern and welcomed the project.
17.	Please provide your suggestions /opinions / views about the project.	In Uma Rentau suggested that the project should install some lights along the streets and create some land for communities to access the sea. In Uma Clalan the women also suggested for creating another alternative road for movement. They also suggested project should establish a partnership with ALCEDA to harvest rice. And if possible, the project should re-establish the People Plant and Government Buys program, and support the transportation for people to access to the market. In Lenao, the women suggested that while implementing the project, they should involve traditional elders to do the ritual ceremonies.
18.	Do you support the project?	Yes. There will be 100 % support to the project stated by all the women. This project will solve their electricity problem and can as they can have access to water through electric pumps. The project has the potential for creating new business opportunities. The project can support the income from selling cakes, can open food businesses, i.e., rice cooked in small woven palm-leaf containers and fish.

Future Consultation Strategy

Consultation will be continued throughout the project cycle especially during final design and also during implementation of the project. Future consultations will be carried out by EDTL and IPP. EDTL will ensure that IPP and its EPC contractor follows participatory

approach while dealing with people in the field. For future consultations, EDTL will consult all the people to be impacted due to construction work and will assess if there is any negative impact to the people. EDTL will inform the communities about progress made in terms of construction. EDTL will disclose information and consult with affected persons at the project area, with the object of availing broad support from the community. Any grievance related issues will be solved through adequate consultations process.

6.6. Disclosure

Initial project layout and technical details were disclosed to the local people during the consultations held in the time of assessment and during preparation of social and environment reports. EDTL will provide relevant information such as construction schedule, environment management plan, social management plan, GRM details in a timely manner, in an accessible place, and in a form and language (English/Tetum) understandable to affected persons and other stakeholders. The summary of SIAMP and EMP will be made available in English/Tetum language along with the English version. The draft SIAMP will be disclosed in ADB's website as well as in the website of EDTL.

VII. Stakeholder Consultation – Halona Serena

The public consultation following the completion of our baseline study was a crucial step in ensuring transparency and community involvement in the solar IPP project in Laleia, Manatuto. The consultation, moderated by Engr. Januario Ribeiro da Costa, Senior Engineer at Halona, served as a platform to present the findings of the baseline study, discuss project details, and address questions and concerns raised by the local community.

The public consultation commenced with an opening address by Simão da Costa, the Deputy Head Administrator of Manututu. He underscored the importance of the project and stressed the need for effective coordination between local and national authorities.

Mr. Agustinho Cabral, the National Director of Renewable Energy Production of Eletricidade de Timor-Leste (EDTL) followed, providing insights into why Laleia was chosen as the project location. He emphasized Laleia's unique advantage of having optimal temperatures for capturing solar radiation, making it an ideal site for the solar IPP project.

Furthermore, ANLA representatives were in attendance to oversee the public consultations directly. During the proceedings, these representatives did not express any concerns or provide comments on the public consultation itself.

Engr. Januario then took the stage to present the findings of the baseline study. He commenced by explaining the concept of solar energy and its relevance to the project. Engr. Januario also outlined the geographical area covered by the study.

A key highlight of the presentation was the project's substantial power-producing capacity of up to 100MW, exceeding Timor-Leste's daily energy demand of 60MW. Engr. Januario elucidated on the scope of work conducted by Halona Lda. Team, emphasizing the comprehensive baseline environmental data collection, which encompassed noise levels, air particle quality, surface water analysis, ecological surveys, and identification of physical and cultural heritage within the project area.

Engr. Januario elaborated on several key points:

- **Noise Levels:** The project area was characterized by relatively low noise levels, primarily attributed to traffic and vehicle movement between Dili, Baucau, Lospalos, and Viqueque.
- **Air Quality:** The air quality in the project area was found to be pristine, with no significant pollution sources identified.
- **Ecological Aspects:** Engr. Januario discussed both marine and terrestrial flora and fauna observed during the ecological survey. He also noted the practice of locals allowing their animals to roam in the project area.

Following the presentation, the public consultation moved into a question-and-answer session, where community members actively engaged with the project team. During the public consultation, all questions and concerns raised by community members were addressed comprehensively by the Halona Team, along with the participation of ADB environmental experts and EDTL.

Table 13.6: Question and Answer Session during public consultation

Person who asked the question	Position/Affiliation	Concern Raised	Answer provided
Mr. Vitoriano Viegas Sousa	Local Community and Animal owners	Enquired about plans for animals currently roaming in the project area once construction begins.	In response to Mr. Vitoriano Viegas Sousa's query regarding the animals currently roaming in the project area, it was clarified that detailed plans will be established to ensure the safe relocation of animals once construction commences. The welfare of local wildlife is a paramount consideration in project planning.

Mr. Frederiku Xavier Ximenes	Local Community	Expressed concerns about laser activity during construction affecting rainfall frequency in Laleia.	Concerns raised by Mr. Frederiku Xavier Ximenes regarding laser activity potentially affecting rainfall frequency were addressed. The National Directors of EDTL assured that, during the project bidding process, it would be mandated in the contract that the chosen company must employ environmentally friendly practices, with a specific emphasis on refraining from activities that could disrupt local weather patterns, such as shooting lasers into the sky.
Mr. Joao Domingos da Costa	Local Community	Raised concerns about the need for land for the increasing population in Laleia and sought solutions.	Mr. Mario Santos Ximenes sought clarification on the exact project area size. ADB environmental consultant, Mr. Leonardo de Sousa Rosa, provided a clear visual representation of the precise location where solar panels will be installed. He emphasized that the winning company would undertake to maintain the current land use practices by the local community. The project's design, including perimeter walls, will deter animals such as buffaloes and goats from damaging the solar panels. Additionally, any roads or pathways affected by the project will be replaced with new access routes to ensure minimal disruption to the local ecosystem.
Mr. Mario Santos Ximenes	Local Community	Sought clarification on the exact project area size compared to the study area of 320 hectares.	

The active participation and engagement of the community members, along with the collaborative efforts of the Halona Team, ADB environmental experts, and EDTL representatives, led to the comprehensive addressing of all questions and concerns raised during the public consultation. These interactions underscore the commitment of all stakeholders to ensuring the responsible and environmentally friendly implementation of solar IPP plant project.

The responses provided during the consultation will be instrumental in shaping the project's planning, execution, and ongoing management, with a continued focus on harmonizing the solar plant's presence with the well-being of the local community and the environment.

14 Difficulties Encountered

The key challenging in the development of this EIS was the lack of reliable secondary data on the project area along with the time limitation in obtaining a full insight baseline data and information from the survey area and limitation of obtaining the most recent data.

It is important to note that Timor-Leste is still considered as one of the countries that is lacked in human resources and technology to provide its own data and information in regard to climate and environment, especially for simulation of future data that are particularly made reference to the past data, such as heat waves, floods and cyclones.

Many data available in the country are taken globally from the nearest region to the country such as Indonesia, Australia and Pacific, in which many of the data are provided based on data and analysis that are recorded and still used from the past 10 or 20 years back. Therefore, it is quite challenging and unrealistic to require this EIS to elaborate and provide climate information in particular to aspects such as cyclones and floods from the last few years, as these are indeed unavailable or lacked in the country.

15 Conclusion and Recommendation

Conclusion

The proposed project is of high significance for Timor Leste considering the urgent need for developing a sustainable and economical source of power generation that is also environmentally friendly.

Primary and secondary data has been collected and used to assess the environmental impacts of the project. This EIS highlights the potential environmental impacts associated with the project and recommends mitigation measures accordingly. Any environmental impacts associated with the project need to be properly mitigated, through the existing institutional arrangements described in this EIS.

The majority of the environmental impacts are associated with the Design and Construction phase of the proposed project and majority of these impacts are site specific, short term and reversible.

The proposed solar IPP site is considered the best available option as it will have minimum environmental impacts. Any negative environmental impacts caused by the project activities are unavoidable due to its nature of work and the current available technology that has been foreseen for each project stage. The impacts on the marine organisms and fishing activities are not likely to occur as the project designs and locations do not target any coastal environment. Even though the project construction phase may cause some disturbance to the environment, particularly some terrestrial and aquatic faunal species, the impacts will not be permanent or long term and are expected to be limited to the construction phase of the project.

The impacts on other aspects such as cultural heritage, community health and safety and tourism etc. may be negligible as the proposed project site is located in a remote and unpopulated location and thus will not interfere with these environmental features.

The implementation of mitigation measures during construction period will be the responsibility of the Contractor. Therefore, the required environmental mitigation measures will have to be clearly defined in the bidding and contract documents, and appropriately qualified environmental staff retained by the CSC to supervise the implementation process. The EMP includes measures to minimize project impacts due to traffic, noise, air pollution, waste generation etc.

Prior to the commencement of works, this EMP must be further updated by the Contractor into site specific EMPs (SSEMPs). In these SSEMPs, aspects such as a detailed traffic management plan, identification of locations for disposal of debris and spoil and any other

details which shall become available later must be included for efficient implementation of all proposed mitigation measures and the subsequent monitoring of these measures.

Based on the above, this EIS concludes that there are no potential adverse environmental impacts from the proposed solar IPP project. Impacts of less significance can be mitigated to an acceptable level by adequate implementation of the mitigation measures identified and suggested in EMP, hence, no significant or unacceptable change in the baseline environmental conditions will occur. Similarly, the project will have a visible positive impact on the socio-economic conditions of the residents of Timor Leste in terms of an improvement in providing cheap, reliable and clean supply of electricity.

Furthermore, the PMU EDTL will ensure that selected construction Concessionaire and his Contractor has contractual obligation with respect to EMP implementation. Also, the PMU EDTL will ensure appropriate staffing and budgeting for effective implementation and monitoring of project EMP.

Recommendations

Based on the findings of this EIS, following recommendations have been formalized for smooth functioning of proposed solar IPP project:

- EDTL shall obtain statutory clearances prior to award of contract and ensure conditions/requirements are incorporated in the project design and documents;
- Upon mobilization of the Contractor(s), PMU to provide a safeguards orientation as per EIS;
- Contractor to appoint environmental and social safeguards, responsible for environmental compliance, occupational health and safety and core labor standards.
- The templates for different management plans are attached as Annexures. However, detailed plans shall be developed by the Contractor before mobilization of construction teams.
- SSEMP shall be developed and implemented by the Contractor during the construction phase. PMU will supervise the implementation status through CSC.
- Prior approval for setting up of construction camps shall be obtained by the Contractor from PMU.

16 Non-Technical Summary - English

A solar IPP project will be developed at a project site located approximately 14 km east of Manatuto Municipality, directly adjacent to the Manatuto to Baucau national road. This site is located in a remote location, away from any settlements.

The site works will commence with fencing the site and then clearing and leveling of the site and then installing a suitable drainage system and installing solar PV panels and associated infrastructure inside it to enable electricity to be generated from the sun. The project will be connected to the nearby transmission line and the power generated will be used for meeting the power needs of the people of Timor Leste. It is expected that the project will be completed within one year.

Detailed technical and environmental and social safeguard assessments have been prepared by teams of experts through data collection and analysis to ensure that the development of the project will not harm the environment of the area in any way.

Some localized and site-specific impacts are expected such as noise, dust emissions, waste generation, large vehicles transporting equipment and machinery to the site etc. However, a detailed and comprehensive EMP containing mitigation measures and regular monitoring will be implemented to ensure any impacts are minimized as far as possible.

Furthermore, the Contractor shall continue engaging with the communities and ensuring any concerns or grievances raised by them are address in a prompt and effective manner.

Non-Technical Summary - Tetun

(To be reviewed and improved by Leon as I used online tool for translation from English to Tetun).

Projetu IPP solar sei dezenvolve iha fatin projetu nian ida-ne'ebé lokaliza maizumenus kilómetru 14 iha parte leste Munisipiu Manatuto, diretamente adisionál ba estrada nasionál Manatuto ba Baucau. Fatin ne'e lokaliza iha fatin dook, dook husi fatin ruma.

Fatin ne'e sei hahú hodi hamoos fatin ne'e no depois hamoos fatin ne'e no halo instalasaun ba sistema drenajen ida-ne'ebé apropriadu no instalasaun painél solar no infraestrutura asosiadu sira iha fatin ne'e nia laran atu nune'e eletrisidade bele hetan husi loro-matan. Projetu ne'e sei liga ba liña transmisaun ne'ebé besik liu no sei uza eletrisidade ne'ebé mak mak mak mak mak sei uza hodi responde ba nesesidade eletrisidade povu Timor-Leste nian. Espera katak projetu ne'e sei remata iha tinan ida nia laran.

Avaliasaun téknika no ambientál no sosiál detalladu sira prepara ona husi ekipa peritu sira liuhusi kolesaun dadus no análize hodi asegura katak dezenvolvimentu projetu ne'e sei la estraga ambiente área nian iha kualkér forma.

Iha impaktu balun ne'ebé lokalizadu no espesífiku ba fatin sira hein hanesan lian maka'as, emisaun rai-rahun, jerasaun lixu, ekipamentu transporte karreta boot no mákina ba fatin no seluk tan. Maske nune'e, sei implementa EMP ida-ne'ebé detalladu no komprehensivu ho medida mitigasaun no monitorizasaun regulár hodi asegura katak impaktu sira-ne'e minimiza to'o iha posibilidade.

Nune'e mós, Kontrator tenke kontinua envolve ho komunidade sira no asegura preokupasaun ka keixa ruma ne'ebé sira hato'o ho lalais no efetivu.

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ANNEXURES

Annex-I
Details of Stakeholder Public Consultations

PUBLIC CONSULTATION AT HATULARAN SUCO

STAKEHOLDER CONSULTATION (COMMUNITY CONSULTATION)

- Name of the hamlet: Uma iuk _____
- Name of the Suco Hatularan _____
- Name of post administrative: Laleia_____
- Name of the Municipality Manatutu_____
- Geographical coordinate of the hamlet: _____
    a. Latitude 8.54235° S_____
    b. Longitude 126.16168° E_____
- Total number of households in the Hamlet 65 household_____
    a. Male 115_____
    b. Female 110_____

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS

Total households in the hamlet and how many approximately have agriculture land and what is the average landholding size?
What are the major crops and how many crops you cultivate in a year?
	• The total number of households in Uma Iuk village is 65.
	• The land for agricultural production in this village is approximately 60-65 hectares.
	• The biggest land is used for the rice production
	• Below is the production for:
	  ○ Corn (depends on the weather)
	  ○ Mustard – Mostly we use to eat and only few that we use sor selling
	  ○ Pumpkin (mostly we use to eat and only few that we use for selling)
	  ○ Tamarind (mostly we use for selling)
	• The rice production starts on January but some people started on November.
	  ○ The harvest can start on June and July.

What is the composition of People in the Village? Population of the Village: Number of total households: Name of the Ethnic Groups:	**Population of the Village (Aldeia Uma iuk):** 225 (Male 115 and Female 110) **Number of total households:** 65 **Name of the Ethnic Groups:** Galolen **Name of the Sub Groups:** N/A

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Name of the Sub Groups: Common language: Official language:	**Common language:** Galolen and Tetum **Official language:** Tetum and Portuguese
Are all houses electrified? Yes/No For how many years, the village is electrified? What % of village is electrified	• Yes • Before the Independence of Timor-Leste, we already have electricity • 100% of the population has access to electricity.
What is average hours of electricity per day for domestic consumption? Is there any seasonal variance, please probe.	• The consumption of electricity is mostly in the day, morning to evening, and when we have "lia" or a big day of religion.

If village is not electrified, what is the current source of electricity for domestic consumption e.g. for charging cellphones (solar panel, DG sets)	• All electrified
	• The sources that we use are:
	  ○ Some people still use the wood for cooking
	  ○ Some people still use petroleum for the stove
	  ○ Some people use fuel in a tractor for the paddy field.
	  ○ The community use a candle when there is no electricity

Do you face any problem regarding current electric supply as far as home connection is concerned?	• Sometimes the lights go out and usually it happens on a rainy day – windy and other natural disasters, it can take 1 or 2 hours. • In the case of natural disasters, the lights go out until 1 or 2 days, waiting for the EDTL to fix it.
Do you face any problem regarding current electric supply as far as your home connection is concerned?	• The electricity is sufficient. The volume that we use is based on the standard and is sufficient.
Are there industrial units in the village and surrounding and if yes please mention the name	• There is no industry in this village.
What is the general economic activities in the area	• The majority of the economic activity is from agriculture production, with nearly 80 population who living as a farmer, the others as public officers, government contracts, and little business.
Have you heard about the Project or Do you have any information about the IPP solar project.	• We just heard it from this survey activity.
What is your opinion about this Project	• We are proud because we are ready when the lights go out, EDTL can support us through this solar panel. • We expect that this project can create employment for our Laleia village.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Do you support this Project	Yes. We support.
Do you support government's efforts to bring new idea such as the IPP solar for increase in electricity generation	• We support.
What are your main concerns/issues about the project	• My question is that this Solar Panel is only distributed to Manatuto or around Timor-Leste. • Every year they give us "compensation" (the land that is for use belongs to the population of Laleia – Will this community get the benefit?) – what benefit that community will get from this solar pv? • Another concer is that that place is the place of searching life through the fishing and animals and the Laleian put all of their animals in there. • The land that will use for this project, considered as an ideal land for the community to live in because that land is flat and this land is productive because there are tamarind trees teak, and redwood – if it is used for the Solar PV, the community will lose the great inheritance. • According to the information, this land, there is some community that already went to measure or claimed as their land – the land on the other side of this project. o How to solve this case?
Can you suggest how best to address your concerns/issues	With all the issues above we suggest: • The community of Laleia administrative post must have some benefit treatment from the government – give some award or recognition because they gave their land. • We suggest opening the road for the animals to access and the road to access the beach (the community shows the old road from the beach) • We support and we will not prevent this, but we want this development considerate of the place and animals, cows that they put in there, so we recommend to the government to create one place for the animals. • Before this, our elders always made a cultural tradition that before they leave the animals, they asked for permission, so when we want to do something we must ask for permission from the cultural ceremony. • The land that will use for this Solar project is an ideal land for the animals to eat in there. The cows only know this place. o For the future, where will we put the animal? o If we can suggest the other land – the land on the other side, above and below.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
	• Create a road to the beach so that the community can access if they close we will go through the Manatuto border rand is very far from our home. • For the plants, when they are already cut they have to plant another one because there is a productive plant such as tropical chestnut, redwood, and teak. • When they cut quality wood, they can manage so that the community can reuse it, they can't throw it in the other place.
The Project is about construction of solar PV in your area. There might be some interruptions in terms of loss of access to do the fishing and collection of tamarind. Would you volunteer to cooperate with the government during construction?	We are ready when all the mentioned suggestions above get a consideration and address.
There would be construction of small transmission line which may pass through your agricultural field. What would be your concern related to the tower footings and lines	• Must compensate if it affects the house or productive land and some plants. • Always protect the environment, when they cut they must plant another one.
Will there be any impact to cultural and religious values due to the project	• The place that will use for this project, our community considers this place sacred, because usually when the community wants to do something in this place, they always ask for permission and make some ritual ceremony. • There is a sacred place, and one stone is united in there, when they go there they have to ask for permission they have to bring the Elder or traditional leader as in Tetum called "Lia-nain" to guide this process.
What would be your suggestion to deal with the fishing activities during and after the project construction	• When the construction is closed or after the construction finish, people can go through this place? If people can go through this place, the government must create a road in there • Create a road. • If can create a new road so that community can pass through it.
The project may bring outside technical labor force to your area. Do you foresee any socio-cultural threats to your society? If yes, please explain and also please explain how to mitigate.	• The important thing that has to be considered is to make a cultural ceremony to ask permission.
Specifically, what concerns/issues do you have on the implementation of the project with respect to the following: • Community health and safety	**Community Health and Safety:** • If there is still air pollution during construction, they have to take care of this issue. • The risk in the electric power and another risk, they need to put the sign during the construction and the sign for the risky area when the construction is built.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
• Land • Agricultural production • Cultural heritage • Displacement • Loss of income and business • Fishery • Others (Specify)	**Land** • The generation of Laleia's community will lose the flat land that can use for living. • We lose a place for the cows. **Agricultural Production** • The identified area for the solar place no longer has agriculture production, but there are some plants. **Cultural Heritage** • That place is considerate a sacred place because usually when the community wants to do something they always ask permission with the ritual ceremony. **Loss of income and business:** • Lose the income from tamarind harvest. **Fishery** • Access to the beach with some fishing activities.
How long have you been living in this area?	• From the beginning.
Are there /Indigenous People live in your locality? If yes, what is the name and how far they live from the solar project site. Do they have same socio cultural and language practice like yours?	None
What positive impacts and/or benefits do you think the project will have	The positive impacts are: Can create a labor camp Reduce the cost for the government Give light Opportunity for development
What negative impacts do you think the project will have	The negative impacts are: Lose access to the road and large and flat space Lose the income from the woods that communities use such as tamarind and other wood that can use for burning. Lose some productive plants. Lose the inheritance land for the future kids, an empty and flat land community can use for living.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Any criteria you would like to be considered for project design, construction and operation stage?	There is no suggestion – I have no idea - dark Bring the expert people to analyze and conclude their suggestion
Are there any local NGO or CBOs, if yes then mention the name and nature of work they do	JICA helps the agriculture World Vision creates cooperative group saving and loan In the past, CARE International came and saw about the education, especially in support of the scholar crochet. NGO BELUN came to see about the economic empowerment activity – facilitated the community with training access to the financial institution.
Would you like to participate during project construction?	Yes. We want.
Please provide your views/suggestions/recommendations	• Losing the income and plants. Other concern the land indicated for Solar PV is a flat land, but concerning we live in hills geographic area, we don't have much options for flat land – So is there any option if they can use those hills to do solar PV instead of occupying the strategic flat land? I need the explanation) Village chief: I ask to assure the involvement from people in Laleia administrative post – this involvement is important, they have to give the priority to people from Laleia. There is some experience that the project of one village but other people from another village that came – if we don't have people, they can bring support from people of other people, but we have to be prioritized our own people. • We emphasize the culture – they have to respect this culture to make a ritual ceremony before the implementation of the project. • In the future, there will still have socialization? We need to know the future plan. • In the future, if we build this solar place, if they need the security, they must recruit people from this village. The recruitment for the EDTL workers in this solar place have to prioritize the people of this village.

TA-9802 TIM: Energy System Strengthening and Sustainability Project - Solar IPP

LIST OF PARTICIPANTS

#	Name	Age	Sex (M/F)	Education	Occupation	Signature
1.	Miguel Soares	65	M	SD	Agricultor	
2.	Filomeno D. Acda Da Costa	39	M	SMA	— 11 —	
3.	Faustino M. da C. Soares	37	M	L consolar	— 11 —	
4.	Regino Soares Ximenes	21	M	SMA	Bantu Construsaun Lima	
5.	Joao Soares	50	M	SMP	[illegible]	
6.	Gil V. da Costa Viegas	27	M	SMA	Agricultor	
7.	Andresa Soares	40	F	SMA	Dona de kasa	
8	Anastacia Soares	26	F	SMA	Dona de casa	

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STAKEHOLDER CONSULTATION (COMMUNITY CONSULTATION)

- Name of the hamlet: Weboro
- Name of the Suco Hatularan
- Name of post administrative: Laleia
- Name of the Municipality Manatutu
- Geographical coordinate of the hamlet:
    a. Latitude 8.53990ºS
    b. Longitude 126.16469ºE
- Total number of households in the Hamlet 146 Households
    a. Male 246
    b. Female 224

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS

Total households in the hamlet and how many approximately have agriculture land and what is the average landholding size?
What are the major crops and how many crops you cultivate in a year?
	• The total number of households in Weboro village is 146, according to the data of 2022
	• The total land of the agriculture activity with an estimated 105 hectares.
	  ○ One family can have 2-3 productive land
	  ○ In some communities, 3-5 families do not have land to make agricultural activities.
	• The most product that they plant is RICE. In a year they can produce 20-25 tons.
	  ○ The income is based on the weather, when the weather is bad they only produce 12-10 tons.
	  ○ There is some experience that they can produce rice more than 25 tons in 2021.
	• There is another productive farm that can produce:
	  ○ Corn
	  ○ Vegetables: Water spinach, mustard, tomato, but it is based on the weather.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
	○ Fruits such as mango, banana, and coconut, when it is time they can use them to eat and sell.
What is the composition of People in the Village? Population of the Village: Number of total households: Name of the Ethnic Groups: Name of the Sub Groups: Common language: Official language:	**Population of the Village (Aldeia Weboro):** 490 (Male = 246, Female = 224) **Number of total households:** 146 **Name of the Ethnic Groups**: Galolen **Name of the Sub Groups:** N/A **Common language:** Galolen and Tetum **Official language**: Tetum and Portuguese
Are all houses electrified? Yes/No For how many years, the village is electrified? What % of village is electrified	• All houses have access to the electricity • Electricity existed from Indonesia times • 100% all of the people have electricity
What is average hours of electricity per day for domestic consumption? Is there any seasonal variance, please probe.	• We usually use electricity during day light; from morning to afternoon because of cooking and doing other activities. • We also use electricity when the making of make "lia" and big day
If village is not electrified, what is the current source of electricity for domestic consumption e.g. for charging cellphones (solar panel, DG sets)	• Besides electricity, we use wood and kerosene • Also gasoline and diesel
Do you face any problem regarding current electric supply as far as home connection is concerned?	• Sometimes, the power goes off for one or two days – especially during rainy or windy season • Electricity does not go off during the dry season • Electricity can go off for one or two hours, it is quick to back to normal
Do you face any problem regarding current electric supply as far as your home connection is concerned?	• Some households have two-three amperes, and they inform EDTL to change it to six amperes, but the normal standard is 12 amperes.
Are there industrial units in the village and surrounding and if yes please mention the name	• There is no industry here
What is the general economic activities in the area	Economic activities in general are as the following sequence 1st Agriculture 2nd Receiving Veterans Payment 3rd Government Employees 4th Business persons and Fishermen (both are the same)

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Have you heard about the Project or Do you have any information about the IPP solar project.	• We have not heard of this – we just heard from this survey. Local authority also has not been informed yet. • The head of the village nor EDTL has not informed us yet about this matter.
What is your opinion about this Project	• We support and are grateful for the Government plan for the development. • We demand that the implementation of the project should prioritize involvement from local people.
Do you support this Project	• We support this project 100% because it benefits us all.
Do you support government's efforts to bring new idea such as the IPP solar for increase in electricity generation	• We support
What are your main concerns/issues about the project	Some concerns involve: • In Tinawake, when building a solar panel, please make fences to protect animals not entering the area because we raise a lot of animals here. • We have facilitated the Government with land to build the solar panel project – our concern is for the future our generation will find it difficult to build their houses. • Ideal place to habitat our cows is located there • We support this project, although we are sad because this land is flat and is good for raising animals. We demand that we are too be prioritized because we are the affected people. o For Example, employ local people for security or other jobs necessary.
Can you suggest how best to address your concerns/issues	• We suggest building retaining walls and water for our cows to be able to access • Other concerns depend on the Government's policies • We also have other concerns: o Can the Government provide another solution to allocate our animals' habitat? o In the future, the flat land in this Administrative will be decreased – how does the Government respond to this?
The Project is about construction of solar PV in your area. There might be some interruptions in terms of loss of access to do the fishing and collection of tamarind. Would you volunteer to cooperate with the government during construction?	• During the rainy season, cows go to the mountain, while during the dry season, cows go to Tinawaki, thus they will need another alternative should they be reallocated.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
There would be construction of small transmission line which may pass through your agricultural field. What would be your concern related to the tower footings and lines	• We still get confused about this question – if it asks about the transmission line being only in the solar panel area, then we do not have any concern because that land does not have any productivity. • But if the transmission line is connected through one village to another one with electricity pillar, then we suggest ○ There should be a compensation if it has to be built withiin communitie's lands or property
Will there be any impact to cultural and religious values due to the project	• In Laleia, the area that the project will be taken place takes part of the Lifau culture – we suggest making cultural ceremony before the project commences. • Tinawaki is the center for cultural and ritual activities. • During the ancestors' time, cultural and ritual ceremonies have been conducted in that place.
What would be your suggestion to deal with the fishing activities during and after the project construction	• Give another alternative to access to the sea.
The project may bring outside technical labor force to your area. Do you foresee any socio-cultural threats to your society? If yes, please explain and also please explain how to mitigate.	• There should be making ritual and cultural ceremonies before commencing the construction – better go talk with the elderly people to see how to conduct the cultural ceremony. • For non-skilled jobs, please consider local communities.
Specifically, what concerns/issues do you have on the implementation of the project with respect to the following: • Community health and safety • Land • Agricultural production • Cultural heritage • Displacement • Loss of income and business • Fishery • Others (Specify)	**Community Health and Safety** • No health facility • Security should oversee mitigation management – they should provide any signals. ○ For this, we have a concern that, if our cows die due to the project, i.e., electricity cable, for instance, there should be a condition to respond to this matter. **Land** • Flat land is limited • That place is ideal to raise animals, like cows. **Agricultural Production:** • That place has no farms, but communities often go and find firewood there. **Cultural Heritage**

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
	• That place is a sacred place for Laleia people – there should be a license before commencing. **Displacement** • Our concerns are destroying the environment – chopping off trees, etc. **Loss of Income and Business** • During the tamarind season, we go to find it for sale **Fishery** • Concern for access to the sea, because that is the area that communities go through before reaching the sea.
How long have you been living in this area?	• Long time ago, during our grandparents era.
Are there /Indigenous People live in your locality? If yes, what is the name and how far they live from the solar project site. Do they have same socio cultural and language practice like yours?	• There is a household where a wife works as a teacher – they have lived in this village for over 10 years. The wife and husband are not originally from here, they are Makasa'e people. • The land they live in belongs to the people of Galolen – they have friends that they consider families.
What positive impacts and/or benefits do you think the project will have	Positive impacts of this project: • Bring development • Bring lights for us • Employment – give direct benefits to communities • Reduce Government expenses.
What negative impacts do you think the project will have	Negative impacts of this project: • Could lose access to roads • No more flat land • Lose an ideal place to raise animals
Any criteria you would like to be considered for project design, construction and operation stage?	• Create a place for water and animals to access the sea.
Are there any local NGO or CBOs, if yes then mention the name and nature of work they do	• World Vision supports the cooperative group – save and loan. Give seeds to communities. • JICA supports agricultural sector in this area.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
	• Local NGO Belun socializes conflict management and gender based-violence to communities.
Would you like to participate during project construction?	• We are ready • There is a number of high youth unemployment – we demand that this project should prioritize local people • If there is a need for engineering diploma, some of our people does have.
Please provide your views/suggestions/recommendation	• None

TA-9802 TIM: Energy System Strengthening and Sustainability Project - Solar IPP

LIST OF PARTICIPANTS

#	Name	Age	Sex (M/F)	Education	Occupation	Signature
1.	Agostinho Guzmão	53	M	SMA	Agriculture	
2.	João Tilman	68	M	SD	Agriculture	
3.	Francisco Gusmão	45	M	SD	Agriculture	
4	Nerci José M. Gusmão	60	M	SD	Chefe Aldeia	
5	Josso Gomes	52	M	SD	Agriculture	
6	João Gusmão	66	M	SDS	AGRICULTOR	
7	Jose Gusmão	55	M	SMP	Agriculture	
8	Eva da Almeida	33	F	SMA	Delegada	
9	Clementina B. da Costa	54	F	SMEA	Dona da casa	
10	João Gusmão	52	M	SMEA	Agriculture	
11	Joana dos Ximenes	53	F	SMP	Dona da casa	

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LIST OF PARTICIPANTS

#	Name	Age	Sex (M/F)	Education	Occupation	Signature
12.	Guilherme de Sousa	49	M	Lisenciatura	La servisu	[signature]
13.	Pedro José M. Gusmão	60	M	S.D.	Xefe Aldeia.	[signature]
14.	Vicente Gusmão	57	M	SMA	Agricultor	[signature]
15	Alexandre de Sousa		M	SMA	Agricultor	[signature]
16.	Felicidade Da C. Soares	37	F	Lisenciatura	Agricultora	[signature]
17.	Pedro Soares	72	M	La escola	Agricultor	[signature]

STAKEHOLDER CONSULTATION (COMMUNITY CONSULTATION)

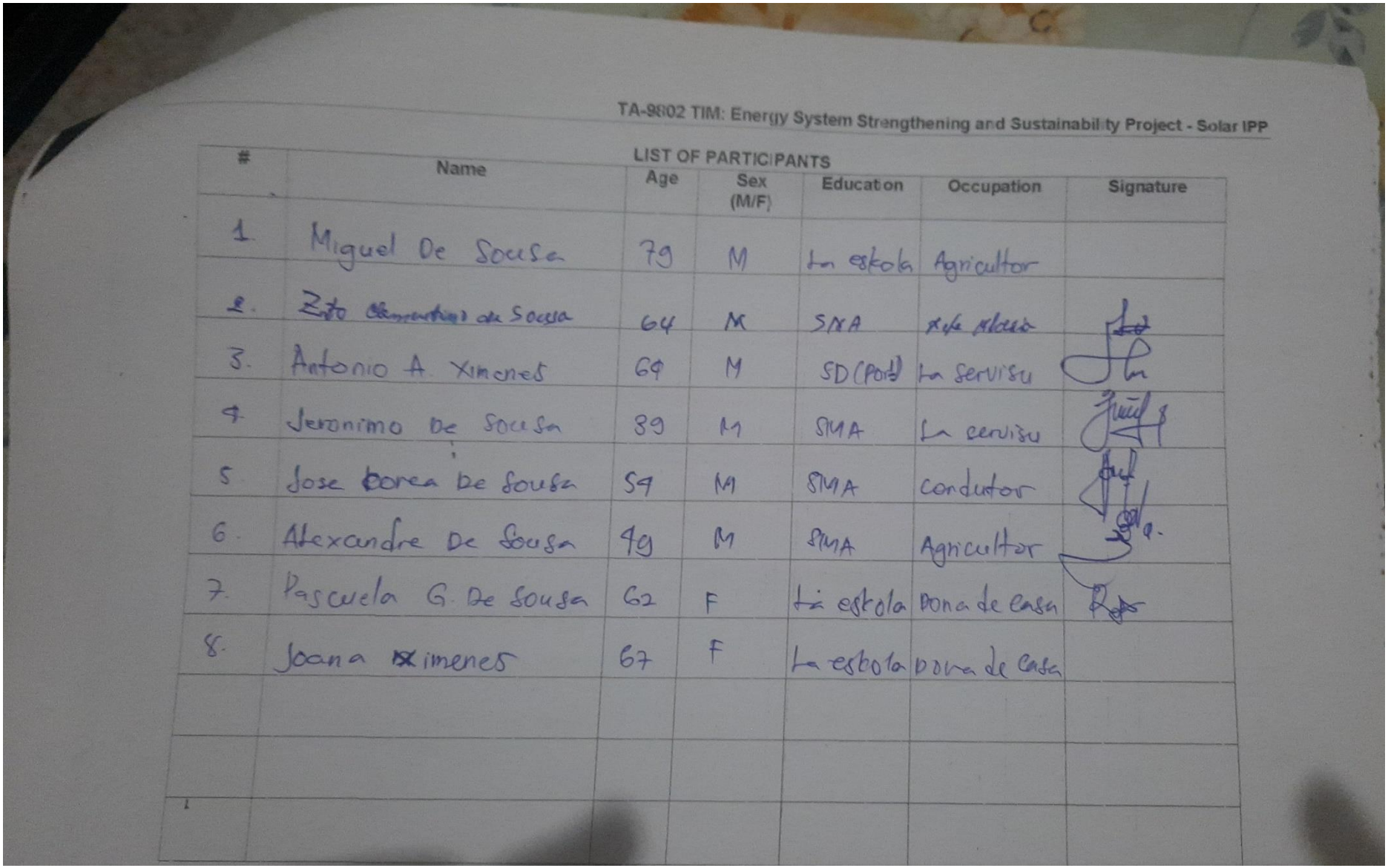
- Name of the hamlet: Ralan _____
- Name of the Suco Hatularan _____
- Name of post administrative: Laleia_____
- Name of the Municipality Manatutu_____
- Geographical coordinate of the hamlet: _____
    a. Latitude 8.53883º s_____
    b. Longitude 126.16442º e _____
- Total number of households in the Hamlet 110 households_____
    a. Male 200_____
    b. Female 219_____

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Total households in the hamlet and how many approximately have agriculture land and what is the average landholding size? What are the major crops and how many crops you cultivate in a year?	• The total number of households in Ralan is 110 • The land for agricultural production in this village is approximately 6-8 hectares. • The biggest land is used for the rice production • Below is the production for: ○ Corn and vegetables (depends on the weather) • The rice production is harvested in June and July – only once in a year
What is the composition of People in the Village? Population of the Village: Number of total households: Name of the Ethnic Groups: Name of the Sub Groups: Common language: Official language:	**Population of the Village (Aldeia Uma iuk):** 419 (Male 200 and Female 219) **Number of total households:** 110 **Name of the Ethnic Groups:** Galolen **Name of the Sub Groups:** N/A **Common language:** Galolen and Tetum **Official language:** Tetum and Portuguese
Are all houses electrified? Yes/No For how many years, the village is electrified? What % of village is electrified	• Yes • Before the Independence of Timor-Leste, we already have electricity • 100% of the population has access to electricity.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
What is average hours of electricity per day for domestic consumption? Is there any seasonal variance, please probe.	• The consumption of electricity is mostly in the day • We also use it mostly during family event or traditional ceremonies such as wedding or funeral
If village is not electrified, what is the current source of electricity for domestic consumption e.g. for charging cellphones (solar panel, DG sets)	• All electrified • The sources that we use are: o Some people still use the wood for cooking o Some people still use petroleum for the stove o Some people use fuel in a tractor for the paddy field. o The community use a candle when there is no electricity
Do you face any problem regarding current electric supply as far as home connection is concerned?	• Sometimes the lights go out and usually it happens on a rainy day – windy and other natural disasters, it can take 1 or 2 hours. • In the case of natural disasters, the lights go out until 1 or 2 days, waiting for the EDTL to fix it.
Do you face any problem regarding current electric supply as far as your home connection is concerned?	• The electricity is sufficient. The volume that we use is based on the standard and is sufficient.
Are there industrial units in the village and surrounding and if yes please mention the name	• There is no industry in this village.
What is the general economic activities in the area	• The majority of the economic activity is from agriculture production, • Few others work as public officers, government contracts, and small businesses
Have you heard about the Project or Do you have any information about the IPP solar project.	• We just heard it from this survey activity.
What is your opinion about this Project	• We are happy to hear about this project that finally Timor-Leste can use solar pv to replace the current electricity • Using solar means we don't worry anymore about light off
Do you support this Project	Yes. We support.
Do you support government's efforts to bring new idea such as the IPP solar for increase in electricity generation	• We support.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
What are your main concerns/issues about the project	○ No more access for our livestock ○ We lost our land for future generation ○ We concern about access to beach for fishery
Can you suggest how best to address your concerns/issues	With all the issues above we suggest: • Prioritize community in Laleia for any labor opportunities during construction • Create alternative road and spot for our livestock • Respect the culture practice in the area – must conduct a traditional ceremony before commencement of the project
The Project is about construction of solar PV in your area. There might be some interruptions in terms of loss of access to do the fishing and collection of tamarind. Would you volunteer to cooperate with the government during construction?	We are ready when all the mentioned suggestions above get a consideration and address.
There would be construction of small transmission line which may pass through your agricultural field. What would be your concern related to the tower footings and lines	• Must compensate if it affects the house or productive land and some plants. • Always protect the environment, when they cut they must plant another one.
Will there be any impact to cultural and religious values due to the project	• As mentioned above please liaise with our traditional leaders to work on the ritual ceremonies before commence with any activity
What would be your suggestion to deal with the fishing activities during and after the project construction	• Provide alternative roads – if possible good road that can access also by public transportation.
The project may bring outside technical labor force to your area. Do you foresee any socio-cultural threats to your society? If yes, please explain and also please explain how to mitigate.	• None – just advice to respect the cultural practices here as mentioned above
Specifically, what concerns/issues do you have on the implementation of the project with respect to the following: • Community health and safety • Land • Agricultural production	**Community Health and Safety:** • No concern on health but in regards safety please provide signs for any risk or prohibited area **Land** • No more access to feed cows **Agricultural Production**

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
• Cultural heritage • Displacement • Loss of income and business • Fishery • Others (Specify)	• We lost some trees in the area **Cultural Heritage** • The area is known as sacral areas – we need to respect **Loss of income and business:** • Lose the income from tamarind harvest and livestock **Fishery** • Access to the beach with some fishing activities.
How long have you been living in this area?	• From the beginning.
Are there /Indigenous People live in your locality? If yes, what is the name and how far they live from the solar project site. Do they have same socio cultural and language practice like yours?	None
What positive impacts and/or benefits do you think the project will have	The positive impacts are: Can create job opportunites Reduce the cost for the government Future development
What negative impacts do you think the project will have	The negative impacts are: Land is the most concern – we wish Government can identify the area in the hills rather than that area
Any criteria you would like to be considered for project design, construction and operation stage?	If the project can identify any tourism potential there to allow job opportunities and increase income of community
Are there any local NGO or CBOs, if yes then mention the name and nature of work they do	JICA helps the agriculture World Vision creates cooperative group saving and loan with training access to the financial institution.
Would you like to participate during project construction?	Yes. We want.
Please provide your views/suggestions/recommendations	We just want to emphasize on our concerns above please take into consideration and please keep us informed with socialization or public consultations – don't just end it here



TA-9802 TIM: Energy System Strengthening and Sustainability Project - Solar IPP

LIST OF PARTICIPANTS

#	Name	Age	Sex (M/F)	Education	Occupation	Signature
1.	Miguel De Sousa	79	M	La eskola	Agricultor	
2.	Zito [illegible] de Sousa	64	M	SMA	[illegible]	
3.	Antonio A. Ximenes	69	M	SD (Port)	La servisu	
4.	Jeronimo De Sousa	89	M	SMA	La servisu	
5.	Jose Correa De Sousa	54	M	SMA	Condutor	
6.	Alexandre De Sousa	49	M	SMA	Agricultor	
7.	Pascuela G. De Sousa	62	F	La eskola	Dona de casa	
8.	Joana Ximenes	67	F	La eskola	Dona de casa	

SUCO LEVEL CONSULTATION MINUTES (HATULARAN SUCO)

Project Title	Solar IPP	Project No:	TA - 9802
Date	24/11/2022	Time	From 10:00 to 11:45 (1:45hours)
Location	SedeSucoHatularan		
Meeting purpose	Public Consultation – Introduction Meeting		

Section #	Description
1	**1st Alexandre De Sousa– Member of Ralan Village Community** • Mr. Alexandre is concerned about his animal's habitat due to the place his animal used to play will be the place for future solar projects. He added that they also had made cultural ceremonies before sending their animals over. He stressed that the community will not impede the development of the project, but he said a number of concerns should need to be addressed first. • This has been considered a major concern by communities. **2nd Luis Soares – Member of Uma lukVillage Community** • Mr. Luis expressed his surprise that the Government will implement the Solar project in the area – some pieces of land have been measured for private use. **3rd Guilherme de Sousa – Member ofRalanVillage Community** • Why did the project decide to be allocated in this place? Was there a political party's program? Did any political party indicate or recommend this place? • Does this project also support clean water to communities? • Will the employment opportunities only be provided during the construction phase? Or will it continue to employ when the Solar Project is ready to start the operation? **4thFelicidade Soares – Member of Uma lukVillage Community** • Mrs. Felicidade's concern is the flat land, which is ideal and potential for communities' economic development and sustainability. If the Government uses the land for the Solar Project, can the communities measure the land near the area for use, economic activities, or living? • Mrs. Felicidade agreed that the project will bring development to the country – but there should also see how the community be benefited from this project

Responses:

ZofimoCorbafo, Consultant for Socio Economic Survey contracted by ADB, gave his intervention to respond to the above questions.

