

Environmental and Social Impact Assessment Report (ESIA) – Likupang

Project No.: 51209-002
February 2018

INO: Eastern Indonesia Renewable Energy Project (Phase 2)

Prepared by ERM for PT Infrastruktur Terbarukan Lestari

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Environmental and Social Health Impact Assessment (ESHIA); Solar Project, Likupang Timur, Sulawesi Utara, Indonesia


Prepared for:
PT Infrastruktur Terbarukan Lestari

February 2018
www.erm.com

Environmental and Social Health Impact Assessment (ESHIA) : Solar Project, Likupang Timur, Sulawesi Utara, Indonesia

PT. ERM Indonesia
 Wisma Aldiron Dirgantara
 2nd floor, Suite 238-239
 Jl. Gatot Subroto Kav. 72
 Jakarta 12870
 Indonesia

Telephone +62 21 7918 1904
 Facsimile +62 21 7918 1905
 Website: www.erm.com

Client PT Infrastruktur Terbarukan Lestari		Project No. 0370573 Redaya Energi ESHIA			
PT Redaya Energi has commissioned PT ERM Indonesia (ERM) to undertake an Environmental, Social and Health Impact Assessment (ESHIA) of the Project to compliment the AMDAL. The purpose of the ESHIA is to provide an environmental and social assessment of the Project against the International Finance Corporation (IFC) Performance Standards and associated World Bank Group Environmental, Health and Safety (EHS) Guidelines.		Date 5 February 2018			
		Approved by 			
		Samantha McCrea Partner ERM Indonesia			
1	DRAFT ESHIA	TS,AH,AS, AG,AF	TS, AH	SM	07/03/17
2	Revised on comments received	AH,AS	RA	MCL	28/04/17
3	Revised on comments received	AH	AH	SM	03/05/17
4	FINAL ISSUE	RA	RA	SM	16/01/18
5	FINAL ISSUE Rev2	RA	RA	SM	05/02/18
Revision	Description	By	Checked	Approved	Date
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EXECUTIVE SUMMARY

The Likupang 15 MWac Solar Farm (the Project) involves the development of a solar power generation facility at Wineru Village, Likupang Timur District, Minahasa Utara Regency, Sulawesi Utara Province, Indonesia. The Project is being developed and will be operated by PT. Infrastruktur Terbarukan Lestari (ITL) who is a Special Purpose Vehicle (SPV) established by PT Redaya Energi Indonesia (REI) to construct and operate the Likupang solar farm. The Project location is shown in **Figure ES1**.

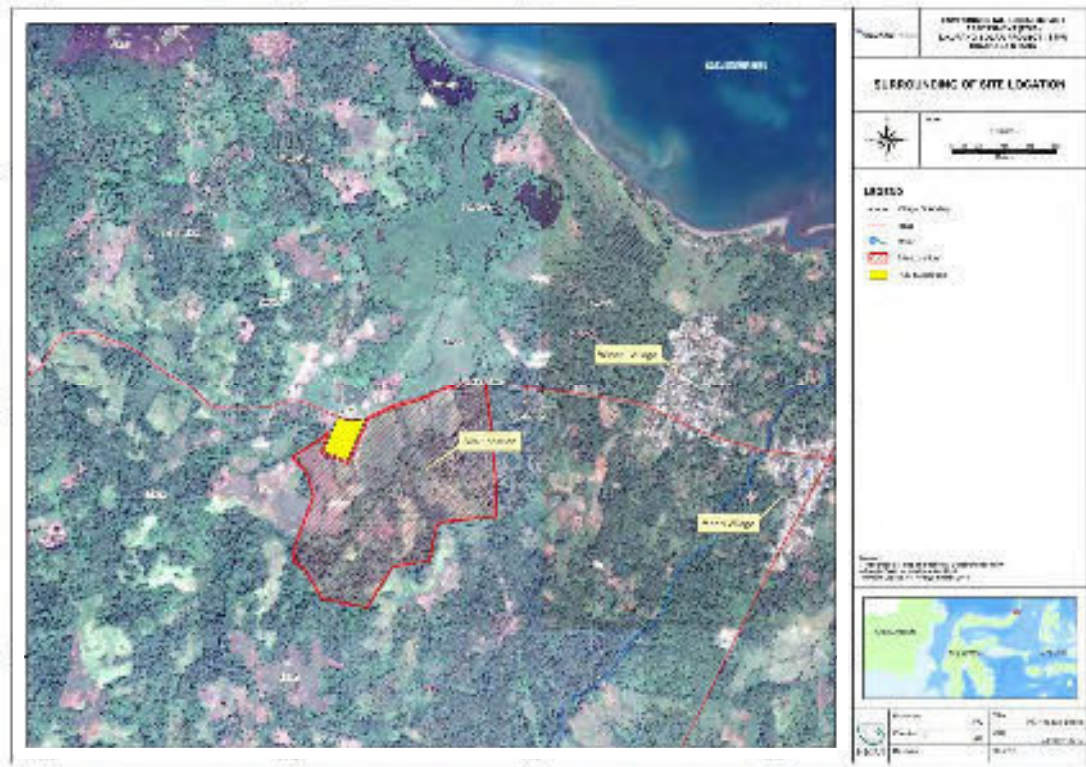


Figure ES1 Site Location and Surrounds

The proposed Project will be developed on 29.4 hectares (Ha) of agricultural land with the nearest village being at Wineru Village, approximately 650 m from the site. The land is being purchased from a single land holder. The land for the Project was secured in June 2017. Project construction is expected to require approximately twelve months with the solar farm commencing operations in March 2019.

The construction consists of developing a Photovoltaic Field (PV Field), inverter station, transformer/high voltage control station, main station, underground transmission line, also access roads. The PV field will occupy a total area of 29.4 Ha and will require the installation of approximately 64,620 solar PV modules. A total of 24 inverters will be installed onsite, with four inverters to be combined at each PV box, making a total of six locations. Two types of transformer will be used to change voltage into 20 kV and 70 kV. An underground transmission line (200m in length) will be constructed from the 70kV plant substation within the Project site, to the Likupang Substation which is connected to the Perusahaan Listrik Negara (PLN) supply grid.

An Environmental Impact Assessment (EIA) or *Analisis Mengenai Dampak Lingkungan* (AMDAL) has been conducted on behalf of the Project proponent; the document has been assessed through the AMDAL Commission of Sulawesi Utara. The Environmental Permit (decree letter number 06/ILK/DPM-PTSP/II/2017) was issued by the Government of Minahasa Utara Regency on 22 February 2017.

PT Redaya Energi has commissioned PT ERM Indonesia (ERM) to undertake an Environmental, Social and Health Impact Assessment (ESHIA) of the Project to compliment the AMDAL. The purpose of the ESHIA is to provide an environmental and social assessment of the Project against the IFC Performance Standards (PS), ADB safeguard policy statement (SPS) and associated World Bank (WB) Group's Environmental, Health and Safety (EHS) Guidelines. The driver for this is ITL's commitment (through its association with the Equis Fund Group) to develop and operate international best practice projects in Indonesia.

The scope of this ESHIA considers the pre-construction (i.e. site selection and land acquisition), construction and operational phase of the Project.

This document provides an overview of the Project as well as a summary of key impacts and suggested management measures to align the Project with the Applicable Standards. Certain aspects of the Project have already been assessed in AMDAL and as such have been excluded from the impact assessment process for this ESHIA (to avoid duplication of efforts and confusion). However the mitigation measures set out in the AMDAL have been included in this report to ensure once set of instructions for the contractors and ITL who will be implementing the mitigation measures.

Surveys and sampling programs were conducted by specialists from the AMDAL and ESHIA teams to obtain additional information on social baseline characteristics. The entire environmental baseline was obtained from the approved AMDAL document and available secondary data sources. This ESHIA report presents the findings of these studies in the context of an updated project description and an assessment of potential impacts from the proposed project activities.

On the whole, environmental and social impacts were assessed as being of **Moderate - Minor** negative significance and thus can be readily managed through the implementation of appropriate management plans and appropriate follow up actions. A number of positive social benefits were also identified during the assessment process. A summary of environmental and social impacts deemed to be moderate or positive are shown in *Table ES1*. Following implementation of appropriate mitigation or management measures residual impacts were considered to be *Minor*.

The ESHIA concludes with the Environmental and Social Management Framework (ESMF) which details the environmental and social management commitments required for implementation as part of the Project's regulatory approval, as well as those identified as being necessary as part of the ESHIA process. An example is provided in *Table ES1*.

The ESMF represents the management and mitigation measures necessary to appropriately manage the identified environmental and social impacts of the Project.

Table ES 1 - Summary of Environmental and Impacts and Mitigation

Receptor	Potential Impact	Impact Evaluation	Mitigation	Residual Impact
Surface Water Bodies	Result of increased runoff and sedimentation (construction and operations)	Moderate	<ul style="list-style-type: none"> • Soil and erosion management • Solid stabilisation • Runoff and storm water drainage system • Sediment control devices 	Minor
Terrestrial Biodiversity	Impacts to Conservation Significant Fauna Species	Moderate	<ul style="list-style-type: none"> • Development of clearing procedures • Establishment and implementation of a clearance protocol to manage encounters with fauna 	Moderate-Minor
Land Acquisition	Economic benefits to the land owner from the Project land acquisition	Positive	<ul style="list-style-type: none"> • Proper documentation • Assess the socio-economic profile of the land owner • Develop a fair market value compensation rate 	n/a
Local Economy and Livelihood	Impact to Local Economy from Employment and Business Opportunities (Construction and Operation)	Positive	<ul style="list-style-type: none"> • To have a clear stipulation of using local labour in the EPC contract • Inform Project's requirement related to employment and business opportunities • Implement community development program 	n/a
Community safety	Impact to Community Safety as a Result of Mobilization during (Construction)	Moderate	<ul style="list-style-type: none"> • Consultation with the communities through corporation with local police • Enforce speed limit regulations and signage, also emergency response procedure • The proposed grievance mechanism should be accessible 	Negligible

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UNITS AND ABBREVIATIONS

AC	: Alternating Current
AMDAL	: Analisis Mengenai Dampak Lingkungan Hidup/Environmental Impact Assessment In Indonesia
ANDAL	: Analisis Dampak Lingkungan/Environmental Impact Analysis (Report issued from the AMDAL process)
BKPM	: Badan Koordinasi Penanaman Modal/Capital Investment Coordinating Board
BLHD	: Badan Lingkungan Hidup Daerah/Environmental Agency
BOD	: Biochemical Oxygen Demand
BPS	: Badan Pusat Statistik/Statistic Of Indonesia
COD	: Chemical Oxygen Demand
CSR	: Corporate Social Responsibility
dB	: Decibels
DC	: Direct Current
EHS	: Environmental, Health and Safety
EN	: Endangered
EPC	: Engineering, Procurement and Construction
EPFIs	: Equator Principle Financial Institutions
EPs	: Equator Principles
ERM	: PT ERM Indonesia
ESG	: Environmental, Social and Corporate Governance
ESHIA	: Environmental, Social And Health Impact Assessment
ESMP	: An Environmental And Social Management Plan
GDP	: Gross Domestic Product
GHG	: Greenhouse Gas Emissions
GIIP	: Good International Industry Practice

GoI	: Government of Indonesia
GR	: Government Regulation Republic Of Indonesia
GW	: Gigawatt
HV	: High Voltage
IA	: Impact Assessment
IEC	: International Electrotechnical Commission
IFC	: International Finance Corporation
IFC PS	: International Finance Corporation Performance Standards
IPP	: Independent Power Producer
IUCN	: The International Union For Conservation Of Nature
KA Andal	: Kerangka Acuan Analisis Dampak Lingkungan/Terms of Reference of Impact Assessment
Kg	: Kilogram
Km	: Kilometre
kV	: Kilo Volt
kVA	: Kilo Volt-Ampere
kWh	: Kilowatt hour
kWp	: Kilowatt peak
L	: Litre
LP	: Low Pressure
m	: Meter
MEMR	: Ministry of Energy and Mineral Resources
MoE	: Ministry of Environment
MV	: Medium Voltage
MVA	: Mega Volt-Ampere
MW	: Megawatt
NO ₂	: Nitrogen Dioxide

OECD	: The Organisation For Economic Co-Operation And Development
O&M	: Operations and Maintenance
PERMEN LH	: Peraturan Menteri Lingkungan Hidup/Regulation Of Ministry Of Environment
PIC	: Person In Charge
PLN	: PT Perusahaan Listrik Negara
PM	: Particulate Matter
RKL/RPL	: Rencana Pengelolaan Lingkungan Hidup/Rencana Pemantauan Lingkungan Hidup/Environmental Management Plan And Environmental Monitoring Plan In Indonesia (Part of AMDAL Document)
SCADA	: Supervisory Control and Data Acquisition
SO _x	: Sulphur Oxide
TOR	: Terms of Reference
TSP	: Total Solid Particulate
TSS	: Total Suspended Solid
TWh	: Terawatt-hour
WHO	: World Health Organisation

1 INTRODUCTION

The Likupang 15 MWac Solar Farm (the Project) involves the development of a solar power generation facility at Wineru Village, Likupang Timur District, Minahasa Utara Regency, Sulawesi Utara Province, Indonesia. The Project is being developed and will be operated by PT. Infrastruktur Terbarukan Lestari (ITL) who is a Special Purpose Vehicle (SPV) established by PT Redaya Energi Indonesia (REI) to construct and operate the Likupang solar farm. The solar Project is being developed to include the following:

- Installation of a solar panel field covering an area of 29.4 Hectares (Ha);
- Installation of an inverter station and infield infrastructure;
- Operation of onsite control and instrumentation facilities; and
- Installation of a 20kV underground transmission line to the Likupang 70kV substation.

A Project location map and overview of the area is provided in **Figure 1-1**.

The Project is yet to commence construction and has completed the Indonesian regulatory environmental approval process, locally referred to as AMDAL (*Analisis Mengenai Dampak Lingkungan Hidup*). The Environmental Permit (decree letter number 06/ILK/DPM-PTSP/II/2017) was issued by the Government of Minahasa Utara Regency on 22 February 2017.

The site is currently used for dry land agriculture, such as coconut and corn production and is not known to contain any important environmental sensitivity. ITL secured all the land needed for the Project in June 2017.

In addition to the AMDAL process, this Environmental, Social and Health Impact Assessment (ESHIA) has been developed to provide an understanding of the Project's alignment with the IFC Performance Standards and Guidelines (**Section 3.3**). Alignment with these expectations is a requirement of REI's parent company, Equis Energy and may also be necessary to support future financing of the Project. Along with identifying impacts and the assessment of predicted environmental and social impacts, the ESHIA recommends appropriate management and mitigation measures to manage the potential impacts and align the Project with the Applicable Standards.

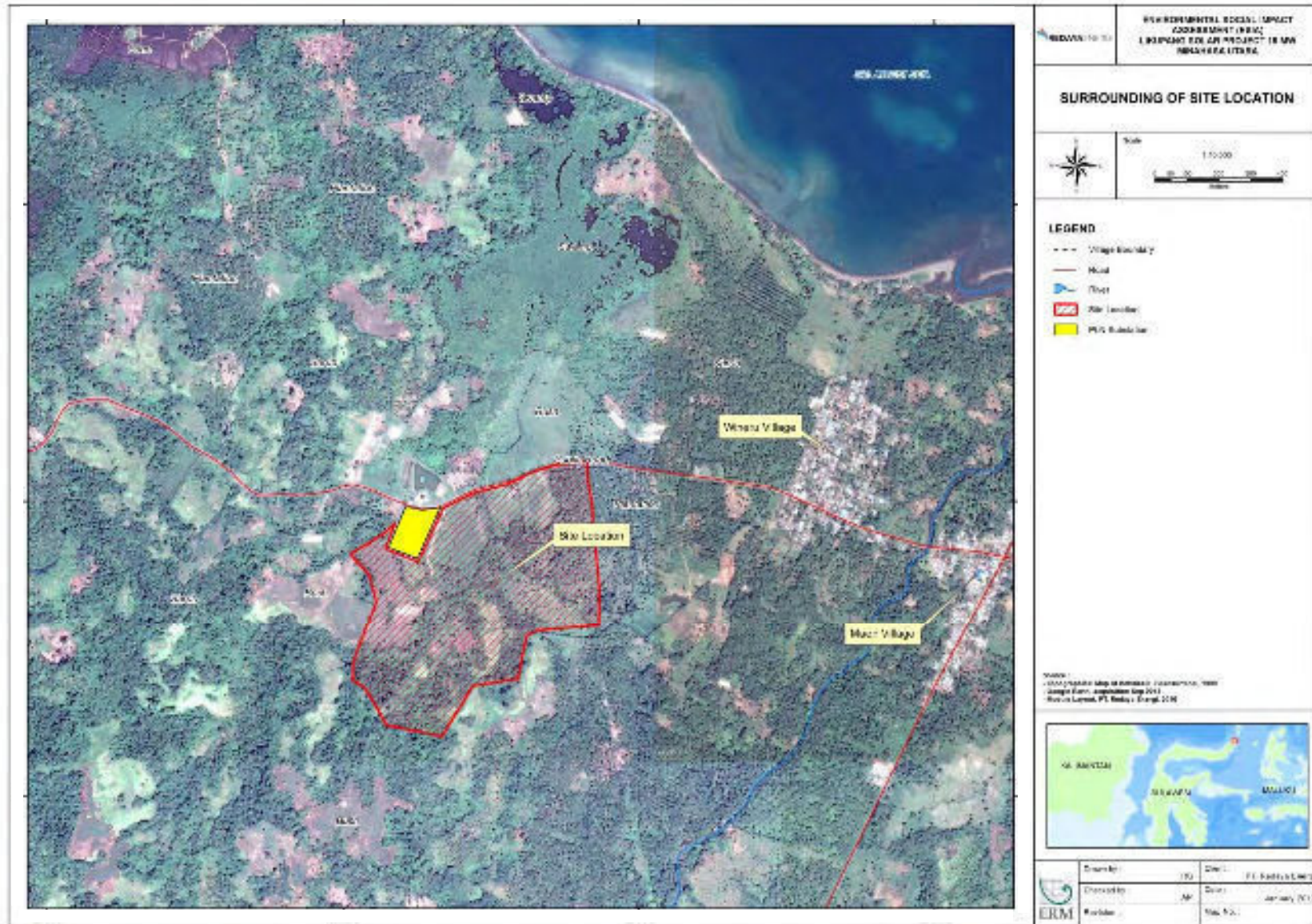


Figure 1-1 Site Location and Surrounds

1.1 PROJECT LOCATION

Administratively, the location of the Project is in Wineru Village of Likupang Timur District, Minahasa Utara Regency, Sulawesi Utara Province, Indonesia. The nearest residence to the Project site is located opposite the site where the former land owner of the Project site resides. However, Wineru village is the closest residential area and is located approximately 650 m to the east of the Project site. The village of Maen is located approximately 800 m east of the Project site (**Figure 1-1**).

The Project location is within an area that is used for dry land agriculture and aside from local villages and agricultural activities, there is generally limited development surrounding the site. The 15 MWac Likupang diesel power station and substation are located on the northern boundary of the site. The closest protected area to the site is the Gunung Duasudara Nature Reserve which is located approximately ten kilometres south east. The coastline is located approximately of 1 km north east from the Project site, with several houses occurring along Surabaya Beach.

1.2 PROJECT PROPONENT

ITL has been established to construct and operate the Project on behalf of REI; a dedicated renewable energy developer and asset manager established with the aim of constructing and owning 1,000MW of wind, solar and hydropower assets in Indonesia. The company was formed in 2015 with a vision to be Indonesia's leading developer and owner of wind and solar energy. REI is based in Jakarta and has established regional offices in its project areas.

REI is a platform company of Equis Energy, the largest renewable energy independent power producer in the Asia-Pacific region, with over 180 assets comprising 11,135MW in operation, construction, and development across Australia, Japan, India, Indonesia, the Philippines, Taiwan, and Thailand.

1.3 PROJECT OBJECTIVES AND JUSTIFICATION

ITL aims to develop and operate a 15 MWac solar power project in order to supply power the North Sulawesi grid. Recent policy decisions by the Government of Indonesia (GoI) have encouraged significant power investment in Indonesia, including for renewable energy. As a result this Project has in part been developed to take advantage of these opportunities, while also supplying clean renewable power to the local market.

In 2015, the GoI announced its plan to add 35,000MW to the nation's new power generation capacity. PLN as Indonesia's state owned power utility, published a Power Supply Business Plan or *Rencana Usaha Penyediaan Tenaga Listrik* (RUPTL) to guide implementation of this plan, and expects that around 25,000MW of the targeted 35,000MW will be developed by private investors' under a scheme of Independent Power Producers (IPP's). The remaining 10,000MW capacity is expected to be developed by PLN.

The GoI, with the support of the Ministry of Energy and Mineral Resources (MEMR), has announced that at least 10,500MW from the 35,000MW target shall be generated

from renewable energy including wind and solar power sources. ITL, as an IPP, is aiming to support this program through development of the Likupang Solar Project.

Based on data provided in the Project's feasibility study (June 2016), Indonesia has a total of 760GW of renewable energy resources including 63GW of solar, with 90% of the overall capacity remaining untapped. As the first large scale solar power project in Indonesia, this Project aims to take advantage of this potential.

The current peak load demand in Sulawesi Utara is 387MW, while the installed capacity is 522MW. The peak demand and electricity sales are projected to grow at 11.97% between 2015 and 2024. As such there is a potential future power shortage in the area unless new sources of power are developed.

Diesel accounted for 50% of all power production in Sulawesi Utara in 2014, followed by geothermal (21%), hydropower (16%), and coal (13%). The average cost of generation within this region is estimated to be approximately USD 0.124/kWh (as per Regulation of Minister of Energy and Mineral Resource Number 1404 K/20/MEM/2017). The role of diesel power plants in Sulawesi Utara remains significant, but is a comparatively expensive means of power production. As such renewable energy, such as wind and solar, is becoming more attractive options for PLN in diversifying its power generation mix.

Renewable energy projects, in particular solar projects, have a very low and largely reversible impact on the environment. The technologies support economic growth without causing adverse environmental and social impacts associated with conventional thermal power projects such as reduction in air quality, thermal water discharges and significant water use. Data provided by ITL predicts that the Likupang Solar Farm will bring significant environmental and social benefits which have been assessed to be:

- Producing enough power for approximately 17,980 Indonesian households that are connected to the grid;
- Providing a total of 110 local employment opportunities over the construction and operation of Likupang Solar Farm;
- Saving approximately 29,200,000 litres of water in comparison to a modern coal fire power plant. The cumulative saving of freshwater is estimated around 730 million litres over a 25-year period; and
- Producing 25,000 tonnes less of CO₂ than an equivalent conventional power plant for the cumulative saving of over 625,000 tonnes of CO₂ over a 25-year period.

1.4 PURPOSE AND SCOPE OF THE ESHIA

ITL commissioned PT ERM Indonesia (ERM) to undertake an Environmental, Social and Health Impact Assessment (ESHIA). The purpose of the ESHIA is to provide an environmental, community health and social assessment of the Project against the IFC Performance Standards (PS), ADB Safeguard Policy Statement (SPS) and associated World Bank (WB) Group's Environmental, Health and Safety (EHS) Guidelines. ITL has committed to implementing an international best practice development by

adhering to the eight performance standards and EHS guidelines (where applicable) for the life of the Project. In addition to these standards Equis Energy has also its own internal corporate environment, social and health standards that the Project will adhere to (discussed further in **Section 3.2**). Environmental and social baseline studies are an essential component to the ESHIA process; these have been largely conducted as part of the AMDAL process. The studies commenced in late 2016 and were completed to support the Indonesian Regulatory approval of the project. The Environmental Permit was received in February 2017. Separate to the regulatory AMDAL process, this ESHIA aims to assess the Project's environmental and social impacts against the IFC PS and World Bank Group EHS Guidelines and culminates in a clear set of management and mitigation measures to be implemented by the Project.

1.5 *ESHIA STRUCTURE*

The structure and contents of the ESHIA reflect the following:

- IFC Performance Standard 1 - Social and Environmental Assessment and Management Systems;
- IFC Guidance Note 1 - Social and Environmental Assessment and Management Systems; and
- IFC Guidance Note 1, Annex A - Social and Environmental Impact Assessment (SEIA) Report.

This document is presented in the subsequent manner:

- Chapter 1: Introduction;
- Chapter 2: Project Description
- Chapter 3: Applicable Standards and Regulatory Framework;
- Chapter 4: Analysis of Alternatives;
- Chapter 5: Impact Assessment Methodology;
- Chapter 6: ESHIA Screening and Scoping;
- Chapter 7: Environmental Baseline;
- Chapter 8: Social and Community Health Baseline;
- Chapter 9: Environmental Impact Assessment;
- Chapter 10: Social and Health Impact Assessment; and
- Chapter 11: Environmental and Social Management Planning.
- Annex A: Consultation Record
- Annex B: Applicable Standards
- Annex C: Stakeholder Engagement Plan
- Annex D: Geoelectric Exploration Report
- Annex E: Environmental, Social, Health, and Safety Management System (ESHS-MS).

2 *PROJECT DESCRIPTION*

2.1 *INTRODUCTION*

This chapter provides a detailed description of the Project development assessed within this ESHIA.

The Project will initially have a power generation capacity of 15 MWac and is expected to be operational for a period of 20 years, and potentially longer. Construction is expected to take approximately twelve months and operations are proposed to commence in March 2019. The Power Purchase Agreement (PPA) with PLN was signed on 2nd August 2017.

The Project will require the construction and operation of the following key elements, which are depicted in **Figure 2-1** below:

- Installation of a solar panel field covering an area of 29.4 Ha;
- Installation of a facility and main station;
- Installation of an inverter station and High Voltage (HV) control station;
- Construction of access roads; and
- Installation of 20kV underground grid connection line to the Likupang 70/20kV substation.

It is envisaged that the following additional activities will be required to support the Project's construction and operation:

- Fencing surrounding the site boundary;
- A drainage system to address the site's runoff; and
- An emergency diesel generator.

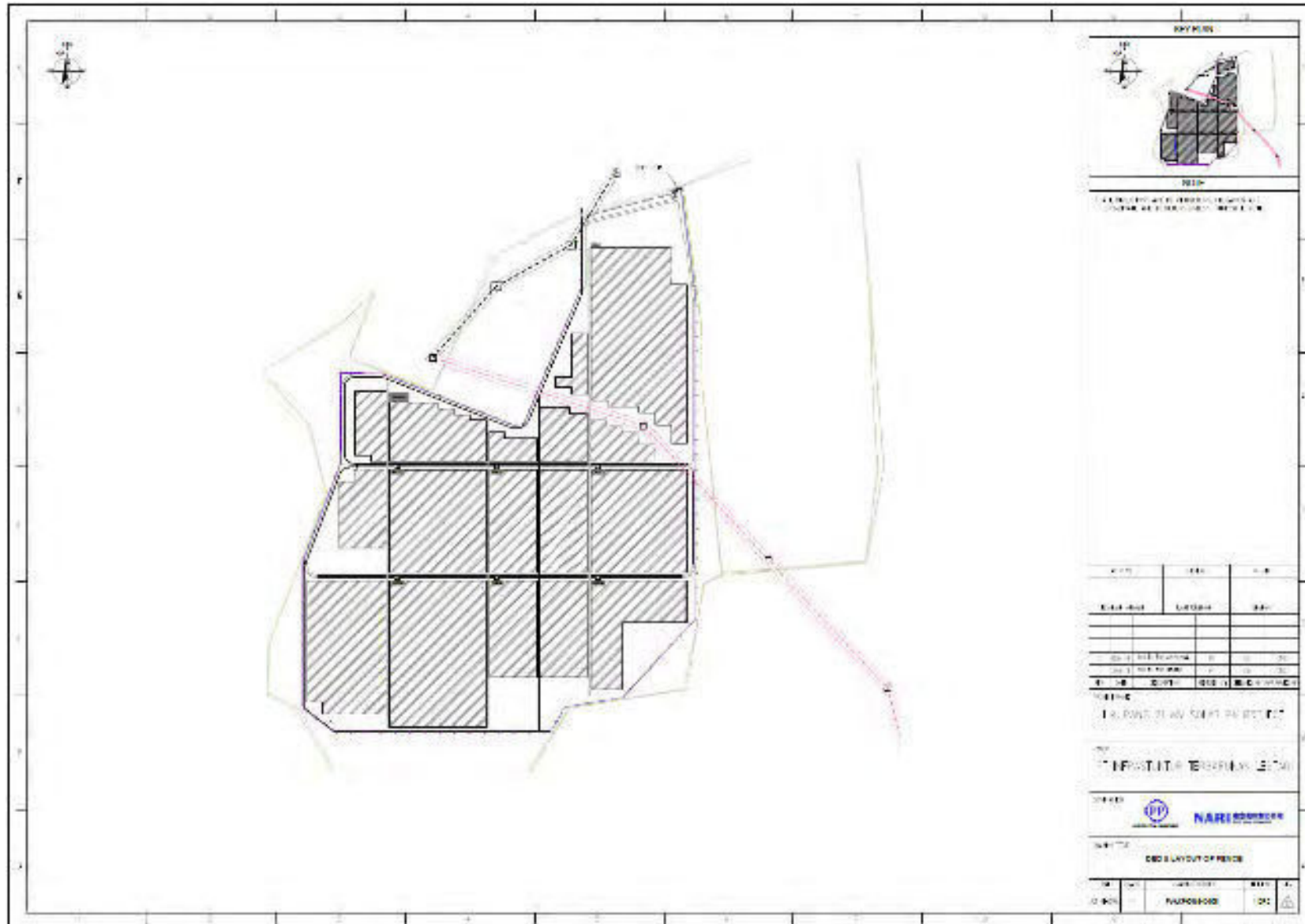


Figure 2-1 Site Layout

2.2 *PROJECT OVERVIEW*

This section provides an overview of the Project, its location and components that form part of the Project Area of Influence. This is broadly defined at the Project site and surrounding areas within a radius of approximately one kilometre.

2.2.1 *Location and Site Setting*

The Project will be developed on a 29.4 Ha area of agricultural land near the village of Wineru in Likupang Timur District. (**Figure 1-1**). The site is located adjacent to the Likupang electricity substation and a diesel power plant operated by PLN. The site itself contains mixed agricultural land and has been historically used for dry land agriculture, containing coconut and corn plantations. The nearest residential area is Wineru Village, approximately 650 m east of the site. The former owner of the Project site still resides opposite the Project site. The site and surrounding areas have been modified to accommodate local dryland agricultural practices and the development of the adjacent Likupang diesel power plant.

The land around the site is generally flat and some natural drainage channels and depressed areas are located nearby which could potentially cause localised flooding during periods of heavy rain.

2.2.2 *Land use and Land Tenure*

The site is located within land zoned as Dry Agricultural Land, which is generally associated with agricultural areas which rely on limited rainfall. As part of the Project's permitting, ITL is required to be granted formal approval by the local Government for conversion of the land to suitable zoning that allows the development of a PV Power Plant, this approval was granted as part of the Project's Location Permit. According to the location permit (No. 02/KPPT/IV/2016), the total granted area for PT ITL to develop the solar power plant in Wineru village is 40 Ha. The current land use map is shown in **Figure 2-2**.

According to the land use map, there is primary mangrove forest located approximately 1.5 km north of the Project site. Based on BirdLife International, this mangrove forest includes 895 ha of Important Bird and Biodiversity Area (IBA) criteria A1 and A2, also located approximately 1.5 km north of project site. A1 (globally threatened species) is defined as a site known or thought to regularly hold significant numbers of globally threatened species of global conservation concern. Whereas A2 (restricted-range species) is defined as a site known or thought to hold a significant component of a group of species whose breeding distributions define an Endemic Bird Area (EBA) or Secondary Area (SA).

According to the AMDAL baseline, a total of 14 bird species were encountered within the proposed project area, three are recognized as protected species under Indonesian regulation (GR 07/1999). However, none of the species are listed as vulnerable, endangered or critically endangered under IUCN redlist; the detailed baseline can be found in **Chapter 7.5.2**.

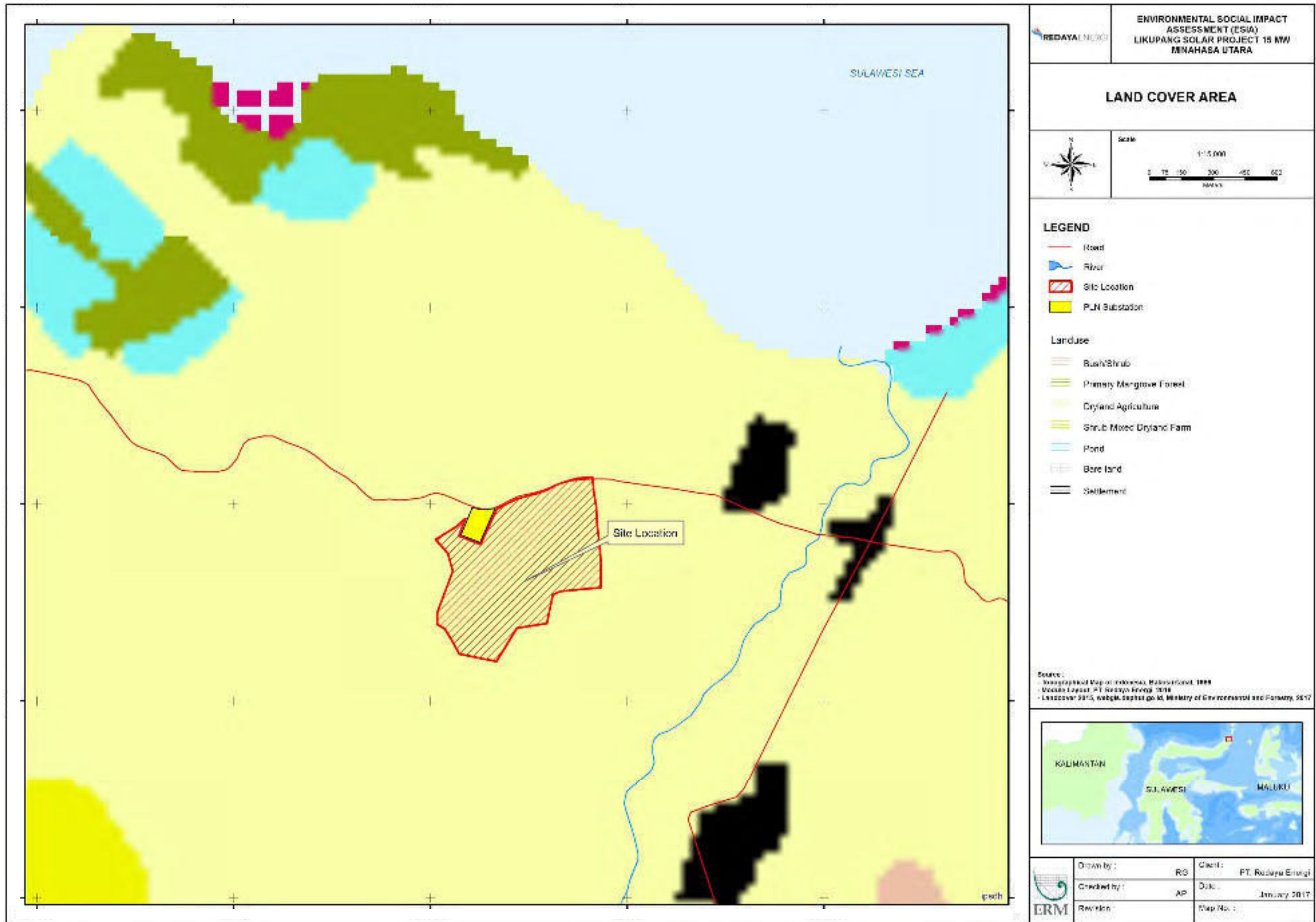


Figure 2-2 Map of Land use

2.2.3 Land Acquisition

The proposed project area is approximately 29.4 hectares (Ha) with the current land use being largely dry agricultural land owned by a single landholder; ITL has completed the acquiring process with the entity in June 2017.

As stated previously the site is used for dry land agriculture hence it is understood that no physical or involuntary displacement occurred as a result of the Project's land acquisition. As such, given the willing buyer willing seller conditions, involuntary resettlement has not taken place.

Under the expectations of IFC PS 5 (Land Acquisition and Involuntary Resettlement), result from land rights acquired through expropriation under the country's legal system and restrictions on access to land or use of other resources, considerations that have been economically displaced to land owners and users. This is discussed in Chapters 8 and 10 of this ESHIA. However within the purview ADB SPS SR2 requirements, the land acquisition results from this project not considering as the triggers of economic displacement.

The details of the land acquisition process related to this project are discussed in **Chapters 8 and 10** of this ESHIA.

2.2.4 Area of Project Disturbance

The solar farm and all associated infrastructure will occupy approximately 29.4 Ha, while the approximate area of the main components is summarized in **Table 2-1**, along with a brief description of each of the main components. **Figure 2-1** depicts the location where the main project components will be constructed.

PT. ITL will construct the solar farm pooling station to the south of the existing PLN substation, on which a 50 m 20Kv cable will be connected to the transformer extension located inside the PLN sub station. As such there is no transmission line associated with the Project. The details of the required land needed for the project are presented in **Table 2-1**.

Table 2-1 *Approximated Area Required*

Project Component	Land Required (Ha)	Description
PV Field	27	Consists of the PV modules and associated mounting structures and cover the vast majority of the project site.
Main station and facilities	1.0	Control room and switching facilities, as well as basic mess facilities.
Inverter station	0.14	The inverter stations will be installed at approximately 6 locations onsite.

Project Component	Land Required (Ha)	Description
High Voltage control station	0.01	One outgoing 20 kV switchgear will be connected to 20kV side of extension transformer bay in PLN substation
Internal roads	1.25	Consists of internal access roads required to manage and operate the Project
Total	29.4	

Source: PT. Infrastruktur Terbarukan Lestari, 2016

2.2.5 Current Project Status and Schedule

Project construction is expected to require approximately twelve months with operations expected to commence in March 2019. **Table 2-2** outlines the schedule.

Table 2-2 Proposed Project Schedule

Activities	Time
PPA signed	2 nd August 2017
Financial Close	15 th March 2018
EPC Contract Signed	13 th November 2017
NTP	15 th March 2018
Commercial Operation	15 th March 2019
Operation	March 2019

2.2.6 Main Project Components

A process flow diagram of the Project indicating main components is provided in

Figure 2-3 below. Each main component is described under the following sub headings.

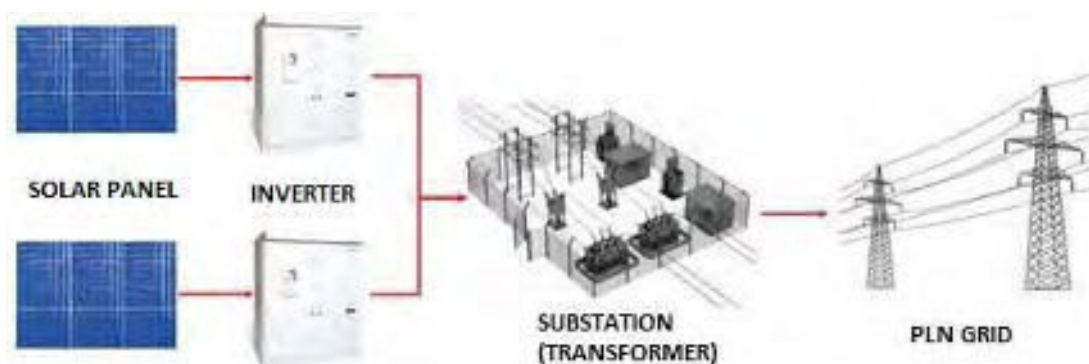


Figure 2-3 Power Generation Process

2.2.6.1 Photovoltaic Field

Photovoltaic (PV) fields generate electricity directly from sunlight through an electronic process which occurs naturally for some type of materials (semi-conductors). Electrons in this material are released by the sunlight and are pushed through the electrical circuit in the form of electricity to the grid. The PV field will occupy a total area of 27 Ha and will require the installation of approximately 64,620 solar PV modules.

This Project will use JAP6 72-325/4BB type PV modules supplied by JA Solar, a leading PV manufacturer based in China. A typical PV module is presented in **Figure 2-4**. Each module consists of 72 cells and is 1,956 mm in length, 991 mm in width and sits at a height of approximately 45 mm. The principal specifications of the PV module are shown in **Table 2-3**.

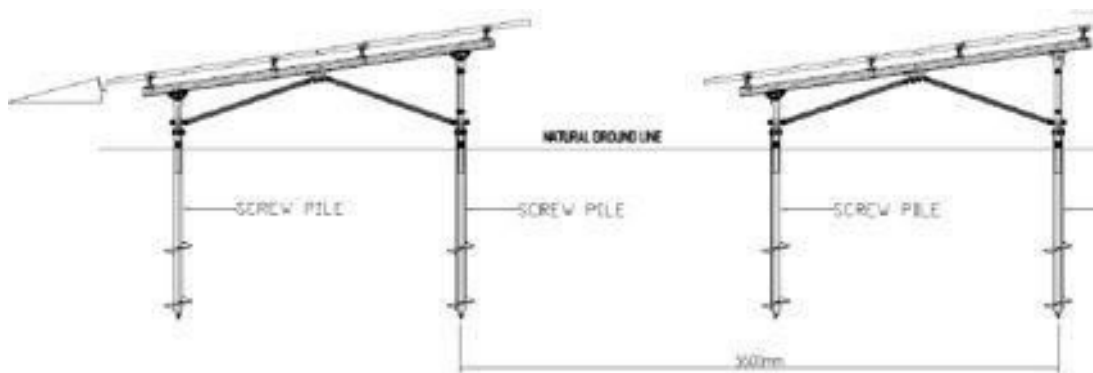


Figure 2-4 Typical PV Module

Table 2-3 PV Module Specifications

Test Criteria	Test Condition
Irradiance	1,000 W/m ²
Air Mass	1.5
Cell Temperature	25°C

Source: JA Solar

Each module is fixed and mounted on a stand cemented to the ground surface and is connected to the inverter station via an array box and cabling. The solar energy generated at the PV module is transferred to the inverter station prior to transmission to the grid. The PV modules would be fixed at an inclination of 6° and will face north. The hydrogeological study states the mounting structure will be 0.8 m above ground and at a spacing of 6.5 m; this is also included in the EPC contract.

The PV modules will be connected together in a series, using MC plugs, which are then connected to an array box. The array box is attached to the PV support structure. Cables are fixed or laid in cable trays mounted onto the PV support structure. From the array box, DC cabling will transition to the underground direct, which is buried

at the end of each PV support structure, and connected to the combiner box in inverter station. **Figure 2-5** illustrates the typical PV Foundation.

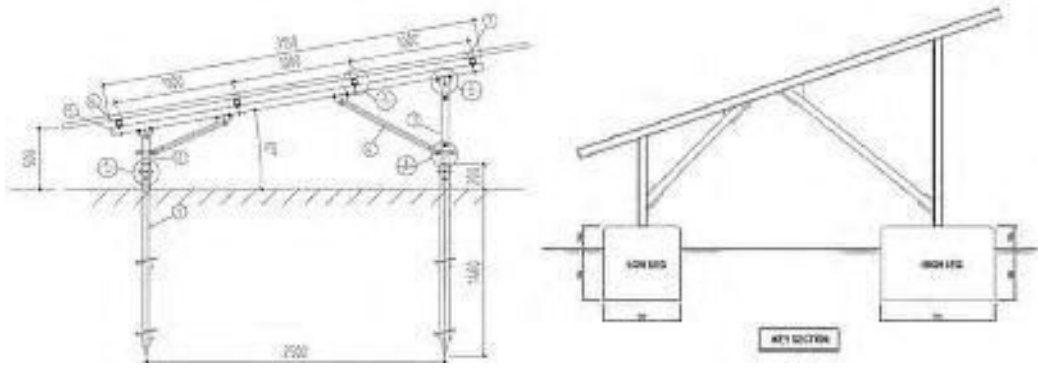


Figure 2-5 Typical PV Foundation

2.2.6.2 Inverter Station

The inverter stations are required to convert Direct Current (DC) power sourced from the solar modules into Alternate Current (AC) power, prior to transfer to the power grid. A total of 24 inverters will be installed onsite, with four inverters to be combined at each PV box, making a total of six locations. The PV box locations are shown in **Figure 2-1** while an image of typical inverter housing is shown in **Figure 2-6**.

Each inverter is connected to a DC combiner box, which combines 868kWp DC of power from five array boxes. The voltage is then stepped up to 20kV, through a 1,360kVA transformer. Two blocks of 2 x 1,360 kVA transformers are connected to a 20 kV MV switchgear.



Figure 2-6 Inverter Building/Housing

2.2.6.3 High Voltage Control Station

As described above, 2 x 1,360kVA Schneider transformers will be established to convert voltage into 20 kV and a high voltage transformer will be established to convert voltage into 70 kV. This will cover an area of 0.01 Ha and is the point from where electricity is exported from the site via an underground transmission line where it will be connected to an existing substation.

2.2.6.4 Main Station

The main station building will consist of a control room, switchgear room, meeting room, pantry and toilets, which is intended to be fully furnished (i.e. table, shelves, control desk, whiteboard and epoxy floor). This is the building from where the safe and efficient operation of the Project will be managed.

2.2.6.5 Underground Transmission Line and Likupang Substation

An underground transmission line (200m length) will be constructed from the 70kV plant substation within the Project site to the existing Likupang Substation. The Likupang substation is currently connected to the PLN supply grid. Additional feeder facilities such as a switching device, control, protection and metering systems will be constructed at the Likupang Substation.

2.2.6.6 Internal Roads and Other Facilities

Internal access roads for construction and operation of the Project will be constructed within the site. A site access road in particular will be required to provide access for heavy vehicles to the Project site from the nearest highway. The plan for site access and public road improvement is described in **Table 2-4**.

Table 2-4 Public Road Improvement and Site Access Road Plan

Road Type	Usage	Pavement Type	Width (m)
Improvement public road	Improve access to project site from the nearest public road to site access road. Used by construction equipment, heavy duty vehicles for easy access to sites.	Compaction/gravel	6.0
Site access road	Provide access to project site from the nearest public road to main road. Used by construction equipment, heavy duty vehicles for easy access to site.	Compaction/gravel	6.0

Internal and perimeter roads will occupy a total area of 12,000 m² (3 m width x 4,000 m length) as described in **Table 2-5**. Fence footing along the perimeter road will also be constructed totalling 100 m². Furthermore a drainage system will be constructed with the dimensions of 1 m in width and 400 m in length.

Table 2-5 Plan for Perimeter Road Construction

Road Type	Usage	Pavement Type	Width (m)
Main road	Provides access from the main entrance to the main building and must be suitable for use by construction workers, personnel, vehicles, maintenance vehicles, semi-trailers	Compaction/gravel with roadway sloped.	5.0

Road Type	Usage	Pavement Type	Width (m)
	transporting 40 foot containers as well as heavy equipment and machinery (such as cranes and transformers).		
Perimeter road	Runs adjacent to the boundary fence within the construction area.	Compaction/gravel sloped.	3.0
Service road	Provides access from the perimeter road to the inverter station and must be suitable for use by construction workers, personnel, vehicles, maintenance vehicles, semi-trailers transporting 40 foot containers as well as heavy equipment machinery (such as cranes and transformers).	Compaction/gravel with roadway sloped.	3.0

If access routes within the site are damaged due to heavy rain and/or flooding, the Engineering, Procurement Contractor (EPC) will restore and facilitate access on the Site by laying down a base of suitable material (such as crushed rock).

In addition to the main processing facilities, the Project also requires supporting facilities such as drainage and fencing as set out in **Table 2-6**.

Table 2-6 Summary of Additional Facilities

Type of Infrastructure	Function
Fencing	The fencing will be erected around the site boundary to protect the site from undesirable disruptions and trespassing.
Drainage system	Drainage system is important to drain of the runoff water during the rainy season and prevent flooding. The drainage system layout and drainage details shown in Figure 2-7 .
Emergency diesel generator	Emergency diesel generator used when the PLN line is out of service. The diesel tank will be located near the generator with a capacity sufficient for 7 days.

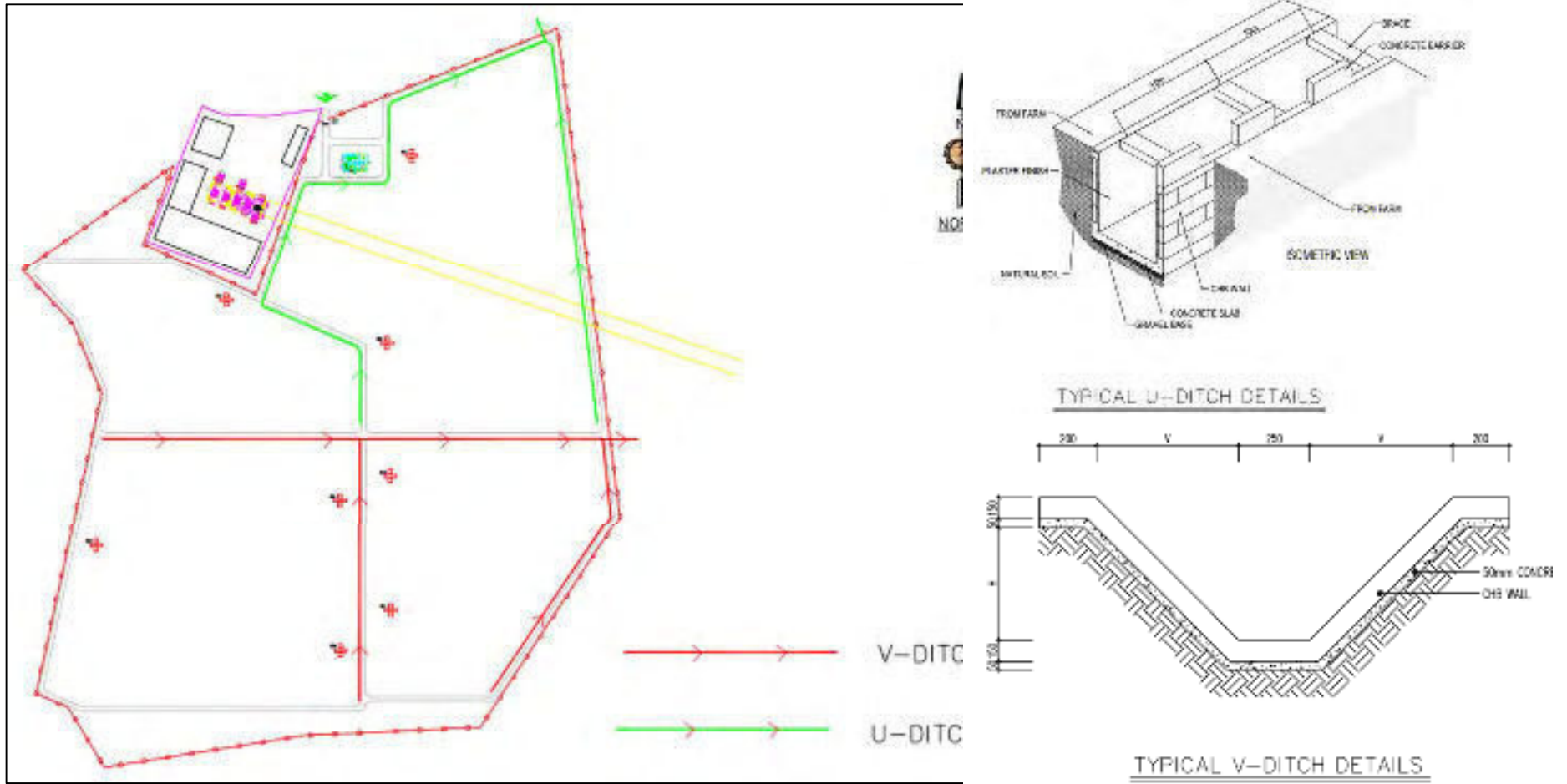


Figure 2-7 Drainage System Layout

2.3 *PRE-CONSTRUCTION*

Pre-construction primarily covers the Project's permitting process. This stage also covers the EPC contracting and finalisation of the Project Feasibility Study and land acquisition.

The Project's AMDAL has been approved and the Environmental Permit obtained in February 2017. The EPC contractor has been selected and the EPC contract signed on 13th November 2017. Construction is to commence in March 2018. More detailed pre-construction activities are described in the subsequent sections.

2.3.1 *Survey*

Survey activities including topography, soil investigation, and hydrology will be undertaken for technical and structural design. The results of the topography survey will then detail the elevation and slope data required for the detailed design. Specifically the survey results will be used for levelling according to ideal slope conditions for the PV modules installation, inverter station, and main station.

2.3.2 *Socialization and Public Consultation*

Socialization and public consultation activities have been undertaken by the Project Proponent and AMDAL consultant team in Wineru Village on 17th October 2016. This activity was intended to provide information on the Project plan, its potential impacts, and mitigation measures to the villagers and also provide a forum for questions. The findings of the consultation included:

- Wineru village, represented by the head of village, village representatives (LPM/BPD) and community leaders accepted the power plant development plan within their administrative area;
- The community expect to be informed and involved during the construction and operational stages; and
- The proponent shall commit to conduct environmental management, monitoring and community development in the surrounding villages and also prioritize local resourcing during the development and operation of the power plant.

The detailed consultation records are presented in **Annex A**.

2.4 *CONSTRUCTION*

2.4.1 *Mobilization of Equipment and Material*

Equipment, machinery and Project infrastructure will be delivered to the site via road. It is expected that most of the equipment will be delivered to site via Bitung Port and transported via truck and heavy vehicles along the main road, a distance of 25 km. The route for mobilization is depicted in **Figure 2-8**; through Bitung Port via Pinokalang, Karandoran, Pinasungkulan, Dua Sudara to the Project Site. Predicted vehicle movements are unknown at this point and will be confirmed as part of the

detailed construction planning by the EPC. Construction will result in increased vehicle movements around the site and along the main transport route to site from Bitung Port; however impacts are generally expected to be confined to the 12 months construction period.

Deliveries to site will include PV panels, PV support structures, mechanical equipment, building materials and concrete for foundation installation. Concrete to support construction will be sourced from a batching plant at Manado, 42 km south west of the site. **Table 2-7**, **Table 2-8**, and **Table 2-9** show material and equipment deliveries for the construction phase. No road upgrades are expected along this main transport route.

Table 2-7 *Material Quantity According to Type of Material*

Rough Estimation of Material Plan			
Item	Description	Quantity	Unit
1	Concrete	2,090	m ³
	- cement	731,500	kg
	- sand	840	m ³
	- aggregate	1,250	m ³
2	Rebar	292,555	kg
3	Sand	1,515	m ³
4	Gravel	3,530	m ³
5	Brick	810	m ²

Source: PT Infrastruktur Terbarukan Lestari, 2016

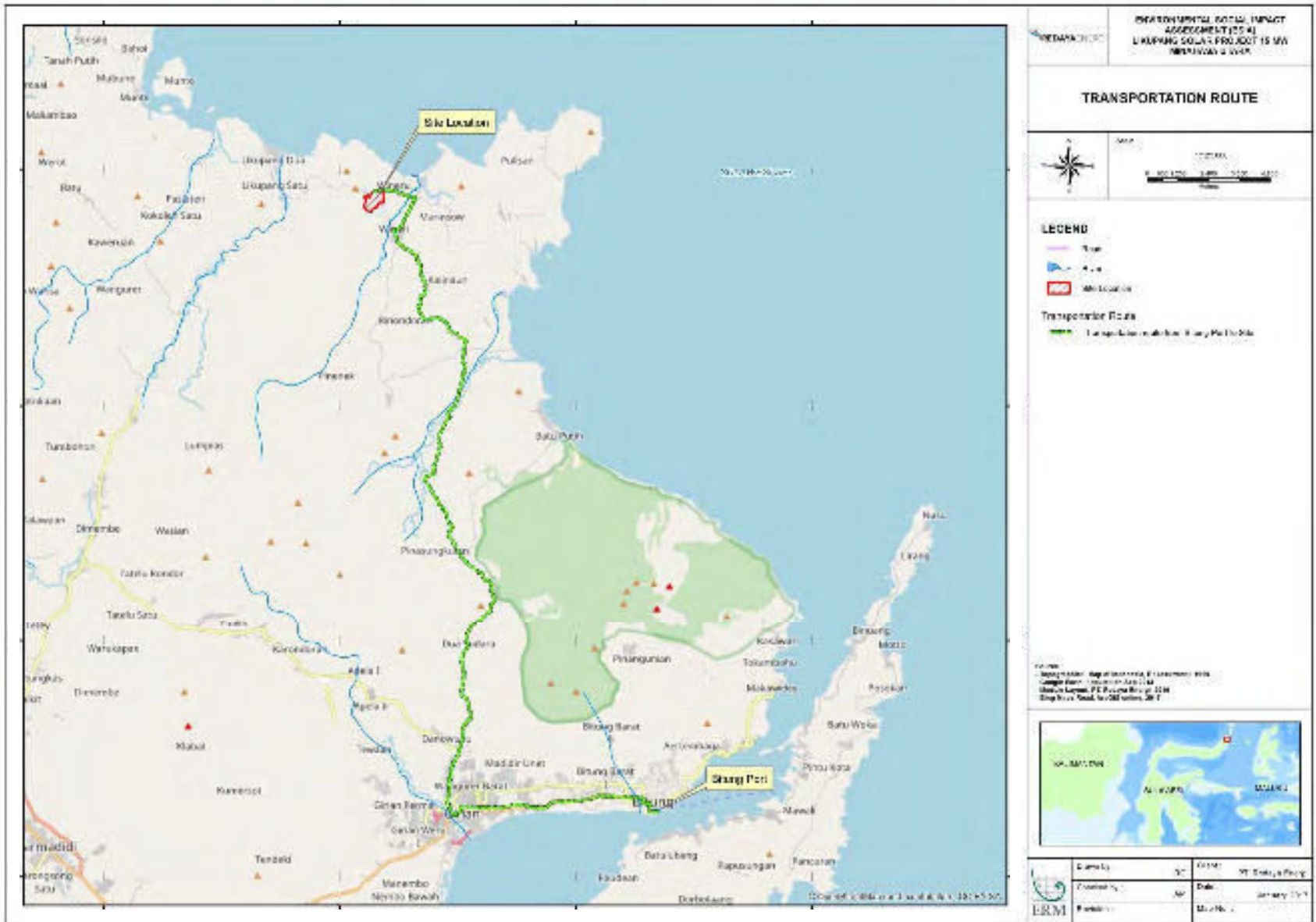


Figure 2-8 Transportation Route

Table 2-8 Material Quantity According to Type of Activities

Material	Quantity	Unit
Civil		
Site clearing and grubbing	278,000	m ²
Grading Cut and Filled	32,500	m ²
Drainage	400	m ²
Road	12,000	m ²
Perimeter fence	4000	m.
Site topography, soil investigation and hydrological	1	lot
Main station	400	m ²
Inverter station	1,000	m ²
Water distribution	1	lot
Sanitary system	1	lot
Security and Main entrance	1	lot
Car parking	1	lot
Landscape	1	lot
Electrical		
PV Modules 325Wp	64,620	pcs
Mounting Structure horizontal single axis tracking	1,640	sets
Step-up transformer 1,360 kVA	12	unit
Inverter 680kW	24	sets
Array box	120	unit
DC & AC cabling	1	lot
SCADA and communication	1	set
AC Equipment	1	lot
DC Equipment	1	lot
HV Equipment	1	lot
Weather sensor	1	lot
Main Transformer 20MVA 70/20kV	1	unit

Source: PT Infrastruktur Terbarukan Lestari, 2016

Table 2-9 Equipment Plan

Equipment	Quantity	Rated(kW)
Electric welder	18	18
Steel bar cutter	5	5.5
Steel bar bending machine	8	4.0
Abrasive wheel cutting machine	8	2.2
Bar straightener	5	9.5
Electric hand drill	20	0.6
Bench drill	5	6.0

Equipment	Quantity	Rated(kW)
Percussion drill	20	1.5
Backhoe	10	100
Grader	5	150
Dump truck	5	100
Boom truck	5	100
Crane	2	30 tons
Forklift	5	37.5

Source: PT Infrastruktur Terbarukan Lestari, 2016

2.4.2 Land Preparation and Civil Works

Land preparation such as earth works, site compaction, site levelling, and excavations will be required to prepare the site for construction. This will be completed by heavy machinery such as excavators and graders and will include clearing and removal of existing vegetation. While rocks/boulders will be removed using an excavator breaker and or pre-drilling machine; no blasting activities are anticipated during the land clearing. The volume of fill material is under the design progress.

Some areas of the site are at a low elevation and may be subject to increased flooding risk, as such site drainage installation and land re-profiling works will be required.

Land preparation is likely to result in additional noise and dust generation as a result of earth works moving and transportation, piling and heavy vehicle movements.

2.4.3 Construction of Facilities and Infrastructure

Construction layout is shown in **Figure 2-1**. This construction includes temporary facilities and permanent facilities.

2.4.3.1 Temporary Facilities

Temporary facilities will be built to support construction phase which are shown in **Table 2-10**.

Table 2-10 Temporary Facilities and Permanent Facilities

Area Type	Construction Area (m ²)	Occupation Area (m ²)	Note
Site office and living area	400	400	Including labour canteen, rest area.
Fabrication/machine area	300	300	The site for steel structure processing, mechanical repairing and assembling and parking the machines.
Warehouse	1,000	700	Storage for modules, mounting structures, mechanical and electrical equipment and steel bar and other items.

Area Type	Construction Area (m ²)	Occupation Area (m ²)	Note
Area for disposal	100	60	Area for the waste and non-conformance construction products
Area for the sensitive/electronic products	400	300	Area for the sensitive products and electronic products
Area for modules	5,000	5,000	PV Module storage
Total	7,200	6,760	Overall area

2.4.4 Photovoltaic Field Installation

Following site preparation, the PV module foundations are established, prior to delivery and installation of each module. A small hole is drilled into the soil surface and concrete foundations and supporting structures are established. An image of a prepared site and module foundation establishment is depicted in **Figure 2-9** below.



Figure 2-9 PV Module Foundation Establishment

Foundations for the onsite buildings and infrastructure will be installed and site facilities established.

2.4.5 Mechanical and Electrical Works

Infrastructure such as cabling and conduits will be established within the PV field to connect the individual modules to the convertor box and central inverter. Connecting conduits will be established below ground, with small trenches dug to install the equipment.

2.4.6 Substation and Transmission Line

An underground line will be constructed from the 70kV plant substation to the extension bay of 70/20kV Likupang Substation. This is a distance of approximately 200 m and a trench will be established in order to install the transmission line. The Likupang Substation is owned by PLN and will comprise the following major equipment:

- Steel structures and associated conductors and insulators;
- Three disconnecting switches and associated earthing switches;
- Local control panel;
- Surge arrester; and
- Earthing system.

2.4.7 *Commissioning*

Commissioning of a solar power project occurs over a number of phases set out below:

- **Pre-Synchronisation/Mechanical Completion Tests** - Requiring verification of compliance of the mounting structures, PV Modules and electrical equipment and wiring.
- **Post-Synchronization Tests** - Once connection to the grid is available, all electrical equipment will be commissioned by the electrical contractor/supplier under the supervision of the EPC. The proper functioning of all equipment will be tested, including the testing of protection devices, the coupling/decoupling of the plant to the grid and the testing of monitoring equipment. Once the grid is synchronized the solar farm will start to produce energy.
- **Pre-Commercial Operation Date (COD) Performance Test** - Upon the completion of the electrical equipment installation, commissioning shall be carried out to ensure that everything is in order and is capable of functioning properly. When any part of the electrical equipment fails their respective tests, checking and maintenance will occur and tested conducted again. Upon passing this test, commercial operations can commence.

2.5 *WORKFORCE REQUIREMENTS*

The total number and qualifications of workers to be recruited will depend on the type of activities involved in the construction activity and the availability of appropriate skills and expertise within the local area, or nationally. While specialist electrical and engineering skills will be required during construction and operation, there are likely to be some non-specialist jobs generated during construction.

Worker recruitment will be handled directly by the EPC hence workforce numbers are yet to be confirmed, but are expected to be approximately 200-300 people during peak construction. Local labour will be prioritized where feasible by the EPC, it is estimated that the project will absorb 60% of workers from the local surrounding project area (i.e. an estimated 110 to 180 people). A breakdown of expected number of man power required during the construction provided in **Table 2-11** and expected number of manpower from local hire provided in **Table 2-12**. The vast majority of roles are unskilled which may present short term employment opportunities for local workers. Local labour from surrounding communities will be prioritized, however the Project may need to source labour from elsewhere for specific roles and depending on the skill levels of the local workforce.

Table 2-11 Estimated Number of Manpower Required During Construction

No	Description	Unit	Quantity
1	Staff	Persons	20
2	Civil	Persons	50
3	Mechanical	Persons	20
4	Electrical	Persons	90
5	Commissioning	Persons	3
6	Security	Persons	5
	Total	Persons	188

Source: PT Infrastruktur Terbarukan Lestari, 2017

Table 2-12 Estimated Number of Manpower During Construction from Local Hire

No	Position	Amount	Qualification
1.	Skilled	50 persons	<ul style="list-style-type: none"> • SMK/SMA or equivalent • Age between 18 to 50 years old • Passes Medical Check Up
2.	Non-Skilled	60 persons	<ul style="list-style-type: none"> • Age between 18 to 50 years old • Passes Medical Check Up

Source: PT Infrastruktur Terbarukan Lestari, 2017

During operations, skilled operators will be required onsite at all times. The total operational workforce requirements are small and are expected to be limited to 20 individuals, however the majority of these are expected to be unskilled positions. A breakdown of operational workforce requirements is provided in **Table 2-13**.

Table 2-13 Estimated Number and Type of Employment Required During Operation

Skill Type	Skill Labour (Number)	Unskilled Labour (Number)
Plant Operator	4/24 hr.	-
Housekeeping	-	1
Security	-	6/24 hr.
Module cleaning	-	5
Grass cutting	-	5
Total	4	16
Total Labour skill and unskilled	20	

Source: PT Infrastruktur Terbarukan Lestari, 2016

2.5.1 Accommodation

To accommodate non-local workers during the construction period, the EPC contractor will rent approximately 2-3 houses located around 2 km from the Site. This will house roughly 70-80 people. All houses will be re-furnished to comply with the applicable standards (IFC/EBRD Guidance on Worker's Accommodation). The operational workforce is expected to be relatively small and will also be housed within the local community.

2.6 WATER USE SUPPLY AND STORAGE

Unlike conventional power plants, PV solar farms do not use water in electricity generation. The main water requirement is for washing of the PV modules and this is expected to occur on a monthly basis; process will be undertaken in sequential stages to clean all the panels over a number of months (**Figure 2-10**).



Figure 2-10 PV Module Washing

Operations, including water for panel cleaning, are expected to require approximately 500m³ per month. This will be sourced from onsite groundwater well.

Water will also be required during construction but will generally be limited to workers' daily needs, dust suppression and to support equipment installation, noting that concrete batching will occur offsite.

The water supply during construction and operation will be extracted from a groundwater well source. According to the hydrogeological study in Geoelectric Exploration issued by Samratulangi University in 2017, the site has significant groundwater resource with available aquifer resources estimated at 70,000 m³. The aquifer is connected to another aquifer on the south side and by a permeable layer with aquifers on the east and west, as such the aquifer has a large recharge area. In addition water around the project site is not directly utilized for agricultural irrigation. Furthermore, the closest community wells from the site were observed at a distance of 1 km from the site as shown on **Figure 2-11** below. Therefore, drilling of

groundwater wells as a source of water for the solar farm site will not affect the discharge of the existing community shallow wells.

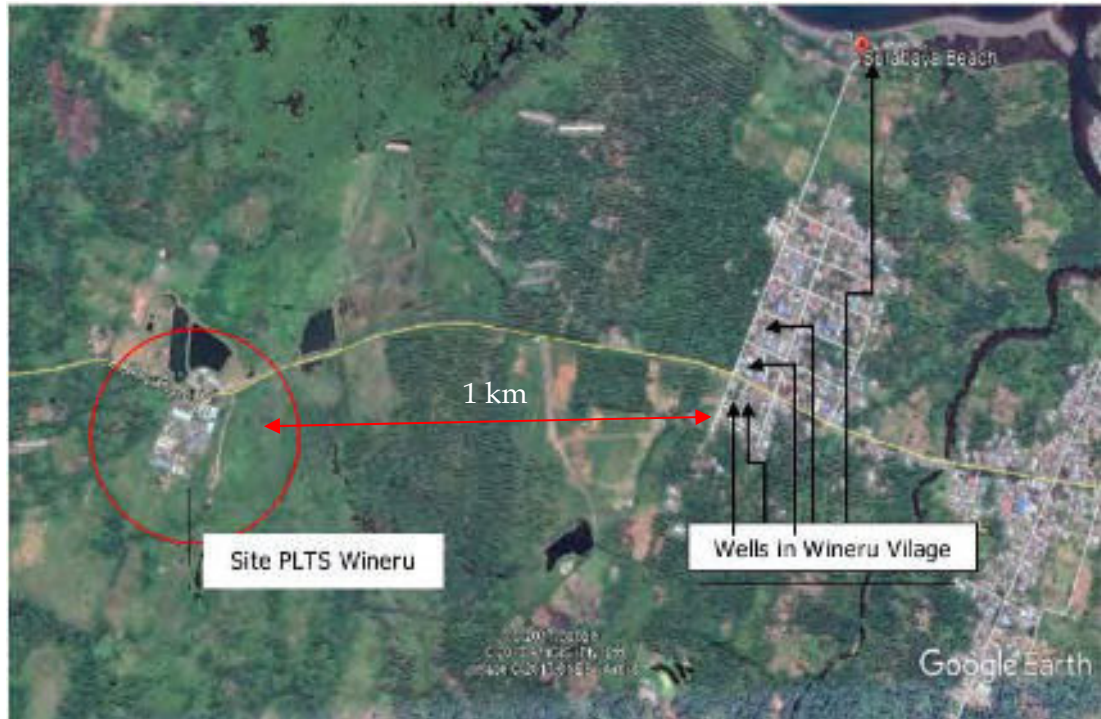


Figure 2-11 Community Wells Surrounding The Site

2.7 ENERGY SUPPLIES

Electricity supply during construction will be from PLN's existing 20kV line which is close to the Project location.

During operations, power will be sourced from the Project (during the daytime) and/or existing PLN 20kV line, with a 50kVA 380V emergency back-up generator retained onsite for use in the event of electricity failure. Maximum necessity of electricity is predicted to be approximately 20,000 kWh per month.

2.8 TRAFFIC AND TRANSPORT

2.8.1 Land Transportation

Traffic associated with the construction of the Project will be generated during the transportation of the following:

- Heavy machinery e.g. bulldozers, graders, trucks, trenchers, excavators and loaders;
- Delivery of Project equipment and support materials; and
- Movement of the workforce to and from the site.

During these activities traffic will utilize existing roads and will travel through a number of local towns and villages to reach the Project site from Bitung Port. The route is a single lane, tarred road from Bitung Port to the site.

Construction is likely to occur for approximately 12 months and while some traffic disturbance is likely to occur, it will not be over an extended period of time.

Transport requirements for operations will be less than that for construction purposes and are unlikely to lead to significant increases in local traffic volumes. It is expected that project contribution to traffic will be 10 trucks per day during construction.

A map showing the main transport routes and proximity to villages is provided in **Figure 2-8**.

2.8.2 Marine Transportation

Bitung Port is a moderate sized regional port servicing parts of Sulawesi Utara. The government is currently preparing Bitung Port to become a trading centre for Asia-Pacific.

The port will be the main delivery point of project equipment such as PV Panels and electrical infrastructure which is not readily available locally. Vessel deliveries to the port would generally be limited to the construction period and are unlikely to result in significant additional vessel loads at the port. From the port, equipment would be loaded directly to trucks and heavy vehicles for delivery to site.

2.9 WASTE AND DISCHARGES

Wastes generated from the construction and operation phase and from various activities and places will be managed to prevent and minimize pollution to the environment. Wastes generated include solid (domestic, construction and hazardous waste) and liquid wastes (domestic wastewater consisting of black water and greywater, construction waste water and contaminated wastewater associated with spills or leaks of hazardous materials).

Other than mentioned above, there will be non-contaminated run-off water from the land area of the solar farm. This will drain directly to nearby creeks and drainage lines, while contaminated runoff would be captured prior to disposal.

2.9.1 Sanitary and Runoff Wastewater Management

A septic sewage treatment system will be installed to dispose of domestic wastewater generated during construction and operation. During operation this is expected to be housed at the Main Station area.

Domestic wastewater will include runoff from the mess, kitchen and bathroom facilities.

Sources of contamination, such as fuel, oil drums and chemicals will be stored in appropriately bunded areas such that runoff can be captured and stored. This contaminated runoff will then be managed and disposed of by a licensed waste contractor.

2.9.2 Solid Waste Management

During construction and operation, solid waste, domestic solid waste, and hazardous waste will be generated. A waste management system will be implemented on-site to ensure compliance with the Indonesian waste and hazardous waste storage and disposal regulations as described in **Table 2-14**.

