Environmental and Social Impact Assessment Report (ESIA) – Lombok

Project No.: 51209-002
February 2018

INO: Eastern Indonesia Renewable Energy Project (Phase 2)

Prepared by ERM for PT Infrastruktur Terbarukan Lestari

Environmental and Social Health Impact Assessment (ESHIA); Solar Farm Project and 20-kV Transmission Line in Pringgabaya, Selong and Sengkol – Nusa Tenggara Barat Province, Indonesia

Prepared for:
PT Infrastruktur Terbarukan Adhiguna ("ITA"), PT Infrastruktur Terbarukan Buana ("ITB") and PT Infrastruktur Terbarukan Cemerlang ("ITC")

February 2018

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Environmental and Social Health Impact Assessment (ESHIA): Solar Farm Project and 20-kV Transmission Line in Pringgabaya, Selong and Sengkol—Nusa Tenggara Barat Province, Indonesia.

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Equis Energy has commissioned PT ERM Indonesia (ERM) to undertake an Environmental, Social and Health Impact Assessment (ESHIA) of the Project. The purpose of the ESHIA is to provide an environmental and social assessment of the Project against the International Finance Corporation (IFC) Performance Standards, associated World Bank Group Environmental, Health and Safety (EHS) Guidelines and Asian Development Bank (ADB) Safeguard Policies.	**Date** 8 February 2018 **Approved by**  **Samantha McCrea** *Partner* *ERM Indonesia*

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

PT. ITA, ITB, and ITC 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 International Finance Corporation's (IFC) Performance Standards (PS), associated World Bank (WB) Group's Environmental, Health and Safety (EHS) Guidelines, and the Asian Development Bank (ADB) Safeguard Policy Statement (SPS). The Proponents have 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 its own internal corporate environment, social and health standards that the Project will adhere to.

Based on Indonesian national regulations, each site had obtained an approval of UKL-UPL as required in the regulation. The UKL-UPL document does not assess all items as required by above international standards, therefore in order to comply with the above international standards and address the gap between UKL-UPL and the above international standards assessment items, an ESHIA document is required. Separate to the regulatory UKL-UPL process, this ESHIA provides an assessment of the Project's environmental and social impacts against the IFC PS, World Bank Group EHS Guidelines, ADB Safeguard Policy Statement, and Equis Energy standards and culminates in a clear set of management and mitigation measures to be implemented by the Project. As an additional environmental document to comply with IFC PS, World Bank Group EHS Guidelines, ADB SPS, and Equis Energy standards, this ESHIA has determined additional mitigation measures required to address all existing impacts.

PT ITA, ITB, and ITC plan to develop and operate each 5 MWac solar power project to supply power to the Lombok Timur and Lombok Tengah grid. Recent policy decisions by the Government of Indonesia (GoI) have encouraged significant power investment in Indonesia, including for renewable energy projects. 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.

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 April 2019. At the time of this ESHIA study the company had signed the Power Purchase Agreement (PPA) with PT PLN.

Socialisation and public consultation activities have been undertaken by the Project Proponent and UKL-UPL consultant team in the Pringgabaya, Selong, and Sengkol Sites. These activities were intended to provide information on the Project plan, its potential impacts, and mitigation measures to the villagers and also provide a forum for questions, detailed consultation results.

The main station building will consist of a control room, switchgear room, meeting room, O&M storage room, pantry and toilets. Rooms will be fully furnished as required (i.e., table, shelves, control desk, whiteboard and epoxy floor).

There will be a total of 21,880 PV modules installed at each site, divided into 1,094 strings lined up on a 7.91 ha area. The PV modules are designed to have 8.08 m row to row spacing and 10° tilt angle (with respect to horizontal), in order to minimize shading loss.

An overhead 20 kV transmission line will be constructed approximately 3 km from the solar power plant to the PLN Pringgabaya 150/20kV substation. The 20 kV transmission line is a medium voltage overhead line which comprises non-insulated and insulated wire network.

The following impacts activities were assessed:

- Impacts from loss of land resource;
- Impact to Local Economy from Employment and Business Opportunities during the Project Construction and Operation;
- Construction impacts on Air Quality;
- Construction impacts on Ambient Noise Levels;
- Construction impacts from Vegetation Clearing;
- Construction impacts on Habitat and Wildlife;
- Construction impacts Soil erosion and Surface Water Quality Impacts;
- Impacts from Project Construction and Operations Water Demand;
- Physical Presence of Transmission Lines on of Birds and Bats;
- Spills and Soil/Water Contamination;
- Impacts on Occupational Health and Safety of Workers; and
- Impact to Community Safety.

A summary of the environmental and social impact assessment, mitigation and residual impact significance is shown in **Table ES1**.

Table ES1 ESHIA Impact Assessment Summary

Impact Description	Impact Nature	Significance of Impact	Residual Impact
Impacts from loss of land resource	Negative	Negligible	Negligible
Impact to local economy from employment and business opportunities during the project construction and operation;	Positive	N/A	N/A
Construction impacts on air quality	Negative	Minor	Minor
Construction impacts on ambient noise levels;	Negative	Minor	Minor

Impact Description	Impact Nature	Significance of Impact	Residual Impact
Construction impacts from vegetation clearing	Negative	Minor	Minor
Habitat Disturbance	Negative	Negligible	Negligible
Construction impacts on habitat and wildlife	Negative	Minor	Negligible
Construction impacts soil erosion and surface water quality impacts	Negative	Negligible	Negligible
Impacts from project construction and operations water demand	Negative	Moderate	Minor
Physical presence of transmission lines on of birds and bats		Minor	Negligible
Spills and soil/water contamination	Negative	Minor	Negligible
Construction Impacts on Occupational Health and Safety of Construction Workers	Negative	Moderate	Minor
Operational Impacts on Occupational Health and Safety of Operation Workers	Negative	Minor	Negligible
Impact to community safety	Negative	Minor	Minor

Due to data gaps and limitations, further study is required on:

- Considering the proximity of the project site to residential areas, ambient air quality and noise level baseline data collection is recommended to be conducted.
- In addition to air quality and noise level standards, it is also important to compare monitoring results with the baseline especially if the results exceed standards or cause nuisance to local communities. The Pringgabaya site in particular is located near stone crusher activities which most likely have decreased air quality in their surrounding area.

UNITS AND ABBREVIATIONS

A	:	Ampere
AC	:	Alternating Current
ADB	:	Asian Development Bank
ADB SPS	:	Asian Development Bank Safeguard Policy Statement
ALARP	:	As Low as Reasonably Practicable
am	:	ante meridiem/before midday
AMDAL	:	*Analisis Mengenai Dampak Lingkungan*/Environmental Impact Assessment
AoI	:	Area of Influence
APL	:	*Areal Penggunaan Lain*/Area for Other Use
a-Si	:	Amorphous Silicon
BAPPEDA	:	*Badan Perencanaan Pembangunan Daerah*/Regional Development Planning Agency
BKPRD	:	*Badan Koordinasi Penataan Ruang Daerah*/Regional Spatial Planning Coordination Agency
BKPM	:	*Badan Koordinasi Penanaman Modal*/Capital Investment Coordinating Board
BKPMD	:	*Badan Koordinasi Penanaman Modal Daerah*/Regional Capital Investment Coordinating Board
BNP2TKI	:	*Badan Nasional Penempatan dan Perlindungan Tenaga Kerja Indonesia*/National Agency for the Placement and Protection of Indonesian Workers
BOD	:	Biochemical Oxygen Demand
BOS	:	*Bantuan Operasional Sekolah*/School Fund Operational Assistance
BPN	:	*Badan Pertanahan Nasional*/National Land Agency
BPPT	:	*Badan Pengkajian dan Penerapan Teknologi*/Agency for Assessment and Application of Technology
BPS	:	*Badan Pusat Statistik*/Central Agency of Statistic
B3	:	*Bahan Berbahaya dan Beracun*/Hazardous and Toxic Materials
CAGR	:	Compound Annual Growth Rate
CAP	:	Corrective Action Plan
CdTe	:	Cadmium Telluride
CIGS	:	Copper Indium Gallium (Di)selenide
CITES	:	the Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLO	:	Community Liaison Officers
CR	:	Critically Endangered
CoC	:	Code of Conduct
COD	:	Commercial Operation Date
CO_2	:	Carbon Dioxide
CSR	:	Corporate Social Responsibility

c-Si	:	Crystalline Silicon
dBA	:	A-weighted Decibels
DC	:	Direct Current
DD	:	Data Deficiency
Dept.	:	Department
DLH	:	*Dinas Lingkungan Hidup*/Environmental Agency
DMC	:	Developing Member Countries
DPRD	:	*Dewan Perwakilan Rakyat Daerah*/Regional House of Representative
DPR-RI	:	*Dewan Perwakilan Rakyat Republik Indonesia*/ Indonesian House of Representative
EHS	:	Environmental, Health and Safety
EHSS	:	Environmental, Health, Safety and Social
EMP	:	Environmental Management Plan
EN	:	Endangered
EPC	:	Engineering, Procurement and Construction
EPFIs	:	Equator Principle Financial Institutions
Eps	:	Equator Principles
ERM	:	PT Environmental Resources Management
ESF	:	Environmental and Social Framework
ESG	:	Environmental, Social and Corporate Governance
ESHIA	:	Environmental, Social and Health Impact Assessment
ESIA	:	Environmental and Social Impact Assessment
ESAP	:	Environmental and Social Action Plan
ESMF	:	Environmental and Social Management Framework
ESMP	:	Environmental and Social Management Plan
ESMS	:	Environmental and Social Management System
etc.	:	et cetera
e.g.	:	exempli gratia/for example
GAD	:	Gender and Development
gCeq	:	Grams of Carbon Equivalent
GDP	:	Gross Domestic Product
GHG	:	Greenhouse Gases
GIIP	:	Good International Industry Practice
GISD	:	Global Invasive Species Data
GoI	:	Government of Indonesia
GPS	:	Global Positioning System
GR	:	Government Regulation
GTRM	:	Grievance Tracking and Redress Mechanism
GW	:	Gigawatt
Ha	:	hectare
HGB	:	*Hak Guna Bangunan*/Building Rights Permit
HR	:	Human Resources
HSD	:	High Speed Diesel