- Zofimo appreciated the community for raising their concerns and affirmed that the objective of this survey is to listen to the community's concerns, especially people who live near the area.
    - Thus, he encouraged the community to actively participate in the consultation process of the survey to be able to raise their concerns and suggestions.
    - Zofimo also clarified that the concerns and suggestions brought by communities will be listed as findings and eventually presented to the Government and ADB for consideration and finding solutions.
- The consultation process would include all communities – the first process of the survey is a feasibility study, where it lists down all the communities' concerns and analyzes them to find solutions
    - Further, Zofimo explained that this feasibility study would gather information and data from people, the communities' plantation, the environment, and socioeconomic and gender aspects. The ADB policies are how to ensure risk mitigation from the affected area for the development plan.
- Regarding the question on the political party's recommendation for the project – Zofimo explained that this Project is the Government's plan. This has been part of the National Development Plan, which belongs to the people and the State's interest.
    - He reinforced that this is the Government's commitment which has been shown through their loan proposal to ADB. Therefore, ADB considers this necessary for the people and national interest of Timor-Leste.
    - The ADB policies are to receive proposals from the State, not any political party, which reflect the national priority and current context of the State.
- In the future, there should be a study to understand, examine, and find solutions to the problems and concerns before implementing a project
- The data and information will be analyzed and weighted according to the existing laws and legal procedures as well as socio-cultural aspects that are in line with the Timor-Leste context.
    - Regarding the employment opportunity, Zofimo emphasized that the priority for employment will be given to two villages that have a direct impact by the project.
    - Stressed on the ADB practices – the tender documents will follow the ADB criteria, which has to involve the local community in the area affected by the project.
    - Therefore, the data and information provided are really useful to design policies and criteria for the implementation of the project.
- On the flat land question, Zofimo explained that this feasibility study will be served as a measurement to understand the short-term, medium-term, and long-term of the project.
    - Zofimo explained that the data will be analyzed based on the land statutes, environmental policies, and socioeconomic and gender aspects including all the details to support the decision-making on using the land.

	○ Zofimo affirmed that the decision that will be made will be considered the above factors including the concerns raised by communities. This process will take longer so that everyone is well informed and aware of the whole process and decision.
2	**1st Guilherme de Sousa – Member ofRalan Village Community** • Mr. Guilherme clarified that he had heard that some of the political leaders said that this is a political party's program, therefore only certain people that are affiliated with the political party would be prioritized to work there when the project commenced. • He also stressed that if this plan would need to have a feasibility study first, then as a Laleia person, he was proud that his people were contributing to the development of the country. **2nd João Soares – Chief of Uma Iuk Village** • Mr. João commented that according to his understanding from the media that the law gives permission for citizens to have a piece of the State's lands – therefore he lamented that the area for the project actually can be owned by local people. In fact, in reality, some people have already measured the piece of land to be owned – given this circumstance, how does the Government think about this? Can the Government compensate the lands for communities? • He ensured that the community would contribute to and support the project, but there should also give attention to the concerns raised by the community. **3rdMember of Ralan Village Community** • Mr. Alexandre agreed that this project will positively impact the development of this country, but he questioned whether or not the project would be going to happen. ○ Because in their experience, many people have come and talked with them, but nothing happened. They were left with promises only.
Responses: Zofimo's interventions: • Zofimo continued to reinforce that this is a Government Plan that is financed by ADB, an international development agency. ○ He strengthened that the presence of the group with ADB and RDTL/EDTL logos was proof that we came here to do what was best for the interest of the people, not a political party. • Zofimo further explained that the feasibility study conducted by ADB consultants and experts would be served as a reference for making a decision, that will consider all aspects including environment and legal procedures. • Lastly, Zofimo commented that ADB's standards and applications, which were shown previously in the PowerPoint presentation, would ensure that the development will function in line with the necessary priorities that eventually benefit local people. In addition, it also would ensure the best treatment for affected people and families and ensure that their livelihoods would not get affected by the implementation of the project. Thus, to make this process successful, there should a contribution from all stakeholders – the State and the people of Timor-Leste.	

TA-9802 TIM: Energy System Strengthening and Sustainability Project - Solar IPP

LIST OF PARTICIPANTS

#	Name	Age	Sex (M/F)	Education	Occupation	Signature
1.	Marta T. De Sousa	39	F	SMA	Delegada Suco	Marta
2.	Matilde Monteiro	40	F	SMA	Delegada	
3.	Luiz Soares	72	M	1a escola	Agricultor	Luiz
4.	Ambrosio de Sousa	82	M	1a escola	Agricultor	
5.	Zito Clementino de Sousa	64	M	SMA	Chefe Aldeia	
6.	Vicente Pereira	63	M	SD	Agricultor	
7.	João Gusmão	66	M	SD	Agricultor	
8.	Domingos Gusmão	63	M	1a escola	Agricultor	
9.	Eva De Almeida	34	F	SMA	Delegada Suco	
10.	João Soares	50	M	SMP	Chefe Aldeia	
11.	Gaspar J. F. da Costa	47	M	SD	Chefe Suco	

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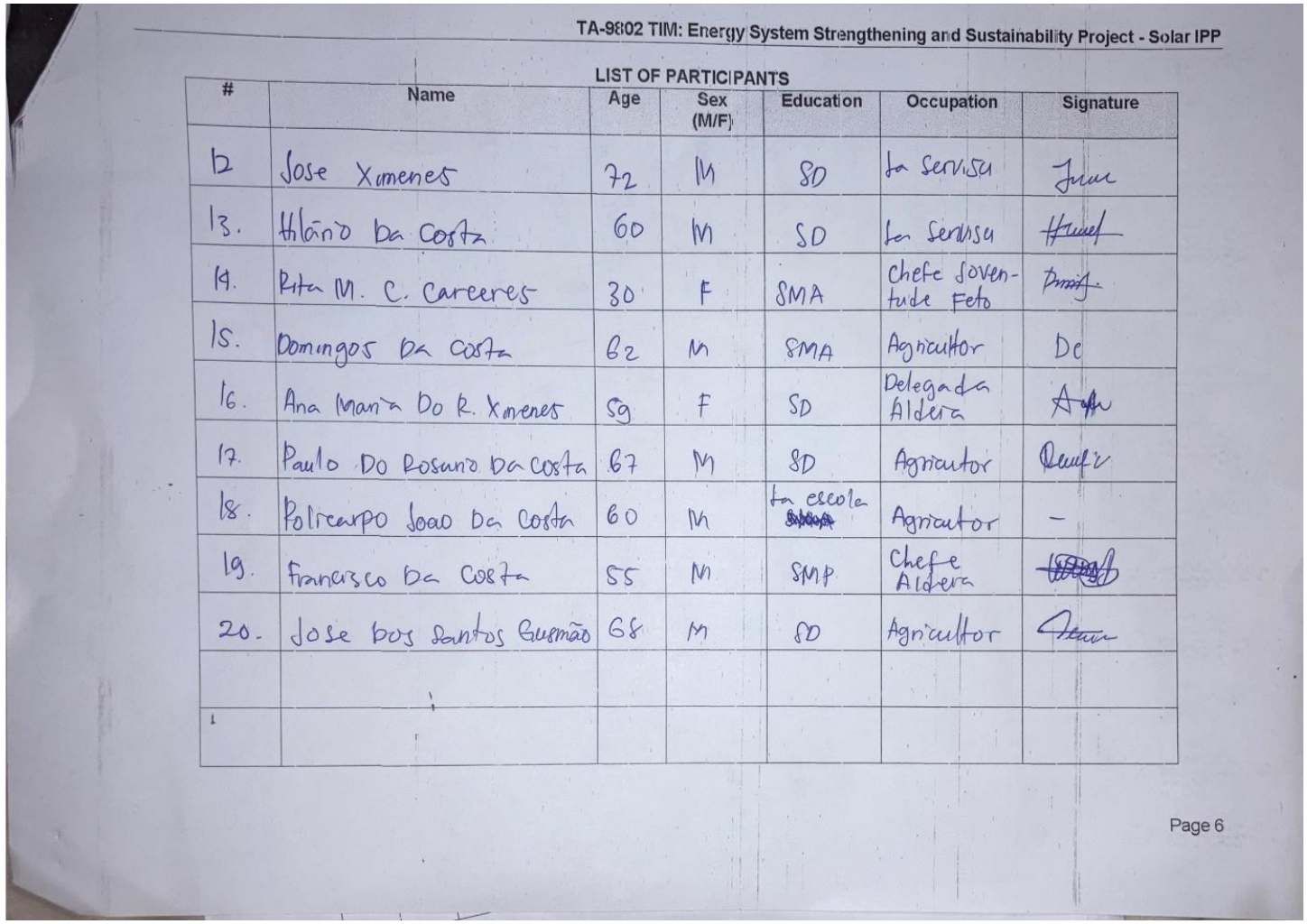

TA-9802 TIM: Energy System Strengthening and Sustainability Project - Solar IPP

LIST OF PARTICIPANTS

#	Name	Age	Sex (M/F)	Education	Occupation	Signature
12	Jose Ximenes	72	M	SD	La Servisu	Jime
13.	Hilário Da Costa	60	M	SD	La Servisu	Hilário
14.	Rita M. C. Carceres	30	F	SMA	Chefe Joventude Feto	Prmf.
15.	Domingos Da Costa	62	M	SMA	Agricultor	De
16.	Ana Maria Do R. Ximenes	59	F	SD	Delegada Aldeia	Ana
17.	Paulo Do Rosario Da Costa	67	M	SD	Agricultor	Paulo
18.	Policarpo Joao Da Costa	60	M	La escola SMA	Agricultor	-
19.	Francisco Da Costa	55	M	SMP	Chefe Aldeia	
20.	Jose Dos Santos Guzmão	68	M	SD	Agricultor	

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PUBLIC CONSULTATION AT LIFAO SUCO

STAKEHOLDER CONSULTATION (COMMUNITY CONSULTAION)

- Name of the hamlet: Uma Rentau
- Name of the Suco Lifau
- Name of post administrative: Laleia
- Name of the Municipality Manatutu
- Geographical coordinate of the hamlet:
  a. Latitude 8.54189º S
  b. Longitude 126.16265º E
- Total number of households in the Hamlet 107 household
  a. Male 222
  b. Female 212

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS

Total households in the hamlet and how many approximately have agriculture land and what is the average landholding size?
What are the major crops and how many crops you cultivate in a year?
	• This village has 175 households
	• In the Uma Rentau village, the community from each family has 4-6 hectares of rice fields.
	• The majority of the farm in this village is rice fields to plant rice: we harvest 2 times a month.
	  ○ December – May
	  ○ July – November
	• Beside rice field, the community also plant corn and vegetables based on the weather
	• The farm plantation is mustard, water spinach, brinjal, and drumstick.

What is the composition of People in the Village? Population of the Village: Number of total households: Name of the Ethnic Groups:	**Population of the Village (Aldeia Uma Rentau):** 434 (Male 222 and Female 212) **Number of total households:** 175 **Name of the Ethnic Groups:** Galolen **Name of the Sub Groups:** N/A

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Name of the Sub Groups: Common language: Official language:	**Common language:** Galolen and Tetum **Official language:** Tetum and Portuguese
Are all houses electrified? Yes/No For how many years, the village is electrified? What % of village is electrified	• Yes, the majority of the population has access to electricity from the beginning before Independence Day. • 100% of people in this village have electricity.
What is average hours of electricity per day for domestic consumption? Is there any seasonal variance, please probe.	• The average hours of using electricity is 7-8 hours, especially at night. • Sometimes there is a windy and rainy day, which can affect environmental disasters. • When there is a rainy day and windy, usually the electricity goes off. • Sometimes the lights go off all day and this happens 2-3 times a year.

If village is not electrified, what is the current source of electricity for domestic consumption e.g. for charging cellphones (solar panel, DG sets)	• All people have access to electricity and use it for all the house activities
	• But the families also use other sources of energy such as
	  • Many of them use electricity for cooking but sometimes they also use wood and petroleum.
	  • Use fuel for a tractor to the rice field.

Do you face any problem regarding current electric supply as far as home connection is concerned?	• My preoccupation is when the light goes off • The light goes off 3-5 times a month • Sometimes the light goes off until 1-2 hours and sometimes it happens during the day and at the night the light is on.
Do you face any problem regarding current electric supply as far as your home connection is concerned?	• The capacity of the light is sufficient based on the capacity of the electricity that uses in each family
Are there industrial units in the village and surrounding and if yes please mention the name	• In this village there is no industry

What is the general economic activities in the area	• Majority of the community is a farmer.
	• Besides farming, there are also other economic activities such as:
	  ○ Business
	  ○ Hired employee (NGO/Government)

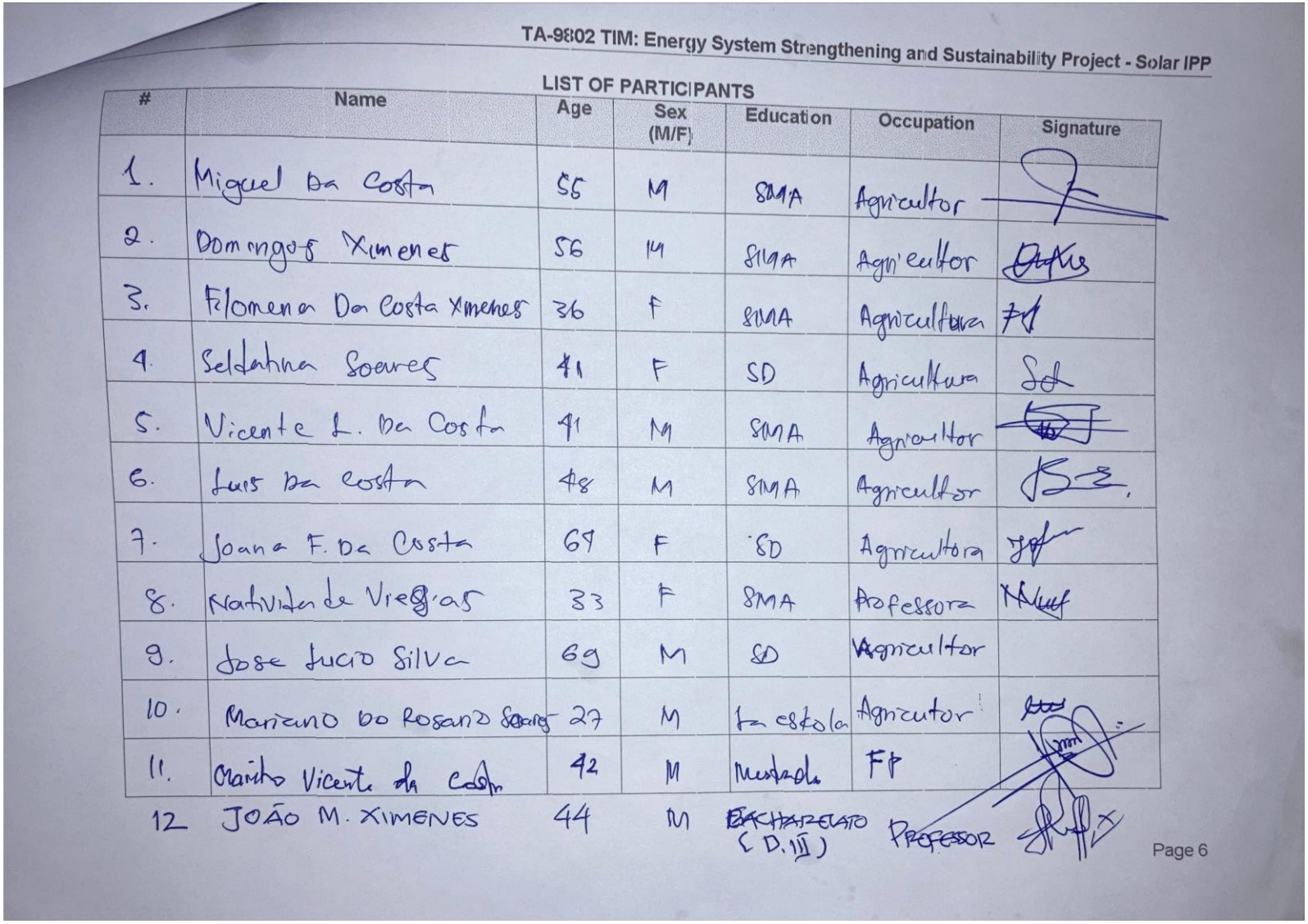
ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Have you heard about the Project or Do you have any information about the IPP solar project.	• We heard the information about this Solar Project from Government EDTL. • When they put the sign in the solar place, the staff of EDTL clarifies that there will be a building of the solar area. • We just heard this information in November 2022
What is your opinion about this Project	• As a community we feel proud and happy, and we think this project is good because it gets energy from the sun and it can reduce the government budget for each year.
Do you support this Project	• We support and are very happy with this solar project.
Do you support government's efforts to bring new idea such as the IPP solar for increase in electricity generation	• We support 100%

What are your main concerns/issues about the project	• The Tinawaki place is a place that uses for animals.
	  ○ There are 10 families from this village that put their animals in there such as all types of cows.
	  ○ This place is a strategic place for the cows to drink water and eat
	  ○ The animals used to live in that place. How about their life when we build the solar project in that area?
	  ○ Tamarind also helps the economic income of communities, when rainy and sunny days the communities harvest and sell and consume the tamarind.
	  ○ That place usually some community access the road to go fishing, collect wood, and collect stone for some road construction.

Can you suggest how best to address your concerns/issues	• If they want to close the road, they have to create another road or give a way for the community to use for fishing. • Make a fence for the solar place and divide it if there is still some place for the animals. ○ Build "Badebu" – a tank for water • They have to reforestation – when they cut the wood, they have to replant it.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
The Project is about construction of solar PV in your area. There might be some interruptions in terms of loss of access to do the fishing and collection of tamarind. Would you volunteer to cooperate with the government during construction?	• We will be ready to cooperate when they address all the suggestions that we recommend above.
There would be construction of small transmission line which may pass through your agricultural field. What would be your concern related to the tower footings and lines	• There must be a reward for losing.
Will there be any impact to cultural and religious values due to the project	• There is an impact on the culture o As a community and Laleian, that place is considered sacred. They have to ask permission before making solar construction in that area. o The sacred place is near the beach. o The land near Tinawaka is categorized as of cultural place.
What would be your suggestion to deal with the fishing activities during and after the project construction	• Create an alternative road for the community to go fishing in that area. • Put a sign in the risky area.
The project may bring outside technical labor force to your area. Do you foresee any socio-cultural threats to your society? If yes, please explain and also please explain how to mitigate.	• There is no other issue. The important thing is to ask permission or follow the cultural ritual before making the construction.
Specifically, what concerns/issues do you have on the implementation of the project with respect to the following: • Community health and safety • Land • Agricultural production • Cultural heritage • Displacement • Loss of income and business • Fishery • Others (Specify)	Community Health and Safety: • There is no any issue about the health. • About the safety is that the risk to access to the solar area – they need to put risky signs and explain it to community. Land: • Tinawaki is the flat land in Laleia, the land of culture and inheritance, need to put into consideration. • The land that will use for this project is the land that communities use for animals. Displacement: • They have to plant the plants that they cut. Loss of Income and Business: • We will lose the income in continuation of animals' life, especially the cows. • The tamarind will not give an impact on income.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
	Fishery: • Open alternative roads for fishermen and some communities who fish at the night.
How long have you been living in this area?	• This community exist since the beginning of the past – before the Indonesian time.
Are there /Indigenous People live in your locality? If yes, what is the name and how far they live from the solar project site. Do they have same socio cultural and language practice like yours?	• There is no one in this village.
What positive impacts and/or benefits do you think the project will have	The positive impacts and benefits are • Reduce the expense of government • Give the light to the road • Can create a labor camp for the people of Laleia when this construction is built
What negative impacts do you think the project will have	The negative impacts are: • Lose access to the road • Lose access to places for the animals such as cows.
Any criteria you would like to be considered for project design, construction and operation stage?	• Suggest including the design for the animal place or animal access o Create a fence for the solar and identify the place or space that community will use for their animals to eat and drink water.
Are there any local NGO or CBOs, if yes then mention the name and nature of work they do	• JICA gives the support in the agriculture area • World Vision gives support to community to build cooperative group
Would you like to participate during project construction?	• Yes. We want.
Please provide your views/suggestions/recommendations	• Make a consultation with other community before decide the alternative way, to avoid the losing of other access.



TA-9802 TIM: Energy System Strengthening and Sustainability Project - Solar IPP

LIST OF PARTICIPANTS

#	Name	Age	Sex (M/F)	Education	Occupation	Signature
1.	Miguel Da Costa	55	M	SMA	Agricultor	
2.	Domingos Ximenes	56	M	SMA	Agricultor	
3.	Filomena Da Costa Ximenes	36	F	SMA	Agricultura	
4.	Seldatina Soares	41	F	SD	Agricultura	
5.	Vicente L. Da Costa	41	M	SMA	Agricultor	
6.	Luis Da costa	48	M	SMA	Agricultor	
7.	Joana F. Da Costa	69	F	SD	Agricultora	
8.	Natividade Viegas	33	F	SMA	Professora	
9.	Jose Lucio Silva	69	M	SD	Agricultor	
10.	Mariano Do Rosario Soares	27	M	Ta eskola	Agricutor	
11.	Manito Vicente da Costa	42	M	Mestrado	FP	
12	JOÃO M. XIMENES	44	M	~~BACHARELATO~~ (D.III)	PROFESSOR	

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STAKEHOLDER CONSULTATION (COMMUNITY CONSULTATION)

Name of the hamlet: Uma Clalan_____

- Name of the Suco Lifau_____
- Name of post administrative: Laleia_____
- Name of the Municipality Manatutu_____
- Geographical coordinate of the hamlet: _____
    a. Latitude 8.54189º S_____
    b. Longitude 126.16265º E_____
- Total number of households in the Hamlet 107 household_____
    a. Male 222_____
    b. Female 212_____

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Total households in the hamlet and how many approximately have agriculture land and what is the average landholding size? What are the major crops and how many crops you cultivate in a year?	• The total number of households in this village is 107. • Generally each household has 5-6 hectares of paddy rice. Some have 1 or 0.5 hectares of paddy rice. • The water pipes have a poor condition that water cannot go through the paddy rice. • Therefore, we need to canalize water from another village. • We also do farming, i.e., planting corn, vegetables, bean, tomatoes, eggplants, bitter gourd, and fruits (pineapple). But, our major production is paddy rice.
What is the composition of People in the Village? Population of the Village: Number of total households: Name of the Ethnic Groups: Name of the Sub Groups: Common language: Official language:	• **Population of the Village**(UmaClelan Village): 434 populations(male 222 and female 212). • **Number of total households:** 107 households • **Name of the Ethnic Groups**:Galolen • **Name of the Sub Groups**: N/A • **Common language**:Galolen no tetum • **Official language**: Tetum no Portugues

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Are all houses electrified? Yes/No For how many years, the village is electrified? What % of village is electrified	• All community have access to electricity • They have had access to electricity since the Indonesian occupation
What is average hours of electricity per day for domestic consumption? Is there any seasonal variance, please probe.	• Use electricity mostly at night • Use mostly for cooking • There is no problem with the electricity, but sometimes it goes off for three hours.
If village is not electrified, what is the current source of electricity for domestic consumption e.g. for charging cellphones (solar panel, DG sets)	All communities have access to electricity
Do you face any problem regarding current electric supply as far as home connection is concerned?	• Generally, we have no problem with electricity. • When in the rainy season, a number of natural disasters happen, i.e., landslides and fallen trees that eventually make the power off. Sometimes it can take more than 12 hours to go back to normal, or even worse a day to normal. • Places to sell electricity saldoare very limited. This has been our major concern.
Do you face any problem regarding current electric supply as far as your home connection is concerned?	• The places that sell electricity saldo are not that far but are very limited. There are only 1 or 2 shops that sell electricity saldo.
Are there industrial units in the village and surrounding and if yes please mention the name	• None.
What is the general economic activities in the area	• We have agricultural activity, which is cultivating rice. • Women raise animals like sheep, goats, pigs, dogs, and chickens. While men take care of bulls.
Have you heard about the Project or Do you have any information about the IPP solar project.	• The community has not heard of the Solar Project, but the Village Leadership has.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
What is your opinion about this Project	• As communities, we hope and expect that the electricity will not only cover our village or Laleia alone but also for the whole territory of Timor-Leste.
Do you support this Project	• Yes, we support this Project because it will benefit us all and the development of Timor-Leste.
Do you support government's efforts to bring new idea such as the IPP solar for increase in electricity generation	• Yes, we support it.
What are your main concerns/issues about the project	• Our concern is we no longer have a place to raise animals. • In the long run, the Government will use the flat lands. This will impact our future generations as they do not have places to build their house and live in. • We suggest hiring Laleia people to work on this project. • Tamarind trees have supported our household income. This project will also impact the tamarind trees as they need to be chopped off. • There should be a need for planting trees to preserve the environment should any trees get chopped off due to the project. • Communities have supported the Government by providing access to lands, but there is no progress at all. • We are concerned that after we had the consultation, there would be no implementation. For example, the land in Dare which we gave to the Government, but until now nothing happened. Another example is that we provide land for tamarind juice, but nothing happened to date. We also gave place to the fish industry, but again nothing happened. We started to lose faith. • The Government comes and prohibits the land for use, but there is no result on what they do with the land. • For us who have access to the sea, please provide another alternative for us to do our activities.
Can you suggest how best to address your concerns/issues	• We suggest flatting the mountain to build houses. We also demand including Laleia people in the process of the project implementation. There should be a clause in the contract agreement to include Laleia people.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
	• Disseminate and socialize the information to communities to keep them informed about the project.
The Project is about construction of solar PV in your area. There might be some interruptions in terms of loss of access to do the fishing and collection of tamarind. Would you volunteer to cooperate with the government during construction?	• We can and are ready to cooperate.
There would be construction of small transmission line which may pass through your agricultural field. What would be your concern related to the tower footings and lines	• Another concern we have is when establishing electrical pillars, they will affect plants, business places (small shops, for instance), fences, etc. thus there should be a repair.
Will there be any impact to cultural and religious values due to the project	• The traditional elders should make the cultural process before the construction. • We also normally celebrate the month of Mother Mary, when we carry the Statue going to into villages and houses to pray and sing. • During Easter time, we usually do the station of the cross to the mountains.
What would be your suggestion to deal with the fishing activities during and after the project construction	• Providing another alternative for fishermen to go to the sea. • When we go to the sea to find goods, women's participation is high.
The project may bring outside technical labor force to your area. Do you foresee any socio-cultural threats to your society? If yes, please explain and also please explain how to mitigate.	• The more important thing is to the cultural ceremonies before the project implementation. • When collecting information, it is important to insert all the details.
Specifically, what concerns/issues do you have on the implementation of the project with respect to the following: • Community health and safety • Land • Agricultural production • Cultural heritage • Displacement • Loss of income and business • Fishery	• **Community health and safety**: there should be coordination with the Ministry of Health and Police before the construction. And disseminate information to communities about the risks of electrical construction. • **Land:**we lose our land and animals. As mentioned above, there should be a cultural ceremony to ask for a license to Nature. • **Agricultural production**: lose lands and animals and tamarind trees. • **Cultural heritage**: when dismantling a place, there should be doing a cultural ceremony • **Displacement/ loss of income**: have to lose temporary shelter (or baraka in Tetum), business places, tamarind trees, and animal habitats.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
• Others (Specify)	• **Fishery:**Providing another alternative for fishermen to access.
How long have you been living in this area?	• Since long time ago,
Are there /Indigenous People live in your locality? If yes, what is the name and how far they live from the solar project site. Do they have same socio cultural and language practice like yours?	• None
What positive impacts and/or benefits do you think the project will have	• Can enlighten and protect and give employment for us.
What negative impacts do you think the project will have	• Lose income and limited flat lands for future generations.
Any criteria you would like to be considered for project design, construction and operation stage?	• None
Are there any local NGO or CBOs, if yes then mention the name and nature of work they do	• There is no NGO that comes to the village, but only the implementation of the PNDS program that builds roads to our village.
Would you like to participate during project construction?	• We are ready
Please provide your views/suggestions/recommendations	N/A

TA-9802 TIM: Energy System Strengthening and Sustainability Project - Solar IPP

LIST OF PARTICIPANTS

#	Name	Age	Sex (M/F)	Education	Occupation	Signature
1.	Sebastião R. Viegas	50	M	SMA	Chefe Aldeia	
2.	Domingos Viegas	60	M	la eskola	Agricultor	
3.	Tomas D.M. Viegas	65	M	SD	Agricultor	
4.	Sebastião Soares	64	M	SD	Agricultor	
5.	Pedro Viegas	52	M	SD	Agricultor	
6.	Jacinto B. Viegas	55	M	SD	Agricultor	
7.	Lourenço De Jesus	40	M	SMP	Agricultor	
8.	Frederico Viegas	54	M	SMA	Delegado	
9.	Afanazio Viegas Da Cruz	36	M	SMA	la Serviço	
10.	Deolindo L. G. Viegas	30	M	SMA	la Serviço	
11.	Asidoro Viegas Pinto	19	M	SMA	Estudante	

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TA-9802 TIM: Energy System Strengthening and Sustainability Project - Solar IPP

LIST OF PARTICIPANTS

#	Name	Age	Sex (M/F)	Education	Occupation	Signature
12.	Emeliano C. G. S. P. Viegas	26	M	Universidade	Estudante	
13.	Martins F. Viegas	18	M	SUNA ~~estudant~~	Estudante	
14.	Luis V. Soares	26	M	Universidade	Estudante	
15.	Francisco Jacob Viegas	29	M	~~Remata~~ Licenciatura	Ja servisu	
16.	Gaspar De B. Viegas	36	M	Licenciatura	Ja servisu	
17.	Ingracia Viegas	59	F	SD	Bona be Casa	
18.	Antonia M. da Costa	47	F	Simp	Bona be Casa	
19.	Domingas da Costa	48	F	Simp	Bona be Casa	

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STAKEHOLDER CONSULTATION (COMMUNITY CONSULTATION)

- Name of the hamlet: Lenao_____
- Name of the Suco Lifau_____
- Name of post administrative: Laleia_____
- Name of the Municipality Manatuto_____
- Geographical coordinate of the hamlet: _____
    a. Latitude 8.53726 º S _____
    b. Longitude 126.16336 º E _____
- Total number of households in the Hamlet 103 Household/384 population_____
    a. Male 188_____ _____
    b. Female 196_____

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS

Total households in the hamlet and how many approximately have agriculture land and what is the average landholding size?
What are the major crops and how many crops you cultivate in a year?
	• The total number of households in this village is 103.
	• The community has land approximately between 1-5 Hectares. 80% have land of 1-5 hectares that are productive areas.
	• The major plantation is:
	  ○ Paddy rice
	  ○ Vegetables: mustard, water spinach, sweet potatoes shoot,
	  ○ Aifuan:Aidila,Has,nu no sukaer
	• Harvesting rice is once a year – starting in December and harvesting in July.

What is the composition of People in the Village? Population of the Village: Number of total households: Name of the Ethnic Groups: Name of the Sub Groups: Common language: Official language:	Demography: Number of total households: • 103 Household Name of the Ethnic Groups: Name of the Sub Groups: Common language:

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
	• Galoleng no Tetum Official language: • Tetum no Portuguese
Are all houses electrified? Yes/No For how many years, the village is electrified? What % of village is electrified	• All community have access to electricity • They have access to electricity since the Indonesian occupation
What is average hours of electricity per day for domestic consumption? Is there any seasonal variance, please probe.	• Use electricity at night • During cultural ceremonies or parties, they consume more electricity • They spend $10 a week on electricity
If village is not electrified, what is the current source of electricity for domestic consumption e.g. for charging cellphones (solar panel, DG sets)	• Maioria Komunidade sira asesu ba eletrisidade • Use electricity for cooking. Sometimes they use firewood and stoves in case the power goes off.
Do you face any problem regarding current electric supply as far as home connection is concerned?	• When in the rainy season, a number of natural disasters happen, i.e., landslides and fallen trees that eventually make the power off. Sometimes it can take more than 12 hours to go back to normal, or even worse a day to normal.
Do you face any problem regarding current electric supply as far as your home connection is concerned?	• The electric pillars have not yet been built, thus the community connects electricity through houses.
Are there industrial units in the village and surrounding and if yes please mention the name	None
What is the general economic activities in the area	• Some of the people live agricultural lives. • Some work for the Government or NGOs. • Some work as fishermen. • Businesspersons.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Have you heard about the Project or Do you have any information about the IPP solar project.	• The majority of the community has not yet heard about this information. With the survey team's presence, they now knew the information about the solar project.
What is your opinion about this Project	• The concerns they have are animals – bulls. If possible, please provide alternative bulls' habitats. • Provide alternative roads for communities to access to go to the sea • Many youths go find jobs overseas – if this project commences, it would give employment for young people.
Do you support this Project	• We really support this project. • With this project, it would reduce problems among youth as they have work to do.
Do you support government's efforts to bring new idea such as the IPP solar for increase in electricity generation	• We really support this solar project.
What are your main concerns/issues about the project	• We are really concerned about the places for bulls to access to. • There is no flat place like Tinawaki. And the community is concerned about future generations as they will experience difficulties finding flat places. • Create another alternative for fishermen to go to the sea • If there is a development taking place in that area, the community also will build their houses around.
Can you suggest how best to address your concerns/issues	• When the solar project commences in Tinawaki, automatically community will start to build their houses around, thus we suggest: o Providing clean water to communities. o Providing electricity and roads to the sea o Create lights along the streets o Build a tank for bulls or animals to drink • Suggest socializing information about the risks of living near the project. We need to know how to better protect our safety.
The Project is about construction of solar PV in your area. There might be some interruptions in terms of loss of access to do the fishing and collection of tamarind. Would you volunteer to cooperate with the government during construction?	• We are ready to cooperate when the conditions we raised are addressed.