Domestic solid wastes such as broken glass, iron and steel, wood, cartons and paper, etc. will be sorted daily on-site, and reused and recycled where possible. Any solid waste that cannot be reused or recycled will be collected and transported by a licensed waste operator to a designated licensed landfill site.

Containers (bins) will be provided on-site to store the domestic solid waste. The number of bins provided will be adjusted during the construction phase, as needed. The domestic solid waste will be disposed at a licensed disposal location TPA Airmadidi (a facility belonging to the local government), located 40 km south of the Project location.

Broken PV modules will require storage and disposal during operations (and potentially construction). A PV module typical life is over 20 years. Silicon is the major component of the modules hence they are unlikely to be classified as a hazardous material. However, there is the potential for some heavy metal leaching should disposal to landfill occur however these risks are largely avoided if appropriate recycling of the modules occurs. Disposal options are summarised in **Table 2-14**. Recycling would be of a higher priority but this will depend on the availability of a recycling facility.

Table 2-14 Waste Disposal Options

Component	Disassembly/Removal Method	Disposal Method
Equipment		
PV Modules	Remove panels from mounting frame through mechanical disassembly	Frame is to be sold directly as scrap. The panels are to be recycled at dedicated facilities or disposed as general waste. If panel is cadmium based, relevant hazardous substances/waste regulations would have to be complied with.
Mounting Structure (of PV Modules)	Mechanical disassembly.	Sold as scrap.
Transformers, Switchgear, Inverter, array boxes, meteorological monitor systems and any other electrical equipment	De-energize, isolate and decommission. Any oils (or fuel) within the equipment (such as transformer) shall be pumped out.	Oils are to be handled separately as per hazardous waste disposal procedures. Assess equipment condition and consider reuse (at other projects) or resale. If reuse/resale is not possible, transport off site to be salvage for scrap.
Underground Structures		

Component	Disassembly/Removal Method	Disposal Method
Underground cables	To be excavated and removed. Ground to be reinstated after removal.	Sold as scrap or disposed directly.
Components for cable protection (e.g. casing, concrete culvert, etc)	To be excavated and removed. Ground to be reinstated after removal.	Recycling potential would be dependant on the material. If recycling is not possible, it is to be transported off-site for disposal.
Building foundations (i.e. likely to be shallow foundations, such as pad footing)	To be excavated and removed. Ground to be reinstated after removal.	All debris and demolition related waste will be transported off-site for disposal.
Piles, supporting the mounting structure of the panels	To be mechanically removed by equipment.	Both screw and driven piles would most likely be salvaged for scrap depending on the condition of the pile after removal.
Septic / Treatment Tank		
Treatment unit/tank of the sanitary facility	Sewerage sludge to be pumped out prior to removal of treatment unit. Plant/tank is to be excavated and removed. Ground to be reinstated after removal.	Sludge to be pumped out and disposed in accordance with applicable regulations. The treatment unit is to be considered for reuse, resale, salvage for scrap or directly disposed (in order of preference).
Wiring/cabling (including transmission lines)	Manual removal after associated electrical equipment has been decommissioned.	Sold as scrap or disposed directly.
Above-ground Structures		
Structures (i.e. Inverter Building, Office and Guardhouse)	Demolition. Any slab-on-grade concrete foundations and support pads will be mechanically broken by equipment, such as a jackhammer, and removed from site.	All debris and demolition related waste will be transported off-site for disposal.
Access roads, paved area and surface drainage	Identify portions/components to be retained after consultation with land owner(s). For the remaining areas, the granular base is to be stripped off using equipment such as a wheel loader.	The aggregate from the granular base can be considered for recycling (if such facilities are available). If not recycled, the materials will be transported off-site for disposal.
Transmission Poles	All poles within the site are to be removed. For poles located outside of the project area, the need for removal will be based on prior agreement with PLN. The poles are to be either fully extracted or excavated,	The poles will be transported off-site to be sold as scrap or disposed off directly.

Component	Disassembly/Removal Method	Disposal Method
	ensuring any buried portion is removed.	
Perimeter Fencing	To be dismantled	Recycling potential would be dependent on the material of the fence (e.g. steel or wood). If recycling is not possible, it is to be transported off-site for disposal.

2.9.3 Hazardous Waste

Government Regulation No. 101/2014 regarding hazardous waste management sets provisions for managing hazardous and toxic wastes, starting from waste generation to final disposal. According to this regulation, the company that generates the hazardous waste (e.g. used oil, oily rags and used grease) is required to temporarily store the waste at the company premises and obtain a permit from the relevant authority. The permit is known as a hazardous waste temporary storage permit (locally known as *Izin Tempat Penyimpanan Sementara Limbah B3* abbreviated as *Izin TPS-B3*). The permit stipulates the requirement of TPS-B3 structure, location and also provisions for reporting of hazardous waste management to the local government. Moreover, the hazardous waste must be transported and disposed of by a permitted waste contractor.

The regulation also stipulates that all shipments of hazardous waste shall be equipped with legal documentation to easily track the movement of hazardous waste and to prevent undesirable events. According to this regulation, the hazardous waste contractor shall have a permit from the central government.

Only small volumes of hazardous wastes are expected to be generated by the Project during construction and operation. These would generally be limited to transformer oil and wastes from the battery control system.

The Project will implement a construction and hazardous waste management framework to ensure that the Project's regulatory provisions are met. These are consistent with the expectations of the IFC PS and EHS Guidelines. This would include a full inventory of likely hazardous wastes, volumes generated and disposal and management actions.

2.10 AIR EMISSIONS

Air emissions during construction are predominantly generated by the mobilisation of equipment and materials during construction activities. The air emissions generated during construction activities will come from heavy and light equipment, earthworks activities, and vehicles movement for mobilisation of material and power generator.

Meanwhile, air emissions during operation activities are generated by the mobilisation of the workforce, supplies and power generation.

Aside from general vehicle movements, the Project will not be emitting air emissions during operations.

2.11 GREENHOUSE GAS EMISSIONS

Further to above, Greenhouse Gas (GHG) emissions will largely be limited to the twelve months construction period. As discussed in **Chapter 2**, a solar power project delivers significant GHG emission savings when compared to conventional fossil fuel power generation.

2.12 LIGHTING AND VISUAL AMENITY

The Project will generate electricity during the day. Night time operations will introduce some general security and safety lighting however would not be a significant light source within the local area. Visually, the Project is within a low lying area and elevated structures would be limited to single story buildings and low lying electricity infrastructure, such as the PV modules. The Project is unlikely to be visible to the villages located around the Project area. An example of a typical solar field layout is shown at **Figure 2-12**. Glaring has been associated with some solar farms in other countries however modern PV modules are now coated with anti-reflective substance which significantly reduces this issue.



Figure 2-12 Typical PV Layout

2.13 NOISE AND VIBRATION

During construction the main sources of noise and vibration will be generated from earthmoving works and construction of foundations. However on the whole, solar farms are generally not associated with noise generation during operations and this will be the case with this Project.

2.14 *UNPLANNED EVENTS*

Solar farms are not typically associated with significant emergency risks however there is the potential for unplanned events to occur during the construction and operation of the Project; this includes:

- Environmental incidents such as hydrocarbon or chemical spills;
- Vehicle accidents;
- Natural disasters such as flooding and fire/explosion; and
- Medical emergencies such as injury, illness, or fatalities.

An Emergency Response Plan (ERP) will be developed as part of HSE Management System in order to manage unplanned events.

2.15 *HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT SYSTEM*

The implementation of a ESHS Management System during construction is a core expectation of IFC PS 1 and is also required under Indonesian Regulations.

An Environment, Social, Health, and Safety Management System (ESHMS) for the Project has been developed and can be found in **Annex E**.

Further guidance and the framework ESMP is provided in **Chapter 11** of this ESHIA.

3 **APPLICABLE STANDARDS AND REGULATORY FRAMEWORK**

3.1 **INTRODUCTION**

There are two levels of regulatory provisions applicable to the Project. The first is the Indonesian assessment and approvals process which must be followed to achieve regulator environmental approval. Secondly, as ITL seeks to adhere to meeting international standards, the 2012 IFC Performance Standards 1-8 (IFC PS) and the World Bank Group EHS Guidelines are also applicable. The primary means of integrating the IFC PS and EHS expectations into the construction and operational phase of the Project is through the preparation of this ESHIA. ITL, as a subsidiary of Equis Energy, is also committed to meeting Equis Energy's own corporate Environment and Social Governance (ESG) requirements. Equis is also a signatory of the United Nations Principles of Responsible Investment (UN PRI) and implements an ESG framework which largely aligns with the IFC PS and EHS Guidelines.

The Project has obtained regulatory environmental approval via the AMDAL process, however in applying international standards to the Project there are additional international standards and expectations which the Project will be required to fulfil throughout the construction and operational scope. While some synergies exist between AMDAL and ESHIA, there are also some key differences which have necessitated the preparation of this ESHIA.

The AMDAL and ESHIA processes and their relevance to the Project are described in detail below.

3.2 **INDONESIAN REGULATORY FRAMEWORK**

3.2.1 ***Project AMDAL Process Overview***

In Indonesia, the Environmental Management and Protection Law No. 32 of 2009 is the main environmental law covering important environmental issues, including: environmental standards, AMDAL, environmental permitting, and environmental audits. AMDAL itself consists of the Environmental Impact Analysis Terms of Reference (known as *Kerangka Acuan Analisis Dampak Lingkungan* or KA-ANDAL), Environmental Impact Analysis (known as *Analisis Dampak Lingkungan* or ANDAL) and Environmental Management/ Monitoring Effort (known as *Rencana Pengelolaan Lingkungan/Rencana Pemantauan Lingkungan* or RKL/RPL),

Indonesia's environmental law requires a project proponent to undertake an AMDAL where it is considered that the project has the potential to result in potential significant environmental or social impacts.

Various legislation and guidelines have been issued to specify the activities that require a full AMDAL process as defined in the Minister of Environment Decree No. 05 Year 2012. Specifically in relation to this Project, Regulation No. 05/2012 states that

the construction of power plants with up to 10 MW capacity is required to obtain AMDAL.

The AMDAL process comprises an integrated and comprehensive assessment of major and significant impacts of a project or activity, taking into account ecological, socio-economic-cultural, and public health aspects. It aims to evaluate the environmental feasibility of a project or activity and is used as a provision by the authority for granting the subsequent permits for the project or activity.

The Project's ANDAL and RKL-RPL has been assessed through the AMDAL Commission of Sulawesi Utara and the environmental permit was issued by the Regent of Minahasa Utara Regency in February 2017. Following this approval, the Project is required to submit a report to the BPLH of Minahasa Utara Regency and BLH Sulawesi Utara Province every six months. The report will detail the Project's implementation of environmental and social commitments specified within the RKL-RPL. An overview of the Project ANDAL and RKL-RPL is provided in **Chapter 6**.

3.2.2 *Land Acquisition Process*

The government of Indonesia has issued a number of laws, decrees, decisions and regulations related to land acquisition; most recently Law No. 2 Year 2012 (Law 2/2012). Meanwhile, the implementing regulations include Presidential Regulation No. 148 Year 2015 as an amendment to the Presidential Regulation No. 71 Year 2012. These two regulations are used as the basis to acquire land for development of facilities associated with public interest (such as this Project). This principle is emphasized on the Presidential Regulation No.148 Year 2015 states that land acquisition for public interest (such as this Project) undertaken by private entities can be conducted through direct negotiation with the land owners by trading or other agreed mechanisms.

The Project undertook its land acquisition based on a willing seller and willing buyer principle. The land compensation payment was implemented based on principle of fair negotiation and an agreed price with the land owners, therefore the land acquisition process has fulfilled the requirements of the Presidential Regulation No.148 Year 2015.

3.2.3 *Other Relevant Regulatory Provisions*

In addition to the overarching requirements to manage environmental, social and health impacts through the AMDAL processes, other applicable regulatory provisions include:

- Indonesian Laws;
- Government Regulations;
- Presidential Decrees;
- Ministerial Regulations;
- Regency Regulations (Decrees of Head of Environmental Impact Management Agency and National Land Agency); and

- Local Regulations and Governor Decrees.

The Project Feasibility Study provides a detailed overview of other permits relating to the Project, while the Project ANDAL-RKL/RPL details valid Indonesian Government Legislations and Regulations pertaining to the Project.

3.3 *INTERNATIONAL REGULATORY FRAMEWORK*

3.3.1 *Equator Principles III*

The Equator Principles (EPs) are the environmental and social risk management framework voluntarily adopted by 83 member financial institutions (Equator Principle Financial Institutions, EPFIs). They are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The Equator Principles were developed by private-sector banks and launched in June 2003. They were first revised in July 2006 and new revisions, known as EP III, took effect on June 4, 2013.

The EPs established voluntary principles for addressing environmental and social risks and issues in global project finance transactions, including adherence to IFC PS. The EPs are designed to serve as a benchmark for the financial industry to manage social and environmental risks in project financing. They apply to all new project financings with total project capital costs of USD \$10 million or more, and across all industry sectors. The Principles (EPs 1 to 10) are:

- Principle 1: Review and Categorisation;
- Principle 2: Environmental and Social Assessment;
- Principle 3: Applicable Environmental and Social Standards;
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan;
- Principle 5: Stakeholder Engagement;
- Principle 6: Grievance Mechanism;
- Principle 7: Independent Review;
- Principle 8: Covenants;
- Principle 9: Independent Monitoring and Reporting; and
- Principle 10: Reporting and Transparency.

The EP III can be found on the Equator Principles website¹.

Under Principle 1: Review and Categorisation, the Project is categorized to ensure that the required level of environmental and social due diligence is commensurate with the nature, scale and stage of the Project, and with the level of environmental and social risks and impacts.

¹ http://www.equator-principles.com/resources/equator_principles_III.pdf

The categories are:

- Category A – Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented;
- Category B – Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and
- Category C – Projects with minimal or no adverse environmental and social risks and/or impacts.

Under Principle 2: Environmental and Social Assessment, all Category A and Category B Projects are required to conduct an assessment process to address the relevant environmental and social risks and impacts of the proposed Project. The categorisation of this Project is provided in **Chapter 6.2**.

Principle 3: Applicable Environmental and Social Standards requires that the Project complies with relevant host country laws, regulations and permits that pertain to environmental and social issues. The principle also brings into consideration compliance with the IFC PS on Environmental and Social Sustainability and the World Bank EHS Guidelines.

- Principles 4 through 7 and Principles 9 and 10 apply to all Category A and, as appropriate, Category B Projects.
- Principle 8 applies to all Category A and Category B Projects.

3.3.2 *IFC Performance Standards*

In April 2006, the IFC, a member of the World Bank Group, released a set of Performance Standards (PSs) based upon the original World Bank Group Safeguard Policies, which recognized further the specific issues associated with private sector projects. EP Three: Applicable Social and Environmental Standards requires that projects in non-OECD countries be undertaken in accordance with IFC Performance Standards, General EHS Guidelines and Industry Specific Guidelines. The IFC PSs have been broadened to include issues such as greenhouse gases, human rights, community health, and safety and security. A revised set of Performance Standards came into force on January 1, 2012. The complete list of PS's is provided in **Figure 3-1**.









 <p>PS1 Assessment and Management of Environmental and Social Risks and Impacts</p>	<p>Assess social and environmental impacts (both positive and negative) in their projects area of influence. Identify ways to improve the social and environmental performance of the project or business through the effectiveness of management systems.</p>	 <p>PS2 Labour and Working Conditions</p>	<p>The workforce is the most valuable asset to any business. A poor relationship could undermine worker commitment and retention, and ultimately jeopardize a project. It can also lead to serious reputational risks.</p>
 <p>PS3 Resource Efficiency and Pollution Prevention</p>	<p>All industrial activity and urbanization will often increase levels of pollution to air, water, and land that may threaten the community and the environment. They can also lead to increased, unsustainable use of these resources.</p>	 <p>PS4 Community Health, Safety and Security</p>	<p>Avoiding or minimize impacts on the health and safety of the local community as a result of business or project. Ensure that the safeguarding of personnel and property is carried out and/or minimize risks to the Communities.</p>
 <p>PS5 Land acquisition and Involuntary Resettlement</p>	<p>Without proper planning and management, involuntary resettlement may result in long-term impoverishment for affected communities, as well as environmental damage and social stress in areas to which they have been displaced.</p>	 <p>PS6 Biodiversity Conservation and Sustainable Natural Resource Management</p>	<p>Protecting and conserving biodiversity, and its ability to change and evolve, is fundamental to human survival and sustainable development.</p>
 <p>PS7 Indigenous Peoples</p>	<p>Indigenous communities are often the most vulnerable and marginalized segments of the national population.</p>	 <p>PS8 Cultural Heritage</p>	<p>Defining whether an object or place is considered a Cultural Heritage is often very difficult, the standards aim to guide in the protection of cultural heritage from adverse impacts and supporting their preservation.</p>

Figure 3-1 IFC Performance Standards

The IFC PS can be found on the IFC website².

PS1: Social and Environmental Assessment and Management Systems are the key driver behind the development of this ESHIA and associated management framework. In particular, the following key steps, as outlined within PS1, have been adhered to as basic principles within the ESHIA preparation:

- Project definition;
- Initial screening and risk assessment of the project;
- Scoping of the assessment process based upon the outcomes of the initial screening and risk assessment;
- Stakeholder identification;
- Gathering of social and environmental baseline data;
- Impact identification and analysis;
- Generation of mitigation or management measures; and
- Development of management action plans.
- This ESHIA has been prepared to be consistent with the expectations of the Performance Standards.

In August 2016 the World Bank's Board of Executive Directors approved a new Environmental and Social Framework (ESF) that expands protections for people and the environment. The new framework includes areas such as transparency, non-discrimination, social inclusion, public participation, and accountability. It also

² http://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/IFC+Sustainability/Sustainability+Framework/Sustainability+Framework+-+2012/Performance+Standards+and+Guidance+Notes+2012/

introduces comprehensive labour and working condition protection; an over-arching non-discrimination principle; community health and safety measures that address road safety, emergency response and disaster mitigation; and a responsibility to include stakeholder engagement throughout the project cycle. The framework is expected to come into effect in early 2018.

3.3.3 *World Bank Group Environmental, Health and Safety (EHS) Guidelines*

Supplementing the IFC PS's are the General EHS Guidelines that were released in April 2007. The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP), as defined in IFC's Performance Standard 3: Resource Efficiency and Pollution Prevention.

The EHS Guidelines contain performance levels and guidance measures that are generally considered to be achievable by new facilities using existing technology at a reasonable cost. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets with an appropriate timetable for achieving them. The following World Bank Group EHS Guidelines are applicable to the Project:

- Environmental, Health, and Safety (EHS) Guidelines.

These Guidelines contain standards relating to:

- Environment: air, energy, waste, hazardous materials management, noise and contaminated land;
- Ambient Air Quality;
- Occupational Health & Safety;
- Community Health & Safety; and
- Construction & Decommissioning.

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors.

3.3.4 *ADB Safeguard Policy Statement*

The ADB released its Safeguard Policy Statement (SPS) in June 2009.

The SPS applies to all ADB-financed and/or ADB-administered projects and their components, regardless of the source of financing, including investment projects funded by a loan; and/or a grant; and/or other means, such as equity and/or guarantees. ADB works with borrowers and clients to put into practice the requirements of SPS.

The SPS supersedes ADB's Involuntary Resettlement Policy (1995), Policy on Indigenous Peoples (1998), and Environment Policy (2002). In accordance with the SPS, these previous policies apply to all projects and tranches of multi-tranche financing facility projects that were reviewed by ADB's management before 20 January 2010.

The objectives of ADB's safeguards are to:

- Avoid adverse impacts of projects on the environment and affected people, where possible;
- Minimise, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- Assist borrowers and clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

The ADB SPS framework consists of three operational policies:

- Environment,
- Indigenous Peoples, and
- Involuntary Resettlement.

All three safeguard policies involve a structured process of impact assessment, planning, and mitigation to address the adverse effects of projects throughout the project cycle. It requires the project to:

- Identify and assess impacts in the project cycle;
- Develop and implement plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts; and
- Inform and consult the affected community during project preparation and implementation.

To help borrowers and clients and their projects achieve the desired outcomes, ADB adopts a set of specific safeguard requirements that borrowers and clients are required to meet in addressing environmental and social impacts and risks. These safeguard requirements are as follows:

- Safeguard Requirements 1: Environment (Appendix 1 of SPS);
- Safeguard Requirements 2: Involuntary Resettlement (Appendix 2 of SPS);
- Safeguard Requirements 3: Indigenous Peoples (Appendix 3 of SPS); and
- Safeguard Requirements 4: Special Requirements for Different Finance Modalities (Appendix 4 of SPS).

In addition, ADB does not finance activities on the prohibited investment activities list (Appendix 5 of SPS). Furthermore, ADB does not finance projects that do not comply with its safeguard policy statement, nor does it finance projects that do not comply with the host country's social and environmental laws and regulations, including those laws implementing host country obligations under international law.

Consultation and Disclosure requirements of ADB

ADB's *Safeguard Policy and Public Communications Policy (2011)* sets out disclosure requirements for various ADB activities, including safeguard requirement. Safeguard Requirements 2: Involuntary Resettlement (Appendix 2 of SPS); and Safeguard Requirements 3: Indigenous Peoples (Appendix 3 of SPS) sets out the need for meaningful consultation and information disclosure during project preparation and operation to the affected peoples and other stakeholders. Key requirements include:

- **Information Disclosure:** The borrower/client will submit the following documents to ADB for disclosure on ADB's website as per the applicability with respect to the Project:
 - Draft EIA including draft EMP;
 - Final EIA/IEE;
 - Updated EIA/IEE and corrective action plan;
 - Environmental Monitoring Reports;
 - Resettlement Plan (RP)/Resettlement Framework (RF);
 - Indigenous Peoples Plan (IPP)/Indigenous Peoples Planning Framework (IPPF); and
 - Monitoring reports.
- **Information disclosure to affected people or stakeholders:** The borrower/client will provide relevant environmental information in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.
- **Consultation and Participation:** The borrower/client will carry out meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation.

Timing and Frequency for consultation and participation: Meaningful consultation begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle.

3.3.5 ADB Gender and Development Policy

The Gender and Development Policy (GAD Policy) of ADB is aimed at integrating gender issues in the Bank's macroeconomic sector and project work. The GAD strategy is based on consideration of social justice, gender equity and on substantial evidence that investments in women are vital to achieving economic efficiency and growth. The key elements of the GAD Policy include the following:

- **Gender Sensitivity:** to observe how ADB operations affect women and men and to take into account women's needs and perspective in planning its operations.
- **Gender Analysis:** to assess systematically the impact of a project on men and women, and on the economic and social relationship between them.
- **Gender Planning:** to formulate specific strategies that aim to bring about equal opportunities for men and women.

- **Mainstreaming:** to consider gender issues in all aspects of ADB operations, accompanied by efforts to encourage women's participation in the decision making process in development activities.
- **Agenda Setting:** to assist DMC governments in formulating strategies to reduce gender disparities and in developing plans and targets for women's and girls' education, health, legal rights, employment and income-earning opportunities.

3.3.6 *ADB Social Protection Strategy*

The Social Protection Strategy of 2001 is ADB developed a Social Protection policy which was designed to reduce poverty and vulnerability by promoting efficient labor markets, diminishing people's exposure to risks, and enhancing their capacity to protect themselves against hazards and interruption/loss of income.

- ADB Social protection consists of five major elements:
- Labor markets,
- Social insurance,
- Social assistance,
- Micro and area-based schemes to protect communities and
- Child protection.

3.3.7 *Review of IFC and Indonesian EIA and Regulatory Processes*

Figure 3-2 illustrates a comparison between AMDAL and ESHIA, describing some of the key gaps and synergies between the two processes. In many respects they are closely aligned and in particular the ANDAL document and subsequent RKL/RPL fulfil many of the key expectations of IFC PS 1, namely the need for an integrated environmental and social assessment and management program.

AMDAL	ESHIA	Description
Public Disclosure and Public Consultation	Used to address EP-5/IFC-PS 1	Stakeholder Engagement
General Environmental Data Collection	Used to address EP-2/IFC-PS 1	Environmental and Social Assessment
Biodiversity Data Collection	Used to address EP-2/IFC-PS 1 and IFC-PS 6	Biodiversity Conservation and Sustainable Management of Living
Socio-Culture Data Collection	Used to address EP-2/IFC-PS 1 and IFC-PS 7 and IFC-PS 8	Indigenous People and Cultural Heritage
Project Land Acquisition Plan and Socio-Economy Data Collection	Used to address EP-2/IFC-PS 1 and IFC-PS 5	Land Acquisition and Involuntary Resettlement
Public Health Data Collection	Used to address EP-2/IFC-PS 1 and IFC-PS 4	Community Health, Safety and Security
Air Emission, Noise, Soil Erosion, Pollution Plume and Groundwater Modelings and Green House Gas	Used to address EP-3/IFC-PS 1 and IFC-PS 3, World Bank Group EHS-Guidelines, JBIC Guidelines	Applicable Environmental and Social Standard
Environmental Management and Monitoring Plan (RKL-RPL)	Used to address EP-4, EP-6, EP-7/IFC-PS 1	Environmental and Social Management System (ESMS),
Environmental Permit	EP-8	Covenant

Figure 3-2 AMDAL and ESHIA Process Comparison

Key gaps as summarized in **Figure 3-2** include Stakeholder Engagement and specifically the IFC expectation that this is ongoing throughout the life time of the Project and includes village level consultation. The AMDAL process usually does not apply a suitably comprehensive and robust consultation framework.

The expectations of Performance Standard 3 are also an important difference. It requires that when a host country’s regulations differ from the levels and measures presented in the World Bank Group EHS Guidelines, projects are required to achieve whichever is the more stringent, unless acceptable cost or technical justification can be provided. The Project does not involve significant sources of noise, air quality or noise emissions and as a result these are not likely to be of concern for the Project.

A full comparison of Indonesian regulatory standards against the IFC EHS guidance for specific effluents, emissions and discharges is provided in **Annex B**. The comparison tables show that there are differences between parameters that are regulated under national legislation and the guidance values of stated in the EHS Guidelines. There are also common parameters that have different standards between the two systems or different units of measurement. The more stringent standard is highlighted for clarity.

3.3.8 *Equis Energy Environment and Social Governance Framework*

Equis Energy implements its own Environment and Social Governance (ESG) management system. This sets out the out the company’s methodology and procedures for identifying and managing ESG responsibilities within their business and the portfolio companies in which they invest. These procedures and management expectations are built around the IFC PS and EHS Guidelines.

The ESG system’s intent is to meet the following corporate objectives of Equis:

- To comply with all applicable laws;
- To use their influence to ensure that the portfolio companies in which Equis invests are always operated to enhance the positive effects and minimise the adverse impacts on the environment, employees and stakeholders (including affected communities);
- To ensure the business and the portfolio companies in which they invest make efficient use of natural resources and protect the environment wherever possible;
- To support the reduction of human induced GHG that contribute to climate change;
- To encourage the businesses in which the Equis' capital is invested to work within a defined timeframe towards full compliance with the International Labour Organization ("ILO") Core Conventions and ILO Basic Terms and Conditions of Work and with the United Nations ("UN") Universal Declaration of Human Rights; and
- To recognise and, as appropriate, promote the social aspects of the development outcomes arising from the activities of the portfolio companies in which the Equis' capital is invested.

4 ANALYSIS OF ALTERNATIVES

4.1 NO PROJECT SCENARIO

Chapter 1 describes the Project against the backdrop of an Indonesian Government led program to increase the country's power supply and also improve distribution and power availability in Sulawesi and within Indonesia more broadly. The Project will contribute to achievement of this agenda.

At a national level, Indonesia is heavily reliant on fossil fuel power production; this includes a reliance on diesel fired power stations in the more remote parts of Indonesia, such as in Sulawesi where it supplies 50% of required power. Of PLN's installed capacity Indonesia wide, 72.85% is produced from fossil fuels, of which 28.58% comes from gas-fired plants, 25.28% from diesel, and 18.99% from coal. The electrical energy generated by renewables is 11.96%, while geothermal power accounts for just 1.51%. (PT PLN (Persero), 2012). PLN is actively trying to address the potential future power supply issues, as well as reduce the country's reliance on diesel fuel power generation particularly during peak demand periods.

Indonesia's reliance on fossil fuels is a contributor to the country being the world's third largest emitter of GHGs. In recognition of the challenges associated with air pollution and climate change, Indonesia has committed to a significant reduction of GHG emissions. As part of this commitment the Government has decreed energy goals that include 25% New and Renewable Energy (NRE) of which 15% is renewable energy generation by 2025 (Energy Vision 25/25) and a 30% reduction in GHG emissions by 2020. The targets from the decree were translated into the Energy Law of 2007.

In 2010, renewable energy, still contributed less than 5% of Indonesia's total energy generation. **Figure 4-1** shows the predicted power generation make-up of Indonesia by fuel type to 2022. While this shows a heavy reliance on coal fired power generation, it also shows the targeted reduction in diesel fuel (HSD) power generation. The percentage supply by renewables such as hydropower, solar and geothermal is predicted to remain relatively stable over that period. This illustrates a need to develop additional sources of renewable energy generation if the Government targets are to be realized.

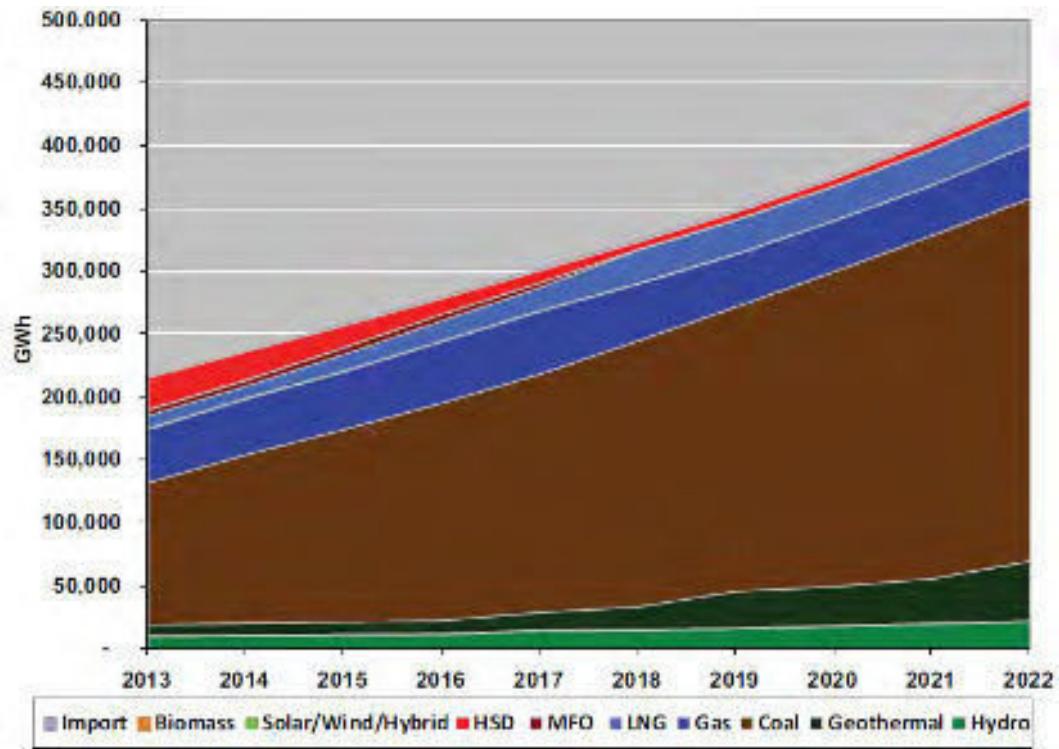


Figure 4-1 Projected Electricity Production by Fuel Type for Indonesia (Source: PT PLN (Persero), 2011-2020)

A review of the Indonesian Electricity Market provided by IITL indicates that between 2015 and 2024, electricity consumption in Indonesia is expected to increase from 201TWh to 464TWh, with an average growth of 8.7% per year, as shown at Figure 4-2.



Figure 4-2 Projected Electricity Consumption

The predicted growth is supported by the following statistics:

- Healthy economic growth – 5.96% average real GDP growth over 2011 – 2014;
- Large population undergoing fast urbanisation – 248 million total population;
- Low electrification ratio of 87.6% – 62 million people have no access to electricity;
- Low electricity consumption – one of the lowest in region with 1.2 MWh/capita.

To meet the growing power demand, an additional generating capacity of 70.4GW is required.

Should the Project not proceed, power supply would continue to be met by other sources, however as noted there is clearly a current and future reliance on fossil fuel generated power, particularly diesel and coal.

As described in **Chapter 1**, data provided by ITL demonstrates that there are significant environmental benefits associated with solar electricity compared to conventional fossil fuel power generation, particularly in relation to GHG emission reductions and water savings.

The environment and social impact assessment chapters and subsequent ESMP framework detail the Project's likely positive and negative impacts and proposed actions to manage these.

4.2 *ALTERNATIVE SITE LOCATIONS*

In September of 2015, representatives from Soleq and Energon (both of which are companies associated with the Equis Energy) undertook a site evaluation tour of four potential solar farm locations in Sulawesi Utara. Three of the sites were considered for a 20MW development while one was considered for a 5MW development. Sulawesi Utara was investigated due to the favourable long term average of annual sunlight, as well as known electricity demand.

The evaluation considered factors such as site topography, existing land use, presence of shade, land area and access to existing power transmission and distribution infrastructure. All sites were generally low lying, free of shade and contained limited environmental or social sensitivities. The Likupang site was selected as a preferred option due to the simplified land acquisition process, availability of nearby electricity infrastructure and minimal significant environmental constraints.

4.3 *ALTERNATIVE TECHNOLOGY*

The primary technological alternative considered related to the selection of alternative solar modules. In practice there is limited environmental variation in the options available. The selection of preferred solar modules was primarily based on proven performance, warranty and ability to meet applicable international standards.

4.4 *ALTERNATIVE METHODS OF POWER GENERATION*

Renewable energy projects and in particular solar projects have a limited and largely reversible impact on the environment. These technologies support economic growth without the social and environmental impacts of most other traditional power plants.

Concerns regarding supply fluctuations due to the intermittent nature of solar power generation can be accommodated by peaking power plants with quick demand response such as diesel, which currently comprise Likupang's generation mix.

Table 4-1 Comparison of Power Generation Methods

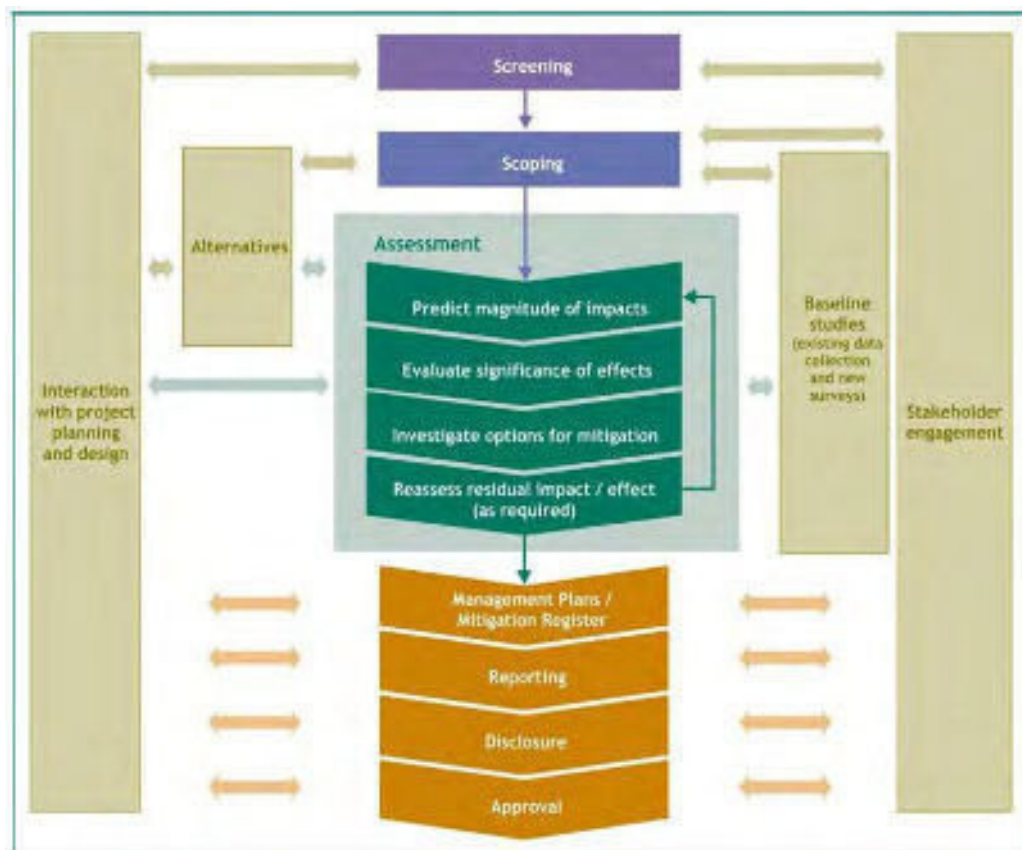
System	Advantage	Disadvantage
Thermal Power	<ul style="list-style-type: none"> • Large-scale production potential • Moderate gestation period Wider distribution potential 	<ul style="list-style-type: none"> • High fossil fuel consumption • Large quantities of water required for cooling • High volume of emission from operation • Accumulation of fly ash (in case of coal powered installations) • Upstream impact from mining and oil exploration • GHG emissions estimated as 228gCeq/kWh
Hydropower	<ul style="list-style-type: none"> • GHG emission estimated as low as 1.1gCeq/kWh for run of river projects • Do not create any waste by-products during conversion process • Some hydropower facilities can quickly go from zero power to maximum output. Because hydropower plant can generate power to the grid immediately, they provide essential back-up power during major electricity outages or disruptions 	<ul style="list-style-type: none"> • Site specific, dependent on reservoir/ river • Long gestation period • Alteration of river flow regime • Adverse social and ecological impacts due to inundation and downstream effects
Solar power	<ul style="list-style-type: none"> • Pollution levels are insignificant • Inexpensive power generation • Inexhaustible solar resource • GHG emissions as low as 8.2gCeq/kWh for the production chain 	<ul style="list-style-type: none"> • Large land requirement • Site-specific, dependent on solar insolation • Expensive installation
Wind power	<ul style="list-style-type: none"> • Pollution levels are insignificant • Inexpensive power generation • Inexhaustible wind resource 	<ul style="list-style-type: none"> • Large land requirement • Site-specific, dependent on wind pattern • Expensive installation

System	Advantage	Disadvantage
	<ul style="list-style-type: none"> • GHG emissions as low as 2.5gCeq/kWh for the production chain 	
Nuclear power	<ul style="list-style-type: none"> • GHG emissions as low as 2.5gCeq/kWh • Low fuel cost • The production of electric energy is continuous. A nuclear power plant generates electricity for almost 90% of annual time. It reduces the price volatility compared to other fuels • Do not emit smoke particles or gases 	<ul style="list-style-type: none"> • Availability of fuel source • Hazards associated with radioactive material • High cost of project • Disposal waste is expensive, as wastes are radioactive in nature • Long gestation period • Risk of fallout and meltdown scenarios and its impacts on the local population and environment

5 IMPACT ASSESSMENT METHODOLOGY

5.1 INTRODUCTION

This section of the ESHIA study presents the methodology that will be used to conduct the IA. The IA methodology follows the overall IA approach illustrated in **Figure 5-1**. The IA is undertaken following a systematic process that predicts and evaluates the impacts the Project could have on aspects of the physical, biological, social/ socio-economic and cultural environment, and identifies measures that the Project will take to avoid, reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable. The stages of the IA process are described below.



Source: ERM, 2015

Figure 5-1 Impact Assessment Approach

The adoption of a generic impact assessment methodology may not accommodate the identification or categorisation of impacts particular to a project of this type and location. The impact assessment methodology developed within this chapter has been developed with reference to internationally recognized best practice. It takes into account issues specifically associated with development of power and associated infrastructure to present impact identification and evaluation mechanism which is specific to the development type, thereby allowing for much more focused and refined assessment.

5.2 *SCREENING*

The first stage in any impact assessment is screening. The primary objective of screening is to identify what IA requirements apply to the Project. Scoping is then conducted to identify and develop the resulting terms of reference to provide the data needed to conduct an informed impact assessment. The results of the screening exercise are reported in **Chapter 6** of this ESHIA Report.

5.3 *SCOPING*

Scoping is undertaken to identify the potential Area of Influence for the Project (and thus the appropriate Study Area), to identify potential interactions between the Project and resources/receptors in the Area of Influence and the impacts that could result from these interactions, enabling these potential impacts to be evaluated in terms of their likely significance.

In order to have a an informed and Project specific impact assessment, it is important to select resources/receptors based on the understanding and evaluation of environmental, social and health conditions specific to the Project and proposed activities, with consideration of the potential Area of Influence. This stage is intended to ensure that the IA identifies and focuses on those issues that are most important for design, decision-making and stakeholder interest. The findings of the scoping exercise are reported in **Chapter 6**.

5.4 *PROJECT DESCRIPTION*

In order to set out the scope of the Project features and activities, with particular reference to the aspects which can impact on the environment, a Project Description is prepared. Details of the Project facilities' design characteristics, as well as planned and unplanned Project activities, are provided in **Chapter 2**.

5.5 *BASELINE CONDITIONS*

To provide a context within which the impacts of the Project can be assessed, a description of physical, biological, social / socio-economic and cultural conditions that would be expected to prevail in the absence of the Project is required. The Baseline includes information on all resources/receptors in the Project Area of Influence, i.e. as having the potential to be affected by the Project. The baseline characterisation is reported in **Chapter 7 and 8** of this ESHIA Report.

5.6 *STAKEHOLDER ENGAGEMENT*

The Project recognizes that achieving effective stakeholder engagement involves building and maintaining constructive relationships over time. Therefore the Project has committed to an ongoing consultation and engagement process. The process focuses on a broad range of activities, including information sharing, consultation to negotiation and partnership building.

A Stakeholder Engagement Plan (SEP) is designed with the aim of providing a platform for consultation and disclosure with Project stakeholders throughout all phases of the development. The SEP sets out the approach which the Project will adopt in order to implement an effective engagement program with stakeholders over the life of the Project. Good relations between the Project and its surrounding communities and relevant stakeholders will be an essential condition for the Project to acquire social license to operate. It is also an important means of receiving community feedback on project related concerns and also disseminating project related information to the community. An SEP has been prepared for the Project and is attached at **Annex C** of this report.

5.7 *IMPACT ASSESSMENT*

Impact identification and assessment starts with scoping and continues through the remainder of the IA Process (**Figure 5-2**). The principle steps are:

- Impact prediction: to determine what could potentially happen to resources/receptors as a consequence of the Project and its associated activities.
- Impact evaluation: to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource/receptor.
- Mitigation and enhancement: to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- Residual impact evaluation: to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

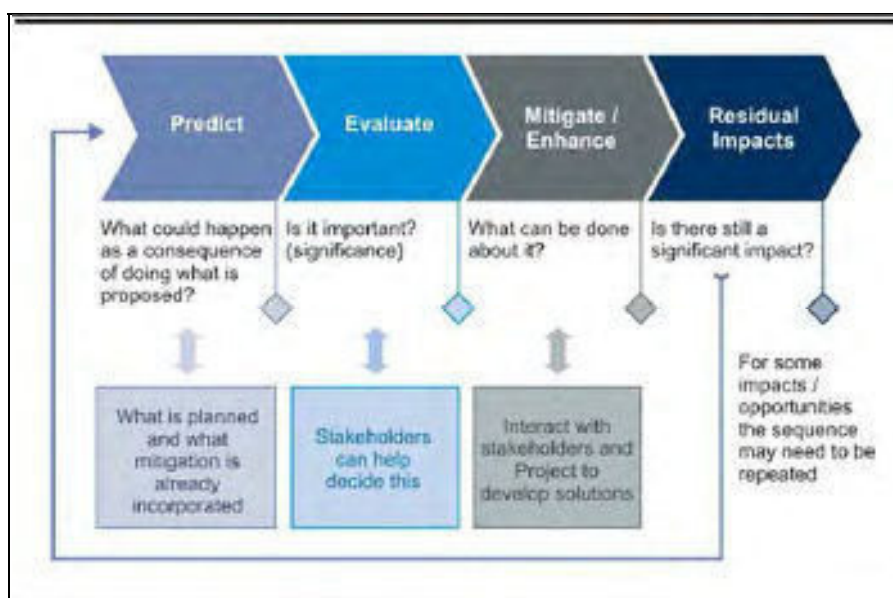


Figure 5-2 *ESIA Impact Evaluation Process*

5.7.1 *Impact Prediction*

Prediction of impacts is essentially an objective exercise to determine what is likely to happen to the environment as a consequence of the Project and its associated activities. From the potentially significant interactions identified in Scoping, the impacts to the various resources/receptors are elaborated and evaluated. The diverse range of potential impacts considered in the IA process typically results in a wide range of prediction methods being used, including quantitative, semi-quantitative and qualitative techniques.

5.7.2 *Impact Evaluation*

The purpose of the impact assessment is to identify and evaluate the significance of potential impacts on identified receptors and resources; to develop and describe mitigation measures that will be taken to minimize any potential adverse effects and enhance potential benefits; and to report the significance of the residual impacts that remain following mitigation.

Impact Magnitude

The term 'magnitude' covers all the dimensions of the predicted impact including:

- The Type of impact: a description indicating the relationship of the impact to the Project (in terms of cause and effect) e.g. direct, indirect, induced;
- The Extent of the impact: the "reach" of the impact (for example confined to a small area around the Project Footprint, projected for several kilometres) e.g. Local, Regional, International; and
- The Duration of the impact: the time period over which a resource / receptor is affected e.g. Temporary, Short-term, Long-term, Permanent.

The scale of the impact, the likelihood and the frequency of the impact will also be used to assess the magnitude of the impact.

An assessment of the overall magnitude of an impact is provided by taking into account all the dimensions of the impact described above to determine whether an impact is of negligible, small, medium or large magnitude.

Receptor sensitivity

The significance of the impacts resulting from an impact of a given magnitude will depend on the sensitivity (terms and definitions of vulnerability and importance may also be used with defining sensitivity) of resources and receptors to that impact, i.e. the extent to which the receptor will undergo a change - negative or positive - as a result of the Project.

The quality or importance of a resource will be judged taking into account, for example, national or international designation, its importance to the local or wider community, its ecosystem function or its economic value. The assessment of the sensitivity of human receptors, for example a fishing community or wider social group, will consider their likely response to the change and their ability to adapt to and manage the effects of the impact.

Evaluation of significance

The assessment of impacts aims at providing information to decision makers and other stakeholders on the importance of each impact, to facilitate decision-making on the Project, and to facilitate the identification and design of impact reduction or mitigation measures.

The evaluation of impacts presented in the ESHIA is based on the judgement of the ESHIA team, informed by legal standards, national and regional government policy, current industry good practice and the views of stakeholders. Where specific standards are either not available or provide insufficient information on their own to allow grading of significance, the evaluation of significance has taken into account the magnitude of the impact and the quality, importance or sensitivity of the affected resource or receptor.

Magnitude and receptor quality/importance/sensitivity are looked at in combination to evaluate whether an impact is, or is not, significant and if so its degree of significance (defined in terms of Negligible, Minor, Moderate or Major). Impacts classed as negligible include those that are slight or transitory, and those that are within the range of natural environmental and social change. This principle is illustrated schematically in **Table 5-1**.

Table 5-1 *Impact Significance Matrix*

		Sensitivity/Vulnerability/Importance of Resource/ Receptor		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Source: ERM, 2010

5.7.3 Mitigation and Enhancement

One of the key objectives of an ESHIA is to identify and define environmentally acceptable, technically feasible and cost-effective mitigation measures. Mitigation measures are developed to reduce the significant negative impacts identified during the ESHIA process to a point where they have no adverse effects, and to create or enhance positive impacts such as environmental and social benefits. In this context the term “mitigation measures” includes operational controls as well as management actions.

Where a significant impact is identified, a hierarchy of options for mitigation is explored in **Table 5-2**.

Table 5-2 Impact Significance Matrix

<ul style="list-style-type: none"> • Avoid or Minimize Disturbance of Sensitive Receptors or Receptor Areas through the design of the Project (e.g., avoiding by siting or re-siting, isolating away from sensitive areas or reducing by restricting the working area and a special actions of the activities).
<ul style="list-style-type: none"> • Apply on-site and available control design to reduce the impact (e.g., pollution control equipment, traffic controls, sediment control, and fencing).
<ul style="list-style-type: none"> • Avoid or Minimize if an impact cannot be avoided use-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impacts to nearby residences or fencing to prevent animals straying onto the site).
<ul style="list-style-type: none"> • Supply or Restore Sensitive Receptor Areas: Habitat damage to a resource (e.g., ecological land and forests) due to clearing access, work, or other activities (e.g., agriculture) and these impacts can be addressed through specific restoration or rehabilitation measures.
<ul style="list-style-type: none"> • Compensation in Kind: Compensation Through Other Means: where other mitigation approaches are acceptable or fully effective, these compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged resource providing access to facilities for loss of fisheries access, recreation and amenity uses).

Source: ESHIA, 2016

5.7.4 Residual Impact Evaluation

Reporting the significance of a residual impact in the ESHIA is based on:

- The predicted magnitude of an impact, taking into consideration all the mitigation measures; and
- The quality/importance/sensitivity of the receptor.

Constraints arising from applicable regulations and standards are taken into account in the evaluation of residual impacts and their acceptability.

5.7.5 Management, Monitoring and Audit

The final stage in the IA Process is definition of the basic management and monitoring measures that are needed to identify whether:

- Impacts or their associated Project components remain in conformance with applicable standards; and
- Mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted.

An Environmental and Social Management framework is then compiled which summarizes all actions which ITL and its EPC will commit to executing with respect to environmental/ social/ community health performance for the Project. The framework includes the mitigation measures, compensatory measures and offsets and management and monitoring activities together with details of who is responsible for implementation, how these measures are evaluated for performance, timing and reporting responsibilities.

6 ESHIA SCREENING AND SCOPING

This ESHIA document addresses all the potential environmental and social impacts associated with the construction and operation of the project, based on available desktop information and from the site visit.

This document is prepared to target the important environmental and social risks including those covered in the AMDAL process. It is important to note that the AMDAL process has also gone through a screening and scoping process which is guided by the Indonesian AMDAL regulations.

ERM has attempted to ensure that there is consistency in the outcomes of scoping; however it is important to understand that there are differences in terminology used, primarily as a result of the different audiences that the AMDAL and ESHIA report are targeted towards.

This ESHIA is prepared to target only the important environmental and social risks and to specifically target areas which fall out of the scope of the AMDAL process. In relation to this Project, this primarily applies to the following:

- ESHIA needing to refer to emission and discharge standards established under the EHS Guidelines;
- More detailed social and health impact assessment expectations of ESHIA; and
- ESHIA consideration of cumulative impacts, associated facilities and non-routine events, which are all not assessed under AMDAL.

Based on the level of Project description information and available desktop information, ERM has a reasonable level of confidence regarding the important environmental and social interactions that have been identified and presented within this Chapter.

6.1 SCOPE OF THE ASSESSMENT

The Project has been subject to an Indonesian Regulatory approval through the local AMDAL process. A certified AMDAL consultancy, PT Sulindo Eko Konsultan, was responsible for the AMDAL production and environmental permit.

The monitoring requirements contained within the Project's RKL-RPL have been incorporated into the framework tables contained in **Chapter 11**.

The ANDAL process identifies hypothetical significant impacts for further assessment through the process of engagement with the community, government and selected recognised experts. This process is described in detail within the ANDAL document. Rationales are also provided as to why certain impacts have been screened as being of 'hypothetical significance'.

The list of hypothetical positive and negative significant impacts identified during the AMDAL process is provided at **Table 6-1**. These have been taken into account as part of the scoping of impacts for this ESHIA process.

Table 6-1 Hypothetical Significant Impacts in the AMDAL

Phase	Environmental and Social Components
Pre-construction	Community perception (+/-)
Construction	Increased job opportunities and income (+)
	Vegetation loss (-)
	Run off (-)
	Increased erosion (-)
Operation	Increased job opportunities and income (+)
	Electricity supply (+)
	Increased temperature (micro climate) (-)
	Electric and magnetic field (-)

The ANDAL and assessment of potential environmental and social impacts results in the preparation of an environmental management and monitoring plan (RKL-RPL). The RKL-RPL for the Project has been incorporated into the ESHIA and must be implemented and reported on every six months to comply with Indonesian regulations.

6.2 SCREENING RESULTS

The requirements for whether an ESHIA is required under IFC PS depend upon the nature and complexity of the project and prediction of impacts that are likely to occur. As discussed in **Chapter 1**, these are embodied within Equator Principle Number One – Review and Categorisation. As discussed previously the categories are Category A, Category B and Category C. Due to the scale of the Project and potential environmental impacts; it would likely be classified as a **Category B Project**. This is primarily determined on the basis that the construction and operation of the Project would result in only limited impacts to the surrounding environment, and that impacts are likely to be readily managed.

6.3 SCOPING RESULTS

Scoping was undertaken for the potential Area of Influence for the Project (and thus the appropriate Study Area), to identify potential interactions between the Project and resources/receptors in the Area of Influence and the impacts that could result from these interactions, and to prioritize these impacts in terms of their likely significance.

6.3.1 Interaction Matrix

Potential impacts were identified through a systematic process whereby the features and activities (both planned and unplanned) associated with the pre-construction, construction, operation and decommissioning of the Project have been considered with respect to their potential to interact with resources/receptors. Potential impacts have each been classified in one of two categories:

- No interaction: where the Project is unlikely to interact with the resource/receptor (e.g., wholly terrestrial projects may have no interaction with the marine environment); and
- Interaction: where there is likely to be an interaction, and the resultant impact has a reasonable potential to cause a significant effect on the resource/receptor. Potential positive as well as negative interactions were considered during this process.

As a tool for conducting scoping, the various Project features and activities that could reasonably act as a source of impact were identified, and these have been listed down the vertical axis of a Potential Interactions Matrix. The resources/receptors relevant to the Baseline environment have been listed across the horizontal axis of the matrix. The completed Preliminary Interactions Matrix is presented in **Table 5-1**.

Each resulting cell on the Potential Interactions Matrix thus represents a potential interaction between a Project activity and an environmental, social or health resource/receptor. Those cells that remain unchecked are 'scoped out' of further consideration in the IA Process. **Chapter 8** presents the appraisal of potential environmental and social impact evaluation.

6.3.2 *Appraisal of Potential Significant Environmental and Social Impacts*

Environmental and social issues identification is conducted to ensure that all potential impacts from the proposed project and associated activities are identified as part of the impact assessment process.

ERM notes that the AMDAL process is finished and that the local EIA has been capable of addressing a significant number of potential impacts, to a reasonable degree of certainty. As a result, ERM use the ESHIA process to address the impacts which we have been screened as being particularly relevant to the Project, or which require particular scrutiny under the IFC framework.

Table 6-2 presents ERM's appraisal of important environmental and social impacts, based on the scoping table presented at **Table 6.1**. The subsequent impact assessment is at **Chapters 9 and 10**.

The following information is provided for each of the Project activities which have been identified as potentially resulting in environmental or social impacts:

- Sources of impact: The potential causes concern, or the environmental and social receptors considered likely to be affected;
- Overview of potential impacts: Discussion of the types of impacts that could occur from construction or operation of the Project based on available information and existing environmental and social baseline data; and
- Proposed assessment approach: An outline of what will be taken into account as part of the assessment and if, for example modelling or specific data collection activities would occur.

The Project and receptor interactions that are likely to lead to significant impacts will form the focus of a detailed impact assessment. Based on ERM's current understanding of the Project these are likely to include:

- Land acquisition activities impacting the land users and their livelihoods;
- Potential positive and negative impacts associated with access to employment and economic benefits to the local community;
- Potential community impacts as a result of restrictions on access during construction and operation;
- Impacts on local fauna currently utilising the site area for nesting etc.; and
- Impacts to drainage in the local area and sediment runoff.

These will be considered more fully within the ESHIA and are likely to form the important impacts to be considered within the ESHIA. This will be confirmed once baseline studies information becomes available.

Table 6-2 Appraisal of Potential Significant Environmental and Social Impacts

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
Construction				
Workforce Mobilisation/presence	<p>Social:</p> <ul style="list-style-type: none"> - Economy and Livelihood (+/-) - Social/Cultural Structure - Disturbance - Public infrastructure and/or transportation <p>Health:</p> <ul style="list-style-type: none"> - Human health and disease - Community security 	<p>The Project has the potential to have a positive impact on the community through generation of new employment and training opportunities. Improved disposable income also has the potential to improve employee lifestyle and create flow-on economic benefits in the community.</p> <p>While the construction period is relatively short (12 months) the presence of additional workers in the community may also create negative impacts such as through causing or accentuating the following:</p> <ul style="list-style-type: none"> • Social/cultural tension from the introduction of workers from outside the area with different cultural values/characteristics • Increasing demand for infrastructure and goods and services (e.g. medical, transport, business). This has the potential to negatively affect the community if it results in decreased access or quality of services and 	<p>Undertake social field visit that includes consultation with affected communities and visual assessment of villages and existing environment. This will help to identify potential impacts, community concerns and build understanding on the areas of potential investment for the Project.</p> <p>Review of community social (demographic and economic structure) and health through primary and secondary sources. This information will be used to inform the Social Impact Assessment.</p>	<p><u>IFC performance Standards</u></p> <ul style="list-style-type: none"> • PS1: Assessment and Management of Environmental and Social Risks and Impacts • PS2: Labour and Working Conditions • PS4: Community Health, Safety, and Security <p><u>ADB Safeguard Policy Statement requirements:</u></p> <p>Requirement 1- Environment:</p> <ul style="list-style-type: none"> • Environmental assessment; • Consultation and participation; and • Health and safety (Community health and safety).

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
		<p>infrastructure available prior to the Project commencing</p> <ul style="list-style-type: none"> • Transferring communicable diseases from non-local workers • Crime or sense of unsafety as a result of non-locals entering the community (even a perceived risk has the potential to disturb the community) 		
<p>Land Preparation and Civil Works</p>	<p>Environment:</p> <ul style="list-style-type: none"> - Soil; - Surface water; - Air - Vegetation; - Terrestrial Fauna; - Noise and vibration; and - Aesthetics 	<p>The site has been subject to disturbance associated with dry land agriculture and the AMDAL study does not suggest that important biodiversity habitats are present within the site.</p> <p>Exhaust emissions from plant and equipment involved in site preparation as well as dust generation may temporarily impact air quality in the immediate area. Surface runoff also has the potential to affect surface water quality as a result of sediment runoff.</p>	<p>Impacts to air quality and noise and vibration as a result of plant and equipment will be confined to the 12 month construction period, while the nearest village is located approximately 650m from the site. A qualitative assessment based on the AMDAL findings will be presented within the ESIA.</p> <p>Surface water impacts would be expected to be temporary only and construction management measures would be capable of managing this.</p>	<p>IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS4: Community Health, Safety, and Security</p> <p><u>ADB Safeguard Policy Statement requirement.</u></p> <p>Requirement 1- Environment:</p> <ul style="list-style-type: none"> • Environmental assessment • Physical cultural resources • Health and Safety (Community Health and Safety)

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
	Social - Cultural Resources	The AMDAL found that no known cultural sites are located within the project area, impacts are therefore considered unlikely	No specific assessment necessary, the ESHIA will provide an overview of cultural resources and values known from the area and factor this into the project's management framework.	
	Health: - Human health and disease - Environmental Quality	Based on publicly available Health data, Respiratory illness is the most common community disease in the area. Settlement areas are located close to the site (approx. 650m) and impacts as a result of dust will be considered.	Existing community health condition, particularly disease status will be considered as part of the assessment.	
Installation of solar field and site infrastructure	Environment: - Air - Noise and vibration - Aesthetics	Site construction has the potential to produce noise and air quality impacts. The construction period is 12 months and the nearest receptors are 650m from the site and as such significant impacts are unlikely. It is expected that some basic construction management measures will be capable of reducing some impacts, while construction would be temporary only.	Assessment to be based on existing baseline assessments on Project area and surrounding environment. For noise and air quality, the ESHIA will be based on the AMDAL information and will provide a quantitative assessment of the predicted impacts from construction.	IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS3: Resource Efficiency and Pollution Prevention PS4: Community Health, Safety, and Security <u>ADB Safeguard Policy Statement requirement.</u> Requirement 1- Environment: <ul style="list-style-type: none"> • Environmental assessment • Pollution prevention and abatement

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
			Mitigation measures will then be developed for implementation.	<ul style="list-style-type: none"> Health and safety (Community Health and Safety)
	Social: - Disturbance; - Economy and livelihood -/+; - Education and Skills -/+; Health: - Environmental Quality	There is the potential for negative impacts associated with general disturbance to the local community and impacts to environmental quality, however positive impacts such as employment opportunities and training.	Impacts will be considered, taking into account baseline community health conditions and the proposed construction time period.	
Workforce Accommodation	Environment: - Aesthetics	It is understood that the project will maximise the use of local workforce. It is expected that workers will stay in available accommodation in the nearby village. The project construction period and workforce size does not require establishment of a workforce camp.	No specific assessment proposed.	IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS2: Labour and Working Conditions PS3: Resource Efficiency and Pollution Prevention PS4: Community Health, Safety, and Security
	Social: - Economy and livelihood - Social/cultural structure - Public infrastructure and/or transportation	The influx of workers during construction has the potential to result in disturbance within the local community, particularly in the form of jealousy or cultural misunderstandings should a large foreign workforce be housed at the site. It is likely that a large proportion of the locally engaged workforce will stay in their current residences or other accommodation available within	The social baseline will be used to understand community experience with worker influx and to also understand their expectations with respect to access to employment opportunities.	<u>ADB Safeguard Policy Statement requirement.</u> Requirement 1- Environment: <ul style="list-style-type: none"> Environmental assessment Health and safety (Community health and safety and occupational health and safety)

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
		the local area. The presence of a workforce of up to 650 people is also likely to place pressure on local waste disposal facilities, roads and also public services.		
	Health: - Human health and disease - Community security	The influx of workers has the potential to increase the risk of communicable disease and other health concerns. This risk will largely be dependent on the final location of the worker camp and camp management practices	Assessment to be based around location of the camp and also assumptions regarding camp management.	
Wastes, emissions and discharges generation, handling and disposal	Environment: - Air - Soil - Surface Water - Aesthetics - Groundwater	<p>Construction will generate a variety of waste products (including hazardous wastes), which will require storage and disposal. If not properly managed, these can lead to contamination and unnecessary impacts to surrounding communities.</p> <p>The location of waste disposal sites will need to be confirmed as part of the follow-up construction management. It is expected that impacts and risks to the community could be appropriately managed, through implementation of sound onsite waste management practices.</p> <p>Groundwater wells will be developed as source of water during construction and operation. The allowable amount of abstracted water will be</p>	Assessment of impacts to be developed based on likely waste and emission types and volumes and also management measures which would be expected to be implemented by the Project.	<p>IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS3: Resource Efficiency and Pollution Prevention PS4: Community Health, Safety, and Security</p> <p><u>ADB Safeguard Policy Statement requirement.</u></p> <p>Requirement 1- Environment:</p> <ul style="list-style-type: none"> • Environmental assessment • Pollution prevention and abatement • Health and safety (Community health and safety)

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
		determined by the government through the water abstraction permit based on water balance study. This is to ensure that no overpumping will be done to avoid interference with existing community wells.		
	Social: - Disturbance - Infrastructure and public services Health: - Human health and disease	Settlement areas are generally not located in close proximity to the construction site. There is however the potential for environmental quality to be affected if wastes are not properly managed and disposed of. This may also pose a risk to community health. It is expected that this could be readily managed through adoption of sound waste management and storage practices.	Assessment of impacts to be developed based on the likely waste and emission types, volumes, and disposal location, also management measures which would be expected to be implemented by the Project.	
Vehicle use/transportation (workforce, supply and support)	Environment: - Air - noise and vibration	Deliveries of equipment and materials will utilize existing community roads. The exact number of vehicle and truck movements is uncertain, however it is expected that construction would place additional strain on the local access roads. The additional vehicle movements would also contribute to existing dust and vehicle emissions within the local area.	The assessment will consist of a qualitative appraisal of expected impacts, based on projected vehicle movements and existing site conditions. Some basic management strategies would then be identified to help reduce potential impacts.	IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS3: Resource Efficiency and Pollution Prevention PS4: Community Health, Safety, and Security <u>ADB Safeguard Policy Statement requirement.</u> Requirement 1- Environment: <ul style="list-style-type: none"> • Environmental assessment
	Social:	Local communities are likely to be exposed to noise and air		

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
	<ul style="list-style-type: none"> - Economic and livelihood (+) - Public infrastructure and/or transportation - General community disturbance <p>Health:</p> <ul style="list-style-type: none"> - Community safety and security 	quality impacts as a result of traffic within the local area. The assessment will consider the potential for the project to significantly contribute to the existing impacts and also the potential for additional traffic congestion to occur as a result of construction traffic.		<ul style="list-style-type: none"> • Pollution prevention and abatement • Health and safety (Occupational health and safety)
Construction Water Use	<p>Environment:</p> <ul style="list-style-type: none"> - Surface Water <p>Social:</p> <ul style="list-style-type: none"> - Public infrastructure and/or transportation - General community disturbance 	It has been confirmed that construction water will be supplied from existing supply infrastructure, located near the site. Project construction is limited to a twelve month period, while an offsite concrete batching plant located in Manado will be used to supply construction concrete.	No Assessment Proposed	No Assessment proposed
Operations				
Workforce Presence	<p>Social:</p> <ul style="list-style-type: none"> - Economy and Livelihood (+/-) - Social/Cultural Structure - Education and Skills (+/-) - Infrastructure and public services (+/-). 	While only approximately 20 direct employment opportunities are expected to be generated during operations, the Project has the potential to have a positive impact on the community through generation of new employment and training opportunities. Improved disposable income also has the potential to improve employee	Impact from operational workforce presence will be assessed and will take into consideration Project plans for CSR and recruitment programs.	IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS2: Labour and Working Conditions PS3: Resource Efficiency and Pollution Prevention PS4: Community Health, Safety, and Security

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
		lifestyles create flow-on economic benefits in the community such as through generating greater demand for local businesses/economic activity.		<u>ADB Safeguard Policy Statement requirement.</u> Requirement 1- Environment: <ul style="list-style-type: none"> • Environmental assessment • Pollution prevention and abatement • Health and safety (Community health and safety and occupational health and safety)
Operational Water usage	Environment: - Surface water Social: - Resource ownership/use	Limited water is required for operations and the Project description confirms that the project will source water from existing supply infrastructure located near the site.	Project description to confirm project water supply options and estimation of volumes.	IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS3: Resource Efficiency and Pollution Prevention PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources <u>ADB Safeguard Policy Statement requirement.</u> Requirement 1- Environment: <ul style="list-style-type: none"> • Environmental assessment • Pollution prevention and abatement • Health and safety (Community health and safety and occupational health and safety)

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
Wastes, emissions and discharges generation, handling and disposal	Environment: - Air - Soil - Surface Water - Groundwater	Operational waste volumes are unlikely to be significant, however if not handled properly, there is the potential for contamination or breaches of local regulations to occur.	Waste inventories and disposal methods will be outlined in ESHIA and assessed for their potential to impact the environment.	IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS3: Resource Efficiency and Pollution Prevention PS4: Community Health, Safety, and Security PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources <u>ADB Safeguard Policy Statement requirement.</u> Requirement 1- Environment: <ul style="list-style-type: none"> • Environmental assessment • Pollution prevention and abatement • Health and safety (Community health and safety and occupational health and safety) • Biodiversity Conservation and Sustainable Natural Resources Management
	Social: - Disturbance - Infrastructure and public services	No direct emissions of wastes from the site to the surrounding environment are expected. The allowable amount of abstracted water will be determined by the government through the water abstraction permit based on appropriate ground water study. This is to ensure that no overpumping will be done to avoid interference with existing community wells..	It is expected that industry standard waste and discharge disposal procedures will be capable of effectively managing impacts.	
Vehicle use/transportation (workforce, supply and support)	Social: - Economic and livelihood (+) - Public infrastructure and/ or transportation - General community disturbance Health:	Limited vehicle movements are expected during operations and these would generally be limited to workforce travel to and from the site and general service vehicles. Positive impacts associated with access to employment opportunities are possible and it is unlikely that additional	Social impacts to be considered qualitatively when assessing project related operational impacts.	IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS2: Labour and Working Conditions PS3: Resource Efficiency and Pollution Prevention PS4: Community Health, Safety, and Security

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
	<ul style="list-style-type: none"> - Community safety and security 	<p>movements would place significant additional strain on local roads.</p>		<p><u>ADB Safeguard Policy Statement requirement.</u></p> <p>Requirement 1- Environment:</p> <ul style="list-style-type: none"> • Environmental assessment • Pollution prevention and abatement • Health and safety (Community health and safety and occupational health and safety)

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
Non-Routine Events				
Spillage of fuel, oil, chemicals and hazardous materials	Environment - Surface water - Groundwater	<p>The project has a range of potential spill sources during construction and operations. It is expected that smaller, land based spills could be readily contained and clean-up with appropriate equipment. It is expected that the project will implement and maintain industry practice emergency response provisions and that these would be capable of readily addressing and responding to most events.</p> <p>The location of groundwater wells will be situated away from potential sources of contamination such as storage areas for chemicals and hazardous wastes.</p>	<p>Given the nature of the project, such risks are likely to be adequately managed through the adoption of industry standard construction and operational management measures</p>	<p>IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS3: Resource Efficiency and Pollution Prevention PS4: Community Health, Safety, and Security</p> <p><u>ADB Safeguard Policy Statement requirement.</u> Requirement 1- Environment:</p> <ul style="list-style-type: none"> • Environmental assessment • Pollution prevention and abatement • Health and safety (Community health and safety and occupational health and safety)
	Social: - Community Disturbance; - Environmental Quality Health - Community safety and security			
Vehicle, accident	Social: - Community disturbance Health - Community safety and security	<p>Increased road traffic will occur as a result of the project and may potentially increase the risk of accident</p>	<p>Qualitative assessment to be conducted based on an understanding of likely control and mitigation measures which would be expected to be implemented by the Project.</p>	<p>IFC Performance Standards PS1: Assessment and Management of Environmental and Social Risks and Impacts PS3: Resource Efficiency and Pollution Prevention PS4: Community Health, Safety, and Security</p> <p><u>ADB Safeguard Policy Statement requirement.</u> Requirement 1- Environment:</p> <ul style="list-style-type: none"> • Environmental assessment

Activity/Aspect	Resource/Receptor	Initial Assessment	Proposed Assessment	Applicable International Standards
				<ul style="list-style-type: none"> • Pollution prevention and abatement • Health and safety (Community health and safety and occupational health and safety)

7 ENVIRONMENTAL BASELINE

7.1 INTRODUCTION

The baseline conditions within the Project area have been characterized based on a consideration of secondary data from published sources, and baseline data collected during preparation of the ANDAL, RKL-RPL by PT Sulindo Eko Konsultan.

The following secondary information sources were drawn on throughout the environmental baseline chapter:

- IUCN Red List;
- Government Regulation of Indonesia Number 7 Year 1999;
- PT Sulindo Eko Konsultan's single season of sampling in late 2016 that included the following surveys and data collection:
 - Air quality and noise;
 - Terrestrial biodiversity;
 - Soil;
 - Surface water; and
 - Electric and magnetic fields.

A map showing the environmental survey locations is provided in **Figure 7-1**.