HSE	:	Health, Safety and Environmental
Hz	:	Hertz
IA	:	Impact Assessment
IBA	:	Important Bird and Biodiversity Area
IDR	:	Indonesian Rupiah
IEE	:	Initial Environmental Examination
IEC	:	International Electrotechnical Commission
IFC	:	International Finance Corporation
IFC PS	:	International Finance Corporation Performance Standards
ILO	:	International Labour Organisation
IPP	:	Independent Power Producer
IPPF	:	Indigenous Peoples Planning Framework
ITA	:	PT Infrastruktur Terbarukan Adhiguna
ITB	:	PT Infrastruktur Terbarukan Buana
ITC	:	PT Infrastruktur Terbarukan Cemerlang
IUCN	:	The International Union For Conservation of Nature
ISO	:	International Organization for Standardisation
i.e.	:	id est,/that is
Jl.	:	*Jalan*/Road
KBA	:	Key Biodiversity Area
kg	:	Kilogram
KIP	:	*Kartu Indonesia Pintar*/Indonesian Smart Card
KIS	:	Kartu Indonesia Sehat/Indonesian Health Card
km	:	Kilometre
km^2	:	Square Kilometre
kV	:	Kilo Volt
kVA	:	Kilo Volt-Ampere
kWh	:	Kilowatt Hour
kWp	:	Kilowatt Peak
L	:	Litre
LC	:	Least Concern
LNG	:	Liquefied Natural Gas
LSM	:	*Lembaga Swadaya Masyarakat*/Non-Governmental Organisation
m	:	Metre
MC	:	Multi-Contact
mm	:	Millimetre
m^2	:	Square Metre
m^3	:	Cubic Metre
MEMR	:	Ministry of Energy and Mineral Resources
MFO	:	Marine Fuel Oil
MoE	:	Ministry of Environment
MoEF	:	Ministry of Environment and Forestry
MV	:	Medium Voltage

MVA	:	Mega Volt-Ampere
MW	:	Megawatt
MWh	:	Megawatt Hour
MWp	:	Megawatt Peak
Mwac	:	Megawatt of Alternating Current
msl	:	Mean Sea Level
NA	:	Not Applicable
NDIR	:	Non-Dispersive Infrared
NGO	:	Non-Governmental Organisation
NRE	:	New and Renewable Energy
NT	:	Near Threatened
NTB	:	*Nusa Tenggara Barat*/West Nusa Tenggara
№	:	Numero sign
NO_2	:	Nitrogen Dioxide
OECD	:	The Organisation for Economic Co-Operation And Development
OHS	:	Occupational Health and Safety
O&M	:	Operations and Maintenance
PERMENLH	:	*Peraturan Menteri Lingkungan Hidup*/ Minister of Environment Regulation
PDAM	:	*Perusahaan Daerah Air Minum*/Regional Drinking Water Company
pcs	:	Pieces
PIC	:	Person in Charge
PKK	:	*Pembinaan Kesejahteraan Keluarga*/Family Welfare Development
PLN	:	*PT Perusahaan Listrik Negara*/State-owned Electricity Company
PM	:	Particulate Matter
pm	:	post meridiem/past midday
Pokja AMPL	:	*Kelompok Kerja Air Minum dan Penyehatan Lingkungan*/Working Group on Water Supply and Sanitation
PPA	:	Power Purchase Agreement
PPE	:	Personal Protective Equipment
PT	:	*Perseroan Terbatas*/Limited Corporation
PV	:	Photovoltaic
RUPTL	:	*Rencana Usaha Penyediaan Tenaga Listrik*/Power Supply Business Plan
RF	:	Resettlement Framework
ROW	:	Right of Way
RP	:	Resettlement Plan
RSUD	:	*Rumah Sakit Umum Daerah*/Regional Public Hospital
SCADA	:	Supervisory Control and Data Acquisition
SIPA	:	*Surat Izin Pengambilan Air Tanah*/Groundwater Abstraction Permit
SMEs	:	Small and Medium-sized Enterprises
SMKN	:	*Sekolah Menengah Kejuruan Negeri*/State Vocational School
SOx	:	Sulfur Oxides

SO_2	:	Sulfur Dioxide
SPAL	:	*Saluran Pembuangan Air Limbah*/Sewerage Channel
SPV	:	Special Purpose Vehicle
SQL	:	Structured Query Language
SPS	:	*Sistem Pengelolaan Sampah*/Municipal Waste Management System
sp.	:	Species; an unspecified species of a genus
TDS	:	Total Dissolved Solid
TKI	:	*Tenaga Kerja Indonesia*/Indonesian migrant workers
TOR	:	Term of Reference
TPS	:	*Tempat Penyimpanan Sementara*/Temporary Storage
TPS-B3	:	*Tempat Penyimpanan Sementara Bahan Berbahaya dan Beracun*/ Temporary Storage for Hazardous Waste
TSP	:	Total Suspended Particulate
TSS	:	Total Suspended Solid
TWh	:	Terawatt-hour
UKL-UPL	:	*Upaya Pengelolaan Lingkungan dan Upaya Pemantauan Lingkungan*/Environmental Management and Monitoring Efforts
UN	:	United Nations
UN PRI	:	United Nations Principles of Responsible Investment
UNRAM	:	*Universitas Mataram*/Mataram University
USD	:	United States Dollar (currency)
V	:	Volt
VU	:	Vulnerable
W	:	Watt
WB	:	World Bank
WHO	:	World Health Organisation
°C	:	Degree Celsius

1 INTRODUCTION

Lombok Solar Farm and Transmission Line Project (hereinafter referred as the "Project") involves the development of solar power generation facility with the total capacity of 15 MWac and 20 kV overhead transmission line in Lombok Island, Nusa Tenggara Barat (hereinafter referred as "NTB") Province. The Project location will be divided to three sites each of 7 MWp (5 MWac) connected to a 20 kV substation. The Project will be developed and will be operated by PT Infrastruktur Terbarukan Adhiguna ("ITA"), PT Infrastruktur Terbarukan Buana ("ITB"), and PT Infrastruktur Terbarukan Cemerlang ("ITC"), together referred as the "Proponents", who are a Special Purpose Vehicle (SPV) established by Equis Energy.

1.1 PURPOSE AND SCOPE OF THE ESHIA

ITA, ITB, and ITC 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), associated World Bank (WB) Group's Environmental, Health and Safety (EHS) Guidelines, and ADB Safeguard Policy Statement. The Proponents have 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 has its own internal corporate environment, social and health standards that the Project will adhere to.

Based on Indonesian national regulations, each site had obtained an approval of UKL-UPL as required in the regulation. The UKL-UPL document does not assess all items as required by above international standards, therefore in order to comply with the above international standards and address the gap between UKL-UPL and the above international standards assessment items, an ESHIA document is required. Separate to the regulatory UKL-UPL process, this ESHIA provides an assessment of the Project's environmental and social impacts against the IFC PS, World Bank Group EHS Guidelines, ADB Safeguard Policy Statement, and Equis Energy standards and culminates in a clear set of management and mitigation measures to be implemented by the Project. As additional environmental document to comply with IFC PS, World Bank Group EHS Guidelines, ADB Safeguard Policy Statement, and Equis Energy standards, this ESHIA has determined additional mitigation measures required to address all existing impacts from UKL-UPL and additional impacts from impact assessment part.

Environmental and social baseline studies are an essential component to the ESHIA process. Although not always required for the UKL-UPL process, some environmental and social baseline studies have been conducted. The studies commenced in late 2016 to support the Indonesian Regulatory approval of the project. The UKL-UPL baseline was then used for baseline for this ESHIA study. In addition, a 4-day site visit was conducted for the ESHIA scoping and also to gain data from visual observation and interviews. The visit only covered visual observation and

interviews, while primary sampling and laboratory analysis are not part of this assessment.

1.2 PROJECT PROPONENT

ITA, ITB, and ITC have been established to construct and operate the Project on behalf of Equis Energy; the largest renewable energy Independent Power Producer (IPP) in the Asia-Pacific region.

Equis Energy was formed in 2012 as a platform company of Equis Funds Group (Equis), Asia's largest independent infrastructure private equity manager headquartered in Singapore. Equis Energy is 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

ITA, ITB, and ITC plans to develop and operate each 5 MWac solar power project to supply power to the Lombok Timur and Lombok Tengah grid. Recent policy decisions by the Government of Indonesia (GoI) have encouraged significant power investment in Indonesia, including for renewable energy projects. 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 35,000 MW 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 25,000 MW of the targeted 35,000 MW will be developed by private investors' under a scheme of Independent Power Producers (IPP's). The remaining 10,000 MW 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 10,500 MW from the 35,000 MW target shall be generated from renewable energy including wind and solar power sources. The Proponents, as IPPs', aim to support this program through development of the Lombok Solar Project.

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

The current peak load demand in Lombok is 187.76 MW, while installed capacity is 269.56 MW. The peak demand and electricity sales are projected to grow at 10.2% and 9.7% Compound Annual Growth Rate (CAGR), respectively, between 2016 and 2025.