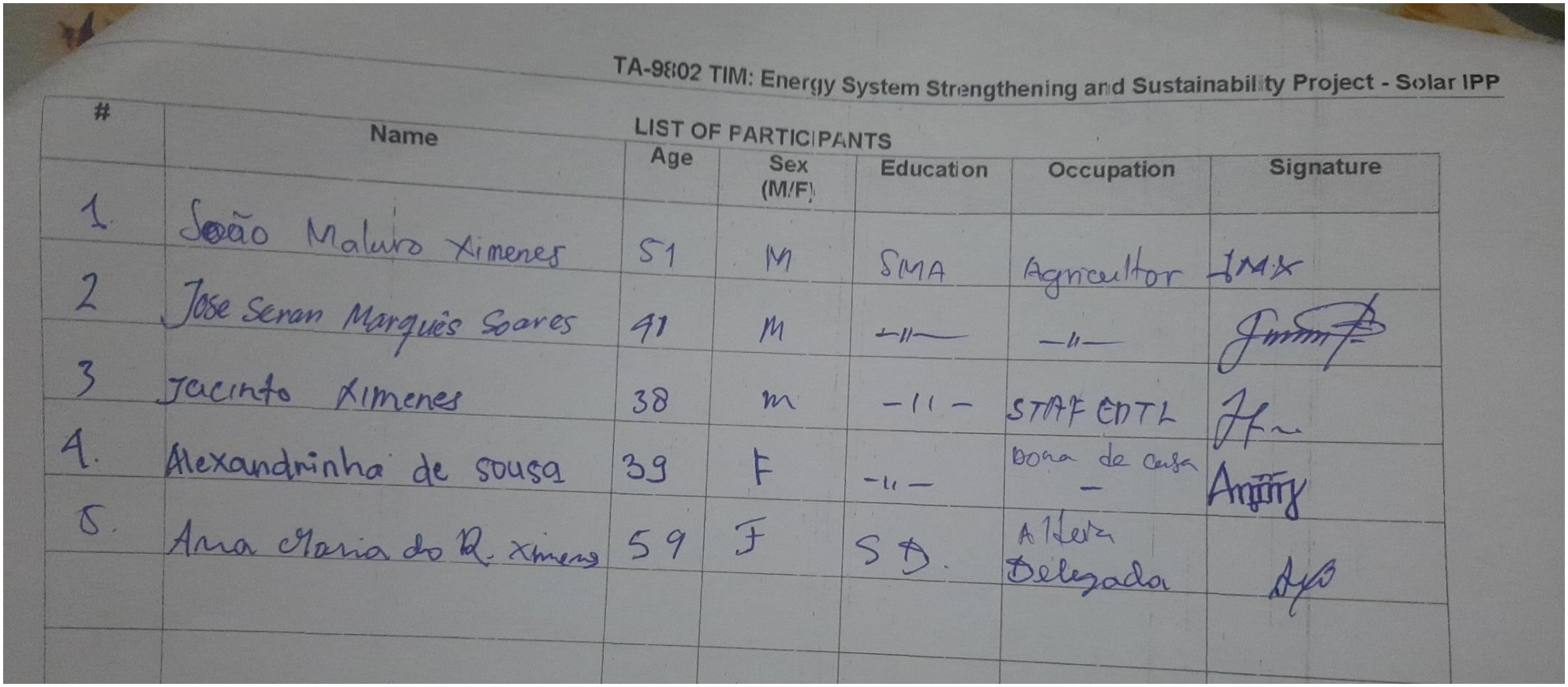
ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
There would be construction of small transmission line which may pass through your agricultural field. What would be your concern related to the tower footings and lines	• All the community wants and hopes is that everything will go according to the plan, and have proper conditions that are good. • The goods that are damaged should be fixed or compensated.
Will there be any impact to cultural and religious values due to the project	• There should be a cultural ceremony before the commencement of the project because Tinawaki is a sacred place.
What would be your suggestion to deal with the fishing activities during and after the project construction	• Providing access to the sea.
The project may bring outside technical labor force to your area. Do you foresee any socio-cultural threats to your society? If yes, please explain and also please explain how to mitigate.	• There should be good coordination with local authorities and elderly people to do cultural ceremonies before the construction.

Specifically, what concerns/issues do you have on the implementation of the project with respect to the following:
• Community health and safety
• Land
• Agricultural production
• Cultural heritage
• Displacement
• Loss of income and business
• Fishery
• Others (Specify)
	• Community Health and Security
	  ○ Creating signals for restricted area
	• Land
	  ○ Flat lands are limited – future generations will find it difficult to find flat lands.
	  ○ Other concerns are related to the access
	• Agricultural Products
	  ○ Tamarind trees do not have a major impact on this project.
	  ○ There are sticks of trees that can support economic activities.
	• Cultural
	  ○ Asking license before the project kicks off.
	  ○ Lia nain / elderly people should indicate which place to do the rituals
	• Displacement
	  ○ Animals' habitats like bulls move to another place.
	  ○ When chopping off trees, there should be planting more trees.
	  ○ Better to plant trees that can generate income.

How long have you been living in this area?	• Since generation to generation. • Ages ago, there was a place near the sea where people at the time used to cook salt. Now, there is a tomb there.

ISSUES	PARTICIPANTS' OPINION, COMMENTS AND SUGGESTIONS
Are there /Indigenous People live in your locality? If yes, what is the name and how far they live from the solar project site. Do they have same socio cultural and language practice like yours?	• None
What positive impacts and/or benefits do you think the project will have	• With the solar project, it can give development to this land. • Create more jobs.
What negative impacts do you think the project will have	• Fishermen can no longer have access to go to the sea. • Place for animals to eat will be no more. • There are no more flat lands to use.
Any criteria you would like to be considered for project design, construction and operation stage?	• Do the cultural ceremonies right before everything else. • Design and give space for communities to access. • Before commencing, better do the surveillance and security access – for that not impact people and animal's movement.
Are there any local NGO or CBOs, if yes then mention the name and nature of work they do	• JICA supported the agricultural sector by providing seeds for paddy rice. • World Vision established a cooperative group (savings and loans).
Would you like to participate during project construction?	• The community is ready.

Please provide your views/suggestions/recommendations	• If possible, include engineers that are local people.
	• Collaborate and trust each other
	  ○ In the tender process, there should be a clause that says the company should involve local people in the implementation of the project.
	  ○ Establish a village committee as a focal contact with the project
	  ○ Create jobs for communities.



TA-9802 TIM: Energy System Strengthening and Sustainability Project - Solar IPP

LIST OF PARTICIPANTS

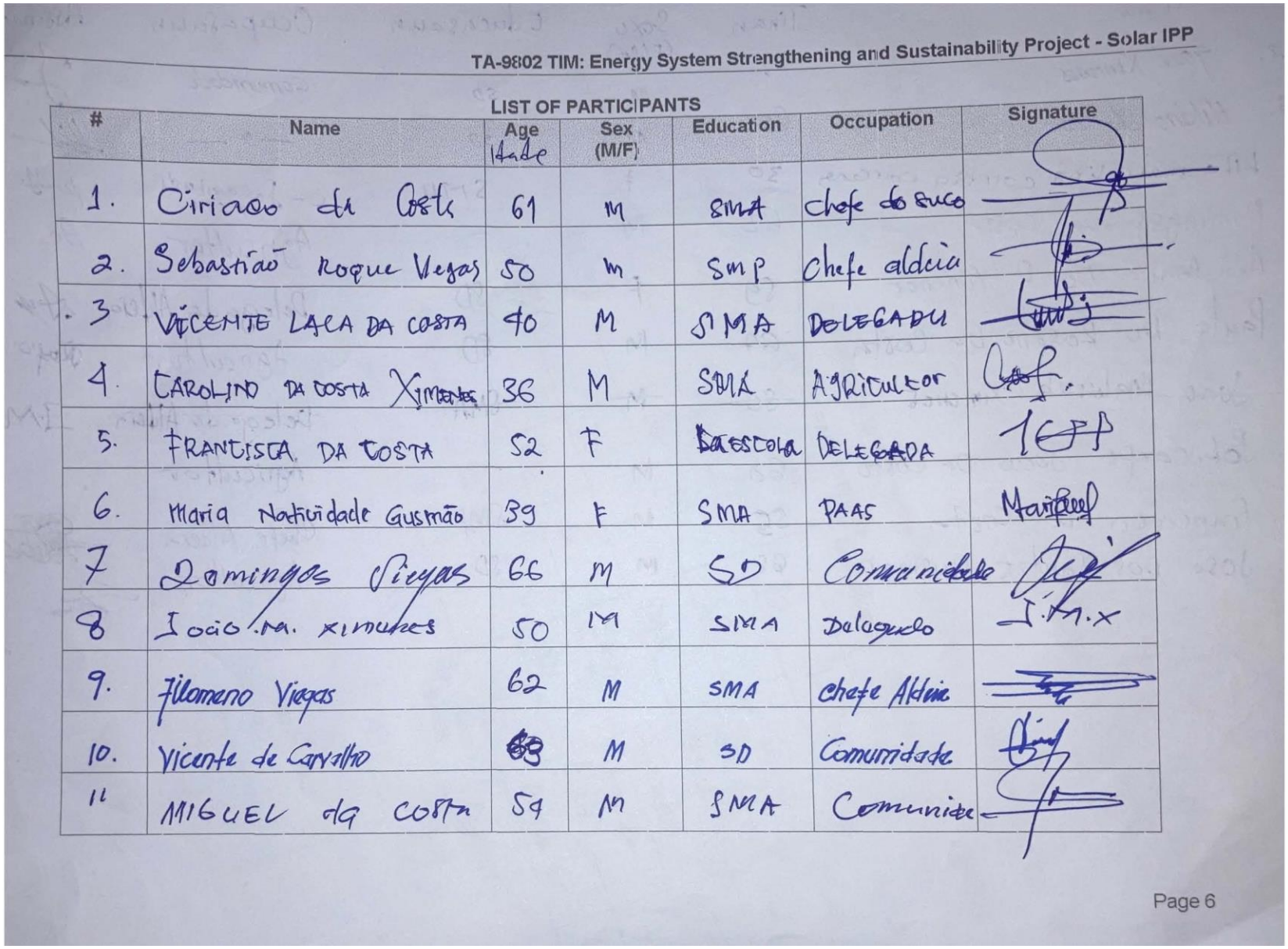
#	Name	Age	Sex (M/F)	Education	Occupation	Signature
1.	João Maluro Ximenes	51	M	SMA	Agricultor	
2	Jose Seran Marques Soares	41	M	-11-	-11-	
3	Jacinto Ximenes	38	m	-11-	STAFF CDTL	
4.	Alexandrinha de sousa	39	F	-11-	Dona de casa	
5.	Ana Maria do R. Ximenes	59	F	SD.	Alteza Delegada	

SUCO LEVEL CONSULTATION MINUTES (LIFAU SUCO)

Project Title	Solar IPP	Project No:	TA - 9802
Date	21/11/2022	Time	From 10:00 to 11:45 (1:45hours)
Location	SedeSucoLifau		
Meeting purpose	Public Consultation (Introduction Meeting)		

Section #	Description
1	**1st Policarpio João – Member of Uma Rentau Village** • Mr. Policarpio suggested providing a space (road) for animals (bulls) to access because the place where the Solar Project was to be implemented used to be the place where animals were habitat. **2nd Paulino da Costa – Member of Uma Rentau Village** • Mr. Paulino expressed that the land to be used actually was considered sacred by Laleia Community, thus he thought that it would be better if the Government rented the property from the community. **3rd Domingos Viegas – Member of Uma Klalan Village** • In his intervention, Mr. Domingos appreciated the project and acknowledged the importance and positive development brought by the Solar Project. But, he also expressed that the community was concerned given that the flat land could be used for the betterment of the community and sustainability for the next generations to come. Further, he mentioned that the land was not empty. The ancestors used to live and do farming there until climate change came and they eventually needed to find another place. **4th Paulo da Costa – Member of Uma Rentau Village** • As Mr. Domingos's explanation, Mr. Paulo also requested that the Government to considered providing space 50-100 m for the community to use for raising animals – there should be a place for bulls to habitat. **5th Domingos da Costa – Member of Uma Rentau Village** • Mr. Domingos declared that the houses nearby the project belonged to him, and he also agreed with his colleagues that that land was not empty nor Government's property – it belongs to the Laleia People. **6th Ciriaco da Costa – Head of Lifau Village**

	• The head of the village opened his intervention by appreciating the project and expressing his consideration of the concerns raised by his communities. • Therefore, he suggested the Government carefully look thoroughly at the case to address these concerns. He further explained that the major concern here was the place to raise animals. • Lastly, he emphasized the importance of hiring local people to work on the project, particularly during the construction phase.
RESPONSES • Zofimo started his intervention by explaining the five applications, which principally emphasized ADB's policies that address the issues with an adequate, best and honest treatment for all stakeholders. • He also mentioned that the process had just begun with several consultations to come, which were designed based on the ADB's guidelines and tools to make sure everyone's participation was counted and heard. • Zofimo ended his intervention by acknowledging the concerns raised by the community and encouraged them to raise them up during the Survey Team interview and discussion in their respective villages. These would be their opportunity to provide also their recommendations and suggestion. He also emphasized that the results of the study along with other analyses would be the measurement to decide on the ongoing development of the project.	



TA-9802 TIM: Energy System Strengthening and Sustainability Project - Solar IPP

LIST OF PARTICIPANTS

#	Name	Age Idade	Sex (M/F)	Education	Occupation	Signature
1.	Ciriaco da Costa	61	M	SMA	chefe do suco	
2.	Sebastião Roque Viegas	50	M	SMP	Chefe aldeia	
3	VICENTE LACA DA COSTA	40	M	SMA	DELEGADO	
4.	CAROLINO DA COSTA XIMENES	36	M	SMA	AGRICULTOR	
5.	FRANTISCA DA COSTA	52	F	~~Escola~~	DELEGADA	
6.	Maria Natividade Gusmão	39	F	SMA	PAAS	
7	Domingos Viegas	66	M	SD	Comunidade	
8	Joao Ma. Ximenes	50	M	SMA	Delegado	
9.	Filomeno Viegas	62	M	SMA	chefe Aldeia	
10.	Vicente de Carvalho	~~63~~	M	SD	Comunidade	
11	MIGUEL da COSTA	54	M	SMA	Comunidade	

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No	Naran	Tinan	Sexu (F/M)	Educasaun	Ocupasaun	Assinatura
12.	José Ximenes	72	M.	SD	Comunidade	
13.	Hilário da Costa	60	M.	SD	— " —	
14.	Rita marcelina correia carceres	30	F	SMA	C-Joventude + eto	
15.	Domingos Da costa	62	M	—	Agricultor	
16.	Ana Maria DO R. Ximenes	59	F	SD	Delegada Aldeia	
17.	Paulo DO Rosario Da Costa	67	M	SD	Agricultor	
~~18.~~	~~Joao Maluruk Ximenes~~	~~50~~	~~M~~	~~SMA~~	~~Delegado Aldeia~~	
18.	Policarpo Joao Da Costa	60	M	—	Agricultor	
19.	Francisco Da Costa	55	M	SMP	Chefe Aldeia	
20.	Jose DOS Santos Gusmao	68	M	SD	Agricultor	

GENDER CONSULTATION AT HATURALAN SUCO
FOCUSED GROUP DISCUSSION ON GENDER (CONSULTATION AMONG WOMEN)

- Name of the hamlet: Ralan
- Name of the Suco Hatularan
- Name of post administrative: Laleia
- Namae of the Municipality Manatutu
- Geographical coordinate of the hamlet:
    a. Latitude 8.53883° s
    b. Longitude 126.16442° e
- Total number of households in the Hamlet 110 household/419 Population
    a. Male 200
    b. Female 219

ISSUES	RESPONSE/DETAILS

Please tell us as to how you spend your time (daily routine)?
 	
- Type of livelihood activity; # of crops/seasons; animal husbandry
- Existence of trade/small business
- Role in farming; other business
- What time do women mostly get up/go to bed?
- What % of day do women spend on average on :
  o Domestic chores/child care
  o Income earning
  o Religion/charity
 	
(Try to probe whether they get leisure time and what are the activities they usually do during the leisure hours.
	The majority of the population lives in the agricultural sector, where they work in the paddy field, rear animals, and farm.
	• In the plantation are planting vegetables, tomatoes, onions, chili, etc. These are not for sale, however for everyday consumption.
	• Women report that in the plantation process or farming, the participation of women and girls starts from the beginning – building fences, preparing seeds, and harvesting process.
	• Men help build the fences by finding a wood stick
	• In addition, they also raise animals such as pigs, goats, sheep, dogs, and cows.
	• Many people raise pigs and chickens.
	• The animals help the household income or economy.
	• Every year, the population plants rice paddy, where women and girls participate from the beginning of the process until harvesting. Rice paddy also helps their families' economic condition. Milling rice is for sale and some are used for everyday consumption.
	• Some of the population live with starting their business (opening their small shop, or "kios", selling biscuits/pastry, selling animals, and sewing clothes).
	• There is also a business for saving and lending money group, that has been trained by World Vision NGO.
	• The saving and lending money business creates opportunities for people who want to loan to do their business, i.e., establishing their small restaurant or sewing business, etc.
	
	• They usually wake up at 4 or 5 in the morning.

ISSUES	RESPONSE/DETAILS
	Activities: • Fry pastry for sale. Prepare breakfast for their husband to go to the farm and children to go to school, and feed animals. • Prepare lunch as well. • Usually there are two hours for rest in midday. These are used for taking naps or taking care of their children. • The noon activity includes talking with their children, and neighbors, and preparing family dinner. • At night, help their children with school homework. • 9 o'clock is the time for rest. • Women in Ralan Village participate in church activity such as choir, cleaning, and decoration.
What are the current energy sources and uses (eg. Solar, fuelwood, etc.) Cooking Lighting/charging Pumps Economic activities Health Clinic School	Many people use electricity as their main source. **Cooking** • Many use electrical kerosene stoves and firewood • When the power goes off, they use firewood to cook **Lighting/Charging** • Use Electricity • Use a candle and flashlight when the power goes off **Pumps** • Majority of the population has access to clean water that is drawn out by pipe. • When they run out of water, they buy clean water or fetch water in the river. **Economic Activities**

ISSUES	RESPONSE/DETAILS
	• Electricity really supports their economic activity – opening their small shops, selling pastries, and sewing clothes. **Health Clinic and School** • Health centers and schools use electricity. When the power goes off, they use a generator.
How will electricity improve life in the village - Specific examples for women and for men Prompt for women to think about: Workload – what would they like to replace in terms of current energy sources Street lights – can they go out now at night; will street lights make a change More light in the home at night – how may it change their daily tasks	Electricity gives so many benefits to communities and makes their life changes for the better. • Can enlighten their nights to help children study • Help women to prepare dinner easily • Wainhira lao iha kalan sente seguru maske lampu iha estrada laiha. • Walking at night feels safe, although there are no lights in the street.
How can electricity enhance current livelihood activities?	Electricity contributes to and helps a lot in the lives of communities both at the personal and business levels (i.e., small shops that women establish)
What are your main concerns/issues about the project Probe for percentage of women depended on tamarind collection in the project area. How the project will impact on these livelihood options?	The concerns they have are: • Plants like tamarind that give income to communities • Access to roads that people of Laleia normally use to go fishing • When there is a puddle in the rice bay, people always leave their animals in that place.
Can you suggest how best to address your concerns/issues	Suggestions for these concerns are: • When the solar project comes to the area, please consider the tamarind plants, which give income to communities. When chopping off the tamarind trees, there is a need to plant another tamarind tree as it supports the family's economy, it also can be used for consumption.

ISSUES	RESPONSE/DETAILS
	• Give space for communities to access roads for they can use to go fishing at night. • The more important is to do a ritual ceremony to ask for permission before starting the solar project. This is the community's belief and major concern from the community. • Providing jobs for Laleia people, especially for women to work in the administration or cooking.
Any new livelihood activities that electricity makes possible?	• Opportunities for small businesses to women include small shops, grilling meats, etc.
What are some of the special environment characteristics of this area (forest, plants, water, vegetation, animals)? What are important cultural/traditional places in this area? Any potential project impacts on environment / cultural places? What impacts/concerns about environment / cultural places do you have?	• This area is categorized as "rock place". • In this Ralan Village, there are two sacred houses that communities believe it is a sacred place to do ritual ceremonies • They are also concerned about irrigation – water that is used for rice paddy that was built by the Japanese. Hope that it will not get affected.
Any safety/security concerns for women or children in this area (reports of human trafficking, gender-based violence)	• Domestic violence is common violence against women that occurs in Ralan Village. • Domestic violence does exist, but it is not that severe. • The number of domestic violence cases has been down due to the training provided by UNDP and Wold Vision on Violence against Women and Girls.
Perceived importance of girls education reasons for sending/not sending girls to school	It is very important for girls to have access to education. • For their future to be brighter • Education plays important role in life, as it prevents people from early marriage

ISSUES	RESPONSE/DETAILS
Type of engagement of children in household activities (try to know about the girls) for the (type) and extent to which they directly contribute to the earning of the household (type of occupations engaged in).	• The participation of girls is high as they also help with the family's economic condition. During the dry season, they help their parents with planting seeds and harvesting their goods for sale. • Selling goods, such as fried bananas, and Pop Ice to support their parents. • The works that girls participate in mostly in their house are sweeping, washing dishes, and preparing food for families. • They also participate in the religious activity such as choir.
Existing skills and traditional skills amongst the adolescent girls and women that must be revived /encouraged. (Try to probe the skills those are economically productive for the women). Explore what external inputs would make them more profitable and sustainable.	The dominant skills for women are: • Cooking and sewing • Elderly women weave baskets • Make biscuits, pastry, and cake for sale
What are the barriers in terms of resources, availability, transport, locations of trainings if any, for pursuing vocational courses by women of your community? Also probe for the barriers from the family side, (like lack of time, etc)	• Besides Village Office, the Church also provides space/hall to support training conducted by NGOs for communities. • The NGOs that provide training are World Vision and UNDP.
Is there any organization, government, private or NGO running any vocational courses for the adolescents and women in area. (Probe for the agencies, nature of vocational trades providing, women's participation and livelihood opportunities).	• World Vision provides capacity building for communities in the business area, i.e., establish the Moris Rasik Group (save and loan money)
Do the women of the households in the community have ownerships of the property in the community, like houses, land, etc. probe for the reasons for having or not having ownership rights.	Women do not have rights for inheritance as when they are wed, they join their spouse's clan

ISSUES	RESPONSE/DETAILS
Referring to the group ask if there is any form of inequality in the receipt of wages, payments, rewards, etc for the work that the women perform. (Try to understand the nature of inequalities prevailing). What are the underlying factors for this prevalence of inequalities?	• No discrimination when it comes to the salary contribution • Women receive equal treatment • If there is no equal treatment, they will fight to eradicate this action
Are the woman who are working and earning have the ultimate decision on the use of their money? (Try to probe the pattern of using the money earned, part saved, used for them, etc.)	• Women also have the right to decide what is best for their family and no need for any confirmation or acceptance from men. • Women have the right to decide any decision for their household when necessary.
What role do the women of the household have in the decision-making process of the household? Do you feel you have equal share along with the male counterpart any household decisions? Does it vary among the earning and non-earning women? (How).	• Have the same right as their spouse/partners
Are there any self-help group functioning in the village for women? If yes, what proportion of women in the village are members. How have they benefitted? Can this be strengthened in any way?	The women groups that exist in the area are: • Cooperative Group (Rai no Impresta Osan, or Save and Loan Money) • Suku Sumasu or Sewing Pillow (15 women) A suggestion from the community is to help establish a group for raising fish.
Are there any specific ailments affecting the women of your community? Probe for the problems and the facilities available for the treatment. In particular, problem about ailments caused by indoor air pollution because of fuel wood/ kerosene use.	• Environmental problems in the area are burning off the ground and landslides. • When a natural disaster happens with a small impact/risk, the community takes initiative to solve the issue. But when it happens with higher risks, they wait for the Government to respond.

ISSUES	RESPONSE/DETAILS
Is there any provision of special health care services available near to your village/ neighbourhood? Probe for the nearest maternity and child health care facilities available, problems faced and the perception on the quality of care. What proportion of women delivers at health centres?	• Health center has really great treatment despite having only two midwives. ○ Attendance to pregnant women is really great. • The number of newly born babies is very minimum. Each year only one or two babies are born. • The community receives training from Brazilian nuns, interned students, and health center regarding healthy, pregnancy, and family planning that enables families to have babies in two years.
Do the women feel safe in going outside in the neighbourhood during day time? Also probe for the situation during the night time? What are the problems or fears they perceived for their movements?	• No concern for night movements • The community feels safe when they walk at night because, in the Ralan Village, they are all relatives/families.
Do the women in the community face any kind of domestic violence at their home? If yes probe for the reasons.	• They have domestic violence, but not that severe.
Will the women group support the Project? Explain about the Solar PV Project.	• The community supports the Solar Project to be implemented in the Laleia Post Administrative.
Views on the Proposed Project and how it is going to benefit or affect the women. Or any other Concern	The recommendation suggested is to have the training to increase women's capacity building in any actvitities across all villages in the Laleia Post Administrative.

LIST OF PARTICIPANTS

#	Name of the Participant	Relation to the Head of the Households	Age	Occupation	Signature
1.	Rosa De Sousa	an rasik	43	Dona de Casa	[signature]
2.	Ursula De Sousa	an rasik	67	Dona de casa	[signature]
3.	Berta desousa	laen	49a.	Dona decasa	[signature]
4	Maria Leocadia das	Laen	46	Dona decasa	[signature]
5.	Faustina dsousa	a an kasik	55an.	dona de casa	
6.	Francelina De Sousa	Ma'e ~~klosan~~	43	La. servisu	[signature]

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FOCUSED GROUP DISCUSSION ON GENDER (CONSULTATION AMONG WOMEN)

- Name of the hamlet: Uma Iuk
- Name of the Suco Hatularan
- Name of post administrative: Laleia
- Namae of the Municipality Manatutu
- Geographical coordinate of the hamlet:
  a. Latitude 8.54235° s
  b. Longitude 126.16168° e
- Total number of households in the Hamlet 65 household/225 Population
  a. Male 115
  b. Female 110

ISSUES	RESPONSE/DETAILS

Please tell us as to how you spend your time (daily routine)?
 	
- Type of livelihood activity; # of crops/seasons; animal husbandry
- Existence of trade/small business
- Role in farming; other business
- What time do women mostly get up/go to bed?
- What % of day do women spend on average on :
  ○ Domestic chores/child care
  ○ Income earning
  ○ Religion/charity
	People living here work in the agricultural sector, such as farming, paddy rice, and raising animals. People said that they work in two different seasons in a year, Paddy Rice and dry season or Farming.
	• Plantation includes planting vegetables, mustards, potatoes, water spinach, etc. Some are for sale, and some are for consumption.
	• In the plantation process, women and girls participate from the beginning such as preparing seeds until the harvesting process.
	• The community also raises animals such as goats, sheep, chickens, dogs, and cows.
	• The priority here is pigs and chickens as they can be raised at home and are easy to look after.

ISSUES	RESPONSE/DETAILS
(Try to probe whether they get leisure time and what are the activities they usually do during the leisure hours.	• Male is responsible to raise bulls because women do not have the strength to pull bulls. • Once a year, the population also cultivates paddy rice – women and girls also take part from the beginning such as cleaning seeds, scattering seeds, harvesting and straining. Paddy rice helps improve household economic conditions. When it comes to paddy rice time, the break is very limited. Sometimes it takes only 15 minutes to rest. • Some people live with small businesses (open small shops or selling fried pastries) • They usually wake up at 4 or 5 am. Activities: • Fried pastries for sale. Prepare breakfast for the husband to go to the farm and the children to go to school. • Prepare lunch as well. • Time for rest in the afternoon usually is for an hour. This can be used to take care of their children during their lunch or conversation. • In the afternoon, the time is used to feed animals, play with children, and prepare dinner. • Time to rest at night is 8 o'clock. • Participating in Church activities like a choir.

ISSUES	RESPONSE/DETAILS
What are the current energy sources and uses (eg. Solar, fuelwood, etc.) Cooking Lighting/charging Pumps Economic activities Health Clinic School	Resources used for cooking: • Many use electrical stoves and woodfire • If the power goes off, use the firewood for cooking. Resources used for lighting: • Lamp • When the power goes off, use candles or flashlights Water • The majority of the population has access to clean water from the extended pipe • When there is no water, buy clean water or draw water from the river. • Water for rice paddy uses canalization. Electricity really supports communities' activities as it generates income for them. Health centers and schools have access to electricity. When the power goes off, they use a generator.
How will electricity improve life in the village - Specific examples for women and for men Prompt for women to think about: Workload – what would they like to replace in terms of current energy sources Street lights – can they go out now at night; will street lights make a change More light in the home at night – how may it change their daily tasks	Electricity really helps the community and provides easier life for them: • Enlighten their night so the children are able to study • Ease women's household work, i.e., cooking. • When going out at night, we can feel safe.
How can electricity enhance current livelihood activities?	Electricity also helps communities' life and businesses. It helps the fridge work – we can use it by putting our drinks there for sale.

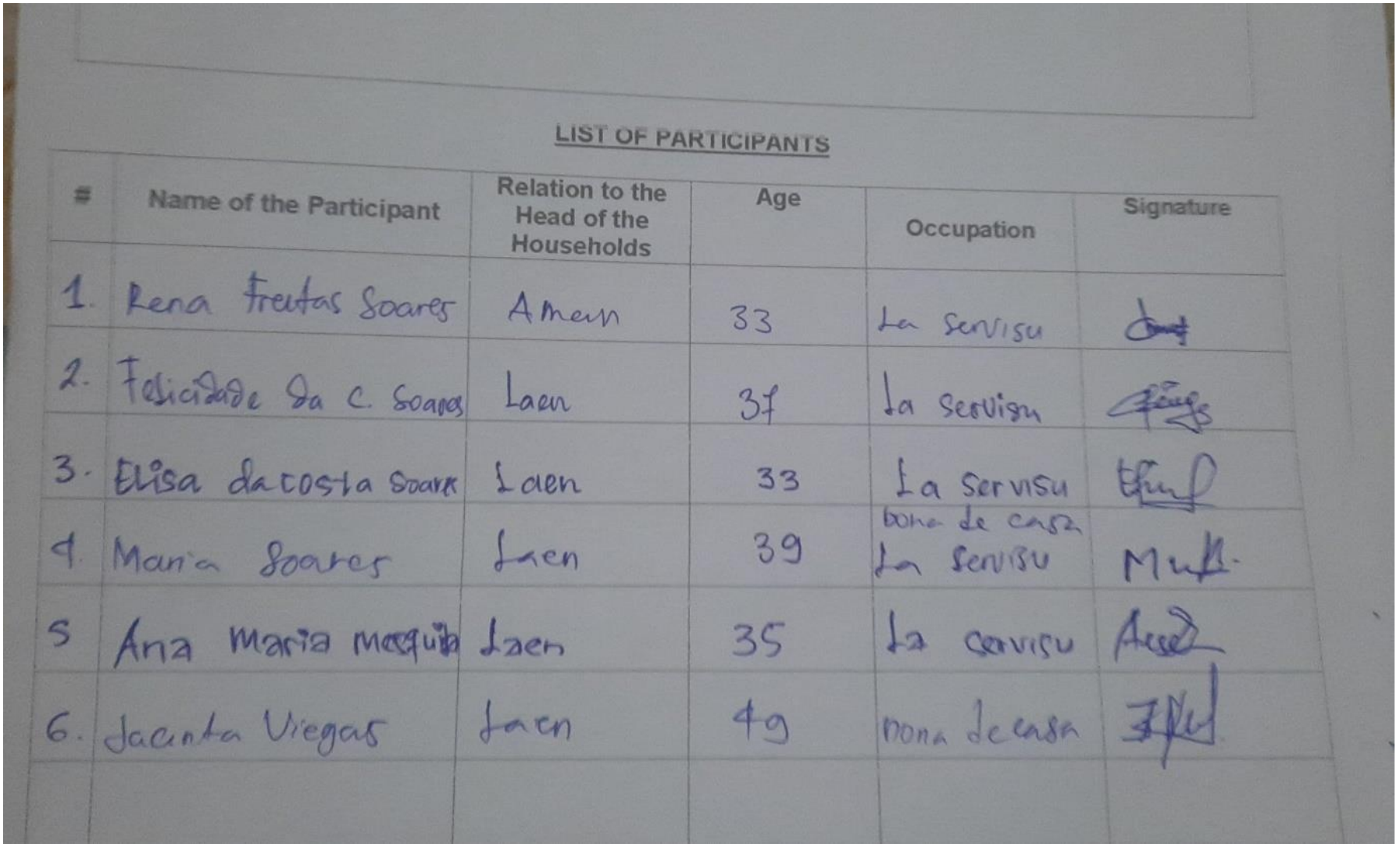
ISSUES	RESPONSE/DETAILS
What are your main concerns/issues about the project Probe for percentage of women depended on tamarind collection in the project area. How the project will impact on these livelihood options?	Our current concerns are: • The tamarind trees that provide income to communities • Roads to the sea • The animals like bulls can no longer go there for drinking water
Can you suggest how best to address your concerns/issues	Suggestions for these concerns: • When the solar project is implemented in the area, please give some space for communities to have access to go to the sea. • Identify another safe place for animals to habitat • The more important thing is to do a ritual or cultural ceremony before commences the project
Any new livelihood activities that electricity makes possible?	Another thought when the solar project is implemented in Laleia is: • Starting business i.e., small shops because the roads have lights.
What are some of the special environment characteristics of this area (forest, plants, water, vegetation, animals)? What are important cultural/traditional places in this area? Any potential project impacts on environment / cultural places? What impacts/concerns about environment / cultural places do you have?	• This area is categorized as a rock place. • In this Iuk Village, there are plenty of sacred places and there are two sacred houses. • Before the project commences, suggest doing the cultural ceremony first to ask for permission.

ISSUES	RESPONSE/DETAILS
Any safety/security concerns for women or children in this area (reports of human trafficking, gender-based violence)	• In this village, there is also domestic violence. It does happen but is not that severe. • No report to the police. If domestic violence occurs, the community usually prefers addressing this in a cultural way, i.e., fine. • Only domestic violence happens.
Perceived importance of girls education reasons for sending/not sending girls to school	• It is important for girls to have access to education. • Boys and girls have the same rights, thus parents really prioritize education for their children, especially girls, so they can also get higher positions in their workplace in the future. • It is important for girls to have an education, so there can be no discrimination in the future.
Type of engagement of children in household activities (try to know about the girls) for the (type) and extent to which they directly contribute to the earning of the household (type of occupations engaged in).	• Normally, the activities that girls do in their household are washing dishes, weeping, cooking, and cleaning. • During the paddy rice, girls also help harvest. • But, when it comes to exam periods, they spend most of their time studying and preparing for the exam. • Girls also help the family's economic condition by selling fried pastries, running their small shops, or selling vegetables. • Girls also participate in religious activities, i.e., being part of the choir team
Existing skills and traditional skills amongst the adolescent girls and women that must be revived /encouraged. (Try to probe the skills those are economically productive for the women). Explore what external inputs would make them more profitable and sustainable.	• The dominant skills the girls have are: • Cooking and sewing, but there are limited machines for sewing. • Weaving baskets • Baking cookies or cakes

ISSUES	RESPONSE/DETAILS
What are the barriers in terms of resources, availability, transport, locations of trainings if any, for pursuing vocational courses by women of your community? Also probe for the barriers from the family side, (like lack of time, etc)	• The place to support or conduct a training is the Village Office.
Is there any organization, government, private or NGO running any vocational courses for the adolescents and women in area. (Probe for the agencies, nature of vocational trades providing, women's participation and livelihood opportunities).	• There is no NGO comes to implement their program here.
Do the women of the households in the community have ownerships of the property in the community, like houses, land, etc. probe for the reasons for having or not having ownership rights.	Males have the right to inheritance because women have to join their spouse's families when they are married.
Referring to the group ask if there is any form of inequality in the receipt of wages, payments, rewards, etc for the work that the women perform. (Try to understand the nature of inequalities prevailing). What are the underlying factors for this prevalence of inequalities?	• There is no discrimination in salary. Females have the same right as men.
Are the woman who are working and earning have the ultimate decision on the use of their money? (Try to probe the pattern of using the money earned, part saved, used for them, etc.)	• Women also have the right to decide what is best for their families financially, but there should be confirmation from their husbands if the expenses are higher.
What role do the women of the household have in the decision-making process of the household? Do you feel you have equal share along with the male counterpart any household decisions? Does it vary among the earning and non-earning women? (How).	• Having the same rights and power to decide.

ISSUES	RESPONSE/DETAILS
Are there any self-help group functioning in the village for women? If yes, what proportion of women in the village are members. How have they benefitted? Can this be strengthened in any way?	• No group exists in this village. • Suggestion from the community is supporting establishing a group of creativity combining cooking, sewing, and others in the community. • Support establishing a photocopy shop because it is very hard to do photocopying here. This also can increase women's capacity in technology.
Are there any specific ailments affecting the women of your community? Probe for the problems and the facilities available for the treatment. In particular, problem about ailments caused by indoor air pollution because of fuel wood/ kerosene use.	• When the risk to the environment is small, the community takes initiative to address the issue. But, when they encounter bigger environmental issues, they wait for the government to respond.
Is there any provision of special health care services available near to your village/ neighbourhood? Probe for the nearest maternity and child health care facilities available, problems faced and the perception on the quality of care. What proportion of women delivers at health centres?	• The health centers have great quality because they have separate rooms for maternity. The treatment is also good. • The facility is good. • The number of newly born babies in this village is very minimum. One year, they have 1-5 babies. • The space for family planning is range between 2, 3, and 4 years, depending on people's decisions.
Do the women feel safe in going outside in the neighbourhood during day time? Also probe for the situation during the night time? What are the problems or fears they perceived for their movements?	No concern for night movement. The community feels safe when going out at night.
Do the women in the community face any kind of domestic violence at their home? If yes probe for the reasons.	They have domestic violence but are not severe.

ISSUES	RESPONSE/DETAILS
Will the women group support the Project? Explain about the Solar PV Project.	• As a community, really support and appreciate the Solar Project to be implemented here in the Laleia Post Administrative.
Views on the Proposed Project and how it is going to benefit or affect the women. Or any other Concern	• If the Solar Project is implemented here, recommend to hire local people. • Support the sewing machine for women. • Establishing photocopy shop • Establish a cooperative group here in Uma Iuk village.