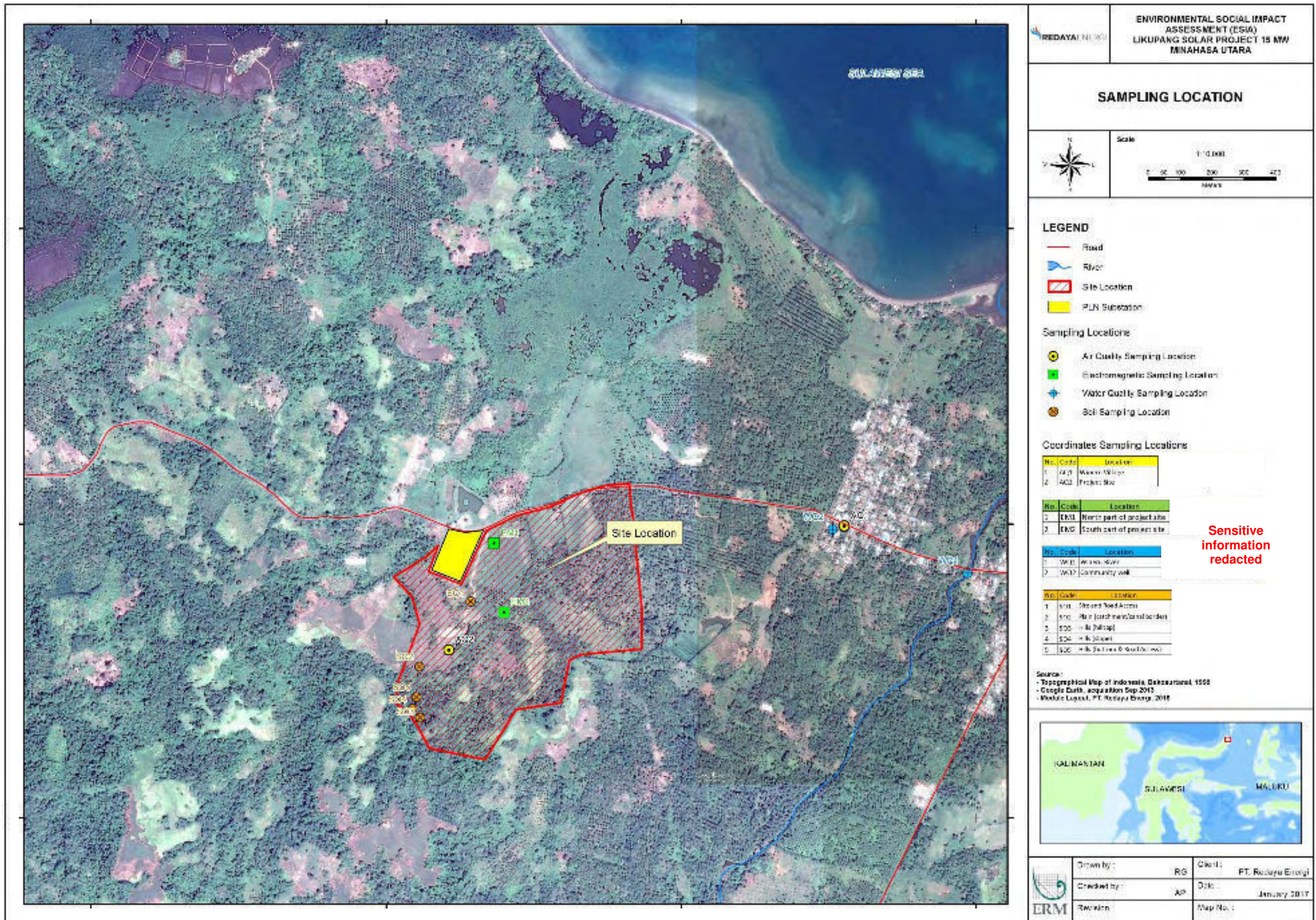


Figure 7-1 Map of Sampling Locations

7.2 CLIMATE

An understanding of the short term and long term climatic conditions within an around a project site is an essential part of project planning and design, construction and operational management phases.

In this regard, the purpose of this section is to provide an understanding of the climatic baseline. In this section, there are three climatic parameters that will be discussed as they are of particular importance to a project of this nature (air temperature, sunlight, and rainfall).

7.2.1 Sunlight

Sunlight data is shown in **Figure 7-2**. The average data from 2006 until 2015 shows that the highest sun radiation happens in October, while the lowest occurs in June. Sun radiation is fairly consistent throughout the year, with only limited variation between the highest and lowest months.

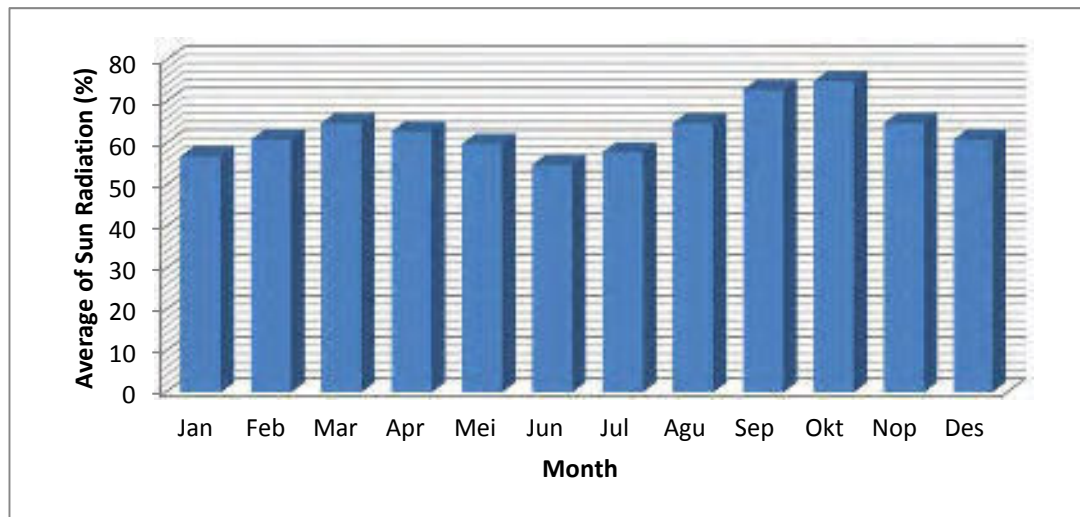


Figure 7-2 Average of Sun Radiation in the Study Area Period 2006 - 2015 (%)

7.2.2 Rainfall

Data for average rainfall each month between 2010 and 2015 was sourced from BMKG Kayuwatu 2016 and shown in **Figure 7-3**. The Project area experiences a distinct wet and dry season. The highest rainfall occurs between the months of November and March, with drier months between June and September in particular. Rainfall during the wettest month of January is over seven times that of the driest month of August.

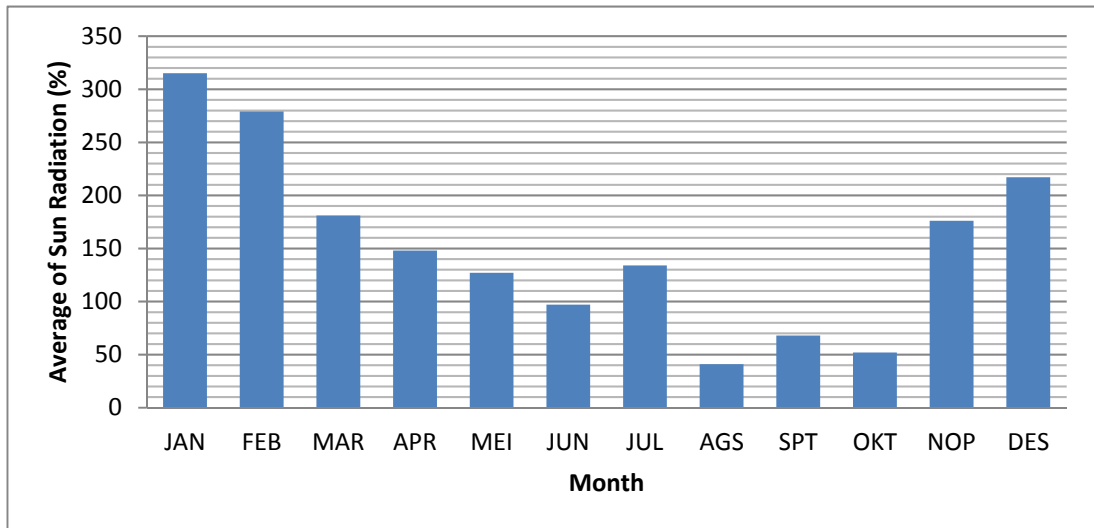


Figure 7-3 Rainfall in Study Area in Period of 2010-2015 (Source BMKG Kayuwatu 2016)

7.2.3 Temperature

Figure 7-4 shows monthly average maximum and minimum air temperature based on air temperature data from 2010 to 2015 recorded at BMKG Kayuwatu. The Project area experiences relatively stable year round temperatures. Monthly average air temperature in the Study Area ranged between 27.5°C and 28.4°C. The monthly average maximum temperature over 10 years varies between 28.0°C and 29.0°C, whilst for the average minimum temperature ranged between 27.0°C and 28.0°C.

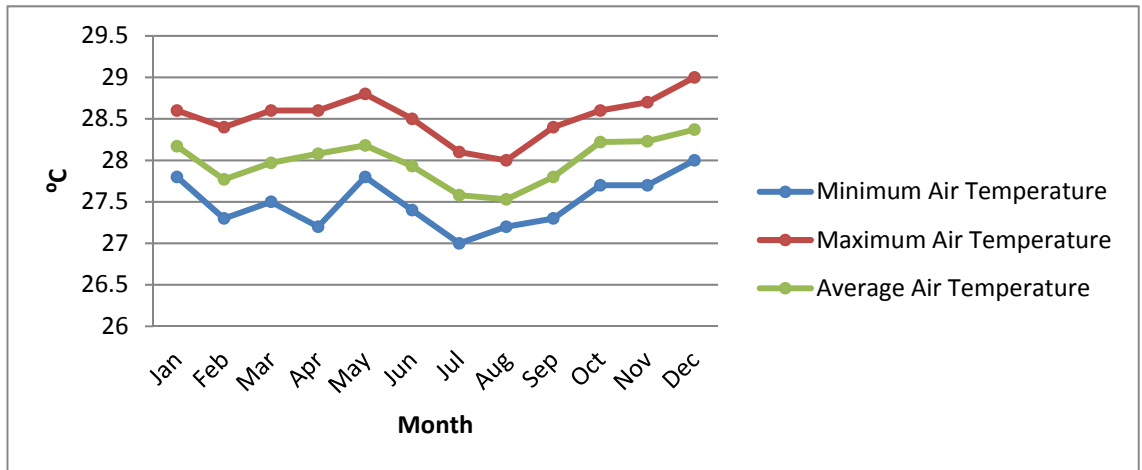


Figure 7-4 Average, Maximum and Minimum Air Temperatures (Source: BMKG Kayuwatu, 2016)

7.3 AIR QUALITY

The air quality baseline is based on a one day sampling program conducted on 17 October 2016 by PT Sulindo Eko Konsultan to support the AMDAL. The sampling locations were at Wineru Village and Project site as shown at Figure 7-1.

The measured parameters and sampling results are also provided at **Table 7-1** below. The measured results indicate that the ambient conditions are well below the ambient air quality standards established under the Indonesian Regulations, and also under the IFC Framework. Under the IFC EHS Guidelines on Air Emissions and Ambient Air Quality, emissions should not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources. Given that local regulatory standards exist for the above parameters, these will be used as the basis for measuring project related impacts.

The results are consistent with the site occurring within an agricultural landscape and the absence of significant industrial development within the area.

Table 7-1 *Result of Ambient Air Quality Analysis in PLTS Likupang Study Area*

No.	Parameter	Unit	Location		Threshold	
			Wineru Village	Project Site	GR. No. 41/1999	IFC Standard
1.	CO	µg/Nm ³	1140	1143	30,000 (1 hour)	-
2.	NO ₂	µg/Nm ³	6.14	3.12	400 (1 hour)	200
3.	SO ₂	µg/Nm ³	4.10	2.15	900 (1 hour)	-
4.	TSP/Dust	µg/Nm ³	23	22	90 (1 hour)	-
5.	Humidity	%	60.4	58.2	-	-
6.	Average Temperature	°C	31.7	31.9	-	-

AMDAL Result Analysis: October 2016

7.4 NOISE

Noise measurements were undertaken through direct measurement at two sampling points by PT Sulindo Eko Konsultan during the AMDAL sampling program which has been done in accordance with AMDAL procedures. The locations are shown at **Figure 7-1** Sample point 1 is located at Wineru Village residential area while sample point 2 is located within the Project Site.

The results of the sampling at both locations are shown at **Table 7-2** and indicate that ambient conditions at both locations are well below both the daytime standards established under Indonesian Regulations and the IFC framework. This is consistent with the absence of significant traffic or industrial development within the Project area. Noise sources are generally restricted to vehicle traffic within Wineru Village, while the Likupang Diesel power plant is likely to be the main source of noise near the Project Site.

During construction and operations, the Indonesian Regulatory Noise Standard at the site will be 70 dBA, with the IFC standard remaining at 55 dBA for daytime noise and 45 dBA for night-time noise.

Table 7-2 Noise Level in PLTS Likupang Study Area

No.	Sampling Location	Unit	Analysis Result			Threshold Decree of Environmental Minister No. 48 Year 1996	Standard IFC
			Noise	Humidity	Average		
1.	Wineru Village	dBA	48.5	60,4	31,7	55 (Residential)	45 (Night-time)
2.	Project location	dBA	43.5	58,2	31,9	70 (Industrial)	55 (Daytime)

Analysis Results: October 2016

7.5 BIODIVERSITY

A biodiversity survey was undertaken on 17 October 2016 by PT Sulindo Eko Konsultan. The survey consisted of a site walkover to confirm vegetation and likely habitats within the site while interviews with the local community were also conducted. Opportunistic observations of bird species and other fauna were also conducted. Using this information, ERM has completed additional desktop research in order to confirm species status according to Indonesian regulation in force and IUCN Red List.

The site has been subject to past clearing and disturbance to support agricultural plantations and there is limited natural habitat contained within the site. No significant flora or fauna values were identified on the site, and it is unlikely that IFC PS 6 would be triggered by the Project. A summary of key findings is provided below.

7.5.1 Flora and Vegetation

The site is dominated by palm plantation and other crops, while pockets of native grasses and shrubs are scattered across the site.

An area of native tree cover occurs in the southern part of the Project site and covers an area of approximately 3 Ha. Based on the analysis results, there are 7 dominant species; among them are *Trema orientalis*, *Ficus sp.*, *Spatodea campanuleta*, *Antocephalus sp.*, *Cananga orodata* and *Macaranga sp.* None of the species identified within the site are listed as being of conservation significance.

7.5.2 Fauna

The site has largely been cleared of native vegetation, with some native tree cover occurring in the southern part of the site. The fauna habitats within the site are generally similar to surrounding areas of mixed agricultural land use. Based on site observations, the Project site is unlikely to contain habitats of particular importance to locally occurring species.

The Project site is located 1.2 km north of coastal area; no mangrove area will be affected by the project. Species of birds recorded during the site visit include are glossy swiftlet (*Collocalia esculenta*), spotted dove (*Streptopelia chinensis*), barred rail (*Gallirallus torquatus*), and javan munia (*Lonchura leucogastroides*). These species are associated with shrubs and grass habitats. There were also several birds categorized as protected (according to Government Regulation Number 7 Year 1999) found within the Project location, however none of these are listed as vulnerable, endangered, and critically endangered in IUCN Red List. These species are Olive-backed Sunbird (*Nectarinia jugularis*), Brahminy kite (*Heliastur indus*), Cerulean Kingfisher (*Alcedo coerulescens*), and Brown-throated sunbird (*Anthreptes malacensis*). More detailed information is shown in **Table 7-3**.

Table 7-3 Bird Species in Study Area

Common Name	Scientific Name	Status	
		Government Regulation Number 7 Year 1999	IUCN Red List
Olive-Backed Sunbird	<i>Nectarinia jugularis</i>	Protected	LC
Slender-Billed Crow	<i>Corvus enca</i>	-	LC
Tahiti Swallow	<i>Hirundo tahitica</i>	-	LC
Spotted Dove	<i>Streptopelia chinensis</i>	-	LC
Brahminy Kite	<i>Heliastur indus</i>	Protected	LC
Barred Rail	<i>Gallirallus torquatus</i>	-	LC
Javan Munia	<i>Lonchura leucogastroides</i>	-	
Eurasian Tree Sparrow	<i>Passer montanus</i>	-	LC
Cerulean Kingfisher	<i>Alcedo coerulescens</i>	Protected	LC
Brown-Throated Sunbird	<i>Anthreptes malacensis</i>	Protected	LC
Mangrove Whistler	<i>Pachycephala cinerea</i>	-	LC
Common Sandpiper	<i>Actitis hypoleucos</i>	-	LC
Glossy Swiftlet	<i>Collocalia esculenta</i>	-	LC
<i>Kacamata/kuloweren</i>	<i>Zosterops sp</i>	-	LC

Notes: LC: Least Concern

Based on a review of these species and habitat preferences, it is unlikely that the site would contain habitat critical to the survival of these species, such as important nesting or feeding areas. Areas of similar habitat are likely to be common within the local area.

According to information from local villagers, mammals species found in the Project location are mostly small mammals and reptiles associated with habitats dominated by shrubs and palm plantation such as rats, lizards, frogs and toads is

shown in **Table 7-4**. Based on the habitat known within the site and surrounding areas, it is considered unlikely that important habitats for protected mammals, reptile or amphibians would be disturbed as a result of the Project.

Table 7-4 Mammals & Reptile Species in Study Area

Common Name	Scientific Name	Status	
		Government Regulation Number 7 Year 1999	IUCN Red List
Mammals			
Rat (Lalak)	<i>Rattus rattus</i>	-	LC
Small rat (Wolat)	<i>Rattus sp.</i>	-	-
Forest rat (Puti Ipus)	<i>Rattus sp.</i>	-	-
Reptiles & Amphibi			
Lizard (Warokek)	<i>Mabouya multifasciata</i>	-	-
Chinese ratsnake	<i>Ptyas korros</i>	-	-
Python	<i>Python sp.</i>	-	-
Water Monitor	<i>Varanus salvator</i>	-	LC
Lizard (Cicak)	<i>Hemidactylus platyurus</i>	-	-
Tree Frog	<i>Hyla sp.</i>	-	-
Frog	<i>Rana sp.</i>	-	-
Toad	<i>Bufo sp.</i>	-	-

Notes: LC: Least Concern

7.6 HYDROLOGY AND DRAINAGE

The site currently consists of approximately 20 Ha of flat land while 9 Ha are hills covered by native vegetation and crops. The site drains into the Wineru River which is situated approximately 1.3 km west of the site, and land preparation has the potential to result in increased site runoff. Based on calculations of surface runoff potential provided within the ANDAL, total runoff discharge from the site is estimated to be up to 26,646.58 m³ during the wet season. This result will then be used to calculate rain erosivity as part of soil erosion estimation.

According to the flood study conducted by Infatech, the lower part of the project site near the discharge points (box culverts) has previously experienced flash floods during the monsoon season. However no long-term flooding has been reported on site.

7.7 SOILS AND EROSION

According to mapping of the land systems and soil resources (PPT and Agroklimat, 2000) the study area is dominated with soils derived from volcanic and sedimentary material derived from local river systems.

Information regarding soil conditions at the Project location was collected by PT Sulindo Eko Konsultan from four locations within the Project site (road access, catchment area, hillside, and hills). From the data obtained, the soil type at the site, road access, catchment area, and hillside is udepts, whereas at hill areas, the soil type is orthents. Generally, orthents contain fewer nutrients and therefore are not suitable for plants. This soil type is generally more easily eroded. On the other hand, areas containing udepts are mostly covered by forest, shrubs or grasses and are likely to have lower erosion potential.

Based on calculations provided in the AMDAL by PT Sulindo Eko Konsultan, for the existing condition, the highest potential soil loss is located on hilltops (55.09 t/Ha/year), followed by site and road access (43.354 t/Ha/year). The results of this analysis are provided in **Table 7-5** and **Figure 7-5** and demonstrate that the existing potential soil loss at these locations, except at the bottom of the hill, is higher than estimated soil formation rates in tropical area, which is 12.5 - 35 tonnes/Ha/year (Hammer, 1981 & USDA, 1973). The data also suggests that the potential erosion from the hilltop area is significantly above the tolerable erosion rate of 35 tonnes/Ha/year calculated by PT Sulindo Eko Konsultan. This is considered to represent a worst case scenario; implementation of appropriate erosion control methods are aimed at reducing erosion rates to acceptable levels.

Table 7-5 *Calculation Result of Erosion in Project Site*

Location	R	K	LS	CP	Erosion (Tonnes/Ha/Year)
Site and Road Access	31,763.28	0.546	0.25	0.01	43.354
Catchment Area (Canal)	31,763.28	0.526	0.25	0.01	41.767
Hilltop	31,763.28	0.408	4.25	0.001	55.089
Bottom of hill	31,763.28	0.532	1.2	0.001	20.274
Notes: R = Rain Erosivity LS = Equivalent length slope and slope K = Erodibility of soil / land CP = Vegetation and soil preservation					

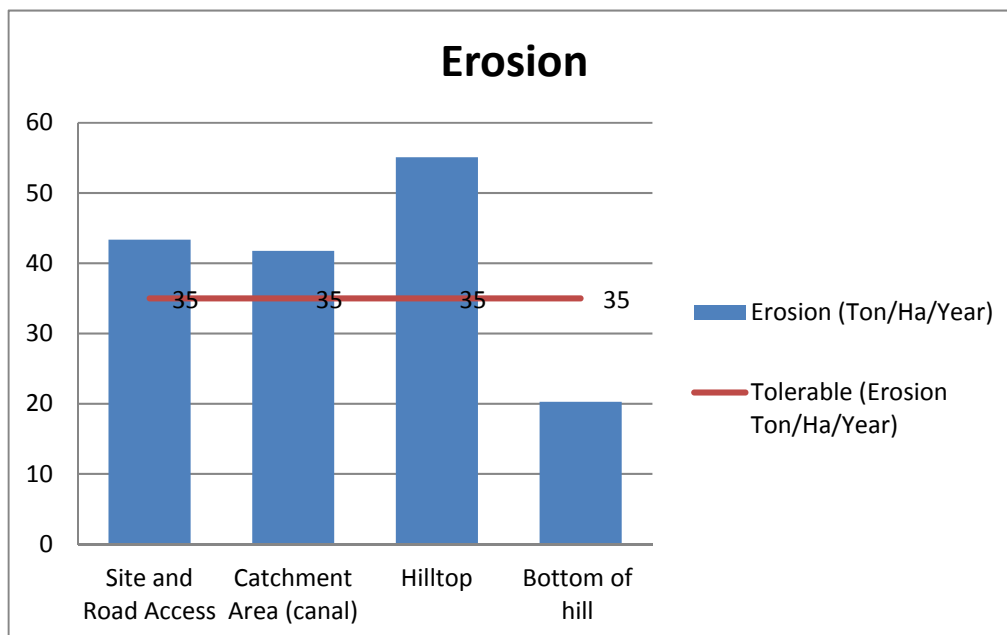


Figure 7-5 Surface Erosion at Sampling Points in Project Location

7.8

GROUNDWATER

A single groundwater sample was taken from a well owned by the local community in Wineru Village. The parameters were analysed according to Regulation of Minister of Health Number 416/Menkes/Per/IX/1990. The results are shown in Table 7-6. As can be seen in the table, none of the parameters exceed the established thresholds.

Table 7-6 Groundwater Laboratory Analysis Result

No	Parameter	Unit	Threshold Regulation of Minister of Health No.416/Menkes/Per/IX/1990	Analysis Result
Physical				
1	Temperature	°C	Air Temperature	25.4
2	Odour	-	No Odour	No Odour
3	Turbidity	SkI NTU	25	1.86
Inorganic Chemistry				
1	Chlorides (Cl)	mg/l	600	52
2	Iron (Fe)	mg/l	1.0	0.1
3	pH	-	6.5 - 9.0	
4	Fluoride (F)	mg/l	1.5	0.7
5	Cadmium (Cd)	mg/l	0.005	<LD
6	Nitrite (NO ₂)	mg/l	1.0	0.02
7	Arsenic	mg/l	0.05	<LD
8	Lead (Pb)	mg/l	0.05	<LD
9	Manganese (Mn)	mg/l	0.5	0.1
10	Mercury (Hg)	mg/l	0.001	<LD

No	Parameter	Unit	Threshold Regulation of Minister of Health No.416/Menkes/Per/IX/1990	Analysis Result
11	Zinc (Zn)	mg/l	15	
12	Hardness	mg/l	500	255
13	Chromium	mg/l	0.05	0.01

7.9

SURFACE WATER

Surface water samples were taken from Wineru River. According to the AMDAL document, the parameters were analysed according to Government Regulation Number 82 Year 2001 for Class II (**Table 7-7**). Based on the laboratory result, there are two parameters exceeding the threshold, which are H₂S and PO₄. It is possible that high H₂S concentration is caused by the existence of natural hot water spring near the river. On the other hand, phosphate (PO₄) can be related to decomposition of organic material, as well as inorganic material such as (sediment and dissolved phosphate in the water).

Table 7-7 Surface Water Laboratory Analysis Result

No	Parameter	Unit	Threshold Regulation of Government Number 82 Year 2001	Analysis Result
Physical				
1	Temperature	°C	Suhu Udara	25.4
2	TSS	mg/l	50	
3	Odour	-	No Odour	No Odour
4	Turbidity	SkI NTU	25	1.86
Inorganic Chemistry				
1	Chlorides (Cl)	mg/l	600	52
2	H ₂ S	mg/l	0.002	0.04
3	Iron (Fe)	mg/l	1.0	0.1
4	pH	-	6.0 - 9.0	7.9
5	Fluoride (F)	mg/l	1.5	0.7
6	Cadmium (Cd)	mg/l	0.005	<LD
7	Phosphate (PO ₄)	mg/l	0.2	3.5
8	Nitrite (NO ₂)	mg/l	1.0	0.02
9	BOD	mg/l	3	1
10	COD	mg/l	25	3
11	DO	mg/l	> 4	8
12	NH ₃ -N	mg/l	(-)	0.17
13	Arsenic	mg/l	0.05	<LD
14	Copper (Cu)	mg/l	0.02	0.01
15	Lead (Pb)	mg/l	0.05	<LD
16	Manganese (Mn)	mg/l	0.5	0.1
17	Mercury (Hg)	mg/l	0.001	<LD

No	Parameter	Unit	Threshold Regulation of Government Number 82 Year 2001	Analysis Result
18	Zinc (Zn)	mg/l	15	
19	Hardness	mg/l	500	255
20	Chromium	mg/l	0.05	0.01

7.10 ELECTRIC AND MAGNETIC FIELDS

Electric and magnetic fields can cause biological effects on humans. Therefore, it is important to manage electric and magnetic field exposure in project locations according to the regulations in force. The threshold for electric field and magnetic field of 50-60 Hz exposure has been published by the International Radiation Protection Association (IRPA) and the World Health Organisation (WHO). It is also regulated in the Decree of Minister of Health Number 261/MENKES/SK/II/1998 regarding Occupational health requirements. Measurements of electric and magnetic fields were undertaken as part of the AMDAL (Table 7-8). As such there were no magnetic or electrical fields detected in the Project site. Both locations were measured to have 0.000 mT and 0.00 KV/m.

Table 7-8 Magnetic Field and Electric Field Measurement Result

Location	Result		Decree of Minister of Health Number 261/MENKES/SK/II/1998
	North part of Project site	South part of Project Site	
Magnetic Field (mT)	0.000	0.00	0.5 (all day) 5.0 (short term up to 2 hours/day)
Electrical Field (KV/m)	0.000	0.00	1x10 (all day) 3x10 (short term up to 2 hours/day)

Source: Primary Data, 2016

8 *SOCIAL BASELINE*

8.1 *OVERVIEW*

The following sections present the description of social and health conditions within the Project area. Some of the information presented in this study has been obtained from the AMDAL social baseline survey and confirmed with key informant interviews and field observations by the ESHIA team. The findings presented in this chapter will be used as a baseline to assess the potential impacts of the Project on social and health aspects and also to prepare necessary measures.

8.1.1 *Scope of Baseline Study*

This section describes socio-economic and socio-cultural conditions of the potentially impacted area in the Project location. During the AMDAL and ESHIA scoping, Wineru village in Likupang Timur District, Minahasa Utara Regency of Sulawesi Utara Province is identified as the main impacted area due to its proximity (650 m east of the Project location). Data presented in this chapter includes demographic conditions, economics and livelihoods, community health, social and cultural institutional arrangements, as well as community perceptions. **Figure 8-1** shows the general village conditions and its public facilities and proximity to the Project location.

In addition, some baseline information on socio-economic conditions at the district, regency, and province level is also presented to provide a wider context.

The data and analysis presented in this report is based on the information from the secondary research and primary data collection. However, it is important to note that some data inconsistency has been found during the research. For example, the sex ratio of the population in Wineru village presented in the village profile is different from data presented in the district level. To minimize the confusion, data from village level is used as the main basis and is confirmed through interviews whenever possible.

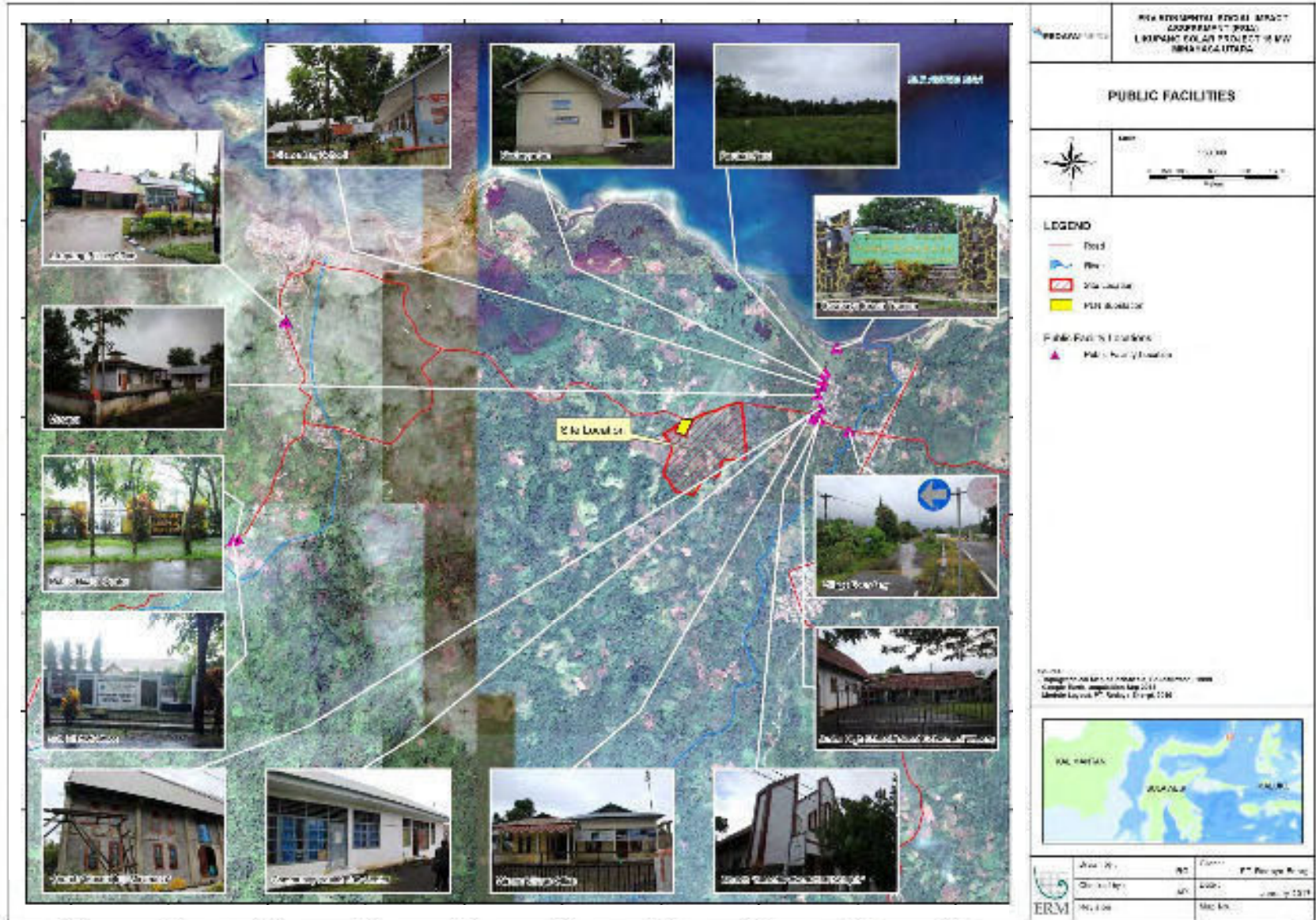


Figure 8-1 Wineru Village and its Public Facilities

8.1.2 *Methodology and Approach*

This study adopts a range of approaches to ensure the robust social baseline data includes:

- Desktop review or secondary research regarding the area from the available published documentation as well as the results of the 2016 AMDAL survey.
- Key informant interviews to gather primary data that is not available in AMDAL document, to enrich the desktop information on socio economic and socio-cultural condition, community health and safety, historical conflict and to confirm unclear information found during the secondary research.
- Field observation through visual inspection, taking photos and GPS coordinates to triangulate information from different sources such as published documentation and interview.

8.1.2.1 *Desktop Review*

A desktop review was initiated to get information about the community social baseline conditions in the Project area. The following documents were collected and reviewed prior to undertaking the data collection:

- Social baseline data presented in the Project KA ANDAL (2016) and AMDAL draft (2017), as well as the AMDAL survey notes and records (2016);
- Published documentation on demography, health, regional and local economics and livelihoods, employment, the use of natural resources, and socio-cultural of the area as follows:
 - Minahasa Utara Regency in Figures, 2016
 - Likupang Timur District in Figures, 2016
 - Wineru Village Profile, 2016
 - Government of Minahasa Utara Performance Report 2015
 - BPS Official Website, 2016
 - Wineru Public Health District Centre, 2016
 - Likupang Timur Public Health Centre Profile, 2016
- Published online news:
 - <http://mediaIndonesia.com/news/read/62816/90-persen-jalan-nasional-di-sulut-tuntas-di-2016/2016-08-22>, accessed on 3 February 2017
 - <https://www.tribrataneews.com/angka-laka-lantas-di-sulawesi-utara-tahun-2016-menurun/> , accessed on 3 February 2017
 - <http://www.jurnalmanado.com/2016/12/angka-lakalantas-di-sulut-tahun-2016.html> , accessed on 3 February 2017.

8.1.2.2 Key Informant Interviews

Key informant interviews were conducted by two ERM consultants on January 24-26 2017 during an additional survey that was undertaken to gather social baseline information that was not yet available from the desktop review.

During these interviews a female group was engaged representing a shop owner, midwife and village secretary. Additionally two respondents from the fisherman's household in Wineru were female.

The information gathered from the key informants and stakeholders and discussed topics is listed in **Table 8-1**.

Table 8-1 Key Informant Interviews

Key Informant	Issues Discussed
Head of Wineru Village	Socio-economic condition of the village, social and cultural arrangements, knowledge about the project, concerns and expectations related to the project.
Wineru Village Secretary	Socio-economic condition of the village, social and cultural arrangements, knowledge about the project, concerns and expectations related to the project.
Land Owner	Land acquisition process, socio-economic condition, knowledge about the project, concerns and expectations related to the project.
Fisherman in Wineru	Socio-economic condition of the village, knowledge about the project, concerns and expectations related to the project.
Grocery shop owner in Wineru	Socio-economic condition of the village, knowledge about the project, concerns and expectation related to the project.
Midwife of Wineru Public Health Sub-centre	Health profile of Wineru village, knowledge about the project, concerns and expectations related to the project.
Head of Economy and Community Development Section of Likupang Timur District	Role of Likupang Timur District in terms of village/ community development, supervision on in-migrant workers and local workers recruitment as well as the village interest towards project.
State-Electricity Company (PLN) of Suluttenggo Area	Electricity supply and demand in the area of Sulawesi Utara, Gorontalo and Sulawesi Tengah. Future strategy on electricity supply.
Sulawesi Utara Province Energy and Mineral Resources (EMR) Agency	The role and authority of Sulawesi Utara Province Energy and Mineral Resources (EMR) Agency in energy fulfilment strategy, especially on electricity.
National Land Agency in Sulawesi Utara	The status and process of land acquisition in the project area.

Source: Primary Data Gathering, 2016

8.1.2.3 *Field Observation*

Field observations were carried out during the additional ERM survey, at the village and district level covering the following aspects:

- Health facilities;
- Education facilities;
- Religion facilities;
- Community security system;
- District and Village government facilities;
- Public transportation services and infrastructures;
- Economic facilities and infrastructures;
- Community daily activities; and
- Community use of natural resources and livelihood.

During the field visit, the area suffered from constant heavy rain for more than 24 hours resulting in flooding and landslides in several locations. Therefore, the field observation results could not be used to generalize the situation of the area especially the physical conditions of the infrastructure such as roads and other public facilities.

8.2 *SOCIO-ECONOMIC BASELINE*

The AMDAL presented some social baseline information at the district and regency level. This section will summarize key information while adding more detail at the village level.

8.2.1 *Demographics*

8.2.1.1 *Population*

Based on Minahasa Utara Regency in Figures for 2016, the total population of Minahasa Utara Regency is 198,084 people; consisting of 100,719 males and 97,365 females. Compared to other regencies' population within Sulawesi Utara Province, Minahasa Utara has the fifth largest population with a population density of approximately 187 people per km² not so densely populated area compared to other regencies or cities in Sulawesi Utara Province (e.g. Minahasa Regency population density is ±274 people per km², while Manado City's is 2,536 people per km²).

Furthermore, data from Minahasa Utara Regency in Figures (2016) reveals that in 2014, the total population of Likupang Timur District is 18,564. This number comprises 9,520 males and 9,044 females. With a total area of 152.61 km², the population density in Likupang Timur is 124 people per km². In general, the population of males is higher than females which are reflected in the figures of sex ratio 105.32. This shows that for every 100 females there are about 105 males.

Wineru Village is stipulated as a definitive village under Likupang Timur District administrative since 1987. The village profile 2016 reports that the total population of

the village is 1,349 people comprising 608 males and 741 females. The sex ratio in the village is 82.05. The population density in the village, which covers an area of 7.5 km², is 181 people per km²—less populated than the population density of the whole regency area (Table 8-2).

Table 8-2 *Population Density*

Village	Household	Population			Sex Ratio	Area (km ²)	Population Density (person/km ²)
		Male	Female	Total			
Wineru	355	608	741	1,349	82.06	7.5	181

Source: Wineru Village Profile, 2016

8.2.1.2 *Growth and Migration*

Data obtained from Sulawesi Utara Province Statistics Office (BPS) shows that the population in Minahasa Utara Regency grew at a rate of 0.95% between 2010 and 2015. In 2010, there were 188,904 people in the Regency and increased to 198,084 people in 2015. The annual population growth rate in Sulawesi Utara Province and Minahasa Utara Regency, as well as the district and village where the Project is located is shown in Table 8-3.

Table 8-3 *Population Growth Rates*

Province/Regency	Population Growth			Annual Population Growth Rates (%)
	2010	2014	2015	2010-2015
Sulawesi Utara	2,270,596	2,386,604	2,412,118	-
Minahasa Utara Regency	188,904	196,419	198,084	0.95
Likupang Timur	16,519	-	18,564	2.48
Wineru Village	1,224	-	1,304	1.31

Source: BPS Official Website, 2016

More detailed information from BPS and the AMDAL indicates that the population growth in Wineru village is 1.31% annually. This growth is likely due to the difference in births and deaths and people's migration from and to Wineru Village.

There is no official data providing detailed information about the migration rate in Wineru Village. However, the Village Head of Wineru explains that many people migrated from Sangihetalaut, Bugis, Java, and other parts of Minahasa to the village either for short or long term purposes. The common reasons for the migration are work or business. The Village Secretary confirmed that more people moved to the area since 2008, in line with the increasing job opportunities in the surrounding village/ within the district areas which resulted from many projects such as gold mining, hotel and recreational businesses, and electricity power house. This indicates

the community's familiarity with construction activities and the presence of in-migrants.

8.2.2 Religion

The majority religion of Minahasa Utara is Christian and accounts for approximately 78% of the total population in 2015. The same situation was observed at the village level. As shown in **Table 8-4**, more than 69% of the Wineru population is Christian. GMIM (*Gereja Masehi Injili di Minahasa*) is the biggest church denomination accounting for 501 people.

Table 8-4 Religion Distribution in Wineru Village, Likupang Timur District, 2016

No	Religion	Religion Distribution in Wineru Village	
		Number	Percentage
1	Christian	841	69.38
2	Islam	358	29.53
3	Catholic	13	1.07
4	Hinduism	-	
5	Buddhism	-	
6	Konghucu	-	
Total		1,212	99.98

Source: Wineru Village Profile, 2016

People of Wineru village practice their religion in various religion facilities located within the village as showed in **Figure 8-2** and **Table 8-5**.

Table 8-5 Religion Facilities in Wineru Village

No	Village	Religion Facilities			
		Mosque	Small Islamic Prayer Room	Christian Church	Catholic Church
1	Wineru	1	0	5	0

Source: Wineru village profile, 2016

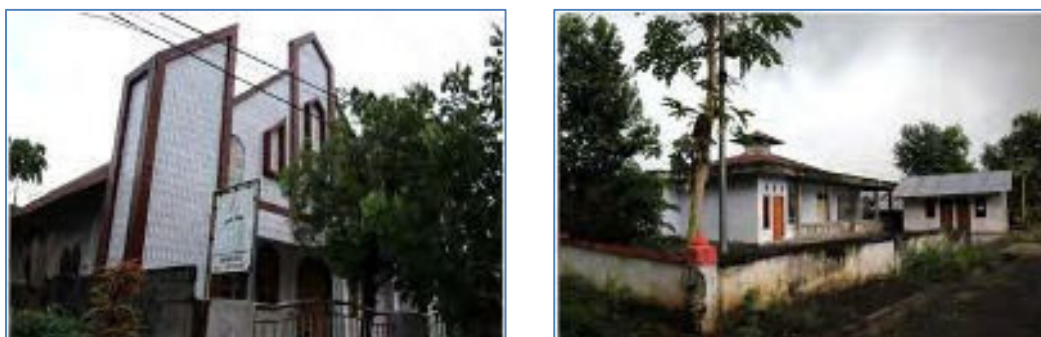


Figure 8-2 Religion Facility in Wineru

People in the Regency typically have a strong religious nature, but also possess strong kinship and a sense of mutual cooperation. As such the potential for religious conflict or political turmoil in Minahasa Utara Regency is considered to be relatively low. According to the Village Head of Wineru, there has been no history of race or religious based social conflict in the village confirming that different religious and ethnicity groups live in harmony. This is demonstrated by the community meetings whereby a prayer led by Christians opens the meeting and a Muslim prayer end the meeting.

8.2.3 Education

Minahasa Utara has a good distribution of education facilities in all districts, although there is no university or college within the Regency (students go to nearest city e.g. Manado). As seen in **Table 8-6**, Minahasa Utara Regency in Figure reports that there are 126 Kindergartens, 166 Elementary Schools, and 94 Junior High Schools in 2016 across the regency.

Table 8-6 Education Facilities in Minahasa Utara Regency

District	Elementary School (ES)		Junior High School (JHS)		Senior High School (SHS)		Total		
	Public	Private	Public	Private	Public	Private	ES	JHS	SHS
Airmadidi	12	9	3	3	2	4	21	6	6
Kauditan	10	14	3	4	1	2	24	7	3
Dimembe	11	11	2	2	1	1	22	4	2
Wori	14	8	6	2	1	1	22	8	2
Likupang Timur	13	8	6	4	1	2	21	10	3
Likupang Barat	13	11	7	6	-	3	24	13	3
Kema	11	5	3	4	-	3	16	7	3
Kalawat	10	4	3	2	1	2	14	5	3
Tawalaan	9	9	3	2	-	2	18	5	2
Likupang Selatan	4	4	2	1	-	2	8	3	2
Total	107	84	38	36	7	21	191	74	28

Source: Government of Minahasa Utara Performance Report, 2015

The number of senior high schools graduates in Minahasa Utara Regency was not available; however the participation rate of senior high school students was reported at 70%. Meanwhile, in Likupang Timur District, education facilities are available for all education level as presented in **Table 8-7**.

Table 8-7 Education Facilities Distribution in Likupang Timur District

Education Level	School	Students	Teacher
Kindergarten			
PAUD/TPA/TPQ	0	0	0
TK	21	144	16
RA	0	0	0
Elementary School			
SD	20	858	0
MI	0	0	0
Junior High School			
SMP	11	2,240	106
MTs	0	0	0
Senior High School			
SMU	2	0	0
SMK	1	0	0
MA	0	0	0

Source: Minahasa Utara Regency in Figures and Likupang Timur District in Figures, 2016

In Wineru village, education facilities are available from kindergarten to senior high school as showed in **Figure 8-3**. Each level has one active facility except the senior high school which is reported inactive due to teachers' unavailability and lacking capacity of Wineru Village Government to manage the school.

Data obtained from Wineru village profile (2016) shows that 98 people graduated from senior high school, 22 people are currently enrolled in university or higher education institution, and 22 people are reported to hold bachelor degree. This indicates the number of potential future job seekers in the village.



Figure 8-3 Education Facility

8.2.4 Regional Economy and Community Livelihood

There are three main sectors which provide the highest contribution to the region's Gross Regional Domestic Products (GRDP) namely agriculture, forestry, and fisheries, processing industry and construction. Other sectors include mining, quarrying, wholesale, retail and motor repair contribute a small proportion to the Regency's economy (Table 8-8). In general, the regional economy and livelihoods of Minahasa Utara Regency indicate a high dependence on the agricultural sector. This is also reflected in Winaru village where the majority (30%) of the village's livelihood is farming.

Table 8-8 Regional GDP Distribution in Minahasa Utara Regency based on Sectors Category, 2014 - 2015

Category	2014 (IDR)	2015 (IDR)
Agriculture, Forestry, and Fishery	2,517,457.4	2,791,926.0
Mining and Quarrying	828,694.0	950,226.2
Processing Industry	1,028,934.2	1,150,031.9
Electricity and Gas Supply	6,714.8	8,208.2
Water Supply, Rubbish Management, Waste and Recycling	6,598.9	7,154.5
Construction	1,067,552.4	1,250,464.6
Wholesale and Retail and Motor Reparation	772,946.1	890,344.0
Transportation and Warehousing	386,437.7	479,461.4
Accommodation and Restaurant	81,369.6	95,771.9
Information and Communication	143,080.7	165,581.2
Financial Service	63,413.3	68,794.3
Real Estate	444,431.5	507,642.2
Business Service	1,327.3	1,540.3
Administration, Defence, Social Assurance	403,035.6	453,365.4
Educational Service	258,876.9	297,794.6
Health Service and Social Activity	203,781.5	225,318.4
Other services	47,521.7	54,363.1
RGDP	8,262,173.8	9,397,988.2

Source: Minahasa Utara Regency in Figure, 2016

8.2.5 Labour Market

The data from Minahasa Utara Regency in Figures (2016), mentioned the number of registered job seekers in Minahasa Utara Regency was 126 people, comprises 48 males and 78 females. Out of this number, 65.08% or 82 people are senior high school graduates. Meanwhile, based on the age group, about 59.52% of registered job seekers or 75 people belong to the 30-44 age group as shown in Table 8-9. The table shows the number of job seekers based on education status and gender.

Table 8-9 *Number of Registered Job Seekers and Those Assigned by Educational Levels in Minahasa Utara Regency*

Educational Level	Job Seeker		
	Male	Female	Total
Not Yet Attending School and Do Not Graduated From Elementary School	0	0	0
Elementary School	1	0	1
Junior High School	1	2	3
Senior High School	27	55	82
Vocational Senior High School	7	5	12
Diploma I/II/ III	3	3	6
University	9	13	22
Total	48	78	126

Source: Minahasa Utara Regency in Figures, 2016

Specifically at the village level, Wineru Village Profile (2016) reveals that there are 91 unemployed people in the village, however there was no available data indicating that unemployed villagers are involved in informal sectors. This indicates the number of potential job seekers in the village.

8.2.6 *Farming and Plantation*

Similar to the Minahasa Utara Likupang Timur's main income also comes from the agricultural sector with rice being the most widely produced crop. Production levels can be as much as 1,815 tons per year. The second major commodity is cassava amounting to 1,640 tons per year. For plantation crops, coconut is the largest commodity with a total production of 3,591.61 tons per year. **Table 8-10** shows the number of households in Likupang Timur District with the main livelihoods based on the farming sub-sector or agriculture commodities.

Table 8-10 *Number of Households based on Commodity 2015*

Sub-sector/Commodity	Household
Farming	2,819
Crops	1,259
Horticulture	948
Plantation	1,369
Livestock	775
Aquaculture	30
Fishing	621
Forestry	268

Source: Likupang Timur in Figure, 2016

Agriculture is also the biggest economic sector in Wineru village. The village profile reports that 684 villagers worked in the agriculture and husbandry sector in 2016. Out of 750 Ha, 420 Ha are used for farming and 42 Ha for husbandry. The main crop in Wineru village is corn and the common livestock are cows and goats as shown in **Figure 8-4**. Based on interviews with the land owner and field observations, the project location and the surrounding fields are used as corn farm land and some open areas are used as grazing fields for cows.



Figure 8-4 Corn as Main Crop in Wineru and Livestock are Cows

8.2.7 Fisheries

The fisheries sector is one of the potential economic streams in Minahasa Utara Regency. The number of households working in the fisheries sector was 12,470 in 2015 with the production level reaching 17,672.03 tons. The dominant products of the fisheries sector in Minahasa Utara Regency are tuna and mackerel fish. Meanwhile in Likupang Timur District although fisheries are not the main income sector, 621 households were recorded as fishermen using 2,393 boats as fishing tools as shown in **Table 8-11**.

Table 8-11 Number of Type Boat/Ship in Likupang Timur

Type of Boat/Ship	Total
Non-motorized boat	495
Outboard motors	1,863
Motor boat	35
Total	2,393

Source: AMDAL Survey, 2016

Wineru Village is located in a coastal area as its northern side borders with the Bangka Strait. It was identified during the ERM survey that some of the villagers are working as fishermen as a main occupation or second job however, there is no official data confirming the exact number of fishermen in the village. Interviews with the fishermen reveal that they use traditional gear to fish and their income is significantly affected by the weather condition. Some fishing communities were observed residing along the coast, however relatively far from the Project location (i.e. 1 km north east of the Project location), as shown in **Figure 8-5**.



Figure 8-5 Fisherman in Wineru village

8.2.8 Other Livelihoods

The Village Head of Wineru confirmed that economic development in the village is showing a positive trend due to the growing number of small businesses within the area such as grocery stores, food stalls and sellers, transportation services, carpentry, and tourism.

Some of the villagers also provide rooms for rent (roughly IDR500,000 (USD ±37) per month) for in-migrants who live temporary in the village for business purposes. Mr. Herman, the previous land owner of the Project location is currently developing a residential complex due to the anticipated increased demand for housing in the area.

It is also common for the local people to work on multiple jobs; depending on available opportunities. For example, farmers will take a job as construction labourer if there is a demand within the area. As such there is likely to be an available pool of skilled and unskilled workers in the local area to meet some of the needs of the Project.

8.2.9 Poverty

The Wineru Village profile of 2016 shows that the number of poor families (categorized as pre-prosperity families) in the village is 306 households; only 22 households fell under the prosperity family category.

Table 8-12 Number of Poor Households in Wineru Village, 2016

Prosperity level	Number of households	
Pre-Prosperity family	306	93.29 %
Prosperity family	22	6.74 %

Source: Wineru Village Profile, 2016

Based on the interview with the village secretary, there is no fixed indicator that is used by the village government to determine the poverty status of the villagers. The categorization is decided based on criteria namely the condition of the house (thatched roof, bamboo wall, and earth floor), income certainty, and the ability to pay for children school fees and daily expenses.

However, field observations revealed the opposite as the majority of the houses in Wineru Village were made of concrete walls, zinc roofs, and cemented or tiled floor.

It is also common to see cars and motorcycles parked in the houses' terrace. The poverty condition is more obviously seen in the coastal area, where many of the houses are built on the land without title and made of modest materials such as bamboo, wood, and thatched roof. People in the area also use public bathrooms or emergency toilets as sanitation facilities.

To tackle the poverty issues, the national government has issued policies such as provision of rice for poor families (also known as Raskin), subsidy programs for education through Kartu Indonesia Pintar (KIP), and also subsidy programs for health through Kartu Indonesia Sehat. In Wineru Village, 48 households are registered to receive rice via the Raskin program.

The village government also initiates some programs to boost the economic growth such as establishing savings and credit groups and women empowerment through the PKK group. Other initiatives are also implemented by companies nearby the village. For example, PT MSM (Meares Sopotan Mining) conducts economic empowerment programs namely:

1. Distribution of pesticides through farmers' groups;
2. Providing revolving capital to buy stocks such as goats and cows for livestock breeder groups; and
3. Providing motorized machines for fishermen groups.

8.3 *LAND ACQUISITION*

The Project requires 29.4 Ha of land for the main and supporting facilities. The company sets a standard procedure for the land acquisition process as shown in **Figure 8-6**.

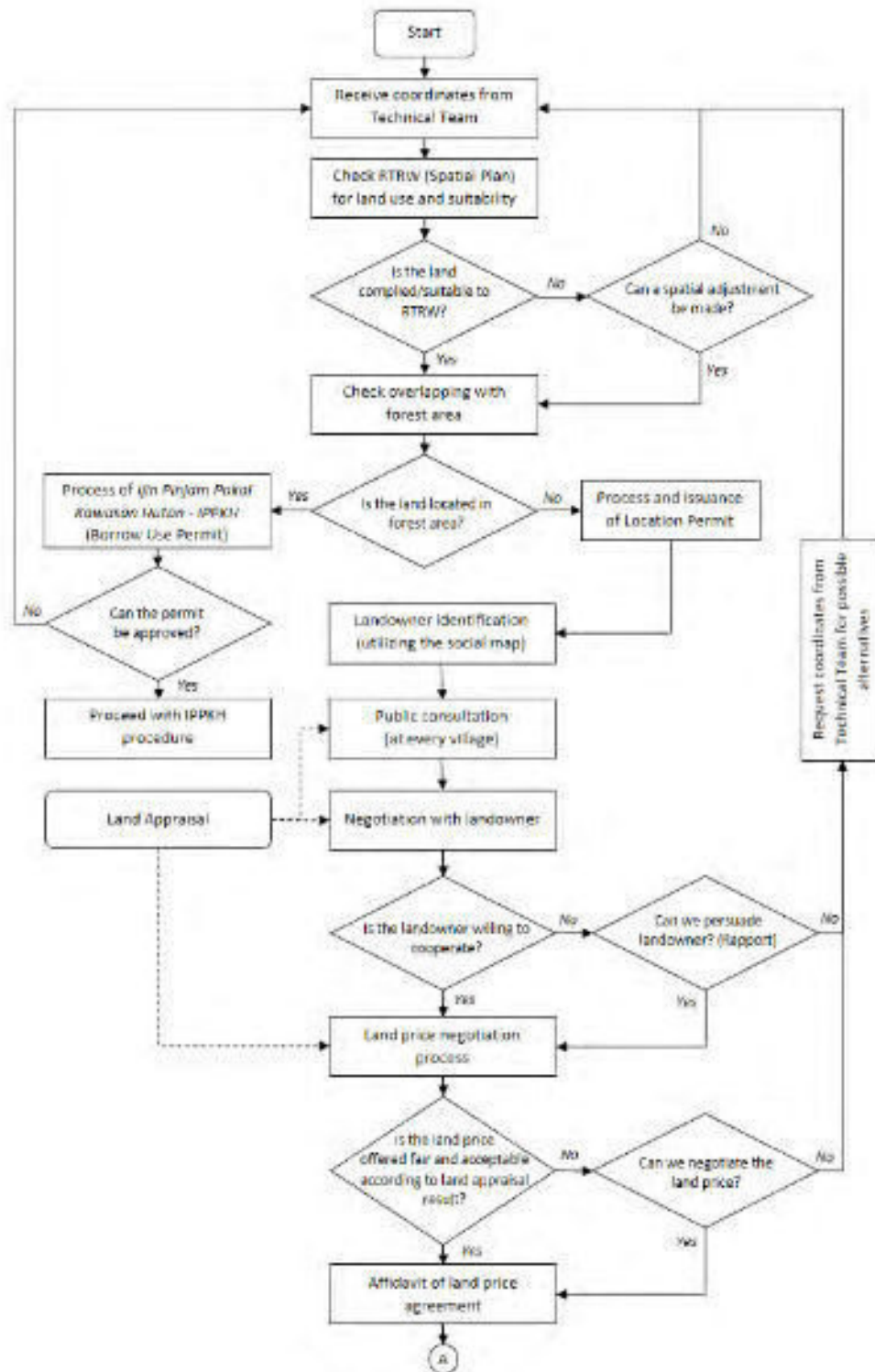
The land acquisition process started in 2016 with a relatively smooth process since the proposed land (± 29.4 Ha) was owned by a single land owner. The land owner is a well-known businessman in the area. Some of his business sectors include fish farming, coconut farming, housing and infrastructure construction, and heavy equipment rental. The remaining land (9 Ha) has not been acquired by the project and is still owned by the land owner.

Both parties (the land owner and the project) agreed on the land value of IDR 35,000 (USD 2.5) per square meter. The compensation of land was paid to the landowner in June 2017 after all the land's legal documents were cleared.

The land title clearing process was contested by another family who claimed to own the land where the Project will be located. According to the village head of Wineru, the family are descendants of the village head who ruled the area in 1929 during the colonial era. They claimed to own plots of land within the Wineru village although they do not possess legal documents to prove the ownership. The mediation process between the disputing parties involved the regional land office and was held in the village hall in early January 2017 but resulted in no agreement. The contesting family was recommended to register the case with the court within 1 month. The land owner

plans to sue the contesting family if they do not register the case to the court within 1 month.

At the time the ERM Survey was conducted, the issue had not been fully resolved. However, the Project and the Village Government have generally acknowledged that the current land owner is the legitimate land owner. According to the last update on 6 March 2017, this case had not been registered with the court, therefore the National Land Agency or Badan Pertanahan Nasional (BPN) has stated that there is no dispute regarding the land. The certificate has already been issued.



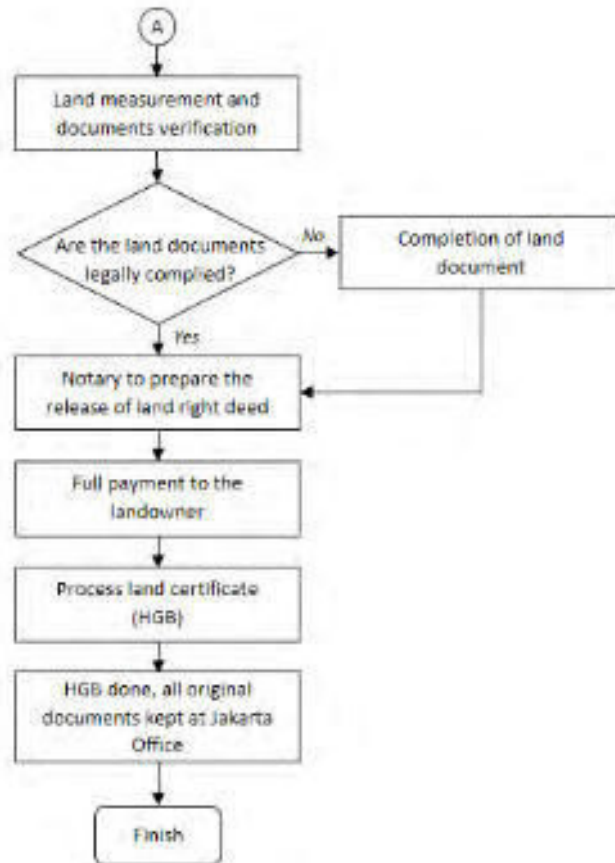


Figure 8-6 *Standard Procedure for the Land Acquisition Process*

The land owner confirmed that the area was used for corn farming and other dry land crops such as rice and chili with rain fed agriculture system. To manage the plantation, the land owner hired on average of 40 casual workers although this was dependent on the workload of the land and harvesting. The corn farming activities were stopped immediately after the agreement on the land acquisition was achieved. The land owner confirmed that he has hired some of these land users for some construction activities he is involved in. Given the level of economic activities in the area and the fact the land users were only casual labourers it is not anticipated that they will be impacted by the land acquisition. According to the land owner, there was no resistance from the land users during the land acquisition process. The same information was also confirmed by the Village Head.

Some famers in Wineru village also use the project location as an alternative route to access their farming lands and to allow their cattle to graze. As such the Project is advised to agree suitable access to their lands via the Project area.

8.4 *COMMUNITY SAFETY AND SECURITY*

8.4.1 *Transportation and Road Safety*

Infrastructure development in Sulawesi Utara includes national road construction; 90% out of the targeted 1,663 kilometres of national road was constructed in 2016. The

remainder will be finished by the end of 2017³. The government is also constructing a toll road from Manado to Bitung, including some of the roads which will be traversed by the Project's construction vehicle and equipment, with a total length of 39 km and 40m to support the national government plan which assigns Bitung city as a special economic zone. Data from Wineru Village Profile (2016) indicates that the village is passed by 6.5 km of province road, 2 km of regency road and 4 km of village road, and 750 m of footpath. **Table 8-13** shows more detailed information about the road conditions.

Table 8-13 Road Condition in Wineru Village, 2016

Type of Roads	Length of Roads	Condition of Roads
Province road	6.5 kilometres	3 kilometres is in good condition, asphalted. 3.5 kilometres is not asphalted.
Regency road	2 kilometres	1 kilometre is in mild damage; 1 kilometre is in severe damage
Village road	4 kilometres	1 kilometre is in mild damage' 3 kilometre is in severe condition
Footpath	750 meter	750 metre is in severe condition

Source: Wineru village profile, 2015

Based on this data a few kilometres of the province road within the Wineru Village is not yet asphalted, however the recent NARI-SOLEQ Survey Report (developed to assess the Project mobilization route and from the observation during the ERM additional survey) identified that the road which will be traversed by the Project during construction phase is generally in relatively good condition (see **Figure 8-7** below).



Figure 8-7 Roads within Wineru village

In 2016, there were 1,265 cases of traffic accidents reported in Sulawesi Utara Province with 230 casualties. This number decreased from 2015 where 1,625 cases were reported with 318 casualties⁴. Unfortunately, there is no official data reporting the number of traffic accident in Likupang Timur District as well as in Wineru Village. It

³ Source: Media Indonesia 22 August 2016. Available at <http://mediaindonesia.com/news/read/62816/90-persen-jalan-nasional-di-sulut-tuntas-di-2016/2016-08-22>; accessed on 3 February 2017

⁴ Source: Tribun Manado 2 January 2017. Available at <https://www.tribatanews.com/angka-laka-lantas-di-sulawesi-utara-tahun-2016-menurun/>; accessed on 3 February 2017; Jurnal Manado 31 December 2016. Available at <http://www.jurnalmanado.com/2016/12/angka-lakalantas-di-sulut-tahun-2016.html>; accessed on 3 February 2017

was identified from the interview with the Village Head and some of the community members that in the last past two years there have been no traffic accidents within the village.

Field observations show that the road conditions in the village and the surrounding area are adequate with no traffic congestion. Although few people use helmets when driving motorcycles more people were observed without helmets (**Figure 8-8**).



Figure 8-8 Road Behaviour: Motorcycle Riders without Helmets

8.4.2 Tourism and Recreational Activities

Although tourism was not recorded as contributing to the regional GDP for Minahasa Utara, the Minahasa Utara Regency Performance report of 2015 cited tourism as an important economic sector. Some programs have been initiated to improve tourism facilities and infrastructures and promote tourism sites. Wineru Village is assigned as a tourist village by the government. One of the tourism sites in the village is Pantai Surabaya (**Figure 8-9**). It is located approximately 650 m north east of the Project location.

Some of the Wineru villagers open food stalls and shops on the beach. Based on an interview with the shop owner, many people visit the beach during the weekend and public holidays. However field observation shows that the facilities and infrastructure of the site are not adequate and need improvement.



Figure 8-9 Surabaya Beach in Wineru Village

8.5 SOCIO-CULTURAL

8.5.1 *Ethnic Groups Diversity*

There was no statistical information on the population of ethnic groups and the diversity in Wineru Village. However, the interview with the Head of Village revealed that the majority of the local people in Wineru village belong to Sangihe Talaud ethnicity. Sangihe Talaud is one of the Minahasa sub-ethnic groups. The original Sangihe Talaud ethnic is known as having reliance toward plantation farming and fishing as their sources of income.

As discussed before in-migrants from other ethnic groups are living in the village including Javanese, Bugis and Gorontalo. Some people also migrated from Manado, Bitung and Kalimantan. These people have been migrating to the area for over ten years ago, triggered by a range of development projects in the area including mining and tourism.

8.5.2 *Social/Customary Institutions and Figures*

Based on consultation with a number of village stakeholders during the ERM survey, there are few respected key figures in the Wineru Village community; religious leaders are the most respected figures, follow by government officials and education professionals.

Presently, formal customary institutions or organization are not present in the village because the practice of cultural traditions has been decreasing with village development. In terms of customary institution, the Village Head also has a role as a customary leader which is locally called *Hukum Tua* (old law). The Village Head also plays the role of mediator if there is any conflict in the community.

The local government has a major role in the community's daily life. As such it is expected that the Project will involve village government (as key stakeholder) in decision making related to the Project's potential impacts to the environment and community, including the process of labour recruitment and land acquisition.

8.5.3 *Women Role in Community*

Women have an important role in the village, for example the Village Secretary of Wineru is a woman. The Family Welfare Guidance/Pembinaan Kesejahteraan Keluarga (PKK) is a civil society organization for women and is active in terms of participating in the village's development e.g. organizing the integrated health service (*Posyandu*) focusing on children and maternity health care.

8.5.4 *Crime and Community Security Systems*

The head of Wineru Village conveyed that crime such as robbery, theft, or rape is minimal in the village. However excessive alcohol consumption has been reported to often cause fighting between young men. Alcohol consumption by locals was also observed during the day time along the coastal area.

In terms of community security crimes are processed internally by involving the village government if they cannot resolve the issue it is dealt with via the police or courts.

8.5.5 *Historical Conflict*

It was identified during the ERM Survey that there past conflict had occurred involving the Wineru community and the gold mining company PT MSM (Meares Soputan Mining). This involved public demonstrations against the company in 2012 triggered by community disagreement toward MSM's policies on land acquisition, waste management and worker recruitment.

8.5.6 *Community Perceptions*

The AMDAL reveals that selected community members of Wineru Village are aware of the Project. It also concluded there is a positive attitude towards the Project. The community expects that the Project will provide benefits through local employment, opportunities for local suppliers such as catering, and support in the promotion of Wineru Village as a tourism destination.

However, some concerns were also recorded related to the road traffic accidents during construction, potential road damage caused by potential increased number of heavy equipment and vehicles as well as noise, dust and vibration. Radiation was also raised as a concern from the solar panels.

Similar expectations and concerns were also identified from the ERM Survey which involved consultation with key stakeholders from Wineru Village, Likupang Timur District, and Minahasa Utara Regency.

8.6 *COMMUNITY HEALTH*

8.6.1 *Key Health Indicator*

Morbidity level and the average length of illness are indicators that can describe a community's health status. A lower rate of morbidity means a better handling of health complaints in an area.

Data from the Sulawesi Utara Province Statistics Agency (2016) identified that the life expectancy rate in Minahasa Utara Regency in 2015 was 70.79 years. This was slightly below the Sulawesi Utara Province life expectancy rate in 2015 which was 70.99 years. This number has increased from the previous year, i.e. 70.62 in 2010. According to the National Statistics Office, the life expectancy at the national level in 2010-2015 was at 70.1.

Life expectancy rate generally indicates the success level of a region's economic and health development. High life expectancy suggests good community health conditions, health knowledge and education levels, as well as good access to health services.

No official data records are available on mortality rates at the district or village level.

8.6.1.1 Births

Data from the 2016 Likupang Timur District in Figures indicated there were 131 births recorded. Meanwhile, at village level, according to an interview with the Wineru village midwife, there were 15 births in 2016 (approximately 10% of total birth number in the district), 11 of them were helped by the midwife in village health facility and 4 were referred to the hospital. There were 9 pregnancies reported until January 2017.

8.6.1.2 Disease Status

Respiratory infections (ARI - Acute Respiratory Infection) are the most prevalent diseases in Wineru Village, followed by gastritis and skin diseases. There were 314 cases of these three diseases reported in 2015. This number is considerably lower compared to the total population of Wineru Village in the same year, where out of 1,304 people only 18% of the villagers suffered from ARIs.

Table 8-14 The Ten Illnesses Treated in Public Health Center in Wineru Village

No.	Illness Type	Number of Patient		
		2013	2014	2015
1	Acute Respiratory Infection	220	165	235
2	Gastritis	59	51	40
3	Diarrhoea	47	46	36
4	Arthritis	46	25	16
5	Diabetes Mellitus	34	10	20
6	Injured	38	27	21
7	Skin disease	22	10	39
8	Hypertension	46	25	20
9	Arthralgia	19	23	35
10	Obs. Febrile	11	10	0
11	Tonsillitis	0	0	32

Source: Wineru Pustu, 2016

8.6.2 Water Availability

As reported in the AMDAL, most of the households in Wineru Village obtain clean water from dug wells as presented in the **Table 8-15**. The dug well water is mostly used for daily activities such as cooking, washing, and bathing. The trend to drink sterilized bottled water is currently increasing among the villagers. The type of dug well construction in Wineru Village shown in **Figure 8-10**.

According to the Geoelectric exploration report conducted by Samratulangi University in 2017 (**Annex D**), the shallow community dug wells have depths ranging from 1.55-3.35 m.

The municipal water line is available at Wineru village but it is not reliable as the quality and the quantity does not suffice the water needs. Thus, the community mostly rely on shallow wells for their daily water needs.

The community opt to buy sterilized bottled water rather than boiling the well water considering the price and practicality aspects. This trend is also supported by the presence of sterilized water provider business that is located in the village.

Table 8-15 *Source of Clean Water for Drinking and Cooking*

Water Source	Drinking and Cooking		Toilet	
	Frequency	(%)	Frequency	(%)
Dug Well	26	86.4	26	86.4
Artesian Well	4	13.6	4	13.6
Total	30	100.0	30	100.0

Source: AMDAL Survey, 2016



Figure 8-10 *A Dug Well*

8.6.3 *Environmental Sanitation*

The environmental sanitation of a village is a good indicator of the quality of community health conditions. Some aspects are important when considering environmental health including availability of clean drinking water, sewage disposal (household toilet), and domestic waste disposal. The AMDAL identified that 60% of the representative households used private septic tanks as toilets. **Table 8-16** also shows that 20% of households are still using public toilets.

Table 8-16 *Toilet for Bathing, Washing and Defecation*

Toilet Type	Defecate	
	Freq.	(%)
Septic tank	18	60
Public Toilet	6	20
Emergency Toilet	4	13.3
Private outside house	2	6.7
Total	30	100.0

Source: AMDAL Survey, 2016

The table also shows that 13.3% of the population still have difficulties in accessing adequate toilet facilities, hence are using the emergency toilet which typically is made of recycled materials as shown in **Figure 8-11**.



Figure 8-11 Emergency Toilet is made of Recycled Materials

8.6.4 Health Awareness and Behaviour

As has been discussed earlier excessive alcohol consumption occurs on in the community. This was identified from interviews with some of the village figures.

Waste management aims to improve community health and environmental conditions. Local waste management practices are considered good if the waste does not become a breeding ground for bacteria and therefore an intermediary medium for the spread of disease. It is also important that waste is managed so that it does not pollute the air, water and soil.

Based on the AMDAL generally the community disposes of the waste to backfilling/burning in backyards/gardens around their house and disposing to nearby public waste disposal places (*tempat pembuangan sampah/TPS*). These are summarized in **Table 8-17**. This condition shows that waste management is not well managed and may result in future environmental and public health issues, especially with the potential additional population of the village once the Project starts construction.

Table 8-17 Community Waste Management System

Waste Management Types	Frequency	(%)
Dumped in a hole in the yard	4	13.3
Discharged to public waste disposal place (TPS)	5	16.7
Backfilled/burnt on backyard/garden around house	21	70
Total	30	100

Source: AMDAL Survey, 2016

When dealing with illnesses the AMDAL indicates that the majority of the villagers (76.6%) go to the public health centre (*Puskesmas*) for immediate health treatment with only a smaller proportion of the population visiting the doctor or hospital (Table 8-18).

Table 8-18 Destination for Health Treatment

Destination of Health Treatment	Frequency	(%)
Doctor (General Practitioner)	5	16.7
Hospital	2	6.7
Public Health Centre (<i>Puskesmas</i>)	23	76.6
Total	30	100.0

Source: AMDAL Survey, 2016

8.6.5 Health Facility and Infrastructure

Minahasa Utara government performance report of 2015 claims that coverage of health facilities in the regency has achieved the target of 100% meaning every citizen has access to health facilities. There are three hospitals in Minahasa Utara Regency comprising one regional public hospital (Maria Walanda Maramis hospital) and two private hospitals (RSU Hermana and RSU Tonsea). Other health facilities available in the regency are public health centres, village maternity posts, community health centres sub-centres, and also mobile community health centre inland and sea (Table 8-19).

Table 8-19 Total Unit Public Health Facilities Available in Minahasa Utara Regency 2016

No	Health Facilities	Total Unit
1	Regional Public Hospital in Minahasa Utara Regency	1
2	Private hospital	2
3	Public Health Centre (<i>Puskesmas</i>)	11
4	Public Health Sub-Centre (<i>Puskesmas Pembantu/Pustu</i>)	30
5	Village Maternity Post (<i>Polindes</i>)	21
6	Village Health Centres (<i>Poskesdes</i>)	44
7	Mobile public health centres (<i>Puskesmas keliling</i>)	
	– Car	4
	– Bicycle	41
	– Speed boat	4
	Total	158

Source: Minahasa Utara Government Performance Report, 2015

In Likupang Timur District, almost all villages have an integrated health service (*posyandu*) facility. The health facilities in the area are considered relatively suitable to cover the health and treatment of the community. However, it was identified during the ERM Survey that the presence of a drugs store in the district is insufficient

compared to the needs of community. The number of health facilities in Likupang Timur District is shown in **Table 8-20**.