Diesel accounted for 84% of all power production in Lombok in 2014 (no recent data is available), followed by coal (11.8%). The average cost of generation within this

region is estimated to be approximately USD 12.24 cents/kWh (as per Regulation of Minister of Energy and Mineral Resource Number 1404 K/20/MEM/2017). The role of diesel power plants in Lombok remains significant, but is a comparatively expensive means of power production. As such, renewable energy such as solar is becoming a more attractive option for PLN in diversifying its power generation mix.

Renewable energy projects, in particular solar projects, have a 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 in the feasibility study predicts that the Lombok Solar Farm will bring environmental and social benefits which have been assessed to be:

- Producing enough power for about 17,980 Indonesian households that are connected to the grid;
- Providing local employment for a total of 144 workers over the construction and 13 workers over the operation of Lombok 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 CO_2 than an equivalent conventional power plant for the cumulative saving of over 625,000 tonnes of CO_2 over a 25-year period.

1.4 *OVERVIEW OF THE PROJECT*

Three solar farms will be developed in different villages and regencies across Lombok Island (***Figure 1-1***). The key details for each solar farm and transmission line are described in ***Table 1-1***. Total land area acquired is greater than the total project land requirement to accommodate landowners' preference to sell larger parcels of land.

Table 1-1 Project Key Details

Item	Pringgabaya	Selong	Sengkol
Name	Pringgabaya solar farm	Selong solar farm	Sengkol solar farm
Capacity	7 MWp (5 MWac)	7 MWp (5 MWac)	7 MWp (5 MWac)
Number of Modules	21,540 panels	21,540 panels	21,540 panels
Location	Pringgabaya Utara Village, Pringgabaya District, Lombok Timur Regency	Geres Sub-District, Labuhan Haji District, Lombok Timur Regency	Sengkol Village, Pujut District, Lombok Tengah Regency
Land area required	Solar farm: 8 ha	Solar farm: 8 ha	Solar farm: 8 ha
Land area acquired	11.19 Ha	Solar farm: 8.63 Ha	Solar farm: 8.73 Ha
Land use	Rain fed agriculture		
Grid Connection	3.5 km 20 kV overhead transmission line to PLN Pringgabaya 150/20kV substation:	9.2 km 20 kV overhead transmission line to PLN Selong 150/20kV substation:	2.6 km 20 kV overhead transmission line to PLN Sengkol 150/20kV substation.

Item	Pringgabaya	Selong	Sengkol
	3.1 km on private land and 0.4 km on existing ROW	3.06 km on private land and 6.12 km on existing ROW	1 or 2 poles on private land, and the rest are on existing ROW.

Source: PT ITA, PT ITB, PT ITC, 2017

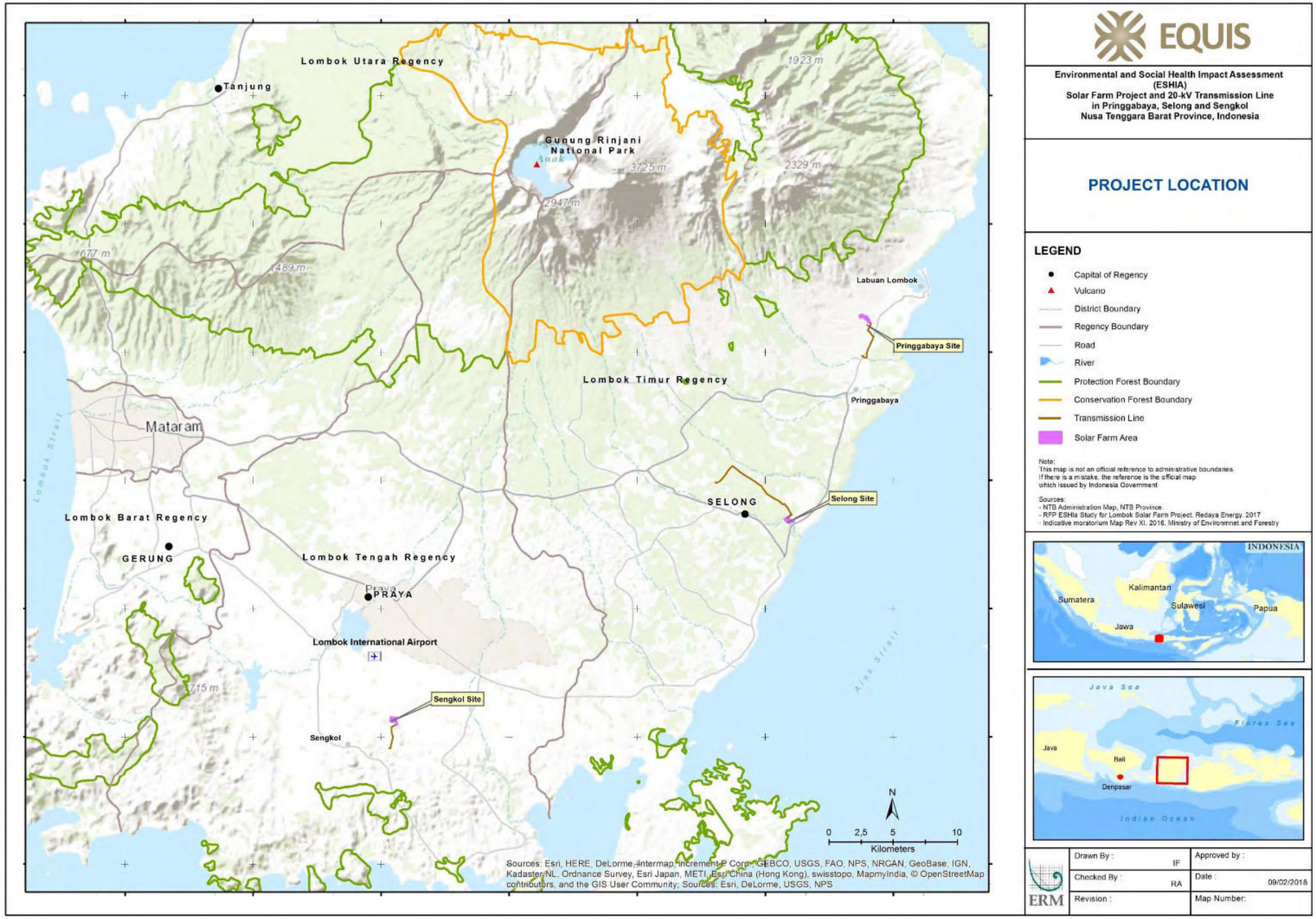
All sites have secured a Principal Permit, Location Permit, Recommendation Letter[1] for Land Use, and Technical Consideration from the Local Governor on ITA, ITB, and ITC's Development Plan in Lombok Timur and Lombok Tengah Regency, Nusa Tenggara Barat (NTB) Province. The land acquisition process for Pringgabaya, Selong, and Sengkol solar power plant location has been completed. Land acquisition for access roads in all sites has also been completed. Prior to the Project, the Pringgabaya, Selong, and Sengkol sites were used for rain fed dry land agriculture.

All three sites have obtained an environmental permit through the Indonesian regulatory environmental approval process for each site, locally referred to as UKL-UPL (Environmental Management and Monitoring Effort/*Upaya Pengelolaan Lingkungan Hidup dan Upaya Pemantauan Lingkungan Hidup*).

In addition to the UKL-UPL process, this Environmental, Social and Health Impact Assessment (ESHIA) has been developed to provide an understanding of the Project's alignment with applicable international standard (**Section 4.3**). Alignment with these expectations is a requirement of Equis Energy to support future financing of the Project. Along with the identification and assessment of predicted environmental, social and health impacts, the ESHIA requires appropriate management and mitigation measures to manage the potential impacts to an acceptable standard in accordance with the Applicable Lender Standards (EPIII, IFC, ADB and Equis).

[1] Recommendation letter is issued by the spatial management coordination body (*Badan Koordinasi Penataan Ruang)* in a regency level that confirm whether the project is inline or not with the local government spatial plan (RTRW) as part of AMDAL/UKL-UPL approval.

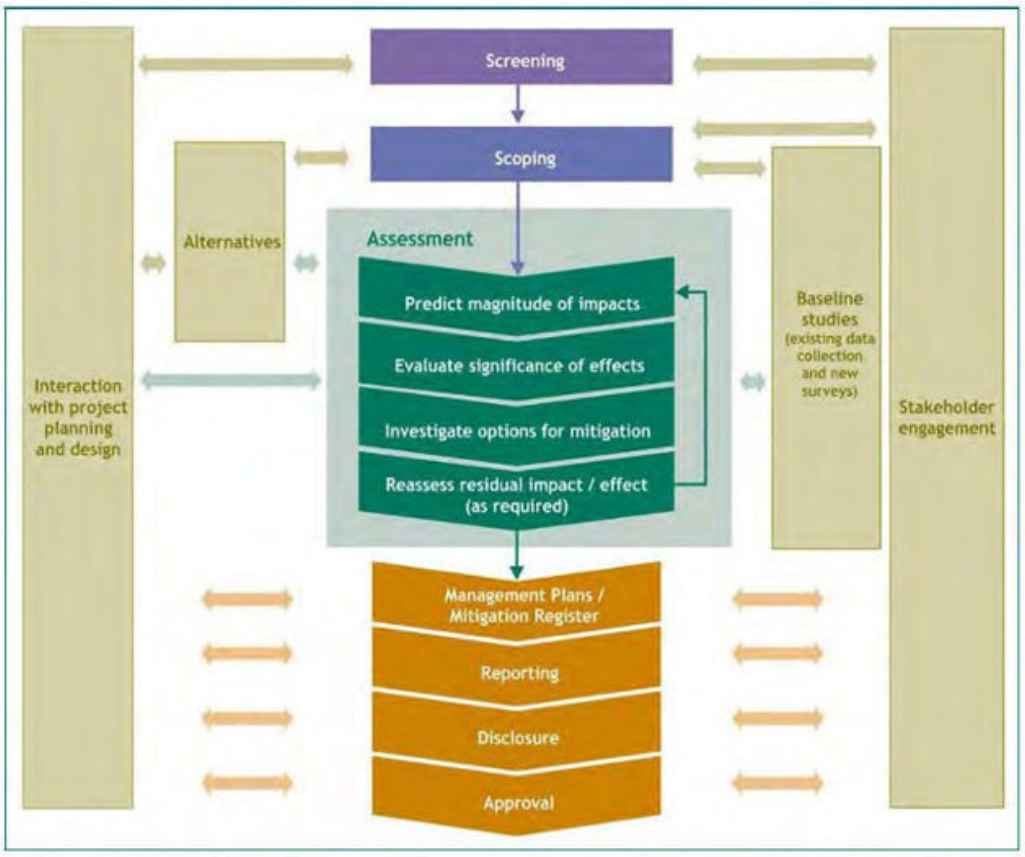
Figure 1-1 Lombok Solar Farm Location Overview