LIST OF PARTICIPANTS

#	Name of the Participant	Relation to the Head of the Households	Age	Occupation	Signature
1.	Rena Freitas Soares	Amein	33	La Servisu	
2.	Felicidade da C. Soares	Laen	37	la Servisu	
3.	Elisa da costa Soares	Laen	33	La servisu	
4.	Maria Soares	Laen	39	bona de casa La Servisu	
5	Ana Maria mesquita	Laen	35	la cervisu	
6.	Jacinta Viegas	Laen	49	bona de casa	

FOCUSED GROUP DISCUSSION ON GENDER (CONSULTATION AMONG WOMEN)

- Name of the hamlet: Weboro
- Name of the Suco Hatularan
- Name of post administrative: Laleia
- Namae of the Municipality Manatutu
- Geographical coordinate of the hamlet:
    a. Latitude 8.53979° s
    b. Longitude 126.16473° e
- Total number of households in the Hamlet 146 household/470 Population
    a. Male 246
    b. Female 224

ISSUES	RESPONSE/DETAILS

Please tell us as to how you spend your time (daily routine)?
 	
- Type of livelihood activity; # of crops/seasons; animal husbandry
- Existence of trade/small business
- Role in farming; other business
- What time do women mostly get up/go to bed?
- What % of day do women spend on average on :
  ○ Domestic chores/child care
  ○ Income earning
  ○ Religion/charity
	Here most of the people work in the agricultural sector. These include rice paddy, farming, and raising animals. But, some of them work as public workers.
	
	• In the plantation, we plant corn, cassava, mung beans, mustard, tomatoes, chilli, etc. This plantation takes place during the dry season in August.
	• In some parts, communities also raise animals like pigs, sheep, chickens, dogs, and bulls.
	• The priority here is pigs and chickens.
	• Once a year, the community plants rice paddy between January and July. Like the plantation process, women and girls take part from the beginning until harvesting. Paddy rice also helps the household's economic situation as some rice is for sale.

ISSUES	RESPONSE/DETAILS
(Try to probe whether they get leisure time and what are the activities they usually do during the leisure hours.	• In some parts, communities also depend on businesses (opening small shops, selling cookies, second-hand clothes, vegetables, rice, grilled meats, and sewing clothes). There is also a business for savings and loans that is run by a group that was trained by World Vision. • Tailor (sewing clothes), etc. • For women, usually they wake up at 5 am, while for girls they wake up at 8 or 9 am. Activity: • Fried pastries for sale, prepare breakfast for husband and children and feed animals. • Prepare lunch as well. • Time to rest is 2 hours in the afternoon. This is used for naps or overseeing children. • In the afternoon, we spare some time to have conversations with our children, and neighbors. We also play Bingo Game and prepare dinner. • Women go to bed at 9 pm, while girls go to bed at 11 pm. • In this Weboro village, people participate in Church activities, like singing in a choir, cleaning, or decorating the Church.

ISSUES	RESPONSE/DETAILS
What are the current energy sources and uses (eg.Solar, fuelwood, etc.) Cooking Lighting/charging Pumps Economic activities Health Clinic School	Electrical resources for cooking: • Majority uses electrical stoves and firewood in case the power goes off. Resources for lights • Lamps • Use candles or flashlights when the power goes off Water • The majority of the population has access to clean water from the extended pipe • When there is no water, buy clean water or draw water from the river. • Water for rice paddy uses canalization. Resources for Economic Activities: • Electricity really supports communities' activities as it generates income for them through selling their goods, baking cookies, etc. Health centers and schools have access to electricity. When the power goes off, they use a generator.
How will electricity improve life in the village - Specific examples for women and for men Prompt for women to think about: Workload – what would they like to replace in terms of current energy sources Street lights – can they go out now at night; will street lights make a change More light in the home at night – how may it change their daily tasks	Electricity really helps the community and provides easier life for them: • Enlighten their night so the children are able to study • Ease women's household work, i.e., cooking. • When going out at night, we can feel safe.

ISSUES	RESPONSE/DETAILS
How can electricity enhance current livelihood activities?	Electricity also helps communities' life and businesses. It helps the fridge work – we can use it by putting our drinks there for sale.
What are your main concerns/issues about the project Probe for percentage of women depended on tamarind collection in the project area. How the project will impact on these livelihood options?	Our current concerns are: • Access to roads to the sea • The community's animals like bulls can no longer go there for drinking water • But we feel happy that this project to be implemeted in the Laleia Post Administrative as it will create many opportunities for local people.
Can you suggest how best to address your concerns/issues	Suggestions for these concerns: • When the solar project is implemented in the area, please give some space for communities to have access to roads to be able to go to the sea. • Make fences so that animals cannot go there • Create employment for local people
Any new livelihood activities that electricity makes possible?	Have not thought about this yet.
What are some of the special environment characteristics of this area (forest, plants, water, vegetation, animals)? What are important cultural/traditional places in this area? Any potential project impacts on environment / cultural places? What impacts/concerns about environment / cultural places do you have?	• This area is categorized as a rock place. • In this Village, there are three sacred houses that the community believes. • There is also a sacred stone that is called Hatu Mara (Yellow Stone) • Before the project commences, suggest doing the cultural ceremony first to ask for permission.

ISSUES	RESPONSE/DETAILS
Any safety/security concerns for women or children in this area (reports of human trafficking, gender-based violence)	• In this Weboro village, there is also a domestic violence case. • It does happen but is not that severe.
Perceived importance of girls education reasons for sending/not sending girls to school	• It is important for girls to have access to education. • To succeed in the future because women are not all about cooking in the kitchen, but they also have a career. • Girls also have the same right as boys for accessing education.
Type of engagement of children in household activities (try to know about the girls) for the (type) and extent to which they directly contribute to the earning of the household (type of occupations engaged in).	• Girls also actively help their parents to improve their household's economic condition by selling cookies, and vegetables, and running their family's small shops. • Their participation is very high and they also help with household activities. They dothe washing dishes, weeping, cooking, and cleaning
Existing skills and traditional skills amongst the adolescent girls and women that must be revived /encouraged. (Try to probe the skills those are economically productive for the women). Explore what external inputs would make them more profitable and sustainable.	• The dominant skills the girls have are: • Cultural dance • Sports – volleyball and futsal • Cooking and sewing • Baking
What are the barriers in terms of resources, availability, transport, locations of trainings if any, for pursuing vocational courses by women of your community? Also probe for the barriers from the family side, (like lack of time, etc)	• The place to support or conduct training is the Village Office and Church's hall.

ISSUES	RESPONSE/DETAILS
Is there any organization, government, private or NGO running any vocational courses for the adolescents and women in area. (Probe for the agencies, nature of vocational trades providing, women's participation and livelihood opportunities).	• World Vision established the Hakmaan Familia (savings and loans), and Climate Resilience (horticulture). • BELUN socialized on reducing conflicts.
Do the women of the households in the community have ownerships of the property in the community, like houses, land, etc. probe for the reasons for having or not having ownership rights.	Tuir lisan Maioria Feto laiha direito ba eransa tamba tuir lisan feto sira kaben sai, maibe depende ba familia idak-idak tamba iha familia balun ne'ebe laiha oan mane so iha deit oan feto.
Referring to the group ask if there is any form of inequality in the receipt of wages, payments, rewards, etc for the work that the women perform. (Try to understand the nature of inequalities prevailing). What are the underlying factors for this prevalence of inequalities?	• Males have the right to inheritance because women have to join their spouse's families when they are married. But, it depends on each family because some only have one single daughter.
Are the woman who are working and earning have the ultimate decision on the use of their money? (Try to probe the pattern of using the money earned, part saved, used for them, etc.)	• Women also have the right to decide what is best for their families financially, but there should be confirmation from their husbands if the expenses are higher.
What role do the women of the household have in the decision-making process of the household? Do you feel you have equal share along with the male counterpart any household decisions? Does it vary among the earning and non-earning women? (How).	• Having the same rights and power to decide.

ISSUES	RESPONSE/DETAILS
Are there any self-help group functioning in the village for women? If yes, what proportion of women in the village are members. How have they benefitted? Can this be strengthened in any way?	Women's groups that exist here are: • Grupo Hakmaan Familia (savings and loans) maioria Feto hamutuk 15 pessoas. • Grupo Rejilensia klimatika(15 pessoas domina liu mane) • Grupu Climate Resilience (15 people, male-dominated) • These groups have five years of duration. Suggestions from the community are: • Hire Laleia people especially the youth • Create development in Laleia
Are there any specific ailments affecting the women of your community? Probe for the problems and the facilities available for the treatment. In particular, problem about ailments caused by indoor air pollution because of fuel wood/ kerosene use.	• Environmental issues that happen in this village are river floods that destroy paddy rice. No equipment to address this issue. • When the risk to the environment is small, the community takes initiative to address the issue. But, when they encounter bigger environmental issues, they wait for the government to respond.
Is there any provision of special health care services available near to your village/ neighbourhood? Probe for the nearest maternity and child health care facilities available, problems faced and the perception on the quality of care. What proportion of women delivers at health centres?	• The health center here is good. But, the facility here is not that good because it has lack medicine. • The number of newly born babies in this village is 5 in a year. • The space for women to have children is 2-3 years.
Do the women feel safe in going outside in the neighbourhood during day time? Also probe for the situation during the night time? What are the problems or fears they perceived for their movements?	No concern for night movement. The community feels safe when going out at night because, in this Weboro, all are relatives/families.

ISSUES	RESPONSE/DETAILS
Do the women in the community face any kind of domestic violence at their home? If yes probe for the reasons.	They have domestic violence but are not severe.
Will the women group support the Project? Explain about the Solar PV Project.	• As a community, really support and appreciate the Solar Project to be implemented here in the Laleia Post Administrative as it will provide development.
Views on the Proposed Project and how it is going to benefit or affect the women. Or any other Concern	• If the Solar Project is implemented here, recommend hiring local people. • Establish English and computer training courses for local people. • Elevate the literacy levels • Increase the women and girls of Weboro's skills in sports, music, cooking, and sewing.

LIST OF PARTICIPANTS

#	Name of the Participant	Relation to the Head of the Households	Age	Occupation	Signature
1	Joseta Imaculada da V. Guzmão	Irmã	29	Dona de casa	
2	Felicidade C. Guzmão	Irmã	54	Dona de casa	
3	Ana Isabel de Fatima Guzmão	Mãe	22	Dona de casa	
4	Luciana Rita do R. Guzmão	Mãe	26	desemprego	
5	Maria do R. Guzmão	Mae	41.	Dona de casa.	
6	Jacinta Viegas	Pai	50	Agricultur	

GENDER CONSULTATION AT LIFAO SUCO

FOCUSED GROUP DISCUSSION ON GENDER (CONSULTATION AMONG WOMEN)

- Name of the hamlet: Lenão
- Name of the Suco Lifau
- Name of post administrative: Laleia
- Namae of the Municipality Manatutu
- Geographical coordinate of the hamlet:
    a. Latitude 8.53726° s
    b. Longitude 126.16336° e
- Total number of households in the Hamlet 103 household
    a. Male 188
    b. Female 196

ISSUES	RESPONSE/DETAILS

Please tell us as to how you spend your time (daily routine)?
 	
- Type of livelihood activity; # of crops/seasons; animal husbandry
- Existence of trade/small business
- Role in farming; other business
- What time do women mostly get up/go to bed?
- What % of day do women spend on average on :
  ○ Domestic chores/child care
  ○ Income earning
  ○ Religion/charity
 	
(Try to probe whether they get leisure time and what are the activities they usually do during the leisure hours.
	• Our activity includes agriculture – paddy rice and raising animals.
	- Paddy rice: during this paddy rice, all women and men contribute to the paddy rice production. Women generally are in charge of preparing lunch; cooking for their husbands to bring and cutting rice plants.
	- Farming: in our farm, we usually cultivate – vegetables, mustard greens, swamp cabbage, spinach, papaya, chilli, etc. What we do on our farm is prepare seeds, plough the ground, plant, water, and take care of them. One year, we plant twice during the dry season. We cannot do this in the rainy season as it will make vegetables full of pests.
	These production for consumption and sale – but mostly are for sale in order to have an income.
	- Raising animals: chickens, pigs, goats, and cows are being overseen by males. They oversee them with feeding, looking after them, and cleaning their cages.
	
	- Business: the business activity we do here is baking slices of bread, cakes, and doughnuts. We also have sewing, but it is only for certain people and their creativity.
	• We mostly sleep from 9 to 4 or 5, because we need to get up earlier to fry pastries to sell.
	• In the morning, we prepare breakfast and take care of our husband and children; and then we rest for one or two hours before preparing lunch. Women with babies/children need to work, take care of their loved ones, as well as rest. This approximately takes seven hours of a whole day.

ISSUES	RESPONSE/DETAILS
	○ Income earning: approximately four hours we use for the cakes/pastries business; we need to wake up at 5 to prepare, and then go to sell the goods. We return home at approximately 8 o'clock depending on whether our goods are finished. ○ Religion/charity: For Church activity, it depends on who is responsible at a certain period of time. When it is time for our village, we go to clean the Church every afternoon during the week; it takes two hours a day more or less. • We have a free time of more or less two hours, and we use this for rest, and taking care of our children (women with babies/smaller children need to rest with their loved ones)
What are the current energy sources and uses (eg. Solar, fuelwood, etc.) Cooking Lighting/charging Pumps Economic activities Health Clinic School	- Cooking –here, many people cook using electricity, and only a few use firewood. - Lighting/charging – using electricity at night and when the power goes off, we use candles or flashlights. - Pump – using water tap, and only a few use electric water pump. - Economic activities – businesses like frying goods use firewood. - Clinic– all use electricity - School– all use electricity

ISSUES	RESPONSE/DETAILS
How will electricity improve life in the village - Specific examples for women and for men Prompt for women to think about: Workload – what would they like to replace in terms of current energy sources Street lights – can they go out now at night; will street lights make a change More light in the home at night – how may it change their daily tasks	- Another good benefit of electricity is to enable us to cook and wash our clothes easily. For cooking, when we use a rice cooker, it saves us a lot of time to do other work. And it also is much easier as we do not bother to go find firewood. - Need to look after the street light as in this village, there is no street light. Thus, at night, it becomes darker.
How can electricity enhance current livelihood activities?	• Electricity is helpful because we can put our leftovers or goods in the fridge.
What are your main concerns/issues about the project Probe for percentage of women depended on tamarind collection in the project area. How the project will impact on these livelihood options?	• For us women in this village, we do not have any concerns regarding this project as it will be helpful and develop Timor-Leste.
Can you suggest how best to address your concerns/issues	• We do not have any other suggestion, but only say that when implementing this project, there should involve traditional elders doing ritual ceremonies to ask for a license.
Any new livelihood activities that electricity makes possible?	• When the Solar Project is implemented, people living nearby the project can open businesses, i.e., cooking rice cooked in small woven palm-leaf containers and fish.

ISSUES	RESPONSE/DETAILS
What are some of the special environment characteristics of this area (forest, plants, water, vegetation, animals)? What are important cultural/traditional places in this area? Any potential project impacts on environment / cultural places? What impacts/concerns about environment / cultural places do you have?	• Our area is categorized as a rock place. • Our cultural place includes one sacred house. This sacred house is very distant – people are not allowed to go in, and there should be no electricity there. We think this project will not affect this place.
Any safety/security concerns for women or children in this area (reports of human trafficking, gender-based violence)	• We do not have any such a thing – we rarely have a such case.
Perceived importance of girls education reasons for sending/not sending girls to school	• We think that they need education because they will live their life, and it will get more competitive to live a better life in the future.
Type of engagement of children in household activities (try to know about the girls) for the (type) and extent to which they directly contribute to the earning of the household (type of occupations engaged in).	• In this village, there are some children that help their mothers. For example, when they have classes in the afternoon, then in the morning they help their mom sell fried pastries, and then in the afternoon, they get ready to go to school. • Single women usually help with household work namely cooking, washing dishes, weeping, etc. • There used to be a lot of children helping in farming, and they also planted their own vegetables for sale, but now due to the internet or PUBG Game, children do not do farming, and many of them also go to Dili for school.

ISSUES	RESPONSE/DETAILS
Existing skills and traditional skills amongst the adolescent girls and women that must be revived /encouraged. (Try to probe the skills those are economically productive for the women). Explore what external inputs would make them more profitable and sustainable.	• Our ability includes cooking (people hire us to cook for parties), sewing, etc. • We also have a cooperative group that cooks traditional food, which had the chance to send the food to Italy.
What are the barriers in terms of resources, availability, transport, locations of trainings if any, for pursuing vocational courses by women of your community? Also probe for the barriers from the family side, (like lack of time, etc)	• We do not have any specific place for training in this village, but when there is an event, we can use the Village Office or Church.
Is there any organization, government, private or NGO running any vocational courses for the adolescents and women in area. (Probe for the agencies, nature of vocational trades providing, women's participation and livelihood opportunities).	• We have NGO that supports our cooperative group, Sanakava. This is, for example, World vision. They also taught us to save and loan money as well as cook traditional food. • Ministry of Health came to disseminate information to children about health and the importance of washing hands. • There is also an NGO that came and taught us fertilizer and planting vegetables.
Do the women of the households in the community have ownerships of the property in the community, like houses, land, etc. probe for the reasons for having or not having ownership rights.	• We women do not have any rights, because according to our tradition, only males do. This is due to women having to join their husband's families when they are wed.

ISSUES	RESPONSE/DETAILS
Referring to the group ask if there is any form of inequality in the receipt of wages, payments, rewards, etc for the work that the women perform. (Try to understand the nature of inequalities prevailing). What are the underlying factors for this prevalence of inequalities?	• We do not have any discrimination about salary between males and females.
Are the woman who are working and earning have the ultimate decision on the use of their money? (Try to probe the pattern of using the money earned, part saved, used for them, etc.)	• We have to talk to our husbands. There should be a collaboration. When the husband does not approve, then we respect it. They make the decision.
What role do the women of the household have in the decision-making process of the household? Do you feel you have equal share along with the male counterpart any household decisions? Does it vary among the earning and non-earning women? (How).	• Still depend on the husband's decisions, the two have to collaborate together.
Are there any self-help group functioning in the village for women? If yes, what proportion of women in the village are members. How have they benefitted? Can this be strengthened in any way?	• We have a cooperative group for saving and loans, which has been mentioned above. Besides this, we also do cornflour, sago pancakes, and other traditional food for an international exhibition. There are some benefits we gain, for instance, we gain some money.

ISSUES	RESPONSE/DETAILS
Are there any specific ailments affecting the women of your community? Probe for the problems and the facilities available for the treatment. In particular, problem about ailments caused by indoor air pollution because of fuel wood/ kerosene use.	• We have a hole that is near the pond, but the community take the initiative to ferry land in the river to solve this hole.
Is there any provision of special health care services available near to your village/ neighbourhood? Probe for the nearest maternity and child health care facilities available, problems faced and the perception on the quality of care. What proportion of women delivers at health centres?	• We have a clinic that provides the really great treatment. They also can attend to emergency needs, but still lack of good facilities. We need to go to the city or Dili instead. • They have maternity treatment, which has good facilities, but for other diseases, they are still incomplete. • Training for mothers has been provided. In this village, the number of newly born babies is 2-3 each year, and women have space between 2-3 years to have a baby.
Do the women feel safe in going outside in the neighbourhood during day time? Also probe for the situation during the night time? What are the problems or fears they perceived for their movements?	• No, all are good.
Do the women in the community face any kind of domestic violence at their home? If yes probe for the reasons.	• We do not have such a thing in this village.
Will the women group support the Project? Explain about the Solar PV Project.	• Yes, we support it.

ISSUES	RESPONSE/DETAILS
Views on the Proposed Project and how it is going to benefit or affect the women. Or any other Concern	• None

LIST OF PARTICIPANTS

#	Name of the Participant	Relation to the Head of the Households	Age	Occupation	Signature
1.	Ambrosia Novitalica	Haen	33	Dona de Casa	
2.	Maria de f. Xumenes	an rasik	49	Professora	
3.	Maria X. Da Costa	an rasik	64	Dona de Casa	
4.	Maria f. Kolek	Haen	28	Dona de Casa	

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`FOCUSED GROUP DISCUSSION ON GENDER (CONSULTATION AMONG WOMEN)

- Name of the hamlet: Uma Clalan
- Name of the Suco Lifau
- Name of post administrative: Laleia
- Namae of the Municipality Manatutu
- Geographical coordinate of the hamlet:
    a. Latitude 8.54189° s
    b. Longitude 126.16265° e
- Total number of households in the Hamlet 107 household
    a. Male 222
    b. Female 212

ISSUES	RESPONSE/DETAILS
Please tell us as to how you spend your time (daily routine)? - Type of livelihood activity; # of crops/seasons; animal husbandry - Existence of trade/small business - Role in farming; other business - What time do women mostly get up/go to bed? - What % of day do women spend on average on : o Domestic chores/child care o Income earning o Religion/charity	• We have agricultural activities such as: - Planting vegetables – women prepare seeds, plant, and sell. Men make fences, cultivate the ground, and work together to harvest and sell. - Cultivate paddy rice – often men's work includes puddling rice and watering. Women do the harvesting and are in charge of expenses decision in collaboration with men. - Raising animals – women raise, feed, and sell animals such as chickens, pigs, dogs, and sheep. While men take care of bulls. Women again are in charge of budget expenses, but they also collaborate with men as well.

ISSUES	RESPONSE/DETAILS
(Try to probe whether they get leisure time and what are the activities they usually do during the leisure hours.	• The business activities that they normally do is rice plant production, opening small shops, selling second-hand clothes, fruits in the market (especially on Thursday on Bazar Day), and flowers. They also sew clothes and bake cookies for sale at Café Boali. • We mostly look after our children and husbands when it comes to financial planning and decision. We can have many ideas on how to invest, but we also have to listen to what our husbands have to say. They are also part of the decision-making process. • We wake up at 5 in the morning, and sleep at 10 at night. • The percentage of domestic chores/child care – our daily morning activity is to look after our children when they go to school. Prepare breakfast, and lunch, wash their clothes, clean the house, and also run the business we have. This whole activity takes between 5 and 6 hours a day. • Religion and charity –go to participate in church activities and cultural ceremonies, and attend community meetings. These sometimes happen three times a week for one or two hours. Meetings at our children's schools mostly are attended by females. • They use their free time for different activities: ▪ Paddy rice time – the free time is during the weekend (Saturday and Sunday)

ISSUES	RESPONSE/DETAILS
	▪ Normal period – rest for one or two hours when finishing the household work.
What are the current energy sources and uses (eg.Solar, fuelwood, etc.) Cooking Lighting/charging Pumps Economic activities Health Clinic School	- Cooking – here many people cook using electricity and firewood in case the power goes off, especially during the rainy day. Some also use stoves. - Lights – use electricity for lights at night and candles in case the power goes off. - Pump – many people use electricityto pump water. - Economic activities – all use electricity. - Health clinic – use electricity (the distant between the village and health clinic is between 10-15 minutes walking)

ISSUES	RESPONSE/DETAILS
How will electricity improve life in the village - Specific examples for women and for men Prompt for women to think about: Workload – what would they like to replace in terms of current energy sources Street lights – can they go out now at night; will street lights make a change More light in the home at night – how may it change their daily tasks	- Another benefit of electricity is people can walk at night without using flashlights. - Help ease people when baking – really supports the economic activities for households.
How can electricity enhance current livelihood activities?	• Increase the electrical capacity and ensure the power cannot go off. During the rainy and windy season, the power goes off for 10-15 times a year.
What are your main concerns/issues about the project Probe for percentage of women depended on tamarind collection in the project area. How the project will impact on these livelihood options?	• It has an impact on our activity when harvesting swollen glands, going to the sea, and paddy rice.
Can you suggest how best to address your concerns/issues	• We suggest creating another alternative road for movement and establishing a partnership with ALCEDA to harvest rice. And if possible, re-establish the People Plant and Government Buys program, and support the transportation for people to access to the market.
Any new livelihood activities that electricity makes possible?	• Can support the income from selling cakes. • Support families during the cultural ceremonies

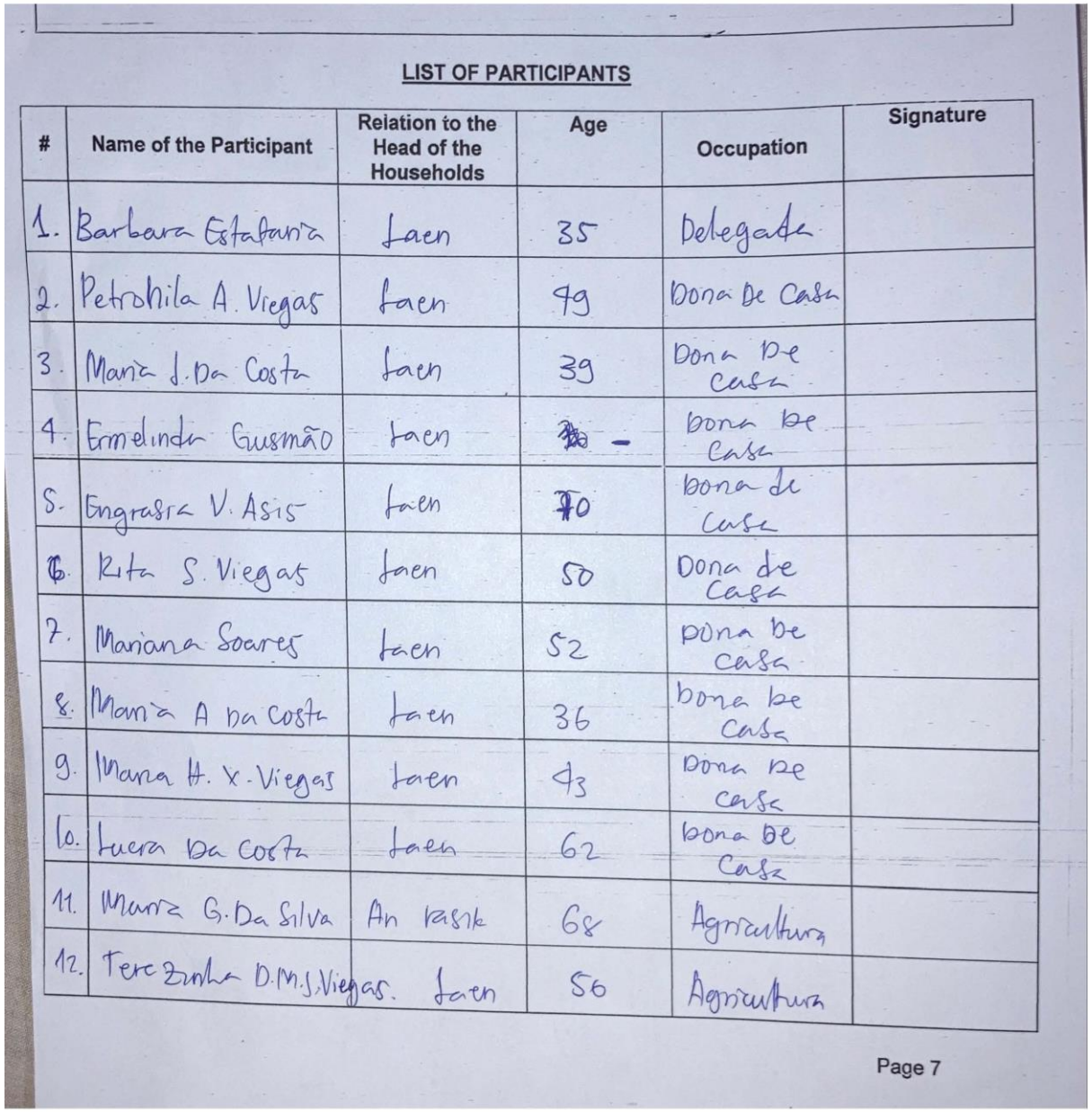
ISSUES	RESPONSE/DETAILS
What are some of the special environment characteristics of this area (forest, plants, water, vegetation, animals)? What are important cultural/traditional places in this area? Any potential project impacts on environment / cultural places? What impacts/concerns about environment / cultural places do you have?	• Our area is full of rocks, but for agricultural activities, we do next to the village, near the river. • Cultural ceremony like the sacred house is conducted approximately once in a year. • For cultural places, there is a need for asking for licenses when implementing any activities there. And there should be planting trees for those to be chopped off. • Environment Issues – landslides, water goes everywhere. And water pipes that are damaged have not been repaired yet. (When these problems occur, they report to the Heads of the Village, but if it is personal, then the community should be responsible for their own) • In this village has three sacred houses.
Any safety/security concerns for women or children in this area (reports of human trafficking, gender-based violence)	• None in this area – because the norms and socio-cultural values are highly valued here.
Perceived importance of girls education reasons for sending/not sending girls to school	• We provide education for our female children because we believe education is the most powerful weapon for living better lives in the future.
Type of engagement of children in household activities (try to know about the girls) for the (type) and extent to which they directly contribute to the earning of the household (type of occupations engaged in).	• Our children help us depend also on their free schedule. Sometimes they help us with agricultural activities such as feeding animals and running small shops.

ISSUES	RESPONSE/DETAILS
Existing skills and traditional skills amongst the adolescent girls and women that must be revived /encouraged. (Try to probe the skills those are economically productive for the women). Explore what external inputs would make them more profitable and sustainable.	• Our ability includes cooking, baking, and sewing. • Suggestion for NGO or Government to provide training on business, budget management, baking for us. If possible, provide sawing machine for each village to do the works.
What are the barriers in terms of resources, availability, transport, locations of trainings if any, for pursuing vocational courses by women of your community? Also probe for the barriers from the family side, (like lack of time, etc)	• We have not received any training from NGOs or Government. And there is no group initiated by females. We only have sports activities and a choir. If possible, provide training to establish a female group. • Our concern regarding transportation is the distant we have to walk to paddy rice. It takes us more or less one to two hours. When the paddy rice period (in January), we go there every day from 8 am to 6 pm.
Is there any organization, government, private or NGO running any vocational courses for the adolescents and women in area. (Probe for the agencies, nature of vocational trades providing, women's participation and livelihood opportunities).	• We do not have such a thing here. Have not made any proposal because there is no female group yet.
Do the women of the households in the community have ownerships of the property in the community, like houses, land, etc. probe for the reasons for having or not having ownership rights.	• Yes, now women and men have the same rights. We women can own a land.

ISSUES	RESPONSE/DETAILS
Referring to the group ask if there is any form of inequality in the receipt of wages, payments, rewards, etc for the work that the women perform. (Try to understand the nature of inequalities prevailing). What are the underlying factors for this prevalence of inequalities?	• None.
Are the woman who are working and earning have the ultimate decision on the use of their money? (Try to probe the pattern of using the money earned, part saved, used for them, etc.)	• The decision has to be made by both males and females. Although female makes their own money, they should listen to what males have to say and they should decide together (there has to be an agreement).
What role do the women of the household have in the decision-making process of the household? Do you feel you have equal share along with the male counterpart any household decisions? Does it vary among the earning and non-earning women? (How).	• Females and males have the same rights to decide. • The income that both females and males make is overseen by females, but both have to decide together on how to spend or invest the money.
Are there any self-help group functioning in the village for women? If yes, what proportion of women in the village are members. How have they benefitted? Can this be strengthened in any way?	• We sometimes lead the group to work on consumption – other than this males organize. • We do not have any discrimination.

ISSUES	RESPONSE/DETAILS
Are there any specific ailments affecting the women of your community? Probe for the problems and the facilities available for the treatment. In particular, problem about ailments caused by indoor air pollution because of fuel wood/ kerosene use.	• Here we have landslides – there is no facility to address this issue.
Is there any provision of special health care services available near to your village/ neighbourhood? Probe for the nearest maternity and child health care facilities available, problems faced and the perception on the quality of care. What proportion of women delivers at health centres?	• It takes 15 minutes to walk to the health center. The facility and treatment are great, and when there is an urgency, they always attend. • There is also another separate for pregnant women (maternity) and the facility and treatment are also great. • They also provide Siska Program, which socializes the family planning program for families. Thus, each year, there are only 1-2 babies born each year. This program enables families to have space for having children.
Do the women feel safe in going outside in the neighbourhood during day time? Also probe for the situation during the night time? What are the problems or fears they perceived for their movements?	• No; everything is good. Sometimes we get afraid when meeting with mentally ill people and strangers.
Do the women in the community face any kind of domestic violence at their home? If yes probe for the reasons.	• None
Will the women group support the Project? Explain about the Solar PV Project.	• Yes, we support 100%.

ISSUES	RESPONSE/DETAILS
Views on the Proposed Project and how it is going to benefit or affect the women. Or any other Concern	• Everything is good, but our concern is the economic condition to send our children to attend higher education in the city. We need to sustain our children until they finish their higher education. • There is also a concern for early marriage for youth, 17-20.



LIST OF PARTICIPANTS

#	Name of the Participant	Relation to the Head of the Households	Age	Occupation	Signature
1.	Barbara Estafania	Faen	35	Delegada	
2.	Petrohila A. Viegas	Faen	49	Dona De Casa	
3.	Maria J. Da Costa	Faen	39	Dona De casa	
4.	Ermelinda Gusmão	Faen	~~30~~ -	Dona De Casa	
5.	Engrasia V. Asis	Faen	~~70~~	Dona de Casa	
6.	Rita S. Viegas	Faen	50	Dona de Casa	
7.	Mariana Soares	Faen	52	Dona De casa	
8.	Maria A Da Costa	Faen	36	Dona De Casa	
9.	Maria H. X. Viegas	Faen	43	Dona De casa	
10.	Lucia Da Costa	Faen	62	Dona De Casa	
11.	Maria G. Da Silva	An Basik	68	Agricultura	
12.	Terezinha D.M.J. Viegas.	Faen	56	Agricultura	

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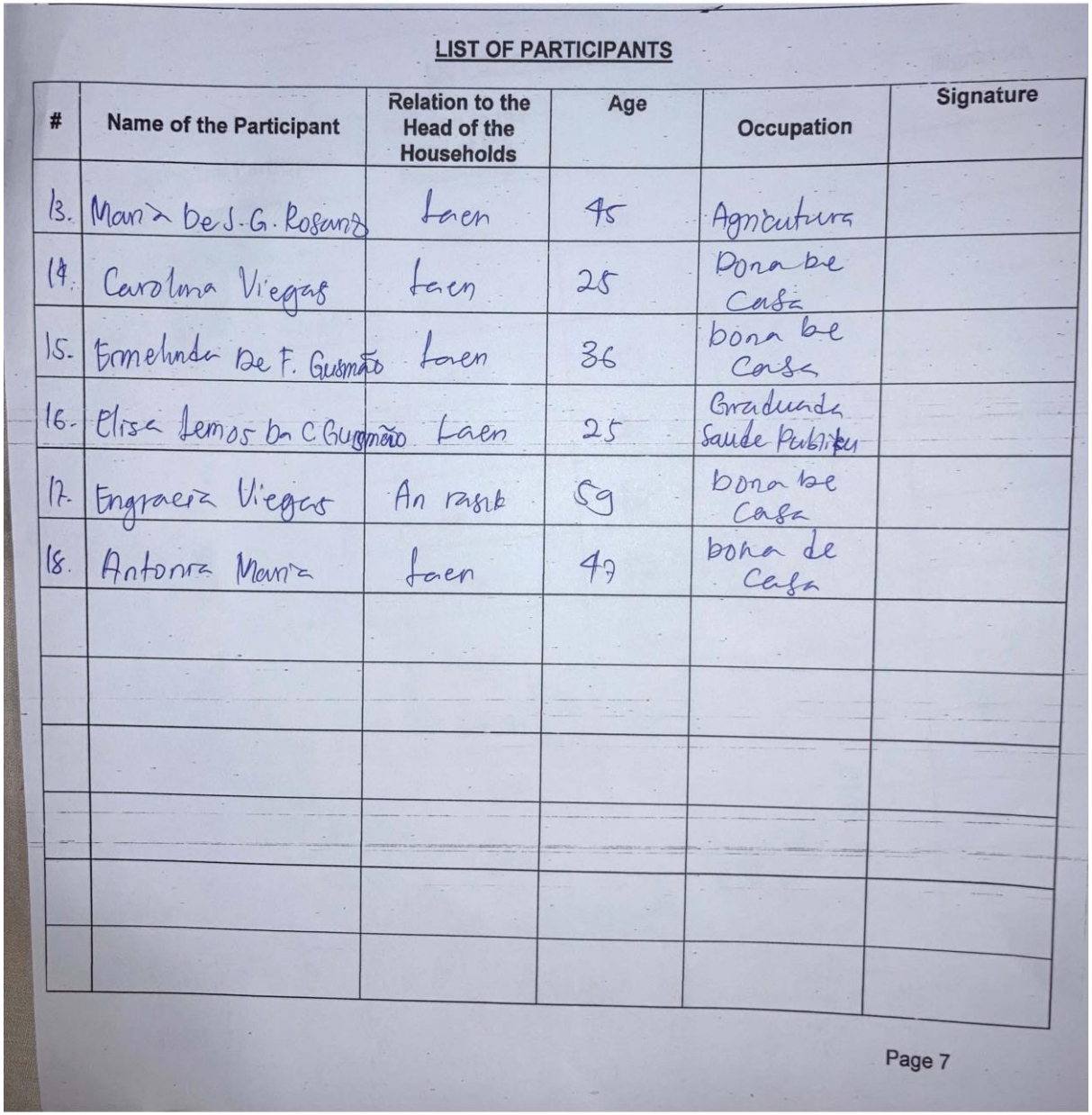

LIST OF PARTICIPANTS

#	Name of the Participant	Relation to the Head of the Households	Age	Occupation	Signature
13.	Maria De J. G. Rosario	Faen	45	Agricultura	
14.	Carolina Viegas	Faen	25	Dona de Casa	
15.	Ermelinda De F. Guzmão	Faen	36	dona de Casa	
16.	Elisa Lemos da C. Guzmão	Faen	25	Graduada Saude Publica	
17.	Engracia Viegas	An rasik	59	dona de Casa	
18.	Antonia Maria	Faen	47	dona de Casa	

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FOCUSED GROUP DISCUSSION ON GENDER (CONSULTATION AMONG WOMEN)

- Name of the hamlet: Uma Rentau
- Name of the Suco Lifau
- Name of post administrative: Laleia
- Namae of the Municipality Manatutu
- Geographical coordinate of the hamlet:
    a. Latitude 8.53203° S
    b. Longitude 126.16103° E
- Total number of households in the Hamlet 175 household
    a. Male 305
    b. Female 313

ISSUES	RESPONSE/DETAILS

Please tell us as to how you spend your time (daily routine)?
 	