Table 8-20 Health Facilities in Likupang Timur District in 2016

No.	Health Facilities	Unit
1.	Public Health Centre (<i>Puskesmas</i>)	1
2.	Supporting Public Health Centre (<i>Puskesmas Pembantu/Pustu</i>)	3
3.	Village Clinic (<i>Poskesdes</i>)	7
4.	Maternity Unit (<i>Polindes</i>)	5
5.	Integrated health services (<i>Posyandu</i>)	17
6.	Clinic	2
7.	Midwife Clinic	1
8.	Drug Store	1

Source: Statistic Data of Likupang Timur District, 2016



Figure 8-12 Health Facility in Wineru Village and Likupang Timur District

In addition to the available health facilities, a number of health personnel are also available in the district. **Table 8-21** shows the number of physicians and nurses in the district; considered low compared to the population in Likupang Timur District of 17,455 people. Detailed information on the health facility and services at village level was not available, however the information at district level above indicates a potential challenge to provide proper health services within the area of study.

Table 8-21 Doctors and Paramedic in Likupang Timur District in 2015

No.	Health Workers	Total
1.	General Physician	6
2.	Midwife (<i>Bidan</i>)	15
3.	Nurse (<i>Perawat</i>)	13
4.	Nutritionists	2
5.	Environmental Health	4
6.	Pharmacist	2
7.	Honorary	5

Source: Likupang Timur Public Health Centre Profile, 2016

9 ENVIRONMENTAL IMPACT ASSESSMENT

9.1 INTRODUCTION

The overall approach to the rating and evaluation of impacts follows the methodology presented in **Chapter 5**. This section provides greater detail in the evaluation of the significant potential environmental impacts identified during Scoping. Where resource/receptor specific magnitude or sensitivity/vulnerability definitions apply, these are discussed in the relevant subsections.

The impact assessment has taken into account the scoping and results of the assessment conducted as part of the AMDAL process, however the assessment also recognizes the need for additional detail and scrutiny regarding the assessment of some environmental aspects for the purposes of the ESHIA.

9.2 ENVIRONMENTAL IMPACT ASSESSMENT RESULTS

The following sections identify and discuss the predicted negative environmental impacts associated with construction and operation of the Project. This is based on the results of scoping and contains an assessment of the following aspects identified from the scoping process (**Table 6.2**).

- Noise and air quality impacts associated with the Project – based on a qualitative assessment which takes into account ambient monitoring and onsite construction and operational activities;
- Biodiversity impacts associated with land clearing, including to fauna species of conservation significance; and
- Impacts to surface water as a result of increased runoff from the PV field.

9.3 IMPACTS TO SURFACE WATER BODIES

The PV field will result in increased surface water runoff as a result of the removal of onsite vegetation exposure of the land surface over an area of approximately 29.4 Ha. A drainage system is to be established within and around the Project site in order to control site runoff during construction and operation. The runoff during construction and operation is planned to drain to the Wineru River. The removal of site vegetation during construction and its absence during operations has the potential to result in increased volumes of runoff, and also increased sediment laden runoff entering this water way.

Calculations developed by the AMDAL consultant, PT Sulindo Eko Konsultan, identified the potential for erosion rates from the hillside area may exceed the acceptable erosion rate (calculated as 35 tonnes/ha/year) by approximately 20 tonnes/ha/year.

Impact Evaluation and Significance

The clearing will occur over a reasonably large area and it is expected that additional runoff from site has the potential to occur throughout the life of the Project and result

in significant levels of erosion; the impact magnitude is therefore considered to be *Medium*. Sensitivity is deemed to be *Medium*, owing to the potential for increased water flows and sediment loads to enter nearby water ways. Impact Significance is therefore considered to be *Moderate*.

Table 9-1 Erosion and Surface Water Assessment

Impact Description	Construction phase impacts to surface water as a result of increased runoff and sedimentation during construction and operations,				
Impact Nature	Positive			Negative	
Impact Type	Direct			Indirect	
Magnitude	Negligible	Small		Medium	Large
Sensitivity/Vulnerability	Low	Medium		High	
Significance	Negligible	Minor		Moderate	Major

Additional Mitigation Measures, Management, and Monitoring

It is expected that the following industry standard management and mitigation measures will be implemented by the Project. These are expected to manage the volumes of erosion estimated to occur as a result of clearing:

- Preparation and implementation of a soil and erosion management plan during construction to incorporate requirements such as use of dust suppression, soil stabilisation during construction and storm water and sediment management and control;
- Solid stabilisation to be implemented following completion of construction, this may include establishment of grass cover or other forms of ground cover across the site;
- Implementation of an operational runoff and storm water drainage system to control runoff volumes; and
- Establishment of sediment control devices at the operational runoff discharge points.

Significance of Residual Impact

The implementation of sound management practices and an onsite drainage and runoff collection system during construction and operation are likely to be capable of managing runoff quality and volumes. Thus the significance of the residual impact is considered to be *Minor*.

9.4 AIR QUALITY IMPACTS

Air quality impacts are likely to be restricted to increased dust generation and small and heavy vehicle emissions during construction and land preparation i.e. land clearing and land levelling. Project operations would not impact air quality emissions of any particular note. Onsite earth works and deliveries will occur for a period of twelve months and will result in only a temporary generation of air quality impacts.

Site civil works are confined to the site and the nearest village is approximately 650 m from the site (although the land owner’s property is located opposite the site). Ambient monitoring found that ambient air quality conditions are well under the established IFC criteria and Indonesian regulations (tabulated in **Chapter 7.3**) and given the duration and nature of onsite activities, significant decreases in air quality conditions are unlikely.

Impact Evaluation and Significance

The significance of impacts on air quality is expected to be *Minor*. Impacts are expected to occur over a twelve month period only, while the nature of proposed activities are unlikely to significantly reduce baseline air quality conditions.

Table 9-2 Air Quality Assessment

Impact Description	Construction phase impacts to air quality as a result of dust generation and vehicle emissions					
Impact Nature	Positive			Negative		
Impact Type	Direct			Indirect		
Magnitude	Negligible		Small	Medium		Large
Sensitivity/Vulnerability	Low		Medium	High		
Significance	Negligible		Minor	Moderate		Major

Additional Mitigation Measures, Management, and Monitoring:

- Develop a traffic management plan to ensure that traffic arrangement during the construction is well-managed.
- Use of dust suppression on access roads, and exposed areas onsite through the watering of roads used during dry periods will assist in managing potential air quality impacts.

Significance of Residual Impact

Residual impacts are expected to remain as *Minor* and not of significance.

9.5 NOISE IMPACTS

Noise generating activities are likely to occur during construction and as a result of the following activities:

- Site clearing;
- Site establishment and civil works; and
- PV field installation and construction.

Discussion of Impacts

Construction will occur for a period of approximately twelve months and generally during the hours of 7am until 6 pm, however there is a potential to work at night. Construction will introduce temporary sources of noise into the local area, and it is possible that these will occasionally be heard offsite. The nearest residential receptor

is the former land owner who resides next to the Project Site. The nearest residential area is located at Wineru Village which is located at approximately 650 m away. Ambient noise conditions within the local area were generally below the established IFC Guidance and Indonesian regulations (55 dBA). These are tabulated at **Chapter 7.4**. While noise will be generated during construction; activities are generally restricted to heavy vehicle movements and potential use of equipment such as drills and saws. Given the timeframe for construction, these activities are unlikely to significantly disrupt the local noise environment.

Impact Evaluation and Significance

Project construction is unlikely to significantly increase noise above background conditions and as a result, magnitude is considered to be *Small*. Sensitivity is assessed as being *Low*, given the distance of the site from the nearest residential receptors and baseline noise conditions. The significance of impact is therefore assessed as being *Minor*.

Table 9-3 Noise Assessment

Impact Description	Increased noise generation during project construction				
Impact Nature	Positive			Negative	
Impact Type	Direct			Indirect	
Magnitude	Negligible	Small		Medium	Large
Sensitivity/Vulnerability	Low	Medium		High	
Significance	Negligible	Minor		Moderate	Major

Additional Mitigation Measures, Management, and Monitoring

Implementation of the following mitigation measures is recommended during construction activities to minimize the impact of noise increase which is generated:

- High noise activities will be undertaken over short periods and where possible scheduled to avoid simultaneous operation of high noise generating plant;
- Complaints tracking and grievance log will be established to address community complaints; and
- Noise monitoring program to be established (this is a requirement of the Project's RKL-RPL).

Significance of Residual Impact

While implementation of the above measures is likely to be able to assist in managing potential impacts, they are expected to remain as *Minor*.

9.6 TERRESTRIAL BIODIVERSITY IMPACTS

Potential impacts on flora and fauna resulting from the Project are considered to include:

- Direct loss of vegetation from land clearing activities for the establishment of the site and construction of onsite facilities; and

- Impacts to Fauna species of conservation significance.

9.6.1 Impacts as a Result of Vegetation Clearing

Discussion of Impacts

Land clearing will occur within an area of 29.4 Ha, consisting of coconut plantation and other agricultural land uses. The vegetation onsite is considered unlikely to be of conservation significance and no significant biodiversity values were encountered within or surrounding the area proposed for future clearing. The flora and fauna values of the site are similar to surrounding locations within the local area and region and as a result similar habitat and vegetation types are relatively common.

Impact Evaluation and Significance

Given the total area of vegetation to be cleared and the modified nature of the Project area, the impact magnitude was assessed as being *Small* as the Project would affect a small area of vegetation and this is unlikely to affect the viability or function of this vegetation type. Sensitivity was assessed as being low as the vegetation type is modified and is unlikely to be of significant ecological importance. Therefore the significance of the impact from land clearing is assessed as negative and *Minor*.

Table 9-4 Terrestrial Biodiversity Assessment

Impact Description	Impacts to flora and fauna as a result of vegetation clearing.				
Impact Nature	Positive			Negative	
Impact Type	Direct			Indirect	
Magnitude	Negligible	Small		Medium	Large
Sensitivity/Vulnerability	Low	Medium		High	
Significance	Negligible	Minor		Moderate	Major

Additional Management and Mitigation

Vegetation clearing cannot be avoided therefore a number of management and monitoring measures will be put in place to ensure impacts associated with vegetation clearing are reduced and do not result in a disturbance to the surrounding vegetation:

- Vegetation clearing only in designated areas for the Project footprint;
- Restricting work to designated/cleared boundaries;
- Establishment and implementation of a clearance protocol to manage encounters with fauna;
- No disturbance to vegetation outside marked areas; and
- Undertaking site revegetation to assist with soil stabilisation, where possible.

Significance of Residual Impacts

While the management measures listed above will assist in managing vegetation clearing activities and ensuring impacts on surrounding vegetation are reduced, the significance rating for loss of vegetation will remain as *Minor*.

9.6.2 Impacts to Conservation Significant Fauna Species

Discussion of Impacts

The baseline identified four bird species of conservation significance as occurring within the Project site. These species are listed as protected species under Indonesian legislation but are of Least Concern under the IUCN Red List. Approximately 29.4 Ha of vegetation will be cleared as a result of the Project. The species identified are generally wide ranging and are likely to make use of a broad range of habitats within the local area. As noted in **Section 6.5.1**, the vegetation within the site is primarily coconut and other plantations and limited native habitat is contained within the Project site. It is considered unlikely that the habitats within the site would be of particular importance for the species identified, or to other conservation significant species which may be known from the area.

Impact Evaluation and Significance

The impact assessment found that while the Project area may provide some habitat for locally occurring species of conservation significance, the habitat contained within the site are unlikely to be of particular importance. The species are likely to continue to persist within the local area and the Project is unlikely to result in significant impacts to these species. Impact magnitude was considered to be *Small*, owing to the area of vegetation to be removed. The impact significance overall was deemed to be *Moderate*.

Table 9-5 Assessment of Impacts to Conservation Significant Species

Impact Description	Impacts to fauna species of conservation significance as a result of clearing				
Impact Nature	Positive			Negative	
Impact Type	Direct			Indirect	
Magnitude	Negligible	Small		Medium	Large
Sensitivity/Vulnerability	Low	Medium		High	
Significance	Negligible	Minor		Moderate	Major

The mitigation measures discussed previously for flora and fauna impacts will assist in management of the potential impacts.

Significance of Residual Impacts

While the management measures listed at **Section 9.6.1** will assist in managing vegetation clearing activities and ensuring impacts on surrounding vegetation and associated fauna habitats are reduced, the significance rating is likely to be *Moderate-Minor*. This is due to the sensitivity of conservation significant species to continued habitat loss.

10 SOCIAL IMPACT ASSESSMENT

10.1 SOCIAL AND HEALTH IMPACT ASSESSMENT RESULT

This section provides discussion on the potential social and community health impacts of the Project. The Project's regulatory AMDAL assessed two **hypothetical significant** impacts and some non-significant impacts related to social and health namely:

1. Public perceptions during pre-construction, particularly related to the Project's permit arrangements. More than 80% of the population in Wineru village gave a positive response towards the Project development plan.
2. Livelihood and income levels during the construction phase. The impact assessment result was positive as the project is hoped to increase employment and small business opportunities for the community.
3. Some non-significant impacts were identified during the construction phase namely disturbance to workers' health conditions and disturbance to community's daily activities during the heavy vehicles and equipment mobilization, also visual impact concerns during the operation phase.

It is understood that the Project is aiming to meet the IFC PSs, therefore this social impact assessment is developed to provide some additional overview on the impacts that have been discussed in the AMDAL, as well as adding some components which have not been assessed. A range of additional mitigation measures are also recommended in accordance with the IFC PSs to manage the Project's adverse impact to community and its environment (and enhance the benefits).

The key impact areas discussed in this section are:

- Land Acquisition;
- Economy and livelihoods;
- Community health;
- Community safety; and
- Occupational health and safety.

10.2 LAND ACQUISITION IMPACT ASSESSMENT RESULT

10.2.1 Economic Benefit from Land Compensation

Discussion of Impacts

The Project confirmed that a total of 29.4 Ha of land is required for the Project development, and the Land Acquisition Procedure which was used to acquire the Project's plot has been in accordance with applicable national regulations. The land is located in Wineru Village, Likupang Timur District, Minahasa Utara Regency in Sulawesi Utara, and was owned by a single owner villager.

An interview with the land owner and the Village Head of Wineru confirmed that the land acquisition process was conducted through a direct consultation and negotiation process with the land owner, and the compensation was agreed based on mutual agreement between the two parties. The Land Acquisition Procedure and Outcome indicates that no compensation was provided for vegetation cleared. Together with the landowner and district representative, the land team surveyed the land parcel to verify the area and boundary of land. The land price was also negotiated and agreed at [REDACTED] with full payment finalized in June 2017 after all the land's legal documents were cleared.

Before the acquisition the land owner utilized the land for corn farming and other dry land crops such as paddy and chilli as one of his income sources. Last year the gross income from the corn farming could reach approximately [REDACTED] excluding operational and labour expenses. However, the land owner claimed to possess other plots of land nearby as well as in other parts of Minahasa Utara Regency. He also runs several businesses such as fish farming, coconut farming, housing and infrastructure construction, and heavy equipment rental. According to the land owner, the loss of land and income from the Project land acquisition was considered insignificant since the compensation rate that was offered was good due to the large area that was acquired.

The compensation allows him to expand his business and increase the business capital as it can be used to buy larger plots of land with a lower price nearby the Project area. The land owner expects to have a future business partnership with the Project.

Impact Evaluation and Significance

The impact significance of the Project's land acquisition for the land owner is assessed as being **Positive (Table 10-1)**. This judgement is taken based on the facts that the land owner got fair compensation for the land and has used it as business capital to expand his business and gain more economic benefits which could improve his livelihood.

Table 10-1 Economic Benefit from Land Compensation

Impact Description	Economic benefit to the land owner from the Project land acquisition		
Impact Nature		Positive	Negative

Proposed Additional Measures

It is understood that the land that has been acquired via a willing buyer willing seller process therefore no impact is expected on the land owner.

In order for the Project to meet IFC PS the Project should conduct the following:

- Ensure proper documentation for the consultation and negotiation process with land owner; and

- Confirm the land owner does not require livelihood assistance i.e. has not had their income decline since the land acquisition (this again could be through documentation).

10.2.2 *Impact to Loss of Access and Income for Land Users*

Discussion of Impacts

Although the land owner will receive a fair compensation package, the process has the potential for adverse impact for the land users and casual workers. It is identified from the baseline study that the land is also used for:

- The Project's plot was used by some of the Wineru villagers/farmers as a grazing field. Upon the Project commencement, they are expected to move their cattle to another area. The exact number of people who utilized the land as graze field could not be identified, however looking at the total area of plantation land in Wineru (i.e. 460 ha of agricultural land) land users will have alternative locations to graze their herds within the village or its surrounding area.
- It was identified during the ERM Survey that the land is also used by local farmers as an access route to their farming areas on the south side of the Project location. During construction phase, the location will be surrounded by fence, therefore can no longer be used as a community access route. However the farmers have an alternative route from the side (west or east) of the project site.
- Before the land was acquired by the Project, the land owner previously hired a number of casual workers, around 40 daily labours, to help his corn farming. These labours were paid daily i.e. ranging from IDR 60,000 - 80,000 depending on the task. The corn farming activities were stopped soon after the land acquisition agreement was achieved. It was identified during the ERM Survey that plantation labourers are generally in high demand due to the large plantation areas in Wineru as well as in the other surrounding villages in Likupang Timur. There was no significant concern from these labourers over the loss of income from the land that has been acquired for the Project. An interview with the land owner and Village Secretary confirmed that some of these labours have now working in other plantation in the village. According to the land owner, in the near future he would still hire some of the ex-workers to work on his other businesses such as fish farming, restaurant and the housing construction project.

Impact Evaluation and Significance

The impact of the Project land acquisition on the loss of access and income for the land users is evaluated as being *Minor* (**Table 10-2**). This judgement is based on the fact that the impact magnitude is *Small* as the impact only affects a few community members, the vulnerability is relatively *Low* given the demand for employment in the area.

Table 10-2 Economic Impact from Land Acquisition

<i>Impact Description</i>	Loss of access and income for land users as a result of the Project land acquisition					
<i>Impact Nature</i>	Positive			Negative		
<i>Impact Type</i>	Direct			Indirect		
<i>Magnitude</i>	Negligible		Small	Medium		Large
<i>Sensitivity/Vulnerability</i>	Low		Medium	High		
<i>Significance</i>	Negligible		Minor	Moderate		Major

10.2.2.1 Proposed Additional Measures

Although the vulnerability of the affected land users is considered *Low*, it is advisable to follow up with the 40 casual workers to ensure their incomes remain the same as before and they have access to other employment opportunities. If not, it is recommended the project consider prioritising them for employment.

Furthermore in terms of access to surrounding fields it is suggested that the Project consult with the affected famers and agree a suitable access route that is suitable for them whilst still managing the security and safety issues of the site. The project has confirmed the mitigation for the farmers to use the alternative route from the west or east side of the project site.

Residual Impacts

As a result of implementation of proposed additional measures, the residual impact associated with loss of access and income to land users is considered as **Negligible**.

10.3 ECONOMY AND LIVELIHOODS

10.3.1 Impact to Local Economy from Employment and Business Opportunities during the Project Construction and Operation

Discussion of Impacts

It is expected that there will be approximately 200-300 people employed during peak construction. Local labour will be prioritized where feasible by the EPC, it is estimated that the project will absorb 60% of workers from the local surrounding project area (i.e. an estimated 110 to 180 people). These workers are projected to fill the positions of steel bar workers, brick layers, welders, crane/ machine operators, electricians, measurement/ survey officers, ordinary/ casual workers, security and safety officers, and also first aiders. The construction phase is projected to be complete in twelve months after the commencement. The Project commits to prioritize and employ local workers especially for the unskilled labour category.

During the operation phase, the Project is projected to employ 20 people comprising 4 skilled labourers and 16 unskilled labourers. While the skilled labourers will be likely recruited from outside of the area, priority will be given to the local community to fill the required unskilled position.

The baseline study reveals that the number of registered job seekers in Minahasa Utara Regency in 2016 was 126 people consisting of 79 male and 47 female. Moreover, the number of unemployed people in Wineru Village in 2016 was 91 people. The community also confirmed their high expectation to be employed by the Project. Therefore, the Project activities, particularly during construction phase are expected to reduce unemployment temporarily in the impacted area and its surroundings. Furthermore, at least in twelve months of the construction phase, the workers will receive a fixed income which is one of the indicators of poverty categorization in the village. This means that the number of poor households in the village will decrease during the construction and operation phase.

In addition to the employment opportunity, the Project construction and operation will also require goods and services to support the activities such as construction materials, equipment, cleaning, catering and other hospitality services. These opportunities will provide additional markets for the existing small and medium local businesses near the Project location such as sands and rocks suppliers, grocery suppliers, restaurants, and lodging providers.

Impact Evaluation and Significance

The Project has committed to prioritize local workers employment during the construction and operation phase. It is also projected to provide additional market opportunities for the small and medium scale businesses near the project location. Based on this analysis, the Project is most likely will have a significant **Positive** impact in terms of employment and business opportunities and increase the economic condition of the local people (**Table 10-3**).

Table 10-3 Economic Benefits from Employment and Business Opportunities

Impact Description	Economic benefit to locals as a result of the Project employment and business opportunities		
Impact Nature		Positive	Negative

Proposed Additional Measures

Local people have a very high expectation to be employed by the Project; hence it is likely that during the Project construction and operation, there will be competition among the locals as well as people from the neighbouring villages and districts. The Village Head of Wineru mentioned that the Project has conveyed its commitment to give 60% quota of the workers particularly the unskilled positions to the people of Wineru. Although there was no written agreement about this, the people are aware and likely to demand the Project to fulfil the commitment. Therefore, it is very important for the Project and EPC to work closely with the local government agencies to synchronize the Project's needs and the local's capacity. Clear consultation on the Project and its requirements is necessary to ensure the community understand the opportunities and the scale. This will help to manage expectations.

Interviews with key informants also revealed that although many people from other areas have migrated to Wineru village to harness the economic opportunities in the

area since 2008, no history of social conflict arising from economic jealousy and competition has been recorded. However, the Project should establish a clear grievance mechanism (as set out in the SEP) to ensure all community issues related to the Project are addressed. The EPC should be clear on the process and their role in its implementation.

To optimise the Project benefits to local community through employment and business opportunities, the Project will implement the following additional mitigation measures:

- To have a clear stipulation of using local labour in the EPC contract and instruct the EPC to prioritise qualified local people as construction workers in accordance with the needs of the Project;
- Provide and communicate clear information about the Project's requirement related to employment and business opportunities and prioritise locals where feasible; and
- Implement community development programs to increase the skills of local workers and the capacity of local businesses to meet the needs and requirements of the Project.

10.3.2 Disturbance to Farming Activities as a Result of Project Construction and Operation Activities

Discussion of Impacts

The baseline study confirms that the majority of Wineru people work in farming and husbandry sectors. The Project's plot was utilized as corn farming land by the land owner and as grazing land by some of the villagers. The area is also surrounded by farming lands where people plant corn, coconut, and other dry land crops such as chilli and vegetables.

Meanwhile, the Project activities particularly during the land clearing and construction phase are anticipated to increase dust volume in the air. Although the AMDAL has assessed dust impact as insignificant, while during the AMDAL consultation and ERM survey there was no concern related to this issue, however the generation of dust during construction may increase community concern towards the disturbance of farming activities in the surrounding areas of the Project.

Impact Evaluation and Significance

The impact of increased dust particles in the air during the land clearing and construction phase to farming activities is assessed as *Minor* significance. The magnitude is relatively *Small* as during operation the heat is expected to influence only a narrow range of the Project's plot surroundings, while during construction it will only occur for a short duration of land works. Although it is unlikely that the Project will impact community incomes generated from farming, the sensitivity of the receptors is assessed as *Medium* due to potential concerns from local farmers as farming is a key source of income (**Table 10-4**).

Table 10-4 Disturbance to Farming Incomes

Impact Description	Disturbance to farming income is potentially occurred as a result of the Project construction and operation				
Impact Nature	Positive			Negative	
Impact Type	Direct			Indirect	
Magnitude	Negligible	Small		Medium	Large
Sensitivity/Vulnerability	Low	Medium		High	
Significance	Negligible	Minor		Moderate	Major

10.3.2.1 Proposed Additional Measures

Although the assessment result shows that the impact is *Minor*, the Project is still expected to implement the following mitigation measures in addition to the AMDAL required measures in managing dust during construction and operation:

- Provide and communicate detailed information about the Project’s plan and schedule particularly related to land clearing and construction to the community with a special attention to farmers nearby the project location; and
- Establishment of a grievance mechanism that is understood by and accessible for all villagers. The mechanism will be simple, efficient and timely and fully consultative.

10.3.2.2 Residual Impacts

As a result of implementation of proposed additional measures, the residual impact on the disturbance to farming activities associated with generation of dust during construction and operation is considered *Negligible*.

10.4 COMMUNITY HEALTH

The Screening and Scoping process identified community health impacts as a result of the mobilization of construction and operational workforce and Project activities and thus warrants further assessment. The following impacts were identified and will be assessed within this section.

10.4.1 Health Impacts Associated with Non-Local Workforce Presence during Project Construction and Operation

Discussion of Impacts

It is expected that there will be approximately 200-300 people employed during peak construction. It is estimated that the project will absorb 60% of workers from the local surrounding project area (i.e. an estimated 110 to 180 people). Non-local workers will be accommodated in 2-3 rental houses located around 2 km from the Site. These workers will stay for some period of time in the community since construction activity is expected to last for twelve months. Given the number of non-local workers, daily interactions with locals are expected to occur e.g. there is potential interaction during the worker purchase of goods and services or when they are out at night or the weekend as well as traffic to and from the site.

The presence of such non-local workers in this Project is unlikely to cause the prevalence of new diseases to local community or social problems however as the interaction with non-local workers will not be limited mitigation measures should be adopted to manage social ills, conflict and the spread of communicable diseases,

However, consultation with key informants in Wineru Village indicates that community in Wineru is very open towards migrants; there have been no significant issue between locals and migrants to date. The immigration in Wineru Village started in 2008 when there were increased job opportunities in surrounding areas for the gold mining, hotel and recreational businesses and the electricity power house. Therefore the local community is familiar with the presence of non-local workers. The baseline does not show any other significant communicable diseases in the area this indicates low vulnerability of the community.

Meanwhile during the operational phase, the expected number of workers is much smaller i.e. 20 people. Although the non-local workforce will also stay within the local community, the number is significantly less and it is expected that community would already familiar with the presence of non-locals in the area; therefore this impact is considered as *Negligible*.

Impact Evaluation and Significance

The significance of impact to community health as a result of non-local workers are assessed as being *Minor* (**Table 10-5**). The magnitude is *Medium* due to potential interaction during construction phase e.g. when the workers purchase goods and services and with contractors residing in the village. Furthermore the sensitivity is assessed as *Low*, as there is no significant communicable disease in the area, while community familiarity is high due to the existing presence of in-migrants.

Table 10-5 Health Impacts Associated with the Presence of Non-Local Workforce

<i>Impact Description</i>	Impacts associated with non-local workforce/in-migrant presence increasing the prevalence of communicable diseases.				
<i>Impact Nature</i>	Positive			Negative	
<i>Impact Type</i>	Direct			Indirect	
<i>Magnitude</i>	Negligible	Small	Medium	Large	
<i>Sensitivity/Vulnerability</i>	Low	Medium	High		
<i>Significance</i>	Negligible	Minor	Moderate	Major	

10.4.1.1 Proposed Additional Measures

The Project will implement the following additional mitigation measures to manage potential negative impacts associated with the presence of non-local workers:

- Compulsory medical examinations for Project workers, including contractors to ensure they are fit for work and to monitor the prevalence of communicable diseases detected through annual medical check-ups;
- Zero tolerance towards inappropriate behaviour from and amongst the workforce;

- Conduct an induction and training on the Project's Code of Conduct regarding do's and don'ts in relation with interaction with locals;
- Establish a grievance mechanism and accessible for all community groups to report concerns associated with potential Project health impacts. Where complaints are submitted the Project will undertake an immediate investigation;
- Regular engagement with local authorities relevant to crime (local police) or other social problems (e.g. village leaders) for prevention of issues and for mitigation when issues arise; and
- Conduct appropriate workers-community engagement such as sporting or cultural events to improve understanding and cohesions between non-local workers and the surrounding communities.

Residual Impacts

As a result of implementation of proposed additional measures, the residual impact on the community associated with non-local presence to community health is considered *Negligible*.

10.4.2 Potential Impact to Community Health Associated with Dust from Construction Mobilisation

Discussion of Impacts

During the construction phase, the Project's equipment, machinery and infrastructure will be delivered to site via Sulawesi Utara Province road from Bitung Port. It is expected that most equipment will be transported via truck and heavy vehicles along the province road with a distance of 25 km to the site. The peak of the mobilisation rate is expected to take place only during the initial and at the end of the twelve months period of the construction phase. However, dust generation as a result of vehicle movements is a particular problem as the baseline identified that some of the road segments within the Wineru Village area that will be traversed by the Project are not yet asphalted, while the road is currently used as major transport route between regencies of Sulawesi Utara Province.

Other construction activities which will likely generate dust come from land preparation. The Project site is located within an agricultural plantation area with minimal human activities, and quite far from the populated residential area of Wineru i.e. over 650 m away. However it was identified during ERM's Survey that the house of the previous owner of the land that is being acquired by the Project is located relatively near from the Project site.

In the meantime, respiratory illnesses rank as the number one health complaint from communities within the Project area. It has been the community's major issue since 2013. However, the number of ARI is considerably low compared to the total population of Wineru Village in the same year, where out of 1,304 people only 18% of the villagers were suffered from ARIs. During operation, the Project activities which have the potential to generate dust will be significantly reduced, therefore the effect is considered *Negligible*.

Impact Evaluation and Significance

The significance of impacts to community health as a result of site construction activities was assessed as being of *Minor* significance. Magnitude was assessed as being *Small* as the peak of mobilization of equipment and materials is expected to occur only during the initial and at the end of the of twelve months period of construction. Vulnerability was assessed as *Medium* owing to the existing occurrence of respiratory illness within the Project area and the fact that the mobilization will traverse some areas where communities residing along the roads.

Table 10-6 Health Impacts Associated with Generation of Dust during Construction

Impact Description	Community health impacts associated with dust generation during project construction and operations.				
Impact Nature	Positive			Negative	
Impact Type	Direct			Indirect	
Magnitude	Negligible		Small	Medium	Large
Sensitivity/Vulnerability	Low		Medium	High	
Significance	Negligible		Minor	Moderate	Major

Proposed Additional Measures

In addition to the existing management measures which are already in place to mitigate dust impacts, the Project will implement the following additional mitigation measures:

- Develop the traffic management plan to ensure that traffic arrangement during the construction is well-managed. The traffic management plan must be ready before the commencement of the construction activities. The Project will socialize the plan to relevant parties involved in the construction process such as drivers and the surrounding communities.
- In the event excessive dust is created from construction activities or traffic flows, the project will utilize water trucks to suppress the dust from the road. The dump body of the trucks must be covered adequately to minimize spillage or dust from the truck.
- Consultation with communities of Project's traffic routes and peak traffic times;
- Consider establishing community health assistance through a CSR program coordinating with public health centres and focusing on managing ARIs and other similar health issues; and
- Establish a grievance mechanism accessible for all villages to report dust concerns. Where complaints are submitted the Project will undertake an immediate investigation.

Residual Impacts

As a result of implementation of the proposed additional measures, the residual negative impact associated with generation of dust to community health will be of *Negligible*.

10.5 IMPACT TO COMMUNITY SAFETY

10.5.1 Disturbance to Local Public Road due to Increased Vehicle Movement during Construction

Discussion of Impacts

Baseline data shows that although main roads in the village are considerably adequate, a few kilometres of the province road within Wineru village are not asphalted yet and a few kilometres of the regency and village road are in damaged.

During the construction activities, heavy equipment equal to 30 tonnes will be transported mainly from Bitung Port to the Project location using trucks or trailers. The same routes will also be used to mobilize up to 40 tonnes of electrical components such as PV modules, step-up transformer, inverter, and other components. Other construction materials such as sand, cement, gravel, and brick will be imported from Manado or Jakarta. These facts indicate the road load within the Project area will increase significantly during the construction phase and expected to negatively impact the existing condition of roads within the Project area.

Impact Evaluation and Significance

Project impacts to local public roads as a result of increased vehicle movement during the construction were assessed as being *Minor* significance. Magnitude was assessed as being *Small*; although vehicle movements will use wide coverage of public roads to transport the Project equipment, electrical components, and construction materials, however it is expected that the peak of construction will only occur during the initial and at the end of the twelve month period. Vulnerability was assessed as *Medium*; although some parts of the public road are damaged however the general condition was observed as fairly adequate.

Table 10-7 Disturbance to Local Public Road

<i>Impact Description</i>	Disturbance to Local Public Road due to Increased Vehicle Movement during Construction				
<i>Impact Nature</i>	Positive			Negative	
<i>Impact Type</i>	Direct			Indirect	
<i>Magnitude</i>	Negligible	Small	Medium	Large	
<i>Sensitivity/Vulnerability</i>	Low	Medium	High		
<i>Significance</i>	Negligible	Minor	Moderate	Major	

Proposed Additional Measures

The Project commits to perform necessary measures to mitigate the negative impacts resulting from the vehicle mobilization on public roads within the Project location. It is understood that the Project has performed an assessment on the condition of public roads prior to vehicle mobilization to ascertain the road load feasibility. In addition, the Project will implement the following mitigation measures:

- Develop the traffic management plan to ensure traffic arrangement during construction is well-managed, the traffic management plan shall be ready before the commencement of the construction activities.
- In the area where unfeasible road conditions are identified road improvement will be conducted to ensure the road conditions meet the standard conditions for construction vehicle mobilization;
- Should road damage occur associated with the Project mobilization, a road improvement program will be implemented to ensure that the public road condition is adequate for the local community and other road users; and
- Establish a proper and accessible grievance mechanism to report concerns about public road conditions. The Project will carry out immediate investigation when the community submits related complaints.
- Socialize the plan to relevant parties involved in the construction process such as drivers and the surrounding community.

Residual Impacts

As a result of implementation of proposed additional measures, the residual impact is considered *Negligible*.

10.5.2 Impact to Community Safety as a Result of Mobilization during the Project Construction

Discussion of Impacts

During the construction phase, the Project mobilization will traverse the main road of Giriam, Danowudu and Wineruvia province road from Bitung Port to site, with a distance of 25 km. In addition to the impacts to dust and disturbance to public road, the mobilization is likely to create impact to community safety due to potential interactions between the Project vehicles with the community traffic/ road users.

Based on the observation during ERM survey, the traffic volume along the main road is relatively quiet. However, community activities were observed along some road segments e.g. housing and shops as well as local traffic. Meanwhile, unsafe driving practices were observed particularly in terms of helmet use.

In 2016, there were 1,265 cases of traffic accident reported in Sulawesi Utara Province with 230 casualties. This number decreased from the accident in 2015 where 1,625 cases were reported with 318 casualties. There is no official data reporting the number of traffic accident in Likupang Timur District as well as in Wineru Village. It was identified from the interview with the Village Head and some of the community

members during the site visit that in the last past two years there have been no traffic accidents within the village reported.

During the operation phase, the Project traffic volume is expected to reduce, therefore unlikely to lead to significant increases in local traffic volumes.

Impact Evaluation and Significance

As presented in **Table 10-8**, the magnitude of impact is assessed as being *Small* mainly since the peak of mobilization of equipment and materials is expected to occur only during the initial and at the end of the twelve month period of construction. Although the traffic volume is quiet, considering the poor conditions of some road segments that will be traversed by the Project and unsafe behaviours, sensitivity is assessed as *Medium*. Therefore the significance of impact to safety risk on land is assessed as *Minor*.

Table 10-8 Community Safety Risk Associated with the Project Construction Mobilisation

Impact Description	Potential incident with community as a result of increase in Project traffic on a public road				
Impact Nature	Positive			Negative	
Impact Type	Direct			Indirect	
Magnitude	Negligible	Small		Medium	Large
Sensitivity/Vulnerability	Low	Medium		High	
Significance	Negligible	Minor		Moderate	Major

Proposed Additional Measures

It is assumed that a range of management measures (that adhere to international best practice approaches around occupational health and safety) will be in place. In addition, the Project is expected to implement the following additional mitigation measures:

- Develop the traffic management plan to ensure that traffic arrangement during the construction is well-managed. The traffic management plan must be ready before the commencement of the construction activities. The Project will socialize the plan to relevant parties involved in the construction process such as drivers and the surrounding communities.
- Consultation with the communities on key Project traffic routes, timing of peak movements, type of vehicles and heavy equipment and provision of road safety awareness to the surrounding community, through corporation with the local police;
- Enforce speed limit regulations to all Project construction vehicles, along with an emergency response procedure should any incidents with other road users or pedestrians occurs; and

- The proposed grievance mechanism should be accessible for all villagers to report concerns associated with health and safety. Where complaints on accidents or near misses are submitted the Project will undertake an immediate investigation.

Residual Impacts

As a result of implementation of the proposed additional measures, the residual Project negative impact to community safety will be *Minor*.

10.6 OCCUPATIONAL HEALTH AND SAFETY-RELATED IMPACTS

10.6.1 Impact Associated with Workers Health and Safety during Construction and Operation

Discussion of Impacts

There are likely to be potential impacts on workers' health and safety due to exposure to risks through the Project development activities. The following occupational health and safety risks are frequently present, in particular during the Project construction phase:

- Mobile vehicles and heavy equipment accidents;
- Heat stress when working in humid and high temperatures;
- Manual handling and musculoskeletal disorders;
- Hand-arm vibration impacts from concrete breakers, grinders, hammer drills, chipping hammers, chainsaws, scrabbles and needle guns;
- Temporary or permanent hearing loss from noise generated machinery used for excavation or piling work;
- Dermatitis that can arise from contact with small substances such as wet cement, and asphalt;
- Tripping due to uneven surfaces and obstacles;
- Falling during working at height;
- Fire due to hot works, smoking, and failure in electrical installations; and
- Electrical shocks.

Impact Evaluation and Significance

Considering the size of the construction workforce, the frequent and high level of potential construction risks the impact to worker's health and safety was assessed as *Moderate* significance.

Table 10-9 Impact Associated with Workers' Health and Safety

<i>Impact Description</i>	Impact Associated with Workers' Health and Safety			
<i>Impact Nature</i>	Positive		Negative	
<i>Impact Type</i>	Direct		Indirect	
<i>Magnitude</i>	Negligible	Small	Medium	Large
<i>Sensitivity/Vulnerability</i>	Low	Medium	High	
<i>Significance</i>	Negligible	Minor	Moderate	Major

Proposed Additional Measures

The above identified risks are typical on any construction site of this nature therefore it is anticipated that the EPC will have the necessary management measures in place to manage potential occupational health and safety (OHS) issues under their responsibility. Appropriate OHS procedures are also expected to be in place to align with the Indonesia regulations, as well as IFC PS 2. The procedure will include, at minimum, the following measures:

- The EPC will be committed to ensure all H&S measures are in place to prevent accidents and reduce the consequences of non-conformance events;
- The EPC will provide training, awareness and supervision to ensure all of its construction workers comply with the OHS procedures;
- The EPC will provide all appropriate resources i.e. personal protective equipment (PPE) to all workers onsite; and
- An emergency response procedure and infrastructure will be available on site to ensure provision of first aid for personnel in case of an emergency.

Residual Impacts

As a result of the implementation of the proposed additional measures, the residual impact associated with occupational health and safety is considered as *Minor*.

11 ENVIRONMENTAL AND SOCIAL MANAGEMENT REQUIREMENTS

The ESHIA process has identified the key environmental, social and health issues, impacts and risks associated with the Project requiring the implementation of a wide range of mitigation measures. The necessary actions required to manage these issues, impacts and risks are presented in this Environmental and Social Management framework (ESMF); these include identification of all Project commitments (including legislative and IFC compliance requirements), mitigation measures that have been identified from the impact assessment, and other best practice measures designed to avoid, minimize or reduce negative impacts and enhance positive impacts. The objectives of the ESMF are to:

- Identify the set of responses to potentially adverse impacts;
- Define the responsibilities for implementation and monitoring;
- Determine requirements for ensuring that mitigation and management measures are implemented effectively and in a timely manner; and
- Describe the means for meeting those requirements.

The purpose of this Chapter is to demonstrate how the mitigation commitments made through the IA Process will be put into practice, monitored and upheld. The content of this chapter is crucial to bridge the findings of the IA with the implementation of the mitigation measures and to provide an early framework of management systems / monitoring regimes that will help to deliver these IA commitments.

Specifically, this Chapter provides information and instructions on how environmental, social, and health commitments of the Project will be managed from pre-construction through the construction and operation phases. The ESMF is a living document which:

- Incorporates the environment and social mitigation measures identified as a result of the ESHIA process into a comprehensive framework to facilitate and ensure appropriate management throughout the Project cycle;
- Outlines the required regulatory monitoring detailed within the Project's RKL-RPL;
- Provides a framework to incorporate commitments into the Project plans and procedures for activities that have risks, as identified in the IA;
- Presents responsibilities for meeting ESMF requirements including the provision of training;
- Provides a framework for the implementation of specific management plans by the EPC; and
- Defines the monitoring/verification and reporting program (including corrective actions).

11.1 ESMF PLANNING BACKGROUND

The Project signed the EPC contract in November 2017 and an ESHS-MS for the Project has been developed by ITL (**Annex E**) which describes the environment management system and organisational structure for implementing the ESMF (managing the environment and social surrounds during construction and operation).

This document therefore outlines the ESHIA expectations and provides guidance on how the actions might be implemented. It is expected that this would be formalized as ITL prepare to commence construction.

11.2 RESPONSIBILITY FOR IMPLEMENTING THE ESMF

The key parties and their primary roles in implementing the ESMP are as follows:

- ITL - as the Project Proponent is responsible for the overall Project monitoring, ensuring compliance with environmental policy and obligations in the ESMF;
- EPC - responsible for complying with ESMF requirements set out by REI; and
- Other operational contractors - responsible for complying with the ESMF requirements set out by ITL.

ERM has provided guidance on the types of roles and responsibilities that would be required for implementation of the ESMF during construction.

11.2.1 Project Manager

The Project Manager is responsible for all construction activities and accountable for overall ESHS (Environmental, Social, Health, and Safety performance) of the Project. Expectations for the role in terms of implementing a management system would include:

- Actively promoting and participating in the Project ESHS Plan;
- Ensuring that the ESHS Management Plan, procedures and work practices are implemented across the Project;
- Ensuring that the ESHS Plan reflects the requirements of the Project in terms of resources and budget;
- Ensuring that all legislative and company requirements are complied with;
- Ensuring that all work scopes are conducted in accordance with the Project ESHS rules and regulations, work practices and procedures, as detailed in this ESMF and other associated documentation (e.g. the AMDAL);
- Ensuring that all contractors are made aware of their roles and responsibilities with regard to ESHS management;
- Ensuring that ESHS is regularly discussed and reported on i.e. in the weekly contractor progress meeting;
- Ensuring that all contractors are evaluated throughout the duration of the Project, as to their capabilities and performance; and

- Ensuring implementation of ESHS audit recommendations for non-compliances.

11.2.2 *HSE Department*

The Health, Safety and Environmental (HSE) Department would be expected to undertake the following roles:

- Manage, review and develop the HSE program to ensure that it fulfils Project requirements, including measures observed in this ESMF, and monitor the implementation including e.g. patrolling the job site daily to ensure construction works' compliance to Project HSE Procedures and safe working practices;
- Coordinate and evaluate the effectiveness of all program elements;
- Liaison with related government bodies as necessary;
- Manage the Project HSE team and supervise them to ensure that all areas of the project are given the required level of safety support and attention;
- Ensure proper housekeeping and waste disposal in accordance with company requirements and regulations;
- Ensure that the respective control areas are given in the required level of safety support and attention including e.g. only safety-approved material and equipment are allowed to be brought onto site;
- Ensure that all HSE reports/findings of any unsafe conditions/practices is brought to the attention of field management and those are immediately corrected, and coordinate accident/incident investigations and report to Project Manager; and
- Manage HSE Audits and report the results to the Project Manager.

11.2.3 *Community Relations Department*

The Community Relations Department would be expected to undertake the following roles:

- Manage, review and develop the Social Program to ensure that it fulfils Project requirements, including measures observed in this ESMF, and monitor the implementation;
- Coordinate and evaluate the effectiveness of all program elements;
- Manage the implementation of stakeholder relations and grievance management to ensure that all social-related requirements in this ESMF are implemented;
- Manage the implementation of community health program, including coordination with HSE team on OHS measures associated with management of impact to community health;
- Coordinating with HSE team on implementation of the Project vehicle safety measures associated with management of impact to community safety;
- Coordinating with HR (Human Resources) person to ensure implementation of labour-related measures required in this ESMF;

- Consultation with community and liaison with relevant stakeholders in implementing the required stakeholder and grievance management measures, including liaison with related government bodies as necessary;
- Leading collaboration to establish and implement the Project grievance mechanism during construction phase, and supervise contractor's social performance as required in this ESMF; and
- Managing social monitoring and reporting the results to the Project Manager.

11.2.4 EPC's Site Representatives/HSE Department

The EPC and its contractors, depending on their work scopes, would be expected to have an HSE team. The contractors' site representatives or HSE Department should be assigned clear responsibilities and expectations with respect to implementing the Project's ESHS expectations and should be fully responsible for implementing any required expectations which fall under their work scopes. More specifically, they will:

- Actively promote and implement all Project HSE Plans related with the work they are performing. The contractor will make sure that all activities under his/her responsibility shall follow all safety regulation/requirements, coordinating with the ITL Project Manager; and
- Ensure that committed resources (personnel, material, and equipment) used are consistent with achieving the objectives and requirements of the Project ESHS Plan.

11.2.5 Employees

All employees involved in the Project will be qualified through training, experience, or knowledge. Non-supervisory personnel employed on the Project shall:

- Familiarize themselves with the concept of the Project ESHS rules and regulations;
- Work in accordance with Project ESHS Procedure, safe work practices, and method statements, risk assessments, permits to work and any other instructions that apply to their works;
- Use only tools/equipment and materials, which have been approved for use, and employ them only for the purpose for which they were designed;
- Take an active part in the protection of themselves, fellow workers, property and the environment from accidental losses;
- Immediately report to his respective supervisor or HSE officer/inspector if any potential hazards (relates to unsafe conditions and/or unsafe acts), which could lead to an accident, are found;
- Report promptly to immediate supervisor and HSE officer/inspector if any incidents/near misses as well as injuries, regardless how minor; and
- Shall attend project safety training and drills programs as required.

11.3 TRAINING, AWARENESS AND COMPETENCY

It is expected that the Project would implement a training and awareness program covering ESHS expectations of the Project. As a minimum, this should be implemented as an induction for all employees and contractors engaged on the project construction, with further training to be implemented depending on the level of responsibility for implementing HSE and social expectations and exposure to environmental and safety risks.

The Project should ensure that all personnel responsible for the implementation of this ESMF are competent on the basis of education, training and experience. All personnel shall be provided with environmental and social training appropriate to their scope of activity and level of responsibility.

11.4 MONITORING, REVIEW, AUDIT AND REPORTING

It would be expected that a monitoring, review and auditing program would be implemented during construction to monitor implementation of the Projects HSE requirements and environment and social commitments. Ultimately ITL would normally be responsible for ensuring that the EPC and its contractors are complying with the applicable HSE and social requirements.

11.5 PROJECT ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

The development of an ESMF is considered to be good management practice for any project or activity with the potential to impact upon the physical, chemical, biological, social and health environment. It provides guidance and a framework for ensuring that the commitments of ITL, made both within this ESHIA and within the Project's ANDAL RKL-RPL, are upheld and that the ESH impacts of the Project are managed to an acceptable level and in accordance with the requirements of the Project ESHIA.

Specifically this ESMF pulls together the mitigation and management measures identified within this ESHIA (and ANDAL/ RKL-RPL) as being necessary for the construction and operational phase of the Project.

The mitigation and management measures take place throughout the Project lifetime, from pre-construction through construction, operation and decommissioning. In addition, there are common mitigation and monitoring requirements that apply to all phases of the Project, e.g. vehicle use/operation.

The mitigation and monitoring measures specific to the impact assessment conducted for this Project ESHIA are detailed in the **Chapter 11.8** and **Chapter 11.9** together with information on:

- Phase and activity;
- Impact summary and receptor impacted;
- Mitigation measures, responsibility and timing;
- Monitoring requirement, responsibility and timing; and Reporting.

Where specific mitigation measures could not be adequately defined due to lack of Project information or uncertainty regarding the environmental or social baseline, recommendations for the development of specific management plans or procedures or follow-up actions have been made.

11.6 *ESMF LINK TO OTHER HSE MANAGEMENT SYSTEM PLANS*

Other types of plans are required to facilitate practical implementation of the ESMF commitments, for example, Operational Environmental Management Plan, Social Management Plans or specific Safety Plans. These plans or studies are not substitutes for the overall ESMF, but serves to describe how the commitments will be implemented in greater detail (and likely at a later stage in Project development) than in the ESMF.

This ESMF will be part of the future construction and operational activities, and as the future construction and operational plans are prepared, these are expected to confirm how these commitments will be incorporated into the relevant ESHS management systems. This implementation will be under the responsibility of ITL. This ESMF is a live document and will be updated periodically, for example, depending on Project execution and performance.

11.7 *PLANS, POLICIES AND PROCEDURES*

The following plans and follow-up actions were identified as being necessary within this ESHIA to manage identified risks or further understand potential environmental and social impacts (see **Table 11-1**). These plans are intended as framework documents which will be developed by ITL to manage specific risks or issues and also align the Project with the expectations of the IFC Ps and HSE Guidelines.

Table 11-1 *Specific Management Plans and Policies*

Management Plan	Description
Stakeholder engagement plan	<p>A stakeholder engagement framework has been developed, to include:</p> <ul style="list-style-type: none"> • Guidelines and recommendations to conduct future engagement, including consultation with relevant community groups e.g. farmer, local health institution, and relevant government institution in managing impact from the Project construction and operation. This should include planning a workers-community engagement events such as sporting or cultural events to improve understanding and cohesions between non-local workers and the surrounding communities; • Provides a framework to manage grievances which can be accessed by all groups of community; and • Recommendation for regular monitoring of stakeholder engagement and grievance resolution.
Social Impact Management Plan	<p>This ESMF identifies the need for the development and implementation of measures to manage issues e.g. impacts from employment and business opportunities, impact to community safety, and community health impact from dust. It is expected that ITL will develop more detailed planning and</p>

Management Plan	Description
	<p>implementation of these programs prior to commencement of construction.</p> <p>A plan would need to be developed to ensure the program is appropriate with community needs, also optimize collaboration with local community group or organisation, e.g. to increase the skills of local workers and the capacity of local businesses to meet the needs and requirements of the Project.</p>
Occupational health and safety (OHS) plan	<p>Some of the mitigation measures that are proposed in this ESMF to manage impact to community health and safety are related to occupational health and safety (OHS) for workers. An OHS plan should be developed to include these measures e.g. compulsory medical examinations for Project workers.</p>
Labour management	<p>A code of conduct or management plan for labour and working condition for all workers both local and non-local involved in the Project, shall be developed in accordance with Indonesia regulation, and also to include the following measures to manage impact from non-local workforce presence to community health and social structure:</p> <ul style="list-style-type: none"> • Conduct inductions and regular training refreshers regarding do's and don'ts in relation with interaction with locals; and • Zero tolerance towards inappropriate behaviour from and amongst the workforce with locals.
Solid and hazardous waste management plan	<p>Solid waste and hazardous waste management plans to be developed for the operations phase of the project. These shall confirm the Project compliance with Indonesian Regulations and IFC PS and EHS Guideline expectations on waste management.</p>

11.8 CONSTRUCTION ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This Section outlines the construction ESMP which will be developed for future construction of the project. Specific standalone tables are provided for the following requirements:

- Air quality management;
- Noise management;
- Terrestrial biodiversity;
- Surface water and sedimentation management;
- Social management;
- Occupational health and safety; and
- Traffic Impact and Management Plan.

These are provided as a working table (see **Table 11-2** to **Table 11-67**) to support future implementation and preparation of the Project's specific ESHS plans.

These tables detail minimum requirements for mitigation measures that will be implemented during construction to avoid, or mitigate environmental or social impacts as a result of the Project.

Table 11-2 Air Quality Management- Construction

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
ANDAL/RKL-RPL	RKL-RPL	Construction	Land preparation	Increased dust in ambient air	Requiring workers to wear masks and goggles while on duty (as per HSE SOP)	PT Infrastruktur Terbarukan Lestari	During land preparation	The concentration of dust (TSP) in the workplace (Regulation of Ministry of Labour and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT Infrastruktur Terbarukan Lestari	Minimum once during land preparation	RKL-RPL implementation report
ANDAL/RKL-RPL	RKL-RPL	Construction	Mobilisation of equipment and material	Increased dust	1) Cover transported material with tarps or adequate plastic 2) Use loading trucks with mud guard 3) Adjust vehicle's speed, especially when passing through settlements and when the path is not paved	PT Infrastruktur Terbarukan Lestari	During mobilisation of equipment and material (construction phase)	Dust (TSP) concentration in ambient air is <230 µg/Nm ³ (Government Regulation Number 41 Year 1999 Regarding Air Pollution Control)	PT Infrastruktur Terbarukan Lestari	Minimum once during mobilisation of equipment and material	RKL-RPL implementation report
ANDAL/RKL-RPL	RKL-RPL	Construction	Construction of solar power generation facility	Increased dust	Requiring workers to wear masks and goggles while on duty (as per HSE SOP)	PT Infrastruktur Terbarukan Lestari	During solar power generation facility construction (construction phase)	The concentration of dust (TSP) in the workplace (Regulation of Ministry of Labour and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT Infrastruktur Terbarukan Lestari	Minimum once during construction of solar power generation facility	RKL-RPL implementation report
ESHIA	9.4	Construction	Onsite earth works, deliveries, civil works	Increased dust generation & small & heavy vehicle emissions	1) Provide a traffic management plan 2) Watering of roads used during dry periods 3) Ensure the construction contractor has a water truck/vehicle to manage the dust generated by the project.	PT Infrastruktur Terbarukan Lestari	During construction	Dust (TSP) concentration in ambient air is <230 µg/Nm ³ (Government Regulation Number 41 Year 1999 Regarding Air Pollution Control)	PT Infrastruktur Terbarukan Lestari	Weekly	Weekly HSE report

Table 11-3 Noise Management - Construction

Source Document	Chapter	Phase	Activity/ Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
ANDAL/RKL-RPL	RKL-RPL	Construction	Land preparation	Increased noise level	Requiring workers to wear ear plugs while on duty (as per HSE SOP)	PT Infrastruktur Terbarukan Lestari	During land preparation	Noise level in the workplace (Regulation of Ministry of Labour and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT Infrastruktur Terbarukan Lestari	Minimum once during land preparation	RKL-RPL implementation report

Source Document	Chapter	Phase	Activity/ Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
ANDAL/ RKL-RPL	RKL-RPL	Construction	Mobilisation of equipment and material	Increased noise level	1) Adjust vehicle's speed, especially when passing through settlements (± 20 km/hour) 2) Provide driver safety training to all drivers involved in the project. 3) Provide appropriate traffic signs along the road within the project area.	PT Infrastruktur Terbarukan Lestari	During mobilisation of equipment and material (construction phase)	Noise level during mobilisation of equipment and material < 55 dBA (Decree of Minister of Environment Number 48 Year 1996 Regarding Noise Threshold)	PT Infrastruktur Terbarukan Lestari	Minimum once during mobilisation of equipment and material	RKL-RPL implementation report
ANDAL/ RKL-RPL	RKL-RPL	Construction	Construction of solar power generation facility	Increased noise level	Requiring workers to wear ear plugs while on duty (as per HSE SOP)	PT Infrastruktur Terbarukan Lestari	During solar power generation facility construction (construction phase)	Noise level in the workplace (Regulation of Ministry of Labour and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT Infrastruktur Terbarukan Lestari	Minimum once during construction of solar power generation facility	RKL-RPL implementation report
ESHIA	9.5	Construction	Site clearing, site establishment and civil works, and PV field installation and construction	Noise disturbance above ambient background levels	High noise activities will be undertaken over short periods and where possible scheduled to avoid simultaneous operation of high noise generating plant	PT Infrastruktur Terbarukan Lestari	During construction	Noise level measurement Community grievances	PT Infrastruktur Terbarukan Lestari	Weekly	Weekly HSE report
ESHIA	9.5	Construction	Site clearing, site establishment and civil works, and PV field installation and construction	Noise disturbance above ambient background levels	Complaints tracking and grievance log	PT Infrastruktur Terbarukan Lestari	During construction	Noise level measurement Community grievances	PT Infrastruktur Terbarukan Lestari	Weekly	Weekly HSE report

Table 11-4 Terrestrial Biodiversity Impact - Construction

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
AMDAL/ RKL-RPL	RKL-RPL	Construction	Land preparation	Loss of natural & cultured vegetation	1) Revegetation of cleared land, especially in the border part. 2) The border of project area will have plants/ trees that can highly absorb carbon, produce high oxygen, and suppress the temperature rise due to the solar power generation facility. The trees may include Rain Tree (<i>Samanea saman</i>), Cassia (<i>Cassia sp</i>), Cananga (<i>Canarium odoratum</i>), Pingku (<i>Dysoxylum excelsum</i>), Kerai Payung (<i>Filicium decipiens</i>), Matoa (<i>Pometia pinnata</i>) and West Indian Mahogany (<i>Swietenia mahogany</i>) 3) Under the solar panel plants will be grown to cover crop, such as Butterfly Pea (<i>Centrosema pubescens</i>), Moss Roses (<i>Portulaca sp.</i>), Napier Grass (<i>Pennisetum purpureum</i>), Scutch Grass (<i>Cynodon sp</i>), and <i>Calopogonium sp.</i>	PT Infrastruktur Terbarukan Lestari	During land preparation	The number and types of trees and vegetation found on the project site	PT Infrastruktur Terbarukan Lestari	Every 6 months	RKL-RPL implementation report

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
ESHIA	9.6	Construction	Land clearing	Vegetation & fauna habitat loss	Vegetation clearing only in designated areas for the project footprint	PT Infrastruktur Terbarukan Lestari	During construction	The number and types of trees and vegetation found on the project site	PT Infrastruktur Terbarukan Lestari	Weekly	Weekly HSE report
ESHIA	9.6	Construction	Land clearing	Vegetation & fauna habitat loss	Restricting work to designated/cleared boundaries	PT Infrastruktur Terbarukan Lestari	During construction	The number and types of trees and vegetation found on the project site	PT Infrastruktur Terbarukan Lestari	Weekly	Weekly HSE report
ESHIA	9.6	Construction	Land clearing	Vegetation & fauna habitat loss	No disturbance to vegetation outside marked areas	PT Infrastruktur Terbarukan Lestari	During construction	The number and types of trees and vegetation found on the project site	PT Infrastruktur Terbarukan Lestari	Weekly	Weekly HSE report
ESHIA	9.6	Construction	Land clearing	Vegetation & fauna habitat loss	Undertaking site revegetation to assist with soil stabilisation, where possible	PT Infrastruktur Terbarukan Lestari	During construction	The number and types of trees and vegetation found on the project site	PT Infrastruktur Terbarukan Lestari	Weekly	Weekly HSE report
ESHIA	9.6	Construction	Land clearing	Vegetation & fauna habitat loss	Establishment and implementation of a clearance protocol to manage encounters with fauna;	PT Infrastruktur Terbarukan Lestari	During construction	The number and types of trees and vegetation found on the project site	PT Infrastruktur Terbarukan Lestari	Weekly	Weekly HSE report

Table 11-5 Surface Water and Sedimentation Management - Construction

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
AMDAL/ RKL-RPL	RKL- RPL	Construction	Land preparation	Run off	<ol style="list-style-type: none"> 1) Construction of retention pond or run off pond in project area to contain run off with a volume of approximately 30,000 m³ (or during land preparation). Natural ponds or puddles in project location will be left as they are temporary until the drainage construction is done. 2) Drainage construction for run-off water canalization to retention pond or natural waterways around the project site in operation stage. 	PT Infrastruktur Terbarukan Lestari	During land preparation and operation	Increased amount of run off discharge	PT Infrastruktur Terbarukan Lestari	Every 6 months	RKL-RPL implementation report
AMDAL/ RKL-RPL	RKL- RPL	Construction	Land preparation	Increased Erosion	<ol style="list-style-type: none"> 1) Minimizing soil damage by suppressing erosion levels to tolerable levels and/or similar to initial conditions. 2) Implement cropping pattern (C), and soil conservation (P) in accordance with $CP \leq T$: RKLS. In order to suppress the erosion level until similar or lower than tolerable level, plant with $C \leq 0,036$ or soil conservation with $P \leq 0,036$ or the combination of both $(CP) \leq 0,036$. For solar power 	PT Infrastruktur Terbarukan Lestari	During land preparation and operation	<p>Any changes in land coverage will cause change to surface erosion rates.</p> <p>Increased erosion on land preparation is tolerable (erosion rate of 12-35 tonnes / ha / year).</p> <p>In addition, the quality of river water surrounding the area is measured by</p>	PT Infrastruktur Terbarukan Lestari	Every 6 months	RKL-RPL implementation report

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
					<p>generation facility, cover crop plantation can be planted.</p> <p>3) For soil around the site which is to be maintained, conservation measures are to be applied in the form of terraces for certain slopes with robust construction that can meet the requirements ($P < 0,036$).</p> <p>4) Avoid land opening, including land clearing in the rainy season and these activities are to be done gradually.</p>			monitoring TDS and TSS			
AMDAL/ RKL-RPL	RKL- RPL	Construction	Land preparation	Landslide	<p>1) Stabilize steep slopes at the site of land preparation and cliffs, also along the sloping lands (terraced)</p> <p>2) Make Soil Retaining Walls</p>	PT Infrastruktur Terbarukan Lestari	During land preparation and operation	A decrease in the level of vulnerability to landslides	PT Infrastruktur Terbarukan Lestari	Minimum once during land preparation	RKL-RPL implementation report
ESHIA	9.3	Construction	Land clearing	Increased of suspended sediment in river water	Solid stabilisation to be implemented during construction, this may include establishment of grass cover or other forms of ground cover across the site	Contractor Construction HSE Manager	During land clearing activities	Land clearing and ground cover area	PT Infrastruktur Terbarukan Lestari HSE Dept.	Weekly	Weekly HSE report
ESHIA	9.3	Construction	Land clearing	Increased of suspended sediment in river water	Solid stabilisation to be implemented during construction, this may include establishment of grass cover or other forms of ground cover across the site	Contractor Construction HSE Manager	During land clearing activities	Land clearing and ground cover area	PT Infrastruktur Terbarukan Lestari HSE Dept.	Weekly	Weekly HSE report
ESHIA	9.3	Construction	Land clearing	Increased of suspended sediment in river water	Storm water management structures such as storm water ponds will be designed to collect the surface runoff and allow the removal of sediment by natural settlement, which in turn should reduce sediment loading prior to discharge into receiving environment	Contractor Construction HSE Manager	During land clearing activities	Storm water pond design	PT Infrastruktur Terbarukan Lestari HSE Dept.	Weekly	Weekly HSE report
ESHIA	9.3	Construction	Land clearing	Increased of suspended sediment in receiving waters	Minimizing the land clearance area where possible, providing surface protection such as sheet cover	Contractor Construction HSE Manager	During land clearing activities	Land clearing and sheet cover area	PT Infrastruktur Terbarukan Lestari HSE Dept.	Weekly	Weekly HSE report
ESHIA	9.3	Construction	Land clearing	Increased of suspended sediment in river water	Appropriate surface drainage will be designed and provided	Contractor Construction HSE Manager	During land clearing activities	surface drainage design	PT Infrastruktur Terbarukan Lestari HSE Dept.	Weekly	Weekly HSE report
ESHIA	9.3	Construction	Land clearing	Increased of suspended sediment and spilled oil contaminants in receiving waters	Provide containment for storage areas of oil, fuel and chemicals to control contaminated surface runoff	Contractor Construction HSE Manager	During land clearing activities	Containment devices	PT Infrastruktur Terbarukan Lestari HSE Dept.	Weekly	Weekly HSE report

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
ESHIA	9.3	Construction	Land clearing	Increased of suspended sediment and spilled oil contaminants receiving waters	Temporary traffic areas and access roads, if any, formed during construction will be protected by coarse stone ballast or equivalent. These measures shall prevent soil erosion caused by rainstorms	Contractor Construction HSE Manager	During land clearing activities	Temporary traffic areas and access roads protected	PT Infrastruktur Terbarukan Lestari HSE Dept.	Weekly	Weekly HSE report
ESHIA	9.3	Construction	Land clearing	Increased of suspended sediment and spilled oil contaminants in receiving waters	Open stockpiles of construction materials (for example, aggregates, sand and fill material) in places which are identified to have a possibility of significant runoff will have measures in place to prevent the washing away of construction materials, soil, silt or debris into any drainage system	Contractor Construction HSE Manager	During land clearing activities	Stockpiles material construction	PT Infrastruktur Terbarukan Lestari HSE Dept.	Weekly	Weekly HSE report

Table 11-6 Social Management - Construction

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
AMDAL/ RKL-RPL	RKL-RPL	Pre-Construction	Land procurement activities	Change of landownership	- To implement the Project buying and selling process in accordance with the applicable provisions by involving village and district government	PT Infrastruktur Terbarukan Lestari	During pre-construction	No conflicts due to the changes of land ownership	PT Infrastruktur Terbarukan Lestari	During Pre-Construction, in one monitoring	RKL-RPL implementation report
AMDAL/ RKL-RPL	RKL-RPL	Pre-Construction	Socialization and public consultation activity	Community Perception	- To socialize regularly the project to community in Wineru - To pay attention to feedback, suggestions and opinions of government and community associated with environmental management according to the results of socialization and public consultation - To implement community development activities which helps to increase the capacity of human resources and improvement of village infrastructure according to the ability of company	PT Infrastruktur Terbarukan Lestari	During pre-construction until post operation phase	Community who agree and support the development of solar power plant is >90%	PT Infrastruktur Terbarukan Lestari	During Pre-Construction (in one monitoring)	RKL-RPL implementation report
AMDAL/ RKL-RPL	RKL-RPL	Construction	Mobilisation of equipment and material	Road damage	- Truck/container capacity suitable with road ability - Implement roadwork when damages occur (the company has committed to repair the damaged road due to project vehicle activity)	PT Infrastruktur Terbarukan Lestari	During mobilisation of equipment and material (construction phase)	Damaged road are repaired	PT Infrastruktur Terbarukan Lestari	Minimum once during mobilisation of equipment and material	RKL-RPL implementation report
AMDAL/ RKL-RPL	RKL-RPL	Construction	Procurement activities of Labour	Increase of Job Opportunity and Income	- Prioritizing the local workforce, especially for unskilled workforce to be employed	PT Infrastruktur Terbarukan Lestari	During construction phase	Local community who were employed in solar power plant is >50%	PT Infrastruktur Terbarukan Lestari	During construction phase, every 6 months	RKL-RPL implementation report

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
					<ul style="list-style-type: none"> - Inform the job vacancies to community and surrounding Wineru Village through head of village and district government of Likupang Timur - Provide labour wages at least equal to the wages of construction labour around the solar power plant or provincial minimum wage of Sulawesi Utara current year - Utilize local contractors to provide materials of construction 						
ESHIA	11.2.1	Pre-construction	Land procurement	Economic benefit from land compensation to the land owner	<p>Where practicable align with IFC PS5 expectation, including:</p> <ul style="list-style-type: none"> - Proper documentation for all consultation and negotiation discussions; - Ensure documentation to demonstrate fair compensation rates; - Develop and implement grievance mechanism for concerns related to the land acquisition to be channelled. The system will be informed to the affected communities and made easily accessible. Relevant grievances will be addressed immediately. 	PT Infrastruktur Terbarukan Lestari - Community Relation/ Development Department	Pre-construction phase/ during land acquisition process	<ul style="list-style-type: none"> - Land acquisition procedure has been updated to meet the IFC PS - Grievance mechanism procedure has been in place - Available documentation of consultation and grievance records 	PT Infrastruktur Terbarukan Lestari	During land acquisition process	Land acquisition completion report
ESHIA	11.2.2	Pre-construction	Land procurement	Impact to Loss of Access and Income for Land Users	<p>The following additional measures will be implemented:</p> <ul style="list-style-type: none"> - Identify the casual labours to obtain more information of their current livelihoods; - Should any significant loss of income be identified the Project will provide a development support program to ensure the livelihood of the affected land users could be restored or improved; - Develop and implement grievance mechanism for the land users to channel their concern. The system will be informed to the affected communities and made easily accessible. Relevant grievances will be addressed immediately. 	PT Infrastruktur Terbarukan Lestari - Community Relation/ Development Department	Pre-construction phase/ during land acquisition process up to the initial stage of construction phase	<ul style="list-style-type: none"> - Land acquisition procedure has been updated to meet the IFC PS - Grievance mechanism procedure has been in place - Available documentation of consultation and grievance records 	PT Infrastruktur Terbarukan Lestari	During land acquisition process and once during the initial phase of construction	Livelihood assistance report
ESHIA	11.3.1	Construction	Workforce Mobilisation/Presence	Economic benefit to locals as a result of the Project employment and business opportunities	To have a clear stipulation of using local labour in the EPC contract and instruct the EPC contractor to prioritise qualified local people as construction workers in accordance with the needs of the Project	PT Infrastruktur Terbarukan Lestari- HR/Procurement Department	Prior to commissioning of construction phase and during construction phase	Clear stipulation in the contract with EPC and Documentation/ record of employment announcement at regional and local (village) level	PT Infrastruktur Terbarukan Lestari	Once prior to commissioning of construction phase and quarterly monitoring during construction phase	Quarterly report regarding workforce number

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
ESHIA	11.3.1	Construction	Workforce Mobilisation/Presence	Economic benefit to locals as a result of the Project employment and business opportunities	Provide and communicate clear information about the Project's requirement related to employment and business opportunities and priorities locals where feasible	PT Infrastruktur Terbarukan Lestari- HR/Procurement Department and Community Relation/ Development Department	Prior to and during construction phase	Documentation/ record of employment and business opportunities announcement at regional and local (village) level, as part of stakeholder engagement/ consultation report	PT Infrastruktur Terbarukan Lestari	Quarterly during construction phase	Quarterly report regarding workforce number and composition and consultation report
ESHIA	11.3.2	Construction	Construction activities	Disturbance to Farming Activities as a Result of Project Construction Activities	The Project is still expected to implement the following mitigation measures in addition to the AMDAL required measures in managing dust during construction: - Provide and communicate the detail information about the Project's plan and schedule particularly related to land clearing and construction to the community with a special attention to farmers nearby the project location. - Agree with local farmers suitable access routes to their lands - Establishment of a grievance mechanism that is understood by and accessible for all villagers. The mechanism will be simple, efficient and timely and fully consultative.	PT Infrastruktur Terbarukan Lestari - Community Relation/ Development Department	Prior to commissioning of construction phase and during construction phase	- Record of consultation - Available documentation of consultation and grievance records	PT Infrastruktur Terbarukan Lestari	Quarterly monitoring on grievance resolution	Consultation report and quarterly grievance report
ESHIA	11.4.1	Construction	Workforce Mobilisation/Presence	Impacts associated with non-local workforce and/or in-migrant presence increasing the prevalence of communicable diseases particularly during construction phase	- Compulsory medical examinations for the Project workers, including contractors to ensure they are fit for working and to monitor the prevalence of communicable diseases detected through annual medical check-up - Zero tolerance towards inappropriate behaviour from and amongst the workforce - Conduct inductions and training refreshers on the Project's Code of Conduct regarding do's and don'ts in relation with interaction with locals	PT Infrastruktur Terbarukan Lestari- HR Department and HSE Department	Prior to the commencement of work, and during construction phase	- Record of employee medical check-up result - Record of breach to the code of conduct - Record of worker induction and training refresher	PT Infrastruktur Terbarukan Lestari	Quarterly during construction phase	- Report of workforce health condition - Report of employee induction and training - Report of code of conduct implementation
ESHIA	11.4.1	Construction	Workforce Mobilisation/Presence	Impacts associated with non-local workforce and/or in-migrant presence increasing the prevalence of communicable diseases particularly during	- Establish a grievance mechanism and accessible for all community groups to report concerns associated with potential Project health impacts. Where complaints are submitted the Project will undertake an immediate investigation. - Conduct appropriate workers-community engagement such as sporting or cultural events to improve understanding and cohesions between non-local	PT Infrastruktur Terbarukan Lestari - Community Relation/ Development Department	Prior to and during construction phase	- Grievance mechanism procedure Documentation/ record of grievance mechanism socialisation at local (village) level - Documentation/ record of the program planning and implementation - Documentation/ record of any form	PT Infrastruktur Terbarukan Lestari	Quarterly during construction phase	- Quarterly grievance report - Stakeholder engagement report

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
				construction phase	workers and the surrounding communities. - Regular engagement with local authorities relevant to crime (local police) or other social problems (e.g. village leaders) for prevention of issues and for mitigation when issues arise.			engagement with stakeholders			
ESHIA	11.4.2	Construction	Vehicle use/transportation (workforce, supply and support)	Community health impacts associated with dust generation during Project construction from the movement of Project heavy equipment	- Develop Traffic Management Plan - Consultation with communities on Project's traffic routes and peak traffic times - Establish a grievance mechanism and accessible for all villages to report dust concerns. Where complaints are submitted the Project will undertake an immediate investigation	PT Infrastruktur Terbarukan Lestari - Community Relation/ Development Department	During the construction phase	- Documentation/ record of consultation - Grievance mechanism procedure Documentation/ record of grievance mechanism socialisation at local (village) level	PT Infrastruktur Terbarukan Lestari	Quarterly during construction phase	- Environmental monitoring report - Stakeholder engagement report - Quarterly grievance report
ESHIA	11.5.1	Construction	Vehicle use/transportation (workforce, supply and support)	Potential incident with community as a result of increase in Project traffic on a public road	It is understood that the Project has performed an assessment about the condition of public roads prior to vehicle mobilization to ascertain the road load feasibility. In addition, the Project will implement the following additional mitigation measures: - In the area where unfeasible road conditions are identified, a road improvement will be conducted to ensure the road condition could meet the standard condition for construction vehicle mobilization. - Should road damage occur associated with the Project mobilization, a road improvement program will be implemented to ensure that the public road condition is adequate for the local community and other road users; and - Establish a proper and accessible grievance mechanism to report concerns about public road condition. The Project will carry out immediate investigation when the community submits related complaints.	PT Infrastruktur Terbarukan Lestari-HSE Department	During construction phase	- Road improvement and/ or repairs - Grievance is resolved in timely manner	PT Infrastruktur Terbarukan Lestari	Quarterly during construction phase	- Report of road improvement, if any - Report of road repairs - Grievance record
ESHIA	11.5.2	Construction	Vehicle use/transportation (workforce, supply and support)	Potential incident with community as a result of increase in Project traffic on a public road	- Enforce speed limit regulations to all Project construction vehicles, along with an emergency response procedure - Consultation with the communities on key Project traffic routes, timings of peak movements, type of vehicles and heavy equipment and provision of road safety awareness to the surrounding	PT Infrastruktur Terbarukan Lestari- HSE Department	Prior to and during construction phase	- Documentation/ record of consultation Safety awareness program planning and report - Safety management plan/ procedure and emergency response plan/ procedure (ERP) in place, along with	PT Infrastruktur Terbarukan Lestari	Quarterly during construction phase	- HSE Report - Stakeholder engagement report - Quarterly grievance report

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
					<p>communities, through corporation with local police</p> <p>- The proposed grievance mechanism should be accessible for all villages to report concerns associated with health and safety. Where complaints on accidents or near misses are submitted the Project will undertake an immediate investigation</p>			<p>record of any breach of the plan/ procedure</p> <p>- Grievance mechanism procedure</p> <p>Documentation/ record of grievance mechanism</p> <p>socialisation at local (village) level</p>			

Table 11-7 Occupational Health and Sanitation Management – Construction

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
ANDAL/RKL-RPL	RKL-RPL	Construction	Land preparation	Disturbance to health and comfort of workers due to decreased air quality and increased noise level	Implement HSE SOP to minimize dust and noise level effect to workers' health.	PT Infrastruktur Terbarukan Lestari	During land preparation	Health condition of workers	PT Infrastruktur Terbarukan Lestari	Minimum once during land preparation	RKL-RPL implementation report
ANDAL/RKL-RPL	RKL-RPL	Construction	Commissioning of solar power generation facility	Increased electric and magnetic field	Restricting public access to the site of solar power generation facility (according to internal company regulation)	PT Infrastruktur Terbarukan Lestari	During commissioning (construction phase)	Magnetic and electric field level	PT Infrastruktur Terbarukan Lestari	Minimum once during commissioning	RKL-RPL implementation report
ESHIA	11.6.1	Pre-construction and Construction	All pre-construction/land works and construction activities	Potential impacts to workers' health and safety during construction phase	<p>Designate a proper storage location within the construction area to store the solar panels and other construction materials and supplies. Proper OHS procedure is expected to be in place, align with Indonesian Regulation, as well as IFC PS. The procedure will include, at minimum, the following measures:</p> <ul style="list-style-type: none"> Contractor will be committed to ensure all health and safety measures are in place to prevent accidents and reduce the consequences of non-conformance events; Contractor will provide training, awareness and supervising to ensure all of its construction workers comply with the OHS procedure; Contractor shall provide all appropriate resources i.e. personal protective equipment (PPE) onsite; and 	PT Infrastruktur Terbarukan Lestari – HSE Department	During pre-construction and construction phase	<ul style="list-style-type: none"> OHS procedure in place Training material on OHS and number of workers participated in the training HS awareness program for workers are implemented e.g. through posters and regular toolbox meeting The use of PPE on all workers ERP in place and socialized to workers e.g. through posters and regular toolbox meeting 	PT Infrastruktur Terbarukan Lestari	Weekly inspection and monthly implementation report	Inspection form and monthly report

					<ul style="list-style-type: none">• Emergency response procedure and infrastructure will be available to all workers• Develop an HSE procedure for panels' installation to prevent electrocution during construction.• Designate a competent person to conduct HSE monitoring.						
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11.9 OPERATIONAL/POST OPERATIONS ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This section outlines environmental and social management to be undertaken during the operational phase of the Project ESMF. The majority of the management measures outlined in the Construction ESMP are applicable and therefore to be carried over in to the operational phase. This operational ESMP therefore addresses issues and management measure applicable only to the operational phase.