1.5 *ESHIA METHODOLOGY*

This section of the ESHIA study presents the methodology that has been used to conduct the IA. The ESHIA methodology follows the overall IA approach illustrated in ***Figure 1-2***. 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 ESHIA process are described below.

Figure 1-2 Impact Assessment Approach



Source: ERM, 2015

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 recognised 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.

1.5.1 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. The Applicable Standards are presented in **Chapter 2**.

1.5.2 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 5**.

1.5.3 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**.

1.5.4 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. Baseline conditions were judged by UKL-UPL information, the visual observation, and interview with the key informants on site, and secondary data from local governments/agencies. These data will then be interpreted to address gaps between Indonesian regulation and the applicable international standard. No baseline sampling or lab analysis has been conducted for this report. The baseline characterisation is reported in **Chapter 6** of this ESHIA Report.

1.5.5 Impact Identification/Prediction

Impact identification and assessment starts with scoping and continues through the remainder of the ESHIA Process. It is an iterative process and completes only when the effects of all identified impacts arising out of the project, including residual impacts, have been assigned a mitigation strategy. The IA comprises of four sequential steps: Impact prediction, Impact evaluation, Mitigation and enhancement,

and finally, residual impact evaluation. The detailed IA is presented in **Chapter 7** ESHIA.

1.5.6 Analysis of Alternatives

A comparative analysis of alternatives for the project is provided in terms of site location analysis and feasibility, power generation technology available including no project scenario in **Chapter 8** of this ESHIA report.

1.5.7 Environmental and Social Management Plan (ESMP)

The results of ESHIA study form the basis of the project ESMP. The ESMP incorporates measures and procedures for the short and long-term environmental and social management of the project during its various stages. The environmental and social management plan (ESMP) is developed for the project and is presented in **Section 9** of this report.

1.5.8 Stakeholder Engagement

The Project recognises 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 maintain a social license to operate, providing an important mechanism for receiving community feedback on project related concerns and also disseminating project related information back to the community. A SEP has been prepared for the Project and presented in **Chapter 8** of this report.

1.6 LIMITATIONS

The limitations are associated with the baseline establishment and impact assessments pertain to the availability of primary and secondary information.

The secondary data utilised for the purpose of the baseline is limited to the UKL-UPL document prepared by Equis' external consultant and made available by PT ITA, PT ITB, and PT ITC. The UKL-UPL itself covers very limited primary data for environmental baseline, which only includes flora and fauna specie lists. However, Equis Energy has provided a secondary data on ambient air and water quality. Interviews with relevant stakeholders and affected communities were conducted, documentation in the form of raw interviews and questionnaire results have been provided to ERM.

A site visit to all three sites was conducted by ERM between 25-28 July 2017 with the main purpose of environment and social scoping. This visit also collected some qualitative information based on visual observation, interviews and informal Focus Group Discussions (FGD). While during the site visit a conscious attempt was made to cover relevant key environmental baseline condition, such as general site settings and surrounding activities, topography, surface waters and ecology, it is acknowledged that the baseline presented in this report may not encompass all physical components as sampling and analysis were not conducted. However, Equis Energy has obtained a set of secondary data from government of NTB to be utilised, in particular to cover the ambient air and water quality information.

Relevant key social groups and stakeholder categories were also identified during the 4-day site visit, however the opinions and concerns presented in this report may not capture all viewpoints amongst the stakeholders. No sampling and lab analysis were conducted for this Report.

During the time of site visit, a coordination meeting for UKL-UPL of Sengkol site has been held by Local Environmental Agency of Lombok Tengah Province and ERM representatives have attended official document discussion for Sengkol site with all related local governments officers.

1.7 ESHIA STRUCTURE

- 1: Introduction
- 2: Applicable Standards and Regulatory Framework
- 3: Project Description
- 4: ESHIA Scoping
- 5: Environmental and Social baseline
- 6: Impact Assessment
- 7. Analysis of Alternatives
- 8. Stakeholder Engagement Plan
- 9. Grievance Redress and Engagement
- 10. Environmental and Social Management Plan
- 11. Conclusion and Recommendation
- Annex A: Applicable Standards
- Annex B: Map Area of Influence
- Annex C: Indigenous Peoples Impacts Screening Checklist
- Annex D: Geoelectric Exploration Reports
- Annex E: Environmental, Social, Health, and Safety Management System (ESHS-MS)
- Annex F: Land Acquisition Procedure

2 APPLICABLE STANDARDS AND REGULATORY FRAMEWORK

2.1 INTRODUCTION

At the initial stage of the ESHIA process, preliminary information was provided to aid in the determination of what legal and other requirements apply to the Project. This step was conducted utilising a high level description of the Project and its associated facilities. The screening process involved the following:

- Reviewing of applicable regulatory framework for the proposed Solar Farm Project;
- Reviewing of available Project related activities and their impacts on various components of environment;
- Collection and compilation of available secondary baseline data from different sources;
- Conducting site visit to collect qualitative data for scoping purpose; and
- Categorisation of Project as per IFC guidelines and ADB.

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 ITA, ITB and ITC are seeking adherence to meeting international standards, the 2012 IFC Performance Standards 1-8 (IFC PS), the IFC EHS Guidelines and ADB SPS are also applicable. The primary means of integrating the IFC PS, EHS and ADB SPS expectations into the construction and operational phase of the Project is through the preparation of this ESHIA and ESMP.

ITA, ITB and ITC, as a subsidiary of Equis Funds Group, is also committed to meeting Equis' 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, EHS Guidelines and ADB Safeguard Policy.

The Project has obtained regulatory environmental approval through the approval of the UKL-UPL document process for all sites. 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. The UKL-UPL and ESHIA processes and their relevance to the Project are described in detail below. Project data are based on UKL-UPL documents.

2.2 *INDONESIAN REGULATORY FRAMEWORK*

2.2.1 *Project UKL-UPL Process Overview*

In Indonesia, the Act № 32 Year 2009 is the main environmental law covering important environmental issues, including: environmental standards, types of environmental documents, environmental permitting, and environmental audits. According to Government Regulation №27 Year 2012 regarding Environmental Permit, the UKL-UPL (also known as *Upaya Pengelolaan Lingkungan Hidup dan Upaya Pemantauan Lingkungan Hidup*) document or the Environmental Management and Monitoring Efforts, is the management and monitoring measures of the business and/or activity which does not have significant impact(s) required for decision making process regarding the related business and/or activity's execution.

According to Minister of Environment Regulation № 5 Year 2012 regarding type of business and/or activity obliged to prepare AMDAL document, Solar Farm development with capacity of ≤10MW requires UKL-UPL document preparation. Since there are 3 (three) Project locations, each is located in a different village and Regency, each site is required to prepare a separate UKL-UPL document and assessed by the local environmental agency of each Regency.

The UKL-UPL process comprises a brief and integrated assessment of insignificant impacts of a project or activity, where the baseline conditions are not part of the content (mostly are mentioned in Annex). It aims to determine the insignificant impacts generated from the Project activity into the environment, the management and monitoring efforts to mitigate all insignificant impacts, and is used as a provision by the authority for granting the subsequent permits for the project or activity.

The Solar Farm's UKL-UPL documents of all three sites have been assessed by the Local Environmental Agency of Lombok Timur and Lombok Tengah Regency, and Environmental Permit for all three sites has been obtained. Following this approval, the Project is required to submit a report to DLH (Environmental Agency) of Lombok Timur Regency for Pringgabaya and Selong site and DLH Lombok Tengah Regency for Sengkol Site every six months. The report will detail the Project's implementation of environmental and social commitments specified within the environmental management and monitoring efforts. An overview of the Project UKL-UPL is provided in **Chapter 5** and **6**.

2.2.2 *Land Acquisition Process*

According to Nusa Tenggara Provincial Regulation № 3 Year 2010 regarding the 2009 – 2029 Nusa Tenggara Province Spatial Plan, Solar Farms in Selong, Sengkol, and Pringgabaya sites are located in the power plant area. Therefore, Solar Farm project locations are consistent with the Provincial Spatial Plan.

The government of Indonesia has issued a number of acts, decrees, and regulations related to land acquisition; most recently Act № 2 Year 2012. Article 10 of the law states that development of power generators, transmission line, substations, network, and electricity distribution are categorized as public interest. The implementation of

this law is regulated in President Regulation No. 148 Year 2015. The President Regulation № 148 Year 2015 article 121 A states that *"Land acquisition for development as mentioned in article 10 letter b to r in Law no 2 Year 2012 regarding Land Acquisition for public interest which is done by private entity can be done through trading, exchange, or other agreed mechanism between the entitled party with the private entity"*.