- Type of livelihood activity; # of crops/seasons; animal husbandry
- Existence of trade/small business
- Role in farming; other business
- What time do women mostly get up/go to bed?
- What % of day do women spend on average on :
  ○ Domestic chores/child care
  ○ Income earning
  ○ Religion/charity
	• In here mostly work in the agricultural sector. These include rice paddy, farming, and raising animals.
	- Rice paddy: we all participate. The rice paddy time takes place once a year. Women generally prepare seeds, plant, and harvest.
	- Farming: plant vegetables like mustard (but accessing water is difficult). The works start with preparing seeds, cultivating the grounds, making fences, planting, watering, and taking care of (sometimes males also help).
	- Raising animals: pigs, chickens, goats, sheep, and dogs.

ISSUES	RESPONSE/DETAILS
(Try to probe whether they get leisure time and what are the activities they usually do during the leisure hours.	• Business: in this area, women open their businesses like selling second-hand clothes, vegetables, and cookies. • We usually wake up between 6 and 7 am, but during the rice paddy period, we wake up at 5 am to prepare to go to the field. We usually go to sleep at approximately 9 pm. • We normally prepare breakfast and take care of our children before sending them to school in the morning. • Free time: we normally have 1-2 hours for rest
What are the current energy sources and uses (eg. Solar, fuelwood, etc.) Cooking Lighting/charging Pumps Economic activities Health Clinic School	- Cooking – many of us use electricity (rice cooker) but when the electricity goes off, we use firewood and a stove. - Lighting/charging – use electricity, lamps at night, and candles when the power goes off. - Pump – sometimes we use electric power pumps, but mostly we use water taps or draw water from the river. - Economic activities – use electricity. - Clinical health– use electricity. - School – use electricity.

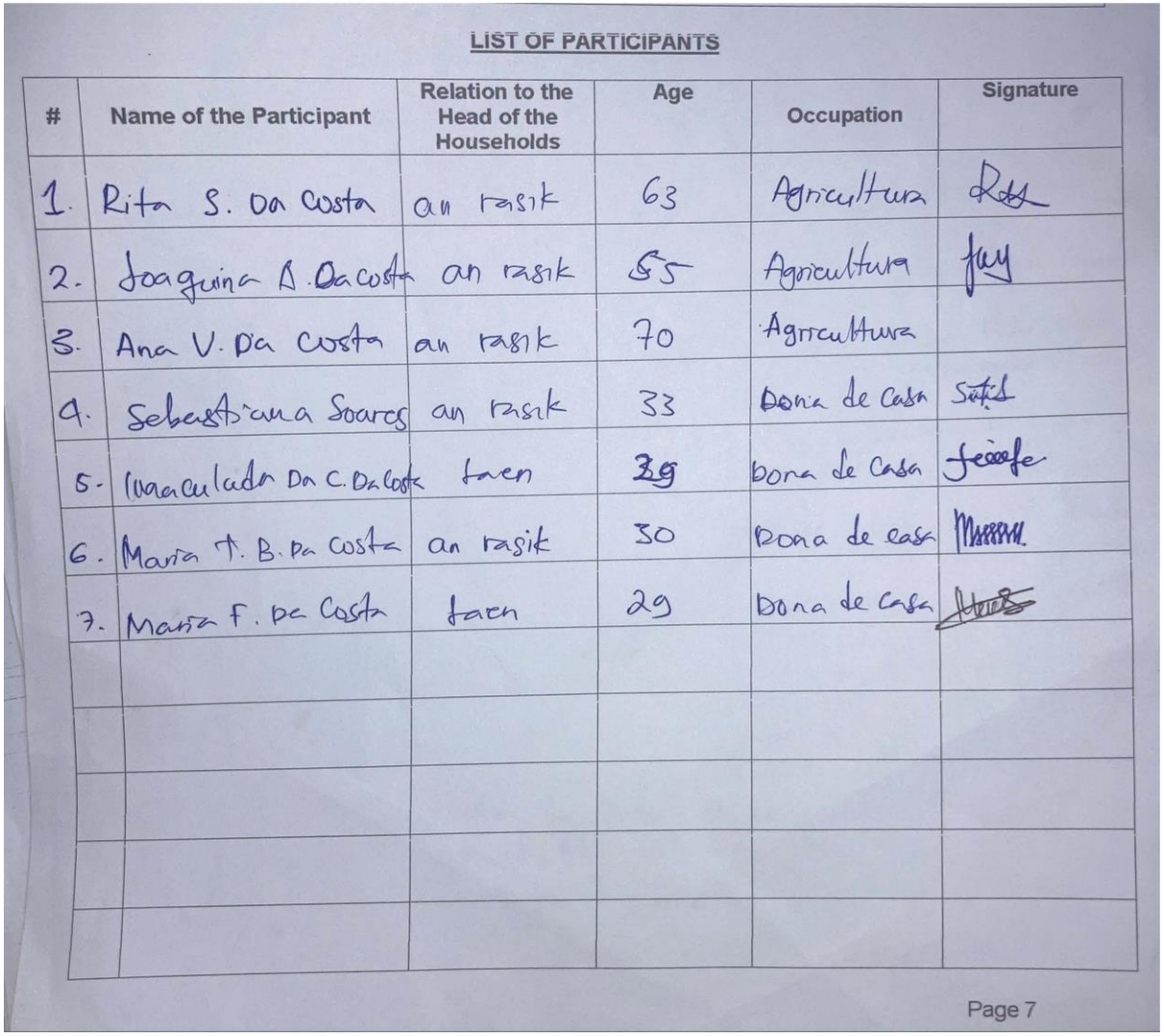
ISSUES	RESPONSE/DETAILS
How will electricity improve life in the village - Specific examples for women and for men Prompt for women to think about: Workload – what would they like to replace in terms of current energy sources Street lights – can they go out now at night; will street lights make a change More light in the home at night – how may it change their daily tasks	- Another good benefit of electricity is facilitating our children to study at night. But, sometimes when the power has minimum energy, it destroys our goods. - Electricity can also help us cook easily. - At night, the streets are darker because there is no lamp.
How can electricity enhance current livelihood activities?	• It is really helpful for income, for instance, small shops can use fridges for goods.
What are your main concerns/issues about the project Probe for percentage of women depended on tamarind collection in the project area. How the project will impact on these livelihood options?	• There is no problem regarding this project. The impact is on the tamarind tree, which often communities use the swollen glands for sale. But it is a minor impact.
Can you suggest how best to address your concerns/issues	• Putting some lights along the streets, and creating some space for communities to access the sea.
Any new livelihood activities that electricity makes possible?	• Possibility to open new businesses • Can live near that area • Can also do other creativity

ISSUES	RESPONSE/DETAILS
What are some of the special environment characteristics of this area (forest, plants, water, vegetation, animals)? What are important cultural/traditional places in this area? Any potential project impacts on environment / cultural places? What impacts/concerns about environment / cultural places do you have?	• Our land characteristic is considered mud • We do not have any sacred places here, but we have three sacred houses, which will not have an impact from this project. (But highly recommend doing ritual and cultural ceremony to ask for permission).
Any safety/security concerns for women or children in this area (reporonf human trafficking, gender-based violence)	• Yes, there is sexual abuse case (we heard of that there is an issue) • We also have martial arts problems that make women and the elderly feel traumatized.
Perceived importance of girls education reasons for sending/not sending girls to school	• We think that this is good for the future. And women are better because they are smarter.
Type of engagement of children in household activities (try to know about the girls) for the (type) and extent to which they directly contribute to the earning of the household (type of occupations engaged in).	• There are girls that help their families by selling vegetables or planting rice (they can make $6 a day from planting rice) • They also do household activities like washing dishes, clothes, etc.
Existing skills and traditional skills amongst the adolescent girls and women that must be revived /encouraged. (Try to probe the skills those are economically productive for the women). Explore what external inputs would make them more profitable and sustainable.	• Women usually cook, bake, and sew. • Baking (sometimes for sale)

ISSUES	RESPONSE/DETAILS
What are the barriers in terms of resources, availability, transport, locations of trainings if any, for pursuing vocational courses by women of your community? Also probe for the barriers from the family side, (like lack of time, etc)	• None, sometimes sewing • There is no public transport here. People normally use their own transportation or walk when going to the market.
Is there any organization, government, private or NGO running any vocational courses for the adolescents and women in area. (Probe for the agencies, nature of vocational trades providing, women's participation and livelihood opportunities).	• There is an NGO, i.e., World Vision that provides training for them on cooperatives, and JICA for providing seeds and training as well.
Do the women of the households in the community have ownerships of the property in the community, like houses, land, etc. probe for the reasons for having or not having ownership rights.	• Yes, we have the rights because now is modern.
Referring to the group ask if there is any form of inequality in the receipt of wages, payments, rewards, etc for the work that the women perform. (Try to understand the nature of inequalities prevailing). What are the underlying factors for this prevalence of inequalities?	• There is no discrimination happening here. If there is, we will speak up.
Are the woman who are working and earning have the ultimate decision on the use of their money? (Try to probe the pattern of using the money earned, part saved, used for them, etc.)	• Yes, we take decisions by ourselves, but when it comes to bigger issues, we collaborate with our husbands.

ISSUES	RESPONSE/DETAILS
What role do the women of the household have in the decision-making process of the household? Do you feel you have equal share along with the male counterpart any household decisions? Does it vary among the earning and non-earning women? (How).	• Can take decisions like men.
Are there any self-help group functioning in the village for women? If yes, what proportion of women in the village are members. How have they benefitted? Can this be strengthened in any way?	• There is none in our village.
Are there any specific ailments affecting the women of your community? Probe for the problems and the facilities available for the treatment. In particular, problem about ailments caused by indoor air pollution because of fuel wood/ kerosene use.	• There is no problem happening to us women.
Is there any provision of special health care services available near to your village/ neighbourhood? Probe for the nearest maternity and child health care facilities available, problems faced and the perception on the quality of care. What proportion of women delivers at health centres?	• The health center here is close – it takes 15 minutes to walk. The facility and treatment are all good. When we need it at urgent times, they will attend to us without thinking about the time. • There is also another separate room for pregnant women (maternity) full of good facilities and treatment. • Through their Siska Program, which provides socialization about family planning, communities, particularly women, are now well understood. Thus, in a year, they produce one or two children. It also teaches them to have space for having children.

ISSUES	RESPONSE/DETAILS
Do the women feel safe in going outside in the neighbourhood during day time? Also probe for the situation during the night time? What are the problems or fears they perceived for their movements?	• None, but only at night that we feel scared because the streets are darker.
Do the women in the community face any kind of domestic violence at their home? If yes probe for the reasons.	• In this village, we do not have such a thing. Sometimes, each household has its own problem, but it has not become severe.
Will the women group support the Project? Explain about the Solar PV Project.	• Yes, we support this project because it can support our electricity. • We can also have access to water due to the electric pump water.
Views on the Proposed Project and how it is going to benefit or affect the women. Or any other Concern	• We have a farm near Tinawaki, the border between Balak (our farm) and Tinawaki (the project's place). Thus, when measuring the land, it should be given a 200m distance (the land has no certificate, but our ancestors have been living there for ages).



LIST OF PARTICIPANTS

#	Name of the Participant	Relation to the Head of the Households	Age	Occupation	Signature
1.	Rita S. Da Costa	an rasik	63	Agricultura	
2.	Joaquina D. Da Costa	an rasik	65	Agricultura	
3.	Ana V. Da Costa	an rasik	70	Agricultura	
4.	Sebastiana Soares	an rasik	33	Dona de Casa	
5.	Imaculada Da C. Da Costa	faen	39	Dona de Casa	
6.	Maria T. B. Da Costa	an rasik	30	Dona de casa	
7.	Maria F. Da Costa	faen	29	Dona de Casa	

Page 7

KONSULTASAUN PUBLIKU (PUBLIC CONSULTATION)
17th de Agusto de 2023 15:00 - remata
Posto Administrativo Laleia

ENERGY SYSTEM STRENGTHENING AND SUSTAINABILITY PROJECT (SOLAR PV) IN LALEIA MANATUTO

LISTA PARTICIPANTES (PARTICIPATION LISTS)

No	Naran	Hela Fatin	Sexo (F/M)	Instituisaun (Representa)	No. Telefoni	Asinatura
1.	Celsia Jong Neto	Bidau Akadiru-Hun	F	CHEC	74889890	
2.	Manuela Nurini soares Pereira	Bekora	F	CHEC	74692670	
3	Deolinda Ximenes	Manatuto	F	Teras propriedade	77080962	
4.	Miguel Soares	"	M	MJ/STPSC M. Manatuto	7730548	
5.	Graciano da Costa	Lifau, Laleia	M	ONAGS	78666678	
6.	Simão da Costa	Lifau. Lenão	M	MAA	780666[illegible]	
7	Gaspar J. Fatima da Costa	Hatu-Ralan	M	Xefe Suco Hatu-Ralan	77720801	
8	José Lúcio da Costa	Uma Lie	M-	Lia nain Suco	—	
9.	Filomeno Viegas	Lenão	M.	Suco Lifau	78496574	
10.	Bernardo Ximenes	—"—	M.	"		
11	João Soares	Uma-Suk	M	Haraman Lifau		
12	Domingos Guzmão	Uma-Suk	M	—"—		
13	Luis Soares	Uma-Suk	M	—"—		
14	Vicente Pereira	Uma-Suk	M	—"—		
15.	João Domingos Cardoso	Lifau/Manatuto	M	MAP	76809984	
16	Mario Sanches Ximenes	Lifau/Lenão	M	Hatlar Wain	[illegible]	
17	Aleixo Ximenes	Lifau/Lenão	M	Haklar nain	—	
18	Jeremias de Jesus	Manatuto	M	Tecnik EDTL-EP		
19	Teofilho Salin ?. do Santo	Manatuto	M	Teknik EDTL. E.P	75865770	
20	Agostinho Cabral	Dili	M	EDTL, E.P.	77383435	
21	António de Sousa	Laleia	M	MAP		
22	Manuel d. R. Viegas	Laleia	M	Siguransa Se VIL	75802249	

KONSULTASAUN PUBLIKU (PUBLIC CONSULTATION)
17th de Agusto de 2023 15:00 - remata
Posto Administrativo Laleia

ENERGY SYSTEM STRENGTHENING AND SUSTAINABILITY PROJECT (SOLAR PV) IN LALEIA MANATUTO

LISTA PARTICIPANTES (PARTICIPATION LISTS)

No	Naran	Hela Fatin	Sexo (F/M)	Instituisaun (Representa)	No. Telefoni	Asinatura
1	António dos Santos	Dili	M	ANLA.I.P	75026316	[illegible]
2	Agostinho T. Carvalheira	Dili	m	—	78138584	[illegible]
3	Fernanda Viegas de Araujo	Dili	F	ADB - Consultant	78258623	[illegible]
4	Leonardo Rosa	Dili	M	ADB - Consultant	77162848	[illegible]
5	Francisco C. de F. Ximenes	Laleia	M	EDTL.E.P. Laleia	75488466	[illegible]
6	Antonio Joaquim B Soares	Manatuto	M	EDTL EP Manatuto	75849623	[illegible]
7	Ernesto Soares	Manatuto	M	EDTL EP Manatuto		[illegible]
8	VICTOR V. DE SOUSA	Laleia	M	Povu / Agricultor		[illegible]
9	Lizete M. J. Soares	Dili	F	EDTL, E.P.	78601645	[illegible]
10	Felipe L.I de Sousa	Laleia	M	EDTL, EP	7589[illegible]	[illegible]
11	Sebastião R. Viegas	Uma'Caluk	M	Xefe Aldeia	77281797	[illegible]
12	Faustino Andre Boavida	Dili	M	EDTL EP	781804[illegible]	[illegible]

Consultation with Head of Haturalan Suco (village)

Consultation with Head of Lifao Suco (village)

Consultation with Conservation International – Timor-Leste (NGO)

Consultation with Ministry of Higher Education, Science and Culture

Consultation with Secretary of State for Professional Training and Employment

Annex-II

Raw Data of Environmental Monitoring

Average Equivalent Level (L_{Aeq}) Raw Data

1. EDTL 13

- Day 1:

Date	Time	L_Aeq (dB)	Unit
6/28/2023	12:37:05	58.423308	dB
6/28/2023	13:37:05	59.766649	dB
6/28/2023	14:37:05	60.0993	dB
6/28/2023	15:37:05	64.348456	dB
6/28/2023	16:37:05	58.944609	dB
6/28/2023	17:37:05	54.750907	dB
6/28/2023	18:37:05	56.735937	dB
6/28/2023	19:37:05	57.089026	dB
6/28/2023	20:37:05	53.595103	dB
6/28/2023	21:37:05	56.04487	dB
6/28/2023	22:37:05	54.90796	dB
6/28/2023	23:37:05	57.972896	dB
6/29/2023	0:37:05	55.354082	dB
6/29/2023	1:37:05	49.691029	dB
6/29/2023	2:37:05	49.95782	dB
6/29/2023	3:37:05	48.964826	dB
6/29/2023	4:37:05	52.07457	dB
6/29/2023	5:37:05	50.934836	dB
6/29/2023	6:37:05	54.378153	dB
6/29/2023	7:37:05	56.872821	dB
6/29/2023	8:37:05	41.769257	dB
6/29/2023	9:37:05	55.413008	dB
6/29/2023	10:37:05	56.756349	dB
6/29/2023	11:37:05	53.195823	dB

- Day 2:

Date	Time (hr)	L_Aeq (dB)	Unit
7/10/2023	12:01:41	58.225463	dB
7/10/2023	13:01:41	57.481934	dB
7/10/2023	14:01:41	56.000354	dB
7/10/2023	15:01:41	59.073766	dB
7/10/2023	16:01:41	59.15416	dB
7/10/2023	17:01:41	59.597373	dB
7/10/2023	18:01:41	58.22844	dB
7/10/2023	19:01:41	56.605248	dB
7/10/2023	20:01:41	58.590235	dB
7/10/2023	21:01:41	55.795012	dB
7/10/2023	22:01:41	56.485484	dB
7/10/2023	23:01:41	53.371935	dB
7/11/2023	0:01:41	50.805955	dB
7/11/2023	1:01:41	49.385095	dB
7/11/2023	2:01:41	45.851955	dB
7/11/2023	3:01:41	46.871067	dB
7/11/2023	4:01:41	42.83918	dB
7/11/2023	5:01:41	35.036975	dB
7/11/2023	6:01:41	53.531072	dB
7/11/2023	7:01:41	54.570997	dB
7/11/2023	8:01:41	54.758607	dB
7/11/2023	9:01:41	56.20711	dB
7/11/2023	10:01:41	53.129402	dB
7/11/2023	11:01:41	55.688632	dB

- Day 3:

Date	time	L_Aeq (dB)	Unit
7/15/2023	9:35:08	56.525819	dB
7/15/2023	10:35:08	54.727918	dB
7/15/2023	11:35:08	58.879104	dB
7/15/2023	12:35:08	55.456372	dB
7/15/2023	13:35:08	62.217165	dB
7/15/2023	14:35:08	56.486882	dB
7/15/2023	15:35:08	49.255747	dB

7/15/2023	16:35:08	53.232615	dB
7/15/2023	17:35:08	53.946662	dB
7/15/2023	18:35:08	57.141951	dB
7/15/2023	19:35:08	68.836088	dB
7/15/2023	20:35:08	58.000777	dB

2. Proposed Location 2

- Day 1:

Date	Time (hr)	L_Aeq (dB)	Unit
6/28/2023	13:30:29	39.446604	dB
6/28/2023	14:30:29	44.418936	dB
6/28/2023	15:30:29	49.944199	dB
6/28/2023	16:30:29	37.372744	dB
6/28/2023	17:30:29	58.999242	dB
6/28/2023	18:30:29	33.373256	dB
6/28/2023	19:30:29	37.326735	dB
6/28/2023	20:30:29	34.526152	dB
6/28/2023	21:30:29	31.806557	dB
6/28/2023	22:30:29	31.032453	dB
6/28/2023	23:30:29	27.774184	dB
6/29/2023	0:30:29	40.918978	dB
6/29/2023	1:30:29	32.129293	dB
6/29/2023	2:30:29	33.2397	dB
6/29/2023	3:30:29	46.842124	dB
6/29/2023	4:30:29	38.564566	dB
6/29/2023	5:30:29	36.853669	dB
6/29/2023	6:30:29	36.132245	dB
6/29/2023	7:30:29	45.440606	dB
6/29/2023	8:30:29	48.843833	dB
6/29/2023	9:30:29	35.063279	dB
6/29/2023	10:30:29	41.166677	dB
6/29/2023	11:30:29	36.735059	dB
6/29/2023	12:30:29	58.942894	dB

Day 2:

Date	Time (hr)	L_Aeq (dB)	Unit
7/10/2023	12:19:21	39.635686	dB
7/10/2023	13:19:21	58.895143	dB
7/10/2023	14:19:21	56.70023	dB
7/10/2023	15:19:21	64.917774	dB
7/10/2023	16:19:21	36.638628	dB
7/10/2023	17:19:21	59.808031	dB
7/10/2023	18:19:21	39.387346	dB

7/10/2023	19:19:21	42.361633	dB
7/10/2023	20:19:21	53.94739	dB
7/10/2023	21:19:21	32.449197	dB
7/10/2023	22:19:21	31.944946	dB
7/10/2023	23:19:21	41.706857	dB
7/11/2023	0:19:21	41.889942	dB
7/11/2023	1:19:21	32.384344	dB
7/11/2023	2:19:21	32.129293	dB
7/11/2023	3:19:21	42.777964	dB
7/11/2023	4:19:21	31.959563	dB
7/11/2023	5:19:21	46.12842	dB
7/11/2023	6:19:21	37.775479	dB
7/11/2023	7:19:21	60.437184	dB
7/11/2023	8:19:21	35.684579	dB
7/11/2023	9:19:21	40.757207	dB
7/11/2023	10:19:21	46.807758	dB
7/11/2023	11:19:21	39.478014	dB

Day 3:

Date	Time (hr)	L_Aeq (dB)	Unit
7/15/2023	9:43:36	38.284966	dB
7/15/2023	10:43:36	62.002028	dB
7/15/2023	11:40:49	36.432599	dB
7/15/2023	12:40:50	54.666205	dB
7/15/2023	13:17:22	40.005834	dB
7/15/2023	14:17:23	36.924146	dB
7/15/2023	14:46:11	39.362295	dB
7/15/2023	15:46:12	42.308117	dB
7/15/2023	16:28:51	57.583864	dB
7/15/2023	17:28:52	42.987557	dB
7/15/2023	18:38:32	34.527656	dB
7/15/2023	20:14:47	54.307879	dB

Annex-III

Certification of Environmental Testing Lab

Appropriate Certification of Water Laboratory

1. Institut Teknologi Sepuluh Nopember (ITS)

SERTIFIKAT AKREDITASI

LP-1014-IDN

Ditetapkan tanggal : 29 Juni 2020 Berlaku hingga : 21 Juni 2025

Diberikan kepada

Lembaga Penelitian dan Pengabdian Kepada Masyarakat – Laboratorium Energi dan Lingkungan Institut Teknologi Surabaya

di

Jl. Teknik Kimia Gedung Pusat Robotika Lantai 2 Kampus ITS, Sukolilo, Surabaya

yang telah menunjukkan kompetensinya sebagai

LABORATORIUM PENGUJI

dengan menerapkan secara konsisten

SNI ISO/IEC 17025:2017 (ISO/IEC 17025:2017)

Persyaratan Umum Untuk Kompetensi Laboratorium Pengujian dan Laboratorium Kalibrasi

untuk ruang lingkup seperti dalam lampiran

KOMITE AKREDITASI NASIONAL

Drs. Kukuh S. Achmad, M.Sc

KETUA

2. Dinas Lingkungan Hidup and Kebersihan (DLHK)

SERTIFIKAT AKREDITASI

LP-1050-IDN

Ditetapkan tanggal : 30 November 2020 Berlaku hingga : 18 Oktober 2025

Diberikan kepada

UPTD Laboratorium Lingkungan Dinas Lingkungan Hidup dan Kehutanan Provinsi Nusa Tenggara Timur

di

Jl. Alfonsus Nisnoni No. 7, Kel. Airnona, Kec. Kotaraja, Kupang

yang telah menunjukkan kompetensinya sebagai

LABORATORIUM PENGUJI

dengan menerapkan secara konsisten

SNI ISO/IEC 17025:2017 (ISO/IEC 17025:2017)

Persyaratan Umum Untuk Kompetensi Laboratorium Pengujian dan Laboratorium Kalibrasi

untuk ruang lingkup seperti dalam lampiran

KOMITE AKREDITASI NASIONAL

Drs. KUKUH S. ACHMAD, M.Sc

KETUA

3. Autoridade Nacional Agua E Saneamento Instituto Publico (ANAS I.P.)

Note: This is a government institution, appropriate certificate for the institution is not available. We do have the professional certificate of ANAS, I.P. personal who were going to the field for sample collection and testing. See attached figures.

Appendix B: Certification of Mr. Mario Soares for Water Sample Collection
Name: Mario Soares
Affiliation: ANAS, I.P.

UNITED NATIONS NATIONS UNIES
East Timor Transitional Administration
(ETTA)

EAST TIMOR TRANSITIONAL ADMINISTRATION
Water & Sanitation Service

STATEMENT OF PARTICIPATION

Mario Soares

Participated in the

Water Treatment & Water Quality Course

Venue:	WSS Laboratory, Dili Water Treatment Plant
Dates:	24th May, 2001 to 1st June, 2001
Length:	40 hours
Topics:	Water Quality Characteristics • Basic Water Treatment Processes Overview • Retention Time • Coagulation / Flocculation • Chemical Metering • Sedimentation • Filtration • Disinfection • Water Supply Distribution • Monitoring & Record Keeping

Michael Petouhoff
Lieutenant Commander
United States Naval Reserve
USGET-US Support Group
East Timor
1st June, 2001

Graham Costin
Head,
Water & Sanitation Service
East Timor Transitional Administration
East Timor
1st June, 2001

Clean Water for ALL in Timor Loro Sae

NWC Institute
Research and Training

CERTIFICATE

No : 0220/InH-I/NWC-II/2004

This is to certify that

MARIO SOARES

has satisfactorily completed
The Operation & Maintenance Training
of The Dili Water Treatment Plant at Bairo Pite

August 11th – September 5th, 2003
December 1st – 12th, 2003
March 1st – 12th, 2004

Dili-Timor Leste, March 12th, 2004

Dr. S. T. Teng
Director

Certificate of Training

This certificate is issued by

The Consortium of Tokyo Engineering Consultants Co., Ltd.
and
Pacific Consultants International

To

Mr. Mario Soares

of the

Water and Sanitation Services (WSS/DNAS), Ministry of NRMEP
for the satisfactory completion of three days training in

Simple Water Quality Testing in Water Treatment Plant

Dec. 1, Dec. 4 - 6, 2006

Taketoshi ISHIHARA, Senior Consultant

TOKYO ENGINEERING CONSULTANTS CO., LTD

CERTIFICATE OF PERFORMANCE THIRD PRIZE

This Certificate Awarded to

Mario Soares

for having satisfactorily completed the Training of the Water Treatment Plant Operation and Maintenance, conducted by Tokyo Engineering Consultants Co., Ltd (TEC) and P.T. Nusantara water Center for the period from August 11, 2003 to September 5, 2003

Given this on 5th of September 2003 in Dili, East Timor

Dr. S.T. Teng
P.T. Nusantara water Center

Sept 05, 2003
Kris Prasad
Tokyo Engineering Consultants Co., Ltd

Certificate of Achievement Examination

The Capacity Development Project for Water Supply System
in
Dili and four Towns (Same, Ainaro, Liquica and Lospalos)

This certificate is issued by
JICA Project Team

To

Mr. Mario Soares

of the

National Directorate for Water and Sanitation Service (DNSAS)/Ministry of Infrastructure
for succeed in passing the Achievement Examination for

The Counterpart's Technical degree of Comprehension

July 15, 2010

Jiro HAGIWARA
JICA Project Team Leader

Annex-IV

Photographs of Project Site

Site consisting of flat and mostly even terrain with scarce tree cover and mostly shrubs and grasses scattered across the site.

Pond located on northern tip of site that is occasionally frequented by crocodiles from the sea during high tide season.

Another view of the site with the flat terrain and minimal vegetative cover visible

Shallow gulleys visible running through the site

Asphalt dump on the project site

(a) Puddles 1

(b) Puddles 2

(c) Puddles 3

(d) Buffalos resting in the Puddles

Numerous Puddles in the project site

(a) Water Channel 1

(b) Water Channel 2

Water Channels, meeting point of river and the sea

Tamarind tree (Tamarindus indica)

(a) Aloe Vera (Aloe barbadensis miller)

(b) Cacti

Aloe Vera (Aloe barbadense miller) and Cacti on Project Area

(a)Timor Bush Warbler (*Locustella timorensis*) (b) Timor Friarbird (*Philemon Inornatus*)

Birds observed in project area

Beach Thick-Knee bird

Sheep

Buffalo

Goats

Cows

Sea grass observed during the survey

(a) Eucheuma Spinosum

(b) Eucheuma Cottoni

Types of sea grasses species

Fiddle Crap, Uca Acuta Lives inside this hole

Fiddle Crap, *Uca Acuta*

Fishes Caught by Local Fisher

Annex-V

Photographs of Environmental Monitoring

Lutron SL-4033SD sound level meter

HT9600 Air Quality Monitor Detector for PM2.5 and PM10

Halona Team Set up and Collecting noise and particle data at Location No.1

Halona Team Set up and Collecting noise and particle data at Location No.2

Surface Water Collection and field Testing

Annex-VI

Occupational Health and Safety Plan

General

Occupational Health and Safety covers all personnel working under the project and will be in line with the World Bank/IFC EHS guidelines on health and safety.

The Occupational Health and Safety program will aim to ensure that the workplace is safe and healthy by: addressing the hazards and risks at the workplace; outlining the procedures and responsibilities for preventing, eliminating and minimizing the effects of those hazards and risks; identifying the emergency management plans for the workplace; and, specifying how consultation, training and information are to be provided to employees at various workplaces.

Some of the risks/hazards associated with workplaces are due to working close to or at sites associated with the various project construction activities. Other risks associated with the project construction phase include risk of increase of vector borne and other different diseases.

The following sections will be implemented during the construction phase to address and ensure workers' health and safety.

a. Screening and regular unannounced checking of workers

As per the procedure for hiring workers, the EPC Contractor and labor agencies are required to make all prospective workers undergo medical tests to screen for diseases and sicknesses, prior to selection and employment of any worker. The EPC Contractor is also responsible for ensuring that no worker who has a criminal record is employed at the project site. It will be ensured that all workers undergo medical tests to screen diseases at source and at sites in consultation with the designated Health Officer.

In addition to this, the Project Management will also undertake sudden, unannounced checks on workers to look for diseases such as HIV, STDs, and hepatitis and take necessary steps as mandated by the Contractual agreement between the EPC Contractor and the Worker(s).

b. Minimizing hazards and risks at the workplace.

To ensure safety at all work sites, the following will be carried out:

i. Installation of signboards and symbols in risky and hazardous areas, to inform workers to be careful.

ii. Construction of barricades around construction sites and deep excavated pits, to cordon off and deter entry of unauthorized personnel and workers into these areas.

iii. Providing a safe storage site/area for large equipment such as power tools and chains, to prevent misuse and loss.

iv. Proper Housekeeping: Ensuring that materials are all stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, or collapse. Brick stacks will not be more than 7 feet in height and for concrete blocks they will not be more than 6 feet high.

v. Removing all scrap timber, waste material and rubbish from the immediate work area as the work progresses.

vi. Where scaffolds are required, ensuring that each scaffold or its components shall be capable of supporting its own weight and at least 4 times the maximum intended load applied or transmitted to it. The platform/scaffold plank shall be at least 15 inches wide and 1.5 inches thick. The rope should be capable of supporting at least 6 times the maximum intended load applied or transmitted to that rope. Pole scaffolds over 60 feet in height shall be designed by a registered professional engineer and shall be constructed and loaded in accordance with that design. Where scaffolds are not provided, safety belts/safety nets shall be provided;

vii. Ensure that all ramps or walkways are at least 6 feet wide, having slip resistance threads and not inclined at more than a slope of 1 vertical and 3 horizontals.

viii. Stacking away all excavated earth at least 2 feet from the pit to avoid material such as loose rocks from falling back into the excavated area and injuring those working inside excavated sites.

ix. Constructing support systems, such as bracing to adjoining structures that may be endangered by excavation works nearby.

x. Only a trained electrician to construct, install and repair all electrical equipment to prevent risks of electrical shocks and electrocution.

xi. Install fire extinguishers and/or other fire-fighting equipment at every work site to prepare for any accidental fire hazards.

c. Provision of Personal Protective Equipment

Risks to the health and safety of workers can be prevented by provision of Personal Protective Equipment (PPEs) to all workers. This will be included in the construction cost for the EPC Contractor. Depending on the nature of work and the risks involved, EPC Contractors must provide without any cost to the workers, the following protective equipment:

i. High visibility clothing for all personnel during road works must be mandatory.

ii. Helmet shall be provided to all workers, or visitors visiting the site, for protection of the head against impact or penetration of falling or flying objects.

iii. Safety belt shall be provided to workers working at heights (more than 20 ft) such as roofing, painting, and plastering.

iv. Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.

v. Ear protecting devices shall be provided to all workers and will be used during the occurrence of extensive noise.

vi. Eye and face protection equipment shall be provided to all welders to protect against sparks.

vii. Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapor.

viii. Safety nets shall be provided when workplaces are more than 25 feet (7.5 m) above the ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors or safety belts is impractical.

The specific PPE requirements for each type of work are summarized below.

Table VI.1 PPE Requirement List

Type of Work	PPE
Elevated work	Safety helmet, safety belt (height greater than 20 ft), footwear for elevated work.
Handling work safety	Helmet, leather safety shoes, work gloves.
Welding and cutting work	Eye protectors, shield and helmet, protective gloves.
Grinding work	Dust respirator, earplugs, eye protectors.
Work involving handling of chemical substances	Dust respirator, gas mask, chemical-proof gloves. Chemical proof clothing, air-lined mask, eye protectors.
Wood working	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Blasting	Hard hat, eye and hearing protection.
Concrete and masonry work	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Excavation, heavy equipment, motor graders, and bulldozer operation	Hard hat, safety boots, gloves, hearing protection.

Quarries	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.

d. Procedures to Deal with Emergencies such as Accidents, Sudden Illness and Death of Workers

First aid kits will be made available at all times throughout the entire construction period by the respective EPC Contractors. This is very important, because most work sites will be at some distance from the nearest hospital. In addition to the first aid kits, the following measures should be in place:

i. Provision of dispensaries by the individual EPC contractor.

ii. A vehicle shall be on standby from the Project Office so that emergency transportation can be arranged to take severely injured/sick workers to the nearest hospital for immediate medical attention.

iii. A designated Health Officer/worker for the Project will be identified as a focal person to attend to all health and safety related issues. This employee's contact number will be posted at all work sites for speedy delivery of emergency services. The focal person shall be well versed with the medical system and facilities available at the hospital.

iv. Communication arrangements, such a provision of radios or mobile communication for all work sites, for efficient handling of emergencies, will be made.

e. Record Maintenance and Remedial action

The Project Management will maintain a record of all accidents and injuries that occur at the work site. This work will be delegated by the EPC Contractor to the site supervisor and regularly reviewed every quarter by project management. Reports prepared by the EPC Contractor shall include information on the place, date and time of the incident, name of persons involved, cause of incident, witnesses present and their statements. Based on such reports, the management can jointly identify any unsafe conditions, acts or procedures and recommend for the EPC Contractor to undertake certain mitigative actions to change any unsafe or harmful conditions.

f. Compensation for Injuries and Death

Any casualty or injury resulting from occupational activities should be compensated as per the local labor laws. Where compensation is sought by the injured party, proper procedures for documentation of the case will be followed, including a detailed report on the accident, written reports from witnesses, report of the examining doctor and his/her recommendation for treatment. The EPC Contractor will be responsible for ensuring compensation for the respective workers.

g. Awareness Programs

The Project management will undertake awareness programs through posters, talks, and meetings with the EPC Contractors to undertake the following activities:

i. Dissemination sessions will clarify the rights and responsibilities of the workers regarding interactions with local people (including communicable disease risks, such as HIV/AIDS), work site health and safety, waste management (waste separation, recycling, and composting), and the illegality of poaching.

ii. Make workers aware of procedures to be followed in case of emergencies such as informing the focal health person who in turn will arrange the necessary emergency transportation or treatment.

h. Nomination of a Health and Safety Focal Person

Within each site (especially if different sites are being implemented by different contractors), a Health and Safety Focal Person will be appointed. The Terms of Reference for the focal person will mainly be as follows:

i. Function as the focal person/representative for all health and safety matters at the workplace;

ii. Responsible for maintaining records of all accidents and all health and safety issues at each site, the number of accidents and its cause, actions taken and remedial measures undertaken in case of safety issues;

iii. Be the link between the EPC Contractor and all workers and submit grievances of the workers to the EPC Contractor and instructions/directives on proper health care and safety from the EPC Contractors back to the workers;

iv. Ensure that all workers are adequately informed on the requirement to use Personal Protective Equipment and its correct use;

v. Also responsible for the first aid kit and making sure that the basic immediate medicines are readily available.

Annex-VII

Emergency Response Plan

PURPOSE

The purpose of this Emergency Response Procedure is to provide measures and guidance for the establishment and implementation of emergency preparedness plans for the project. The aim of the Emergency Response Procedure is to:

(i) Ensure all personnel and visitors to the office/job sites are given the maximum protection from unforeseen events.

(ii) Ensure all personnel are aware of the importance of this procedure to protection of life and property.

EMERGENCY PREPARATION AND RESPONSE MEASURE SCOPE

The emergency management program is applied to all Project elements and intended for use throughout the Project life cycle. The following are some emergencies that may require coordinated response.

(i) Construction Accident

(ii) Road & Traffic Accident

(iii) Hazardous material spills

(iv) Structure collapse or failure

(v) Trauma or serious illness

(vi) Sabotage

(vii) Fire

(viii) Environmental Pollution

(ix) Loss of person

(x) Community Accident

RESPONSIBILITIES

The detailed roles and responsibilities of certain key members of the Emergency Response team available to assist in emergency are provided in **Table VII.1** below.

Table VII.1 Emergency Response Team

Action Group	Responsibility
Emergency Coordinator	Overall control of personnel and resources. The Emergency Coordinator will support and advise the Site Safety Supervision as necessary. Serves as public relations spokes persons, or delegates to some staff member the responsibility for working with news media regarding any disaster or emergency. Also assure proper coordination of news release with appropriate corporate staff or other designated people.
Site Safety Supervision (Emergency Commander)	Overall responsibility for activating emergency plan and for terminating emergency actions. Be alternative of emergency response chairpersons. Disseminates warnings and information as required to ensure all people in the immediate area have been warned and evacuated either by alarms or by word of mouth. Supervise the actions of the Emergency Response Team to ensure all persons are safe from the danger. Notify outside authorities if assistance is required. Carries the responsibility for coordinating actions including other organizations in accordance with the needs of the situation. Ensure maximum co-operation and assistance is provided to any outside groups called to respond to an emergency. Establish and appoint all emergency organization structure and team. Assures adequate delegation of responsibilities for all key positions of assistants on the Project to assist with any foreseeable emergency. Ensure resources available to purchase needed emergency response equipment and supplies. Assures that all persons on the Emergency Response Team aware and fully understand their individual responsibilities for implementing and supporting the emergency plan.