Table 11-8 to **Table 11-10** present the framework for each management issue as before, which is to be elaborated in specific plans and procedures. These tables detail minimum requirements for mitigation measures that will be implemented to avoid, or mitigate environmental or social impacts as a result of Project operation. In addition post-operation measures from the RKL-RPL are also indicated.

Table 11-8 Environmental Management - Operations/Post Operations

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
OPERATIONS											
AMDAL/RKL-RPL	RKL-RPL	Operations	Solar power generation facility operation	Increased electric energy supply	1) Maintaining the stability of the electric supply to PLN 2) Maintaining underground power transmission lines connected to the source of the generator.	PT Infrastruktur Terbarukan Lestari	During operation	Electricity supply	PT Infrastruktur Terbarukan Lestari	Every six months	RKL-RPL implementation report
AMDAL/RKL-RPL	RKL-RPL	Operations	Solar power generation facility operation	Temperature rise (micro climate change)	1) Plant and maintain cover crop/grass in solar power generation facility area 2) Plant trees that can highly absorb CO ₂ and produce high O ₂ surrounding project area.	PT Infrastruktur Terbarukan Lestari	During operation	Ambient temperature <35°C	PT Infrastruktur Terbarukan Lestari	Every six months	RKL-RPL implementation report
POST OPERATIONS											
AMDAL/RKL-RPL	RKL-RPL	Post-operations	Demolition of solar power generation facility	Increased dust	Requiring workers to wear masks and goggles while on duty (as per HSE SOP)	PT Infrastruktur Terbarukan Lestari	During demolition of facility	The concentration of dust (TSP) in the workplace (Regulation of Ministry of Labour and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT Infrastruktur Terbarukan Lestari	Minimum once during the demolition	RKL-RPL implementation report
-	-	Post-operations	Demolition of solar power generation facility	Increase waste of damaged panel	1) Develop a waste management plan which includes handling and management of the broken panels 2) Implement proper waste handling and management during demolition	PT Infrastruktur Terbarukan Lestari	During demolition of facility	Procedure of waste management in place Waste manifest record available Closure document available	PT Infrastruktur Terbarukan Lestari	Minimum once during the demolition	ESIA report

Table 11-9 Noise Management - Operations/Post Operations

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
POST OPERATIONS											
AMDAL/RKL-RPL	RKL-RPL	Post-operations	Demolition of solar power generation facility	Increased noise level	Requiring workers to wear ear plugs while on duty (as per HSE SOP)	PT Infrastruktur Terbarukan Lestari	During demolition of facility	Noise level in the workplace (Regulation of Ministry of Labour and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT Infrastruktur Terbarukan Lestari	Minimum once during the demolition	RKL-RPL implementation report

Table 11-10 Social Management - Operations/Post Operations

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
AMDAL/RKL-RPL	RKL RPL	Operations	Recruitment of workforce and income	Increased procurement of workforce and income	- Prioritizing the local workforce, especially for unskilled workforce to be employed during operations phase - Inform job vacancies to community and surrounding Wineru Village through head of village and district government of Likupang Timur	PT Infrastruktur Terbarukan Lestari	During procurement of workforce activity	Opening up employment opportunities for workers which derive from Wineru Village and other villages around the site of Likupang solar power plant (>50% of unskilled workforce from Wineru Village)	PT Infrastruktur Terbarukan Lestari	During operation phase, every six month	RKL-RPL implementation report

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
					- Provide labour wages at least equal to the wages of construction labour around the solar power plant or provincial minimum wage of Sulawesi Utara current year						
ESHIA	11.3.1	Operations	Workforce Mobilisation/Presence	Economic benefit to locals as a result of the Project employment and business opportunities	Communicate Project's requirements around employment and business opportunities where feasible	PT Infrastruktur Terbarukan Lestari- HR/Procurement Department and Community Relation/ Development Department	Prior to and during operation phase	Documentation/ record of employment and business opportunities announcement at regional and local (village) level, as part of stakeholder engagement report	PT Infrastruktur Terbarukan Lestari	Bi-annually during operation phase	Bi-annual report regarding workforce number and composition and stakeholder engagement report
ESHIA	11.3.2	Operations	Disturbance to Farming Activities as a Result of Project Operation Activities	Disturbance to Farming Activities as a Result of Project Operation Activities	The Project is still expected to implement the following mitigation measures in addition to the AMDAL required measures in managing heat during operation: - Establishment of a grievance mechanism that is understood by and accessible for all villagers. The mechanism will be simple, efficient and timely and fully consultative.	PT Infrastruktur Terbarukan Lestari - Community Relation/ Development Department	Prior to and during operation phase	- Record of consultation - Available documentation of consultation and grievance records	PT Infrastruktur Terbarukan Lestari	Bi-annually during operation phase	Consultation report and Bi-annual grievance report
POST OPERATIONS											
AMDAL/ RKL RPL	RKL RPL	Post operations	Suspension of solar power generation facility operation	Loss of employment opportunity and income	- The proponent should provide allowance or severance to the workforce who laid off in accordance with the employment contract - Inform to the Wineru Village Government or Likupang Timur Head of District regarding plan to halt operations of solar power plant	PT Infrastruktur Terbarukan Lestari	Towards the end of operation phase	No conflict and unrest of workforce	PT Infrastruktur Terbarukan Lestari	In the end of operation phase, regularly monitoring in operation phase	RKL-RPL implementation report
AMDAL/ RKL RPL	RKL RPL	Post operations	Hand over solar power plant to PLN	Community perception	- Socialization the planning of handover of solar power plant to PLN - Socialization the suspension of solar power plant operation to district government and village government and community surrounding Wineru Village	PT Infrastruktur Terbarukan Lestari	Towards the end of operation phase	Have a positive perception from community	PT Infrastruktur Terbarukan Lestari	In the end of operation phase, regularly monitoring in operation phase	RKL-RPL implementation report

Table 11-11 Occupational Health and Sanitation Management – Operations/Post Operations

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
OPERATIONS											
AMDAL/ RKL-RPL	RKL-RPL	Operations	Solar power generation facility operation	Increased electric and magnetic field	1) Restricting public access to the site of solar power generation facility (according to internal company regulation)	PT Infrastruktur Terbarukan Lestari	During operation	Level or magnetic and electric field	PT Infrastruktur Terbarukan Lestari	Every six month	RKL-RPL implementation report

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
					2) Measuring the magnetic and electric field level periodically						
AMDAL/ RKL-RPL	RKL-RPL	Operations	Solar power generation facility operation	Disturbance to health of workers	1) Plant trees surrounding project area 2) Plant and maintain cover crop or grass in solar power generation facility area	PT Infrastruktur Terbarukan Lestari	During operation	Health condition of workers	PT Infrastruktur Terbarukan Lestari	Every six month	RKL-RPL implementation report
AMDAL/ RKL-RPL	RKL-RPL	Operations	Solar power generation facility maintenance	Hazardous and toxic waste contamination	1) The proponent has had hazardous and toxic waste handling procedure 2) Waste storage is in accordance with Government Regulation Number 101 Year 2014 regarding Management of Hazardous and Toxic Waste, among others: hazardous and toxic waste should be free from flood and is not prone to natural disaster; it should be in control of every person generating hazardous and toxic waste; emergency response equipment is provided; every 3 months, hazardous and toxic waste collected is sent to a hazardous and toxic waste management company which has permit. 3) Develop a waste management plan which include handling and management of the broken panels	PT Infrastruktur Terbarukan Lestari	During solar power generation facility maintenance (operation phase)	Hazardous and toxic waste in temporary landfill and in solar power generation facility area	PT Infrastruktur Terbarukan Lestari	Every six month	RKL-RPL implementation report
POST OPERATIONS											
AMDAL/ RKL-RPL	RKL-RPL	Post-operations	Demolition of solar power generation facility	Hazardous and toxic waste contamination	1) The proponent has had hazardous and toxic waste handling procedure 2) Waste storage is in accordance with Government Regulation Number 101 Year 2014 regarding Management of Hazardous and Toxic Waste, should be free from flood and is not prone to natural disaster; it should be in control of every person generating hazardous and toxic waste; emergency response equipment is provided; every 3 months, it is sent to a hazardous and toxic waste management company which has permit.	PT Infrastruktur Terbarukan Lestari	During demolition of facility	Hazardous and toxic waste	PT Infrastruktur Terbarukan Lestari	Minimum once during the demolition	RKL-RPL implementation report
AMDAL/ RKL-RPL	RKL-RPL	Post-operations	Demolition of solar power generation facility	Solid waste contamination	1) Solid waste such as building materials, ferrous scrap, and others are to be placed in temporary landfill before being transported by truck to final	PT Infrastruktur Terbarukan Lestari	During demolition of facility	Solid waste	PT Infrastruktur Terbarukan Lestari	Minimum once during the demolition	RKL-RPL implementation report

Source Document	Chapter	Phase	Activity/Aspect	Potential Impacts	Mitigation	Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
					landfill in Minahasa Utara Regency 2) Perform a final clean-up in project location						
AMDAL/ RKL-RPL	RKL-RPL	Post-operations	Demolition of solar power generation facility	Aesthetics disturbance	1) Conduct management of solid waste and hazardous and toxic waste 2) Cultivate cultured vegetation or local natural vegetation in project location	PT Infrastruktur Terbarukan Lestari	During demolition of facility	Aesthetic aspect of project location	PT Infrastruktur Terbarukan Lestari	Minimum once during the demolition	RKL-RPL implementation report

12 CONCLUSION

This ESHIA has been conducted to evaluate the impacts associated with the proposed Likupang 15 MWac Solar Farm at Wineru Village, Likupang Timur District.

The impact assessment has been conducted in compliance with administrative framework identified herein, including relevant national legislative requirement, international conventions and Equis Energy's corporate requirements.

12.1 IMPACTS SUMMARY

Following a scoping exercise, this ESHIA was focused on interactions between Project activities and various resources/receptors that could result in significant impacts. *Table 12-1* presents the outcomes of the comprehensive assessment of identified impacts as a result of the various phases of the proposed Project and summarise the impacts. Based on the impacts significance, the ESMP has been prepared.

Table 12-1 ESHIA Impact Assessment Summary

Potential Impact	Impact Evaluation	Mitigation	Residual Impact
Result of increased runoff and sedimentation (construction and operations)	Moderate	<ul style="list-style-type: none"> • Soil and erosion management • Solid stabilisation • Runoff and storm water drainage system • Sediment control devices 	Minor
Impacts to Conservation Significant Fauna Species	Moderate	<ul style="list-style-type: none"> • Development of clearing procedures • Establishment and implementation of a clearance protocol to manage encounters with fauna 	Moderate-Minor
Economic benefits to the land owner from the Project land acquisition	Positive	<ul style="list-style-type: none"> • Proper documentation • Assess the socio-economic profile of the land owner • Develop a fair market value compensation rate 	n/a
Impact to Local Economy from Employment and Business Opportunities (Construction and Operation)	Positive	<ul style="list-style-type: none"> • To have a clear stipulation of using local labour in the EPC contract • Inform Project's requirement related to employment and business opportunities • Implement community development program 	n/a

Potential Impact	Impact Evaluation	Mitigation	Residual Impact
Impact to Community Safety as a Result of Mobilization during (Construction)	Moderate	<ul style="list-style-type: none"> • Consultation with the communities through corporation with local police • Enforce speed limit regulations and signage, also emergency response procedure • The proposed grievance mechanism should be accessible 	Negligible

The Environmental and Social Management Plan (ESMP) describes mitigation measures for impacts specific to project activities and also discusses implementation mechanism.

To conclude, the implementation of the ESMP will help ITL in complying with the national/ state regulatory framework as well as to meet IFC/ADB reference framework requirements.

ANNEX A CONSULTATION RECORDS

**Rangkuman Butir-Butir Hasil Sosialisasi dan Konsultasi Publik
Studi Amdal Pembangunan Pembangkit Listrik Tenaga Surya (PLTS) Likupang
Kapasitas 25 MW Oleh PT Infrastruktur Terbarukan Lestari
di Desa Wineru Kecamatan Likupang Timur Kabupaten Minahasa Utara**

Hari/Tanggal: Senin, 17 Oktober 2016
Tempat: Balai Desa Wineru Kec. Likupang Timur

1. Pemerintah desa, wakil masyarakat (LPM/BPD) dan tokoh masyarakat (pemuka agama, pemuda dan guru) dari desa Wineru, kecamatan Likupang Timur yang hadir pada acara sosialisasi dan konsultasi publik pada dasarnya menerima rencana Pembangkit Listrik Tenaga Surya (PLTS) Likupang Kapasitas 25 MW Oleh PT Infrastruktur Terbarukan Lestari di wilayah Desa Wineru Kecamatan Likupang Timur Kabupaten Minahasa Utara.
2. Memasukkan dalam dokumen Amdal program pengembangan masyarakat desa sekitar (comdev) yang akan dilakukan pemrakarsa pada waktu PLTS beroperasi. Kegiatan pengembangan masyarakat desa (comdev atau CSR) di desa Wineru supaya diprioritaskan untuk pembangunan atau rehabilitasi rumah ibadah.
3. Mempertanyakan apakah pembangunan PLTS ini tidak ada bahayanya, terutama bahaya radiasi dari pemasangan panel dengan luas 30 hektar pada PLTS yang akan dibangun.
4. Pengelolaan limbah B3 dari PLTS supaya dikaji dalam studi Amdal ini.
5. Memberikan batasan akses masyarakat umum atau pengunjung di lokasi PLTS, untuk menghindari terjadinya berbagai hal atau kejadian yang tidak diinginkan.
6. Jadwal waktu pelaksanaan pembangunan PLTS supaya diberitahukan pada pemerintah desa Wineru dan pemerintah kecamatan Likupang Timur supaya ada koordinasi di lapangan.
7. Tenaga kerja dan pengusaha lokal agar dilibatkan mulai dari tahap konstruksi sampai pengoperasian
8. Pemrakarsa harus menyatakan komitmennya secara tertulis untuk melaksanakan pengelolaan dan pemantauan lingkungan termasuk komitmen untuk membangun desa sekitar, memprioritaskan penggunaan tenaga kerja lokal dan memberikan kesempatan pada pengusaha lokal untuk terlibat dalam kegiatan konstruksi PLTS Likupang In.



Sosialisasi dan Diskusi dengan Pemerintah dan Masyarakat Setempat



Sosialisasi dan Diskusi dengan Pemerintah dan Masyarakat Setempat



Diskusi dengan Pemerintah Kecamatan Likupang Timur

KUESIONER STUDI AMDAL
PEMBANGUNAN PEMBANGKIT LISTRIK TENAGA SURYA (PLTS) 25 MW
DI DESA WINERU KECAMATAN LIKUPANG TIMUR, KABUPATEN MINAHASA UTARA

Hari/Tanggal :
Nama Responden :
Dusun/Ling/RT/Desa :

I. IDENTITAS RESPONDEN

1. Nama/Umur :/.....thn
2. Jenis Kelamin : a. Laki-laki b. Perempuan
3. Kedudukan dalam Keluarga : a. Kepala Keluarga b. Ibu Rumah tangga
4. Agama :
5. Pendidikan Terakhir :
 - a. Tidak Tamat SD
 - b. Tamat SD
 - c. SLTP
 - d. SLTA
 - e. Diploma/S1
 - f. Pascasarjana
6. Pekerjaan Pokok :
7. Pekerjaan Sampingan :
8. Jumlah Tanggungan Keluarga.....orang

II. EKONOMI

1. Pendapatan :
 - Pendapatan rata-rata perbulan yang bersumber dari pekerjaan pokok sebesar Rp.....
 - Pendapatan rata-rata perbulan yang bersumber dari pekerjaan sampingan sebesar Rp.....
 - Total Pendapatan Rata-rata keluarga perbulan, termasuk dalam kategori:
 - a. < Rp. 500.000
 - b. Rp. 500.000 – 1.000.000
 - c. Rp. 1.000.000 – 1.500.000
 - d. Rp. 1.500.000 – 2.000.000
 - e. Rp. 2.000.000 – 3.000.000
 - f. > Rp. 3.000.000
2. Pengeluaran rata-rata perbulan sebesar Rp.....
3. Bagaimana pendapat saudara tentang kesempatan kerja yang ada saat ini ?
 - a. Luas/banyak
 - b. Cukup tersedia
 - c. Kurang tersedia.
4. Lapangan kerja mana yang menurut saudara paling terbuka diwilayah ini
 - a. Industri dan perdagangan
 - b. Pertanian
 - c. Pariwisata
 - d. Bangunan Konstruksi
 - e. Lainnya.....

III. Sosial Budaya

1. Saudara/Bapak/Ibu termasuk dalam etnis/suku?
 - a. Minahasa
 - b. Sangihe
 - c. Mongondow
 - d. Jawa
 - e. Gorontalo
 - f. Lainnya
2. Sudah berapa lama Bapak/Ibu tinggal di desa initahun
3. Sebutkan kegiatan-kegiatan kemasyarakatan yang ada di Kelurahan yang bapak/ibu ikuti?
4. Apakah dilokasi ini ada terdapat situs atau tempat yang dilindungi? Jika ya, namanya apa dan lokasi persisnya dimana.....

IV. Tanggapan Atas Rencana Pembangunan PLTS 25 MW

1. Apakah Bapak/Ibu mengetahui ada rencana kegiatan pembangunan PLTS 25 MW di desa Wineru Kec. Likupang Timur, diwilayah ini?
 - a. Ya
 - b. Tidak
2. Jika Ya atau sudah tahu, darimana sumber informasi tersebut berasal ?
 - a. Pemerintah Kecamatan
 - b. Pemerintah Desa
 - c. Tetangga
 - d. Media Massa
 - e. Pemrakarsa (PLTS 25 MW)
 - f. Lainnya
3. Apakah bapak/ibu memiliki tanah yang terletak di area calon kegiatan pembangunan/proyek?
 - a. Ya (luasnya.....m2)
 - b. Tidak
5. Jika ya, bagaimana rencana saudara dengan tanah tersebut?
 - a. Minta ganti rugi berdasarkan harga yang disepakati bersama pemerintah.
 - b. Minta ganti rugi berdasarkan harga yang pemilik tentukan
 - c. Mempertahankan
 - d. Lainnya.....
6. Menurut bapak/ibu manfaat apa yang diinginkan dari rencana kegiatan pembangunan tersebut di wilayah ini? (boleh pilih jawaban lebih dari satu)
 - a. Mengurangi pengangguran/kesempatan kerja terbuka
 - b. Daerah menjadi lebih ramai
 - c. Usaha dagang menjadi lebih berkembang
 - d. Pembangunan daerah
 - e. Peningkatan pendapatan
7. Menurut bapak/ibu akibat apa yang tidak diinginkan apabila dilaksanakan pembangunan tersebut?
 - a. Pencemaran udara
 - b. Kebisingan suara
 - c. Kemungkinan banjir
 - d. Meningkatnya suhu udara
 - e. Lainnya.....
8. Bagaimana sikap bapak/ibu dengan adanya rencana kegiatan pembangunan PLTS di wilayah ini?
 - a. Sangat setuju
 - b. Setuju
 - c. Kurang Setuju
 - d. Tidak Setuju
9. Jika setuju alasannya
10. Jika tidak alasan.
11. Apa saran saudara sehubungan dengan adanya rencana kegiatan pembangunan tersebut?
 - a. Menyerap tenaga kerja
 - b. Pengendalian pencemaran lingkungan
 - c. Membantu pembangunan desa
 - d. kesempatan berusaha
 - e. Pengelolaan limbah/sampah
 - f. Lainnya.....

V. KESEHATAN MASYARAKAT.

1. Dalam satu bulan terakhir jenis penyakit apa yang dikeluhkan oleh anggota keluarga?
 - a. Flu (pilek, panas)
 - b. Batuk
 - c. Diare
 - d. Malaria
 - e. Darah tinggi
 - f.

2. Jika sakit berobat kemana
 - a. Puskesmas
 - b. Rumah sakit umum
 - c. Dokter praktek
 - d. Mantri
 - e. Dukun
 - f. Berobat sendiri

3. Kebutuhan air bersih untuk masak dan minum berasal dari:
 - a. PDAM (dalam rumah)
 - b. PDAM (hidran umum)
 - c. Sumur bor
 - d. Sumur gali
 - e.

4. Kebutuhan air bersih untuk mandi dan cuci?
 - a. PDAM (dalam rumah)
 - b. PDAM (hidran umum)
 - c. Sumur bor
 - d. Sumur gali
 - e.



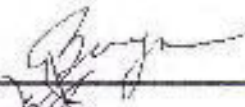

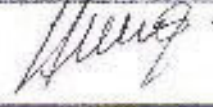

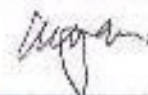
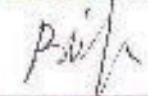

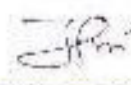




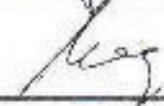
5. Bagaimana sistem pembuangan tinja di rumah bapak/ibu?
 - a. Septik-tank
 - b. WC umum
 - c. WC darurat
 - d. WC tetangga
 - e.

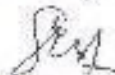
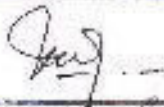

6. Bagaimana sistem pembuangan sampah
 - a. Ditampung di tempat penampungan
 - b. Ditimbun dalam lubang dipekarangan
 - c. Di bakar
 - d.

DAFTAR HADIR KONSULTASI PUBLIK
STUDI AMDAL PEMBANGUNAN PEMBANGKIT LISTRIK TENAGA
SURYA (PLTS) 25 MW
DI DESA WINERU KECAMATAN LIKUPANG TIMUR,
KABUPATEN MINAHASA UTARA

Hari/Tanggal : SEMIN , 17 OKTOBER 2016

No.	Nama Peserta	Instansi	Tanda Tangan
✓ 1.	Agustinus Alexander	Tommas	
✓ 2. ✓	Stendi Olangangke	Tokoh Agama	
✓ 3.	MANISUR	- -	
✓ 4. ✓	Handrik Marthin	Tommas	
✓ 5. ✓	Syaban Bawuhes	Pardes	
✓ 6. ✓	Fredysep M. C. M.	PEMDES	
✓ 7. ✓	POAS Labetorau	Ketua jemaat	
✓ 8.	Benediktus Ramak	tokoh agama	
✓ 9. ✓	MUH. STAFRI	T. Mascardat	
✓ 10. ✓	Bonifasius Kabali	Panglat Desa	

✓ 11. ✓	ROY ADAM	Too Ad Ben	
✓ 12. ✓	Zerfius Tular Spt.	BPD	
✓ 13. ✓	BERNY MARSAM	Penghad Desa	
✓ 14. ✓	ELFIANUS LIMAR	— " —	
✓ 15. ✓	STELL MANGERONGKONDA	" " "	
✓ 16. ✓	H-S. Sangbi long Ind	Ang. BPD.	
✓ 17. ✓	Matidas Muniaga	Warakat I	
✓ 18. ✓	Spilge. Bawis. Spt.	Ang BPD	
19.	O. Pette. Spt.	SK. Des	
✓ 20. ✓	Teofilus Kobahi	KETUN BPD	
✓ 21. ✓	Makmus. Wowor	Mawiteng pagu	
✓ 22. ✓	ABDULHA. SAKIRIHARI	kep. JABAPOL	
✓ 23. ✓	Hajar Pali	Kaur Kesta	
24.	FARI. M.		
25.	ARMAN M.		

✓ 26. ✓	RAMLI PERUS	PENANGKAT DESA	
27. ✓	ZUBAIR PAMUNBO	Helekan Tula	
✓ 28.	SAPTA DUCIMA MI	KETUA PKK	
✓ 29.	MARDIANA. SAWIENG	ANGGOTA PKK	
30.	George F. Lawendatu	staf Kecamatan	
✓ 31. ✓	SHERLY KALALO	BIDAN DESA	
32.	STYVI WATUPONSOH, SIP	Camat	
✓ 33. ✓	DOLRENO. J. Hari'bae	TD MAS.	
34.	MELBETH BUKUMUSA.	KEP JAGA II	
35.			

Wineru, 17 Oktober 2016

ANNEX B APPLICABLE STANDARDS

Annex A provides a comparison of Indonesian and IFC emissions discharges which would be relevant to this project.

The IFC EHS Guidelines apply their own set of standards for specific effluents, emissions and discharges. Application of the IFC PS requires that when host country regulations differ from the levels and measures presented in the World Bank Group EHS Guidelines, projects are required to achieve whichever is the more stringent. If less stringent levels or measures than those provided in the EHS Guidelines are appropriate in view of specific project circumstances, a full and detailed justification must be provided for any proposed alternatives through the environmental and social risks and impacts identification and assessment process. This justification must demonstrate that the choice for any alternate performance levels is consistent with the objectives of IFC Performance Standard 3. As such it is important to engage with the Lender (or Lender's consultant) early in the regulatory EIA process so as to agree the applicable standards for the Project ESIA and avoid potential delays or cost implications, particularly those that may affect engineering design decisions.

The following IFC and Indonesian regulatory standards are applicable to the Project:

Indonesian Regulations:

- Government Regulation No. 41 Year 1999 regarding Air Pollution Control;
- Ministry of Environment Decree No. 48 Year 1996 regarding Noise Level;
- Ministry of Manpower Decree No. KEP-51/MEN/1999 regarding Threshold Limit Value of Physical Factors in the Work Environment;
- Government Regulation No. 82/2001 on management of water quality and control over water pollution;
- Ministry of Health Regulation No. 416/1990 concerning Water Quality Requirements and Monitoring;
- Ministry of Environment Decree No. 112 Year 2003 regarding Domestic Wastewater Standard;
- Government Regulation Number 101 year 2014 regarding Hazardous and Toxic Waste Management; and

World Bank Group EHS Guidelines:

- Environmental, Health, and Safety (EHS) Guidelines - General EHS Guidelines, April 30, 2007;

Annex A provides a comparison of standards relating to ambient environmental parameters and project emissions and discharges. The most stringent standard is highlighted for ease of reference.

A.1 Air Quality

Under Indonesian regulations, air quality is regulated by Government Regulation No. 41 Year 1999 regarding Air Pollution Control (PP41/1999). The IFC EHS Guidelines for ambient air quality state that to protect ambient air quality nationally legislated ambient air quality standards should be selected or in their absence for emitted compounds standards from the World Health Organisation (WHO) or other internationally recognised standards. Where standards exist under PP41/1999, these effectively become the IFC EHS guideline. Where standards do not exist under PP41/1999 for emitted compounds standards have been sought from WHO and EPA NSW in that order.

Table A.1 Ambient Air Quality¹

Parameter	Period of Measurement	Unit	PP41/1999	IFC EHS Guidelines
Carbon monoxide (CO)	1 hour	µg/m ³	30,000	-
	24 hour	µg/m ³	10,000	-
Nitrogen dioxide (NO ₂)	1 hour	µg/m ³	400	200 (guideline)
	24 hour	µg/m ³	150	-
	1 year	µg/m ³	100	40 (guideline)
Sulphur dioxide (SO ₂)	10 minute	µg/m ³	-	500 (guideline)
	1 hour	µg/m ³	900	-
	24 hour	µg/m ³	365	125 (Interim target-1) 50 (Interim target-2) 20 (guideline)
	1 year	µg/m ³	60	-
Dust (TSP)	24 hour	µg/m ³	230	-
	1 year	µg/m ³	90	-

A.2 Noise Levels

Under Indonesian standards, the Decree of Environmental Ministry No. 48/1996 on Noise level Quality Standard and IFP regulates ambient noise. Noise health and safety limits are established under the Ministry of manpower Decree No 51 of 1999.

The IFC Performance Standards applicable for industrial noise applies to fixed noise sources only. Noise impacts should not exceed the levels presented in **Table A.2**, or result in a maximum increase in background levels greater than 3 dB at the nearest receptor location off-site.

¹ World Health Organization (WHO). Air Quality Guidelines Global Update, 2005. PM 24-hour value is the 99th percentile.

Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

Table A.2 Noise Standards (dBA)²

Site	MoE Dec. #48/1996	National Standard 51/1999	IFC EHS Guidelines*	
			Daytime (07:00 - 22:00)	Night-time (22:00 - 07:00)
Residential; Institutional; educational	55		55	45
Industrial Area	70	-		
Occupational Health & Safety (exposure limits)		Exposure Limit/Day	LAeq, 8h	Max LAmax, fast
		-	40-45 (closed offices)	-
		-	45-50 (Open offices)	-
		85 (8 hours)	85 (heavy industry)	110 (heavy industry)
		88 (8 hours)		
		91 (8 hours)		
		94 (1 hours)		
		97 (30 minutes)		

*LAeq (dBA)

A.3 Water Quality

The IFC does not establish standards for surface water quality. Indonesian standards are established by Government Regulation (PP) #82/2001 on Water Quality Management and Water Pollution Control, which includes different classes according to use. It is unlikely that local rivers would be affected by the Project and hence these standards may not directly apply. Class I is applicable for drinking water (Class I) and Classes II-IV as water suitable for use for recreational, fresh water fish cultivation, livestock and irrigation.

Table A.3 Water Quality

Parameters	Units	IFC	PP 82/2001 Class I	PP 82/2001 Class II	PP 82/2001 Class III	PP 82/2001 Class IV
Physical Tests						
Temperature	°C	-	3 deviation	3 deviation	3 deviation	3 deviation
pH	-	-	6 - 9	6 - 9	6 - 9	5 - 9
Hardness (calc)		-	-	-	-	-
Total Dissolved Solids, TDS	mg/L	-	1,000	1,000	1,000	2,000
Total Suspended Solids, TSS	mg/L	-	50	50	400	400
Anions & Nutrients						
Fluoride, F	mg/L	-	0.5	1.5	1.5	-
Chloride, Cl	mg/L	-	600	-	-	-
Sulphate, SO ₄	mg/L	-	400	-	-	-

² Source: Ministry of Environment Decree #48, 1996

Ministry of Manpower Decree 51, 1999

IFC General EHS Guidelines. Guidelines values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999.

Acceptable indoor noise levels for residential, institutional, and educational settings (WHO 1999).

Parameters	Units	IFC	PP 82/2001 Class I	PP 82/2001 Class II	PP 82/2001 Class III	PP 82/2001 Class IV
Nitrate Nitrogen, NO ₃ -N	mg/L	-	10	10	20	20
Nitrite Nitrogen, as N	mg/L	-	0.06	0.06	0.06	-
Total Phosphate, T-PO ₄ sebagai P	mg/L	-	0.2	0.2	1	5
Sulphide, H ₂ S	mg/L	-	0.002	0.002	0.002	-
Free Ammonia Nitrogen, NH ₃ -N	mg/L	-	0.5	-	-	-
Cyanide, CN	mg/L	-	0.02	0.02	0.02	-
<i>Dissolve Metals</i>						
Arsenic, As	mg/L	-	0.05	1	1	1
Barium, Ba	mg/L	-	1	-	-	-
Boron, B	mg/L	-	1	1	1	1
Cadmium, Cd	mg/L	-	0.01	0.01	0.01	0.01
Chromium Hexavalent, (Cr ⁶⁺)	mg/L	-	0.05	0.05	0.05	0.01
Cobalt, Co	mg/L	-	0.2	0.2	0.2	0.2
Copper, Cu	mg/L	-	0.02	0.02	0.02	0.2
Iron, Fe	mg/L	-	0.3	-	-	-
Lead, Pb	mg/L	-	0.03	0.03	0.03	1
Manganese, Mn	mg/L	-	0.1	-	-	-
Mercury, Hg	mg/L	-	0.001	0.002	0.002	0.005
Selenium, Se	mg/L	-	0.01	0.05	0.05	0.05
Zinc, Zn	mg/L	-	0.05	0.05	0.05	2
<i>Microbiology</i>						
Fecal Coliform	MPN/10 0ml	-	100	1000	2000	2000
Total Coli form	MPN/10 0ml	-	1,000	5000	10000	10000
<i>Others</i>						
Biochemical Oxygen Demand, BOD	mg/L	-	2	3	6	12
Dissolve Oxygen, DO	mg/L	-	6	4	3	0
Chlorine, Cl ₂	mg/L	-	0.03	0.03	0.03	-
Chemical Oxygen Demand, COD	mg/L	-	10	25	50	100
Surfactant, MBAS	µg/L	-	200	200	200	-
Oil & Grease	mg/L	-	1	1	1	1
Senyawa Phenol, as Phenol	µg/L	-	1	1	1	-
BHC	µg/L	-	210	210	210	-
Aldrin/Dieldrin	µg/L	-	17	-	-	-
Chlordane	µg/L	-	3	-	-	-
DDT	µg/L	-	2	2	2	2

Parameters	Units	IFC	PP 82/2001 Class I	PP 82/2001 Class II	PP 82/2001 Class III	PP 82/2001 Class IV
Heptachlor and Heptachlor epoxide	µg/L	-	18	-	-	-
Lindane	µg/L	-	56	-	-	-
Methoxychlor	µg/L	-	35	-	-	-
Endrin	µg/L	-	1	4	4	-
Toxaphane	µg/L	-	5	-	-	-
Radioactivity						
Gross-A	Bq/L	-	0.1	0.1	0.1	0.1
Gross- B	Bq/L	-	1	1	1	1

Class I water used as raw water for drinking water, or other uses that require water quality similar as aforementioned

Class II water used for infrastructure / water recreation facilities, freshwater fish farming, livestock, water for irrigating crops or other uses that require water quality similar as aforementioned

Class III water used for freshwater fish farming, livestock, water for irrigating crops or other uses that require water quality similar as aforementioned

Class IV water used to irrigate crops and or other uses that require water quality similar as aforementioned

A.4 Groundwater Quality

The IFC does not establish standards for groundwater quality. Indonesian standards are established by the Regulation of Health Ministry No. 416/1990 in Appendix II.

Table A.4 Groundwater Quality

Parameters	Units	Regulation of Health Ministry 416/1990 Appendix II
Physical Tests		
Colour	TCU	50
Odour	-	No odour
Temperature	°C	± 3
Taste	-	No taste
Total Hardness as CaCO ₃	mg/L	500
Total Dissolved Solids, TDS	mg/L	1500
pH	-	6.5 - 9
Turbidity	NTU	25
Anions & Nutrients		
Chloride, Cl	mg/L	600
Fluoride, F	mg/L	1.5
Nitrate Nitrogen, NO ₃ -N	mg/L	10
Nitrite Nitrogen, NO ₂ -N	mg/L	1
Sulphate, SO ₄	mg/L	400
Cyanide, CN-	mg/L	0.1
Sulphide, H ₂ S	mg/L	-

Parameters	Units	Regulation of Health Ministry 416/1990 Appendix II
Microbiology Tests		
Total Coli form	MPN/100ml	50
Fecal Coliform	MPN/100ml	10
Dissolve Metals		
Arsenic, As	mg/L	0.05
Cadmium, Cd	mg/L	0.005
Chromium Hexavalent, (Cr6+)	mg/L	0.05
Copper, Cu	mg/L	-
Iron, Fe	mg/L	1
Lead, Pb	mg/L	0.05
Manganese, Mn	mg/L	0.5
Mercury, Hg	mg/L	0.001
Selenium, Se	mg/L	0.01
Sodium, Na	mg/L	-
Zinc, Zn	mg/L	15
Organic Chemistry		
Aldrin dan Dieldrin	mg/L	0.0007
Benzena	mg/L	0.01
Benzo (a) pyrene	mg/L	0.00001
Chlordane (total isomer)	mg/L	0.007
Coloroform	mg/L	0.03
2,4 D	mg/L	0.1
DDT	mg/L	0.03
Detergen	mg/L	0.5
1,2 Discloroethane	mg/L	0.01
1,1 Discloroethene	mg/L	0.0003
Heptaclor dan heptaclor epoxide	mg/L	0.003
Hexachlorobenzene	mg/L	0.00001
Gamma-HCH (Lindane)	mg/L	0.004
Methoxychlor	mg/L	0.03
Pentachlorophanol	mg/L	0.01
Pestisida Total	mg/L	0.1
2,4,6 urichlorophenol	mg/L	0.01
Zat organik (KMnO4	mg/L	10
Radioactivity		
Gross Alpha Activity)	Bq/L	0.1
Gross Beta Activity)	Bq/L	1

A.5 Domestic Wastewater Standards

Table A.5 Domestic Wastewater

Parameter	Unit	MoEF Regulation N. P.68/Menlhk/Setjen/Kum.1/8/2016*	IFC EHS Guidelines Indicative Values for Treated Sanitary Sewage Discharges
pH	-	6 – 9	6 – 9
BOD	mg/L	30	30
COD	mg/L	100	125
TSS	mg/L	30	50
Total nitrogen	mg/L		10
Total phosphorus	mg/L		2
Oil and grease	mg/L	5	10
Ammoniac	Mg/L	10	
Total Coliform	Amount/100mL	3000	
Total coliform bacteria	MPN ^b / 100 ml		400 ^a

Notes:

*Ministry of Environment and Forestry Regulation Number P.68/Menlhk/Setjen/Kum.1/8/2016 regarding Domestic Wastewater Threshold

IFC EHS Guidelines:

1. Not applicable to centralised, municipal, wastewater treatment systems which are included in EHS guidelines for water and sanitation
2. MPN = Most Probable Number

A.6 Hazardous and Toxic Waste

Hazardous and toxic waste management is regulated in Government Regulation Number 101 Year 2014 regarding Hazardous and Toxic Waste Management, and also IFC EHS Guidelines as stated in the body document sub-chapter 2.9.3.

**ANNEX C STAKEHOLDER ENGAGEMENT PLAN
(SEP)**



**PT INFRASTRUKTUR TERBARUKAN LESTARI
(ITL):
STAKEHOLDER ENGAGEMENT PLAN (SEP)**

**Solar Project, Likupang Timur,
North Sulawesi, Indonesia**

**Prepared for:
Redaya Energi**

**March 2017
www.erm.com**

Report

PT Infrastruktur Terbarukan Lestari:
Stakeholder Engagement Plan (SEP)

PT. ERM Indonesia
Wisma Aldiron Dirgantara
2nd floor, Suite 238-239
Jl. Gatot Subroto Kav. 72
Jakarta 12870
Indonesia

Telephone +62 21 7918 1904
Facsimile +62 21 7918 1905
Website: www.erm.com


Client PT Redaya Energi		Project No. 0370573			
This Stakeholder Engagement Plan (SEP) is designed with the aim of providing a platform for consultation and disclosure with Project stakeholders throughout all phases of the development. The SEP sets out the approach the Project will adopt in order to implement an effective engagement program with stakeholders over the life of the Project.		Date March 2017			
		Approved by  Samantha McCrea <i>Partner</i> <i>ERM Indonesia</i>			
Included in this report					
1.	Draft SEP	AA, SA, AS, MP	AA	SM	20/02/17
2.	Final SEP	AA,SA	AA	SM	08/03/17
3.	Final SEP V2	AA,SA	AA	SM	16/03/17
4.	Final SEP V3	AA	AA	SM	23 /03/17
Revision		By	Checked	Approved	Date
<p>This document has been prepared by PT ERM Indonesia (ERM) with all reasonable skill, care and diligence, incorporating our General Terms and Conditions of Business.</p> <p>We disclaim any responsibility to the client and others in respect or any matters outside the scope of the above.</p> <p>This document or any part thereof is a confidential submission to the client and is not permitted to be released to third parties without ERM's approval.</p>		Distribution <input checked="" type="checkbox"/> Internal <input type="checkbox"/> Public <input checked="" type="checkbox"/> Confidential			

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1 INTRODUCTION

1.1 OVERVIEW OF STAKEHOLDER ENGAGEMENT PLAN

PT Redaya Energi is a dedicated renewable energy developer and asset manager established with the aim of constructing and owning 1,000MW of wind, solar and hydropower assets in Indonesia. The company was formed in 2015 with a vision to be Indonesia's leading developer and owner of wind and solar energy. Redaya Energi is based in Jakarta and has established regional offices in its project areas.

Redaya Energi is a platform company of Equis Funds Group, an Asian independent energy and infrastructure developer and asset manager headquartered in Singapore. PT Redaya Energi Indonesia has established a Special Purpose Vehicle namely PT. Infrastruktur Terbarukan Lestari (ITL) as the project company of Likupang Solar Farm.

The Likupang Timur Solar Project aims to develop and operate a 30MW solar power farm in order to supply power to the North Sulawesi grid. Recent policy decisions by the Government of Indonesia (GoI) have encouraged significant power investment in Indonesia, including for renewable energy. EMR Ministry Regulation Number 19 year of 2016 regarding Purchasing Electricity from Solar Power Plant is considered to encourage the utilization of solar energy for power generation. As such the Project has in part been developed to take advantage of these opportunities, while also supplying clean renewable power to the local market.

Based on the AMDAL data provided by Redaya Energi predicts that the Likupang Solar Farm will have significant environmental and social benefits including:

- Producing enough power for roughly 36,000 Indonesian households connected to the grid.
- Providing 108 local employment opportunities over the construction and operation of Likupang Solar Farm.
- Saving approximately 45,000,000 litres of water in comparison to the operation of a modern coal fire power plant. The cumulative saving of freshwater would be around 1,047 million litres over a 25-year period.
- Producing 38,000 tonnes less of CO₂ than an equivalent conventional power plant for the cumulative saving of over 895,000 million tonnes of CO₂ over a 25-year period.

This Stakeholder Engagement Plan (SEP) is designed with the aim of providing a platform for consultation and disclosure with Project stakeholders throughout all phases of the solar farm. The SEP sets out the approach the Project will adopt in order to implement an effective engagement program with stakeholders over the life of the Project. Good relations between the Project and its surrounding communities and relevant stakeholders will be essential for the Project to acquire and maintain its social license to operate. It is also an important means for receiving community feedback on project related concerns, perceptions and expectations as well as enabling the Project to disseminate information to the community.

1.2 SOCIAL AND ECONOMIC SETTING OF PROJECT AREA

The socio-culture structure of the community living surrounding the Project area (approximately 650 m from residential area in Wineru village) is characterized by a mixture of modern and traditional culture. The majority ethnic group in the impacted Project area is Sangihe Talaud, one of sub-ethnics of Minahasa. Other ethnic groups include Javanese, Bugis, Gorontalo and Kalimantan as well as Manado and Bitung.

The social institution system in the surrounding of the Project area is characterized by a strong bond between communities based on the kinship system. However, there is no formal kinship or customary institution within Wineru village since the practice of cultural traditions has been reduced in line with the village development. The village head is still considered as a customary figure named *Hukum Tua* (Old Law) and religious leaders are the most respected figures in the village.

In terms of conflict reconciliation the village head plays an important role as a mediator. If the conflict cannot be resolved in the village it is processed at the district level police office. Other parties involved in conflict resolution include the Likupang Timur District Government.

Agriculture is the biggest economic sector in Wineru village, followed by fisheries and services sector such as tourism, transportation and carpentry. The majority of women in the community are housewives who maintain a conventional domestic role of taking care of the household and children. A few females have important roles in the Wineru village such as the village secretary and midwife.

The AMDAL (Analisa Mengenai Dampak Lingkungan) or the Regulatory Environmental Impact Assessment documents reveal that stakeholders consulted are aware of the Project. Direct one on one surveys and a series of public consultation were conducted throughout the AMDAL process; the public consultation took place on the 17th of October 2016. The activities involved selected community members and other key stakeholders in Wineru village and the Likupang Timur District.

The AMDAL document also confirms that those consulted largely have a positive attitude towards the project. However the Wineru communities expects benefits in terms of local worker recruitment, opportunities for local suppliers such as catering and provision of materials and also support to promote Wineru as a tourism village.

The Wineru community discussed several concerns particularly in regards to potential road traffic accidents during the construction phase due to road damage caused by the heavy project equipment and vehicles. Other concerns include noise, dust and vibration from the project activities and radiation when the farm is operational.

1.3 *STAKEHOLDER ENGAGEMENT PLAN STRUCTURE*

The SEP contains the following sections:

- Section 1 Introduction – describes an overview of the SEP document, its purpose and objectives and description of the social-economic setting of the Project area.
- Section 2 Project Description – describes the Project background and details of the facilities to be built.
- Section 3 Regulation and Requirement – outlines the key Indonesian legislation and international guidelines concerning stakeholder engagement that apply to the Project.
- Section 4 Consultation Undertaken to Date – explains consultation activities undertaken during the AMDAL (Regulatory EIA) and ESHIA development process.
- Section 5 Stakeholder Engagement Planning – identifies the Project stakeholders and issues along with power and influence analysis. It also provides a description of planned future stakeholder engagement activities and timetable of when these activities will occur. At the end of this section a detailed project-based Grievance Mechanism is discussed.
- Section 6 Management for implementation of SEP – details resources for implementation of this SEP and describes monitoring, reporting and evaluation measures to be undertaken to ensure the success of this SEP.

1.4 *LIMITATIONS*

The findings reported in this SEP are based on the information provided to ERM by Redaya Energi and the Project AMDAL Consultant CV. Sulindo Eko Konsultan based in Manado and data gathered during an additional site visit as part of ESHIA development conducted by ERM in January 2017. Based on the above a number of limitations exist:

- Limited data or information recorded regarding previous stakeholder engagement activities.
- Reliance on AMDAL data gathered by CV. Sulindo Eko Kosultan as the AMDAL consultant to PT. Infrastruktur Terbarukan Lestari.
- Limited consultation activities with government agencies, namely the Environmental Agency and Office of Likupang District, due to their lack of availability at the time of the consultation.

2 PROJECT DESCRIPTION

The Likupang 25 Megawatt (MW) Solar Farm (the Project) involves the development of a solar power generation facility at Wineru Village of Likupang Timur District, Minahasa Utara Regency, North Sulawesi Province, Indonesia. PT Infrastruktur Terbarukan Lestari (ITL) is responsible for development and future operation of the Project. The Project includes the following components:

- Installation of a solar panel field with the total number of 2,016 photovoltaic field panels covering an area of 27 Hectare (Ha);
- Installation of main station and additional facilities namely fencing, drainage system, and emergency diesel generator;
- Installation of an inverter station and High Voltage control station;
- Internal and perimeter roads which will occupy a total of 12,000 m² (3 m width x 4,000 m length); and
- Installation of 20kV underground grid connection line to the Likupang 70kV substation.

The Project will be developed on 29.4 Ha of agricultural land, approximately 650 m from the residential area of Wineru village. The 38.4 Ha will cover the Solar Farm and all associated infrastructure. The site is located within land zoned as Dry Agricultural Land. Aside from local villages and agricultural activities there is generally limited development within a radius of one km around the site. The 25MW Likupang Diesel Power Station and Substation are located on the northern boundary of the site. The closest protected area to the site is the Gunung Dua Sudara Nature Reserve which is located approximately ten kilometers south east. Gunung Dua Sudara Nature Reserve is composed of green hills and valleys with scenic views of natural beauty. It hosts black macaques, cuscuses, maleo birds, red-knobbed hornbill and the tarsier. The Project site location and surrounding land uses are shown in **Figure 2-1**.

Project construction is expected to require approximately twelve months with operations expected to commence in the second half of 2017. However as the Project is yet to commence construction (as of February 2017) this is likely to be delayed. The Project has obtained the Environment Permit on 22 February 2017, the process of the AMDAL (Environmental Impact Assessment or locally known as Analisis Mengenai Dampak Lingkungan Hidup) has been started since November 2016 and obtained the SKKL or Certificate of Environmental Feasibility on the 20th of January 2017.

In addition to the AMDAL process, this Environmental, Social and Health Impact Assessment (ESHIA) has been developed to support the Project's alignment with the IFC Performance Standards 2012 (IFC-PS 2012), IFC's Environmental, Health and Safety (EHS) Guidelines, IFC's Utility-Scale Solar Photovoltaic Power Plant; a Project Developer's Guide and the Equator Principles (EP) III 2013.

The AMDAL public consultation was conducted on 17 October 2016 in Wineru village following the process prescribed under the AMDAL (Regulation of the State Minister for Environment No. 17/2012 regarding Guidelines for Community Involvement in the Process of Environmental Impact Assessment and Environmental Permit). No further consultation as part of the regulatory AMDAL process has occurred since this event.

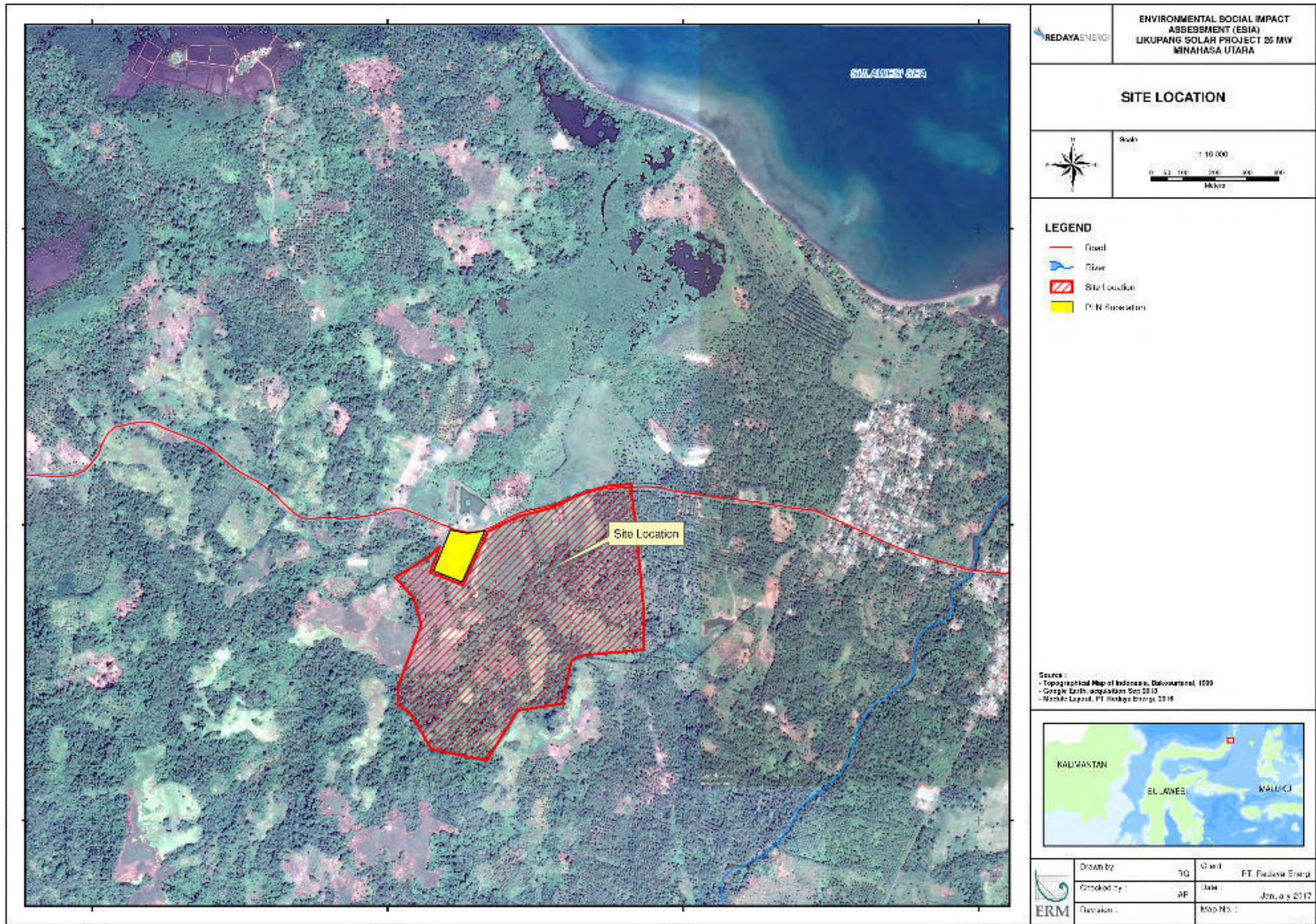


Figure 2-1 Site Location and Surrounding Land Use Map

3 REGULATION AND REQUIREMENTS

Redaya Energi aims to ensure that the Project complies in all respects with Indonesian law and regulatory requirements for public consultation and disclosure. In addition, as the company desires to meet international best practice, the Project is also seeking to comply with the International Finance Corporation’s guidance on stakeholder consultation and disclosure which serves as an international benchmark for good practice.

This section outlines the key Indonesian legislation and international guidelines concerning stakeholder engagement which apply to the Project. It also sets out the key principles concerning public or stakeholder consultation and the disclosure of Project information.

3.1 PUBLIC CONSULTATION REQUIREMENTS UNDER INDONESIAN REGULATION

Redaya Energi is committed to upholding all applicable laws and regulations of the Government of the Republic of Indonesia. Laws and regulations most applicable to stakeholder consultation and disclosure activities are summarized in **Table 3-1**.

Table 3-1 National Regulation Framework for Stakeholder Consultation and Information Disclosure

Regulation	Content	Citation
Law (UU) No. 23 of 1997 about “Environmental Management”	<ul style="list-style-type: none"> The community has the right to receive clear information about the Project’s environment management planning; Every company is obligated to provide clear information regarding business operations and environmental management to the community and public; and Every company is needed and mandated to share the clear information and / or report related to their business operation to the community and public. 	Article No. 5 Paragraph 2
Government Regulation (PP) No. 27 of 1999 on “Environmental Impact Assessment”	Discusses sharing information and encouraging participation of the community in terms of the environmental management plan, implementation and monitoring.	Article No. 34 Paragraph 1
Regulation of the State Minister for Environment No. 17/2012 regarding Guidelines for Community Involvement in the Process of Environmental Impact Assessment and	<p>This regulation as guarantee and guidelines the implementations of community involvement in the process of environmental impact assessment and environmental permit.</p> <p>Stated that the mandatory notification should be using 2 mandatory media i.e.</p> <ol style="list-style-type: none"> printed media such as local newspaper and/ or national newspaper (if required by EIA assessment authority 	<p>Chapter II: Part B, point b</p> <p>Chapter III: Part B, point 1.b</p>

Regulation	Content	Citation
Environmental Permit	<p>2) bulletin board which is easily accessible to the affected communities</p> <p>In addition of mandatory media as mentioned above, the Project could using other supporting media to undertake notification such as:</p> <ol style="list-style-type: none"> 1) printed media such as brochures, pamphlet, or banner; 2) electronic media such as television, website, social network, short message service (SMS), and/ or radio; 3) bulletin board in environmental agencies and relevant government agencies in national, province and regency level; and 4) other media which can be used <p>In addition, this regulation also mention that the notification should be conveyed through multimedia which effectively accessible to the community such as website and bulletin board in the Project plan location which easily to reach by the affected community.</p>	
Head of BAPEDAL Decree (KepKa) No. 8 of 2000 on "Disclosure of Information on the AMDAL Process"	In terms of protecting the community from the impact of business operations, the participation from the community and open communication in the preparation of environmental impact analysis is required.	
Law (UU) No. 32 of 2009 about "Environmental Protection and Management"	Chapter XI details expectations associated with community participation. The community has equal rights and opportunities to actively participate in and protect the environment as well as part of the planning and implementation of environmental protection and management.	Articles No. 70 Paragraph 1

3.2 IFC PERFORMANCE STANDARDS

In April 2006 the IFC, a member of the World Bank Group (WBG), released a set of Performance Standards (PSs) based upon the original World Bank Group Safeguard Policies, which recognize further the specific issues associated with private sector projects. The IFC PSs have been broadened now to include issues such as greenhouse gases, human rights, indigenous peoples, cultural heritage, land acquisition and resettlement, community health, safety and security as well as stakeholder engagement and community grievance handling. A revised set of PSs came into force on January 1, 2012. The complete list of PS's is provided in **Figure 3-1**.









	<p>Assess social and environmental impacts (both positive and negative) in their projects areas of influence. Identify ways to improve the social and environmental performance of the project or business through the effective use of management systems.</p>		<p>The workforce is the most valuable asset to any business. A poor relationship could undermine worker commitment and retention, and ultimately jeopardize a project. It can also lead to serious reputational risks.</p>
	<p>All industrial activity and urbanization will often increase levels of pollution to air, water, and land that may threaten the community and the environment. They can also lead to increased, unsustainable use of these resources.</p>		<p>Avoidance or minimize impacts on the health and safety of the local community as a result of business or project. Ensure that the safeguarding of personnel and property is carried that avoids or minimizes risks to the Communities.</p>
	<p>Without proper planning and management, involuntary resettlement may result in long term impoverishment for affected communities, as well as environmental damage and social stress in areas to which they have been displaced.</p>		<p>Protecting and conserving biodiversity, and its ability to change and evolve is fundamental to human survival and sustainable development.</p>
	<p>Indigenous communities are often the most vulnerable and marginal segments of the national population.</p>		<p>Defining whether an object of place is considered a Cultural Heritage is often very difficult, this standard aims to guide in the protection of cultural heritage from adverse impacts and supporting their preservation.</p>

Figure 3-1 IFC Performance Standards

The Project is seeking to adhere to these standards to meet their shareholders' expectations. As a result it intends to comply with the IFC PSs. These standards (most specifically PS1: Assessment and Management of Environmental and Social Risks and Impacts) set out the following expectations with regards to stakeholder engagement:

- *“An effective Environmental and Social Management System...involves engagement between the client, its workers and the local communities directly affected by the project”.*
- *“To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them...”.*
- *“...the client will identify individuals and groups that may be differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status....”.*
- *“Stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts “.*
- *“Stakeholder engagement is an ongoing process that may involve, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism, and ongoing reporting to Affected Communities...”.*
- *“...The nature, frequency, and level of effort of stakeholder engagement may vary considerably and will be commensurate with the project's risks and adverse impacts, and the project's phase of development. ...”.*
- *“When Affected Communities are subject to identified risks and adverse impacts from a project, the client will undertake a process of consultation...”.*

- *“Effective consultation is a two-way process that should...(iv) be free of external manipulation, interference, coercion, or intimidation”.*

Furthermore, in the book *“Stakeholder Engagement: A Good Practice Handbook for Companies doing Business in Emerging Markets”* (2007), which is the most applicable guide for involving the stakeholders, the following matters are addressed:

1. Explanation of good procedure, process and practice in developing and applying effective programs to engage the stakeholders.
2. In each phase of the project cycle, stakeholder engagement is one of the requirements that must be fulfilled, which includes collecting input and involving the stakeholders in the planning of the project to be implemented.
3. Provide a guide on how to provide a beneficial information service, which is easy to access and adjusted to the needs of the stakeholders.
4. Recommends that information be given out first through consultations and decision-making.
5. Introduces and establishes a two-way dialogue and explains why the process of engagement should be free from intimidation and coercion.

The document provides recommendations and suggestions to involve all groups of stakeholders with different interests, at the same time ensuring that the vulnerable and overlooked communities are provided with a media through which they can provide and receive information.

This SEP has therefore been developed with the national regulations and international standards set out in this chapter.

4 CONSULTATION UNDERTAKEN TO DATE

4.1 REGULATORY ENVIRONMENTAL IMPACT ASSESSMENT PHASE (AMDAL)

At the current status of the Project, the main stakeholder engagement activity thus far was undertaken during the development of the AMDAL and additional consultations as part of ESHIA. This included discussions and consultation meetings with the local, provincial and national level authorities and the impacted community regarding the Project design, identified potential Project impacts to the surrounding environment and Project planning to develop the mitigation measures. A summary of the consultation undertaken by AMDAL team is presented in **Table 4-1**.

The consultation conducted by the AMDAL consultant and Redaya Energi involved representatives of the related regencies' government authorities, head of district, head of village, and representatives of the community.

In addition to the consultation process, the AMDAL consultant also collected social economic baseline data from the community living in Wineru village (the nearest village to the project site). This village was selected based on screening of the affected areas undertaken by CV. Sulindo Eko Konsultan and has been approved by the Provincial Environmental Agency.

Table 4-1 *PT. Infrastruktur Terbarukan Lestari's Historical and Completed Stakeholder Engagement during EIA (AMDAL) Phase*

Date and Location	Activities	Stakeholder Involved	Issues Covered
17 October 2016 Wineru Village, Likupang Timur District	Public Consultation	<ol style="list-style-type: none">1. Head of East Likupang District2. Village Representative Committee3. Head of Village4. Midwife5. Representatives of village government6. Religion Figures	<ol style="list-style-type: none">1. Project description2. Regulations related to power plant construction3. Concept of Partnership offered to community and government by the project. This concept to optimize the beneficial impact such community development as well as prioritizing local worker and minimizing adverse impact to both environmental and social (Wineru community)4. Clarification related to hazard such as radiation and community accessibility to the Project site

Date and Location	Activities	Stakeholder Involved	Issues Covered
17 October 2016 Wineru Village, East Likupang District	Household Survey	30 households in Wineru village	<ol style="list-style-type: none"> 1. Socio-economic, socio-cultural and community livelihood 2. Community response towards the Project 3. Community health including disease prevalence, water supply and sanitation

4.2 ENVIRONMENTAL AND SOCIAL HEALTH IMPACT ASSESSMENT CONSULTATION

Consultation as part of the ESHIA has so far been limited to the village of Wineru in order to address gaps in the social assessment data collected to support the AMDAL and also to inform the preparation of this SEP.

Face to face interviews were undertaken during the site visit; a summary of the consultation undertaken during the ESHIA development phase is detailed in **Table 4-2**.

The consultation process is designed to enable communities and other relevant stakeholders to make meaningful contribution toward the ESHIA process and the development of potential mitigation measures to address potential negative impacts.

Table 4-2 *Summary of the Consultation Activities Undertaken During the ESHIA Development*

Date & Location	Activity	Stakeholder Involved	Issues Covered
Manado, 24 January 2017	Consultation with related government authorities.	<ol style="list-style-type: none"> 1. AMDAL Coordinator 2. Energy and Mining Agency of North Sulawesi 3. State Electricity Company National Land Agency 	<ul style="list-style-type: none"> • The update and progress of AMDAL process • Electricity supply and demand in the area of North Sulawesi, Gorontalo and Central Sulawesi. Future strategy to fulfill electricity demand • The role and authority of North Sulawesi Province Energy and Mineral Resources (EMR) Agency in terms of the energy fulfilment strategy, especially on electricity The status and process of land acquisition in the project area.

Date & Location	Activity	Stakeholder Involved	Issues Covered
Wineru Village, 25 January 2017	Observation of proposed Project site and village of Wineru Consultation with local governments and affected village community.	<ol style="list-style-type: none"> 1. Head of Wineru Village 2. Secretary of Wineru Village 3. Land Owner 4. Head of Economy and Community Section of District Government 5. Local grocery shop owner 6. Fisherman household 7. Midwife 	<ol style="list-style-type: none"> 1. Employment opportunities for local people 2. Socio-economic condition of the village, social and cultural arrangement, knowledge about the project, concerns and expectations related to the project. 3. Land acquisition process, socio-economic condition, knowledge about the project, concerns and expectations related to the project. 4. Health profile of Wineru village 5. Role of Likupang Timur District in terms of village/community development, supervision on immigrant worker and local worker recruitment and village interest towards the project.

Source: ERM Primary Data Gathering, January 2017

5 *STAKEHOLDER ENGAGEMENT PLAN*

5.1 *PROJECT STAKEHOLDERS*

5.1.1 *Approach and Method for Stakeholder Identification*

A range of approaches and methods to undertake stakeholder identification were adopted and implemented for this SEP including:

- Desktop review or secondary research regarding the area from the available published documentation as well as the results of AMDAL survey and enrichment through email correspondence and face to face discussions with Redaya Energi and the AMDAL team in Manado.
- Key stakeholder interviews to gather data on items not included in AMDAL document such as the National Electrical Company, Land Agency, Energy and Mining Agency and staff of the local District, to enrich the information on relevant issues, perceptions and concerns and to confirm unclear information found during the secondary research.
- Field observations through visual inspection, taking photo and GPS coordinate to triangulate information from different sources such as published documentation and interview.

5.1.2 *Stakeholders Identified During AMDAL and ESHIA Consultation*

A stakeholder is defined as a person or persons affected or likely to be affected by the Project (affected parties) or may have an interest in the Project (other interested parties). Following this definition, the two principal categories of Project stakeholders are:

1. Affected parties; people/entities directly affected by the Project and/or have been identified as most vulnerable to change and who need to be engaged in identifying impacts and their significance, as well as in decision-making on mitigation and management measures, namely:
 - The community in Wineru village;
 - Land Owner of the site;
 - Village Government; and
 - Local figures such as religious, community and youth figures.
2. Other interested parties; people / entities that are interested in the Project and / or could affect the Project in some way, namely:
 - NGO: Formitra/ Forum Rakyat Peduli Minahasa Utara (Wineru head of village is the contact person). Formitra is an NGO based in Airmadidi (capital of Minahasa Utara Regency). The NGO focuses on community development and conducts advocacy to defend community interests when needed. Currently, there are no particular issues submitted by the NGO related to the Project.

- District/Regency/province Government; SULUTTENGGGO Office Area of PLN, BAPPEDA, BLH, Kanwil BPN, District Police, Resort Police, Army in Likupang Timur District (KODIM), and Likupang Timur District Government with each role as follows:
 - SULUTTENGGGO Office Area of PLN provides and supervises the electricity supply in 3 provinces i.e. Sulawesi Utara, Gorontalo and Sulawesi Tengah Provinces;
 - BAPPEDA is incorporated in all development plans in the area;
 - BLH oversees permitting and manages the impact of development in the area;
 - District Police handles the security issues at the district level;
 - Resort Police is handling the security issue in the regency level;
 - Army in Likupang Timur District (KODIM) handles the defense issues in the village and district level; and
 - Likupang Timur District Government is incorporated in all government programs in the area.

5.1.3 *Vulnerable Groups*

In the Project area, especially in Wineru village, the number of families categorized as pre-prosperity families is more than 90% (306 of 328 families). However, in Wineru village, only 48 households are registered to receive Raskin (rice for poor families). The program is one of national government's strategies to tackle poverty issues. At the village level there is no fixed indicator to determine the poverty status of the villagers. Refer to BPS data (Likupang Timur dalam Angka 2017) there are ten disables persons in Wineru Village.

The village secretary disclosed that some of the villagers receive Kartu Indonesia Pintar/ KIP and Kartu Indonesia Sehat/ KIS, subsidy programs for education and health from the national government although there is no official data to confirm the number of beneficiaries. The categorization is decided based on criteria such as the condition of the house (thatched roof, bamboo wall, and earth floor), income certainty, and the ability to pay for children's school fees and daily expenses.

The ERM team field observations reveal that majority of the houses in Wineru village are made of concrete walls, zinc roofs, and cemented or tiled floors. It is also common to see cars and motorcycles parked in the houses' terrace. The poverty condition is more obviously seen along the coastal area, where many of the houses are built on land without titles and are made of modest materials such as bamboo, wood, and thatched roof. People in the area also use the public bathroom or emergency toilet for their daily sanitation facilities.

5.1.4 Summary of Issues and Concerns Raised by Stakeholders during Consultation

This section summaries the issues and concerns raised by stakeholders during the consultation processes undertaken during AMDAL and ESHIA development. A summary of issues and concerns is presented in **Table 5-1**.