The Project undertook its land acquisition based on the willing seller and willing buyer principle and the land compensation payment is implemented based on negotiation and agreed price with land owners. Therefore the land acquisition process considerably has been met the requirement of the Presidential Regulation № 148 Year 2015.

2.2.3 Other Relevant Regulatory Provisions

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

- Indonesian Laws;
- Government Regulations;
- Ministerial Regulations; and
- Regency Regulations (Head of Regencies Decrees).

The Project Feasibility Study provides a detailed overview of other permits relating to the Project, while the Project UKL-UPL contents valid Indonesian Government Legislations and Regulations pertaining to the Project.

2.3 INTERNATIONAL STANDARDS

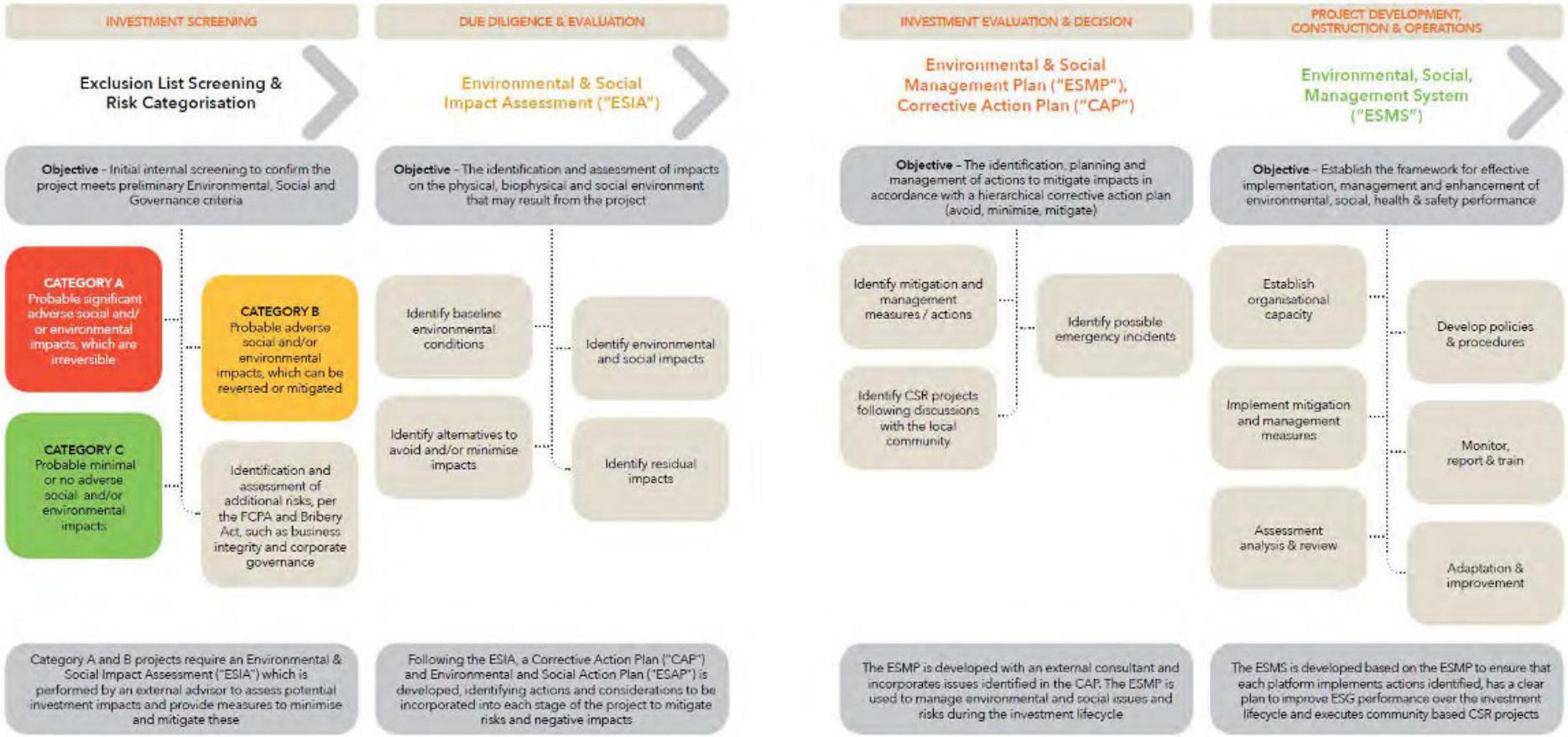
2.3.1 Equis Funds Group Environment and Social Governance Framework

Equis Funds Group implements its own Environment and Social Governance (ESG) management system. This sets 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 on ***Figure 2-1***. 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 Organisation ("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.

Figure 2-1 *ESG Process in Equis Funds Group*



2.3.2 *Equator Principles, 2013*

Equator Principles Financial Institutions (EPFIs), have adopted the Equator Principles; a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects. Since 4 June 2013, the Equator Principles (EP) III is effective, replacing the previous EP II. EP III comprises ten principles as summarised in ***Table 2-1***.

Table 2-1 EP III Statement of Principles

Principle 1 : Review and Categorisation
Project categorisation is based on the environmental and social categorisation process of the IFC.
Principle 2 : Environmental and Social Assessment
For Category A, and as appropriate, Category B Projects, the Assessment Documentation includes an Environmental and Social Impact Assessment (ESIA).
Principle 3 : Applicable Environmental and Social Standards
For Projects located in Non-Designated Countries[2] (included Indonesia), the Assessment process evaluates compliance with the then applicable IFC Performance Standards on Environmental and Social Sustainability (Performance Standards) and the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines)
Principle 4 : Environmental and Social Management System and Equator Principles Action Plan
Develop or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards.
Principle 5 : Stakeholder Engagement
Demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities and, where relevant, Other Stakeholders.
Principle 6 : Grievance Mechanism
Establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance.
Principle 7 : Independent Review
An Independent Environmental and Social Consultant, not directly associated with the client, will carry out an Independent Review of the Assessment Documentation including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation
Principle 8 : Covenants
An important strength of the Equator Principles is the incorporation of covenants linked to compliance. For all Projects, proponent will covenant to comply with all relevant host country environmental and social laws, regulations and permits in all material respects.

[2] Designated Countries are those countries deemed to have robust environmental and social governance, legislation systems and institutional capacity designed to protect their people and the natural environment. List can be found in EP website: http://www.equator-principles.com/index.php/ep3/designated-countries

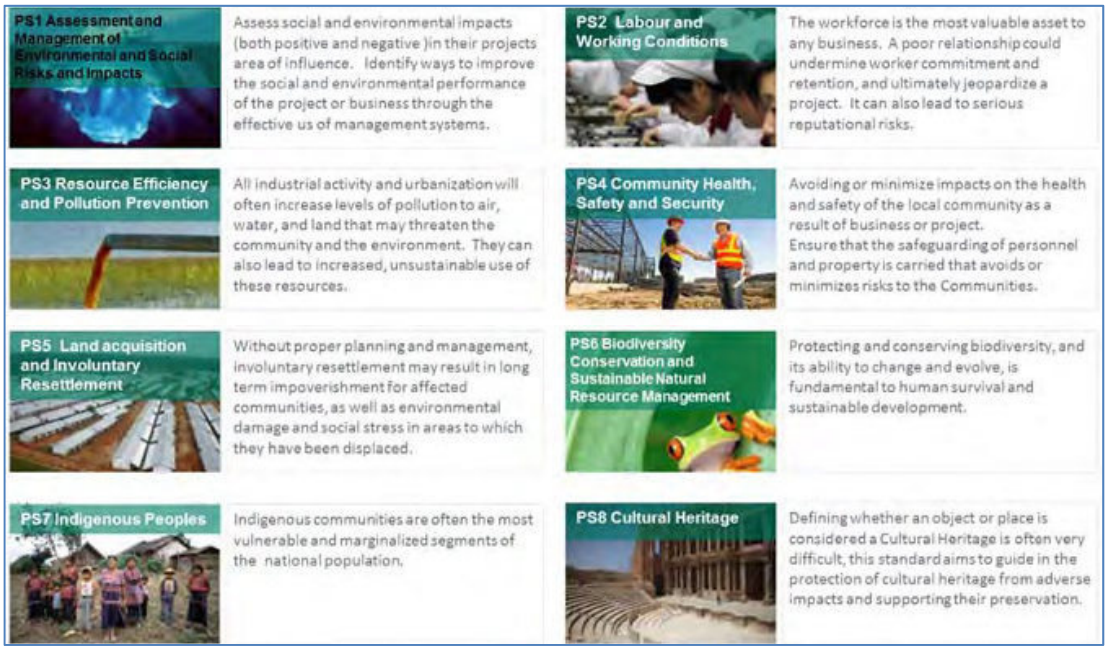
Principle 9 : Independent Monitoring and Reporting
Appointment of an Independent Environmental and Social Consultant, or require that the client retain qualified and experienced external experts to verify its monitoring information
Principle 10 : Reporting and Transparency
At a minimum, a summary of the ESIA is accessible and available online.

The EP III can be found on the EP website[3].

2.3.3 *IFC Performance Standards on Environmental and Social*

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 Recognised 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 2-2.***

Figure 2-2 IFC Performance Standards



The IFC PS can be found on the IFC website[4] .

[3] http://www.equator-principles.com/index.php/ep3/ep3

[4] 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/

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 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.