Action Group	Responsibility
	Establish the emergency drill schedule of all identified emergency scenarios, track the status and evaluate the emergency. The Emergency Commander shall ensure that senior management personnel have been reported of the emergency as soon as practical after the event.
Security Team	Ensure that the exit route is regularly tested and maintained in good working order. Maintain station at the security gate or most suitable location to secure the area during any emergency such that only authorized personnel and equipment may enter, prevent access to the site of unauthorized personnel. Assist with strong/activation of services during an emergency. Ensure vehicles and obstructions are moved to give incoming emergency vehicles access to the scene, if ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct any incoming emergency service to the site of emergency.
Rescue & Medical Team	Protect the injured from further danger and weather. Provide treatment to the victim(s) to the best of their ability by first aid and then transfer to hospital. Remain familiar with the rescue activities and rescue apparatus. Assist outside medical services personnel when they arrive
General Administration Team	Response to support any requested general facilities for assisting Emergency Response Team in their work.
Government Relation Team	Coordinate with local government on a matter of concerned in the emergency response plan to liaise with local officers in their affair for support Emergency Response Team. Coordinate emergency plan with the government authorities, local community.
Environment Team	In case of emergency related to the environmental pollution such as the chemical spill, oil spill into the ambient, the environment team will

Action Group	Responsibility
	support the technical advice to control and mitigate the pollution until return to the normal situation.
Department Heads	Call up of personnel into the safe location for protective life and property. Take immediate and appropriate action while Emergency Response Team is being mobilized. Keep in touch with the Emergency Commander Control and supervise operators and EPC Contractors on the implementation of this procedure, with consultation with Safety Team as necessary. Provide and maintain emergency equipment of their responsible areas.
Other Staff and Employees	All other staff and employees will remain at their workstations or assembly point unless directed otherwise from Emergency Response Team. Each supervisor will ensure that all members of his work group are accounted for and keep in touch with each of their Department Head.

PROCEDURE

Emergency situation and injuries to person can occur at any time or place either on Project site or elsewhere. The most two common types of emergencies on site are fire and serious accident.

Figure VII.1 Emergency Procedure for Fire

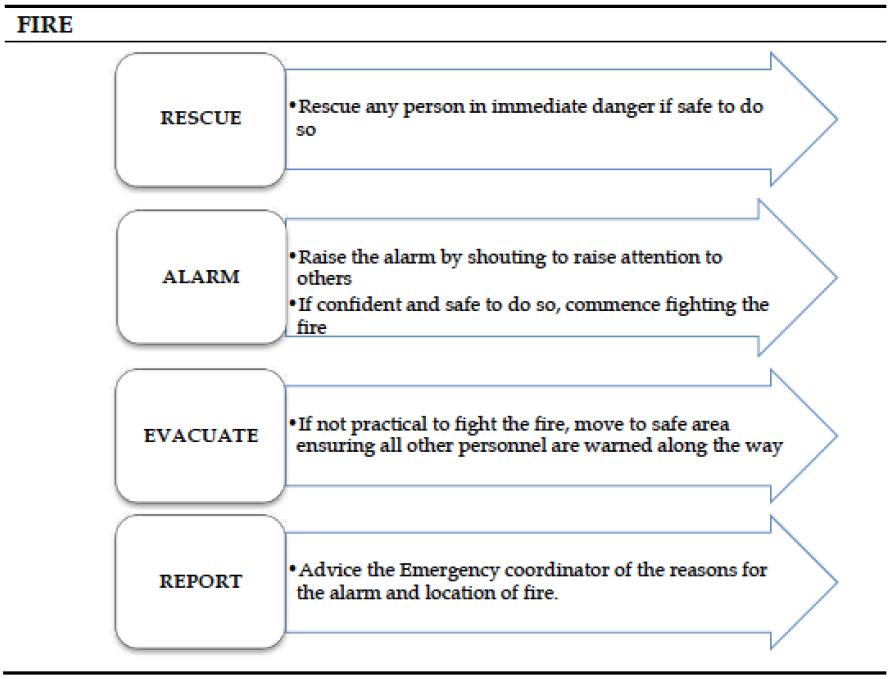
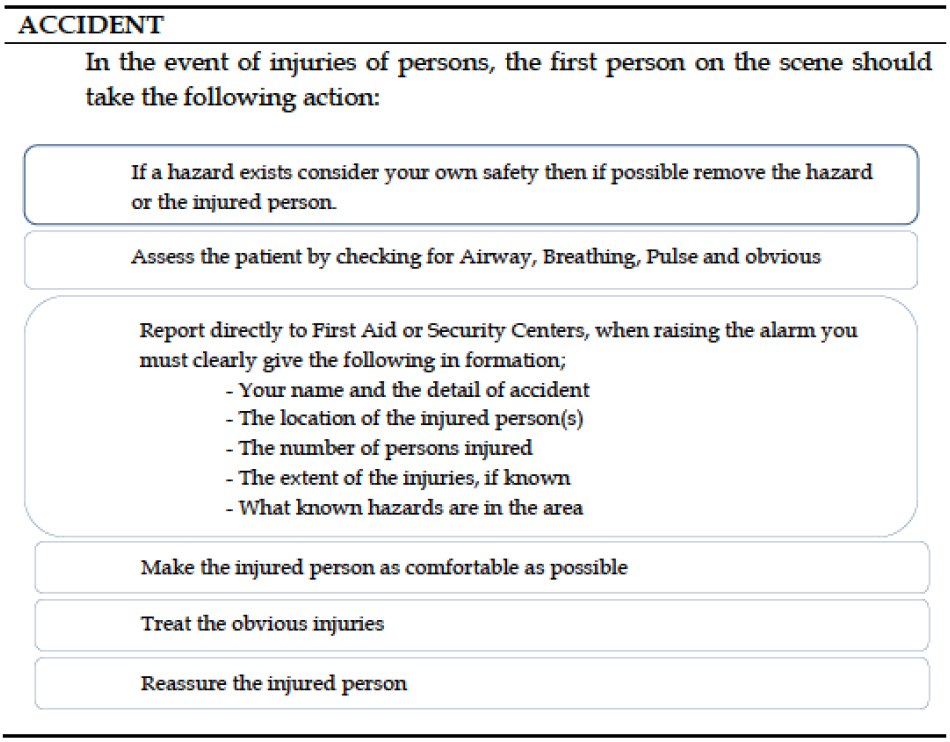


Figure VII.2 Emergency Procedure for Serious Accident



COMMUNICATION WITH AUTHORITIES / PRESS AT SITE

In the event of an accident or incident, only senior staff is permitted to give factual information to the authorities for resource of liability exposure. The press must be avoiding politely, at all costs, with the terse comment that "the matter is under investigation and relevant information when available will be provided by our Head Office" Do not ever give your opinion or story.

First Aid Persons

- Upon advice of medical emergency, make immediate assessment to response required and if necessary, advise security to summon ambulance or medical assistance, the qualified first aid attendant should also,
- Provide treatment to the victim(s) to the best of his/her ability.
- Ensure the safety of victims by ceasing any work activity in the area.
- Protect the injured from further danger and weather.
- Assist medical services personnel when they arrive.

General Administration Team

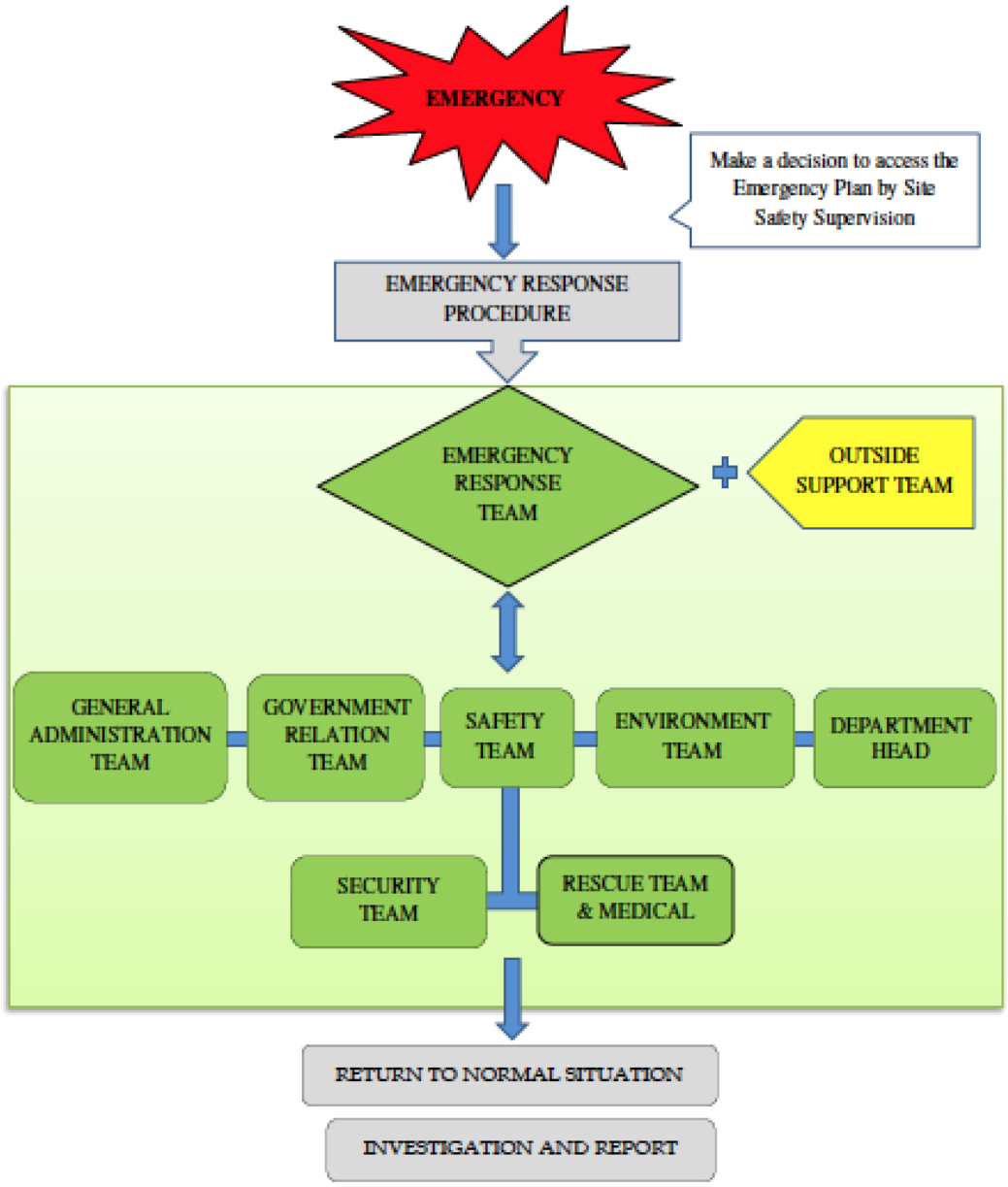
- Upon advice of medical emergency, maintain contact with first aid personnel and summon ambulance if required.

Security Team

- If ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct vehicle closest to the scene.
- Prevent access to the site of unauthorized personnel (press, etc.).

Emergency Coordinator

- The Emergency Coordinator shall assist emergency personnel at the scene as required through allocation of company resources.
- The Emergency Coordinator shall ensure next-of-kin are properly notified as soon as possible and give whatever company support and assistance is necessary to assist them bundle the situation.
- The Emergency Coordinator shall ensure that senior management personnel are advised of the emergency as soon as practical after the event.



Note: Name of contact person and call number from Owner/Contractor to be determined.

Figure VII.3 INCIDENT AND ACCIDENT REPORT

Section A: Identification Data

Report No:	Date of Reported:	Reporter:	Sign:
Job Title:		Company Name:	

Section B: Violence Rate

Accident Violence: ☐ 01-Death ☐ 02-Serious Injury ☐ 03-Lost Time Injury ☐ 04-First Aid ☐ 05- Not Injury ☐ 06-Near Miss

Property Damage Cost: ☐ 1-2,000 USD ☐ 2,001-10,000 USD ☐ 10,001-50,000 ☐ > 50,001

Section C: Environmental Impact

Affected area	☐ Construction area	☐ Public area	
Receptor	☐ None	☐ Workers	☐ Community
Type of pollution	☐ Physical	☐ Chemical	☐ Biological
Toxicity	☐ Non-toxic	☐ Low - toxic	☐ High - toxic
Return to Normal	☐ 1 day	☐ 1 day to 1 week	☐ ≥ 1 week
Cumulative impact	☐ Non-cumulative	☐ Cumulative	

Section D: Injured/Illness Employee

1.Name:	Sex:	Date of Birth:			Age:	Regular Job Title:	Experience:			
	☐ Male ☐ Female	Month	Day	Year			In this job title Years	Weeks	In this Project Years	Weeks

Site:	Company:	Reference:	Phone No:	Social Security Numbe

Part of Body Injured or Affected:

☐ Head ☐ Hands ☐ Face ☐ Nose
☐ Eyes ☐ Legs ☐ Teeth ☐ Neck
☐ Trunk ☐ Toes ☐ Elbow ☐ Shoulder
☐ Back ☐ Ankle ☐ Wrist ☐ Foot
☐ Arms ☐ Thump ☐ Fingers ☐ Internal

Remark: .....

Nature of Injury or Illness:

☐ Laceration ☐ Amputation ☐ Puncture ☐ Fracture
☐ Strain & Sprain ☐ Burns ☐ Contusion ☐ Dry Heat Friction
☐ Hernia ☐ Foreign Body ☐ Chemical ☐ Contamination
☐ Skin (Occupationnel) ☐ Rash ☐ Irritation

Remark: .....

2.Name:	Sex:	Date of Birth:			Age:	Regular Job Title:	Experience:			
	☐ Male ☐ Female	Month	Day	Year			In this job title Years	Weeks	In this Project Years	Weeks

Site:	Company:	Reference:	Phone No:	Social Security Numbe

Part of Body Injured or Affected:

☐ Head ☐ Hands ☐ Face ☐ Nose
☐ Eyes ☐ Legs ☐ Teeth ☐ Neck
☐ Trunk ☐ Toes ☐ Elbow ☐ Shoulder
☐ Back ☐ Ankle ☐ Wrist ☐ Foot
☐ Arms ☐ Thump ☐ Fingers ☐ Internal

Remark: .....

Nature of Injury or Illness:

☐ Laceration ☐ Amputation ☐ Puncture ☐ Fracture
☐ Strain & Sprain ☐ Burns ☐ Contusion ☐ Dry Heat Friction
☐ Hernia ☐ Foreign Body ☐ Contamination ☐ Chemical
☐ Skin (Occupationnel) ☐ Rash ☐ Irritation

Remark: .....

Section E: Accidents/incident Details

Date Accident/Incident Occurred:	Time Accident/Incident Occurred:	Exact Location of the Accident / Incident:

Details of the actual Job Being done at the time:

Details of Accident / Incident / What actually happened?

Section F: Accident Cause (Basic cause mark X / Contributing cause, if any mark O)

UNSAFE CONDITIONS		UNSAFE ACTS	
1	☐ Inadequately Guarded	1	☐ Operating Without Authority / Training
2	☐ Unguarded	2	☐ Operating at Unsafe Speed
3	☐ Defective Tools, Equipment, or Substance	3	☐ Marking SHE Device Inoperative
4	☐ Unsafe Design or Construction	4	☐ Using Unsafe Equipment or Equipment Unsafely
5	☐ Hazardous Arrangement	5	☐ Unsafe Loading, Placing, Mixing
6	☐ Unsafe Illumination	6	☐ Taking Unsafe Position
7	☐ Unsafe Ventilation	7	☐ Working on Moving or Dangerous Equipment
8	☐ Unsafe Clothing	8	☐ Distraction, Teasing, Horse Play
9	☐ Insufficient Instruction	9	☐ Failure to use Personal Protective Devices
10	☐ Lack of system of work	10	☐ Lack of effective instruction or supervision

Why was the unsafe act committed? _____ Why did the unsafe condition exist? _____

Section G: Guide to Corrective Action (Base on the cause checked above, I am taking the following corrective action)

UNSAFE ACT	UNSAFE CONDITION	If Supervisor can't handle, then recommend to
☐ Stop the Behaviour	☐ Remove	☐ Site Engineer, or
☐ Study the job	☐ Guard	☐ Site Manager, or
☐ Instruct (tell-show-try-check)	☐ Warn	☐ Project Manager, or
☐ Follow Up	☐ Supervisory Training	☐ Safety Committee
☐ Enforce		

Detail below any immediate remedial actions that have been taken:

Detail below any corrective and preventative actions that could be taken to prevent future re-occurrence:	**Responsible**	**Completion Date**

Section H: Witness Statement	
Witness Name	**Interviewer Name**

Section I: Reviewed & Recommend by			
Recommendation:			
Reviewed By:	Position:	Signature:	Date:

Remarks : If Accident or Incident happened with lost time injury and affected to the publicity must further report to Safety Department;

: First Aid Cases will not applicable to this form;

: The accident report shall submit to Safety Department within 3 days

: Attached the photograph or sketch the location of accident / incident;

Annex-VIII

Archaeological ‘Chance Find’ Procedure

Background

The purpose of this document is to address the possibility of archaeological deposits becoming exposed during ground altering activities within the project area and to provide protocols to follow in the case of a chance archaeological find to ensure that archaeological sites are documented and protected as required.

Archaeological sites are an important resource that is protected for their historical, cultural, scientific and educational value to the general public and local communities. Impacts to archaeological sites must be avoided or managed by development proponents. The objectives of this 'Archaeological Chance Find Procedure' are to promote preservation of archaeological data while minimizing disruption of construction scheduling/ It is recommended that due to the moderate to high archaeological potential of some areas within the project area, all on site personnel and EPC Contractors be informed of the Archaeological Chance Find Procedure and have access to a copy while on site.

Potential Impacts to Archaeological Sites

Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Activities such as road construction, land clearing, and excavation are all examples of activities that may adversely affect archaeological deposits.

Archaeological 'Chance Find' Procedure

If you believe that you may have encountered any archaeological materials, stop work in the area and follow the procedure below:

The following 'chance-find' principles will be implemented by the EPC Contractor throughout the construction works to account for any undiscovered items identified during construction works:

(i) Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.

(ii) Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.

(iii) If the site supervisor determines that the item is of potential significance, an officer from the department of Archaeology (DoA) will be invited to inspect the site and work will be stopped until DoA has responded to this invitation.

(iv) Work will not re-commence in this location until agreement has been reached

between DoA and proponent as to any required mitigation measures, which may include excavation and recovery of the item.

(v) A precautionary approach will be adopted in the application of these procedures.

Detailed Procedural Steps

If the Director, department of Archaeology receives any information or otherwise has the knowledge of the discovery or existence of an antiquity of which there is no owner, he shall, after satisfying himself as to the correctness of the information or knowledge, take such steps with the approval of the Government, as he may consider necessary for the custody, preservation and protection of the antiquity.

Whoever discovers, or finds accidentally, any movable antiquity shall inform forth with the Directorate within seven days of its being discovered or found.

If, within seven days of his being informed, the Director decides to take over the antiquity for purposes of custody, preservation and protection, the person discovering or finding it shall hand it over to the Director or a person authorized by him in writing.

Where the Director decides to take over an antiquity, he may pay to the person by whom it is handed over to him such cash reward as may be decided in consultation with the Advisory Committee.

The Director or any officer authorized by him with police assistance may, after giving reasonable notice, enter into, inspect and examine any premises, place or area which or the sub-soil of which he may have reason to believe to be, or to contain an antiquity and may cause any site, building, object or any antiquity or the remains of any antiquity in such premises, place or area to be photographed, copied or reproduced by any process suitable for the purpose.

The owner or occupier of the premises, place or area shall afford all reasonable opportunity and assistance to the Director.

No photograph, copy of reproduction taken or made shall be sold or offered for sale except by or with the consent of the owner of the object of which the photograph, copy or the reproduction has been taken or made.

Where substantial damage is caused to any property as a result of the inspection, the Director shall pay to the owner thereof reasonable compensation for the damage in consultation with the Advisory Committee.

If the Director after conducting an inquiry, has reasonable grounds to believe that any land contains any antiquity, he may approach the Government to direct the Revenue Department to acquire such land or any part thereof and the Revenue Department shall thereupon acquire such land or part as for a public purpose.

Annex-IX

Dust Management Plan

General

The purpose of this plan is to describe the measures that the project shall take to ensure that the risk of emissions from dust generated by site operations during construction are minimized and that best practice measures are implemented.

Dust emissions from construction can cause ill health effects to EPC Contractor staff along with nuisance and annoyance to members of the local community. Dust will be controlled through:

Elimination

Reduction/Minimisation

Control

This dust management plan shall be implemented based on the measures already provided in the Environmental Management Plan (EMP) relating to controlling dust emissions.

Methodology

The following methodology will be undertaken for each project section:

Step 1 – Identify the dust generating activities

Construction activities that are likely to produce dust will be identified. The activities that will be taken into account are:

Haulage Routes, Vehicles and Asphalt/Concrete Batching Plant

Roads, surfaces and public highways

Static and mobile combustion plant emissions

Tarmac laying, bitumen surfacing and coating

Materials Handling, Storage, Spillage and Disposal

Storage of material

Stockpiles

Spillages

Storage of Waste

Site Preparation and Restoration after Completion

Earthworks, excavation and digging

Storage of spoil and topsoil

Demolition

Construction and Fabrication Processes

Step 2 – Identify Sensitive Receptors

Sensitive receptors have already been identified. The nature and location of the sensitive receptors will be taken into account when implementing control measures.

Step 3 – Implement Best Practice Measures to Control

Based on the nature of the activity producing the dust, the likelihood of dust being produced and the possible consequence of dust based on the sensitive receptors, the most effective control measure will be identified and implemented.

Step 4 – Monitor effectiveness of control

Construction Supervision Staff (CSC) will have the responsibility to ensure that dust control measures are being implemented and are effective.

Step 5 – Record and report result of monitoring

All inspections, audits and results of monitoring will be recorded and kept as part of the site filing system.

Method Statements and Risk Assessments

The EPC Contractor's Risk Assessments and Method Statements will be required to be approved by the CSC prior to commencing work and will be required to contain environmental aspects of the task, including dust control measures where required.

Where dust has been identified within the risk assessment as a significant issue, the method statement will be required to cover the following:

Methods and materials that will be used to ensure that dust generation is minimized.

The use of pre-fabricated materials where possible.

Optimum site layout:

Dust generating activities to be conducted away from sensitive receptors

Supply of water for damping down.

Good housekeeping and management

All employees will be briefed on the Risk Assessment and Method Statement before starting work.

Training

All EPC Contractor staff will be required to attend training seminars as already mentioned in the EMP document. A site-specific induction will also be required before being allowed to work on site. These will include site-specific sensitive receptors and details regarding dust control measures to be taken.

Toolbox talks on air pollution and minimizing dust emissions will be provided on a regular basis to EPC Contractor staff.

Identification of Dust Generating Sources and Control Methods

Haulage Routes, Vehicles and Asphalt/Concrete Batching Plant

Dust Source	**Dust Control Methods**
Major haul roads and traffic routes	Haul roads will be dampened down via a mobile bowser, as required.
Site traffic management	Site traffic will be restricted to constructed access roads as far as possible. Site speed limit will be set at 10 mph as this will minimize the production of dust.
Road Cleaning	A mechanical road sweeper will be readily available and used.
Handling, Storage, Stockpiling and Spillage of Dusty materials	
Material handling operations	The number of times a material will have to be handled will be kept to a minimum to prevent double handling and ensure dusty materials are not handled unnecessarily.
Transport of fine dusty materials and aggregates.	Closed tankers will be used or sheeted vehicles.
Vehicle loading/unloading materials on to vehicles and conveyors.	Dusty materials will be dampened down. Drop heights will be kept to a minimum and enclosed where possible.
Storage of Materials	

Dust Source	Dust Control Methods
Bulk cement, bentonite etc.	Bentonite will be delivered in tankers and stored in dedicated enclosed areas. Bulk cement will be transported through tractor trollies or trailers.
Fine dry materials	These will be protected from the weather and by storing in appropriate containers and indoors, where necessary.
Storage location	Material will be stored in dedicated lay-down areas.
Storage of Stockpiles	
Stockpile location	Stockpiles will be placed so as to minimize double handling and facilitate the site restoration.
Building stockpiles	Stockpiles, tips and mounds will not be stored at an angle greater than an angle of repose of the material.
Small and temporary stockpiles	Where possible, stockpiles will be placed under sheeting. Dusty material will be damped down. Wind barriers (protective fences) of a similar height to the stockpiles will be erected, if required.
Large and long-term stockpiles	Long-term stockpiles will be vegetated and stabilized as soon as possible. Stock plies will be dampened down until stabilized, where necessary. Wind barriers (protective fences) of a similar height to the stockpile will be erected, if required.
Waste Material from Construction	
Disposal method	A dedicated lay-down area will be available for waste. Waste will not be allowed to build up and will be disposed off at the designated locations as per EMP.
Site Preparation and Restoration	

Dust Source	Dust Control Methods
Earthworks, excavation and digging	These activity areas will be kept damp where required and if possible, will be avoided during dry and windy periods.
Completed earthworks	Surfaces will be stabilized by re-vegetation as soon as possible, where applicable.
Construction and Fabrication Process	
Crushing of material for reuse, transportation and disposal	Authorization will be obtained from PMU before using any mobile plant on site for activities such as crushing and screening. Any crushing or screening activities will be located away from sensitive receptors.
Cutting, grinding, drilling, sawing, trimming, planning, sanding	These activities will be avoided wherever possible. Equipment and techniques that minimize dust will be implemented. Water will be used to minimize dust.
Cutting roadways, pavements, blocks	Water sprinkling to be used.
Angle grinders and disk cutters	Best practice measures will be used such as dust extraction

Monitoring Arrangements

Monitoring will be conducted at sensitive receptor locations in the project area as provided in the EMP. Furthermore, at locations where PM levels are exceeding applicable guidelines, additional stringent measures will be implemented at the respective location(s) in the project area to ensure dust levels are controlled as far as possible.

Annex-X

Traffic Management Plan

Need for Plan

The construction of the project will take over 9 months and in this period, considerable vehicular movement carrying large amount of material and machinery is expected. This will definitely interrupt the local traffic and is therefore important to manage the traffic to avoid the nuisance to local residents in terms of noise, dust, congestion and inconvenience.

The plan

The Objective of Traffic Management Plan (TMP) is to define the requirements that should be implemented to mitigate any potential negative risks to the environment, workers or the community resulting from construction traffic.

The TMP will advise and inform site EPC Contractors and external suppliers of equipment and materials of access and entry points along with other key information such tipping areas and wash-out areas. It is intended to compliment and work alongside relevant ESMMP. The TMP will be classed as “live” and therefore be subjected to updates as required.

EPC Contractor, at the time of the execution of the project will prepare a comprehensive TMP in coordination with local traffic police department, PMU, emergency services and local administrative department. The PMU and CSC will review and approve EPC Contractors TMP. The EPC Contractor’s TMP shall include following mitigation measures during its preparation:

Undertake a road conditions assessment prior to and following the peak construction period, to assess any damage to road infrastructure that can be attributed to Project construction.

Repair damage as appropriate or enter into a voluntary agreement with the relevant roads authority to reimburse the cost of any repairs required to the public road network as a result of the Project.

Spoil dumpsites located close to Project site to minimise journey distance and limit movements to site access roads.

Concrete mixing plant located at Project site limiting traffic movements associated with concrete delivery to site access roads.

Construction of worker accommodation on site to reduce light vehicle movements relating to travel to/ from the site.

Provision of bus/minibus services for personnel living in nearby settlements.

Movements of construction workers will be planned to avoid the busiest roads and times of day when traffic is at its greatest.

Schedule deliveries and road movements to avoid peak periods.

Driver training for HGV drivers and refresher course every six months for Project drivers.

Speed restrictions for project traffic travelling through communities (to be agreed with Traffic Management Authority)

Run a safety campaign to improve the people's knowledge of the traffic hazard on their roads, public information and other activities to address the issues.

Run a pedestrian awareness programme

Temporary signage

The traffic management plan is provided below.

Other Recommendations

It is important to manage public access routes during construction because it can cause delay to local traffic and create a safety hazard both on and offsite. People working and living near the project site would be annoyed by the emissions, noise and visual intrusion of queuing vehicles. Some important factors involved in access routes and site traffic are as follows:

Public Access Routes

The use of public road for site access may be restricted in terms of:

Vehicle size, width and type of load

Time limits

Parking

Pedestrian conflicts

EPC Contractor should have consultation with the local police or local authority to address these issues and to effectively manage them before the beginning of the construction.

Site Workers Traffic

Site personnel should not be permitted to park vehicles near the site boundary; this will lead to disruption in material deliveries. Designated parking area with appropriate parking space will be needed for this purpose; any plain area near construction site can be used for this purpose.

Site Rules

Access to and from the site must be only via the specified entrance.

On leaving the site, vehicles must be directed to follow the directions given.

Drivers must adhere to the site speed limits.

All material deliveries to site must keep allocated time limits.

No material or rubbish should be left in the loading-unloading area.

Develop a map for alternate routes showing material delivery services.

Assign designated personnel on site to receive deliveries and to direct the vehicles.

Monitor vehicle movement to reduce the likelihood of queuing or causing congestion in and around the area.

Project vehicles should have a unanimous badge or logo on windscreen displaying that they belong to the project.

EPC Contractor's Obligation

The traffic management plan of the EPC Contractor should be safe enough and widening of access roads and construction of the detours must be completed before start of project construction activities so that heavy vehicular transportation for construction activities do not hinder the normal course of traffic. If widening any access roads, the safe movement of the vehicles, people, animals and wildlife must be ensured. It will be sole responsibility of EPC Contractor. The roads widening should be designed on the basis of the traffic survey, summarized and estimated site traffic. EPC Contractor must ensure that road closures are carried out by a competent person. The EPC Contractor obligation must include the display of traffic signs according to the need to divert the traffic volume and to guide the road users in advance. The traffic sign, traffic light should be placed from any diverting route or road marking.

The EPC Contractor should consider the environmental and social impacts of the traffic during construction. It will be sole responsibility of the EPC Contractor to implement a plan which produces minimum nuisance to the local people and to the environment. Safety of the people should be given due importance. It will be under EPC Contractor obligation to notify the traffic management plan and its later changes to CSC, PMU, emergency services and Traffic Police and also publish weekly programme in local newspapers, if felt necessary.

Annex-XI

Solid Waste Management Framework

INTRODUCTION

EPC contractors may use this framework as guiding document for preparation of site-specific solid waste management plan. The purpose of this Framework Solid Waste Management Plan is to ensure that wastes arising from the proposed construction works are managed, reused, recovered or disposed of by a method that ensures the provisions of the applicable rules in accordance with international good practices. It also ensures that the optimum levels of waste reduction, re-use and recycling are achieved.

Waste management priorities for project are based following waste management hierarchy.

- Prevent material wastage
- Minimise the quantity of waste
- Reuse of site materials
- Recycling of waste
- Energy recovery
- Disposal

WASTE MANAGEMENT at Project site

National Level – TL Regulations

Waste management of the project will be carried as per applicable national rules and/or international good practices and guidelines.

Regional Level

- IFC guidelines for Solid Waste Management
- Best practices of waste management on construction sites

Details of the wastes to be produced

During construction/civil works, potential sources of waste will include spoils generated during excavation, concrete and construction waste, domestic wastes (solid & wastewater), fuel or oil leakages or spills, onsite effluents from vehicle wash & cleaning, and cement spills. It is the responsibility of all personnel on site including EPC Contractors, Sub-Contractors and their Employees to ensure compliance with this Waste Management Plan.

Main Waste Categories

Contractors are required to develop inventory of main waste categories that will be generated during construction phase of the project. Anticipated main waste categories include construction debris, concrete waste, scrap wood, bricks, concrete, asphalt, plumping fixtures, piping, insulation (asbestos and non-asbestos), metal scraps, oil, electrical wiring and components, chemicals, paints, solvents.

Anticipated Hazardous Waste Arising

Fuels stored on site that will be used during the construction phase are classed as hazardous. There will be fuel stored on site for machinery and construction vehicles. All fuel tanks and draw

off points will be bunded. If the fuel is correctly contained and bunded, it is not expected that there will be any fuel wastage at the site. Other sources of hazardous waste include used paints, used oil/lubricants, electrical waste and chemicals. EPC contractors are required to develop SOPs for handling, storage and disposal of hazardous waste arising from the project.

ESTIMATED WASTE GENERATION

Construction Waste Generation
EPC contractors are required to develop and maintain waste inventory clearly showing the type, amount and location of waste generated from different activities at the site. Waste record keeping is key to successful implementation of waste management plan.

Proposed Waste Management Options
Waste will be segregated on site. EPC Contractor will ensure that sufficient number of waste drums are placed at site with appropriate color coding. All recyclable waste will be handed over to recycling contractor. The appointed waste contractor will collect and transfer the recyclable wastes as receptacles are filled. The non-recyclable waste will be transferred by an authorized waste collector to an appropriate facility. Project contractors will identify both recycling and non-recycling contractor working in the project area. Contractors through bidding documents will be bound to hire such waste contractors for efficient waste management at project sites.

A successful Waste Management Plan is largely dependent on how readily it can be changed into normal site operations by the person responsible. It is recognized that the plan should not be obstructive to site operations and the construction program by placing the responsibility of construction waste management with the Manager, all reuse, recycling, wastage and necessary disposal can be monitored as close to the source as possible. An Environmental Representative from each Works Sub-Contractor will also be nominated responsible for all waste management in their own operations. In this way, it is possible to identify where the greatest material wastage occurs, with a view to implementing better management.

The site Construction Manager will be designated as the Responsible Person and have overall responsibility for the implementation of the on-site Waste Management Plan. The Responsible Person will be assigned the authority to instruct all site personnel to comply with the specific provisions of the plan. At the operational level, a nominated Environmental Representative from each sub-contractor company on the site shall be assigned the direct responsibility to ensure that the discrete operations stated in this framework for solid waste management are performed on an on-going basis.

Tracking and documentation procedures for off-site waste
The site construction Manager will maintain a copy of all waste collection permits. If waste (soil & stone) is being accepted on-site, a waste docket must be issued to the collector. If the waste is being transported to another site, a copy of the waste permit for that site must be provided to the manager. Record of waste collection docket, a receipt from the final destination of the

material will be kept as part of the on-site waste management records. All information will be entered in a waste management system to be maintained on-site.

Disposal Waste

Contractors are required to develop SOP for disposal of recyclable, non-recyclable and hazardous waste generated at site. Food waste will be disposed at food waste pit which will be fenced. Recycling waste will be handed over to recycling waste contractor. Hazardous waste will be disposed through incineration facility available in close proximity of the project area. Workers on the site will be encouraged to recycle as much municipal waste as possible i.e. cardboard, plastic, metals and glass. Prior to removal, the municipal waste will be examined to determine if recyclable materials have been placed in other containers. If this is the case, effort will be made to determine the cause of the waste not being segregated correctly.

ESTIMATED COST OF WASTE MANAGEMENT

Contractors are required to estimate and budget cost for waste management through BOQ items. Such waste management cost should include cost of waste drums, cost of waste handling crew, cost of waste transportation, cost of ANLA approved waste contractor services and associated incineration costs if any. By reusing materials on site, there will be reduction in transport and disposal costs for a waste contractor taking the material away.

TRAINING PROVISIONS FOR WASTE MANAGER AND SITE CREW

A waste manager will be appointed or designated by construction contractors to ensure commitment, operational efficiency and accountability during the project execution.

Site Manager Training and Responsibility

The waste manager will be given responsibility and authority to select a waste team if required i.e. members of the site crew that will aid him in the organization, operation and recording the waste management system implemented on-site. The waste manager will have overall responsibility to oversee record and provide feedback to the CSC on everyday waste management at the site. Authority will be given to the waste manager to delegate responsibility to sub-contractors where necessary and to co-ordinate with suppliers, service providers and sub-contractors to prioritize waste prevention and salvage. The waste manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on-site. He will also be trained in the best method for segregation and storage of recyclable materials, have information on the materials that can be reused on-site and know how to implement this Framework for Solid Waste Management.

Site Crew Waste Management Training

Training of the site crew is the responsibility of the waste manager and as such, a waste training program should be organized. A basic awareness course will be held for all crew to outline the construction waste management plan and to detail the segregation of waste at source. This may be incorporated with other training needs (e.g. general site induction, safety training etc.). This basic course will describe the materials to be segregated, the storage methods and the location

of the waste storage areas. A subsection on hazardous wastes will be incorporated and the particular dangers of each hazardous waste will be explained.

RECORD KEEPING

Records will be kept for each waste material which leaves the site, either for reuse on another site, recovery, recycling or disposal. A system will be put in place to record the construction waste arising on-site. The waste manager or delegate will record the following:

- Waste taken off-site for reuse
- Waste taken off-site for recovery
- Waste taken off-site for recycling
- Waste taken off-site for disposal
- Waste (soil & stone) accepted on-site for recovery

For each movement of waste off-site, a signed waste collection docket will be obtained by the waste manager (or delegate) from the contractor. This will be carried out for each material type. This system will also be linked with the delivery records. A signed waste acceptance docket will be issued for each movement of waste on-site.

OUTLINE WASTE AUDIT PROCEDURE

Contractors are required to develop SOP for waste auditing at the construction sites. Such SOP should reflect frequency and types of waste audits, audit criteria and way forward to close non-compliances.

Responsibility for Waste Audit

The appointed waste manager will be responsible for conducting a waste audit at the site during project execution.

Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported off-site, as well as waste accepted, should be undertaken. If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. Each material type will be examined in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved. Waste management costs will also be reviewed. Upon completion of the construction phase a final report will be prepared summarizing the outcomes of waste management processes adopted and the total recycling/reuse/recovery figures for the development.

CONSULTATION WITH RELEVANT BODIES

Local Authority

Project contractors are required to maintain close coordination with focal government departments/agencies to ensure that all available waste reduction, re-use and recycling opportunities are identified and utilized.