Table 5-1 Issues and Concerns Raised by Stakeholders Related to the Project

Issue	Description	Category of Stakeholder Raising the Issue / Concerns
Project contribution to community development	Stakeholders expect the Project will significantly contribute towards community development to increase community livelihoods and infrastructure improvement in Wineru village.	<ul style="list-style-type: none"> • Head of Wineru Village • East Likupang District Government Wineru Community
Local workers priority	This includes transparency on worker recruitment. Involving local government (village and district level) to ensure the data validity of the workers and also to monitor the number and mobility of immigrant workers.	<ul style="list-style-type: none"> • Local businessman • Head of Wineru Village East Likupang District Government
Optimizing local supplier and local vendor such as catering and materials	Local businessmen are already aware about the economic opportunities from the presence of the Project as a local supplier and vendor. They expect to be involved to support the project activities.	<ul style="list-style-type: none"> • Local businessman • Head of Wineru Village East Likupang District Government
Community health	Community concerns regarding dust, noise and other sources.	<ul style="list-style-type: none"> • Wineru Midwife • Head of Wineru Village Wineru Community
Minimizing adverse impact	This includes road safety from heavy vehicle mobilization and potential radiation that maybe harmful to the health of pregnant women and people which passing near the Project area.	<ul style="list-style-type: none"> • Wineru village head • Wineru Midwife • East Likupang District Government Wineru Community

Based on the consultation undertaken, a number of issues must be prioritized and followed up by the Project including:

- Project contribution to community development;
- Local worker recruitment process;
- Local supplier and vendor requirements;
- Potential project impacts and mitigation measures; and
- Discussing road safety and other community fears.

5.1.5 *Stakeholder Analysis (Interest, Influence and Perception) Towards the Planned Project*

Based on the results of direct one-on-one consultations during the AMDAL and ESHIA development, a stakeholder analysis was conducted, see **Table 5-2**.

Generally positive perceptions were voiced, however the level of support from stakeholders towards the Project varied depending on the extent with which the Project can contribute positively to Wineru village. The village has co-existed with several Projects operating within and surrounding the village such as Gardu Induk (Electricity Substation) PLN, PLTD (Diesel Power Plant), MSM (Gold Mining) and PLTG (Gas Power Plant). As such the community is very sensitive and aware of how Projects manage their environmental and social issues.

Table 5-2 Summary of the Project's Stakeholder Analysis

No.	Stakeholder	Location	Interest	Power or Influence	Perception
1.	Head of Wineru Village	Wineru, Village Level	Head of Wineru Village has an interest to optimize the beneficial impacts from the Project including establishing a community development program, improving village infrastructure, providing opportunities for local suppliers and vendors, optimizing and prioritizing Wineru villagers as project workers especially during the construction and also minimizing all the potential adverse impacts such as radiation, dust, noise and road safety.	Elected as the village head for two periods since 2008 prove his strong power and influence in the village. Head of Wineru village is cooperative and open minded. He is also active in Formitra, an advocacy NGO based in Airmadidi, as PIC in Wineru.	Very supportive and positive towards the Project but also critical because he has many experiences with several investments or projects within and surrounding Wineru village. He believes that through the incoming investment, Wineru village can advance its development.
2.	Businessman (specifically Pak Herman who is well known as local businessman who provides services to project's similar to this)	Wineru, Village until Province Level	<ol style="list-style-type: none"> 1. Opportunity to develop residential complex for project employees 2. As a local supplier 3. As a local vendor (Sub-contractor), labor brokers, rental of heavy equipment such as excavators 	Has significant influence and power in village and district level. He also has a close relationship with political figures at the Province level.	Supportive and very positive towards the Project. He sees the project as a big opportunity to develop his businesses in the area.
3.	North Sulawesi Energy and Mineral Resources Agency	Manado, Province Level	Ensuring the availability of a consistent energy supply in North Sulawesi.	Very strong as the authority that controls the energy sector in the province of North Sulawesi.	Positive, strongly supports the project.
4.	Kanwil BPN (National land Agency in Sulawesi Utara Province.	Manado, Province Level	Implementation of land acquisition complies with relevant regulations.	Authority in issuing land certificates.	Neutral, simply follow the regulations related to land acquisition process.

No.	Stakeholder	Location	Interest	Power or Influence	Perception
5.	Likupang Timur District Government	Likupang Timur, District Level	<p>Likupang Timur District's interest is to gain benefits from the Project i.e. to increase and improve public infrastructure and reduce unemployment. They also have interest to ensure that the anticipated negative impacts such as dust, poor roads, cable tracks are addressed properly.</p> <p>The District government expects not to be involved in the coordination only if problem occurs, but throughout the project stages.</p>	The Likupang district government's main duties are to oversee the project's CSR programs and supervise the workers recruitment, ensuring the priority is given to local workers.	Very supportive and expecting transparency on the recruitment process of workers
7.	SULUTTENGGGO Office Area of PLN	Manado, Province Level	Keep the balance of the electricity supply and demand.	SULUTTENGGGO Office Area of PLN only provides considerations on technical aspects since the decision is made by PLN's headquarters in Jakarta.	<p>Positive attitude towards the project; notes that the Project capacity should be reduced to 10MW based on two considerations:</p> <ol style="list-style-type: none"> 1. Electricity demand in SULUTTENGGGO is already fulfilled; the office claims that the supply is surplus. 2. 10 MW of solar power is more stable to handle.

No.	Stakeholder	Location	Interest	Power or Influence	Perception
8.	Land owner, Herman Luntungan	Wineru, Village Level	<ol style="list-style-type: none"> 1. Land compensation paid timely 2. The opportunity to develop housing for project employees 3. As a local supplier 4. As a local vendor (Sub-contractor), labor brokers, rental of heavy equipment such as excavators 	<p>Having significant influence and power on the economy and politics in the village, district, and province level. He also has a broad economic and political network in the region.</p> <p>Possesses many plots of land in Wineru village and its surroundings.</p>	Pak Herman is supportive and positive towards the Project. He agreed to sell his land for the Project location. He believes that incoming investment in Wineru will leverage his business capacity.
9	Local youth organization (Karang Taruna/ village youth organization, Remaja Masjid/ Mosque youth organization, Pemuda Gereja/ church youth organization)	Village level	<ol style="list-style-type: none"> 1. Involvement of youth in the village development 2. Employment opportunities 	<p>Local youth organizations are quite active in the village organizing social activities involving youth such as sport and religious events.</p> <p>These organizations have a large potential to influence youth attitude towards the project.</p>	Positive attitude towards the project due to employment opportunities and CSR programs that will empower and involve youth.
10	Local NGO Forum Rakyat Peduli Minahasa Utara (Formittra)	Regency level, based in Airmadidi District	Good governance and transparency of development projects in the regency, ensuring that community's interests are addressed in the project	This NGO monitors the government's performance and their opinions are quite often quoted in local magazines. The NGO has a capacity to influence public opinion towards the project if it doesn't comply the regulation or not address the interests of the community	Head of Wineru village is the main contact of the organization in the village. He stated that currently the NGO doesn't have a specific interest towards the project. The NGO will take action only if there's a problem harming the community.

5.2 *STAKEHOLDER ENGAGEMENT METHODOLOGY*

Stakeholder engagement is centered on building and maintaining constructive relationships over time with groups of people / stakeholders who are affected or interested in the Project’s activities. It is an ongoing process between ITL and its Project stakeholders that extends throughout the life of the Project and encompasses a range of activities and approaches, from information sharing and consultation, to participation, negotiation, and information of partnerships.

Considering the social setting of the community and category of stakeholders identified during the AMDAL and ESHIA consultation, the following section presents the strategy and approach for the Project to conduct stakeholder engagement activities in a culturally appropriate manner.

The goal is to ensure the timely provision of relevant and understandable information and to create a process that provides opportunities for all stakeholders to express their views and concerns, and allows the Project to consider and respond to them. The nature and frequency of this engagement should reflect the level of Project risks and impacts.

5.2.1 *Stakeholder Engagement Materials*

Materials supporting stakeholder engagement can include printed information in the form of leaflets and posters as well as documents that form the focus of disclosure and consultation activities, including the AMDAL and ESHIA Reports. Other materials are developed to support consultation meetings, including presentations, posters and banners illustrating aspects of the Project and the ESHIA process.

Potential consultation / engagement methods that could be used by ITL include (but are not exclusive to) those detailed in **Table 5-3**.

Table 5-3 *Stakeholder Engagement Tools*

Method*	Use
Briefings and presentations	Provide information on a specific issue/initiative to those that may be affected.
Public displays	Increase accessibility of information to community. Include Fact Sheets/Newsletters and staff to answer questions.
Media coverage (both editorial and advertising)	Raise awareness amongst wide audience.
Open days	Informal event designed to raise awareness and provide vehicle for addressing community concerns. Include printed material and staff for further information.
Printed/website materials (external)	Provide updates to reach wide audience.
Printed/intranet materials (internal)	Provide updates to reach wide internal audience.

Method*	Use
Videos/DVDs	Visual depiction of development/ activities. Can be used in briefings/presentations, open days, public displays and other methods of consultation/engagement.
Website	Provides regular updates and stores other useful information (such as fact sheets/newsletters etc.). Include feedback mechanism.
Community Consultative Committees	Made up of relevant interest group representatives in order to provide a vehicle for constructive discussion and good relationships.
Community profiling	Used to understand the community profile in a specific geographical area or community of interest. Can assist in better understanding consultation needs.
Focus groups	Often used to identify specific issues on which to base further research or consultation.
Negotiation/mediation	Aimed at dealing with conflict and resulting in an agreed outcome.
Public meetings	Used to raise awareness amongst wide audience and provides a vehicle for community to raise their concerns.
Stakeholder interviews	Used to gain in-depth understanding of a specific issue.
Surveys	Used to gain overview of community views or level of community understanding.
Community partnerships	Provide an opportunity for joint company-community decision making on community projects and initiatives.
Social investment	Strategic contributions to support areas of identified need in the community. Can lead to good relationships and will enhance corporate reputation.

5.2.2 *Communication Channels*

The different consultation and disclosure methods, materials and communication channels that can be used to engage stakeholders are shown in **Table 5-4**.

Table 5-4 *Communication Channels*

Stakeholder Category	Disclosure Methods	Communication Channels
Residents of local communities	Paper copies of documents made available in central community location (e.g. town halls, cultural centers, village head office, traditional market, etc.)	<ul style="list-style-type: none"> • Email, telephone, post and in person. • Secure comment boxes • Community meetings and public hearings
Government Authorities	Notification, key documents and invitations to meet with Project addressed to specific stakeholders.	<ul style="list-style-type: none"> • Email, telephone, post and in person. • Meeting and correspondence with the Project representative

Stakeholder Category	Disclosure Methods	Communication Channels
Non-government organizations (NGOs)	Notifications, key documents and invitation to meet with the Project addressed to specific stakeholders.	<ul style="list-style-type: none"> • Email, telephone, post and in person. • Meeting and correspondence with the Project representative

5.3 *PLANNED FUTURE STAKEHOLDER ENGAGEMENT*

This SEP identifies the relevant stakeholder groups, key messages to be delivered, approach and tools of engagement, timeline and responsible parties. The SEP is designed to include all relevant stakeholders and issues to cover the entire lifecycle of the Project. The plan is a dynamic tool to be periodically updated and adapted to the current social, economic and political situation of the area since the Project's stakeholders and issues / concerned raised may change over the life time of the Project.

Based on the analysis of stakeholder interest verses power or influence presented in Table 5-2 in the previous sub-section, the type of engagement that will be implemented for each of the different stakeholder identified is shown in **Figure 5-1**.

The proposed future Project stakeholder engagement activities, based on ERM's understanding of potential project impacts and stakeholder consultation results are presented in **Table 5-5**.

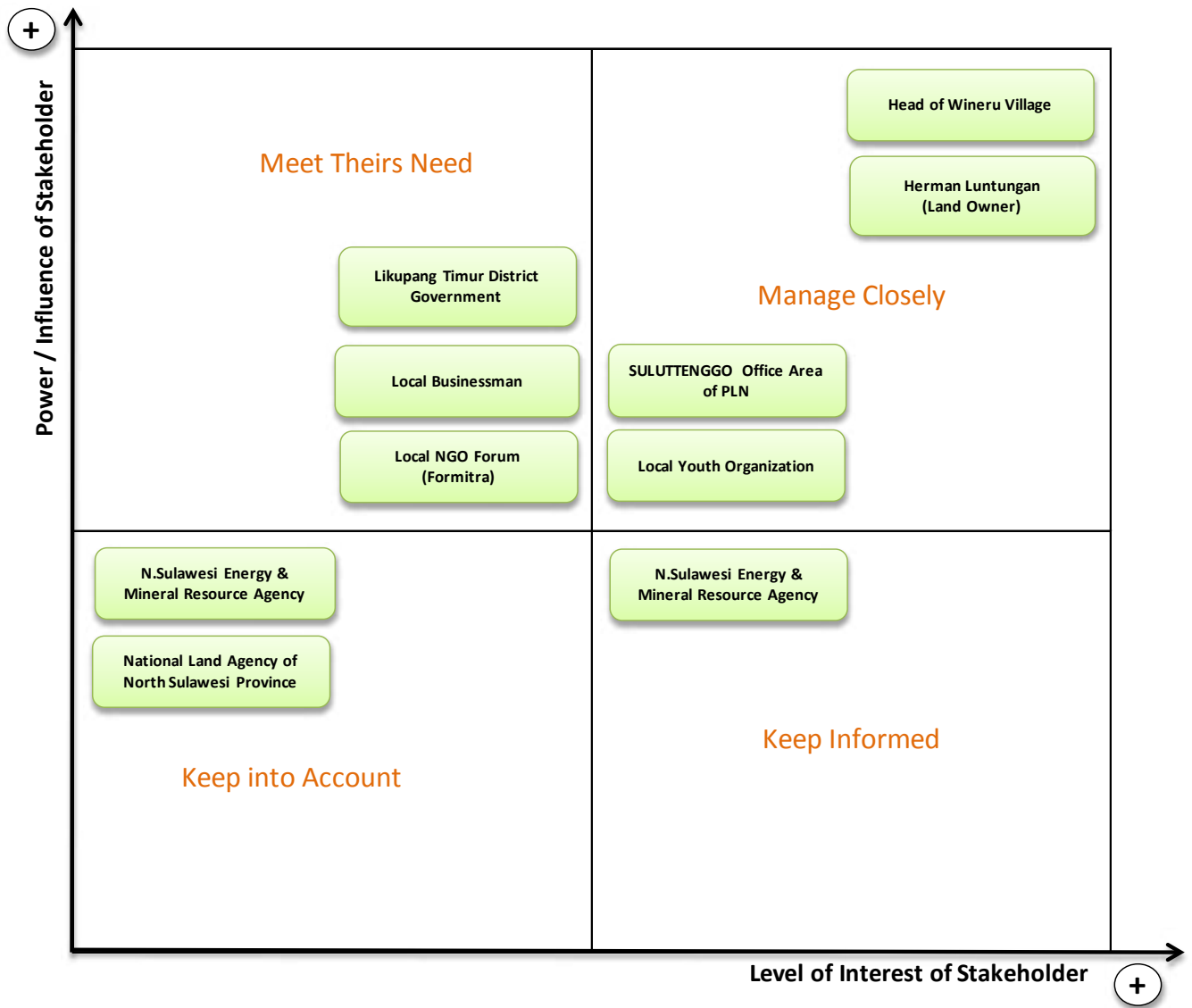


Figure 5-1 Stakeholder Engagement Based on Power versus Interest

Table 5-5 Proposed Project Stakeholder Engagement Activities

Stakeholder Group	Location	Key Issue	Approach	Timeline
Businessman	Wineru Village until Province Level	<ol style="list-style-type: none"> 1. Project development and activities. 2. Project activities which could have an opportunity for the businessman including: <ol style="list-style-type: none"> 1. The opportunity to develop housing for project employees 2. As a local supplier 3. As a local vendor (Sub-contractor), labor brokers, rental of heavy equipment such as excavators 	Socialization and Consultation Tools: <ul style="list-style-type: none"> • Socialization forum in Wineru village • Posters in location where it is easily accessible to the community. 	Prior to construction, construction and operation phase.
Midwife	Wineru, Village Level	<ol style="list-style-type: none"> 1. Project development and activities. 2. Project activities which could have an impact on the Wineru's community health 	Socialization and Consultation Tools: <ul style="list-style-type: none"> • Socialization forum in Wineru village • Posters in location where it is easily accessible to the community. 	Prior to construction, construction and operation phase.
Farming Communities	Village of Wineru and farming communities in general who resides in adjacent to the Project site	Project development and activities. Project activities which could have an impact on the livelihoods of the farming communities due to disruption of dust in farming location surrounding Project area. Project Grievance Mechanism for affected communities (system and process, person in charge, grievance submission).	Socialization and Consultation Tools: <ul style="list-style-type: none"> • Socialization forum in Wineru village • Posters in location where it is easily accessible to the community. 	Prior to construction phase.

Stakeholder Group	Location	Key Issue	Approach	Timeline
Residents of Wineru Village	Village of Wineru	<ul style="list-style-type: none"> • Project development and activities • Environmental, health and social impacts generated from Project development and activities. • Benefits and opportunities provided by the Project. • Disclosure summary of AMDAL (EIA) and ESHIA • Project labor requirement and procurement mechanism • Project Grievance Mechanism for affected communities (system and process, person in charge and grievance submission). 	<p>Socialization and Consultation</p> <p>Tools:</p> <ul style="list-style-type: none"> • Socialization forum in Wineru village • Posters in location where it is easily accessible to the community. 	Prior to construction, construction and operation phase.
Wineru Village Governments	Village of Wineru	<ul style="list-style-type: none"> • Project design and development, impacts and opportunities. • Project Environmental Permit (AMDAL) • Environmental, health and social impacts generated from Project development and activities. • Project labor requirement and procurement mechanism. • Project Grievance Mechanism for affected communities. 	<p>Socialization and Consultation</p> <p>Tools:</p> <ul style="list-style-type: none"> • Socialization forum in Wineru village involving village governments. 	Prior to construction
SULUTTENGGGO Office Area of PLN	Manado, Province Level	Keep the balanced electricity availability between the supply and demand.	<p>Socialization and Consultation</p> <p>Tools:</p> <ul style="list-style-type: none"> • Face to face meeting in SULUTTENGGGO Office Area of PLN. 	Prior to construction, construction and operation phase.

Stakeholder Group	Location	Key Issue	Approach	Timeline
Land owner, Herman Luntungan	Wineru, Village Level	Land compensation paid immediately	Socialization and Consultation Tools: <ul style="list-style-type: none"> • Socialization forum in Wineru village involving village government. 	Prior to construction
District Governments	Likupang Timur District	<ul style="list-style-type: none"> • Project design and development, impacts and opportunities. • Project Environmental Permit (AMDAL) • Environmental, health and social impacts generated from Project development and activities. • Project labor requirement and procurement mechanism. • Project Grievance Mechanism for affected communities. 	Socialization and Consultation Tools: <ul style="list-style-type: none"> • Socialization forum in Likupang Timur District involving village government. 	Prior to construction
Regency Government	Airmadidi, North Minahasa Regency, Province of North Sulawesi.	<ul style="list-style-type: none"> • Disclosure of ANDAL (EIA) permit and the environmental and social management plan. • Project design and development, impacts and opportunities. 	Socialization Tools: <ul style="list-style-type: none"> • Direct one-on-one meeting with relevant government agencies as required • Workshops 	Prior to construction.

Stakeholder Group	Location	Key Issue	Approach	Timeline
Provincial Government	Manado, Province of North Sulawesi.	<ul style="list-style-type: none"> • AMDAL (EIA) permit approval • Regular reporting of environmental and social management plan implementation under the AMDAL. • Sea traffic permits for heavy vessels transportation 	<p>Consultation and Reporting</p> <p>Tools:</p> <ul style="list-style-type: none"> • Direct one-on-one meeting with relevant government agencies as required • Workshop 	Prior to construction, construction and operation phase.
Local Youth Organization	Village of Wineru	<ul style="list-style-type: none"> • Project design and development, impacts and opportunities. • Project labor requirement and procurement mechanism. • Project Grievance Mechanism for affected communities. 	<p>Socialization and consultation</p> <p>Tools:</p> <ul style="list-style-type: none"> • Direct one-on-one meeting with relevant representative. • Socialization forum in Wineru village involving the youth group 	Prior to construction and construction phase.
Local Non-Governmental Organization	Village of Wineru and surrounding area	<ul style="list-style-type: none"> • Project labor requirement and procurement mechanism. • Project Grievance Mechanism for affected communities (system and process, person in charge, grievance submission). 	<p>Socialization</p> <p>Tools:</p> <ul style="list-style-type: none"> • Focus group discussion in the village involving local NGOs • Socialization forum in Wineru village involving local NGOs 	Construction phase.

5.4 COMMUNITY GRIEVANCE MECHANISM

Grievances can be an indication of growing stakeholder concerns (real and perceived) and can escalate if not identified and resolved. Identifying and responding to grievances supports the development of positive relationships between projects, communities and other stakeholders.

A grievance management process will be established for the Project. This will provide a formal and on-going avenue for stakeholders to engage with the Project. A Project-level grievance mechanism is a locally based, formalized way for a company or Project to accept, assess, and resolve stakeholder complaints related to Project activities. It offers a package of widely understood and effective procedures for solving problems in a culturally appropriate manner.

The grievance mechanism will be advertised and announced to affected stakeholders so that they are aware of the process, know they have the right to submit a grievance and understand how the mechanism will work and how their grievance will be addressed. In most cases, a grievance or complaint will be submitted by a stakeholder or local resident by phone, in writing or by speaking with one of the company's project representative officer.

5.4.1 Proposed Grievance Mechanism for Project Affected Communities

It is understood at the current stage of the Project a formal mechanism for managing community complaints has not been established by ITL.

Although the Project will seek to reduce potential negative impacts arising from the Project and to operate strictly according to legal and good practice guidelines, it is inevitable that community queries and grievances will arise throughout the construction and operation phase. For these reasons, a Grievance Tracking and Redress Mechanism (GTRM) should be established.

An affective GTRM is phased in a set of steps and activities which are easy to follow and understand. A typical GTRM is characterized by five basic steps illustrated and further detailed in **Figure 5-2** and **Figure 5-3**.

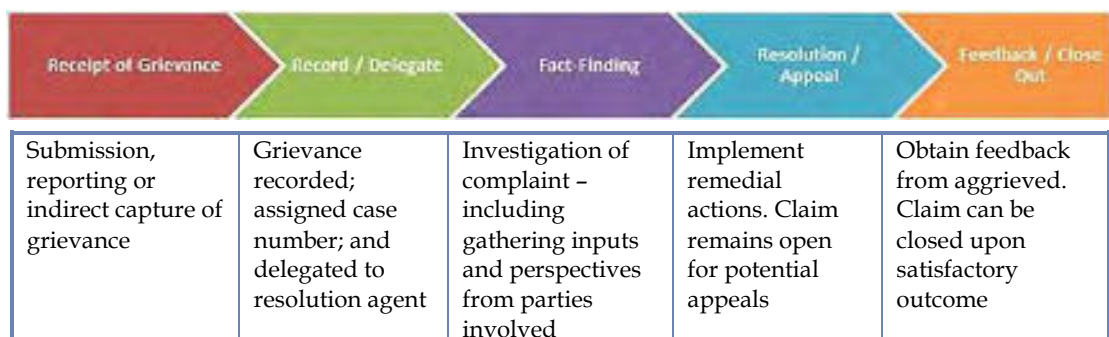


Figure 5-2 Basic Steps of Grievance Tracking and Redress Process

Figure 5-3 Typical Steps of a Grievance Mechanism

Steps	Time Frame	Description
Step 1 ↓		Identification of Grievance: Through personal communication with appropriately trained and advertised Project workers (Grievance Officer). This could be in person, by phone, letter, or email using specific contact details.
Step 2 ↓	Within 1 (One) day of Identification	Grievance is recorded in the "Grievance Log": Grievances will be logged (paper and electronic) within one day of identification. The grievance log will be held at the Project offices and managed by the Grievance Officer. The significance of the grievance will then be assessed within five to seven days.
Step 3 ↓	10 - 14 working days after submission	Grievance is acknowledged through a personal meeting, phone call, or letter as appropriate, within a target of 10 - 14 working days after submission. If the grievance is not well understood or if additional information is required, clarification will be sought from the complainant during this step
Step 4 ↓	Within 5 - 7 working days after submission	The GO delegates the Grievance within five to seven days via email to relevant department(s) / personnel to ensure an effective response is developed (e.g. Human Resource).
Step 5 ↓	Within 14 working days after submission	A Response is developed by the delegated team and Grievance Officer within 14 days, with input from senior management and others, as necessary
Step 6 ↓	Within 14 working days after submission	The Response is signed-off by senior manager and or the Grievance Officer within 14 days. The sign-off may be a signature on the grievance log or an email which indicates agreement, which should be filed by the GO and referred to in the grievance log.
Step 7 ↓		Communication of the response should be carefully coordinated. The Grievance Officer ensures that an approach to communicating the response is agreed and implemented.
Step 8 ↓		Record the response of the complainant to help assess whether the grievance is closed or whether further action is needed. The Grievance Officer should use appropriate communication channels, most likely telephone or a face to face meetings, to confirm whether the complainant has understood and is satisfied with the response. The complainant's response should be recorded in the grievance log.
Step 9		Close the grievance with sign-off from the Grievance Officer. The Grievance Officer assesses whether a grievance can be closed or whether further attention is required. If further attention is required the Grievance Officer should return to step 2 to re-assess the grievance. Once the Grievance Officer has assessed whether the grievance can be closed, he/she will sign off or seek agreement from the senior management / project manager to approve closure of the grievance. The agreement may be a signature on the grievance log or an equivalent email, which will be filed by the Grievance Officer and referred to in the grievance log. In addition, a "Grievance Closeout Form" will be used.

Numerous channels will be used for stakeholders to submit a complaint:

- Telephone - All incoming calls will be registered and information summarized daily and sent to the relevant department for processing and action in accordance with the grievance procedure outlined above.
- Post - Mail can be used by stakeholders for submission of their queries / requests / complaints / comments for consideration by the Project management. All incoming letters will be documented and stored as well as the responses sent to the originating party in accordance with the grievance procedure outlined above.
- Any queries / requests / complaints / comments can be brought to the attention of the Project verbally or written (e-mail) or by filling in a Grievance Form which will be available in the project site office.

Grievances can be directed to the Project Community Liaison Officer (CLO) or through the head of the village who then will convey them to the community relationship officer. The dedicated stakeholder relationship officer will then have the responsibility to monitor the resolution progress, record all discussions (*Annex 1*) and ensure all grievances are responded to where feasible in a timely and proper manner.

To the greatest extent possible the Project will treat community complaints confidentially, and in all cases grievances will be addressed without prejudice.

5.4.2 *Dedicated Resources for Managing Community Grievance Mechanism*

The grievance mechanism will be effective if adequate resources – people, systems and processes, and associated financial resources – are assigned to its implementation, and if responsibilities are clearly defined. The mechanism should be recognized as part of the business' function. Details of grievance mechanism management and resources allocated will be described in *Section 6* of this report. In order to execute the mechanism appropriately the organizational structure / function outlined in **Table 6-1** is proposed.

5.4.3 *Monitoring and Reporting of Grievance Management*

The Project will establish an internal monitoring process to monitor the effectiveness of the Grievance Mechanism. Internal monitoring will be undertaken on a regular basis. The monitoring process is designed to identify areas of high performance and areas for improvement to enhance the process. The scopes of the monitoring include:

- Assessing the effectiveness of the grievance tracking and handling procedure;
- Identifying the need for organizational improvement in implementing the procedure;
- Evaluating the progress of resolution implementation and identify intervention needs from senior management to manage overdue / outstanding cases or recurring grievances; and

- Identifying the need for improvement of the procedure, should any significant changes in external factors occur, e.g. economic and political conditions which potentially encourage additional social risk and impact.

Periodic reporting will be prepared by the Community Liaison Officer or person within the organization with similar role with the following timeframe:

- Monthly reporting will be submitted to the senior management or the site manager as a reference in the coordination meeting with the Contractor's HSE Team; and
- Quarterly reports to be submitted to Redaya Energi's Management and distributed to other relevant parties as required to identify the need for organizational and procedure improvements.

The content of the report will at minimum contain the following information:

- Summarize the grievances received and classification based on the grievance type within the timeframe;
- The resolution status - number of grievances resolved, pending of implementation and unresolved, along with challenges in implementing the resolution, and timeframe to resolve the remaining grievances;
- Results of monitoring and the status of implementation of the proposed recommendation; and
- Identify trends and critical grievances occurring regularly or overdue cases.

6 MANAGEMENT FOR IMPLEMENTATION OF STAKEHOLDER ENGAGEMENT AND GRIEVANCE MECHANISM

6.1 DEDICATED RESOURCES FOR MANAGING SEP

The Stakeholder Relations and Grievance Team of ITL will be the main point for communications with stakeholders and conducting engagement activities. The team will be responsible for the implementation and management of the Project's overall stakeholder engagement activities and grievance management across all categories of stakeholders.

Currently, the Project has not established a specific unit or management team to undertake the proposed stakeholder engagement activities and grievance address mechanism, however it is understood there are personnel from the Project who have been actively conducting consultation with the local community in order to provide initial information regarding the Project and as part of acquiring formal environmental and social data as part of the AMDAL process and environmental permit.

It is recommended that a specific team should be established for the duration of the Project to support the management of social and environmental impacts, addressing of grievances and implementation of community development activities.

Figure 6-1 illustrates the broader organizational structure in more detail. **Table 6-1** summarizes the key roles and responsibilities that will be required to implement this plan effectively.

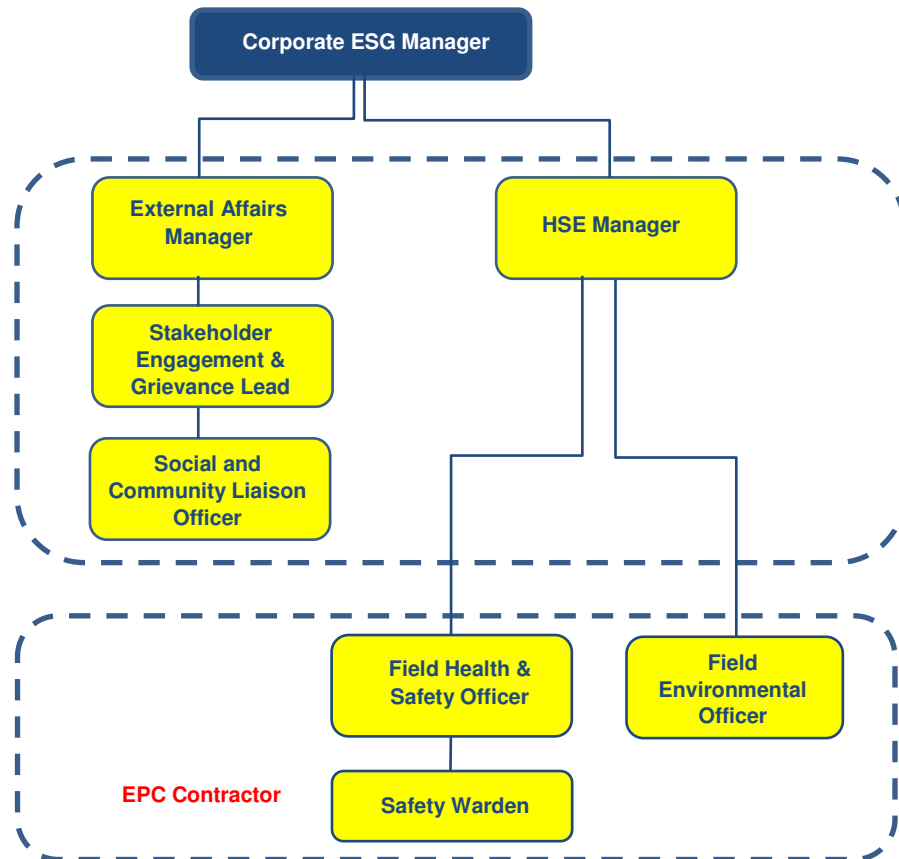


Figure 6-1 Proposed Project Structure for Implementation of Stakeholder Engagement Plan

Table 6-1 Summarizes the Key Roles and Responsibilities that will be required to Implement the Stakeholder Engagement Plan

No	Roles and Responsibilities
Stakeholder Engagement and Grievance Management Lead	
1.	Develop and endorse Community related Policies
2.	Liaise with all relevant stakeholders
3.	Plans, directs, manages, and coordinates CSR program, projects, services, functions and activities
4.	Monitor and report the Project’s Social performance on a regular basis to the Project Manager, and take action to address performance issues, as needed.
5.	Develops, justifies, and manages the budget
6.	Lead collaboration with Project EPC Construction HSE Team to establish and implement the Project Grievance Mechanism for construction phase.
7.	Ensure the social-related commitments in the HSE&S Policy are applied.
8.	Manage the implementation of grievance mechanism, monitoring and audit as required.
9.	To collaborate with other related units or departments and external parties (e.g. contractors) in resolving grievances.
10.	Report to the Top Management on social issues and grievance resolution implementation progress.

Community Liaison Officer	
1.	Support Stakeholder Relationship and Grievance Management Lead in communicating with all relevant stakeholders to include the government.
2.	Manage the implementation of CSR program, services and activities
3.	To observe the steps required in tracking and handling grievances.
4.	To receive, record and log grievances properly as required.
5.	Support Stakeholder Relationship and Grievance Management Lead in communicating with stakeholders and complainants.
6.	Support Stakeholder Relationship and Grievance Management Lead in coordinating with contractors and other related parties as requested.
7.	To ensure proper documentation and database update of grievance and its resolution.
8.	To prepare periodical grievance reporting.

6.2 *MONITORING AND TRACKING OF STAKEHOLDER ENGAGEMENT ACTIVITIES*

It is important to monitor stakeholder engagement to ensure that consultation and disclosure efforts are effective, and in particular that stakeholders have been meaningfully consulted throughout the process. Stakeholder engagement monitoring will include:

- Auditing implementation of the SEP;
- Monitoring consultation activities conducted with all groups of stakeholders;
- Monitoring the effectiveness of the engagement processes in managing impacts and expectations by tracking feedback received from engagement activities; and
- Monitoring any grievances received.

6.3 *DISCLOSURE OF GRIEVANCE MECHANISM*

The disclosure and communication of the grievance mechanism will begin early in the Project lifecycle and continue on an on-going basis as grievances arise. It will be disclosed in a culturally appropriate manner in the local language (the majority of the community residing around the Project site speak Bahasa Indonesia fluently but the local Manado language is also spoken widely) and format that is understandable to all the project affected peoples.

The following information will be disclosed:

- Steps of Project-based Grievance Mechanism;
- Who can raise complaints – focusing on the affected community;
- Where, when, and how community members can submit complaints;
- Who is responsible for receiving and responding to complaints, and if any external parties can receive complaints from communities;
- What type of responses complainants can expect from the Project including timing of responses; and
- The benefits that complainants can receive from using the grievance mechanism.

In regard to disclosing the mechanism, the Project will undertake communication in group discussions, community meetings and through the Project's community liaison officers as well as by using posters.

It is essential that the local government (and all contractors) also fully understands the mechanism to enable them to communicate the step-by-step process to the project affected peoples, particularly in the case where the grievances are submitted to them for resolution.

6.4 ***REPORTING***

Typically quarterly reports will be developed and will summarize all activities for the period, and provide a summary of issues raised and how they have been addressed, including timeliness of responses and corrective and mitigation measures to address grievances, and analysis of trends. These will include:

- Total number of stakeholders engaged according to stakeholder category;
- Numbers of comments and queries received by topic and responses given;
- Issues raised and level of support for and against the Project;
- Number of grievances submitted; and
- Time to resolve and close out grievances.

APPENDICES

ANNEX 1
PUBLIC GRIEVANCE FORM

1	Nomor identifikasi	ex : EBJ-ESHS-FORM-GL- 03
	Status	
2	Rincian Komplain/Keluhan	
2.1	Kapan terjadi	
2.2	Dimana terjadi	
2.3	Bagaimana terjadi dan siapa yang terlibat	
2.4	Keterangan dari pihak yang komplain dan harapan yang ingin di capai	
2.5	Tanggal Keluhan di catat	
2.5	tempat/metode keluhan diterima	
3	Profil dari pihak yang mengeluh/komplain	
3.1	Jenis kelamin	
3.2	Usia	
4.	Informasi kontak	
4.1	Tidak bernama (anonim) (Y/N)	
4.2	Telpon	
4.3	Email	
4.4	Alamat	
5	Keluhan diterima?	
5.1	Keluhan DITOLAK	
5.1.1	Tindakan lebih lanjut	Telah jelas tidak terkait dengan aktivitas dari kegiatan proyek – ditolak Keluhan berkaitan dengan tenaga kerja – transfer Berkaitan dengan kebijakan oemerintah - transfer kepada pihak yang berkaitan Lainnya:
5.1.2	Pihak yang mengeluh diberitahu? Y/N	
5.1.3	Metode pemberitahuan	
5.1.4	Tanggal penyelesaian	
5.2	Keluhan DITERIMA	
5.2.1.	Kategori keluhan	Lingkungan Kesehatan, Keselamatan, dan Keamanan Sosial Lahan Lainnya
5.2.2	Photo/dokumentasi sebagai bukti	

5.2.3	Contoh penyelesaian	Pertama : Internal – Personnel yang bertanggung jawab/divisi
		Kedua : Multi stakeholder
		Ketiga : melibatkan pihak ke-tiga – Pemerintah/mediator independen
5.2.4	Resolusi/Tindakan yang dilakukan	
5.2.5	Pihak pengeluh diberitahu? Y/N	
5.2.6	Metode Pemberitahuan	
5.2.7	Pihak pengeluh puas atau tidak	
5.2.8	Photo dan dokumentasi sebagai bukti penyelesaian	
5.2.9	Sumberdaya yang di habiskan	
5.2.10	Tanggal penyelesaian	
5.2.11	Hari dari keluhan di terima sampai di selesaikan	

ANNEX 2
LIST OF CONSULTED STAKEHOLDERS DURING THE AMDAL AND
ESHIA CONSULTATION

Appendix 2. List of Stakeholders Consulted During AMDAL and ESHIA Phase

No	Date	Name of Stakeholders	Position	Category	Village	Sub-District	Issue Raised by Stakeholders
1	17 October 2016	<ol style="list-style-type: none"> 1. Head of East Likupang District 2. Village Representative Committee 3. Head of Village 4. Midwife 5. Representative of village government 6. Religion Figures 	<p>Representative of Likupang Timur District Government</p> <p>Village Representative Committee</p> <p>Representative of the Wineru Village Government</p> <p>Representative of Health Government</p> <p>Representative of Religious Figures</p>	<p>Government</p> <p>Village Figure</p> <p>Government</p> <p>Government</p> <p>Government</p> <p>Community Figures</p>	-	<p>Likupang Timur</p> <p>Wineru</p> <p>Wineru</p> <p>Wineru</p> <p>Wineru</p> <p>Wineru</p>	<ul style="list-style-type: none"> • Project description • Regulations related to power plant construction • Concept of Partnership offered to community and government by project • Clarification related to radiation impacts and community accessibility to the Project site • Optimizing beneficial impacts such as community development as well as prioritizing local worker recruitment and minimizing adverse impacts (both environmental and social) in Wineru community
	17 October 2016	30 households in Wineru village	<ul style="list-style-type: none"> • Village and Sub-District Government • Representatives of women, industrial labor, housewife and fisherman. 	Villager	Wineru	Likupang Timur	<ul style="list-style-type: none"> • Socio-economic, socio-cultural and community livelihoods • Community response towards the Project • Community health including community disease, water supply and sanitation
	24 January 2017	<ol style="list-style-type: none"> 1. AMDAL Coordinator 2. Energy and Mining Agency of North Sulawesi 3. State Electricity Company 4. National Land Agency 	<p>AMDAL authority Energy authority</p> <p>Electricity authority/ buyer Land authority</p>	Government	-	Manado	<ul style="list-style-type: none"> • The update and progress of AMDAL issues and completion • Electricity supply and demand in the area of North Sulawesi, Gorontalo and Central Sulawesi. Future strategy to supply electricity • The role and authority of North Sulawesi Province Energy and Mineral Resources (EMR) Agency in terms of the energy fulfilment strategy, especially on electricity • The status and process of land acquisition in the project area.

No	Date	Name of Stakeholders	Position	Category	Village	Sub-District	Issue Raised by Stakeholders
	25 January 2017	1. Head of Wineru Village	Village authority	Government	Wineru	Likupang Timur	<ul style="list-style-type: none"> • Employment opportunities for local people • Socio-economic condition of the village, social and cultural arrangement, knowledge about the project, concerns and expectations related to the project. • Land acquisition process, socio-economic condition, knowledge about the project, concerns and expectations related to the project. • Health profile of Wineru village • Role of Likupang Timur District in terms of village/community development, supervision of immigrant workers and local worker recruitment and village interest towards project.
		2. Secretary of Wineru Village	Secretary of village Land owner	Government	Wineru		
		3. Herman Luntungan		Community			
		4. Head of Economy and Community Section of District Government	Representative of Likupang Timur District Government	Government	Wineru Likupang Satu		
		5. Food stalls	Food stalls owner Fishermen	Community Community	Wineru		
		6. Fisheries	Midwife village	Government	Wineru		
		7. Midwife			Wineru		

**ANNEX D GEOELECTRIC EXPLORATION
REPORT**

INTRODUCTION

A.1. Background

Energy is one of the primary needs that plays an important role in economic growth in North Sulawesi which its implementation is an integral part in development planning. Facilities and infrastructure are important needs in order to increase production in all areas and to increase the income of the people. Therefore, it is necessary to build supporting infrastructure in the form of Solar Power Plant (SPP) in Wineru Village, East Likupang District, North Minahasa Regency, North Sulawesi. In its development, planning aspect is needed to support other needs to ensure the sustainability of development and implementation of SPP itself. Geophysical information on the location of the project, especially the availability of groundwater and its utilization is very necessary. It can be done through geoelectric measurements.

A.2. Purpose and Objectives

The purpose and objectives of geoelectric measurement activities at Wineru Solar Power Plant are:

1. To ensure that technical planning work is carried out in accordance with the plan using applicable standard procedures to achieve the quality of physical work.
2. To achieve the completion of the handling problems that is specific and has a high level of problematic so that the purpose of this work can be achieved.
3. To introduce the geoelectric system approach to provide information on where SPP projects are located. Memperkenalkan pendekatan sistem Geolistrik untuk memberikan informasi keberadaan lokasi proyek PLTS.

A.3. Target

The target is to get the product of Detail Engineering Design (DED) that can be used, and the impact that will be generated in the implementation of geoelectric measurement of Wineru Solar Power Plant in order to increase the agricultural production.

A.4. Work Location

The work location is spread in the Wineru Village, East Likupang District

A.5. Activity Scope

The scope of planning is divided into several stages:

1. Conducting a physical survey and measurement of each location in the framework of data collection and observation of field conditions as the basis of required technical planning development activities.
2. Analyzing the existing data.
3. Designing drawings of plans as the technical requirements of construction planning.
4. Creating a report that summarizes the activities

A.6. Systematical Documents Presentation

In the framework of procurement of Consultant Services for Geoelectric Measurement of Wineru Solar Power Plant, this is the Technical Proposal Document which contains the following chapters:

A. Introduction

Introduction contains background, purpose and objectives, target, location, activity scope, and systematic reports.

B. Approach and Methodology

A methodological approach that presents the job implementation methodology, which is a more detailed description of some parts of the work plan described in the previous chapter.

C. Work Implementation Schedule

This section will describe about the work implementation schedule that the consultant uses to complete the work.

D. Experts and The Responsibilities

This section will describe about experts and the responsibilities that the consultant uses in completing the work.

E. Assignments Experts Schedule

This section will describe the deployment of experts in completing the work.

F. Report

This section will describe the making of reports in completing this activity.

G. Supporting Staff

This section will describe the support staff used in completing this activity.

H. Supporting Facilities

This section will describe the supporting facilities used in completing this activity.

I. Closing

APPROACH AND METHODOLOGY

B.1. GENERAL

The purpose of this measurement work is to provide support to the service provider for the achievement of quality within a long span of control. Technical personnel provide technical assistance for the best planning.

B.2. PREPARATORY WORK

This preparation consists of several jobs as follows:

1. Administration preparation
2. Survey and field data collection preparation
3. Survey design preparation
4. Personnel and equipment preparation

B.3 SURVEY AND INVESTIGATION WORK

The survey and investigation work is done in two stages:

B.3.1 Initial Conditions Survey

This survey is intended to determine the existing condition of each planned location. The results of this survey will be made survey design. The basic image of the location of this area is taken using Google Earth, to make it easier to identify conditions in the field. Based on this map, drawings of trajectories are measured and also the number of paths to be used, path length, and spacing between electrodes. The measurement track is avoided from power lines, water pipelines and river flow cuts. The product of the survey results is then printed.

B.3.2 Checking Desain Survey

Design surveys that have been made must be checked again with field conditions. Checking is useful to ensure that the measurement trajectory that has been made is possible to wiring pass. The steps of this method consist of:

- a. Determination of the path containing the measurement points (electrode points)
- b. Improved position of measurement points

- c. Finalization of survey design

B.3.3 Field Measurement Survey

Field measurement survey to be conducted consists of:

A. Preparation Measurement

1. The geoelectric set is placed in the middle of the track.
2. Cable measurement consisting of 4 rolls with a length of 120 m each positioned on the right and left main unit.
3. The cable is extended; the electrode is plugged at 10 m spacing.
4. There are 48 pieces of electrodes, so the total length of the stretch is 480 m.
5. All parts of the tool are connected, tool setting is completed.
6. The measurement is ready.

B. Data Acquisition

1. Measurements were made by using Dipole-dipole configuration for 48 electrodes.
2. Flow will be inputted and it will give the measurement results of potential difference and resistivity pseudo rocks.
3. Measurements are done by stacking at least 3.
4. The re-measurement will be performed for irrational data with high deviation.
5. Elevation data of each electrode is measured using GPS (Global Positioning System).
6. Data is stored in the .DAT extension.
7. The measurement is complete

C. Data Processing

1. Data measurement results will be processed using a personal computer or laptop.
2. Software to be used is RES2DInv
3. 2D image cross-profile resistivity of subsurface layers is obtained.
4. Cross-sectional image is analyzed, and interpreted.
5. Suspected subsoil that carries groundwater aquifer is obtained.
6. The image is printed

B.4 REPORTING SYSTEM

The reports are: Introduction that contains a work plan, expert mobilization and service provider activity schedule, final report completed with photographs.

IMPLEMENTATION SCHEDULE

No.	Description	Day ⁻¹				Note
		I	II	III	IV	
1	2	3	4	5	6	7
1.	Preparation					Execution time 4 (Four) Days
2.	Collecting Data					
	~ Preliminary Survey					
	~ Survey Detail					
3.	Technical Planning					
4.	Report Generation					

EXPERTS AND THE RESPONSIBILITIES

The success of the "Goelectric Measurements of Wineru Solar Power Plant" project is the responsibility of the owner of the work. Therefore, the executives work as closely as possible to prepare experts as best as possible.

To achieve the effectiveness and efficiency of this work, the Consultant has selected and appointed the experts to be assigned. These job professionals are:

1. Team Leader (Team Leader), who is the coordinator in project implementation. Team Leader serves as coordinator and supervisor that is coordinating and supervising all activities, both field activities (survey, inventory and inventigation) and office activities that is document preparation (reports) and others required.
2. Planner/Assistant Team Leader, who serves to carry out technical planning activities according to their field in project implementation, preparing reports and documents related to this work plan.

The proposed experts who will be involved in this activity are as follows:

NO	NAMA TENAGA AHLI	POSISI PENUGASAN
1.	HESKY S KOLIBU, S.Pd., S.T., M.T	Team Leader
2.	AS'ARI, S.Si., M.Sc	Expertise
3.	JEAFERT RICO P, S.Si	Operator
4.	NISMA MANGIRI, S.Si	Data Acquisition
5.	TESAL KOBANDAHA	Operator

REPORT

The consultant will prepare and send the report to Equis Energy Corp. through the Commitment Maker Official, as required by each report as follows: Activity Summary Report containing: The full results of technical planning work, including:

- a. The track measurements of the location (Detail Engineering Design).
- b. 2D Resistivity Cross Section image (subsurface).
- c. Water Aquifer Engineer's Estimate (EE).
- d. Drilling point recommendation.

GEOELECTRIC EXPLORATION REPORT

WINERU VILLAGE

EAST LIKUPANG DISTRICT

NORTH MINAHASA REGENCY

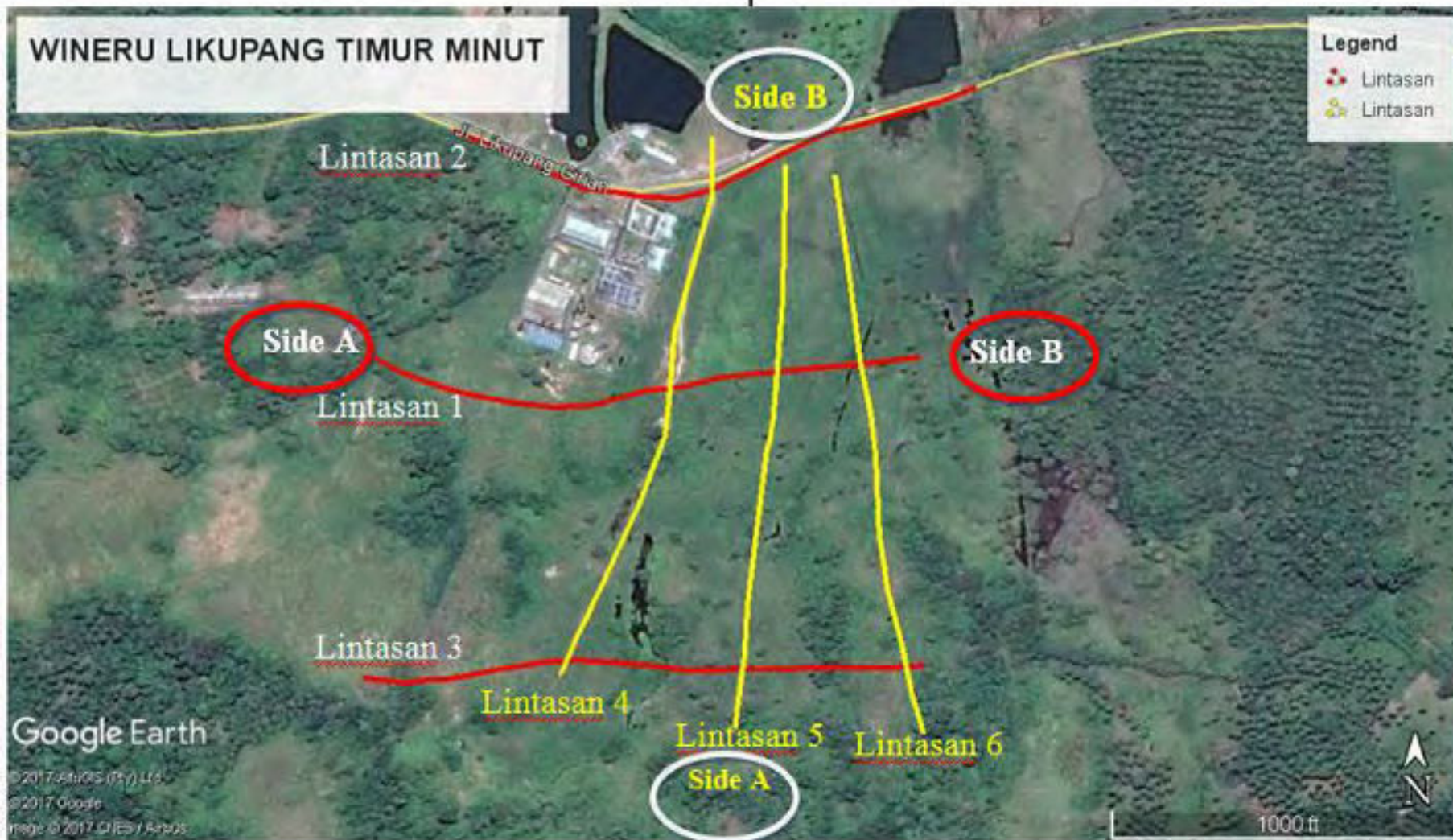
Geoelectric Exploration of Wineru Solar Power Plant

Exploration Tool: Geo Resistivity Meter MAE X612-EM

Exploration is conducted on 12 - 14 December 2017 on 6 tracks. The track consists of: Track 1, Track 2, Track 3, Track 4, Track 5 and Track 6. This exploration uses the geoelectric method of Dipole-Dipole type resistance. The exploration result is a map of the data retrieval track, and the data is processed using RES2DINV software with the result of a cross-sectional resistivity image of 2D which describes the state of the rock layers under the surface. The horizontal axis represents the position of the electrode along the track (480 meters), with a space of 10 meters. The vertical axis represents the depth of the meter.

Results are presented in the following order:

1. Location map and measurement track.
2. 2D image at each tracks, contains information on the prediction of groundwater aquifer position: electrodes and depth.
3. Electrode position: latitude, longitude and elevation/altitude.



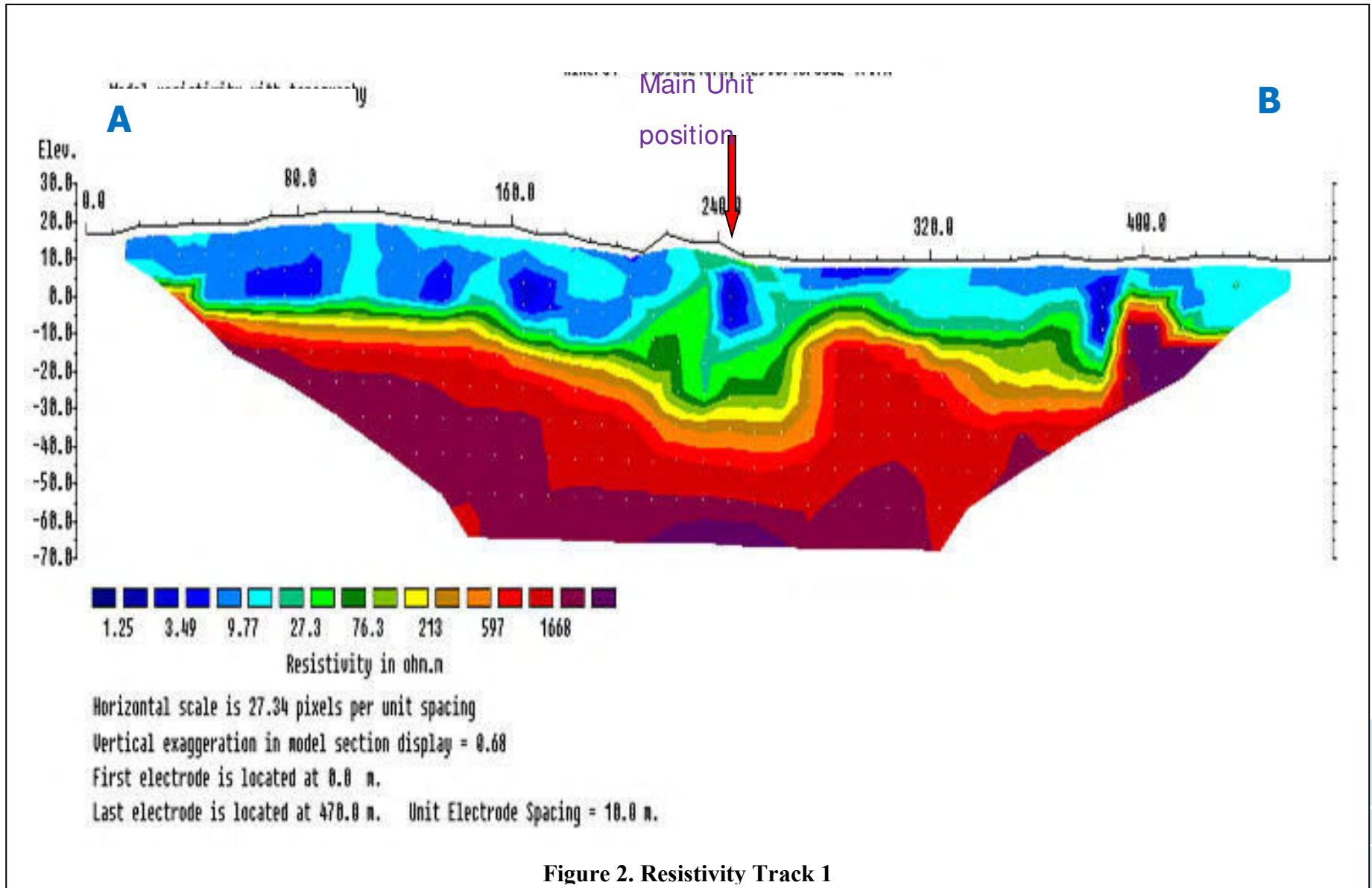
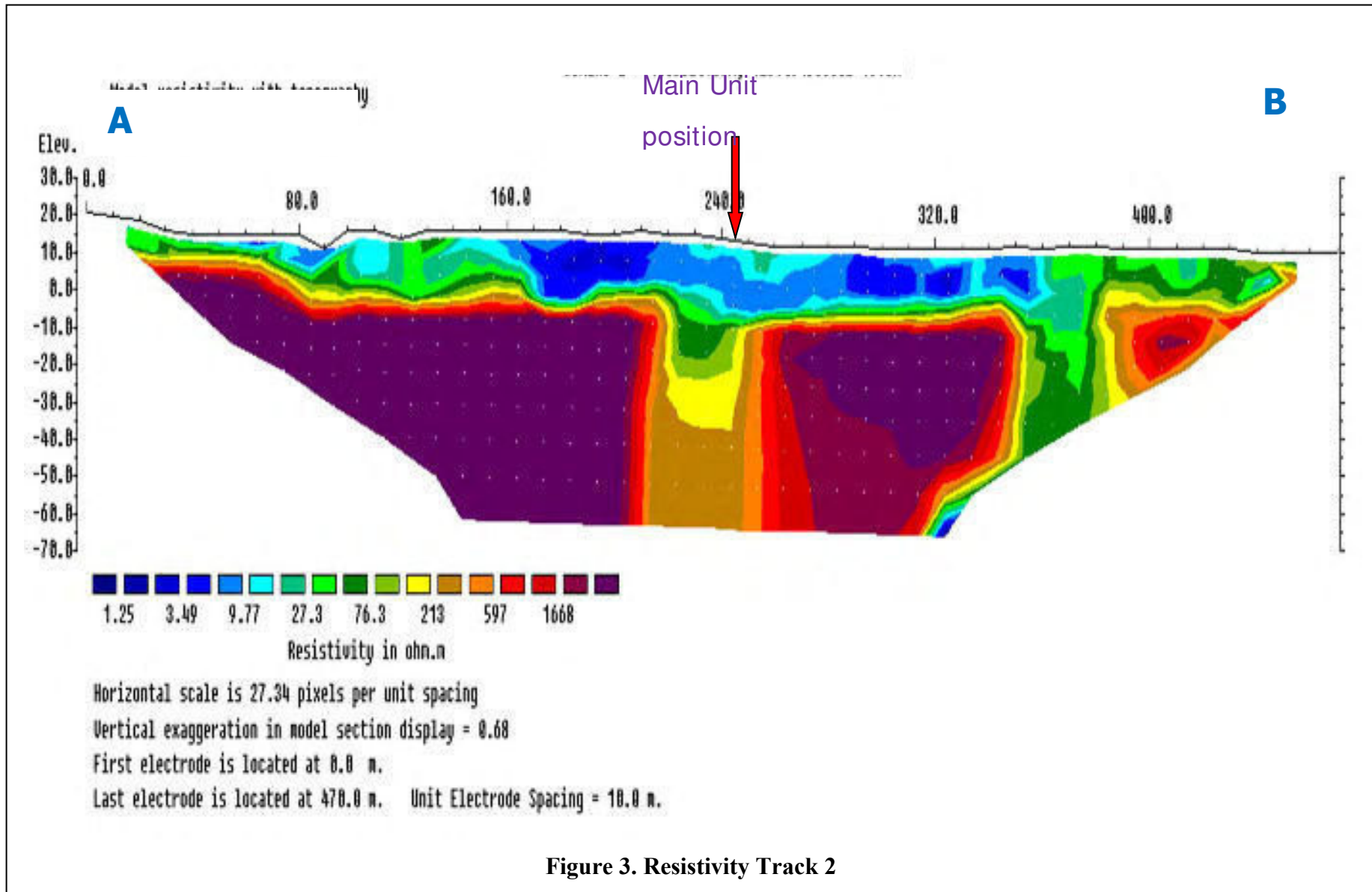


Figure 2. Resistivity Track 1



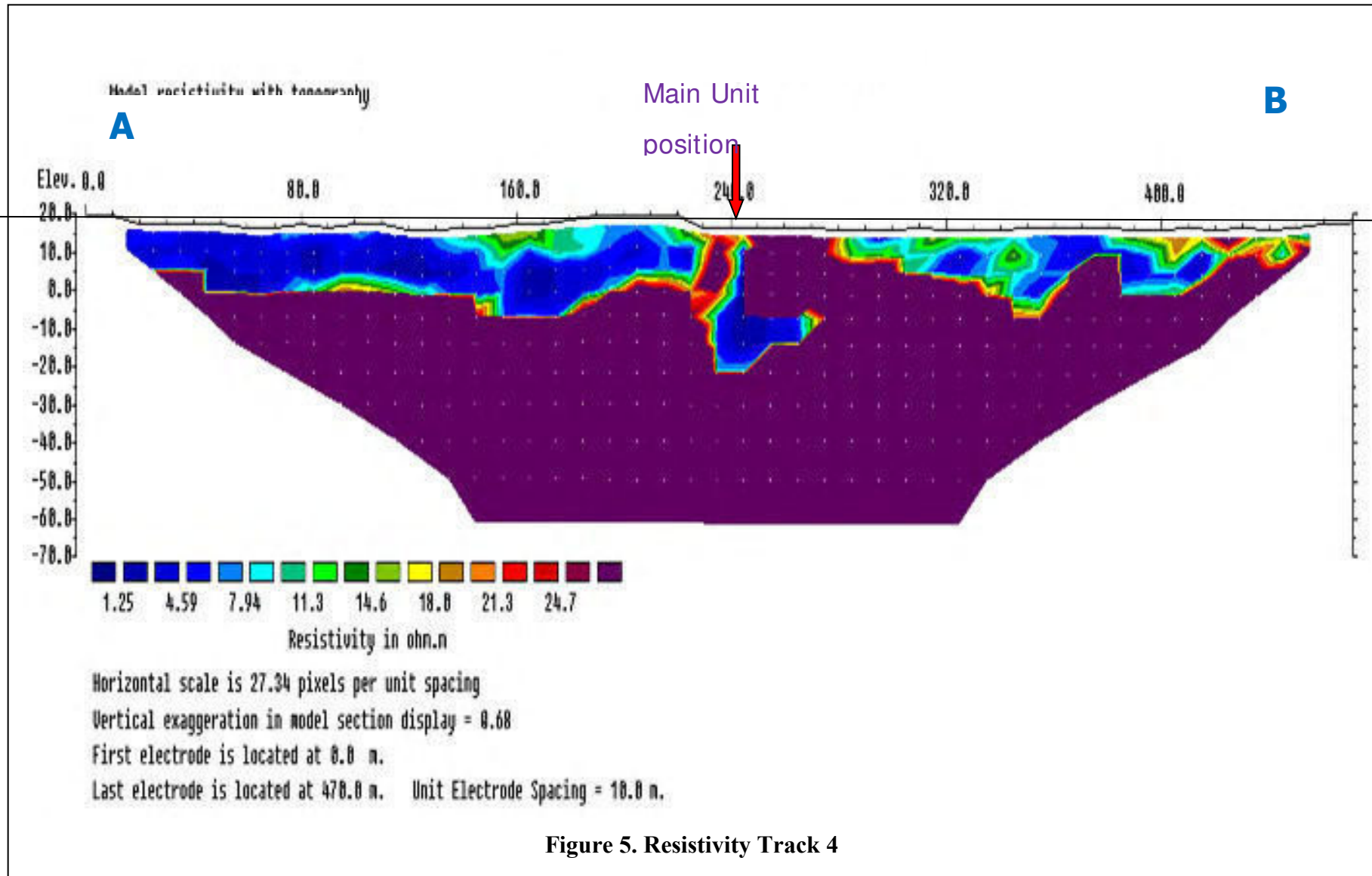


Figure 5. Resistivity Track 4

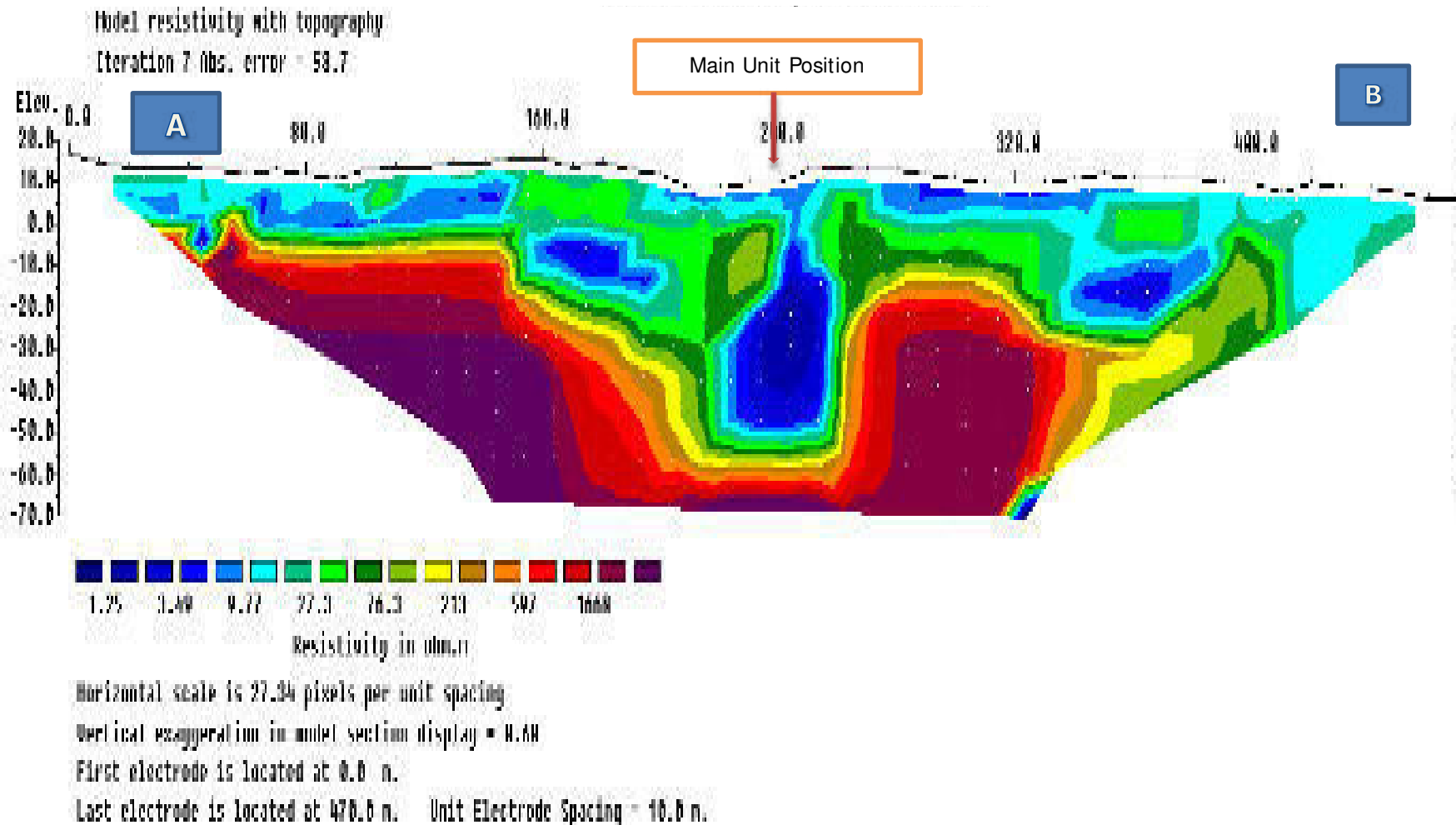


Figure 7. Resistivity Track 6

The image of the track measurement (Picture 1) (Side A and Side B) corresponds to the image of resistivity cross (Fig. 2 - 7) (A and B). The length of the track is 480 m with a depth of 80 m. Groundwater aquifers are identified by a resistivity $\leq 9.77 \Omega\text{m}$ (■) and a connecting layer (■) which has a resistivity ($9.77 < \rho < 18.54$) Ωm . The connecting layer has the property to pass water in a small capacity.

Picture 2 shows the latitude of subsurface resistivity at Track 1, groundwater aquifers scattered along the path. The groundwater aquifers are located at a depth of <25 m, the aquifers in this path are discontinuous connected by the connecting layer.

Picture 3 shows the subsurface subsistence resistivity at Track 2, groundwater aquifers are located at 16 - 36 electrodes (meter of 160 - 360) with a depth of <15 m.

Picture 4 shows the subsurface resistivity at Track 3. The left (A side) has hilly contours. On the hill found groundwater aquifer on the electrode meter of 15 - 165 with a depth of up to 80 m. At the meter of 165 to 390, the groundwater aquifer is identified to a depth of <30 m. Aquifers at the meter of 30 to 320 are interconnected and continuous.

Picture 5 shows the latitude of subsurface resistivity at Track 4, groundwater aquifers are continuously shown at 15 to 230 meters with a depth of <25 m. A single aquifer is identified at 245 meters with a depth of <30 m. Several connected aquifers but not continuously are identified at the meter of 280 - 420 with a depth of <20 m.

Picture 6 shows a subsurface resistivity cross-section view at Track 5. The groundwater aquifer is identified at the meter of 15-25, continuous to depths of up to <65 m. Aquifers are also detected at the meter of to 280 - 330 with a depth of <10 m and at the meter of 410 - 440 with a depth of <40 m.

Picture 7 shows a subsurface resistivity cross-section view at Track 6. In this path the aquifer is scattered along the path continuously. The aquifer depth varies up to <64 m. The flow of water on the surface leads northward.

This stream is a stream of water that is no longer absorbed into the ground because the aquifers beneath the surface are saturated. At the intersection of Track 1 and Track 5, there is an estimated aquifer of about $70,000 \text{ m}^3$. This potential aquifer is used as a source of ground water that can be exploited. This aquifer is connected continuously with the aquifer on the

south side and is connected by a permeable layer with aquifers on the east and west, so that the aquifer has a large recharge area.

WATER UTILIZATION AROUND THE LOCATION OF WINERU SOLAR POWER PLANT

The distance of the project location and the settlement of Wineru Village is around 1 km. Based on observations and interviews with Wineru villagers, the following observations are obtained:

1. Water around the project site is not directly utilized for agricultural irrigation.
2. There is no Water Supply Company (*PDAM*), so people only use wells for daily water source.
3. Potential groundwater aquifer in Wineru Village is very large.

OBSERVATION DATA OF WELLS IN WINERU VILLAGE

NO	LATITUDE	LONGITUDE	MASL(m)	DEPTH (m)
1			14	3,35
2			14	3,05
3	Sensitive information redacted	Sensitive information redacted	12	3
4			7	2,65
5			6	1,55



DATA ATTACHMENT OF MEASUREMENT RESULT

Track 1

Latitude coordinates at **and longitude at** **second component**
 (“) in the table below:

Number of electrode	Latitude (“)	Longitude (“)	Altitude (m)	Number of electrode	Latitude (“)	Longitude (“)	Altitude (m)
1			17	25	23.80	38.85	15
2			17	26	23.72	39.20	15
3			17	27	23.68	39.51	11
4			19	28	23.65	39.82	11
5			19	29	23.66	40.13	10
6			20	30	23.65	40.47	10
7			20	31	23.53	40.87	10
8			20	32	23.48	41.12	10
9			22	33	23.43	41.42	10
10			22	34	23.37	41.77	10
11			23	35	23.36	42.05	10
12	Sensitive information redacted	Sensitive information redacted	23	36	23.35	42.40	10
13	Sensitive information redacted	Sensitive information redacted	23	37	23.27	42.72	10
14			22	38	23.20	43.05	11
15			21	39	23.18	43.34	11
16			20	40	23.13	43.69	10
17			19	41	23.06	43.98	10
18			19	42	22.81	44.19	11
19			17	43	22.62	44.43	10
20			17	44	22.54	44.74	11
21			15	45	22.42	45.06	11
22			14	46	22.28	45.30	11
23			12	47	22.11	45.61	10
24			17	48	21.97	45.87	10

Track 2

Latitude coordinate at _____ and longitude at _____ second component (_____) in the table below:

Number of electrode	Latitude (“)	Longitude (“)	Altitude (m)	Number of electrode	Latitude (“)	Longitude (“)	Altitude (m)
1			22	25	29.50	40.51	15
2			21	26	29.67	40.70	14
3			20	27	29.83	40.95	13
4			19	28	29.92	41.28	12
5			16	29	30.07	41.56	12
6			15	30	30.21	41.87	12
7			15	31	30.33	42.15	12
8			15	32	30.45	42.40	11
9			15	33	30.62	42.71	11
10			15	34	30.84	43.05	11
11			16	35	30.93	43.39	11
12	Sensitive information redacted	Sensitive information redacted	16	36	31.00	43.64	11
13	Sensitive information redacted	Sensitive information redacted	16	37	31.10	43.93	12
14			14	38	31.20	44.25	11
15			16	39	31.28	44.58	12
16			16	40	31.36	44.88	12
17			16	41	31.46	45.19	11
18			16	42	31.50	45.50	11
19			16	43	31.57	45.81	11
20			16	44	31.65	46.14	11
21			15	45	31.72	43.46	11
22			15	46	31.80	46.73	10
23			16	47	31.89	47.04	10
24			15	48	32.02	47.36	10

Track 3

Latitude coordinate at and longitude at second component (“) in the table below:

Table with 8 columns: Number of electrode, Latitude (“), Longitude (“), Altitude (m), Number of electrode, Latitude (“), Longitude (“), Altitude (m). Rows 11-12 contain redacted sensitive information.