2.3.4 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.

2.3.5 Review of IFC and UKL-UPL and Regulatory Standards

There are gaps between UKL-UPL and ESHIA assessment and parameters. In many respects they are aligned in impact assessment, although the UKL-UPL doesn't define impact significance like the other type of Indonesian environmental document e.g. the AMDAL document. UKL-UPL fulfil many of the key expectations of IFC PS 1, namely the need for an integrated environmental and social assessment and management program, although UKL-UPL doesn't mention the project disclosure and consultation with local stakeholders/affected communities and client's management of environmental and social performance throughout the life of the Project.

Key gaps as summarised are include Stakeholder Engagement and specifically the IFC expectations that this is ongoing throughout the life time of the Project and includes village level consultation. The UKL-UPL process usually does not apply a suitably comprehensive and robust consultation framework since it is not the content of UKL-UPL document.

The expectations of Performance Standard 2 and 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. In regards to PS 2, the Project should establish and foster a sound worker-management relationship in order to establish constructive worker-management relationship, treat the workers fairly and provide them with safe and healthy working conditions, which finally will create enhancement of the efficiency and productivity of their operations. The objectives of PS 2 are as follows:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers;
- To establish, maintain, and improve the worker-management relationship;

- To promote compliance with national employment and labour laws; and
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the Project's supply chain.

For PS2, the Project can manifest it through the company policy and should communicate and applied to all parties (internal and external, including the sub-contractor).

Related to PS 3, 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.

In regards to land acquisition, it is understood that the Project is procuring the land directly from the land owners on a willing seller and willing buying principle at a mutually agreed price. As such, PS 5 land Acquisition and Involuntary Resettlement is not triggered.

Related to PS 7, the UKL-UPL does not assess the Indigenous People since it's not the content of UKL-UPL. Sasak ethnicity is the major tribe of people in Lombok Island. Sasak is considered as an indigenous tribe due to its distinct social characteristics such as language, customary, and social institution. The indigenous peoples of the Sasak tribe community live in designated villages where their traditional practices still exist and are usually assigned as tourism destinations.

During the field visit, the community members interviewed within the Project boundary identified themselves as Sasak People. However, they do not live as indigenous people anymore as they have experienced acculturation and live within mainstream society in Indonesia. Therefore, PS 7 is not applicable for this Project.

In terms of PS 9, Cultural Heritage assessment is not included in UKL-UPL either. However, the Project site does not located in or adjacent to cultural heritage, therefore PS 9 is not applicable.

A full comparison of Indonesian regulatory standards against the IFC EHS guidance for specific effluents, emissions and discharges is provided in **Annex A**. 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.

2.3.6 ADB Safeguard Policy Statement, 2009

In July 2009, ADB's Board of Directors approved the new Safeguard Policy Statement (SPS) governing the environmental and social safeguards of ADB's operations. The SPS builds upon ADB's previous safeguard policies on the Environment, Involuntary Resettlement, and Indigenous Peoples, and brings them into one consolidated policy framework with enhanced consistency and coherence, and more comprehensively addresses environmental and social impacts and risks. The SPS also provides a

platform for participation by affected people and other stakeholders in the project design and implementation.

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.

ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

- Environmental safeguards;
- Involuntary Resettlement safeguards; and
- Indigenous Peoples safeguards.

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 active 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.

2.3.7 ADB Gender and Development Policy 2003

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.

2.3.8 ADB Social Protection Strategy 2001

The Social Protection Strategy of 2001 is a set of policies and programs designed to reduce poverty and vulnerability by promoting efficient labour markets, diminishing people's exposure to risks, and enhancing their capacity to protect themselves against hazards and interruption/loss of income. The five components identified for social protection include labour markets, social insurance, social assistance, micro and area-based approaches and/or child protection.

2.4 PROJECT CATEGORISATION

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**. Typically Category B projects with potential limited adverse environmental impacts which are few in number, generally site specific, largely reversible and readily addressed through mitigation measures. Whilst a full ESHIA is not required, some environmental and socio-economic analysis is required. 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.

2.4.1 Equator Principles and IFC Categories

Equator Principles Financial Institutions (EFPIs) are required to categorise projects according to the magnitude of its potential impacts based on the environmental and social screening criteria of IFC as per the following understanding:

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

With reference to the IFC's environmental and social screening criteria, it is anticipated that the proposed Project will fall under 'Category B' for the following reasons:

- **Potentially limited reversible**: environmental and social impacts of the project are anticipated during the construction phase. This will encompass impact on terrestrial ecology in and around solar farm and run off increase due to land preparation activity; increased noise & vibration, decreased air quality, risk to occupational health and safety, decreased community health and safety in overall construction activities. The Project footprint is limited to the immediate vicinity and any site-specific environmental and social impacts can be readily addressed through appropriate mitigation measures proposed in ESMP.

- **Limited adverse impacts on the baseline**: solar energy development is a non-polluting source of energy and thus is not likely to lead to any adverse impacts on the baseline environment during operation phase. In terms of social impacts, the land required is procured from willing sellers and comprised of rain fed agriculture land, hence it is only productive during 2-3 months in a year. The land acquisition process did not involve any physical displacement. Economic displacement is associated with land used for grazing.

2.4.2 ADB Safeguard Categories[5]

The projects are screened on the following criteria:

1. *Environment* -proposed project was screened according to type, location, scale, and sensitivity and the magnitude of their potential environmental impacts, including direct, indirect, induced, and cumulative impacts.

2. *Involuntary Resettlement* - The involuntary resettlement impacts of an ADB-supported project are considered significant if 200 or more persons will be physically displaced from home or lose 10% or more of their productive or income-generating assets.

   For those involving involuntary resettlement, a resettlement plan is prepared that is commensurate with the extent and degree of the impacts: the scope of physical and economic displacement and the vulnerability of the affected persons.

[5] ADB safeguard categories for environment, involuntary resettlement and indigenous peoples (http://www.adb.org/site/safeguards/safeguard-categories)

3. *Indigenous People* - The impacts of an ADB-supported project on indigenous peoples is determined by assessing the magnitude of impact in terms of

   - customary rights of use and access to land and natural resources;
   - Socioeconomic status;
   - Cultural and communal integrity;
   - Health, education, livelihood, and social security status; and
   - The recognition of indigenous knowledge; and
   - The level of vulnerability of the affected Indigenous Peoples community.

As per these criteria projects are classified into any of the four categories: A, B, C and F1. The criteria and categories are further explained in ***Table* 2-2**.

Table 2-2 ADB Safeguard Project Categories

Category	Criteria		
	Environment	**Involuntary Resettlement**	**Indigenous People**
A	A proposed project is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA), including an environmental management plan (EMP), is required.	A proposed project is likely to have significant involuntary resettlement impacts. A resettlement plan, which includes assessment of social impacts, is required.	A proposed project is likely to have significant impacts on indigenous peoples. An indigenous peoples plan (IPP), including assessment of social impacts, is required.
B	The proposed project's potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE), including an EMP, is required.	A proposed project includes involuntary resettlement impacts that are not deemed significant. A resettlement plan, which includes assessment of social impacts, is required.	A proposed project is likely to have limited impacts on indigenous peoples. An IPP, including assessment of social impacts, is required.
C	A proposed project is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.	A proposed project has no involuntary resettlement impacts. No further action is required.	A proposed project is not expected to have impacts on indigenous peoples. No further action is required.
F1	A proposed project involves the investment of ADB funds to or through a financial intermediary. The financial intermediary must apply and maintain an environmental and social management system, unless all of the financial intermediary's business activities have minimal or no environmental impacts or risks.	A proposed project involves the investment of ADB funds to or through a financial intermediary. The financial intermediary must apply and maintain an environmental and social management system, unless all of the financial intermediary's business activities are unlikely to generate involuntary impacts.	A proposed project involves the investment of ADB funds to or through a financial intermediary. The financial intermediary must apply and maintain an environmental and social management system, unless all of the financial intermediary's business activities unlikely to have impacts on indigenous peoples.

Based on site specific environmental and social impacts identified in the UKL-UPL and ERM's experience, the project is deemed to be Category C for all three criterion; environment, involuntary resettlement and indigenous peoples. This is based on the information described below:

- The project study area does not fall under any legally protected area or natural habitat, and hence requirements suggested in ADB SPS 2009 regarding legally protected area and the requirements therein is not triggered.
- The proposed Project's potential adverse environmental impacts are concentrated during the construction phase which are mostly site-specific and limited largely to 500 m from site and approximately 100 m access road;
- Impact on soil and water will be limited and largely reversible;
- The proposed project does not involve any involuntary resettlement as no settlements are located on the project location;
- Based on the field observation, the proposed project will not have impact on indigenous people (Suku Sasak). Regardless of the self-identification as Sasak people, the surrounding communities within the Project boundary have experienced acculturation and live within mainstream society of Indonesia. Meanwhile, Sasak people who are still practising their traditional culture live in designated villages beyond the Project boundary;
- There are no species identified as vulnerable, endangered and critically endangered according to IUCN red list within the project site;
- One species is identified as National protected species, namely Banded Linsang (a tree-dwelling carnivorous mammal native to the Sudanic region of Southeast Asia);
- All three sites have been used for rain fed agriculture activity and therefore are not known to have diverse species of flora and fauna.

3 PROJECT DESCRIPTION

3.1 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 total 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 April 2019. At the time of this ESHIA study the company had signed the Power Purchase Agreement (PPA) with PT PLN.