Annex-XII

Accident and Incident Investigation Procedure

INCIDENT / NEAR MISS REPORT	QUALITY RECORDS / FORMS	
	Doc. Level:	Doc. Version:1
	Doc. No	

HS.T.02	INCIDENT / NEAR MISS REPORT	
Title of Project:		
Location:		Date:

Objective(s)

To implement immediate and effective process in order to provide immediate treatment against any fatality, Injuries, Casualty.

SECTION A: TO BE COMPLETED BY PERSON INVOLVED (OR BY SUPERVISOR OR HEALTH AND SAFETY REPRESENTATIVE IF WORKER IS INCAPACITATED) AND BY THEIR SUPERVISOR

Details of the person involved in the incident/near miss

Employee #: ..... **Site Address** ..... **Work phone:** .....

Name: ..... **Father Name:** .....

Position: ..... **Date of birth:** ..... ☐ **Male** ☐ **Female**

Please select one: ☐ Member ☐ Client Member ☐ Sub Contractor ☐ Visitor/Other

Details of the: ☐ Incident ☐ Near miss ☐ Medical

Date: ..... **Time:** ..... A.M /P.M

City: ..... **Location:** .....

Was the incident/near miss reported to your supervisor, immediately: ☐ Yes ☐ No

Part of the body injured

Head	Trunk	Internal	Arm	Hand	Leg	Foot eye
☐ neck	☐ heart	☐ left	☐ left	☐ left	☐ left	☐ ear
☐ hip	☐ lungs	☐ right	☐ right	☐ right	☐ right	☐
☐ nose	☐ chest	☐ systemic	☐ shoulder	☐ thumb	☐ knee	☐ great toe
☐ mouth	☐ stomach		☐ upper arm	☐ fingers	☐ lower leg	☐ other toes
☐ teeth	☐ groin		☐ elbow	☐ palm	☐ ankle	
☐ face	☐ back		☐ forearm		☐ thigh	
☐ skull	☐ multiple		☐ wrist		☐ upper leg	☐ psychosocial

Nature of injury

☐ abrasion	☐ puncture	☐ heart attack	☐ sprain	☐ burn	☐ traumatic shock
☐ bruise	☐ laceration	☐ hearing loss	☐ strain	☐ scald	☐ electric shock
☐ fracture	☐ amputation	☐ foreign body	☐ hernia	☐ rash	☐ psychosocial
☐ concussion	☐ bite	☐ minor cuts		☐ allergy	☐ chemical

☐ aggravation of previous injury or medical condition *(please describe)*: .....

Type of incident which caused injury

☐ striking against	☐ stumbling	☐ lifting	☐ pushing	☐ ingestion
☐ struck by	☐ slipping	☐ bending	☐ pulling	☐ absorption
☐ caught in/on	☐ tripping	☐ twisting	☐ jumping	☐ inhalation
☐ stepping on	☐ falling	☐ stress	☐ vehicle	☐ needlestick

☐ other *(please describe)*: .....

Annex-XIII

Framework for Resource Management Plan

1. INTRODUCTION

Most of the resources in this world are finite and non-renewable in nature. We are completely dependent on these resources to fulfill all our daily requirements. Therefore, sustainable development calls for the need to conserve resources in a way that meet our needs of present generation as well as future generation, especially the non-renewable resources.

2. OBJECTIVE OF THE PLAN

The Resource Conservation Plan is intended to make an effort towards achieving sustainable development. The objective of the resource conservation plan is to:

- Minimize the use of natural resources; and
- Mitigate and prevent pollution contaminating the natural resources.

3. PLANNING

Careful estimations of quantities of material, fuel, water and energy required directly or indirectly shall be done to avoid excessive or unnecessary wastage of these materials. In addition to this, pollution prevention strategies shall also be devised to prevent contamination of resources.

The estimations include the following:

- Estimation of construction material required for the project;
- Estimation of fuel consumption for construction machinery, construction vehicles and generators;
- Estimations of the energy requirements during all the stages of the project; and
- Estimations of water consumption for construction activities and construction camp sites.
- Strategies shall be planned to reduce loads on the identified resources to be consumed;
- Best management practices shall be devised to control or reduce pollution resulting from the activities during different stages of the project; and
- An inspector shall be assigned responsibility to oversee the ongoing activities to check the compliance of the planned strategies.

4. EXECUTION OF THE PLAN

The planned strategies shall be implemented to conserve the natural resources including but not limited to the following:

Material

- Material supplied shall be in conformance with the estimated quantities and excess material shall be returned to the supplier;
- Material wastage shall be avoided by using best management practices;
- Waste produced during the project execution shall be disposed of safely to the designated disposal sites through approved contractors; and

- Reuse of the materials shall be appreciated.

Energy

- Reduce trips and optimize routes to and from the construction site for all kinds of activities;
- Regular maintenance of equipment and vehicles to avoid leaks and sustain efficient fuel consumption;
- Switch off idle equipment and vehicles to avoid wastage of fuel;
- Minimize warm up time, unnecessary acceleration and deceleration of the construction equipment and vehicles;
- Avoid unnecessary burning of fuel for cooking in construction camps;
- Avoid unnecessary use of heating and cooling systems during extreme weathers events;
- Construction shall start in early hours of the day to avoid heat in summers and utilization of day light.
- Alternate energy sources shall be considered for electricity generations during construction and ope renewable resource.

Water

- Avoid using potable water for sprinkling, curing and washing of equipment and vehicles.
- Surface water or treated effluent can be used instead;
- Wastage of water should be controlled through providing proper valves and through controlling pressure of the water;
- Unnecessary equipment washings should be avoided;
- Awareness amongst workers shall be raised to conserve water and immediately report for any leaks detected;
- Ensure protection of canal water from contamination resulting from construction activities.

Pollution

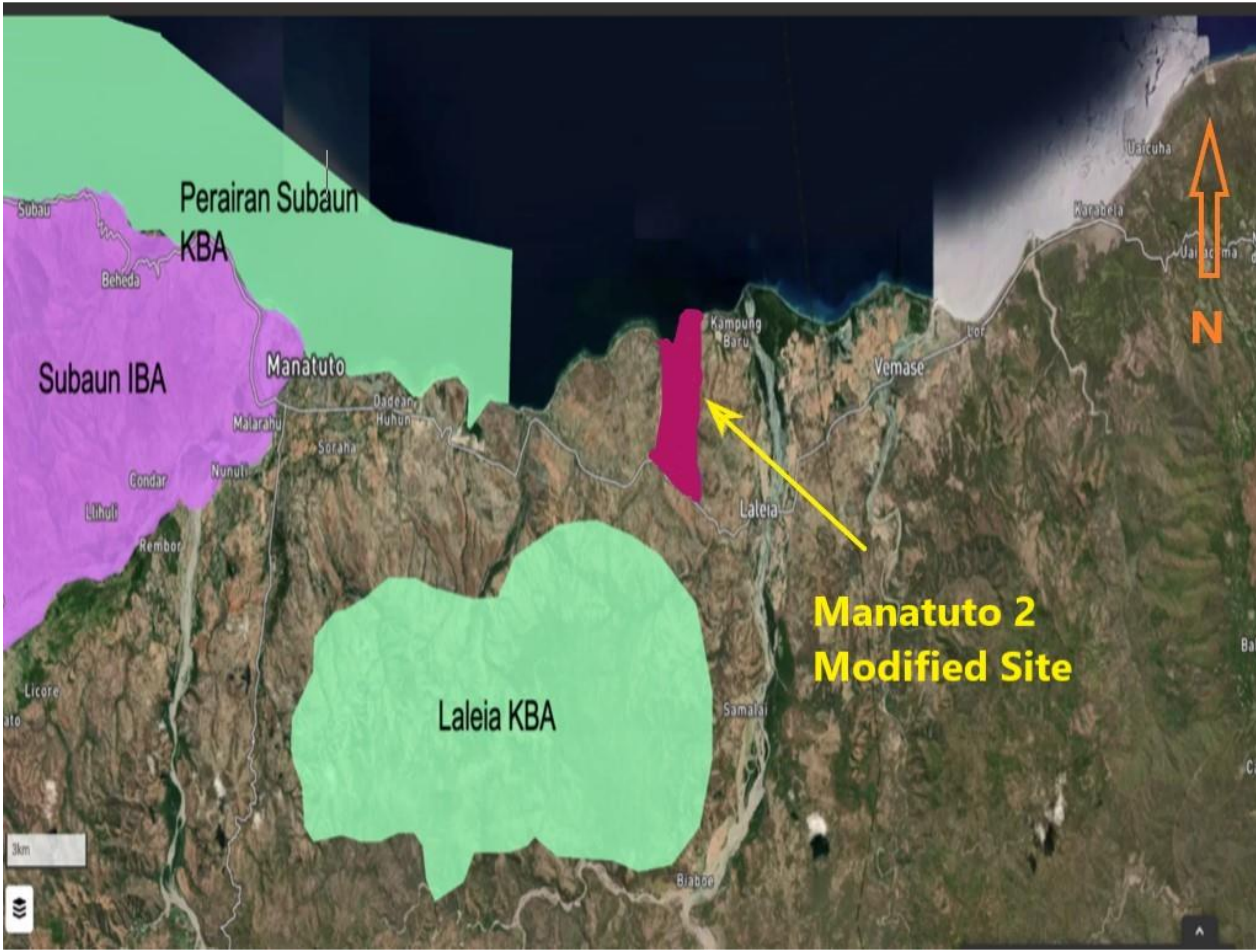
- Emissions shall be reduced and controlled as far as possible and direct discharges to air shall be avoided by strictly adhering to the mitigation measures outlined in IEE report;
- Waste water shall not be discharged directly into the canal and must be managed as per the recommendations presented in EIS report; and
- Construction waste, and municipal solid waste shall not be dumped and burnt openly, and shall be handled according to the preventative measure given in EIS report.

5. CHECKING AND CORRECTIVE ACTIONS

The project developer shall bind the construction contractor through contract agreement to comply with the strategies outlined in the Resource Conservation Plan. The Environmental Committee shall also appoint an Inspector who shall monitor the daily onsite activities and shall report any issues and concerns raised in relation to Resource Conservation Plan. The inspector shall recommend adequate corrective actions to mitigate the issues raised.

Annex-XIV

IBAT Screening Results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Subaun IBA
Manatuto
Laleia KBA
Manatuto 2
Modified Site
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Subau
Beheda
Malarahu
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Condar
Nunuli
Lihuli
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Licore
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Kampung Baru
Vemase
Laleia
Samalai
Braboe
Uaicuha
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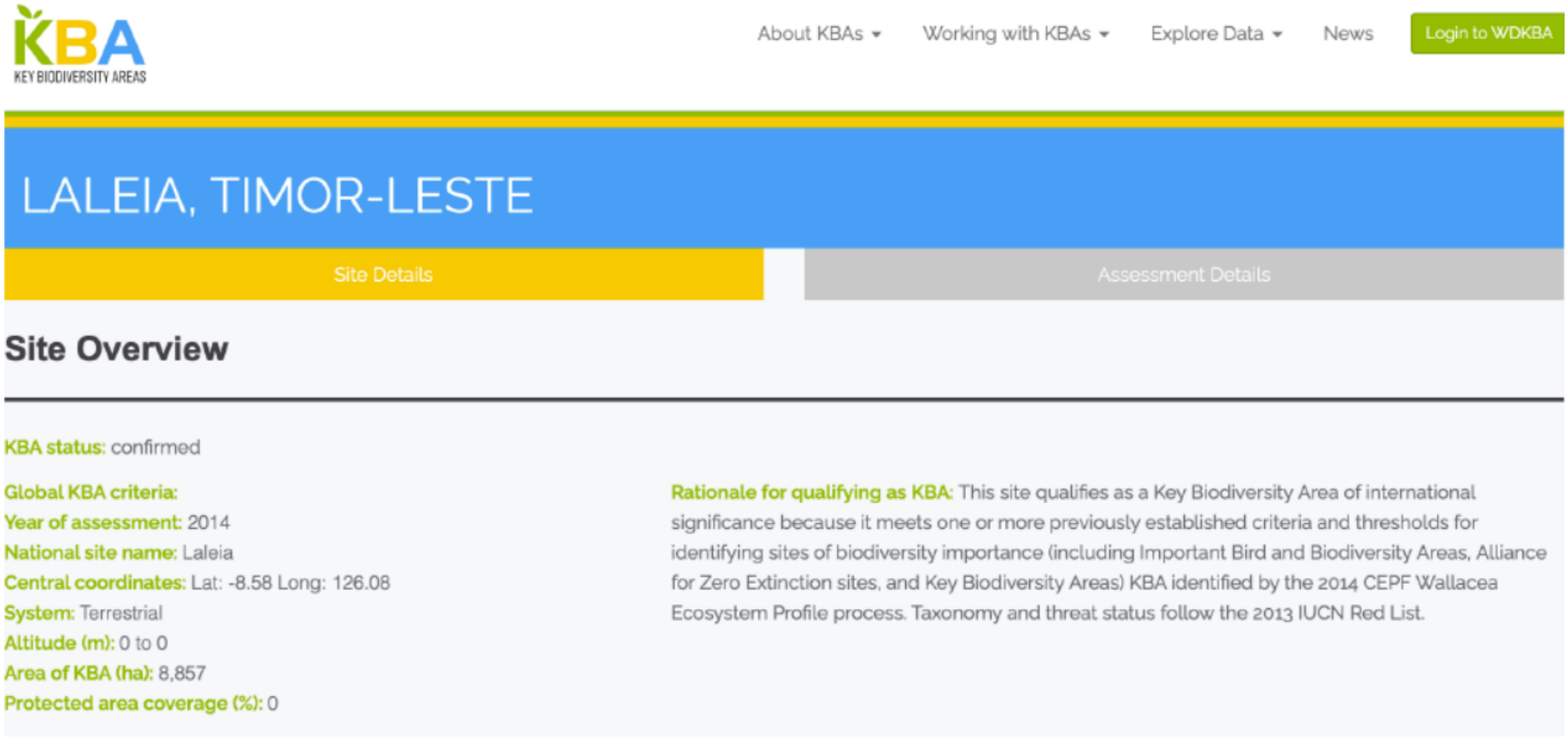
KBA
KEY BIODIVERSITY AREAS
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LALEIA, TIMOR-LESTE
Site Details
Assessment Details
Site Overview
KBA status: confirmed
Global KBA criteria:
Year of assessment: 2014
National site name: Laleia
Central coordinates: Lat: -8.58 Long: 126.08
System: Terrestrial
Altitude (m): 0 to 0
Area of KBA (ha): 8,857
Protected area coverage (%): 0
Rationale for qualifying as KBA: This site qualifies as a Key Biodiversity Area of international significance because it meets one or more previously established criteria and thresholds for identifying sites of biodiversity importance (including Important Bird and Biodiversity Areas, Alliance for Zero Extinction sites, and Key Biodiversity Areas) KBA identified by the 2014 CEPF Wallacea Ecosystem Profile process. Taxonomy and threat status follow the 2013 IUCN Red List.

LALEIA, TIMOR-LESTE

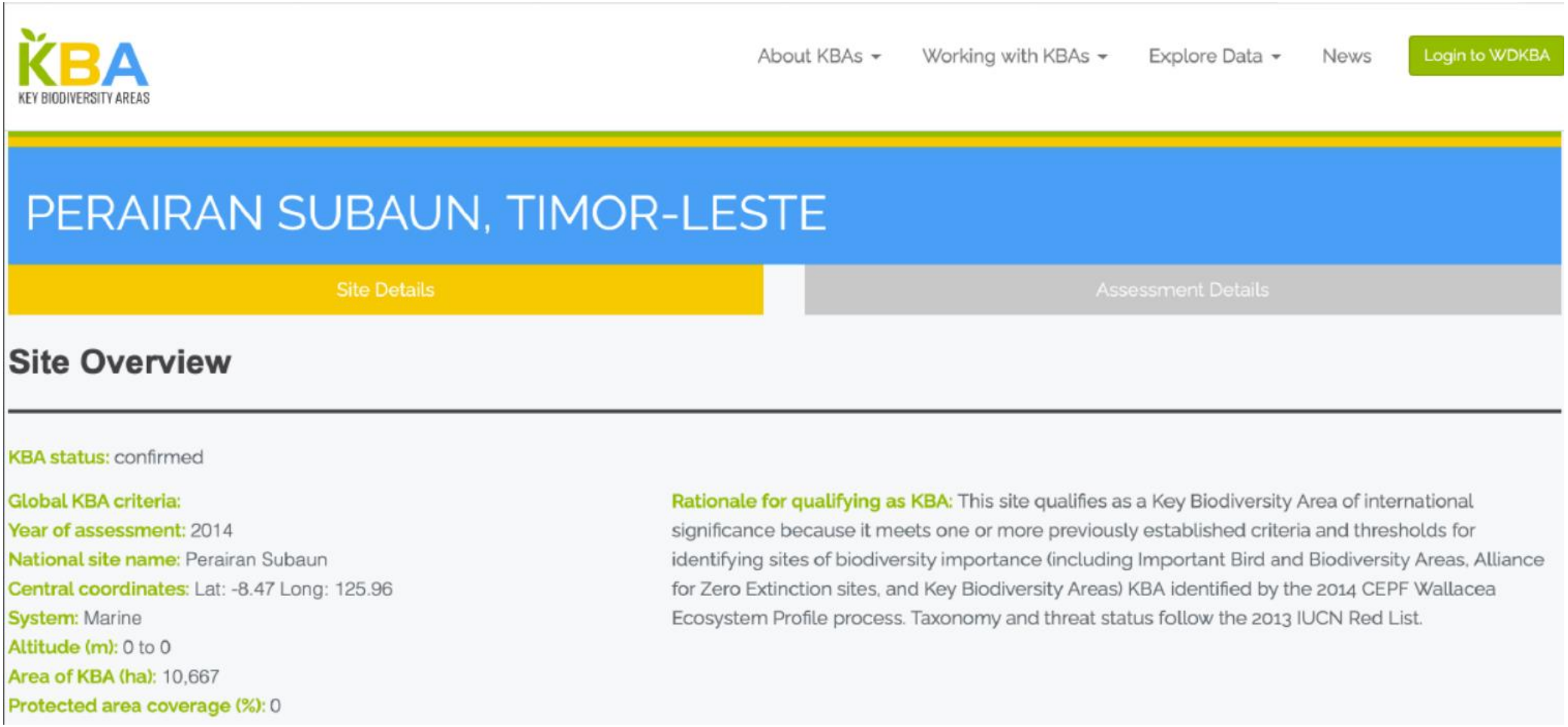
Site Details | Assessment Details

Biodiversity elements triggering KBA criteria

Taxonomic Group	Scientific name	Common name	IUCN Red List Category	KBA Criteria	Legacy Criteria
Mammals	*Rusa timorensis*	Javan Rusa	VU		Y
Plants	*Santalum album*	Sandalwood	VU		Y

Recommended citation

Key Biodiversity Areas Partnership (2022) *Key Biodiversity Areas factsheet: Laleia*. Extracted from the World Database of Key Biodiversity Areas. Developed by the Key Biodiversity Areas Partnership: BirdLife International, IUCN, American Bird Conservancy, Amphibian Survival Alliance, Conservation International, Critical Ecosystem Partnership Fund, Global Environment Facility, Global Wildlife Conservation, NatureServe, Rainforest Trust, Royal Society for the Protection of Birds, World Wildlife Fund and Wildlife Conservation Society. Downloaded from http://www.keybiodiversityareas.org/ on 26/08/2022.



KBA KEY BIODIVERSITY AREAS

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PERAIRAN SUBAUN, TIMOR-LESTE

Site Details | Assessment Details

Site Overview

KBA status: confirmed

Global KBA criteria:
Year of assessment: 2014
National site name: Perairan Subaun
Central coordinates: Lat: -8.47 Long: 125.96
System: Marine
Altitude (m): 0 to 0
Area of KBA (ha): 10,667
Protected area coverage (%): 0

Rationale for qualifying as KBA: This site qualifies as a Key Biodiversity Area of international significance because it meets one or more previously established criteria and thresholds for identifying sites of biodiversity importance (including Important Bird and Biodiversity Areas, Alliance for Zero Extinction sites, and Key Biodiversity Areas) KBA identified by the 2014 CEPF Wallacea Ecosystem Profile process. Taxonomy and threat status follow the 2013 IUCN Red List.

PERAIRAN SUBAUN, TIMOR-LESTE

Site Details | Assessment Details

Biodiversity elements triggering KBA criteria

Taxonomic Group	Scientific name	Common name	IUCN Red List Category	KBA Criteria	Legacy Criteria
Invertebrates	*Euphyllia cristata*		VU		Y
Invertebrates	*Heliofungia actiniformis*		VU		Y
Invertebrates	*Heliopora coerulea*	Blue Coral	VU		Y
Invertebrates	*Pectinia lactuca*	Lettuce Coral	VU		Y
Invertebrates	*Porites nigrescens*		VU		Y
Invertebrates	*Turbinaria mesenterina*		VU		Y
Reptiles	*Chelonia mydas*	Green Turtle	EN		Y

Recommended citation

Key Biodiversity Areas Partnership (2022) *Key Biodiversity Areas factsheet: Perairan Subaun*. Extracted from the World Database of Key Biodiversity Areas. Developed by the Key Biodiversity Areas Partnership: BirdLife International, IUCN, American Bird Conservancy, Amphibian Survival Alliance, Conservation International, Critical Ecosystem Partnership Fund, Global Environment Facility, Global Wildlife Conservation, NatureServe, Rainforest Trust, Royal Society for the Protection of Birds, World Wildlife Fund and Wildlife Conservation Society. Downloaded from http://www.keybiodiversityareas.org/ on 26/08/2022.

KBA
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SUBAUN, TIMOR-LESTE

Site Details | Assessment Details

Site Overview

KBA status: confirmed

Global KBA criteria:
Year of assessment: 2014
National site name: Subaun
Central coordinates: Lat: -8.53 Long: 125.87
System: Terrestrial
Altitude (m): 0 to 1,320
Area of KBA (ha): 23,691
Protected area coverage (%): 9

Rationale for qualifying as KBA: This site qualifies as a Key Biodiversity Area of international significance because it meets one or more previously established criteria and thresholds for identifying sites of biodiversity importance (including Important Bird and Biodiversity Areas, Alliance for Zero Extinction sites, and Key Biodiversity Areas) KBA identified by the 2014 CEPF Wallacea Ecosystem Profile process. Taxonomy and threat status follow the 2013 IUCN Red List.

Text account

Year of compilation: 2007
Site description:
An area of steep to moderately steep hills rising from sea level to more than 1,300 m on the isolated peak of Mount Curi, with a fine example of near pristine Eucalyptus savanna woodland extending from sea level to the steep hill slopes. The dominant vegetation below c.400 m is Eucalyptus alba savanna woodland with a tall grassy understorey (mostl Heteropogon and Themeda), with Eucalyptus urophylla dominant above c.400 m. Topographically protected tropical dry forest (or riparian semi-evergreen forest) occurs in gullies and on isolated hill slopes but is nowhere extensive (all patches <1 km2). The grassy understorey is burnt regularly (1–3 year periodicity) maintaining the open woodland. Locally, closed forest and savanna woodland is converted to small shifting agriculture plots to grow corn and other vegetables.

SUBAUN, TIMOR-LESTE

Site Details | Assessment Details

Biodiversity elements triggering KBA criteria

Taxonomic Group	Scientific name	Common name	IUCN Red List Category	KBA Criteria	Legacy Criteria
Birds	*Dicaeum maugei*	Red-chested Flowerpecker	LC		Y
Birds	*Ducula rosacea*	Pink-headed Imperial-pigeon	NT		Y
Birds	*Gerygone inornata*	Plain Gerygone	LC		Y
Birds	*Lichmera flavicans*	Yellow-eared Honeyeater	LC		Y
Birds	*Meliphaga reticulata*	Streaky-breasted Honeyeater	LC		Y
Birds	*Myzomela vulnerata*	Red-rumped Myzomela	LC		Y
Birds	*Nectarinia solaris*	Flame-breasted Sunbird	LC		Y
Birds	*Oriolus melanotis*	Olive-brown Oriole	LC		Y
Birds	*Pachycephala orpheus*	Fawn-breasted Whistler	LC		Y
Birds	*Padda fuscata*	Timor Sparrow	NT		Y
Birds	*Philemon inornatus*	Plain Friarbird	LC		Y
Birds	*Sphecotheres viridis*	Timor Figbird	LC		Y

Birds	*Padda fuscata*	Timor Sparrow	NT	Y
Birds	*Philemon inornatus*	Plain Friarbird	LC	Y
Birds	*Sphecotheres viridis*	Timor Figbird	LC	Y
Birds	*Trichoglossus euteles*	Olive-headed Lorikeet	LC	Y
Birds	*Turacoena modesta*	Black Cuckoo-dove	NT	Y
Plants	*Santalum album*	Sandalwood	VU	Y

Recommended citation

Key Biodiversity Areas Partnership (2022) *Key Biodiversity Areas factsheet: Subaun*. Extracted from the World Database of Key Biodiversity Areas. Developed by the Key Biodiversity Areas Partnership: BirdLife International, IUCN, American Bird Conservancy, Amphibian Survival Alliance, Conservation International, Critical Ecosystem Partnership Fund, Global Environment Facility, Global Wildlife Conservation, NatureServe, Rainforest Trust, Royal Society for the Protection of Birds, World Wildlife Fund and Wildlife Conservation Society. Downloaded from http://www.keybiodiversityareas.org/ on 25/08/2022.

IBAT

Integrated Biodiversity Assessment Tool

PROXIMITY REPORT
MANATUTO MODIFIED SITE

Country: Timor-Leste

Location: [-8.5, 126.1]

Date of analysis: 24 December 2022 (GMT)

Size of site: 2 km^2

Buffers applied: 1 km | 3 km | 5 km

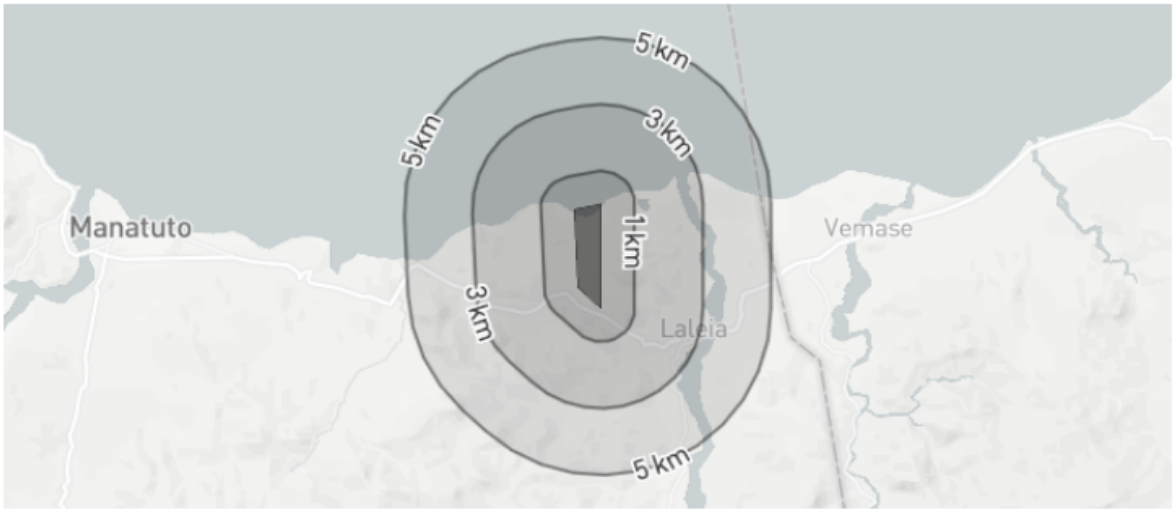
IUCN Red List Biomes: Marine, Terrestrial

Generated by: Cherry Rivera

Organisation: ADB

Overlaps with:

Protected Areas	1
Key Biodiversity Areas	1
IUCN Red List	259



Displaying project location and buffers: 1 km, 3 km, 5 km

About this report

This report presents the results of [1284-38105] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 3 km, 5 km.

This report is one part of a package generated by IBAT on 24 December 2022 (GMT) that includes full list of all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a 'How to read IBAT reports' document.

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the Sensitive Data Access Restrictions Policy for the IUCN Red List. This relates to sensitive Threatened species and KBAs triggered by sensitive species.

Data used to generate this report

- UNEP-WCMC and IUCN, 2022. Protected Planet: The World Database on Protected Areas (WDPA)[On-line], Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net - December 2022.
- BirdLife International (on behalf of the KBA Partnership), 2022. Key Biodiversity Areas - November 2022.
- IUCN, 2022. IUCN Red List of Threatened Species - August 2022.
- IUCN. The IUCN Red List of Threatened Species. Version 2019-3. (2019). https://www.iucnredlist.org
- IUCN. Threats Classification Scheme (Version 3.2). (2019)
- Strassburg, B.B.N., Iribarrem, A., Beyer, H.L. et al. Global priority areas for ecosystem restoration. Nature 586, 724–729 (2020). https://doi.org/10.1038/s41586-020-2784-9

IBAT

Protected Areas

The following protected areas are found within 1 km, 3 km, 5 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

Area name	Within buffer of
Lamsanak	1 km

Key Biodiversity Areas

The following key biodiversity areas are found within 1 km, 3 km, 5 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

Area name	Distance
Laleia	3 km

IUCN Red List of Threatened Species

The following threatened species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Eretmochelys imbricata	Hawksbill Turtle	REPTILIA	CR	Decreasing	Terrestrial, Marine
Carcharhinus longimanus	Oceanic Whitetip Shark	CHONDRICHTHYES	CR	Decreasing	Marine
Sphyrna lewini	Scalloped Hammerhead	CHONDRICHTHYES	CR	Decreasing	Marine
Pristis zijsron	Green Sawfish	CHONDRICHTHYES	CR	Decreasing	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Rhina ancylostoma	Bowmouth Guitarfish	CHONDRICHTHYES	CR	Decreasing	Marine
Rhynchobatus australiae	Bottlenose Wedgefish	CHONDRICHTHYES	CR	Decreasing	Marine
Millepora boschmai		HYDROZOA	CR	Unknown	Marine
Pristis pristis	Largetooth Sawfish	CHONDRICHTHYES	CR	Decreasing	Marine, Freshwater
Glaucostegus typus	Giant Guitarfish	CHONDRICHTHYES	CR	Decreasing	Marine
Balaenoptera borealis	Sei Whale	MAMMALIA	EN	Increasing	Marine
Balaenoptera musculus	Blue Whale	MAMMALIA	EN	Increasing	Marine
Chelonia mydas	Green Turtle	REPTILIA	EN	Decreasing	Terrestrial, Marine
Rhincodon typus	Whale Shark	CHONDRICHTHYES	EN	Decreasing	Marine
Isurus oxyrinchus	Shortfin Mako	CHONDRICHTHYES	EN	Decreasing	Marine
Carcharhinus amblyrhynchos	Grey Reef Shark	CHONDRICHTHYES	EN	Decreasing	Marine
Anoxypristis cuspidata	Narrow Sawfish	CHONDRICHTHYES	EN	Decreasing	Marine
Eusphyra blochii	Winghead Shark	CHONDRICHTHYES	EN	Decreasing	Marine
Negaprion acutidens	Sharptooth Lemon Shark	CHONDRICHTHYES	EN	Decreasing	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Stegostoma tigrinum	Zebra Shark	CHONDRICHTHYES	EN	Decreasing	Marine
Rhinoptera javanica	Javanese Cownose Ray	CHONDRICHTHYES	EN	Decreasing	Marine
Mobula tarapacana	Sicklefin Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
Mobula thurstoni	Bentfin Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
Isurus paucus	Longfin Mako	CHONDRICHTHYES	EN	Decreasing	Marine
Porites eridani		ANTHOZOA	EN	Unknown	Marine
Anacropora spinosa		ANTHOZOA	EN	Decreasing	Marine
Lobophyllia serratus	Lobed Cactus Coral	ANTHOZOA	EN	Unknown	Marine
Porites ornata		ANTHOZOA	EN	Unknown	Marine
Montipora setosa		ANTHOZOA	EN	Decreasing	Marine
Alveopora excelsa		ANTHOZOA	EN	Unknown	Marine
Alveopora minuta		ANTHOZOA	EN	Unknown	Marine
Pectinia maxima		ANTHOZOA	EN	Unknown	Marine
Mobula kuhlii	Shorthorned Pygmy Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
Alopias pelagicus	Pelagic Thresher	CHONDRICHTHYES	EN	Decreasing	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Holothuria scabra	Golden Sandfish	HOLOTHUROIDEA	EN	Decreasing	Marine
Holothuria lessoni	Golden Sandfish	HOLOTHUROIDEA	EN	Decreasing	Marine
Thelenota ananas	Prickly Redfish	HOLOTHUROIDEA	EN	Decreasing	Marine
Mobula birostris	Oceanic Manta Ray	CHONDRICHTHYES	EN	Decreasing	Marine
Numenius madagascariensis	Far Eastern Curlew	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater
Calidris tenuirostris	Great Knot	AVES	EN	Decreasing	Terrestrial, Marine
Mobula mobular	Spinetail Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
Centrophorus granulosus	Gulper Shark	CHONDRICHTHYES	EN	Decreasing	Marine
Cuora amboinensis	Southeast Asian Box Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Macaca fascicularis	Long-tailed Macaque	MAMMALIA	EN	Decreasing	Terrestrial
Pteropus vampyrus	Large Flying-fox	MAMMALIA	EN	Decreasing	Terrestrial
Pterocarpus indicus	Burmese Rosewood	MAGNOLIOPSIDA	EN	Decreasing	Terrestrial