Track 4

Latitude coordinate at _____ and longitude at _____, second component (_____) in the table below:

Number of electrode	Latitude (“)	Longitude (“)	Altitude (m)	Number of electrode	Latitude (“)	Longitude (“)	Altitude (m)
1			19	25	30,11	40,69	17
2			20	26	30,39	40,91	17
3			20	27	30,66	40,4	17
4			18	28	30,95	40,17	17
5			18	29	30,23	40,24	17
6			18	30	30,60	40,33	16
7			18	31	30,94	40,42	16
8			17	32	30,26	40,46	16
9			17	33	30,58	40,51	17
10			18	34	30,86	40,54	16
11	Sensitive information redacted	Sensitive information redacted	17	35	30,16	40,59	16
12			18	36	30,50	40,67	16
13			18	37	30,77	40,81	17
14			16	38	30,4	40,90	17
15			16	39	30,37	40,11	17
16			17	40	30,69	40,21	17
17			17	41	30,1	40,20	16
18			18	42	30,32	40,32	16
19			18	43	30,59	40,41	17
20			19	44	30,78	40,37	16
21			20	45	30,7	40,28	17
22			20	46	30,26	40,28	16
23			20	47	30,59	40,28	17
24			20	48	30,91	40,23	18

Track 5

Latitude coordinate at and longitude at second component (
“) in the table below:

Number of electrode	Latitude (“)	Longitude (“)	Altitude (m)	Number of electrode	Latitude (“)	Longitude (“)	Altitude (m)
1			19	25	23.12	45.53	13
2			17	26	23.45	42.60	13
3			17	27	23.76	42.61	13
4			15	28	24.05	42.69	13
5			16	29	24.39	42.75	12
6			16	30	24.73	42.80	12
7			16	31	25.04	42.89	11
8			17	32	25.36	42.93	12
9			17	33	25.70	42.95	11
10			16	34	26.03	42.98	11
11	Sensitive information redacted	Sensitive information redacted	15	35	26.34	43.07	12
12			13	36	26.65	43.14	12
13			14	37	26.93	43.20	11
14			13	38	27.23	43.27	11
15			13	39	27.54	43.42	11
16			14	40	27.84	43.44	11
17			14	41	28.19	43.56	11
18			14	42	28.47	43.64	11
19			14	43	28.83	43.69	11
20			13	44	29.12	43.79	9
21	13	45	29.44	43.82	11		
22	13	46	29.72	43.93	11		
23	13	47	30.06	43.98	10		
24	13	48	30.35	44.05	10		

Track 6

Latitude coordinate at () and longitude at () second component () in the table below:

Number of electrode	Latitude (“)	Longitude (“)	Altitude (m)	Number of electrode	Latitude (“)	Longitude (“)	Altitude (m)
1			16	25	21.74	45.07	10
2			17	26	22.10	45.17	10
3			15	27	22.40	45.23	13
4			14	28	22.67	45.63	14
5			14	29	23.13	45.53	13
6			14	30	23.35	45.66	13
7			13	31	23.61	45.73	12
8			12	32	24.01	45.84	11
9			13	33	24.26	45.87	10
10			12	34	24.48	46.01	10
11			11	35	24.87	46.10	10
12	Sensitive information redacted	Sensitive information redacted	13	36	25.22	46.22	11
13			14	37	25.62	43.37	12
14			14	38	25.89	46.42	11
15			15	39	26.12	46.58	11
16			15	40	26.37	46.65	11
17			16	41	26.67	46.82	10
18			16	42	26.98	46.89	10
19			14	43	27.31	46.90	8
20			15	44	27.64	46.94	10
21			13	45	27.95	47.02	9
22			12	46	28.32	46.99	9
23			9	47	28.64	47.04	8
24			9	48	28.88	47.09	6

SUPPORTING STAFF

Supporting Staff

To conduct technical-related activities in the field, we are assisted by workers from Wineru Village as part of the empowerment of local communities' potential.

No	Task	Name of the Personnel
1	Village Head	M.Z. PAPUNGGGO
2	Surveyor	NOFTY AHAP
3	Helper	ANDRO MERE
4	Helper	DEFRIT WORANG
5	Helper	JEMMY PORODISA
6	Helper	EKING LOHIKE

SUPPORTING FACILITIES

L.1. Equipment Required

To be able to carry out the work of geoelectric measurements of Wineru Solar Power Plant, the work shall be supported by the availability of facilities and infrastructure as well as the facilities and logistics of daily operational needs by paying attention to the economics concept while maintaining the quality of work as requested.

L.2. Appurtenances

During the field survey, safety facilities are provided at the project site, while processing and data analysis will be carried out at INSTRUMENTATION AND RENEWABLE ENERGY LABORATORY AND GEOPHYSICAL LABORATORY OF FACULTY OF MATHEMATICS AND NATURAL SCIENCES, SAM RATULANGI UNIVERSITY. Therefore, the availability of facilities and equipment is very important. The personnel assigned to carry out this work are as follows:

FACILITIES PROVIDED BY CONSULTANT

No	Facilities Provided	Area/Unit	Condition
1	Personal Computer	1 Set	Good
2	Printer A4	1 Pc	Good
3	Printer A3	1 Pc	Good
4	Laptop	1 Pc	Good
5	Scanner	1 Pc	Good
6	Rool meter (@ 150 m)	2 Pc	Good
7	GPS	1 Pc	Good
8	Resistivitymeter MAE X 612EM	1 Pc	Good
9	Roll cable (@ 120 m)	4 Pc	Good
10	Battery	1 Pc	Good
11	Camera Digital	1 Pc	Good
12	Handy cam	1 Pc	Good
13	Electrode set	48 Pc	Good
14	Two-wheeled vehicle	1 Pc	Good
15	Handy Talky	1 Pc	Good

CONCLUSION

Has been measured to use Geoelectric method in Wineru village, and producing a conclusion as follows:

1. Exploration is conducted on 12 - 14 December 2017 on 6 tracks. The track consists of: Track 1, Track 2, Track 3, Track 4, Track 5 and Track 6. This exploration uses the geoelectric method of Dipole-Dipole type resistance
2. Stream is a stream of water that is no longer absorbed into the ground because the aquifers beneath the surface are saturated. At the intersection of Track 1 and Track 5, there is an estimated aquifer of about **70,000 m³**. This potential aquifer is used as a source of ground water that can be exploited. This aquifer is connected continuously with the aquifer on the south side and is connected by a permeable layer with aquifers on the east and west, so that the aquifer has a large recharge area.
3. Water around the project site is not directly utilized for agricultural irrigation. There is no Water Supply Company (*PDAM*), so people only use wells for daily water source. Potential groundwater aquifer in Wineru village is very large.

SUPPORTING PHOTOS

Figure 1. Team Support



Photo 2. Interview With People In Wineru Village



Figure 3. Wells Survey



Figure 4. Implementation of geoelectric measurements





**ANNEX E ENVIRONMENTAL, SOCIAL, HEALTH,
AND SAFETY MANAGEMENT SYSTEM (ESHS-MS)**



PT INFRASTRUKTUR TERBARUKAN LESTARI ENVIRONMENTAL, SOCIAL, HEALTH, AND SAFETY MANAGEMENT SYSTEM MANUAL

An Affiliate of



DECEMBER 2017

This manual outlines PT Infrastruktur Terbarukan Lestari (“PT ITL” or the “Company”) approach in providing guidance and setting expectations to address environmental and social issues primarily in respect to project’s compliance with the related Indonesian Laws and Regulations as well as the IFC Performance Standards. This document shall be revised/updated accordingly for any changes or modifications that shall be implemented during construction and operational phases of the project.

DOCUMENT SIGNOFF

Nature of Signoff	Person	Signature	Date	Role
Author				ESG Officer
Reviewer				ESG manager
Reviewer				Head of Project
Approved By				President Director

DOCUMENT CHANGE RECORD

Date	Version	Author	Change Details
4-Dec-17	Draft		Initial Draft for review
12-dec-17	Rev1		Internal review

Once printed, this is an uncontrolled document unless issued and stamped Controlled Copy.

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Appendix 4	Community Health, Safety, and Security Management Plan

1 Introduction

1.1 Project Overview

The Likupang 15 MW_{AC} (21 MWp) Solar Farm Project (the “Project”) is being developed by Equis Energy Indonesia through its Special Purpose Vehicle (SPV) company PT Infrastruktur Terbarukan Lestari (“PT ITL”). The Project is located in Wineru village, Likupang Timur district, Minahasa Utara regency, Sulawesi Utara province. The Project is required to conduct the Environmental Impact Assessment, locally known as AMDAL, to comply with Indonesia’s Regulation. Equis as a UNPRI (UN Principles for Responsible Investments) signatory since 2014 must also comply with the International Finance Corporation (IFC) Performance Standards (PS). Thus, this Project specific Environmental, Social, Health and Safety Management System (ESHS-MS) document is prepared as guidance for the management of environmental and social impacts.

1.2 Scope

PT ITL has developed this Environmental and Social Management System (ESHS-MS) Manual to identify the environmental and social management and mitigation actions required for the project to comply with the requirements of the International Finance Corporation’s (IFC) Performance Standards and applicable Indonesian national and local laws, standards, and regulations. It provides an overview of the environmental and social baseline conditions of the project area, summarizes the potential impacts associated with the solar farm and sets out the management measures required to mitigate any potential impacts presented in the Environmental and Social Management Plan (ESMP). The ESMP shall also be utilized by the EPC contractors commissioned by PT ITL for the project as the basis of the site-specific management plans to be prepared before commencing works.

The potential impacts, the associated mitigation measures, and management procedures presented in this ESHS-MS Manual are based on the baseline information and assessments gathered from the Feasibility Study, EIA (AMDAL) study conducted by PT Sulindo Eko Konsultan, ESHIA study conducted by ERM, and latest project information as per contract with the Engineering, Procurement and Construction (EPC) Contractor.

The Management Plans presented in this ESHS-MS Manual detail the environmental and social management procedures, processes, mitigation and monitoring measures required to complete actions as identified in the AMDAL (local EIA) and ESIA documents. In addition to the ESMP, other plans and manuals are also attached in the Appendixes. Stakeholder Engagement Plan (SEP) is one of the examples. SEP outlines the measures to be used in community engagement, dissemination of project information, and grievance management. SEP shall be utilized as a key element in all the proposed management, monitoring, and mitigation measures outlined in this document. This ESHS-MS Manual and associated attachments are living documents and shall be updated as required during the project implementation.

1.3 Objectives

One of PT ITL’s objective is to avoid, where practical, unacceptable adverse environmental, social and/or economic impacts. In the circumstance that an impact cannot be avoided, PT ITL and its EPC Contractor (who shall be responsible for the management of the construction phase of the project) are committed to implement the appropriate mitigation measures. For clarity in the management

structure, EPC shall consult with PT ITL on the matters related to environmental, health and safety performances. However, EPC shall have the overall responsibility for planning, implementation, monitoring and enforcement of activities associated with this ESHS-MS Manual and environmental, health, and safety performances during the construction phase.

The primary objective of this ESHS-MS Manual is to describe the measures required to implement the construction, operation, and post-operation related management and mitigation commitments set out in the project’s EIA (AMDAL) report and the issued Environmental Permit, as well as IFC PS as presented in the ESHIA report

All contractors and subcontractors shall be required to comply and apply the ESHS-MS Manual requirements as applicable to the tasks they are employed to undertake.

The measures and procedures outlined in this ESHS-MS Manual are commitments made by PT ITL. Therefore remains responsible for the implementation. It is recognized that practical implementation of many of the measures may rest with contractors and subcontractors and consequently, PT ITL shall require an implementation of a robust review/audit program, as described in this ESHS-MS Manual, to measure and ensure that it is executed.

1.4 ESHS-MS Structure

The ESHS-MS Manual consists of this document and a series of specific supporting plans and manuals provided as appendixes to this document (see Figure 1-1 below).

The ESHS-MS Manual outlines the environmental and social management processes and procedures applicable to the project and includes the topics which are common to all environmental and social disciplines.



Figure 1-1 PT ITL's ESHS-MS Structure

1.5 Intended Users and Audience

This document aims to communicate to the Project Team (PT ITL, including contractor (EPC) and sub-contractors) of the potential environmental and social issues, management requirements, mitigation measures, and commitments associated with the project construction, operation, and post-operation. The Project Team shall utilize the ESHS-MS Manual and associated Action Plans during Project execution to manage the Project's environmental and social aspects.

1.6 Document Control

The ESHS-MS Manual is a controlled document. This document shall be reviewed and updated to reflect changes to the Project. Changes requiring modifications shall be incorporated by the process defined in PT ITL's document control plan and procedures.

1.7 Management of Change

PT ITL, EPC contractor, and sub-contractors shall be required to apply appropriate project change management procedures for all changes/deviations to the agreed Project scope and objectives. The overall Project scope and objectives are governed by cost and schedule baselines, design and philosophy documents, including this ESHS-MS Manual. Any recommendations or changes that impact any of these documents or approved design documents are considered a change.

Project change management is the responsibility of the PT ITL and is managed accordingly. All changes within the project will be assigned a classification by PT ITL which dictate the approval path and the accountabilities for managing/coordinating the change. The classification process requires a risk assessment.

1.8 Assumptions and Limitations

The project (as of February 2018) is about to enter the construction phase, however some detailed designs and specifications are still being prepared by the EPC contractor. As such the project information provided here may be revised during the project implementation.

This ESHS-MS Manual should be regarded as a living document and should be reviewed and updated as impacts become apparent during the project life.

2 Equis Energy Environmental and Social Policy Statement

As Equis Energy is a UNPRI signatory, PT ITL has also incorporated the UNPRI Principles into our Environmental and Social Responsibility Policy which outlines actions required pre- and post-investment, including:

- Incorporating ESG considerations into investment analysis and decision-making processes;
- Being active owners and incorporating ESG issues into our ownership policies and practices;
- Seeking appropriate disclosure on the ESG practices of target investments;
- Promoting the acceptance and implementation of the Principles within the investment industry;
- Working to enhance our effectiveness in implementing the Principles;
- Promoting ESG to the investment industry; and
- Monitoring and reporting platform investment ESG activities and progress on a quarterly and annual basis.

This policy will be communicated and understood by the workforce through clear roles and responsibilities, internal communications, and training.

Project EHS Policies

Our Commitment

PT Infrastruktur Terbarukan Lestari (PT ITL) is committed to the effective implementation of our ESHS Policy and to the continual improvement of our ESHS performance.

Environment

We care for the environment. It is in the nature of our business as a renewable energy IPP that we are contributing to the reduction of Greenhouse Gas (GHG) emissions. The largest anthropogenic source of GHG has been from fossil fuel burning to generate electricity. We have strong commitment to sustainable development by providing electricity generated from renewable resources.

We are committed to comply with the following principles:

- Compliance with applicable environmental laws and regulations;
- Efficient use of resources, cleaner production principles in product design and production processes; and
- Prevention of pollution and minimizing the environmental impacts of our operations including the materials that we use.

Community and Stakeholder Engagement

We strive to be a valued corporate citizen to the communities in the vicinity of our operations.

We are committed to the following principles:

- We respect the values and cultural heritage of local communities;
- We aim to improve the livelihood of local community where possible and to minimize any impact on their living conditions;

- We are committed to developing strong, constructive, and responsive relationships with the affected communities and stakeholders including but not limited to government entities, non-governmental organizations (NGOs), shareholders, and other interested parties in carrying out our activities including planning, design, construction, and operation.

We will achieve this objective through stakeholder engagement, operating a robust grievance mechanism, and ongoing reporting to the affected communities.

Labor and Working Conditions

We and our contractors recognize our responsibility to respect and protect the rights of our workers.

We adopt the following principles:

- We obey and comply with local labor practices relating to term of employment, work hours, payment of wages, and maintaining good working relationships with our workers; and, **we demand the same from our contractors;**
- We will not employ or support the use of any form of child labor or forced/coerced labor, either **directly or through suppliers or contractors;**
- We respect our workers' right to associate and engage in the collective bargaining process pursuant to local labor practices;
- We guarantee our workers that they will be free from all forms of harassment and discrimination based on race, color, religion, national origin, gender (including pregnancy), age, disability, sexual orientation, gender identity, HIV status, marital status, or any other status protected by the laws and regulations in the locations where we operate; and
- We protect workers' rights by allowing each worker to deal directly with management on issues of importance to that worker. Thus, we provide a grievance mechanism to receive, analyze, and address workers' concerns.

Health and Safety

We do not compromise the health and safety of our workers and our contractors' workers. We will provide a safe and comfortable working environment to our workers and will ensure our contractors to do the same. We aspire to achieve a Zero Harm track record for all of our workers as well as the surrounding communities. It is our fundamental belief that all accidents can be prevented.

Our Actions

To meet our ESHS commitments, we will:

- Ensure that all activities undertaken by us, our contractors and consultants are complying with the applicable regulations of the Republic of Indonesia as well as international standard that we subscribe to;
- Continuously review, measure, and evaluate our environmental, social, health, and safety objectives;
- Perform Environmental, Social, Health, and Safety Management System (ESHS-MS) performance reviews, which will be reported to Senior Management to ensure the effectiveness of ESHS-MS implementation;

- Take any necessary and appropriate follow-up action to ensure the intent of the ESHS policy is met, that procedures and plans are being implemented, and are seen to be effective;
- Ensure that all workers, shareholders, and other stakeholders understand our ESHS Policy commitments; and
- Manage external interactions through an active stakeholder engagement program and a mechanism to receive, analyze, and address stakeholder grievances.

This policy will be communicated to all staff, contractors and stakeholders of the Company.

PT ITL's ESHS Policy Statement is provided in bilingual (English and Bahasa Indonesia) and is presented in Appendix 1.

3 Applicable International Finance Corporation Performance Standards

The IFC Performance Standards is a set of international benchmarks for identifying and managing environmental and social risks. These standards offer a framework for understanding and managing environmental and social risks for high profile, complex, international, or potentially high impact project. The financial institution is required to verify, as part of its environmental and social due diligence process, that the commercial client/investee complies with the IFC Performance Standards. To do so, the financial institution needs to be knowledgeable of the environmental and social laws of the country in which it operates and to be able to compare the regulatory requirements against those of the IFC Performance Standards to identify gaps. A good understanding of both set of requirements as well as potential gaps ensures that the financial institution can effectively identify and assess the key environmental and social risks and impacts that might be associated with a financial transaction.

If non-compliances with the IFC Performance Standards are identified, and depending on the severity of the issue, the financial institution can require the commercial client/investee to develop a corrective action plan to address the issue within a reasonable timeframe and stipulate this as a condition of the financial transaction with the commercial client/investee.

The IFC Performance Standards help IFC, and its clients manage and improve their environmental and social performance through an outcome-based approach and also provide a solid base from which clients may increase the sustainability performance of their business operations. The desired outcomes are described in the objectives of each Performance Standard, followed by specific requirements to help clients achieve these outcomes through means that are appropriate to the nature and scale of the project and commensurate with the level of environmental and social risks (likelihood of harm) and impacts.

The IFC Performance Standards (PS) comprised eight topics:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
- Performance Standard 2: Labor and Working Conditions
- Performance Standard 3: Resource Efficiency and Pollution Prevention
- Performance Standard 4: Community Health, Safety, and Security
- Performance Standard 5: Land Acquisition and Involuntary Resettlement
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- Performance Standard 7: Indigenous Peoples
- Performance Standard 8: Cultural Heritage

PS 1: Assessment and Management of Environmental and Social Risks and Impacts

Commercial clients/investees are required to manage the environmental and social performance of their business activity, which should also involve communication between the client/investee, its workers and the local communities directly affected by the business activity. This requires development of a good management system, appropriate to the size and nature of the business

activity, to promote sound and sustainable environmental and social performance and to lead to improved financial outcomes.

PS 2: Labor and Working Conditions

For any business, its workforce is an asset and a sound worker-management relationship is a key component of the overall success of the enterprise. By protecting the basic rights of workers, treating workers fairly, and providing them with safe and healthy working conditions, commercial clients/investees can enhance the efficiency and productivity of their operations and strengthen worker commitment and retention.

PS 3: Resource Efficiency and Pollution Prevention

Business activity often generates increased levels of pollution to air, water, and land that may threaten people and the environment at the local, regional, and global level. Commercial clients/investees are required to integrate pollution prevention and control technologies and practices (as technically and financially feasible as well as cost-effective) into their business activities.

PS 4: Community Health, Safety, and Security

Business activities can increase the potential for community exposure to risks and impacts arising from equipment accidents, structural failures, and releases of hazardous materials as well as impacts on a community's natural resources, exposure to diseases, and the use of security personnel. Commercial clients/investees are responsible for avoiding or minimizing the risks and impacts to community health, safety, and security that may arise from their business activities.

PS 5: Land Acquisition and Involuntary Resettlement

Land acquisition due to the business activities of a commercial client/investees may result in the physical displacement (relocation or loss of shelter) and economic displacement (loss of access to resources necessary for income generation or as means of livelihood) of individuals or communities. Involuntary resettlement occurs when affected individuals or communities do not have the right to refuse land acquisition and are displaced, which may result in long-term hardship and impoverishment as well as environmental damage and social stress. Commercial clients/investees are required to avoid physical or economic displacement or minimize impacts on displaced individuals or communities through appropriate measures such as fair compensation, improving livelihoods and living conditions.

PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Protecting and conserving biodiversity (including genetic, species, and ecosystem diversity) and its ability to change and evolve is fundamental to sustainable development. Commercial clients/investees

are required to avoid or mitigate threats to biodiversity arising from their business activities and to promote the use of renewable natural resources in their operations.

PS 7: Indigenous Peoples

Indigenous Peoples are recognized as social groups with identities that are distinct from other groups in national societies and are often among the marginalized and vulnerable. Their economic, social, and legal status may limit their capacity to defend their interests and rights to lands, natural and cultural resources. Commercial clients/investees are required to ensure that their business activities respect the identity, culture, and natural resource-based livelihoods of Indigenous Peoples and reduce exposure to impoverishment and disease.

PS 8: Cultural Heritage

Cultural heritage encompasses properties and sites of archaeological, historical, cultural, artistic, and religious significance as well as unique environmental features and cultural knowledge, innovations, and practices of communities embodying traditional lifestyles, which are protected for current and future generations. Commercial clients/investees are required to avoid significant damage to cultural heritage due to their business activities.

4 Legal and Regulatory Compliance

PT ITL and all contractors and sub-contractors shall confirm and ensure compliance with all relevant national and local environmental and social legal requirements.

4.1 Environmental and Social Laws and Regulation

The Indonesia legal framework relating to environmental regulations is originated from the regulations formulated in the late 1980s. The passage of Act No. 4 of 1982 formed the key requirements of Environmental Protection which created the National Pollution Control Commission and was tasked to oversee and implement regulations to protect the environment. This regulation and the other regulations which followed enhances the awareness of the public and the private sector on the need to prevent pollution, protect the resources and in the end, minimize and prevent pollution. In 2009, to accommodate gaps concerned the law enforcement in environmental protection, the 1982 act was superseded by Act number 32 of 2009 regarding Environmental Protection.

Furthermore, the underlying law that regulated the Environmental Permit is Government Regulation (GR) No. 27/2012 regarding Environmental Permit, which should be applied before construction phase. This regulation indicates that the business and/or activities which could potentially cause significant impacts on the environment must conduct Environmental Impact Assessment (Analisis Dampak Lingkungan or AMDAL) as stipulated by the Ministry of Environment and Forestry (MoEF) following the suggestion and consideration of other associated ministers and/or non-departmental government institutions such as Ministry of Energy and Natural Resources (MEMR) and Ministry of Public Work. AMDAL consist of the following key documents (according to Minister of Environmental Decree Number 27 of 2012;

- Term of Reference (KA – *Kerangka Acuan*)
- Environmental Impact Statement (AMDAL - *Analisis Dampak Lingkungan*)
- Environmental Management Plan – Environmental Monitoring Plan (RKL-RPL *Rencana Pengelolaan Lingkungan – Rencana Pemantauan Lingkungan*)

The AMDAL and Environmental Permit is a legal document for the project to implement its environmental management and monitoring commitment as established in (RKL-RPL) document, and are a basis to obtain other permits required to build the project.

Furthermore, the Act number 13 of 2003 regarding labor is the governing law between employers and employees in the private sector. It seeks to afford protection to labor, promote employment and human resources development and ensure industrial peace based on social justice. This law also set fort the requirements related to working hours, health, and safety requirements, employment dispute and freedom to join and form the labor union.

The Ministry of Manpower is the primary government agency mandated to promote gainful employment opportunities, develop human resources, protect workers and promote their welfare, and maintain industrial peace. This ministerial agency consists of several directorate generals that perform primarily policy and program development and advisory functions for the minister in the administration and enforcement of laws relating to working conditions. The labor supervision and health and safety directorate general envisions well-guided employers and workers committed to a

safe, healthful and productive work environment. In Indonesia, there is a dedicated court that is specifically handling the industrial dispute which called PHI (*Pengadilan Hubungan Industrial*).

4.2 Environmental Document and Environmental Permit

Environmental Permit is a legal approval and commitments of PT ITL that embodied in the Impacts Assessment and Mitigation that were included in the AMDAL documents. The summary of these mitigation measures is presented in the next section of this document. Environmental Permit issuance enforces PT ITL legal responsibility to address the identified issues and provide the necessary mechanisms in dealing with every concern recognized in the impact assessment process.

5 Project Description

The Likupang 21 MWp Solar Farm (the Project) involves the development of a solar power generation facility at Wineru Village, Likupang Timur District, Minahasa Utara Regency, Sulawesi Utara Province, Indonesia. The solar Project is being developed to include the following:

- Installation of a solar panel field covering an area of 29.4 Hectares (Ha);
- Installation of a facility and main station;
- Installation of an inverter station and high voltage control station;
- Construction of access roads;
- Operation of onsite control and instrumentation facilities; and
- Installation of a 20kV underground grid transmission line to the Likupang 70/20 kV substation.

Map of the Project site is provided in Figure 5-1 below.



Figure 5-1 Site Locations and Surrounds

The proposed Project will be developed on a total of 29.4 hectares (Ha) of agricultural land near Wineru village. The site is located adjacent to the Likupang substation. The site itself contains mixed agricultural land and has been historically used for dryland agriculture, comprising coconut and corn plantations. The nearest residential area is Wineru Village, approximately 650 m east of the site. The site and surrounding areas have been modified to accommodate local dryland agricultural practices and the development of the adjacent Likupang diesel power plant.

The land has been purchased from a single landholder. ITL has completed the acquisition and certification process in June 2017. The former owner of the land still resides across the Project site.

An Environmental Impact Assessment (EIA) or *Analisis Mengenai Dampak Lingkungan* (AMDAL) has been conducted on behalf of the Project proponent; the document has been assessed through the

AMDAL Commission of Sulawesi Utara. The Environmental Permit (decree letter number 06/ILK/DPM-PTSP/II/2017) was issued by the Government of Minahasa Utara Regency on 22 February 2017.

The Project has completed land acquisition process and has obtained the necessary permit to progress to construction. The construction of the Project is commenced in March 2018 and the operation phase is expected to start in March 2019. The activities that have been carried out and planned to be conducted throughout the lifetime of the Project are described in the following sections.

5.1 Pre-Construction Phase

Pre-construction primarily covers the Project's permitting and land acquisition process. The Project's AMDAL has also been approved and the Environmental Permit obtained in February 2017. This stage also covers the EPC contracting and it has been signed in November 2017.

Socialization and public consultation activities have been undertaken by the Project Proponent and AMDAL consultant team in Wineru Village on 17th October 2016. This activity was intended to provide information on the Project plan, its potential impacts, and mitigation measures to the villagers and also provide a forum for questions.

5.2 Construction

a. Mobilization of Equipment and Material

Equipment, machinery, and Project infrastructure will be delivered to the site via road. It is expected that most of the equipment will be delivered to site via Bitung Port and transported via truck and heavy vehicles along the main road, a distance of 25 km. Construction will result in increased vehicle movements around the site and along the main transport route to site from Bitung Port; however, impacts are generally expected to be confined to the 12-month construction period.

b. Land Preparation and Civil Works

Land preparation such as earthworks, site compaction, site leveling, and excavations will be required to prepare the site for construction. This will be completed by heavy machinery such as excavators and graders and will include clearing and removal of existing vegetation. Some areas of the site are at a low elevation and may be subject to increased flooding risk, as such site drainage installation and land re-profiling works will be required. Land preparation is likely to result in additional noise and dust generation as a result of earthworks moving and transportation, piling and heavy vehicle movements.

c. Photovoltaic Field Installation and Construction of Facilities and Infrastructures

Following site preparation, the PV module foundations are established, prior to delivery and installation of each module. A small hole is drilled into the soil surface and concrete foundations and supporting structures are established.

Temporary facilities, such as site office, fabrication/machine area, warehouse, etc. will also be built to support construction phase.

d. Mechanical and Electrical Works

Infrastructure such as cabling and conduits will be established within the PV field to connect the individual modules to the convertor box and central inverter. Connecting conduits will be established below ground, with small trenches dug to install the equipment.

e. Substation and Transmission Line

An underground line will be constructed from the 70kV plant substation to the extension bay of 70/20kV Likupang Substation. This is a distance of approximately 200 m and a trench will be established in order to install the transmission line.

f. Commissioning

There will be several tests and verification conducted during the commissioning, those include Pre-Synchronization/Mechanical Completion Tests, Post-Synchronization Tests, Pre-Commercial Operation date (COD) Performance Test. Upon passing all these tests, commercial operations can commence.

5.3 Workforce Requirement

The total number and qualifications of workers to be recruited will depend on the type of activities involved in the construction activity and the availability of appropriate skills and expertise within the local area, or nationally.

Worker recruitment will be handled directly by the EPC hence workforce numbers are yet to be confirmed, but are expected to be approximately 188 people during peak construction. The vast majority of roles are unskilled which may present short term employment opportunities for local workers. Local labor from surrounding communities will be prioritized, however the Project may need to source labor from elsewhere for specific roles and depending on the skill levels of the local workforce. The breakdown of labor needed during construction is presented in Table 5-1 below.

Table 5-1 Estimated Number and Type of Employment during Construction

No	Description	Unit	Quantity
1	Staff	Persons	20
2	Civil	Persons	50
3	Mechanical	Persons	3
4	Electrical	Persons	
5	Commissioning	Persons	60
6	Security	Persons	30
	Total	Persons	

During operations, skilled operators will be required onsite at all times. The total operational workforce requirements are small and are expected to be limited to 15 individuals that include plant operator, security, and housekeeper. The majority of these are expected to be unskilled positions.

Accommodation arrangements during construction are to be confirmed by the EPC. The base case is that the non-local workforce would stay in available accommodation within the local community. Onsite worker's accommodation may be established if the available accommodation is not adequate to accommodate all the non-local workforce. The operational workforce is expected to be relatively small and will also be housed within the local community.

5.4 Water Use Supply and Storage

Unlike conventional power plants, PV solar farms do not use water in electricity generation. The main water requirement is for washing of the PV modules and this is expected to occur four times per year. Operations, including water for panel cleaning, are expected to require approximately 500 m³ per month. This will be sourced from an existing water distribution line which runs beside the Project site, and already supplies the PLN substation.

Water will also be required during construction but will generally be limited to workers' daily needs, dust suppression and to support equipment installation, noting that concrete batching will occur offsite. Domestic water, such as drinking water, is expected to be delivered to site, while construction water supply will also be sourced from the existing water distribution line. Should the water requirement is considered to be inadequate, option of water trucking from nearby river will be used.

5.5 Energy Supply

Electricity supply during construction will be from PLN's existing 20kV line which is close to the Project location. During operations, power will be sourced from the Project (during the daytime) and/or existing PLN 20kV line, with a 50kVA 380V emergency back-up generator retained onsite for use in the event of electricity failure. The maximum necessity of electricity is predicted to be approximately 20,000 kWh per month.

5.6 Traffic and Transport

Land Transportation

Traffic associated with the construction of the Project will be generated during the transportation of the following:

- Heavy machinery e.g. bulldozers, graders, trucks, trenchers, excavators and loaders;
- Delivery of Project equipment and support materials; and
- Movement of the workforce to and from the site.

During these activities traffic will utilize existing roads and will travel through a number of local towns and villages to reach the Project site from Bitung Port. The route is a single lane, tarred road from Bitung Port to the site.

Marine Transportation

Bitung Port is a moderately sized regional port servicing parts of Sulawesi Utara. The government is currently preparing Bitung Port to become a trading center for Asia-Pacific. The port will be the main delivery point of project equipment such as PV Panels and electrical infrastructure which is limitedly available locally. Vessel deliveries to the port would generally be limited during the construction period and are unlikely to result in significant additional vessel loads at the port. From the port, the equipment would be loaded directly to trucks and heavy vehicles for delivery to site.

5.7 Waste and Discharge

Sanitary and Runoff Wastewater Management

A septic sewage treatment system will be installed to dispose of domestic wastewater generated during construction and operation. During operation, this is expected to be housed at the Main Station area. Domestic wastewater will include runoff from the mess, kitchen and bathroom facilities.

Sources of contamination, such as fuel, oil drums and chemicals will be stored in appropriately banded areas such that runoff can be captured and stored. This contaminated runoff will then be managed and disposed of by a licensed waste contractor.

Solid Waste Management

During construction and operation, solid waste, domestic solid waste, and hazardous waste will be generated. Domestic solid wastes such as broken glass, iron and steel, wood, cartons and paper, etc. will be sorted daily on-site, and reused and recycled where possible. Any solid waste that cannot be reused or recycled will be collected and transported by a licensed waste operator to a designated licensed landfill site.

Containers (bins) will be provided on-site to store the domestic solid waste. The number of bins provided will be adjusted during the construction phase, as needed. The final disposal location is still to be confirmed as part of the detailed construction planning.

Broken PV modules will require storage and disposal during operations (and potentially construction). A PV module typical life is over 20 years. Silicon is the major component of the modules hence they are unlikely to be classified as a hazardous material.

Hazardous Waste

Only small volumes of hazardous wastes are expected to be generated by the Project during construction and operation. These would generally be limited to transformer oil and wastes from the battery control system.

Government Regulation No. 101/2014 regarding hazardous waste management sets provisions for managing hazardous and toxic wastes, starting from waste generation to final disposal. According to this regulation, the company that generates the hazardous waste (e.g. used oil, oily rags and used grease) is required to temporarily store the waste at the company premises and obtain a permit from the relevant authority. Moreover, the hazardous waste must be transported and disposed of by a permitted waste contractor

5.8 Air and Greenhouse Gas Emissions

Air emissions during construction are predominantly generated by the mobilization of equipment and materials during construction and construction activities. The air emissions generated during construction activities will come from heavy and light equipment, earthworks activities, and vehicles movement for mobilization of material and power generator. Meanwhile, air emissions during operation activities are generated by the mobilization of the workforce, supplies and power generation.

Solar power project delivers significant GHG emission savings when compared to conventional fossil fuel power generation.

5.9 Lighting and Visual Amenity

Visually, the Project is within a low-lying area and elevated structures would be limited to single story buildings and low-lying electricity infrastructure, such as the PV modules. The Project is unlikely to be visible to the villages located around the Project area.

Glaring has been associated with some solar farms in other countries however modern PV modules are now coated with anti-reflective substance which significantly reduces this issue.

5.10 Noise and Vibration

During construction, the main sources of noise and vibration will be generated from earthmoving works and construction of foundations. However, solar farms in general are not associated with noise generation during operations and this will be the case with this Project.

5.11 Unplanned Events

Solar farms are not typically associated with significant emergency risks however there is the potential for unplanned events to occur during the construction and operation of the Project; this includes:

- Environmental incidents such as hydrocarbon or chemical spills;
- Vehicle accidents;
- Natural disasters such as flooding and fire/explosion; and
- Medical emergencies such as injury, illness, or fatalities.

An Emergency Response Plan (ERP) will be developed as part of ESHS Management System in order to manage unplanned events.

6 Environmental and Social Baseline

6.1 Environmental Baseline

The baseline conditions within the Project area have been characterized based the result of AMDAL and ESHIA studies conducted. It is sourced from a consideration of secondary data from published sources, and baseline data collected during preparation of the ANDAL and RKL-RPL by PT Sulindo Eko Konsultan. The following secondary information sources were drawn on throughout the environmental baseline chapter:

- IUCN Red List;
- Government Regulation of Indonesia Number 7 Year 1999;
- PT Sulindo Eko Konsultan’s single season of sampling in late 2016 that included the following surveys and data collection:
 - Air quality and noise;
 - Terrestrial biodiversity;
 - Soil;
 - Surface water; and
 - Electric and magnetic fields.

A map showing the environmental survey locations is provided in Figure 6-1 below.

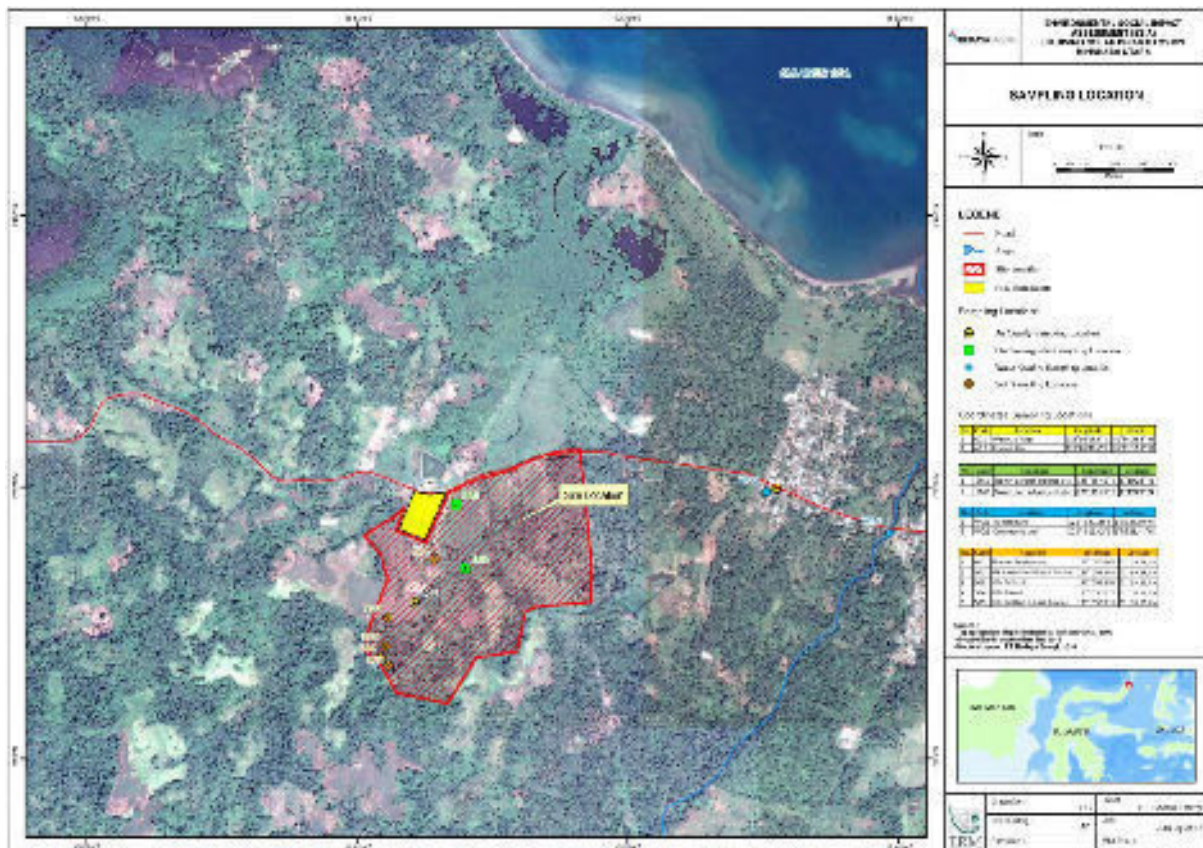


Figure 6-1 Map of Sampling Locations

6.1.1 Climate

6.1.1.1 Sunlight

Sun radiation is fairly consistent throughout the year, with only limited variation between the highest and lowest months.

6.1.1.2 Rainfall

The highest rainfall occurs between the months of November and March, with drier months between June and September in particular. Rainfall during the wettest month of January is over seven times that of the driest month of August.

6.1.1.3 Temperature

The Project area experiences relatively stable year-round temperatures. Monthly average air temperature in the Study Area ranged between 27.5°C and 28.4°C. The monthly average maximum temperature over 10 years varies between 28.0°C and 29.0°C, whilst for the average minimum temperature ranged between 27.0°C and 28.0°C.

6.1.2 Air Quality

The air quality baseline is based on a one day sampling program conducted on 17 October 2016 by PT Sulindo Eko Konsultan to support the AMDAL. The result is shown in the Table 6-1 below. The measured results indicate that the ambient conditions are well below the ambient air quality standards established under the Indonesian Regulations, and also under the IFC Framework.

Table 6-1 Result of Air Quality Analysis in Project Area

No.	Parameter	Unit	Location		Threshold	
			Wineru Village	Project Site	GR. No. 41/1999	IPC Standard
1.	CO	µg/Nm ³	1140	1143	30,000 (1 hour)	-
2.	NO ₂	µg/Nm ³	6.14	3.12	400 (1 hour)	200
3.	SO ₂	µg/Nm ³	4.10	2.15	900 (1 hour)	-
4.	TSP/Dust	µg/Nm ³	23	22	90 (1 hour)	-
5.	Humidity	%	60.4	58.2	-	-
6.	Average Temperature	°C	31.7	31.9	-	-

6.1.3 Noise

Noise measurements were undertaken at two sampling points by PT Sulindo Eko Konsultan during the AMDAL sampling program. The locations are shown in Figure 6-1. The results are given in the Table 6-2 below. The results indicate that ambient conditions at both locations are well below both the daytime standards established under Indonesian Regulations and the IFC framework.

Table 6-2 Noise Level in the Project Area and Wineru village

No.	Sampling Location	Unit	Analysis Result			Threshold Decree of Environmental Minister No. 48 Year 1996	Standard IFC
			Noise	Humidity	Average		
1.	Wineru Village	dBA	48,5	60,4	31,7	55 (Residential)	45 (Night-time)
2.	Project location	dBA	43,5	58,2	31,9	70 (Industrial)	55 (Daytime)

During construction and operations, the Indonesian Regulatory Noise Standard at the site will be 70 dBA, with the IFC standard remaining at 55 dBA for daytime noise and 45 dBA for night-time noise.

6.1.4 Biodiversity

The site has been subject to past clearing and disturbance to support agricultural plantations and there is limited natural habitat contained within the site. No significant flora or fauna values were identified on the site, and it is unlikely that IFC PS 6 would be triggered by the Project.

6.1.4.1 Flora and Vegetation

The site is dominated by palm plantation and other crops, while pockets of native grasses and shrubs are scattered across the site. An area of native tree cover occurs in the southern part of the Project site and covers an area of approximately 3 Ha. Based on the analysis results, there are 7 dominant species, among them are *Trema orientalis*, *Ficus sp.*, *Spatodea campanuleta*, *Antocephalus sp.*, *Cananga orodota* and *Macaranga sp.* None of the species identified within the site are listed as being of conservation significance.

6.1.4.2 Fauna

The site has largely been cleared of native vegetation, with some native tree cover occurring in the southern part of the site. The fauna habitats within the site are generally similar to surrounding areas of mixed agricultural land use. Based on site observations, the Project site is unlikely to contain habitats of particular importance to locally occurring species.

The Project site is located in a coastal area which can be categorized as an ecotone zone (transition zone between land and sea). One of the characteristics of this ecotone is a high diversity of birds. Species of birds recorded during the site visit include are glossy swiftlet (*Collocalia esculenta*), spotted dove (*Streptopelia chinensis*), barred rail (*Gallirallus torquatus*, and javan munia (*Lonchura leucogastroides*). These species are associated with shrubs and grass habitats. There were also several birds categorized as protected (according to Government Regulation Number 7 Year 1999) found within the Project location, however none of these are listed as vulnerable, endangered, and critically endangered in IUCN Red List. These species are Olive-backed Sunbird (*Nectarinia jugularis*), Brahminy kite (*Heliastur indus*), Cerulean Kingfisher (*Alcedo coerulescens*), and Brown throated sunbird (*Anthreptes malacensis*). More detailed information is shown in Table 6-3 below.

Based on a review of these species and habitat preferences, it is unlikely that the site would contain habitat critical to the survival of these species, such as important nesting or feeding areas. Areas of similar habitat are likely to be common within the local area.

Table 6-3 Bird Species in Study Area

Common Name	Scientific Name	Status	
		Government Regulation Number 7 Year 1999	IUCN Red List
Olive-Backed Sunbird	<i>Nectarinia jugularis</i>	Protected	LC
Slender-Billed Crow	<i>Corvus enax</i>	-	LC
Tahiti Swallow	<i>Hirundo tahitica</i>	-	LC
Spotted Dove	<i>Streptopelia chinensis</i>	-	LC
Brahminy Kite	<i>Haliastur indus</i>	Protected	I.C
Barred Rail	<i>Gallinula torquans</i>	-	LC
Javan Munia	<i>Lonchura leucogastroides</i>		
Eurasian Tree Sparrow	<i>Passer montanus</i>	-	LC
Cerulean Kingfisher	<i>Alcedo coeruleascens</i>	Protected	I.C
Brown-Throated Sunbird	<i>Anthracoceros malaccensis</i>	Protected	I.C
Mangrove Whistler	<i>Pachyopelia chinensis</i>	-	LC
Common Sandpiper	<i>Actitis hypoleucos</i>	-	I.C
Glossy Swiftlet	<i>Collocalia esculenta</i>	-	LC
Kacamata/Kulotoven	<i>Zosterops sp</i>	-	LC

Notes: LC: Least Concern

According to information from local villagers, mammal species found in the Project location are mostly small mammals and reptiles associated with habitats dominated by shrubs and palm plantation such as rats, lizards, frogs and toads. Based on the habitat known within the site and surrounding areas, it is considered unlikely that important habitats for protected mammals, reptile or amphibians would be disturbed as a result of the Project.

6.1.5 Hydrology and Drainage

Some part of the site is currently flat land while some other are hills covered by native vegetation and crops. The site drains into the Wineru River and land preparation has the potential to result in increased site runoff.

6.1.6 Soils and Erosion

The soil type at the site, road access, catchment area, and hillside is udepts, whereas at hill areas, the soil type is orthents. Generally, orthents contain fewer nutrients and therefore are not suitable for plants. This soil type is generally more easily eroded. On the other hand, areas containing udepts are mostly covered by forest, shrubs or grasses and are likely to have lower erosion potential.

Based on calculations provided in the AMDAL by PT Sulindo Eko Konsultan, for the existing condition the highest potential soil loss is located on hilltops (55.09 t/Ha/year), followed by site and road access (43.35 t/Ha/year). This is calculated on the basis of total land required for the project is 38.4 Ha (for 20 MW_{AC}) instead of the actual 29.4 Ha to be used for the 15MW_{AC} solar farm). The results demonstrate that the existing potential soil loss at these locations, except at the bottom of the hill, is higher than estimated soil formation rates in tropical area, which is 12.5 – 35 tons/Ha/year (Hammer, 1981 & USDA, 1973). The data also suggests that the potential erosion from the hilltop area is

significantly above the tolerable erosion rate of 35 tons/Ha/year calculated by PT Sulindo Eko Konsultan. This is considered to represent a worst-case scenario; implementation of appropriate erosion control methods is aimed at reducing erosion rates to acceptable levels.

6.1.7 Groundwater

A single groundwater sample was taken from a well owned by the local community in Wineru Village. The parameters were analyzed according to Regulation of Minister of Health Number 416/Menkes/Per/IX/1990. The results show that none of the parameters analyzed exceed the established thresholds.

6.1.8 Surface Water

Surface water samples were taken from Wineru River. According to the AMDAL document, the parameters were analyzed according to Government Regulation Number 82 Year 2001 for Class II. Based on the laboratory result, there are two parameters exceeding the threshold, which are H₂S and PO₄. It is possible that high H₂S concentration is caused by the existence of natural hot water spring near the river. On the other hand, phosphate (PO₄) can be related to decomposition of organic material, as well as inorganic material such as (sediment and dissolved phosphate in the water).

6.1.9 Electric and Magnetic Field

There were no magnetic or electrical fields detected in the Project site. Both locations were measured to have 0.000 mT and 0.00 KV/m. The threshold for electric field and magnetic field of 50-60 Hz exposure has been published by the International Radiation Protection Association (IRPA) and the World Health Organization (WHO). It is also regulated in the Decree of Minister of Health Number 261/MENKES/SK/II/1998 regarding occupational health requirements.

6.2 Socio-economic Condition

The information presented in this section has been obtained from the AMDAL social baseline survey and confirmed with key informant interviews and field observations during ESHIA survey. Data presented includes demographic conditions, economics and livelihoods, community health, social and cultural institutional arrangements, as well as community perceptions.

Figure 6-2 shows the general village conditions and its public facilities and proximity to the Project location.

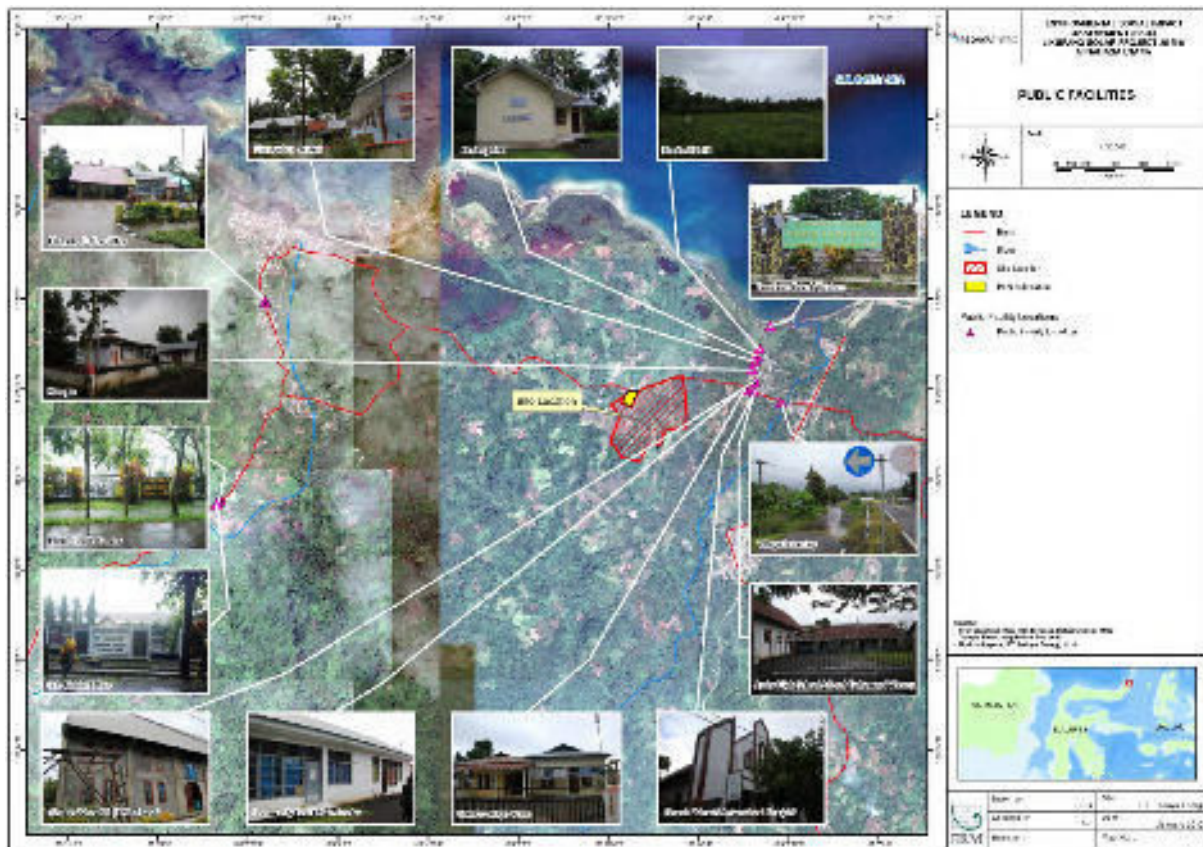


Figure 6-2 Wineru village and its Public Facilities

6.2.1 Demographics

6.2.1.1 Population

The total population of Likupang Timur District is 18,564. This number comprises 9,520 males and 9,044 females. With a total area of 152.61 km², the population density in Likupang Timur is 124 people per km². In general, the population of males is higher than females which are reflected in the figures of sex ratio 105.32. This shows that for every 100 females there are about 105 males.

Wineru Village is stipulated as a definitive village under Likupang Timur District administrative since 1987. The village profile 2016 reports that the total population of the village is 1,349 people comprising 608 males and 741 females. The sex ratio in the village is 82.05. The population density in the village, which covers an area of 7.5 km², is 181 people per km²—less populated than the population density of the whole regency area.

6.2.1.2 Growth and Migration

Data obtained from Sulawesi Utara Province Statistics Office (BPS) shows that the population in Minahasa Utara Regency grew at a rate of 0.95% between 2010 and 2015. In 2010, there were 188,904 people in the Regency and increased to 198,084 people in 2015.

6.2.2 Religion

The majority religion of Minahasa Utara is Christian and accounts for approximately 78% of the total population in 2015. The same situation was observed at the village level.

People in the Regency typically have a strong religious nature, but also possess strong kinship and a sense of mutual cooperation. As such the potential for religious conflict or political turmoil in Minahasa Utara Regency is considered to be relatively low.

6.2.3 Education

In Wineru village, education facilities are available from kindergarten to senior high. Data obtained from Wineru village profile (2016) shows that 98 people graduated from senior high school, 22 people are currently enrolled in university or higher education institution, and 22 people are reported to hold bachelor degree. This indicates the number of potential future job seekers in the village.

6.2.4 Regional Economy and Community Livelihood

There are three main sectors which provide the highest contribution to the region's Gross Regional Domestic Products (GRDP) namely agriculture, forestry, and fisheries, processing industry and construction. Other sectors include mining, quarrying, wholesale, retail and motor repair contribute a small proportion to the Regency's economy.

6.2.5 Labor Market

The data from Minahasa Utara Regency in Figures (2016), mentioned the number of registered job seekers in Minahasa Utara Regency was 126 people, comprises 48 males and 78 females. Out of this number, 65.08% or 82 people are senior high school graduates. Meanwhile, based on the age group, about 59.52% of registered job seekers or 75 people belong to the 30-44 age group. Specifically, at the village level, Wineru Village Profile (2016) reveals that there are 91 unemployed people in the village.

6.2.6 Farming and Plantation

Similar to the Minahasa Utara, Likupang Timur's main income also comes from the agricultural sector with rice being the most widely produced crop. Production levels can be as much as 1,815 tons per year. The second major commodity is cassava amounting to 1,640 tons per year. For plantation crops, coconut is the largest commodity with a total production of 3,591.61 tons per year.

Agriculture is also the biggest economic sector in Wineru village. The village profile reports that 684 villagers worked in the agriculture and husbandry sector in 2016. Out of 750 Ha, 420 Ha are used for farming and 42 Ha for husbandry. The main crop in Wineru village is corn and the common livestock are cows and goats.

6.2.7 Fisheries

The fisheries sector is one of the potential economic streams in Minahasa Utara Regency. The number of households working in the fisheries sector was 12,470 in 2015 with the production level reaching 17,672.03 tons. The dominant products of the fisheries sector in Minahasa Utara Regency are tuna

and mackerel fish. Meanwhile in Likupang Timur District, although fisheries are not the main income sector, 621 households were recorded as fishermen using 2,393 boats as fishing tools.

Interviews with the fishermen reveal that they use traditional gear to fish and their income is significantly affected by the weather condition. Some fishing communities were observed residing along the coast, however relatively far from the Project location (i.e. 1 km north east of the Project location).

6.2.8 Other Livelihoods

The Village Head of Wineru confirmed that economic development in the village is showing a positive trend due to the growing number of small businesses within the area such as grocery stores, food stalls and sellers, transportation services, carpentry, and tourism.

It is also common for the local people to work on multiple jobs; depending on available opportunities. For example, farmers will take a job as construction laborer if there is a demand within the area. As such there is likely to be an available pool of skilled and unskilled workers in the local area to meet some of the needs of the Project.

Although tourism was not recorded as contributing to the regional GDP for Minahasa Utara, the Minahasa Utara Regency Performance report of 2015 cited tourism as an important economic sector. Some programs have been initiated to improve tourism facilities and infrastructures and promote tourism sites. Wineru Village is assigned as a tourist village by the government. One of the tourism sites in the village is Pantai Surabaya. It is located approximately 650 m north east of the Project location.

6.2.9 Poverty

The Wineru Village profile of 2016 shows that the number of poor families (categorized as pre-prosperity families) in the village is 307 households; only 22 households fell under the prosperity family category. The categorization is decided based on criteria namely the condition of the house (thatched roof, bamboo wall, and earth floor), income certainty, and the ability to pay for children school fees and daily expenses.

However, field observations revealed the opposite as the majority of the houses in Wineru Village were made of concrete walls, zinc roofs, and cemented or tiled floor. It is also common to see cars and motorcycles parked in the houses' terrace. The poverty condition is more obviously seen in the coastal area, where many of the houses are built on the land without title and made of modest materials such as bamboo, wood, and thatched roof. People in the area also use public bathrooms or emergency toilets as sanitation facilities.

6.2.10 Socio-Cultural

6.2.10.1 Ethnic Groups Diversity

The interview with the Head of Village revealed that the majority of the local people in Wineru village belong to Sangihe Talaud ethnicity. Sangihe Talaud is one of the Minahasa sub-ethnic groups. The original Sangihe Talaud ethnic is known as having reliance toward plantation farming and fishing as their sources of income. People who live in Wineru are not identified as indigenous people (IP) as they practice mainstreaming living with other communities. Only Sangir is considered IP and they live along the small islands of Mindanao in Sulawesi.

In-migrants from other ethnic groups are also living in the village including Javanese, Bugis, and Gorontalo. Some people also migrated from Manado, Bitung, and Kalimantan. These people have been migrating to the area for over ten years ago, triggered by a range of development projects in the area including mining and tourism.

6.2.10.2 Social/Customary Institutions and Figures

Presently, formal customary institutions or organization are not present in the village because the practice of cultural traditions has been decreasing with village development. In terms of customary institution, the Village Head also has a role as a customary leader which is locally called *Hukum Tua* (old law). The Village Head also plays the role of mediator if there is any conflict in the community.

6.2.10.3 Women Role in Community

Women have an important role in the village, for example the Village Secretary of Wineru is a woman. The Family Welfare Guidance/Pembinaan Kesejahteraan Keluarga (PKK) is a civil society organization for women and is active in terms of participating in the village's development e.g. organizing the integrated health service (Posyandu) focusing on children and maternity health care.

6.2.10.4 Crime and Community Security Systems

The head of Wineru Village conveyed that crime such as robbery, theft, or rape is minimal in the village. However excessive alcohol consumption has been reported to often cause fighting between young men. Alcohol consumption by locals was also observed during the day time along the coastal area.

In terms of community security, crimes are processed internally by involving the village government if they cannot resolve the issue, it is then dealt with via the police or courts.

6.2.10.5 Historical Conflict

It was identified during the ESHIA Survey that past conflict had occurred involving the Wineru community and the gold mining company PT MSM (Meares Sopotan Mining). This involved public demonstrations against the company in 2012 triggered by community disagreement toward MSM's policies on land acquisition, waste management, and worker recruitment.

6.2.10.6 Community Perceptions

The AMDAL reveals that selected community members of Wineru Village are aware of the Project. It also concluded there is a positive attitude towards the Project. The community expects that the Project will provide benefits through local employment, opportunities for local suppliers such as catering, and support in the promotion of Wineru Village as a tourism destination.

6.2.11 Community Health

6.2.11.1 Key Health Indicator

Data from the Sulawesi Utara Province Statistics Agency (2016) identified that the life expectancy rate in Minahasa Utara Regency in 2015 was 70.79 years. At village level, according to an interview with the Wineru village midwife, there were 15 births in 2016 (approximately 10% of total birth number in the district), 11 of them were helped by the midwife in village health facility and 4 were referred to the hospital.

Respiratory infections (ARI – Acute Respiratory Infection) are the most prevalent diseases in Wineru Village, followed by gastritis and skin diseases. There were 314 cases of these three diseases reported in 2015.

6.2.11.2 Water Availability

Most of the households in Wineru Village obtain clean water from dug wells. The dug well water is mostly used for daily activities such as cooking, washing, and bathing. The trend to drink sterilized bottled water is currently increasing among the villagers. They opt to buy sterilized bottled water rather than boiling the well water considering the price and practicality aspects. This trend is also supported by the presence of sterilized water provider business that is located in the village.

6.2.11.3 Environmental Sanitation

The AMDAL identified that 60% of the representative households used private septic tanks as toilets, 20% of households are still using public toilets, and 13.3% of the population still have difficulties in accessing adequate toilet facilities, hence are using the emergency toilet which typically is made of recycled materials

6.2.11.4 Health Awareness and Behavior

Based on the AMDAL, generally the community disposes of the waste to backfilling/burning in backyards/gardens around their house and disposing to nearby public waste disposal places (*tempat pembuangan sampah/TPS*). This condition shows that waste management is not well managed and may result in future environmental and public health issues, especially with the potential additional population of the village once the Project starts construction.

6.2.11.5 Health Facility and Infrastructure

In Likupang Timur District, almost all villages have an integrated health service (posyandu) facility. The health facilities in the area are considered relatively suitable to cover the health and treatment of the community. However, it was identified during the ESHIA Survey that the presence of a drugs store in the district is insufficient compared to the needs of community. The number of physicians and nurses in the district is also considered low compared to the population in Likupang Timur District of 17,455 people.

7 Environmental and Social Management

This ESHS-MS Manual is developed to address the issues identified in the AMDAL and ESHIA, and provide measures and actions to mitigate/manage potential adverse impacts, to enhance positive or beneficial impacts based on the following mitigation hierarchy:

- Avoidance;
- Minimization; and
- Compensation/offset

PT ITL shall allocate financial resources and designate responsible personnel within the organization to implement the management program. A procedure to adjust the ESHS-MS Manual and to adapt actions and mitigations based on the environmental and social monitoring data shall be developed.

7.1 Environmental and Social Management Framework

The environmental management framework allows for the identification of environmental and social impacts, the development of mitigation and/or management actions, and the establishment of a structure to ensure the effective implementation and adoption of mitigation and management measures. It is illustrated in the Figure 7-1 below.

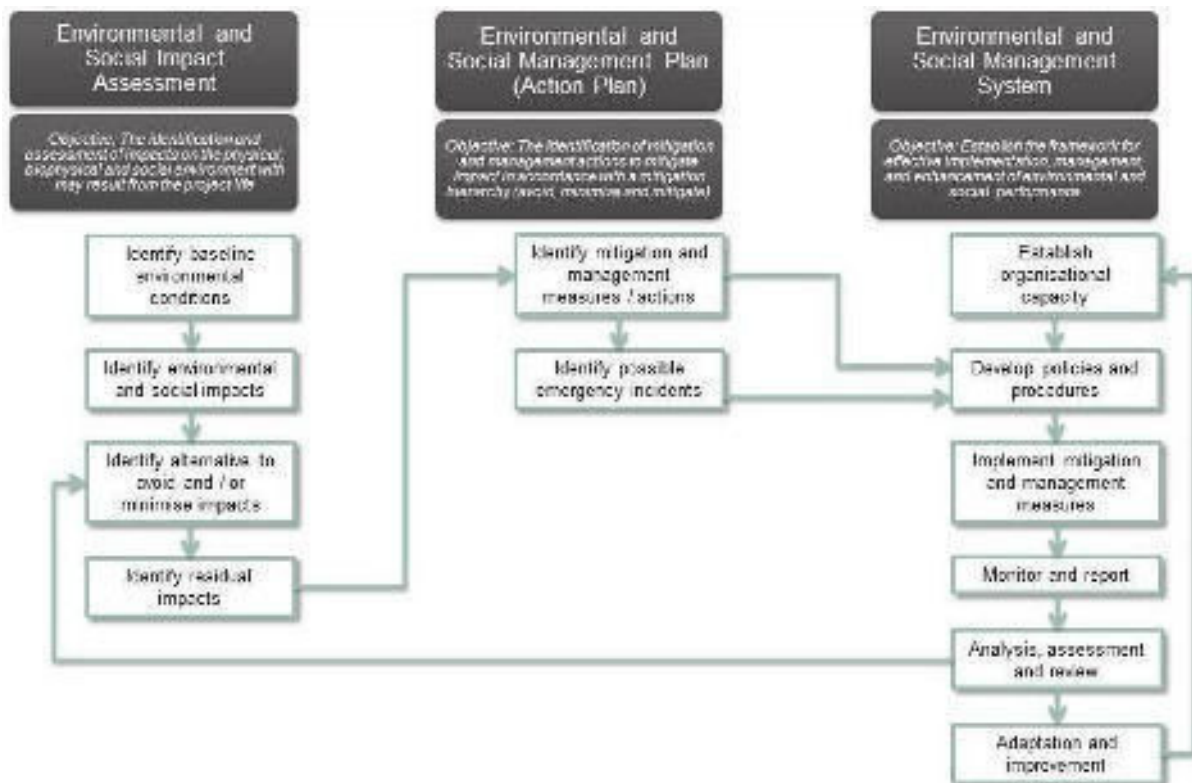


Figure 7-1 Environmental and Social Impact Assessment and Management

7.2 Environmental Impact Assessment and Management

Environmental impacts associated with the Project have been identified as part of AMDAL study conducted by PT Sulindo Eko Konsultan and ESHIA study conducted by ERM. Based on the results of scoping and assessment in those studies, the following environmental impacts are identified and predicted during construction and operation of the Project:

Table 7-1 Significance of the Identified Environmental Impacts

No.	Impact	Significance of impact	Significance of residual impact
1	Impacts to surface water bodies	Moderate	Minor
2	Air quality impacts	Minor	Minor
3	Noise impacts	Minor	Minor
4	Terrestrial biodiversity impacts		
	- Result of vegetation clearing	Minor	Minor
	- Impacts to conservation of significant of fauna species	Moderate	Minor

7.2.1 Impacts to surface water bodies

The PV field will result in increased surface water runoff as a result of the removal of onsite vegetation and exposure of the land surface. A drainage system is to be established within and around the Project site in order to control site runoff during construction and operation. The runoff during construction and operation is planned to drain to the Wineru River. The removal of site vegetation during construction and its absence during operations has the potential to result in increased volumes of runoff, and also increased sediment laden runoff entering this water way.

The impact significance is considered to be *Moderate*. The Project will implement the following industry standard management and mitigation measures. These are expected to manage the volumes of erosion estimated to occur as a result of clearing:

- Preparation and implementation of a soil and erosion management plan during construction to incorporate requirements such as use of dust suppression, soil stabilization during construction and storm water and sediment management and control;
- Solid stabilization to be implemented following completion of construction, this may include establishment of grass cover or other forms of ground cover across the site;
- Implementation of an operational runoff and storm water drainage system to control runoff volumes; and
- Establishment of sediment control devices at the operational runoff discharge points.

The implementation of sound management practices and an onsite drainage and runoff collection system during construction and operation are likely to be capable of managing runoff quality and volumes. Thus, the significance of the residual impact is considered to be *Minor*.

7.2.2 Air quality impacts

Air quality impacts are likely to be restricted to increased dust generation and small and heavy vehicle emissions during construction. Project operations would not impact air quality emissions of any particular note. Onsite earth works and deliveries will occur for a period of twelve months and will result in only a temporary generation of air quality impacts. Site civil works are confined to the site and the nearest village is approximately 650 m from the site. The significance of impacts on air quality is expected to be *Minor*.

It is expected that the use of dust suppression on access roads, and exposed areas onsite through the watering of roads used during dry periods will assist in managing potential air quality impacts. Residual impacts are expected to remain as *Minor* and not of significance.

7.2.3 Noise impacts

Noise generating activities are likely to occur during construction and as a result of site clearing, site establishment and civil works, and PV field installation and construction. Construction will occur for a period of approximately twelve months and generally during the hours of 7am until 6 pm, however there is a potential to work at night. Construction will introduce temporary sources of noise into the local area, and it is possible that these will occasionally be heard offsite. The nearest residential area is located at Wineru Village which is located at approximately 650 m away. Given the timeframe for construction, these activities are unlikely to significantly disrupt the local noise environment. The significance of noise impact is assessed to be *Minor*.

Implementation of the following mitigation measures is recommended during construction activities to minimize the impact of noise increase which is generated:

- High noise activities will be undertaken over short periods and where possible scheduled to avoid simultaneous operation of high noise generating plant;
- Complaints tracking and grievance log will be established to address community complaints; and
- Noise monitoring program to be established

While implementation of the above measures is likely to be able to assist in managing potential impacts, the residual impact significance is expected to remain as *Minor*.

7.2.4 Impacts on terrestrial biodiversity as a result of vegetation clearing

Land clearing will occur within an area of 29.4 Ha, consisting of coconut plantation and other agricultural land uses. The vegetation onsite is considered unlikely to be of conservation significance and no significant biodiversity values were encountered within or surrounding the area proposed for future clearing. The flora and fauna values of the site are similar to surrounding locations within the local area and region and as a result similar habitat and vegetation types are relatively common. The significance of impact from land clearing is therefore assessed as *Minor*.

As vegetation clearing cannot be avoided, therefore a number of management and monitoring measures will be put in place to ensure impacts associated with vegetation clearing are reduced and do not result in a disturbance to the surrounding vegetation:

- Vegetation clearing only in designated areas for the Project footprint;
- Restricting work to designated/cleared boundaries;
- Establishment and implementation of a clearance protocol to manage encounters with fauna;
- No disturbance to vegetation outside marked areas; and
- Undertaking site revegetation to assist with soil stabilization, where possible.

While the management measures listed above will assist in managing vegetation clearing activities and ensuring impacts on surrounding vegetation are reduced, the significance of residual impact remains as *Minor*.

7.2.5 Conservation of significant fauna species

The impact assessment found that while the Project area may provide some habitat for locally occurring species of conservation significance, the habitat contained within the site are unlikely to be of particular importance. The species are likely to continue to persist within the local area and the Project is unlikely to result in significant impacts to these species. The significance of impact is deemed to be *Moderate*.

Management and monitoring measures associated with impact on terrestrial biodiversity discussed previously will assist in managing the potential impacts. Those measures are

- Vegetation clearing only in designated areas for the Project footprint;
- Restricting work to designated/cleared boundaries;
- Establishment and implementation of a clearance protocol to manage encounters with fauna;
- No disturbance to vegetation outside marked areas; and
- Undertaking site revegetation to assist with soil stabilization, where possible.

While the measures above will help ensuring impacts on surrounding vegetation and associated fauna habitats are reduced, the significance rating is likely to be *Moderate-Minor*. This is due to the sensitivity of conservation of significant species to the continued habitat loss.

7.3 Social Impact Assessment and Management

AMDAL study has identified two hypothetical significant social impacts from the Project. Those are public perception during pre-construction as well as livelihood and income levels during construction phase. As the Project aims to meet IFC PSs, it is important for the Project to also include some components that are not covered in the AMDAL in the social impact assessment, as part of ESHIA study. The key impact areas are land acquisition; economy and livelihood; community health; community safety; and occupational health and safety. The impacts and its significance are presented in the Table 7-2 below.

Table 7-2 Significance of the Identified Social Impacts

No.	Impact	Significance of impact	Significance of residual impact
1	Economic benefit from land acquisition	Positive	N/A
2	Loss of access and for land users	Minor	Negligible
3	Economic benefits from employment and business opportunities	Positive	N/A
4	Disturbance to farming incomes	Minor	Negligible
5	Health impacts associated with the presence of non-local workforces	Minor	Negligible
6	Health impacts associated with generation of dust during construction	Minor	Negligible
7	Disturbance to local public road	Minor	Negligible
8	Community safety risk associated with project construction mobilization	Minor	Minor
9	Impacts associated with worker's health and safety	Moderate	Minor

7.3.1 Economic benefit from land compensation

Land owner and the Village Head of Wineru confirmed that the land acquisition process was conducted through a direct consultation and negotiation process with the land owner, and the compensation was agreed based on mutual agreement between the two parties.

Before the acquisition the land owner utilized the land for corn farming and other dry land crops such as paddy and chili as one of his income sources. Last year the gross income from the corn farming could reach approximately IDR 280,000,000 excluding operational and labor expenses. However, the land owner claimed to possess other plots of land nearby as well as in other parts of Minahasa Utara Regency. He also runs several businesses such as fish farming, coconut farming, housing and infrastructure construction, and heavy equipment rental. According to the land owner, the loss of land and income from the Project land acquisition was considered insignificant since the compensation rate that was offered was good due to the large area that was acquired. Therefore, the impact significance of the Project's land acquisition for the land owner is assessed as being *Positive*.