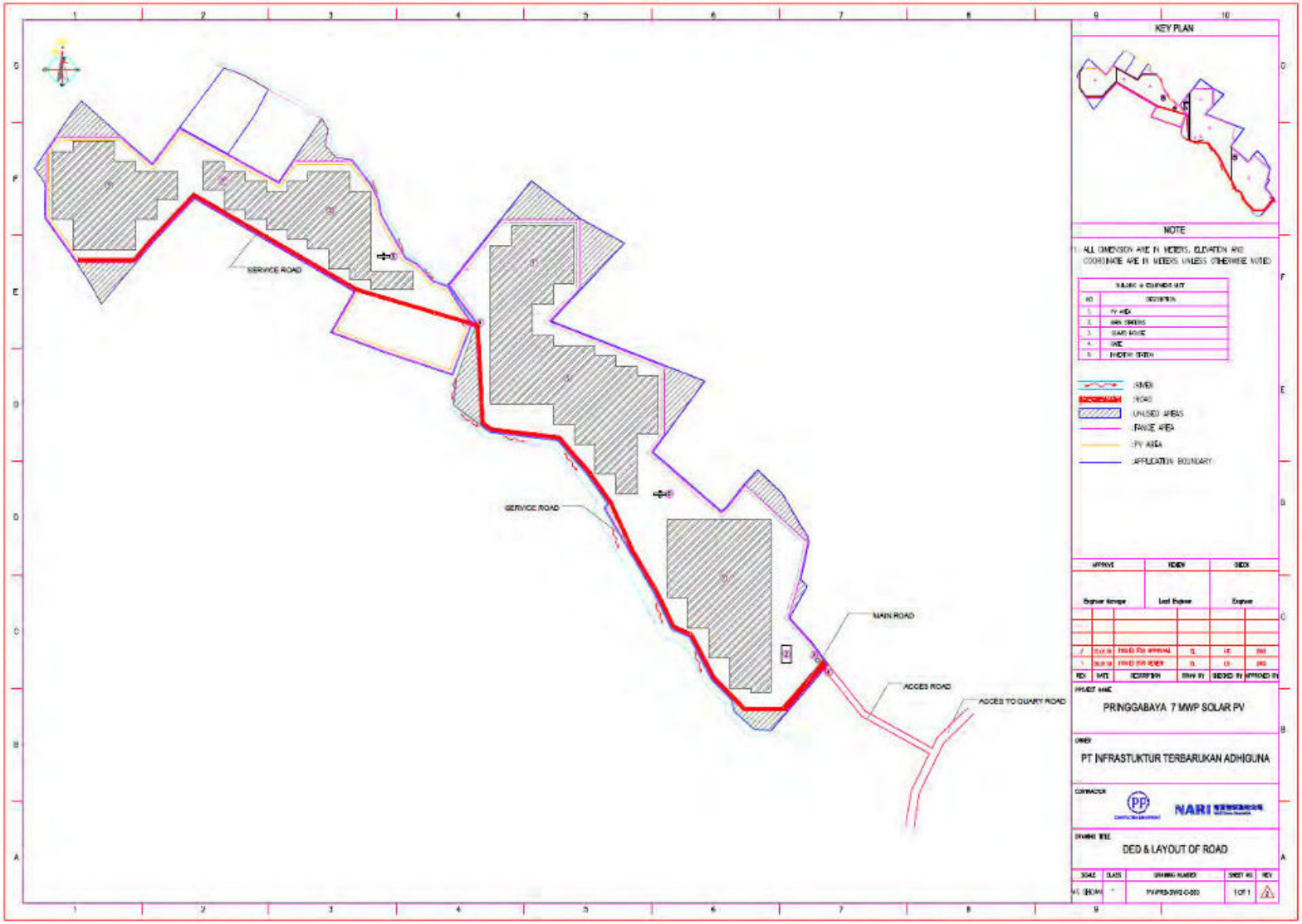
Each solar farm will require the construction and operation of the following key elements, which are depicted in ***Figure 3-1*** to ***Figure 3-3***:

- Installation of a solar panel field;
- Installation of main station;
- Installation of inverter station;
- Construction of drainage and water distribution system;
- Construction of internal roads; and
- Installation of 20 kV overhead transmission line to the nearest PLN 150/20kV substation.

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

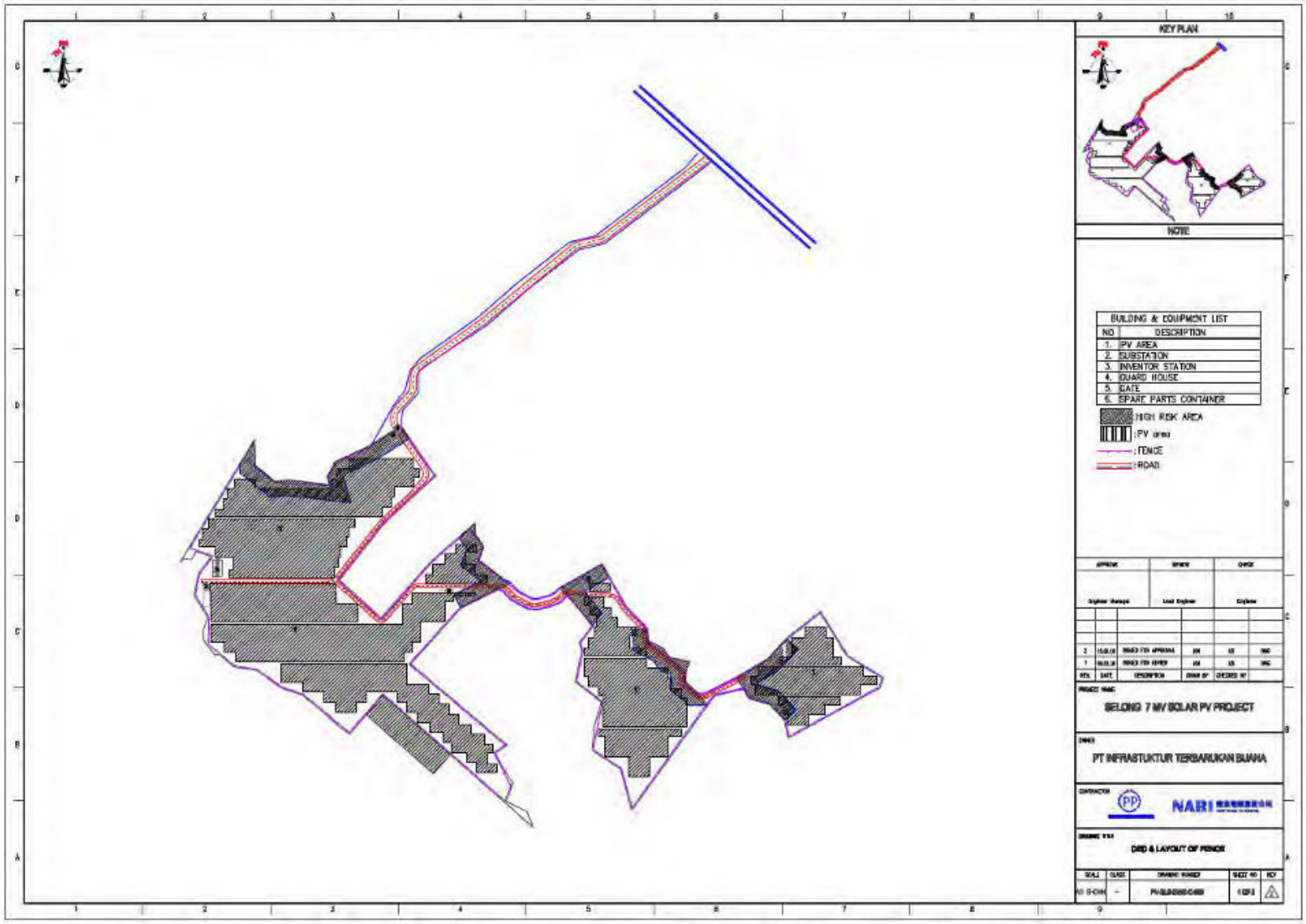
- Fencing surrounding the site boundary;
- An emergency diesel generator.