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Rhinolophus montanus	Timorese Horseshoe Bat	MAMMALIA	EN	Unknown	Terrestrial
Alopecoenas hoedtii	Wetar Ground-dove	AVES	EN	Decreasing	Terrestrial
Treron psittaceus	Timor Green-pigeon	AVES	EN	Decreasing	Terrestrial
Calostoma insigne		AGARICOMYCETES	EN	Decreasing	Terrestrial
Eucalyptus urophylla	Timor White Gum	MAGNOLIOPSIDA	EN	Decreasing	Terrestrial
Macaca fascicularis ssp. fascicularis	Common Long-tailed Macaque	MAMMALIA	EN	Decreasing	Terrestrial
Carcharodon carcharias	White Shark	CHONDRICHTHYES	VU	Decreasing	Marine
Caretta caretta	Loggerhead Turtle	REPTILIA	VU	Decreasing	Terrestrial, Marine
Dermochelys coriacea	Leatherback	REPTILIA	VU	Decreasing	Terrestrial, Marine
Dugong dugon	Dugong	MAMMALIA	VU	Decreasing	Marine
Hippocampus histrix	Thorny Seahorse	ACTINOPTERYGII	VU	Decreasing	Marine
Hippocampus trimaculatus	Three-spot Seahorse	ACTINOPTERYGII	VU	Decreasing	Marine
Lepidochelys olivacea	Olive Ridley	REPTILIA	VU	Decreasing	Terrestrial, Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Carcharhinus amboinensis	Pigeye Shark	CHONDRICHTHYES	VU	Decreasing	Marine
Carcharhinus brevipinna	Spinner Shark	CHONDRICHTHYES	VU	Decreasing	Marine
Carcharhinus falciformis	Silky Shark	CHONDRICHTHYES	VU	Decreasing	Marine
Carcharhinus melanopterus	Blacktip Reef Shark	CHONDRICHTHYES	VU	Decreasing	Marine
Triaenodon obesus	Whitetip Reef Shark	CHONDRICHTHYES	VU	Decreasing	Marine
Urogymnus asperrimus	Porcupine Ray	CHONDRICHTHYES	VU	Decreasing	Marine
Carcharhinus amblyrhynchoides	Graceful Shark	CHONDRICHTHYES	VU	Decreasing	Marine
Hippocampus kelloggi	Great Seahorse	ACTINOPTERYGII	VU	Decreasing	Marine
Physeter macrocephalus	Sperm Whale	MAMMALIA	VU	Unknown	Marine
Nebrius ferrugineus	Tawny Nurse Shark	CHONDRICHTHYES	VU	Decreasing	Marine
Rhizoprionodon acutus	Milk Shark	CHONDRICHTHYES	VU	Decreasing	Marine
Odontaspis ferox	Smalltooth Sand Tiger	CHONDRICHTHYES	VU	Decreasing	Marine
Epinephelus fuscoguttatus	Brown-marbled Grouper	ACTINOPTERYGII	VU	Decreasing	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Taeniurops meyeni	Blotched Fantail Ray	CHONDRICHTHYES	VU	Decreasing	Marine
Epinephelus polyphekadion	Camouflage Grouper	ACTINOPTERYGII	VU	Decreasing	Marine
Bolbometopon muricatum	Green Humphead Parrotfish	ACTINOPTERYGII	VU	Decreasing	Marine
Plectropomus areolatus	Squaretail Coralgrouper	ACTINOPTERYGII	VU	Decreasing	Marine
Montipora angulata		ANTHOZOA	VU	Decreasing	Marine
Moseleya latistellata		ANTHOZOA	VU	Decreasing	Marine
Pavona venosa		ANTHOZOA	VU	Unknown	Marine
Catalaphyllia jardinei		ANTHOZOA	VU	Unknown	Marine
Montipora hodgsoni		ANTHOZOA	VU	Decreasing	Marine
Alveopora marionensis		ANTHOZOA	VU	Unknown	Marine
Acropora turaki		ANTHOZOA	VU	Decreasing	Marine
Echinopora ashmorensis	Hedgehog Coral	ANTHOZOA	VU	Decreasing	Marine
Pectinia lactuca	Lettuce Coral	ANTHOZOA	VU	Unknown	Marine
Montipora gaimardi		ANTHOZOA	VU	Decreasing	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Acropora willisae		ANTHOZOA	VU	Decreasing	Marine
Montipora orientalis		ANTHOZOA	VU	Decreasing	Marine
Acropora plumosa		ANTHOZOA	VU	Decreasing	Marine
Acropora acuminata		ANTHOZOA	VU	Decreasing	Marine
Pectinia alcicornis		ANTHOZOA	VU	Unknown	Marine
Turbinaria bifrons		ANTHOZOA	VU	Unknown	Marine
Acropora listeri		ANTHOZOA	VU	Decreasing	Marine
Acropora paniculata		ANTHOZOA	VU	Decreasing	Marine
Anacropora matthaii		ANTHOZOA	VU	Decreasing	Marine
Plerogyra discus		ANTHOZOA	VU	Unknown	Marine
Acropora derawanensis		ANTHOZOA	VU	Decreasing	Marine
Acropora multiacuta		ANTHOZOA	VU	Decreasing	Marine
Goniopora planulata		ANTHOZOA	VU	Unknown	Marine
Montipora malampaya		ANTHOZOA	VU	Decreasing	Marine
Pocillopora ankeli		ANTHOZOA	VU	Unknown	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Goniopora polyformis		ANTHOZOA	VU	Unknown	Marine
Galaxea cryptoramosa		ANTHOZOA	VU	Unknown	Marine
Acropora vaughani		ANTHOZOA	VU	Decreasing	Marine
Lobophyllia flabelliformis		ANTHOZOA	VU	Unknown	Marine
Fungia curvata		ANTHOZOA	VU	Unknown	Marine
Porites nigrescens		ANTHOZOA	VU	Unknown	Marine
Pavona decussata	Cactus Coral	ANTHOZOA	VU	Unknown	Marine
Fimbriaphyllia paradivisa		ANTHOZOA	VU	Unknown	Marine
Montipora florida		ANTHOZOA	VU	Decreasing	Marine
Platygyra yaeyamaensis		ANTHOZOA	VU	Decreasing	Marine
Astreopora cucullata		ANTHOZOA	VU	Decreasing	Marine
Acropora kirstyae		ANTHOZOA	VU	Decreasing	Marine
Astreopora incrustans		ANTHOZOA	VU	Decreasing	Marine
Alveopora daedalea		ANTHOZOA	VU	Unknown	Marine
Pocillopora danae		ANTHOZOA	VU	Unknown	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Pocillopora elegans		ANTHOZOA	VU	Unknown	Marine
Porites attenuata	Hump Coral	ANTHOZOA	VU	Unknown	Marine
Galaxea acrhelia		ANTHOZOA	VU	Unknown	Marine
Acropora caroliniana		ANTHOZOA	VU	Decreasing	Marine
Montipora cactus		ANTHOZOA	VU	Decreasing	Marine
Acropora retusa		ANTHOZOA	VU	Decreasing	Marine
Porites sillimaniana		ANTHOZOA	VU	Unknown	Marine
Porites cumulatus		ANTHOZOA	VU	Unknown	Marine
Symphyllia hassi		ANTHOZOA	VU	Unknown	Marine
Montipora friabilis		ANTHOZOA	VU	Decreasing	Marine
Acropora aspera		ANTHOZOA	VU	Decreasing	Marine
Acropora abrolhosensis		ANTHOZOA	VU	Decreasing	Marine
Stylocoeniella cocosensis		ANTHOZOA	VU	Unknown	Marine
Leptoseris yabei		ANTHOZOA	VU	Unknown	Marine
Porites aranetai		ANTHOZOA	VU	Unknown	Marine
Alveopora verrilliana		ANTHOZOA	VU	Unknown	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Paramontastraea salebrosa		ANTHOZOA	VU	Decreasing	Marine
Acropora russelli		ANTHOZOA	VU	Decreasing	Marine
Fimbriaphyllia ancora		ANTHOZOA	VU	Unknown	Marine
Turbinaria patula		ANTHOZOA	VU	Unknown	Marine
Isopora brueggemanni		ANTHOZOA	VU	Decreasing	Marine
Montipora vietnamensis		ANTHOZOA	VU	Decreasing	Marine
Heliopora coerulea	Blue Coral	ANTHOZOA	VU	Decreasing	Marine
Acropora tenella		ANTHOZOA	VU	Decreasing	Marine
Nemenzophyllia turbida		ANTHOZOA	VU	Unknown	Marine
Montipora caliculata		ANTHOZOA	VU	Decreasing	Marine
Acropora donei		ANTHOZOA	VU	Decreasing	Marine
Acropora kimbeensis		ANTHOZOA	VU	Decreasing	Marine
Turbinaria heronensis		ANTHOZOA	VU	Unknown	Marine
Pavona danai		ANTHOZOA	VU	Unknown	Marine
Heliofungia actiniformis		ANTHOZOA	VU	Unknown	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Acropora batunai		ANTHOZOA	VU	Decreasing	Marine
Fimbriaphyllia paraancora		ANTHOZOA	VU	Unknown	Marine
Acropora striata		ANTHOZOA	VU	Decreasing	Marine
Acropora lokani		ANTHOZOA	VU	Decreasing	Marine
Porites tuberculosa		ANTHOZOA	VU	Unknown	Marine
Leptoria irregularis		ANTHOZOA	VU	Decreasing	Marine
Acropora horrida		ANTHOZOA	VU	Decreasing	Marine
Acropora solitaryensis		ANTHOZOA	VU	Decreasing	Marine
Cyphastrea ocellina	Ocellated Brain Coral	ANTHOZOA	VU	Decreasing	Marine
Acropora dendrum		ANTHOZOA	VU	Decreasing	Marine
Acanthastrea regularis		ANTHOZOA	VU	Unknown	Marine
Alveopora allingi		ANTHOZOA	VU	Unknown	Marine
Mycedium steeni		ANTHOZOA	VU	Unknown	Marine
Acropora speciosa		ANTHOZOA	VU	Decreasing	Marine
Galaxea astreata		ANTHOZOA	VU	Unknown	Marine
Porites napopora		ANTHOZOA	VU	Unknown	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Acropora microclados		ANTHOZOA	VU	Decreasing	Marine
Pavona bipartita		ANTHOZOA	VU	Unknown	Marine
Goniopora albiconus		ANTHOZOA	VU	Unknown	Marine
Micromussa multipunctata		ANTHOZOA	VU	Decreasing	Marine
Montipora corbettensis		ANTHOZOA	VU	Decreasing	Marine
Acanthastrea ishigakiensis		ANTHOZOA	VU	Unknown	Marine
Dipsastraea laddi		ANTHOZOA	VU	Decreasing	Marine
Acropora globiceps		ANTHOZOA	VU	Decreasing	Marine
Goniopora burgosi		ANTHOZOA	VU	Unknown	Marine
Acropora loisetteae		ANTHOZOA	VU	Decreasing	Marine
Acropora desalwii		ANTHOZOA	VU	Decreasing	Marine
Acropora hoeksemai		ANTHOZOA	VU	Decreasing	Marine
Turbinaria stellulata		ANTHOZOA	VU	Unknown	Marine
Montipora samarensis		ANTHOZOA	VU	Decreasing	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Montipora verruculosa		ANTHOZOA	VU	Decreasing	Marine
Acanthastrea bowerbanki		ANTHOZOA	VU	Unknown	Marine
Anacropora puertogalerae		ANTHOZOA	VU	Decreasing	Marine
Montipora capricornis		ANTHOZOA	VU	Decreasing	Marine
Acropora simplex		ANTHOZOA	VU	Decreasing	Marine
Acropora spicifera		ANTHOZOA	VU	Decreasing	Marine
Montipora crassituberculata		ANTHOZOA	VU	Decreasing	Marine
Montipora mactanensis		ANTHOZOA	VU	Decreasing	Marine
Seriatopora dendritica		ANTHOZOA	VU	Unknown	Marine
Acropora walindii		ANTHOZOA	VU	Decreasing	Marine
Montipora australiensis		ANTHOZOA	VU	Decreasing	Marine
Montipora turtlensis		ANTHOZOA	VU	Decreasing	Marine
Pachyseris rugosa		ANTHOZOA	VU	Unknown	Marine
Physogyra lichtensteini		ANTHOZOA	VU	Unknown	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Montipora cocosensis		ANTHOZOA	VU	Decreasing	Marine
Acropora aculeus		ANTHOZOA	VU	Decreasing	Marine
Isopora crateriformis		ANTHOZOA	VU	Decreasing	Marine
Porites horizontalata		ANTHOZOA	VU	Unknown	Marine
Montipora delicatula		ANTHOZOA	VU	Decreasing	Marine
Acropora papillare		ANTHOZOA	VU	Decreasing	Marine
Caulastraea echinulata		ANTHOZOA	VU	Decreasing	Marine
Duncanopsammia peltata		ANTHOZOA	VU	Unknown	Marine
Porites cocosensis		ANTHOZOA	VU	Unknown	Marine
Acropora kosurini		ANTHOZOA	VU	Decreasing	Marine
Alveopora gigas		ANTHOZOA	VU	Unknown	Marine
Acropora anthocercis		ANTHOZOA	VU	Decreasing	Marine
Goniastrea ramosa		ANTHOZOA	VU	Decreasing	Marine
Alveopora fenestrata		ANTHOZOA	VU	Unknown	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Seriatopora aculeata		ANTHOZOA	VU	Unknown	Marine
Acropora palmerae		ANTHOZOA	VU	Decreasing	Marine
Acropora verweyi		ANTHOZOA	VU	Decreasing	Marine
Leptoseris incrustans		ANTHOZOA	VU	Unknown	Marine
Leptastrea aequalis		ANTHOZOA	VU	Decreasing	Marine
Acanthastrea brevis		ANTHOZOA	VU	Unknown	Marine
Pavona cactus		ANTHOZOA	VU	Unknown	Marine
Lobophyllia dentatus		ANTHOZOA	VU	Unknown	Marine
Porites rugosa		ANTHOZOA	VU	Unknown	Marine
Acropora awi		ANTHOZOA	VU	Decreasing	Marine
Euphyllia cristata		ANTHOZOA	VU	Stable	Marine
Acropora indonesia		ANTHOZOA	VU	Decreasing	Marine
Acropora jacquelineae		ANTHOZOA	VU	Decreasing	Marine
Lobophyllia diminuta	Lobed Cactus Coral	ANTHOZOA	VU	Unknown	Marine
Australogyra zelli		ANTHOZOA	VU	Decreasing	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Montipora cebuensis		ANTHOZOA	VU	Decreasing	Marine
Acanthastrea faviaformis		ANTHOZOA	VU	Unknown	Marine
Cyphastrea agassizi		ANTHOZOA	VU	Decreasing	Marine
Turbinaria mesenterina		ANTHOZOA	VU	Unknown	Marine
Acanthastrea hemprichii		ANTHOZOA	VU	Unknown	Marine
Acropora polystoma		ANTHOZOA	VU	Decreasing	Marine
Echinophyllia costata		ANTHOZOA	VU	Unknown	Marine
Isopora cuneata		ANTHOZOA	VU	Decreasing	Marine
Acropora echinata		ANTHOZOA	VU	Decreasing	Marine
Acropora elegans		ANTHOZOA	VU	Decreasing	Marine
Anacropora reticulata		ANTHOZOA	VU	Decreasing	Marine
Astraeosmilia curvata		ANTHOZOA	VU	Decreasing	Marine
Montipora altasepta		ANTHOZOA	VU	Decreasing	Marine
Turbinaria reniformis		ANTHOZOA	VU	Unknown	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Urogymnus granulatus	Mangrove Whipray	CHONDRICHTHYES	VU	Decreasing	Marine
Pateobatis fai	Pink Whipray	CHONDRICHTHYES	VU	Decreasing	Marine
Alopias superciliosus	Bigeye Thresher	CHONDRICHTHYES	VU	Decreasing	Marine
Pateobatis jenkinsii	Jenkins' Whipray	CHONDRICHTHYES	VU	Decreasing	Marine
Istiophorus platypterus	Sailfish	ACTINOPTERYGII	VU	Decreasing	Marine
Stichopus herrmanni	Curryfish	HOLOTHUROIDEA	VU	Decreasing	Marine
Actinopyga miliaris	Harry Blackfish	HOLOTHUROIDEA	VU	Decreasing	Marine
Actinopyga mauritiana	Surf Redfish	HOLOTHUROIDEA	VU	Decreasing	Marine
Actinopyga echinites	Deep Water Redfish	HOLOTHUROIDEA	VU	Decreasing	Marine
Amblyglyphidodon batunai	Green Sergeant	ACTINOPTERYGII	VU	Decreasing	Marine
Amblyglyphidodon ternatensis	Ternate Damsel	ACTINOPTERYGII	VU	Decreasing	Marine
Mola mola	Ocean Sunfish	ACTINOPTERYGII	VU	Decreasing	Marine
Albula glossodonta	Shortjaw Bonefish	ACTINOPTERYGII	VU	Decreasing	Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Himantura leoparda	Leopard Whipray	CHONDRICHTHYES	VU	Decreasing	Marine
Mobula alfredi	Reef Manta Ray	CHONDRICHTHYES	VU	Decreasing	Marine
Holothuria fuscogilva		HOLOTHUROIDEA	VU	Decreasing	Marine
Hydrobates matsudairae	Matsudaira's Storm-petrel	AVES	VU	Unknown	Terrestrial, Marine
Aetobatus ocellatus	Spotted Eagle Ray	CHONDRICHTHYES	VU	Decreasing	Marine
Gobiodon erythrospilus	Red-spotted Coralgoby	ACTINOPTERYGII	VU	Unknown	Marine
Oxymonacanthus longirostris	Harlequin Filefish	ACTINOPTERYGII	VU	Decreasing	Marine
Carcharhinus tjutjot	Indonesian Whaler Shark	CHONDRICHTHYES	VU	Decreasing	Marine
Pastinachus ater	Broad Cowtail Ray	CHONDRICHTHYES	VU	Decreasing	Marine
Aetomylaeus nichofii	Banded Eagle Ray	CHONDRICHTHYES	VU	Decreasing	Marine
Hippocampus spinosissimus	Hedgehog Seahorse	ACTINOPTERYGII	VU	Decreasing	Marine
Acerodon mackloti	Sunda Fruit Bat	MAMMALIA	VU	Decreasing	Terrestrial
Pteropus griseus	Gray Flying Fox	MAMMALIA	VU	Decreasing	Terrestrial

IBAT

Recommended citation

IBAT Proximity Report. Generated under licence 1284-38105 from the Integrated Biodiversity Assessment Tool on 24 December 2022 (GMT). www.ibat-alliance.org

How to use this report

This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a "first-step", providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.

IBAT

Recommended citation

IBAT Proximity Report. Generated under licence 1284-35341 from the Integrated Biodiversity Assessment Tool on 19 October 2022 (GMT). www.ibat-alliance.org

How to use this report

This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a "first-step", providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.

Annex-XV

Climate Risk Screening Excerpts from Modeling Software 'Aware'

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Project created and Report generated by Cherry Rivera, Asian Development Bank | Date created: 09.05.2022 16:14

01 Introduction

This report summarises results from a climate and geological risk screening exercise. The project information and location(s) are detailed immediately below.

The screening is based on the Aware™ geographic data set, compiled from the latest scientific information on current geological, climate and related hazards together with projected changes for the future where available. These data are combined with the project's sensitivities to hazard variables, returning information on the current and potential future risks that could influence its design and planning.

Project Information

PROJECT NAME:	TIM Solar PV
SUB PROJECT:	Manatuto Solar IPP
PROJECT NUMBER / REFERENCE:	2
SECTOR:	Energy
SUB SECTOR:	Renewable energy generation - solar
DESCRIPTION:	The Manututo site is a proposed solar IPP project location.

02 Chosen Locations

1) Location 1
2) Location 2
3) Location 3
4) Location 4

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03 Project Climate Risk Ratings

Below you will find the overall climate risk level for the project together with a radar chart presenting the level of risk associated with each individual climate risk topic analysed in Aware™. Projects with a final "High risk" rating are always recommended for further more detailed climate risk analyses.

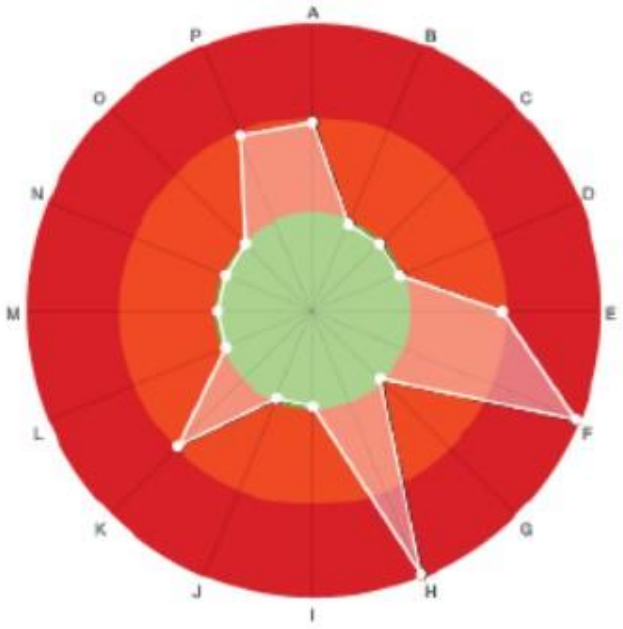
The radar chart provides an overview of which individual risks are most significant. This should be used in conjunction with the final rating to determine whether the project as a whole, or its individual components, should be assessed in further detail. The red band (outer circle) suggests a higher level of risk in relation to a risk topic. The green band (inner circle) suggests a lower level of risk in relation to a risk topic.

In the remaining sections of this report more detailed commentary is provided. Information is given on existing and possible future climate conditions and associated hazards. A number of questions are provided to help stimulate a conversation with project designers in order to determine how they would manage current and future climate change risks at the design stage. Links are provided to recent case studies, relevant data portals and other technical resources for further research.

Final project climate risk ratings

Medium Risk

Breakdown of climate risk topic ratings



A) Temperature increase
B) Wild fire
C) Permafrost
D) Sea ice
E) Precipitation increase
F) Flood
G) Snow loading
H) Landslide
I) Precipitation decrease
J) Water availability
K) Wind speed increase
L) Onshore Category 1 storms
M) Offshore Category 1 storms
N) Wind speed decrease
O) Sea level rise
P) Solar radiation change

04
HIGH RISK

FLOOD

ACCLIMATISE COMMENTARY

• Our data suggest that the project is located in a region which has experienced recurring major flood events in the recent past. A high exposure in Aware means that between 1985 and 2016 there have been at least one significant, large-scale flood event in the region. This is based on post-processed data from the Dartmouth Flood Observatory at the University of Colorado.

• The risk and type of flooding is dependent on local geographical factors including:
- Proximity to the coast and inland water courses
- Local topography
- Land use characteristics, including land use in upstream catchment area
- Design and maintenance level of drainage infrastructure
- Vulnerability of exposed assets
• Up to date information on flood risk worldwide is available online, for example UNEP / UNISDR's Global Risk Data Platform and Dartmouth Flood Observatory's Global Active Archive of Large Flood Events.

1. What does this mean for the design and construction of my project?

• If floods are identified as a potential problem for the project, it is recommended that:
- More localized information is collected on past floods and their consequences in the exact project location, especially since flood hazard can change significantly over short distances; depending on the findings, a site-specific flood risk assessment (including flood modelling) might be required that provides a good understanding of the current and future flood risk level
- Information is collected on land use and building regulations, such as flood zonation ordinances
- The project siting, design and construction features ensure that site-specific flood risk management measures are undertaken. Such measures could include a combination of grey infrastructure (such as flood defence infrastructure) and green infrastructure (such as restoration of wetlands) to reduce flood risk, as well as measures to manage the residual flood risk (such as through flood early warning, flood preparedness planning, flood insurance etc.)

2. What does the science say could happen in the future and what does this mean for the design of my project?

• Climate change is projected to influence the frequency and intensity of flood events.
• Existing engineering designs may not take into consideration the impact of climate change on the risks from flooding. See "Critical thresholds" in the "Help & glossary" section for further details on how a changing climate can impact on critical thresholds and design standards.

3. As a starting point you may wish to consider the following questions:

Q1 Would the expected performance and maintenance of the project be impaired by flooding?
Q2 Is there a plan to integrate climate change into a flood risk assessment for the project?
Q3 Does the project siting consider flood risk to ensure the proposed project will not be impacted by flooding and will not increase risk of flooding?
Q4 Does the project design and construction features incorporate measures to manage flood risk, both in the immediate term and as risk of flooding changes as a consequence of climate change?
Q5 Will the project include emergency management plans which make provision for continued successful operation in the event of floods?

4. What next?

1. See the section "Further reading" in "Help and glossary" at the end of this report which lists a selection of resources that provide further information on a changing climate.
2. Click here for the latest news and information relating to floods and climate change.

I have acknowledged the risks highlighted in this section.

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05
HIGH RISK

LANDSLIDE

ACCLIMATISE COMMENTARY

• Our data suggest that the project is located in a region which is at risk from precipitation induced landslide events. A high exposure in Aware means that based on slope, lithology, geology, soil moisture, vegetation cover, precipitation and seismic conditions the area is classed as 'medium' to 'very high' risk from landslides. This is based on post-processed data from UNEP/ GRID-Europe.
• Landslide risk is locally influenced by other factors, for example local slope and vegetation conditions, long term precipitation trends and human actions, such as excavation of slopes, deforestation, mining etc. If landslides are identified as a potential problem for the project, it is recommended that a more localised and in-depth assessment is carried out. This information can then be used to inform the design process if necessary.
• Up to date information on landslide risk worldwide is available online, for example UNEP / UNISDR's Global Risk Data Platform.

1. What does this mean for the design and construction of my project?

• If landslides are identified as a potential problem for the project, it is recommended that:
- More localized information is collected on past landslides and highly susceptible areas
- Information is collected on local land use and building regulations, such as landslide zonation ordinances
- The project siting, design and construction features ensure that the structures are stable and will not increase landslide risk

2. What the science says could happen in the future and what does this mean for the design of my project?

• Climate change is projected to influence landslide risk in regions where the frequency and intensity of precipitation events is projected to increase.
• Existing engineering designs may not take into consideration the impact of climate change on the risk of landslides. Previously affected areas may suffer from more frequent and severe events. See "Critical thresholds" in the "Help & glossary" section for further details on how a changing climate can impact on critical thresholds and design standards.

3. As a starting point you may wish to consider the following questions:

Q1 Would the expected performance and maintenance of the project be impaired by landslides?
Q2 Will assets or operations associated with the project be in elevated areas or close to slopes?
Q3 Is there a history of landslides in the local area where the project is proposed?
Q4 Are there any plans to integrate climate change factors into a landslide risk assessment for the project?
Q5 Does the project design and construction features incorporate measures to

reduce landslide risk, both in the immediate term and as risk of landslides changes as a consequence of climate change?
Q6 Will the project include local early warning measures?

4. What next?

• See the section "Further reading" in "Help and glossary" at the end of this report which lists a selection of resources that provide further information on a changing climate.
• Click here for the latest news and information relating to landslides and climate change.

I have acknowledged the risks highlighted in this section.

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06
MEDIUM RISK

TEMPERATURE INCREASE

ACCLIMATISE COMMENTARY

1. What does this mean for the design of my project?

• The project is considered to have medium sensitivity to increased temperature and there is a potential for an increase in incidences where current design standards will not be sufficient. See "Critical thresholds" in the "Help and glossary" section for further details on how a changing climate can impact on critical thresholds and design standards.

• The design, operational and maintenance standards should be reviewed - take into consideration current impacts of high temperatures as well as potential future changes.

2. How could current high temperatures affect the project even without future climate change?

• Heatwaves put stress on buildings and other infrastructure, including roads and other transport links. In cities, the 'urban heat island' can increase the risk of heat related deaths.
• Warm weather can raise surface water temperatures of reservoirs used for industrial cooling. In addition, this could impact local eco-systems, improving the growing conditions for algae and potentially harmful micro-organisms in water courses.
• Heatwaves can have an impact on agricultural productivity and growing seasons.
• High temperatures can have implications for energy security. Peak energy demand due to demand for cooling can exceed incremental increases on base load in addition to the risk of line outages and blackouts.
• Human health can be affected by warmer periods. For example, urban air quality and disease transmission (e.g. malaria and dengue fever) can be impacted by higher air temperatures.
• Wildfire risk is elevated during prolonged warm periods that dry fuels, promoting easier ignition and faster spread.
• Permafrost and glacial melt regimes as impacted by warm periods.
• If our data suggests that there are existing hazards associated with high temperatures in the region, they will be highlighted elsewhere in the report. This may include existing wildfire risks as well as areas potentially impacted by permafrost and glacial melt.

3. What does the science say could happen by the 2050s?

• Climate model projections do not agree that annual average temperature increase will reach 2ÊšC in the project location.
• If you want to know more about projected changes in the project location across a range of GCMs and RCPs please refer to USGS's CMIP5 Global Climate Change Viewer for detailed maps.

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07
MEDIUM RISK

PRECIPITATION INCREASE

ACCLIMATISE COMMENTARY

1. What does this mean for the design of my project?

• The project is considered to have medium sensitivity to increased precipitation and there is a potential for an increase in incidences where current design standards will not be sufficient. See "Critical thresholds" in the "Help and glossary" section for further details on how a changing climate can impact on critical thresholds and design standards.

• The design, operational and maintenance standards should be reviewed - take into consideration current impacts of heavy precipitation events as well as potential future changes.

2. How could current heavy precipitation affect the project even without future climate change?

• Seasonal runoff may lead to erosion and siltation of water courses, lakes and reservoirs.
• Flooding and precipitation induced landslide events.
• In colder regions, seasonal snow falls could lead to overloading structures and avalanche risk.
• If our data suggests that there are existing hazards associated with heavy precipitation in the region, they will be highlighted elsewhere in the report. This may include existing flood and landslide risks.

3. What does the science say could happen by the 2050s?

• Climate model projections do not agree that annual average precipitation will increase in the project location which could indicate a relatively high degree of uncertainty (see the section "Model agreement and uncertainty" in "Help and glossary" at the end of this report). On the other hand, this could also mean precipitation patterns are not expected to change or may even decrease (see elsewhere in the report for more details of projections related to precipitation decrease).
• If you want to know more about projected changes in the project location across a range of GCMs and RCPs please refer to USGS's CMIP5 Global Climate Change Viewer for detailed maps.

4. What next?

1. See the section "Further reading" in "Help and glossary" at the end of this report which lists a selection of resources that provide further information on a changing climate.
2. Click here for the latest news and information relating to water and climate change.

I have acknowledged the risks highlighted in this section.

08
MEDIUM RISK

WIND SPEED INCREASE

ACCLIMATISE COMMENTARY

1. What does this mean for the design of my project?

• The project is considered to have medium sensitivity to wind and there is a potential for an increase in incidences where current design standards will not be sufficient. See "Critical thresholds" in the "Help and glossary" section for further details on how a changing climate can impact on critical thresholds and design standards.

• The design, operational and maintenance standards should be reviewed - take into consideration current impacts of increasing wind speed as well as potential future changes.

2. How could stronger winds affect the project even without future climate change?

• The design and operation of certain infrastructure (e.g. wind turbines) is determined by the prevailing climatic wind conditions.
• Given the energy in the wind is the cube of wind speed, a small change in the wind climate can have substantial consequences for the wind energy available.
• Similarly, small changes could have dramatic consequences for wind related hazards e.g. wind storm damage.
• If our data suggests that there is an existing risk of tropical storms in the region, it will be highlighted elsewhere in the report.

3. What does the science say could happen in the future?

• Climate change could alter the geographic distribution and/or the seasonal variability of wind resource.
• Climate model projections remain uncertain and it appears unlikely that mean wind speeds will change by more than the current inter-annual variability.
• Changes in extreme wind speeds associated with extra-tropical and tropical storm are similarly uncertain. However, there have been studies that suggest fewer but more intense events. Stronger storms bring with them an increases risk of coastal storm surge, coastal erosion, wind damage and flooding.
• Given future uncertainty it is advisable to carefully assess past wind speed in the region, bearing in mind that it could change in the future. The UNEP Solar and Wind Energy Resource Assessment SWERA provides a useful global overview of wind information.

4. What next?

1. See the section "Further reading" in "Help and glossary" at the end of this report which lists a selection of resources that provide further information on a changing climate.
2. Click here for the latest news and information relating to wind and climate change.

☐ I have acknowledged the risks highlighted in this section.

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09
MEDIUM RISK

SOLAR RADIATION CHANGE

ACCLIMATISE COMMENTARY

1. What does this mean for the design of my project?

• The project is considered to have medium sensitivity to changes in solar radiation and there is a potential for incidences where current design standards will not be sufficient or met. See "Critical thresholds" in the "Help and glossary" section for further details on how a changing climate can impact on critical thresholds and design standards.

• The design, operational and maintenance standards should be reviewed - take into consideration current impacts of fluctuating solar radiation as well as potential future changes.

2. How could changes in solar radiation affect the project even without future climate change?

Medium (yearly, seasonal) or longer term variations in solar radiation at the Earth's surface can affect for example:
• Agricultural yields. In some cases, the rate of photosynthesis (and therefore growing season) is proportional to the surface solar radiation.
• Solar power potential.
• The rate of degeneration of building materials.

3. What does the science say could happen in the future?

• Future projections of regional 'dimming' or 'brightening' are difficult to predict. This is due largely to the uncertainty surrounding cloud formation under climate change conditions.
• Given future uncertainty it is advisable to carefully assess past variations in solar radiation in the region, bearing in mind that it could change in the future. The UNEP Solar and Wind Energy Resource Assessment SWERA provides a useful global overview of solar radiation information.

4. What next?

1. See the section "Further reading" in "Help and glossary" at the end of this report which lists a selection of resources that provide further information on a changing climate.
2. Click here for the latest news and information relating to water and climate change.

☐ I have acknowledged the risks highlighted in this section.

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10
LOW RISK

PRECIPITATION DECREASE

ACCLIMATISE COMMENTARY

1. What does this mean for the design of my project?

• Even though the project is considered to have low sensitivity to decreased precipitation, it is worth considering existing precipitation related hazards in the region where the project is planned.

2. How could reduced precipitation affect the project even without future climate change?

• Decreased seasonal runoff may exacerbate pressures on water availability, accessibility and quality.
• Variability of river runoff may be affected such that extremely low runoff events (i.e. drought) may occur much more frequently.
• Pollutants from industry that would be adequately diluted could now could become more concentrated.
• Increased risk of drought conditions could lead to accelerated land degradation, expanding desertification and more dust storms.
• If our data suggests that there are existing hazards associated with decreased precipitation in the region, they will be highlighted elsewhere in the report. This may include water availability and wildfire.

3. What does the science say could happen by the 2050s?

• Climate model projections do not agree that annual average precipitation will decrease in the project location which could indicate a relatively high degree of uncertainty (see the section "Model agreement and uncertainty" in "Help and glossary" at the end of this report). On the other hand, this could also mean precipitation patterns are not expected to change or may even increase (see elsewhere in the report for more details of projections related to precipitation increase).
• If you want to know more about projected changes in the project location across a range of GCMs and RCPs please refer to USGS's CMIP5 Global Climate Change Viewer for detailed maps.

4. What next?

1. See the section "Further reading" in "Help and glossary" at the end of this report which lists a selection of resources that provide further information on a changing climate.
2. Click here for the latest news and information relating to water and climate change.

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The sections above will provide details on all high and medium climate hazard risks from Aware™ where these are suggested by the climate sensitivities of the project and / or the underlying data. Selected Low risks may also be detailed. Local conditions, however, can be highly variable, so if you have any concerns related to risks not detailed in this report, it is recommended that you investigate these further using more site-specific information or through discussions with the project designers.

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12 Project Geological Hazard Risk Ratings

Below you will find the overall geological hazard risk level for the project together with a radar chart presenting the level of risk associated with each individual geological risk topic analysed in Aware™. Projects with a final "High risk" rating are always recommended for further more detailed geological risk analyses.

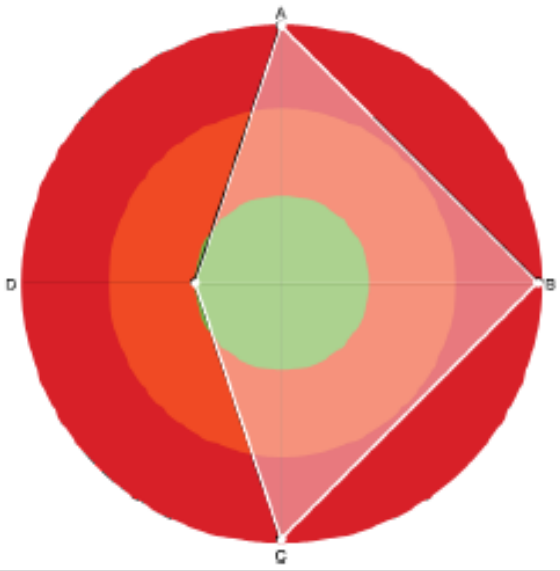
The radar chart provides an overview of which individual risks are most significant. This should be used in conjunction with the final rating to determine whether the project as a whole, or its individual components, should be assessed in further detail. The red band (outer circle) suggests a higher level of risk in relation to a risk topic. The green band (inner circle) suggests a lower level of risk in relation to a risk topic.

In the remaining sections of this report more detailed commentary is provided. Information is given on existing geological conditions and associated hazards. A number of questions are provided to help stimulate a conversation with project designers in order to determine how they would manage geological risks at the design stage. Links are provided to recent case studies, relevant data portals and other technical resources for further research.

Final project geological hazard risk ratings

High Risk

Breakdown of geological hazard risk topic ratings



- A) Earthquake
- B) Seismic landslide
- C) Tsunami
- D) Volcano

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13

HIGH RISK

EARTHQUAKE

ACCLIMATISE COMMENTARY

• Our data suggest that the project is located in a region where Peak Ground Acceleration (PGA) of >31 cm/s may be expected from a 250yr return period event, potentially leading to moderate to heavy damage. This is based on post-processed data from International Centre for Numerical Methods in Engineering (CIMNE) and INGENIAR Ltda (GAR15).

• Earthquake risk is dependent on several factors including the characteristics of the hazard, exposure of assets and population to the hazard, and vulnerabilities:
- Distance away from the epicentre
- Depth of the earthquake
- Local geology
- Duration of the shaking
- Population density
- Land use characteristics
- Design standards, construction quality and materials, and maintenance standards of infrastructure and assets.
• Up to date information on seismic risk worldwide is available online, for example UNEP / UNISDR's Global Risk Data Platform, GEM Foundation's OpenQuake Platform and OpenQuake tools.

1. What does this mean for the design and construction of my project?

• If earthquakes are identified as a potential problem for the project, it is recommended that:
- More localised information is collected earthquake history and any associated secondary hazards (liquefaction, landslide, tsunami, fire)
- Information is collected on local building regulations and how they factor earthquake risk considerations
- Soil investigations are conducted, including assessment of physical characteristics, such as liquefaction potential, stability of slope etc
- The project design and construction features ensures that the structures can adequately resist seismic forces during earthquakes
- Where the proposed infrastructure will act as a critical facility, such as, major dams, power plants etc., a more detailed earthquake risk assessment is undertaken to inform the project siting, design and construction process if necessary.

2. As a starting point you may wish to consider the following questions:

Q1 Would the expected performance of the project be impaired by earthquakes?
Q2 Does the project team have a good understanding of the earthquake risk in the area, including past earthquakes, soil characteristics, local building regulations?
Q3 Is there a plan to assess seismic risk to project design, construction and operation?
Q4 Do the project design standards incorporate features to resist seismic forces?
Q5 If the proposed infrastructure is likely to be used by as an evacuation center and/or is a critical facility, will the project include emergency management plans

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14

HIGH RISK

SEISMIC LANDSLIDE

ACCLIMATISE COMMENTARY

• Our data suggest that the project is located in a region with a recorded level of at least "Low risk" or above from seismically triggered landslide events. This is based on post-processed data from the International Centre for Geohazards /NGI for the Global Assessment Report on Risk Reduction (GAR).
• Landslide risk is locally influenced by other factors, for example local slope and vegetation conditions, long term precipitation trends and human actions, such as excavation of slopes, deforestation, mining etc.
• Up to date information on seismically triggered landslide risk worldwide is available online, for example UNEP / UNISDR's Global Risk Data Platform.

1. What does this mean for the design and construction of my project?

• If seismically triggered landslides are identified as a potential problem for the project, it is recommended that:
- More localised information is collected on past landslides and highly susceptible areas
- Information is collected on local land use and building regulations, such as landslide zonation ordinances
- The project siting, design and construction features ensure that the structures are stable and will not increase landslide risk

2. What the science says could happen in the future and what does this mean for the design and construction of my project?

• Climate change is projected to influence the frequency and intensity of rainfall events and changes in vegetation cover. This may impact on slope stability, exacerbating the risk of seismically triggered landslides. If our data suggests that there are existing landslide hazards associated with heavy precipitation in the region, they will be highlighted elsewhere in the report.
• Existing engineering design and construction may not take into consideration the impact of climate change on exacerbating the risk of seismically triggered landslides. See "Critical thresholds" in the "Help & glossary" section for further details on how a changing climate can impact on critical thresholds and design standards.

3. As a starting point you may wish to consider the following questions:

Q1 Would the expected performance and maintenance of the project be impaired by landslides?
Q2 Will assets or operations associated with the project be in elevated areas or close to slopes?
Q3 Is there a history of landslides and seismic events in the local area where the project is proposed?
Q4 Are there any plans to integrate climate change factors into a landslide risk assessment for where the project is being undertaken?
Q5 Does the project siting considers landslide risk to ensure the landslide hazard will not be increased due to construction of the infrastructure?

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15
HIGH RISK

TSUNAMI

ACCLIMATISE COMMENTARY

• Our data suggest that the project is located in a region where there is a tsunami run up hazard associated with a 500yr return period event. This is based on post-processed data from the International Centre for Numerical Methods in Engineering (CIMNE) and INGENIAR Ltda (GAR15).
• The risk and scale of tsunami flooding is dependent on the size of the tsunami event and local geographical factors including proximity to the coast and local topography.
• Up to date information on tsunami risk worldwide is available online, for example UNEP / UNISDR's Global Risk Data Platform, NCEI's Global Historical Tsunami Database and NOAA's Pacific Tsunami Warning Center.

1. What does this mean for the design and construction of my project?

• If tsunami risk is identified as a potential problem for the project, it is recommended that:
- More localised information is collected on past tsunamis and local site condition
- Information is collected on local land use and building regulations, such as tsunami zonation ordinance
- The project siting, design and construction features ensure tsunami risk reduction considerations. It is recommended that consideration be given to site selection, in particular whether it is feasible for the project to be located on higher ground
- Where the proposed infrastructure will act as a critical facility, such as power supply, communication networks etc., a more detailed tsunami risk assessment is undertaken to inform the project siting, design and construction process

2. What the science says could happen in the future and what does this mean for the design and construction of my project?

• Although rising sea level is unlikely to have a noticeable additional effect on flooding from the larger, more destructive scale of tsunamis, it may exacerbate the extent of flooding that may be expected from smaller scale events.
• Existing engineering design and construction may not take into consideration the impact of climate change on otherwise manageable flood risk from small scale tsunamis. See "Critical thresholds" in the "Help & glossary" section for further details on how a changing climate can impact on critical thresholds and design standards.

3. As a starting point you may wish to consider the following questions:

Q1 Would the expected performance and maintenance of the project be impaired by tsunami related flooding?
Q2 Does the project team have a good understanding of the tsunami risk in the area, including past tsunamis, local site conditions, local land use and building regulations?
Q3 If the proposed infrastructure will act as a critical facility, is there a plan to assess tsunami risk to project location, design, construction and operation?

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16 The sections above will provide details on all high geological hazard risks from Aware™ where these are suggested by the underlying data. Local conditions, however, can be highly variable, so if you have any concerns related to risks not detailed in this report, it is recommended that you investigate these further using more site-specific information or through discussions with the project.