7.3.2 Loss of access and for land users

Although the land owner will receive a fair compensation package, the process has the potential for adverse impact for the land users and casual workers. It is identified that the land is also used for:

- The Project's plot was used by some of the Wineru villagers/farmers as grazing field. Upon the Project commencement, they are expected to move their cattle to another area. However,

looking at the total area of plantation land in Wineru (i.e. 460 ha of agricultural land) land users will have alternative locations to graze their herds within the village or its surrounding area.

- The land is also used by local farmers as an access route to their farming areas on the south side of the Project location.
- Before the land was acquired by the Project, the land owner previously hired a number of casual workers, around 40 daily labors, to help his corn farming. There was no significant concern from these labors over the loss of income from the land that has been acquired for the Project. An interview with the land owner and Village Secretary confirmed that some of these labors have now working in other plantations in the village. According to the land owner, in the near future he would still hire some of the ex-workers to work on his other businesses such as fish farming, restaurant and the housing construction project.

The significance of impact is assessed to be *Minor* considering it only affects a few community members and also given the demand for employment is quite high in the area.

It is advisable to follow up with the 40 casual workers to ensure their incomes remain the same as before and they have access to other employment opportunities. If not, it is recommended the project consider prioritizing them for employment. Furthermore, in terms of access to surrounding fields it is suggested that the Project consult with the affected famers and agree a suitable access route that is suitable for them whilst still managing the security and safety issues of the site.

As a result of implementation of proposed additional measures, the residual impact associated with loss of access and income to land users is considered as *Negligible*.

7.3.3 Economic benefits from employment and business opportunities

The Project commits to prioritize and employ local workers especially for the unskilled labor category. the Project construction and operation will also require goods and services to support the activities such as construction materials, equipment, cleaning, catering and other hospitality services. These opportunities will provide additional markets for the existing small and medium local businesses near the Project location such as sands and rocks suppliers, grocery suppliers, restaurants, and lodging providers.

Thus, the Project is most likely will have a significant *Positive* impact in terms of employment and business opportunities and increase the economic condition of the local people.

To optimize the Project benefits to local community through employment and business opportunities, the Project will implement the following additional mitigation measures:

- To have a clear stipulation of using local labor in the EPC contract and instruct the EPC to prioritize qualified local people as construction workers in accordance with the needs of the Project;
- Provide and communicate clear information about the Project's requirement related to employment and business opportunities and prioritize locals where feasible; and
- Implement community development programs to increase the skills of local workers and the capacity of local businesses to meet the needs and requirements of the Project.

7.3.4 Disturbance to farming incomes

The generation of dust during construction may increase community concern towards the disturbance of farming activities in the surrounding areas of the Project. During operation, the Project has the potential to increase air temperature of the area and its surrounding from the solar panels. The impact of increased dust particles in the air during the land clearing and construction phase as well as increase air temperature of the area and its surrounding from solar panels to farming activities is assessed as *Minor* significance.

Although the assessment result shows that the impact is *Minor*, the Project is still expected to implement the following mitigation measures in managing dust and heat during construction and operation:

- Provide and communicate detailed information about the Project's plan and schedule particularly related to land clearing and construction to the community with a special attention to farmers nearby the project location; and
- Establishment of a grievance mechanism that is understood by and accessible for all villagers. The mechanism will be simple, efficient and timely and fully consultative.

As a result of implementation of proposed additional measures, the residual impact is expected to be *Negligible*.

7.3.5 Health impacts associated with the presence of non-local workforces

The presence of non-local workers in this Project is unlikely to cause the prevalence of new diseases to local community or social problems however as the interaction with non-local workers will not be limited, mitigation measures should be adopted to manage social ills, conflict and the spread of communicable diseases.

However, consultation with key informants in Wineru Village indicates that community in Wineru is very open towards migrants; there have been no significant issue between locals and migrants to date. Although the non-local workforce will also stay within the local community, the number is significantly less and it is expected that community would already familiar with the presence of non-locals in the area; therefore, this impact is considered as *Negligible*.

The Project will implement the following additional mitigation measures to manage potential negative impacts associated with the presence of non-local workers:

- Compulsory medical examinations for Project workers, including contractors to ensure they are fit for work and to monitor the prevalence of communicable diseases detected through annual medical check-ups;
- Zero tolerance towards inappropriate behavior from and amongst the workforce;
- Conduct an induction and training on the Project's Code of Conduct regarding do's and don'ts in relation with interaction with locals;
- Establish a grievance mechanism and accessible for all community groups to report concerns associated with potential Project health impacts. Where complaints are submitted the Project will undertake an immediate investigation;

- Regular engagement with local authorities relevant to crime (local police) or other social problems (e.g. village leaders) for prevention of issues and for mitigation when issues arise; and
- Conduct appropriate workers-community engagement such as sporting or cultural events to improve understanding and cohesions between non-local workers and the surrounding communities.

7.3.6 Health impacts associated with generation of dust during construction

During the construction phase, the Project's equipment, machinery and infrastructure will be delivered to site via Sulawesi Utara Province road from Bitung Port. The peak of the mobilization rate is expected to take place only during the initial and at the end of the twelve months period of the construction phase. This activity is expected to generate dust, especially along the roads that are not yet asphalted.

Other construction activities which will likely generate dust come from land preparation. The Project site is located within an agricultural plantation area with minimal human activities, and quite far from the populated residential area of Wineru i.e. over 650 m away.

The significance of impacts to community health as a result of site construction activities was assessed as being of *Minor* significance. The Project will implement the following mitigation measures:

- Consultation with communities of Project's traffic routes and peak traffic times;
- Consider establishing community health assistance through a CSR program coordinating with public health centers and focusing on managing ARIs and other similar health issues; and
- Establish a grievance mechanism accessible for all villages to report dust concerns. Where complaints are submitted the Project will undertake an immediate investigation.

As a result of implementation of the proposed additional measures, the residual negative impact associated with generation of dust to community health will be of *Negligible* significance.

7.3.7 Disturbance to local public road

The road load within the Project area will increase significantly during the construction phase and expected to negatively impact the existing condition of roads within the Project area. Project impacts to local public roads as a result of increased vehicle movement during the construction were assessed as being *Minor* significance. It is considering the expected peak construction will only occur during the initial and at the end of the twelve-month period. It is also given that the general condition of the public road to be traversed was observed to be fairly adequate.

In addition, the Project will implement the following mitigation measures. Upon the implementation of these measures, the residual impact is considered *Negligible*.

- In the area where unfeasible road conditions are identified, road improvement will be conducted to ensure the road conditions meet the standard conditions for construction vehicle mobilization;

- Should road damage occur associated with the Project mobilization, a road improvement program will be implemented to ensure that the public road condition is adequate for the local community and other road users; and
- Establish a proper and accessible grievance mechanism to report concerns about public road conditions. The Project will carry out immediate investigation when the community submits related complaints.

7.3.8 Community safety risk associated with project construction mobilization

In addition to the impacts to dust and disturbance to public road, the mobilization is likely to create impact to community safety due to potential interactions between the Project vehicles with the community traffic/ road users. Community activities were observed along some road segments e.g. housing and shops as well as local traffic. Meanwhile, unsafe driving practices were observed particularly in terms of helmet use.

The significance of impact to safety risk on land is assessed as *Minor*. However, the Project is expected to implement the following additional mitigation measures:

- Consultation with the communities on key Project traffic routes, timing of peak movements, type of vehicles and heavy equipment and provision of road safety awareness to the surrounding community, through corporation with the local police;
- Enforce speed limit regulations to all Project construction vehicles, along with an emergency response procedure should any incidents with other road users or pedestrians occurs; and
- The proposed grievance mechanism should be accessible for all villagers to report concerns associated with health and safety. Where complaints on accidents or near misses are submitted the Project will undertake an immediate investigation.

As a result of implementation of the proposed additional measures, the residual Project negative impact to community safety will be *Minor*.

7.3.9 Impacts associated with worker's health and safety

There are likely to be potential impacts on workers' health and safety due to exposure to risks through the Project development activities. The following occupational health and safety risks are frequently present, in particular during the Project construction phase:

- Mobile vehicles and heavy equipment accidents;
- Heat stress when working in humid and high temperatures;
- Manual handling and musculoskeletal disorders;
- Hand-arm vibration impacts from concrete breakers, grinders, hammer drills, chipping hammers, chainsaws, scrabbles and needle guns;
- Temporary or permanent hearing loss from noise generated machinery used for excavation or piling work;
- Dermatitis that can arise from contact with small substances such as wet cement, and asphalt;
- Tripping due to uneven surfaces and obstacles;
- Falling during working at height;

- Fire due to hot works, smoking, and failure in electrical installations; and
- Electrical shocks.

Considering the size of the construction workforce, the frequent and high level of potential construction risks the impact to worker's health and safety was assessed as *Moderate* significance.

The above identified risks are typical on any construction site of this nature therefore it is anticipated that the EPC will have the necessary management measures in place to manage potential occupational health and safety (OHS) issues under their responsibility. Appropriate OHS procedures are also expected to be in place to align with the Indonesia regulations, as well as IFC PS 2. The procedure will include, at minimum, the following measures:

- The EPC will be committed to ensure all H&S measures are in place to prevent accidents and reduce the consequences of non-conformance events;
- The EPC will provide training, awareness and supervision to ensure all of its construction workers comply with the OHS procedures;
- The EPC will provide all appropriate resources i.e. personal protective equipment (PPE) to all workers onsite; and
- An emergency response procedure and infrastructure will be available on site to ensure provision of first aid for personnel in case of an emergency.

As a result of the implementation of the proposed additional measures, the residual impact associated with occupational health and safety is considered as *Minor*.

7.4 Environmental and Social Management Plan (ESMP)

7.4.1 Pre-construction and Construction Environmental and Social Management Plan

This Section outlines the construction ESMP which will be developed for the construction of the project. Specific standalone tables are provided for the following requirements:

- Air quality management;
- Noise management;
- Terrestrial biodiversity;
- Surface water and sedimentation management;
- Social management; and
- Occupational health and safety.

These tables detail minimum requirements for mitigation measures that will be implemented during construction to avoid, or mitigate environmental or social impacts as a result of the Project.

Table 7-3 Pre-Construction and Construction Environmental and Social Management Plan

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
Air Quality Management								
Land preparation	Increased dust in ambient air	Requiring workers to wear masks and goggles while on duty (as per HSE SOP)	PT ITL	During land preparation	The concentration of dust (TSP) in the workplace (Regulation of Ministry of Labor and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT ITL	Minimum once during land preparation	RKL-RPL implementation report
Mobilization of equipment and material	Increased dust	<ol style="list-style-type: none"> 1) Cover transported material with tarps or adequate plastic 2) Use loading trucks with mud guard 3) Adjust vehicle's speed, especially when passing through settlements and when the path is not paved 	PT ITL	During mobilization of equipment and material (construction phase)	Dust (TSP) concentration in ambient air is <math><230 \mu\text{g}/\text{Nm}^3</math> (Government Regulation Number 41 Year 1999 Regarding Air Pollution Control)	PT ITL	Minimum once during mobilization of equipment and material	RKL-RPL implementation report
Construction of solar power generation facility	Increased dust	Requiring workers to wear masks and goggles while on duty (as per HSE SOP)	PT ITL	During solar power generation facility construction (construction phase)	The concentration of dust (TSP) in the workplace (Regulation of Ministry of Labor and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT ITL	Minimum once during construction of solar power generation facility	RKL-RPL implementation report

Environmental, Social, Health and Safety Management System (ESHS-MS)

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
Onsite earth works, deliveries, civil works	Increased dust generation & small & heavy vehicle emissions	Watering of roads used during dry periods	PT ITL	During construction	Dust (TSP) concentration in ambient air is <230 µg/Nm ³ (Government Regulation Number 41 Year 1999 Regarding Air Pollution Control)	PT ITL	Weekly	Weekly HSE report
Noise Management								
Land preparation	Increased noise level	Requiring workers to wear ear plugs while on duty (as per HSE SOP)	PT ITL	During land preparation	Noise level in the workplace (Regulation of Ministry of Labor and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT ITL	Minimum once during land preparation	RKL-RPL implementation report
Mobilization of equipment and material	Increased noise level	Adjust vehicle's speed, especially when passing through settlements (±20 km/hour)	PT ITL	During mobilization of equipment and material (construction phase)	Noise level during mobilization of equipment and material < 55 dBA (Decree of Minister of Environment Number 48 Year 1996 Regarding Noise Threshold)	PT ITL	Minimum once during mobilization of equipment and material	RKL-RPL implementation report
Construction of solar power generation facility	Increased noise level	Requiring workers to wear ear plugs while on duty (as per HSE SOP)	PT ITL	During solar power generation facility construction (construction phase)	Noise level in the workplace (Regulation of Ministry of Labor and Transmigration Number 13 Year 2011 regarding Threshold Limit Value	PT ITL	Minimum once during construction of solar power generation facility	RKL-RPL implementation report

Environmental, Social, Health and Safety Management System (ESHS-MS)

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
					Physical and Chemical Factors in the Workplace)			
Site clearing, site establishment and civil works, and PV field installation and construction	Noise disturbance above ambient background levels	High noise activities will be undertaken over short periods and where possible scheduled to avoid simultaneous operation of high noise generating plant Complaints tracking and grievance log	PT ITL	During construction	Noise level measurement Community grievances	PT ITL	Weekly	Weekly HSE report
Terrestrial Biodiversity Impact								
Land preparation	Loss of natural & cultured vegetation	1) Revegetation of cleared land, especially in the border part. 2) The border of project area will have plants/ trees that can highly absorb carbon, produce high oxygen, and suppress the temperature rise due to the solar power generation facility. The trees may include Rain Tree (<i>Samanea saman</i>), Cassia (<i>Cassia sp</i>), Cananga (<i>Canangium odoratum</i>), Pingku (<i>Dysoxylum excelsum</i>), Kerai Payung (<i>Filicium decipiens</i>), Matoa (<i>Pometia pinnata</i>) and	PT ITL	During land preparation	The number and types of trees and vegetation found on the project site	PT ITL	Every 6 months	RKL-RPL implementation report

Environmental, Social, Health and Safety Management System (ESHS-MS)

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		West Indian Mahogany (<i>Swietenia mahogany</i>) 3) Under the solar panel plants will be grown to cover crop, such as Butterfly Pea (<i>Centrosema pubescens</i>), Moss Roses (<i>Portulaca sp.</i>), Napier Grass (<i>Pennisetum purpureum</i>), Scutch Grass (<i>Cynodon sp.</i>), and <i>Calopogonium sp.</i>						
Land clearing	Vegetation & fauna habitat loss	Vegetation clearing only in designated areas for the project footprint	PT ITL	During land preparation	The number and types of trees and vegetation found on the project site	PT ITL	Weekly	Weekly HSE report
		Restricting work to designated/cleared boundaries						
		No disturbance to vegetation outside marked areas						
		Undertaking site revegetation to assist with soil stabilization, where possible						
		Establishment and implementation of a clearance protocol to manage encounters with fauna						

Environmental, Social, Health and Safety Management System (ESHS-MS)

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
Surface Water and Sedimentation Management								
Land preparation	Run off	<p>1) Construction of retention pond or run off pond in project area to contain run off with a volume of approximately 30,000 m³ (or during land preparation). Natural ponds or puddles in project location will be left as they are temporary until the drainage construction is done.</p> <p>2) Drainage construction for runoff water canalization to retention pond or natural waterways around the project site in operation stage.</p>	PT ITL	During land preparation and operation	Increased amount of run off discharge	PT ITL	Every 6 months	RKL-RPL implementation report
Land preparation	Increased Erosion	<p>1) Minimizing soil damage by suppressing erosion levels to tolerable levels and/or similar to initial conditions.</p> <p>2) Implement cropping pattern (C), and soil conservation (P) in accordance with $CP \leq T$: RKLs. In order to suppress the erosion level until similar or lower than tolerable level, plant with C</p>	PT ITL	During land preparation and operation	Any changes in land coverage will cause change to surface erosion rates. Increased erosion on land preparation is tolerable (erosion rate of 12-35 tons/ ha/year). In addition, the quality of river water surrounding the area is measured by monitoring TDS and TSS.	PT ITL	Every 6 months	RKL-RPL implementation report

Environmental, Social, Health and Safety Management System (ESHS-MS)

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		<p>≤ 0.036 or soil conservation with $P \leq 0.036$ or the combination of both (CP) ≤ 0.036. For solar power generation facility, cover crop plantation can be planted.</p> <p>3) For soil around the site which is to be maintained, conservation measures are to be applied in the form of terraces for certain slopes with robust construction that can meet the requirements ($P < 0.036$)</p> <p>4) Avoid land opening, including land clearing in the rainy season and these activities are to be done gradually.</p>						
Land preparation	Landslide	<p>1) Stabilize steep slopes at the site of land preparation and cliffs, also along the sloping lands (terraced)</p> <p>2) Make soil retaining walls</p>	PT ITL	During land preparation and operation	A decrease in the level of vulnerability to landslides	PT ITL	Every 6 months	RKL-RPL implementation report
Land clearing	Increased of suspended	Solid stabilization to be implemented during construction, this may include establishment of grass cover	Contractor Construction HSE Manager	During land clearing activities	Land clearing and ground cover area	PT ITL (HSE Dept.)	Weekly	Weekly HSE report

Environmental, Social, Health and Safety Management System (ESHS-MS)

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
	sediment in river water	or other forms of ground cover across the site						
		Storm water management structures such as storm water ponds will be designed to collect the surface runoff and allow the removal of sediment by natural settlement, which in turn should reduce sediment loading prior to discharge into receiving environment			Storm water pond design			
		Minimizing the land clearance area where possible, providing surface protection such as sheet cover			Land clearing and ground cover area			
		Appropriate surface drainage will be designed and provided			Surface drainage design			
Land clearing	Increased of suspended sediment and spilled oil contaminants in receiving waters	Provide containment for storage areas of oil, fuel and chemicals to control contaminated surface runoff	Contractor Construction HSE Manager	During land clearing activities	Containment devices	PT ITL (HSE Dept.)	Weekly	Weekly HSE report
		Temporary traffic areas and access roads, if any, formed during construction will be protected by coarse stone ballast or equivalent. These			Temporary traffic areas and access roads protected			

Environmental, Social, Health and Safety Management System (ESHS-MS)

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		measures shall prevent soil erosion caused by rainstorms						
		Open stockpiles of construction materials (for example, aggregates, sand and fill material) in places which are identified to have a possibility of significant runoff will have measures in place to prevent the washing away of construction materials, soil, silt or debris into any drainage system			Stockpiles material construction			
Social Management								
Land procurement activities	Change of landownership	To implement the Project buying and selling process in accordance with the applicable provisions by involving village and district government	PT ITL	During pre-construction	No conflicts due to the changes of land ownership	PT ITL	During Pre-Construction, in one monitoring	RKL-RPL implementation report
Socialization and public consultation activity	Community Perception	1) To socialize regularly the project to community in Wineru 2) To pay attention to feedback, suggestions and opinions of government and community associated with environmental management according to the results of	PT ITL	During preconstruction until post operation phase	Community who agree and support the development of solar power plant is >90%	PT ITL	During Pre-Construction, in one monitoring	RKL-RPL implementation report

Environmental, Social, Health and Safety Management System (ESHS-MS)

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		socialization and public consultation 3) To implement community development activities which helps to increase the capacity of human resources and improvement of village infrastructure according to the ability of company						
Mobilization of equipment and material	Road damage	1) Truck/container capacity suitable with road ability 2) Implement roadwork when damages occur (the company has committed to repair the damaged road due to project vehicle activity)	PT ITL	During mobilization of equipment and material (construction phase)	Damaged roads are repaired	PT ITL	Minimum once during mobilization of equipment and material	RKL-RPL implementation report
Procurement activities of Labor	Increase of job opportunity and income	1) Prioritizing the local workforce, especially for unskilled workforce to be employed 2) Inform the job vacancies to community and surrounding Wineru Village through head of village and district government of Likupang Timur 3) Provide labor wages at least equal to the wages of construction labor around	PT ITL	During construction phase	Local community who were employed in solar power plant is >50%	PT ITL	During construction phase, every 6 months	RKL-RPL implementation report

Environmental, Social, Health and Safety Management System (ESHS-MS)

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		the solar power plant or provincial minimum wage of Sulawesi Utara current year 4) Utilize local contractors to provide materials of construction						
Land procurement	Economic benefit from land compensation to the land owner	Where practicable align with IFC PSS expectation, including: <ul style="list-style-type: none"> - Proper documentation for all consultation and negotiation discussions; - Ensure documentation to demonstrate fair compensation rates; - Develop and implement grievance mechanism for concerns related to the land acquisition to be channeled. The system will be informed to the affected communities and made easily accessible. Relevant grievances will be addressed immediately. 	PT ITL (Community Relation/ Development Dept.)	Pre-construction phase/during land acquisition process	<ul style="list-style-type: none"> - Land acquisition procedure has been updated to meet the IFC PS - Grievance mechanism procedure has been in place - Available documentation of consultation and grievance records 	PT ITL	During land acquisition process	Land acquisition completion report
Land procurement	Impact of loss of access and income for land users	The following additional measures will be implemented: <ul style="list-style-type: none"> - Identify the casual labors to obtain more information 	PT ITL (Community Relation/ Development Dept.)	Pre-construction phase/during land acquisition process up to the initial stage	<ul style="list-style-type: none"> - Land acquisition procedure has been updated to meet the IFC PS 	PT ITL	During land acquisition process and once during the initial phase of construction	Livelihood restoration monitoring report

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		about their current livelihoods; - Should any significant loss of income be identified the Project will provide a development support program to ensure the livelihood of the affected land users could be restored or improved; - Develop and implement grievance mechanism for the land users to channel their concern. The system will be informed to the affected communities and made easily accessible. Relevant grievances will be addressed immediately.		of construction phase	- Grievance mechanism procedure has been in place - Available documentation of consultation and grievance records			
Workforce Mobilization/ Presence	Economic benefit to locals as a result of the Project employment and business opportunities	To have a clear stipulation of using local labor in the EPC contract and instruct the EPC contractor to prioritize qualified local people as construction workers in accordance with the needs of the Project	PT ITL (HR/ Procurement Dept.)	Prior to commissioning of construction phase and during construction phase	Clear stipulation in the contract with EPC and Documentation/ record of employment announcement at regional and local (village) level	PT ITL	Once prior to commissioning of construction phase and quarterly monitoring during construction phase	Quarterly report regarding workforce number
		Provide and communicate clear information about the	PT ITL (HR/ Procurement)	Prior to and during	Documentation/ record of employment and business	PT ITL	Quarterly during	Quarterly report regarding

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		Project's requirement related to employment and business opportunities and priorities locals where feasible	Dept. and Community Relation/ Development Dept.)	construction phase	opportunities announcement at regional and local (village) level, as part of stakeholder engagement/consultation report		construction phase	workforce number and composition and consultation report
Construction activities	Disturbance to farming activities as a result of project construction activities	<p>The Project is still expected to implement the following mitigation measures in addition to the AMDAL required measures in managing dust during construction:</p> <ul style="list-style-type: none"> - Provide and communicate the detail information about the Project's plan and schedule particularly related to land clearing and construction to the community with a special attention to farmers nearby the project location. - Agree with local farmers suitable access routes to their lands - Establishment of a grievance mechanism that is understood by and accessible for all villagers. The mechanism will be 	PT ITL (Community Relation/ Development Dept.)	Prior to commissioning of construction phase and during construction phase	<ul style="list-style-type: none"> - Record of consultation - Available documentation of consultation and grievance records 	PT ITL	Quarterly monitoring on grievance resolution	Consultation report and quarterly grievance report

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		simple, efficient and timely and fully consultative.						
Workforce mobilization/ presence	Impacts associated with non-local workforce and/or in-migrant presence increasing the prevalence of communicable diseases particularly during construction phase	<ul style="list-style-type: none"> - Compulsory medical examinations for the Project workers, including contractors to ensure they are fit for working and to monitor the prevalence of communicable diseases detected through annual medical check-up - Zero tolerance towards inappropriate behavior from and amongst the workforce - Conduct inductions and training refreshers on the Project's Code of Conduct regarding do's and don'ts in relation with interaction with locals 	PT ITL (HR/ Procurement Dept. and HSE Dept.)	Prior to the commencement of work, and during construction phase	<ul style="list-style-type: none"> - Record of employee medical check-up result - Record of breach to the code of conduct - Record of worker induction and training refresher 	PT ITL	Quarterly monitoring on grievance resolution	<ul style="list-style-type: none"> - Report of workforce health condition - Report of employee induction and training - Report of code of conduct implementation
	Impacts associated with non-local workforce and/or in-migrant presence increasing the prevalence of	<ul style="list-style-type: none"> - Establish a grievance mechanism and accessible for all community groups to report concerns associated with potential Project health impacts. Where complaints are submitted the Project will 	PT ITL (Community Relation/ Development Dept.)	Prior to and during construction phase	<ul style="list-style-type: none"> - Grievance mechanism procedure documentation/ record of grievance mechanism socialization at local (village) level - Documentation/ record of the program planning and implementation 	PT ITL	Quarterly during construction phase	<ul style="list-style-type: none"> - Quarterly grievance report - Stakeholder engagement report

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
	communicable diseases particularly during construction phase	<ul style="list-style-type: none"> undertake an immediate investigation. - Conduct appropriate workers community engagement such as sporting or cultural events to improve understanding and cohesions between non-local workers and the surrounding communities. - Regular engagement with local authorities relevant to crime (local police) or other social problems (e.g. village leaders) for prevention of issues and for mitigation when issues arise. 			<ul style="list-style-type: none"> - Documentation/ record of any form engagement with stakeholders 			
Vehicle use/ transportation (workforce, supply and support)	Community health impacts associated with dust generation during Project construction from the movement of Project heavy equipment	<ul style="list-style-type: none"> - Consultation with communities on Project's traffic routes and peak traffic times - Establish a grievance mechanism and accessible for all villages to report dust concerns. Where complaints are submitted the Project will undertake an immediate investigation 	PT ITL (Community Relation/ Development Dept.)	During construction phase	<ul style="list-style-type: none"> - Documentation/ record of consultation - Grievance mechanism procedure - Documentation/ record of grievance mechanism socialization at local (village) level 	PT ITL	Quarterly during construction phase	<ul style="list-style-type: none"> - Environmental Monitoring report - Stakeholder engagement report - Quarterly grievance report

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
	Potential incident with community as a result of increase in Project traffic on a public road	<p>It is understood that the Project has performed an assessment about the condition of public roads prior to vehicle mobilization to ascertain the road load feasibility. In addition, the Project will implement the following additional mitigation measures:</p> <ul style="list-style-type: none"> - In the area where unfeasible road conditions are identified, a road improvement will be conducted to ensure the road condition could meet the standard condition for construction vehicle mobilization. - Should road damage occur associated with the Project mobilization, a road improvement program will be implemented to ensure that the public road condition is adequate for the local community and other road users; and - Establish a proper and accessible grievance mechanism to report 	PT ITL (HSE Dept.)		<ul style="list-style-type: none"> - Road improvement and/or repairs - Grievance is resolved in timely manner 	PT ITL	Quarterly during construction phase	<ul style="list-style-type: none"> - Report of road improvement, if any - Report of road repairs - Grievance record

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		concerns about public road condition. The Project will carry out an immediate investigation when the community submits related complaints.						
		<ul style="list-style-type: none"> - Enforce speed limit regulations to all Project construction vehicles, along with an emergency response procedure - Consultation with the communities on key Project traffic routes, timings of peak movements, type of vehicles and heavy equipment and provision of road safety awareness to the surrounding communities, through corporation with local police - The proposed grievance mechanism should be accessible for all villages to report concerns associated with health and safety. Where complaints on accidents or near misses are submitted the Project 	PT ITL (HSE Dept.)	Prior to and during construction phase	<ul style="list-style-type: none"> - Documentation/ record of consultation - Safety awareness program planning and report - Safety management plan/ procedure and emergency response plan/ procedure (ERP) in place, along with record of any breach of the plan/ procedure - Grievance mechanism procedure - Documentation/ record of grievance mechanism socialization at local (village) level 	PT ITL	Quarterly during construction phase	<ul style="list-style-type: none"> - HSE Report - Stakeholder engagement report - Quarterly grievance report

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		will undertake an immediate investigation						
Occupational Health and Sanitation Management								
Land preparation	Disturbance to health and comfort of workers due to decreased air quality and increased noise level	Implement HSE SOP to minimize dust and noise level effect to workers' health.	PT ITL	During land preparation	Health condition of workers	PT ITL	Minimum once during land preparation	RKL-RPL implementation report
Commissioning of solar power generation facility	Increased electric and magnetic field	Restricting public access to the site of solar power generation facility (according to internal company regulation)	PT ITL	During commissioning (construction phase)	Magnetic and electric field level	PT ITL	Minimum once during commissioning	RKL-RPL implementation report
All pre-construction/ land works and construction activities	Potential impacts to workers' health and safety during construction phase	Proper OHS procedure is expected to be in place, align with Indonesia Regulation, as well as IFC PS. The system will include, at minimum, the following measures: - Contractor will be committed to ensure all health and safety measures are in place to prevent accidents and reduce the consequences of nonconformance events;	PT ITL (HSE Dept.)	During preconstruction and construction phase	<ul style="list-style-type: none"> - OHS procedure in place - Training material on OHS and number of workers participated in the training - HS awareness program for workers are implemented e.g. through posters and regular toolbox meeting - The use of PPE on all workers - ERP in place and socialized to workers 	PT ITL	Weekly inspection and monthly implementation report	Inspection form and monthly report

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		<ul style="list-style-type: none"> - Contractor will provide training, awareness and supervising to ensure all of its construction workers comply with the OHS procedure; - Contractor shall provide all appropriate resources i.e. personal protective equipment (PPE) onsite; and - Emergency response procedure and infrastructure will be available to all workers 			e.g. through posters and regular toolbox meeting			

7.4.2 Operational and Post Operations Environmental and Social Management Plan

This section outlines environmental and social management to be undertaken during the operational phase of the Project. The majority of the management measures outlined in the Construction ESMP are applicable and therefore to be carried over into the operational phase. This operational ESMP therefore addresses issues and management measure applicable only to the operational phase.

Table 7-4 details the minimum requirements for mitigation measures that will be implemented to avoid, or mitigate environmental or social impacts as a result of Project operation. In addition, post-operation measures from the RKL-RPL are also indicated.

Table 7-4 Operations/Post-Operations Environmental and Social Management Plan

Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
Environmental Management								
Solar power generation facility operation	Increased electric energy supply	1) Maintaining the stability of the electric supply to PLN 2) Maintaining underground power transmission lines connected to the source of the generator.	PT ITL	During operation	Electricity supply	PT ITL	Every six months	RKL-RPL implementation report
	Temperature rise (micro climate change)	1) Plant and maintain cover crop/grass in solar power generation facility area 2) Plant trees that can highly absorb CO2 and produce high O2 surrounding project area.	PT ITL	During operation	Ambient temperature <35°C	PT ITL	Every six months	RKL-RPL implementation report
Demolition of solar power generation facility	Increased dust	Requiring workers to wear masks and goggles while on duty (as per HSE SOP)	PT ITL	During demolition of facility	The concentration of dust (TSP) in the workplace (Regulation of Ministry of Labor and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT ITL	Minimum once during the demolition	RKL-RPL implementation report

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
Noise Management								
Demolition of solar power generation facility	Increased noise level	Requiring workers to wear ear plugs while on duty (as per HSE SOP)	PT ITL	During demolition of facility	Noise level in the workplace (Regulation of Ministry of Labor and Transmigration Number 13 Year 2011 regarding Threshold Limit Value Physical and Chemical Factors in the Workplace)	PT ITL	Minimum once during the demolition	RKL-RPL implementation report
Surface Water and Sedimentation Management								
Land clearing	Increased of suspended sediment in river water	Solid stabilization to be implemented during construction, this may include establishment of grass cover or other forms of ground cover across the site	Contractor Construction HSE Manager	During land clearing activities	Land clearing and ground cover area	PT ITL (HSE Dept.)	Weekly	Weekly HSE report
		Stormwater management structures such as stormwater ponds will be designed to collect the surface runoff and allow the removal of sediment by natural settlement, which in turn should reduce sediment loading prior to discharge into receiving environment			Stormwater pond design			

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
Social Management								
Recruitment of workforce and income	Increased procurement of workforce and income	<ul style="list-style-type: none"> - Prioritizing the local workforce, especially for unskilled workforce to be employed during operations phase - Inform job vacancies to community and surrounding Wineru Village through head of village and district government of Likupang Timur - Provide labor wages at least equal to the wages of construction labor around the solar power plant or provincial minimum wage of Sulawesi Utara current year 	PT ITL	During procurement of workforce activity	Opening up employment opportunities for workers which derive from Wineru Village and other villages around the site of Likupang solar power plant (>50% of unskilled workforce from Wineru Village).	PT ITL	During operation phase, every six months	RKL-RPL implementation report
Workforce mobilization/ presence	Economic benefit to locals as a result of the Project employment and business opportunities	Communicate Project's requirements around employment and business opportunities where feasible	PT ITL (HR/ Procurement Dept. and Community Relation/ Development Dept.)	Prior to and during operation phase	Documentation/ record of employment and business opportunities announcement at regional and local (village) level, as part of stakeholder engagement report	PT ITL	Bi-annually during operation phase	Bi-annual report regarding workforce number and composition and stakeholder engagement report
Disturbance to farming activities as a result of	Disturbance to farming activities as a result of	The Project is still expected to implement the following mitigation measures in addition to the AMDAL	PT ITL (Community Relation/	Prior to and during operation phase	<ul style="list-style-type: none"> - Record of consultation - Available documentation of consultation and grievance records 	PT ITL	Bi-annually during operation phase	Consultation report and

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
project operation activities	project operation activities	<p>required measures in managing heat during operation:</p> <ul style="list-style-type: none"> - Provide and communicate the detail information about the Project's plan particularly related to managing potential impact to increase heat, with a special attention to farmers nearby the project location. - Establishment of a grievance mechanism that is understood by and accessible for all villagers. The mechanism will be simple, efficient and timely and fully consultative. 	Development Dept.)					Biannual grievance report
Suspension of solar power generation facility operation	Loss of employment opportunity and income	<ul style="list-style-type: none"> - The proponent should provide allowance or severance to the workforce who laid off in accordance with the employment contract - Inform to the Wineru Village Government or Likupang Timur Head of District regarding plan to halt operations of solar power plant 	PT ITL	Towards the end of operation phase	No conflict and unrest of workforce	PT ITL	In the end of operation phase	RKL-RPL implementation report

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
Hand over solar power plant to PLN	Community perception	<ul style="list-style-type: none"> - Socialization the planning of handover of solar power plant to PLN - Socialization the suspension of solar power plant operation to district government and village government and community surrounding Wineru Village 	PT ITL	Towards the end of operation phase	Have a positive perception from community	PT ITL	In the end of operation phase	RKL-RPL implementation report
Occupational Health and Sanitation Management								
Solar power generation facility operation	Increased electric and magnetic field	<ol style="list-style-type: none"> 1) Restricting public access to the site of solar power generation facility (according to internal company regulation) 2) Measuring the magnetic and electric field level periodically 	PT ITL	During operation	Level of magnetic and electric field	PT ITL	Every six months	RKL-RPL implementation report
	Disturbance to health of workers	<ol style="list-style-type: none"> 1) Plant trees surrounding project area 2) Plant and maintain cover crop or grass in solar power generation facility area 			Health condition of workers			
	Hazardous and toxic waste contamination	<ol style="list-style-type: none"> 1) The proponent has had hazardous and toxic waste handling procedure 2) Waste storage is in accordance with 		During solar power generation facility maintenance	Hazardous and toxic waste in temporary landfill and in solar power generation facility area			

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		Government Regulation Number 101 Year 2014 regarding Management of Hazardous and Toxic Waste, among others: hazardous and toxic waste should be free from flood and is not prone to natural disaster; it should be in control of every person generating hazardous and toxic waste; emergency response equipment is provided; every 3 months, hazardous and toxic waste collected is sent to a hazardous and toxic waste management company which has permit.		(operation phase)				
Demolition of solar power generation facility	Hazardous and toxic waste contamination	1) The proponent has had hazardous and toxic waste handling procedure 2) Waste storage is in accordance with Government Regulation Number 101 Year 2014 regarding Management of Hazardous and Toxic Waste, among others: hazardous and toxic waste should be free from flood	PT ITL	During demolition of facility	Hazardous and toxic waste	PT ITL	Minimum once during the demolition	RKL-RPL implementation report

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Activity/ Aspect	Potential Impacts	Mitigation	Management Responsibility	Timing	Monitoring Parameter	Monitoring Responsibility	Monitoring Frequency	Reporting
		and is not prone to natural disaster; it should be in control of every person generating hazardous and toxic waste; emergency response equipment is provided; every 3 months, hazardous and toxic waste collected is sent to a hazardous and toxic waste management company which has permit.						
	Solid waste contamination	1) Solid waste such as building materials, ferrous scrap, and others are to be placed in temporary landfill before being transported by truck to final landfill in Minahasa Utara Regency 2) Perform a final clean-up in project location			Solid waste			
	Aesthetics disturbance	1) Conduct management of solid waste and hazardous and toxic waste 2) Cultivate cultured vegetation or local natural vegetation in project location			Aesthetic aspect of project location			

8 Organizational Commitment

8.1 Organization Chart

PT ITL will establish, maintain, and strengthen as necessary an organizational structure that defines roles, responsibilities, and authority to implement the Environmental and Social Management System (ESMS). Specific personnel, including management representative(s) with clear lines of responsibility and authority, will be designated.

The organizational arrangement for Likupang Solar Farm is presented in Figure 8-1 below. The key personnel responsible for implementation of ESHS-MS and oversee the compliance of commitments set in the ESMP are Equis Energy ESG team, Environmental/Community Specialist, HSE Coordinator, Environmental Officer, Community Liaison Officers (CLOs), and Human Resource Manager. Equis Energy Technical Team role is also important in supporting the implementation of ESHS-MS.

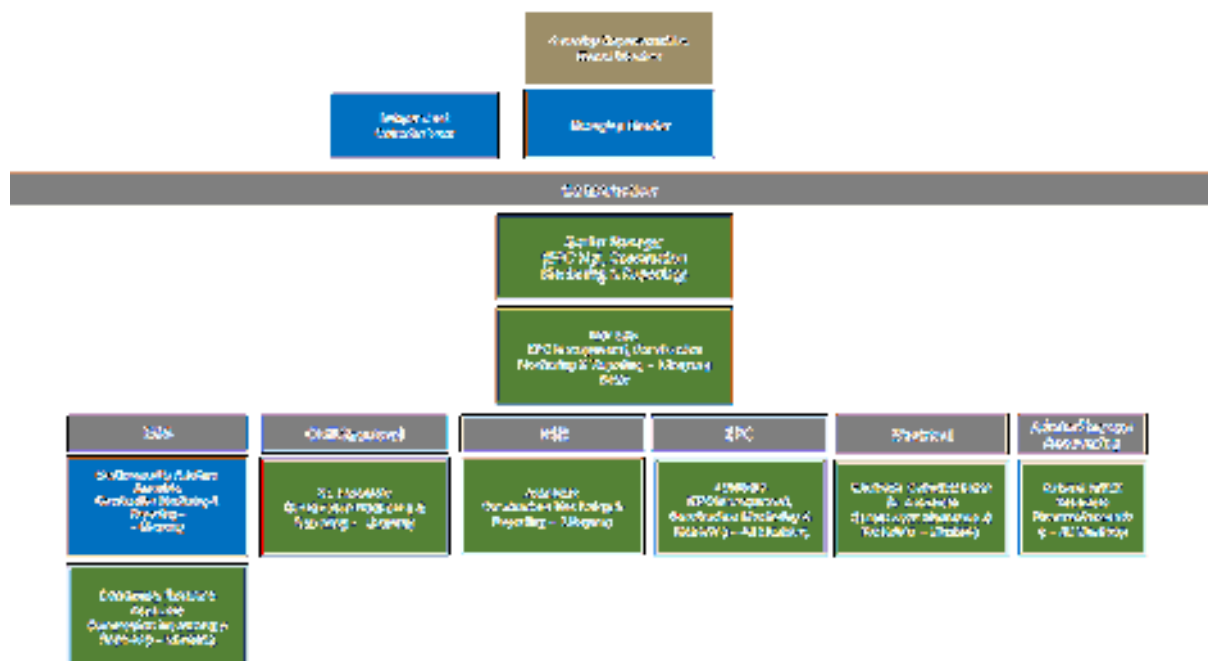


Figure 8-1 Organizational Arrangement for Likupang Solar Farm

8.2 Roles and Responsibilities

Table 8-1 Roles and Responsibilities of the key personnel in ESHS-MS Implementation

Role	Responsibilities	Competencies
Equis ESG Manager	<p>Coordinate the ESHS-MS during project implementation</p> <p>Oversee the development of procedure and guideline to facilitate implementation of the ESHS-MS</p> <p>Monitor the implementation and operation of the ESMP</p> <p>Responsible for all the physical-chemical monitoring of inflow and outflow water quality and air quality as well as other environmental parameters such as ecological monitoring as required in AMDAL/ESHIA documents</p> <p>Responsible for monitoring the performance of the EPC contractor against statutory requirements and the agreed objectives and targets</p> <p>Review and approved the Contractor Management Plans prepared by the EPC, and specialist procedures and identify any area for improvement</p> <p>Identify the environmental competence of all contractors and sub-contractors working on the Project</p> <p>Act as a main contact between the contractor team on environmental and social issues</p>	<p>Understands the ESHS-MS and how to build cross-functional support for the ESHS-MS, especially with construction staffs and integrate ESHS-MS requirements into overall management system.</p> <p>Experienced as an EHS professional, including impact assessments, social performance and human rights issues, and management plans.</p> <p>Understanding of local ESMS-related GoI regulations and policy issues, such as AMDAL.</p> <p>Leadership, project management, analytical and planning skills.</p> <p>Understands and undertakes continual improvement steps.</p> <p>Leverages lessons learned from inside and outside the Project and applies best practices</p>
Environmental Specialist	<p>Explain to every employee the importance and needs of the ESHS-MS</p> <p>Develop procedures and guidelines to facilitate implementation of the ESHS-MS</p> <p>Monitor the implementation and operation of the ESMP</p> <p>Review, analyze and interpret data and records emanating from monitoring activities to assess their effectiveness and the overall ESMP for improvement</p> <p>Assist in the revision/updates of the Emergency Preparedness and Response Plan where appropriate</p>	<p>Hold the National and/or International standard training Course as an EO, such as ISO 14,001 training or SMK3L from GoI.</p> <p>Understands the ESHS-MS and how to build cross-functional support for the ESHS-MS, especially with construction staffs and integrate ESHS-MS requirements into overall management system.</p> <p>Experienced as an EHS professional, including impact assessments, social performance and human rights issues, and management plans.</p>

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Role	Responsibilities	Competencies
	<p>Review, analyze and interpret data and records emanating from monitoring activities to assess the effectiveness of the monitoring process and the overall ESMP for continual improvement</p> <p>Ensure adherence to associated monitoring protocols and program</p> <p>Maintain a repository of material safety data sheets</p> <p>Review and approved the Contractor Management Plans prepared by the EPC, and specialist procedures and identify any area for improvement</p> <p>Review method statements for environmental aspect and advise of any suggested improvements prior to the start of work</p> <p>Monitor construction activities to ensure the identified and appropriate control measures are effective and in compliance with the ESMP</p> <p>Coordination of hazardous material management and disposal</p> <p>Liaise closely with the HSE Coordinator with respect to areas of overlapping concern in the ESMP</p> <p>Contribute to training and capacity building in the area of environmental management</p> <p>Prepare and submit to DLH (Dinas Lingkungan Hidup – Environmental Office) of South Sulawesi province the six-monthly monitoring report, among others, as required in the regulations</p> <p>Take lead in the processing of the application and renewal of the required clearances/permits</p> <p>Maintain records of the analytical data</p>	<p>Understanding of local ESMS-related GoI regulations and policy issues, such as AMDAL.</p> <p>Leadership, project management, analytical and planning skills.</p> <p>Understands and undertakes continual improvement steps.</p> <p>Leverages lessons learned from inside and outside the Project and applies best practices</p>
HSE Coordinator	<p>Develop procedures and guidelines to facilitate implementation occupational and community health and safety aspects of the ESMP</p> <p>Monitor the implementation and operation of the occupational and community health and safety aspects of the ESMP</p> <p>Ensure adherence to associated monitoring protocols and programs</p>	<p>AK3 Qualified; AK3-Umum at the minimum</p> <p>Understands the ESHS-MS and how to build cross-functional support for the ESHS-MS, especially with construction staffs and integrate ESHS-MS requirements into overall management system.</p>

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Role	Responsibilities	Competencies
	<p>Assists in the review, analysis and interpretation of data emanating from monitoring activities to assess their effectiveness and the overall ESMP for continual improvement</p> <p>Assist in the revision/updating the Emergency Preparedness and Response Procedures where appropriate</p> <p>Liaise closely with the Environmental Specialist with respect to areas of overlapping concern in the ESMP</p> <p>Contribute to training and capacity building in the area of occupational and community health and safety</p> <p>Maintain occupational and community health and safety records</p>	<p>Experienced as an EHS professional, including impact assessments, social performance and human rights issues, and management plans.</p> <p>Understanding of local ESMS-related GoI regulations and policy issues, such as AMDAL.</p> <p>Leadership, project management, analytical and planning skills.</p> <p>Understands and undertakes continual improvement steps.</p> <p>Leverages lessons learned from inside and outside the Project and applies best practices</p>
Community Liaison Officer (CLO)	<p>Assure compliance with the ESHS-MS, including leading, resourcing, and serving as advocate for the Stakeholder Engagement Procedure, and the Grievance Mechanism, to ensure that these are understood, meet commitments of the ESHS-MS, and add value. External stakeholder issues primarily relate to Performance Standards 1, 4, 5, 7, and 8.</p> <p>Lead the implementation, measurement, audit, and continual improvement (of effectiveness and efficiency) of the procedures, plans, and Grievance Mechanism.</p> <p>Benchmark Project against competitors and top performers in the region.</p> <p>Maintain and deliver stakeholder engagement training</p> <p>Maintain a database of approved external stakeholder engagement consultants.</p> <p>Integrate and align relevant stakeholder information into business planning and decision making.</p> <p>Develop and maintain a Stakeholder Engagement Plan to document engagement and communications plans and activities.</p> <p>Carry out regular review of regulatory and other issues that may affect the Project and ensure related stakeholders are engaged.</p> <p>Ensures stakeholder issues are satisfactorily closed out (addressed) in timely manner.</p>	<p>Understands the ESHS-MS and how to build cross-functional support for the ESHS-MS and integrate supply chain requirements into overall management system. Includes Stakeholder Engagement Procedure, and the Grievance Mechanism.</p> <p>Understanding of the key stakeholders and their issues.</p> <p>Leadership, analytical, planning, and project management skills.</p> <p>Understands and undertakes continual improvement steps.</p> <p>Leverages lessons learned from inside and outside the Project and applies best practices</p> <p>Has completed related training.</p> <p>Understands community development principles and planning processes.</p> <p>Proficient in engaging stakeholders, per the Stakeholder Engagement Procedure.</p>

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Role	Responsibilities	Competencies
	Develop, maintain, and implement the Project Community Development Plan/CSR.	
Human Resources Manager	<p>Assure compliance with the ESHS-MS, particularly relating to PS 2 (Labor and Working Conditions), to ensure that it is understood, meets commitments of the ESHS-MS, and adds value.</p> <p>Lead the implementation, measurement, audit, and continual improvement (of effectiveness and efficiency) for labor and working conditions commitments of the ESHS-MS.</p> <p>Benchmark Project against competitors and top performers in the region.</p> <p>Maintain and deliver training.</p>	<p>Understands the ESHS-MS and how to build cross-functional support for the ESHS-MS and integrate human resources requirements into overall management system.</p> <p>Understands key stakeholders and their issues relating to human resources.</p> <p>Leadership, analytical, planning and project management skills.</p> <p>Understands and undertakes continual improvement steps.</p> <p>Leverages lessons learned from inside and outside the Project and applies best practices.</p>

8.3 Training

PT ITL shall identify the knowledge and skills necessary for implementation of the management systems and its derivative plans and programs, and also identify training requirements for the organization's personnel.

All persons responsible for undertaking work during the life of the project shall be trained on the contents of the ESHS-MS Manual. PT ITL is also responsible for identifying the knowledge and skills necessary for the implementation of the ESHS-MS Manual and associated programs as well as to identify training requirements for the workers and staff involved in the implementation of the action plan.

Ensure that all site personnel have a basic level of environmental and social awareness training. PT ITL technical personnel in-charge shall provide support in explaining the technical issues and to answer questions.

9 Labor and Working Condition

9.1 Human Resources Policies and Procedures

As a new company operating in Indonesia, PT ITL will develop robust human resources policies and procedures that are consistent with global standards and national law. The policies and procedures are to be clear and understandable and comprehensively cover worker rights under national labor and employment law and applicable collective agreements, including rights related to hours of work, wages, overtime, compensation, and benefits upon beginning the working relationship and when any material changes occur. PT ITL will comply with local regulations related to labor and working conditions and maintain a human rights policy that is consistent with global standards.

9.2 Indonesian Labor Law

It is important to note that Indonesian labor regulations are comprehensive, and as such fully conform to ILO requirements (Table 9-1). PT ITL has developed Human Resources Policies and procedures in accordance with national labor regulations reflected in a formal Company Regulation approved by management and to be approved by GOI (Peraturan Perusahaan in Bahasa Indonesia) and appropriately communicated to employees. The Company Regulation will detail Working Conditions and Terms of Employment (see **Appendix 1**).

Table 9-1 Summary of Core ILO Conventions Ratified by GOI

Four Core Conventions	Ratified by Indonesian Government
ILO Convention 87 on Freedom of Association and Protection of the Right to Organize	In Force in 09 Jun 1998
ILO Convention 98 on the Right to Organize and Collective Bargaining	In Force in 15 Jul 1957
ILO Convention 29 on Forced Labor	In Force in 12 Jun 1950
ILO Convention 105 on the Abolition of Forced Labor	UU-19-1999
ILO Convention 138 on Minimum Age (of Employment)	UU-20-1999
ILO Convention 182 on the Worst Forms of Child Labor	UU-01-2000
ILO Convention 100 on Equal Remuneration	UU-80-1957
ILO Convention 111 on Discrimination (Employment and Occupation)	UU-21-1999

Source: Indonesian Labor Law No 13/2003 on Labor

Indonesian law prohibits harmful child labor and forced labor. It also requires equal employment opportunity and includes articles against workplace harassment. This approach affects most aspects of its business, from recruitment, training, and development, to supply chain (purchasing). The Project will aim to ensure gender equality by creating job opportunities for women.

9.3 Working Conditions and Management of Worker Relationship

Working conditions, treatment of workers, and worker's terms of employment shall be communicated to workers verbally and/or in writing. This includes but not limited to:

- Conditions in the workplace refer to the physical environment, health, and safety precautions, and access to facilities (including all basic services such as sanitary facilities, access to drinking water, etc.).
- Treatment of workers refers to all aspects related to respect for the worker's personal dignity, disciplinary practices and reasons, and process for termination.
- Terms of employment refer to remuneration and benefits, deductions, hours of work, breaks, rest days, overtime arrangements, overtime compensation, medical insurance, pension, and leave for illness, vacation, maternity/paternity, or holiday.

9.4 Protecting the Workforce

9.4.1 Child Labor

The Project will not employ children in any manner that is economically exploitative, or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. The Project will identify the presence of all persons under the age of 18. Where employment of minors is allowed under Indonesian law, the Project will follow applicable laws. Children under the age of 18 will not be employed in hazardous work. All work of persons under the age of 18 is subject to an appropriate risk assessment and regular monitoring of health, working conditions and hours of work.

9.4.2 Forced Labor

The Project does not employ forced labor, including any kind of involuntary or compulsory labor (e.g. indentured labor, bonded labor, or similar labor-contracting arrangements). The Project does not employ trafficked persons.

9.5 Non-Discrimination and Equal Opportunity

The principles of equal opportunity and non-discrimination shall be applied through effective methods and as applicable to country specific aspects and the relevant legislation. The basis for recruitment, training, and advancement shall be based on the experience, skill, and qualifications, and the process for recruitment and promotion shall be transparent and consistent. Avoid systematic applications of job requirements that would disadvantage certain groups.

Labor policies and procedures shall address and protect disabled persons and shall include appropriate working conditions, access and egress.

A grievance mechanism shall be available to all workers and a procedure shall be developed to address complaints, handle appeals, and provide recourse for employees. The grievance mechanism shall be developed to protect the confidentiality of the worker.

9.6 Worker Organizations

All workers shall be free to join workers' organizations and may enter into collective bargaining agreements with the employer. In the event that some employees are covered by collective bargaining agreements and others are not, the terms and conditions of employment as well as benefits of all employees in similar positions shall be equivalent. Where collective bargaining agreements are in

place, the employer should verify that these meet the requirements of the applicable legislation. In the absence of such agreements, or where the agreements do not address the particular working conditions and terms of employment, the employer shall provide reasonable working conditions and terms of employment that, at a minimum, to comply with the applicable legislation.

Services to workers shall be provided in a non-discriminatory manner and comply with the applicable legislation as well as international standards for quality, security, and safety.

9.7 Occupational Health and Safety

PT ITL is committed to providing a safe and healthy work environment, taking into account inherent risks, including physical, chemical, biological and radiological hazards and specific threats to women. The Project takes steps to prevent accidents, injury and disease arising from, associated with, or occurring during work by minimizing, as far as reasonably practicable, the causes of hazards. PT ITL will maintain a comprehensive occupational health and safety program to assess the risk of exposure to occupational health hazards and implement adequate controls for the workforce. Every workplace job task will include an evaluation of physical hazards, as well as the potential consequences related to occupational illness.

PT ITL will develop an overall EHS management system consistent with the World Bank Group Environmental, Health and Safety Guidelines to address:

- Identification of potential hazards to workers, particularly those that may be life-threatening;
- Provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances;
- Training of workers;
- Documentation and reporting of occupational accidents, diseases, and incidents; and
- Emergency prevention, preparedness, and response arrangements.

In addition, EBJ will comply with applicable Indonesian laws, most notably Minister of Health Decree No 1405 of 2002 on Health Requirements in the Office and Industry Working Environment and Regulation of Minister of Public Works no. 05/PRT/M/2014 regarding Health and Safety Management System (SMK3) guidelines for Public Constructions.

9.8 Workers Engaged by Third Parties

With respect to contracted workers the Project takes commercially reasonable efforts to ascertain that the third parties who engage these workers are reputable and legitimate enterprises and have an appropriate ESMS that allows them to operate in a manner consistent with the requirements of performance standards. The Project has established policies and procedures for managing and monitoring the performance of such third-party employers in relation to the requirements of performance standards. In addition, the Project incorporates these requirements in contractual agreements with such third-party employers. The Project's grievance mechanism will be made available to contract workers.

9.9 Supply Chain

It is important to manage supply chain during the Project's, especially to address risk of child labor or forced labor in the primary supply chain. The Project is to identify those risks through a disciplined and documented process. If child labor or forced labor cases are identified, the Project takes appropriate steps to remedy them. The Project monitors its primary supply chain on an ongoing basis in order to identify any significant changes in its supply chain and if new risks or incidents of child and/or forced labor are identified, appropriate steps are taken to remedy them.

Even given that ITL has not operated in North Sulawesi previously, the Project is confident that its Supply Chain procedures will identify suppliers that do not use child and forced labor (e.g., at the concrete aggregate quarries during construction). Additionally, PT ITL will develop contractor management procedures and mitigation measures to ensure that suppliers take steps to address high risk significant safety issues. For example, purchase order(s) or supply contract(s) shall contain environmental and social conditions or requirements relevant to the particular materials, equipment or machineries that shall bind the suppliers for compliance.

10 Stakeholder Engagement Plan

PT ITL has established framework for Stakeholder Engagement Plan (SEP) as result of AMDAL and ESHIA study. This SEP document (**Appendix 2**) shall be treated as live document and shall be revised regularly as the Project progresses.

Stakeholder Engagement Plan (SEP) is designed with the aim of providing a platform for consultation and disclosure with Project stakeholders throughout all phases of the solar farm. The SEP sets out the approach the Project will adopt in order to implement an effective engagement program with stakeholders over the life of the Project. Good relations between the Project and its surrounding communities and relevant stakeholders will be essential for the Project to acquire and maintain its social license to operate. It is also an important means for receiving community feedback on project related concerns, perceptions and expectations as well as enabling the Project to disseminate information to the community.

The SEP document shall include and provide adequate details on

1. Project description and social economic setting of Project area
2. Key Indonesian legislation and international guidelines concerning stakeholder engagement which apply to the Project, as well as key principles concerning public or stakeholder consultation and the disclosure of Project information
3. Consultations undertaken to date
4. Stakeholder engagement plan that shall cover
 - a. Stakeholder identification
 - b. Issues and concerns raised by stakeholder during consultation
 - c. Stakeholder analysis (interest, influence, and perception) towards the Project
 - d. Stakeholder engagement methodology
 - Stakeholder engagement materials
 - Communication channels
 - Planned future stakeholder engagement
5. Community grievance mechanism (GM)
6. Management of SEP implementation:
 - a. Dedicated resource for managing SEP and GM
 - b. Monitoring and tracking of stakeholder engagement activities
 - c. Disclosure of grievance mechanism
 - d. Reporting

11 Community Health and Safety Management Plan

PT ITL shall during the project life, continue to seek opportunities (not limited to those identified in the environmental and social impact and risk assessment) to improve environmental conditions which affects the surrounding communities (such as improvement of potable water availability or sanitary wastewater collection, treatment, or discharge) especially where these can be provided at marginal cost to the project.

Community Health, Safety, and Security Management Plan (CHSSMP) document (see **Appendix 3**) is prepared by PT ITL which provides measures and plans in managing and mitigating impacts from the Project that may cause disturbance to community's health, safety, and security, as provided in AMDAL and ESHIA documents. It shall also set out protocol for disclosure of Project's health, safety, and security related information, as well as mechanism for grievances registering and resolution. The document should also include mechanism for ongoing report to the affected community.

The measures and plans set out in CHSSMP is to be implemented by EPC contractor during construction phase and O&M contractor during operational phase. Along with implementation of SEP, PT ITL will also be responsible for disclosing information and communicating it to local community, addressing grievances received, and ongoing reporting to the affected community.

Throughout the Project's lifetime, PT ITL will:

- Notify the affected communities of construction and operation activities prior to the implementation of concerned activities and update them whenever there is a material change to the information provided. This will include, but not limited to:
 - Transportation route and schedule of construction materials, heavy vehicles, and equipment mobilization;
 - Risks, prevention measures, and available treatment for the use of security personnel; and
 - Emergency Preparedness and Reponses Plan.
- Station a community liaison staff who is fluent in local language at the site;
- Aim for rapid response times in resolving grievances, if any; and
- Report to the affected communities on progress of this Community HS&S Management Plan.

The CHSSMP will also include regulations and standard in which the plan should be in compliant with; description of baseline on health, social, and economic condition of the Project area; communication strategy; grievance mechanism; information disclosure and communication in the event of emergency; as well as measures and actions necessary to address community health, safety, and security specific issues and impacts.

12 Contractor Management Plans

12.1 Construction HSE Management Plan

Construction Health, Safety, and Environment Management Plan (CHSEMP) is to be developed to identify the health, safety, and environmental management and mitigation actions required to execute the Project in accordance with the requirements of the International Finance Corporation's Performance Standards (IFC-PS) and applicable Indonesian national and local laws, standards, and regulations. It provides a summary of the potential impacts associated with the solar farm and sets out the management measures required to mitigate these potential impacts. The site-specific CHSEMP is to be prepared and implemented by the contractors and subcontractors commissioned by PT ITL for the Project and shall form the basis of activity-specific procedures prepared by the contractors as part of their construction work plan.

The potential impacts and associated mitigation measures and management procedures in CHSEMP shall be based on the management system laid out in the ESHS-MS document as well as baseline information and assessments provided in the AMDAL and ESHIA documents. The CHSEMP should be treated as living document and shall be updated as required during the Project construction.

12.2 Recruitment Plan

Contractor shall provide recruitment plan prior to construction commencing. This recruitment plan shall be focusing on local recruits to address requirement stipulated in AMDAL document. The recruitment plan shall detail the number and role/position of worker required for the Project; applicable regulation related to worker procurement; types of working arrangement including work time and wage/benefit; as well as method and procedure for worker recruitment.

12.3 Training Matrix and Management Plan

In order to ensure the personnel involved in the construction activities of the Project have the required skills and knowledge to perform their jobs/activities, it is important for the contractor to propose a Training Management Plan (TMP). The plan shall identify the training needs of the personnel through needs analysis and training matrix. It shall also refer to the applicable international standard related to the training, for example ISO 140001 regarding internationally recognized environmental system standard. The TMP shall provide adequate details on plan, schedule, and type of training to be conducted, as well as the qualification of trainers. The trainings that have been conducted shall be documented.

12.4 Waste Management Plan

Waste Management Plan (WMP) is to be prepared by the contractor that shall cover waste management during construction period. The document shall be use as guidance in the effort to reduce the production of waste to a minimum, to reuse or recycle where practical and to ensure that people or the environment is not compromised by poor waste management practices.

At minimum, the WMP document shall provide details on

- Applicable regulatory requirements that the Project must be in compliance with
- Roles and responsibilities of involved parties and personnel
- Waste classification, that shall include hazardous and non-hazardous waste

- Waste handling procedure, including waste collection, segregation, storage, transportation, and disposal
- Estimation of amount and type of waste to be generated during the construction period
- Proposed storage location in the Project area and the available disposal facilities around the area
- Management of contaminated land
- Recording and reporting

12.5 Security Management Plan

Contractor is required to establish Security Management Plan (SMP) in which the objective is to guide the Contractor's actions at the project in protecting against and mitigating risks of a security (as well as a human rights) that could threaten communities, employees, facilities, and ability to operate, as well as the reputation of the Contractor, the Company, and its global operations.

The SMP document shall be formulated and implemented so to ensure that all Company's and Contractor's staff, sub-contractors, and visitors working at the project site and in the project area are able to do so in a safe and secure environment. It is also to ensure that all facilities are kept safe and secure, and that all project operations are unhindered. The contractor shall provide effective security-operational support to all project activities. The standard is to follow the UN

12.6 Emergency Preparedness and Response Plan

Emergency Preparedness and Response Plan (EPRP) is to be prepared by the contractor to be used as a guidance in managing emergency event, through the following

- Providing a management structure to manage the tactical and strategic issues resulting from an emergency
- Documenting the relationships between the Corporate Crisis Management Teams and the site-specific Emergency Response Groups
- Documenting the roles, responsibilities and checklist of the individual Emergency Management Team members
- Documenting the interfaces of the Emergency Management Team with external agencies. Providing relevant supporting performance, guidelines and contact lists.

12.7 Traffic Management Plan

Contractor is to establish Traffic Management Plan (TMP) to be implemented during construction period. The objective is to minimize the likelihood of traffic accident and disturbance to community during the construction period.

The TMP shall provide background on local context and key transportation issue in the area, existing condition of the road and its capacity. The management plan shall cover strategy for information disclosure, safety mitigation, type of signage and places to put temporary signage and flag-persons, Project's vehicles requirement, and driver discipline.

12.8 Worker's Accommodation Plan

At the current stage of the Project (as per November 2017), accommodation arrangements during construction are yet to be confirmed by the EPC. The base case is that the non-local workforce would stay in available accommodation within the local community. Onsite worker's accommodation may

be established if the available accommodation is not adequate to accommodate all the non-local workforce.

Should on site worker's accommodation is required during the construction period, the Contractor is obligated to prepare Worker's Accommodation Management Plan (WAMP). The WAMP document shall provide details on the arrangement of the worker's accommodation and shall ensure that the arrangement is in compliant with the requirements of the IFC/EBRD standard for the construction and operation of the worker's accommodation.

13 Implementation Plan

13.1 Time Scheduling

The ESHS-MS requirements set in this document should be implemented throughout the lifetime of the Project. Full use should be made of existing environmental protocols, programs, systems and recording systems where appropriate.

13.2 Communication

PT ITL shall establish and maintain procedures for the following:

- a) Internal communication between various functions and levels
- b) Receiving, documenting, and responding to external party interests

13.3 Incidents Management, Non-conformance, and Corrective Action

PT ITL shall provide a summary report of incidents and investigation outcomes for key incidents in the routine reports.

Notifiable environmental and social incidents of relevance to this ESMP include:

- Regulatory non-compliance including permit/licenses exceedance, liquids loss of containment (oils, diesel, hazardous liquids, chemicals);
- Solids loss of containment - > 40kg hazardous materials;
- Any stakeholder complaint or grievance; and
- Event that has heightened social impact or community concern or has the potential to attract adverse media attention.

Corrective actions (those that correct an actual deficiency) and preventive actions (those that remove the causes of a potential issue) are identified in response to a variety of management process and operational outcomes including the following:

- Risk assessments;
- Communications;
- Incidents and emergencies;
- Emergency preparedness and response planning;
- Audits; and
- Reviews.

PT ITL will develop a system for tracking all actions, including corrective and preventive actions as described above. Actions are prioritized, periodically reviewed, and completed in a timely manner. PT ITL Action Log tracks and manages actions including email notification of new actions and reminders for actions requiring completion, editing of action information by the responsible person, and action status reporting.

Corrective and preventive actions arising from non-conformances and incidents at the solar farm activities are managed in accordance with the incident management plan. Tracking of corrective and preventive actions should be provided, once responsibilities have been assigned and accepted, and completion deadlines have been set. Details of corrective actions are recorded in the incident logs and the actions are tracked to completion. Actions managed in an external contractor's system shall still be summarized in the incident logs. Recorded details of actions include:

- A clear description of the task;
- The action creator (the ‘Assigned By’ person in the incident logs);
- The action assignee (the ‘Assigned To’ person in the incident logs); and
- The required completion date;
- The person responsible for checking and closing the action.

Under the incident management system, contractors/sub-contractors are responsible for the implementation of all corrective actions and controls necessary to prevent recurrence of incidents within their areas of responsibilities.

Contractors and sub-contractors are to review and analyze all corrective actions and may propose corrective controls to prevent recurrences. The principal contractor HSE Manager or Safety Officer is accountable to ensure that the controls put in place are in compliance with relevant standards by:

- Analyzing all processes, operations, concessions, environmental records, reports including complaints, to detect and eliminate potential causes of non-compliance;
- Initiating preventative actions to deal with problems to a level corresponding to the risk encountered;
- Maintaining records of reviews and corrective actions;
- Maintaining a log of corrective and preventative actions for all incidents; and
- Tabling incident logs tabled at weekly progress meetings and monitored to ensure their effectiveness and timely close out of corrective actions.

Contractors shall be required to maintain a Non-Conformance/Incident Register and provide details of any such event in the Monthly Report to the ESHSU. The Register should be available for inspection by stakeholders approved by PT ITL.

13.4 Documentation

PT ITL shall maintain information relating to key elements of the ESHS-MS in hard copy and electronic format.

A documentation control system should be established and maintained to ensure that documentation is prepared in a standardized manner, stored, and retrieved for use and review.

13.5 Monitoring

PT ITL shall have systems in place to monitor and report environmental and social performance, as well as to assess and audit the effectiveness of the contractors’ systems and plans (and those of their sub- contractors) to be able to manage and mitigate risks.

The contractors should develop and implement monitoring programs in their respective areas to measure the performance of various project activities against pre-approved objectives, standards or measures to meet the statutory approval regimes under all applicable Indonesia environmental and social laws. Monitoring required under these jurisdictions shall be conducted by suitably qualified persons. The monitoring methods, locations, parameters, and frequency are specified in the relevant approval conditions under these authorities.

During the construction and operation phase the monitoring programs, as set in the ESMP and required by the BLHD, shall be implemented based on the established protocols for each parameter.

A lender's third-party monitoring will also be undertaken at least in annual basis during the construction phase and number of years during the operation phase.

13.6 Auditing

PT ITL shall establish and maintain program and procedures for auditing the ESHS-MS to ascertain whether the ESHS-MS requirements have been conformed to and has been properly implemented and maintained. Auditing of compliance with the ESHS-MS shall be undertaken at least on an annual basis or more frequent if deemed necessary.

13.7 Reporting

Reporting and incident notification should be handled as part of the respective incident management processes managed by PT ITL, EPC Contractor and its sub-contractors, as well as contractors engaged during operation and decommissioning phases of the project.

The following are the reporting requirements consistent with each of the management plans:

- The EPC Contractor shall provide monthly updates on routine monitoring and auditing results;
- Non-routine monitoring and auditing results shall be communicated to the ESHSU Manager as they become available;
- As per AMDAL requirements, the Environmental Officer shall be responsible for the preparation and submission of regular (six monthly) monitoring report to BLHD and other related authorities;
- The Safety Officer shall prepare and submit to the regional (regency level) manpower body the occupational safety and health reports;
- Where additional reporting is required it is noted within the relevant management plan.

The EPC contractor and its sub-contractors are required to notify relevant authorities as soon as reasonably practical within a fixed period of becoming aware of incidents or non-compliances that result in (or could result in) harm. These notification requirements are specified in the Act No. 13 of 2003.

The incidents and non-compliance notifications and reporting regime may cover a range of triggers, these include but not limited to the following incidents:

- Any release of contaminants not in accordance with the conditions of the Ministry of Environment's (MoE) emissions and effluents standards;
- Accidents resulting to injuries or fatality(ies) should be reported based on the Ministry of Manpower (MoM) requirements;
- Any other non-compliance with any condition of the MOE and/or MOM regulations and/or standards;
- Any event where environmental or personal harm has been caused or may be caused; and
- Releases of any volumes of contaminants where potential serious or material environmental harm has occurred or may occur.

Apart from providing specific details of the incident or non-compliance, PT ITL should investigate the cause of the incident or non-compliance and provide the administering authority written reports, which should include:

- The root cause of the emergency or incident;
- The confirmed quantities and types of any contaminants involved in the incident;
- Number of people involved in the incident;
- Results and interpretation of any analysis of samples taken at the time of the emergency or incident (including the analysis results of any impact monitoring);
- A final assessment of the impacts from the emergency or incident including any actual or potential environmental or personal harm that has occurred or may occur in the longer term as a result of the release or incident;
- The success or otherwise of actions taken at the time of the incident to prevent or minimize environmental or personal harm;
- Results and current status of stakeholders' consultation, including commitment to resolve any outstanding issues and/or concerns; and
- Actions and/or procedural changes to prevent a recurrence of the emergency or incident.

PT ITL shall provide written advice to MOE of the results of any monitoring performed in relation to an emergency or incident that results in the release of contaminants not in accordance with, or reasonably expected not to be in accordance with, the emissions and effluents standards. The report shall be provided as soon as practicable, but not more than six weeks following the specific monitoring activities.

Observed non-conformances and incidents associated with non-conformances should be recorded and reported using the Incident Management processes that have been established by PT ITL and the EPC contractor. Where non-conformances are identified as a result of a site inspection, assessment or audit, the results should be contained in the relevant inspection, assessment and audit reports, and corrective and preventive actions assigned to responsible managers and tracked until they are closed out.

PT ITL shall require the EPC Contractor to report lagging and leading HSE indicators against targets to PT ITL monthly on the 15th business day after the end of each month. Specific measurements for the PT ITL SO and EPC Contractor to report are set out in the OHS Plan, and may include:

- Employee and contractor working hours;
- Recordable injuries;
- Environmental or social incidents;
- Number of near misses;
- Number of observations, including hazards and positive behaviors; and
- Other leading indicators reviewed and agreed during HSE strategic planning based on the stage of business development and priority risks, and being representative of HSE management system effectiveness and HSE culture that can affect future performance and guide improvement plans.

PT ITL EO and the EPC Contractor are responsible for ensuring that relevant metrics are tracked and reported in the monthly performance reports.

External reporting of the project's environmental and social performance (other than reporting to Regulatory authorities) is currently limited to the provision of data and case studies for public

sustainability reports prepared by the ESHSU submitted to the Lenders and other external reports as may be necessary.

The EPC Contractor shall establish and maintain procedures for identification and maintenance of EMP records.

13.8 Management Review

The purpose of management review is to:

- Ensure that management reviews are conducted regularly;
- Ensure that an accurate reporting system is in place in documenting the results of the management reviews; and
- Ensure continual development for the ESHS-MS.

The review shall be carried out by management annually. The following item of ESHS-MS shall be reviewed:

- ESHS performance;
- Changes to activities/products, and/or services, and developments in ESHS legal and other requirements related to ESHS aspects;
- Results of the internal and external ESHS-MS audits;
- Communications to stakeholders including complaints;
- Follow-up actions from previous management reviews;
- Status of corrective and preventive actions; and
- Opportunities for continual improvements