Figure 3-1 Solar PV Module Array Layout for Pringgabaya Site



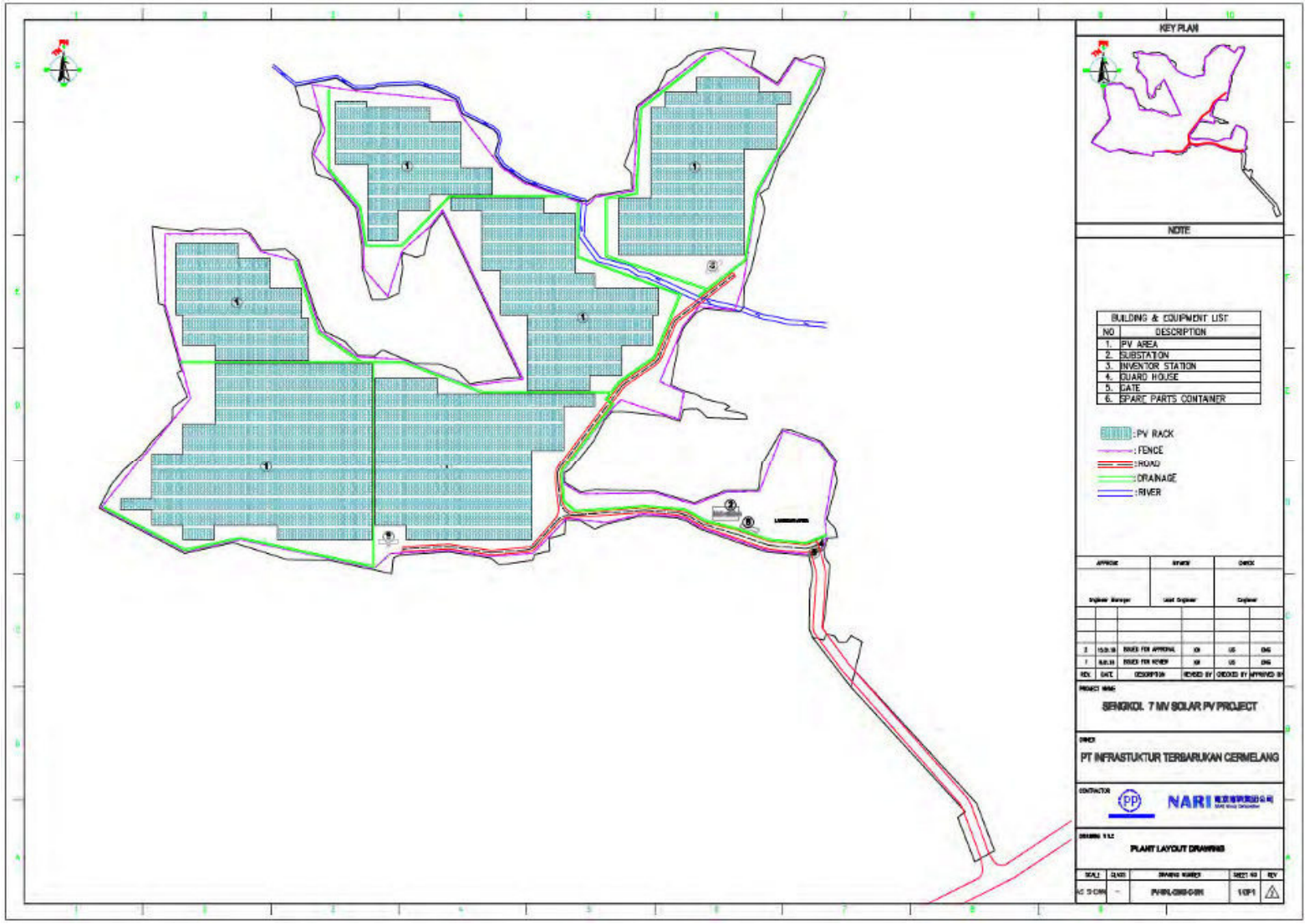
Source: PT ITA, 2017

Figure 3-2 Solar PV Module Array Layout for Selong Site



Source: PT ITB, 2017

Figure 3-3 Solar PV Module Array Layout for Sengkol Site



Source: PT ITB, 2017

3.2 *LOCATION AND SITE SETTING*

Pringgabaya solar farm will be developed on approximately 11.19 Ha areas, Selong site on 8.63 Ha, and Sengkol site on 8.73 Ha (28.55 Ha in total) and these three sites are not located within nor do they intersect an area of conservation importance.

3.2.1 Pringgabaya Site

The 7 MWp (5 MWac) Pringgabaya Solar Farm site is located at Pringgabaya Utara Village, Pringgabaya District, Lombok Timur Regency, NTB Province (***Figure 3-4***). A representative geographical coordinate of the site is 8°31'3.19"S and 116°37'58.09"E. The altitude of the sites is 730 meters above mean sea level (msl) and elevated with a maximum slope of 4% based on the PV module lay out.

Pringgabaya site is located approximately 3.5 km to PLN Pringgabaya 150/20 kV substation and 100 m to the nearest village road. The nearest residential area is approximately 200 m southwest from the site. The closest sensitive receptors to Pringgabaya site are SMKN 1 Pringgabaya School which located 500 metres from the project in the south direction and Musholla Islahulummah which located 350 from the south eastern project boundary.

Site Land use and Zoning

According to the Spatial Plan of NTB Province (NTB Province Local Regulation No. 3 Year 2010) and Lombok Timur Regency (Lombok Timur Local Regulation No. 2 Year 2012), the Pringgabaya Solar Farm location is suitable for solar power plant development. This site has been granted this recommendation from the Spatial Planning Coordination Agency (BKPRD) of Lombok Timur Regency No. 090/160/PD/2016 dated 4 March 2016 regarding Recommendation of Spatial Use for Construction of Solar Power Plant. A Location Permit for Pringgabaya site with total area of 9.5 Ha (№ 1283/503/PM.II/2017) has been issued from Integrated Permit and Investment Agency of Lombok Timur Regency. The land acquired at Pringgabaya by the project is totalling 11.19 Ha and is slightly greater than the location permit. It is understood that some landowners did not want to sell their land in partial, instead they want to sell it in full plot. It is also understood that in Pringgabaya, the land parcel is bigger per plot comparing to other sites. Thus, the land acquired ended up in bigger number than the land required by the project i.e. around 8 Ha. The local land agency has acknowledged this and did not have any objection, it is proven by issuance of the land certificate for all land plots.

The site and surrounding areas have been modified to accommodate for rain fed dryland agricultural practices (***Figure 3-5***). The site itself has been historically used for corn, sugar-apple (*srikaya*), and beans plantations. Since no irrigation was used, plantation use can only be done once in a year during the rainy season. Besides agricultural activities, stone crushers can also be found surrounding the site (**Figure 3-6**). The closest stone crushers are located 100 m north and south of the site, which are PT Sasak Manunggal and PT Karya Nusantara respectively. About 300 m east of the project site, there is also a stone crusher owned by PT Indomain. The stone is

normally transported from different district, generally from Sambalie District, therefore no stone quarries are found nearby. Approximately 3 km from the site, there is a diesel power plant which has been operated since 2015.

Figure 3-4 Project Boundaries and Land Cover for Pringgabaya Solar Farm and Transmission Line

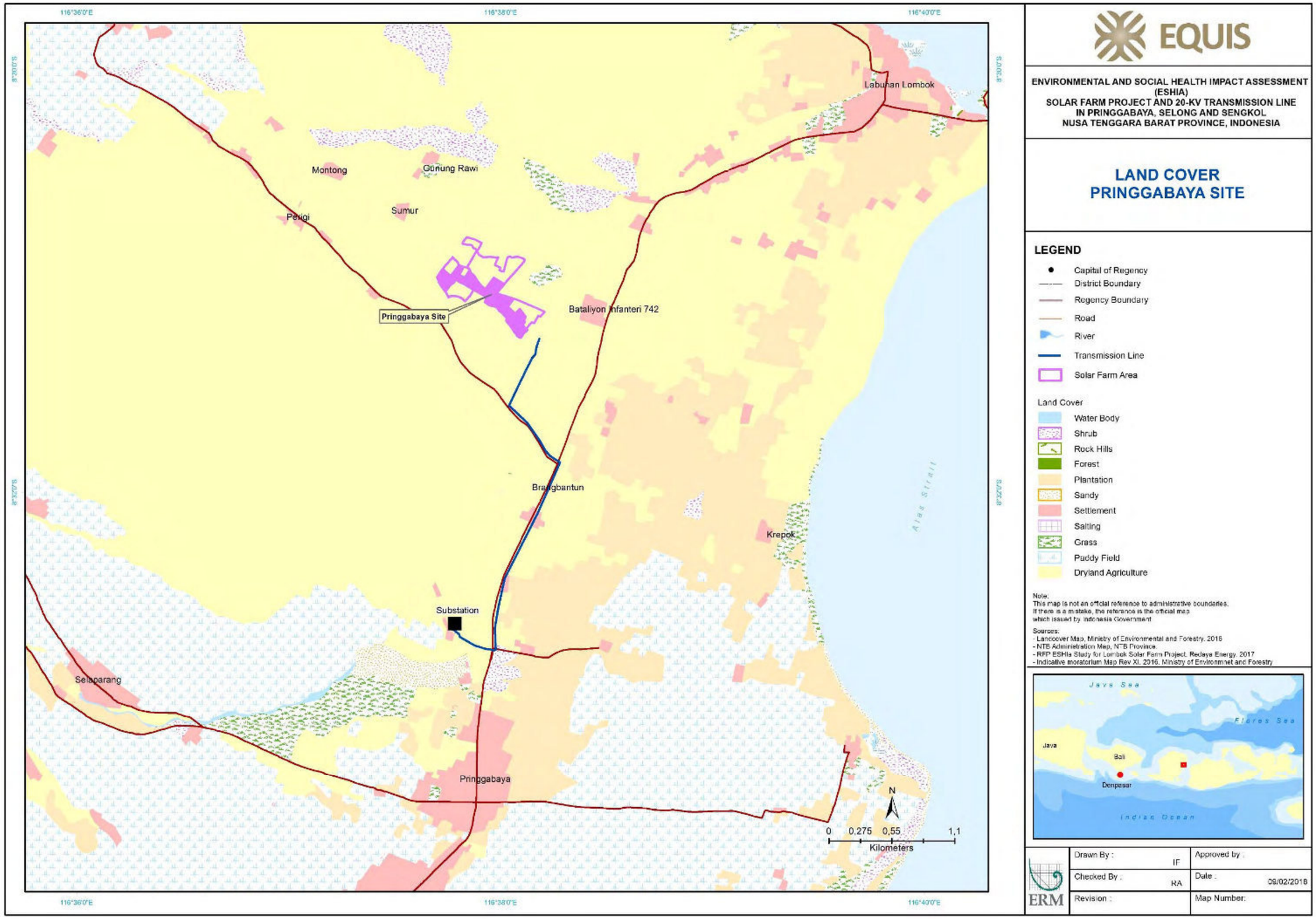


Figure 3-5 Pringgabaya Site Overview

Figure 3-6 Stone Crushers Surround Pringgabaya Site

Site Access

The site is located approximately 6 km away from the city of Pringgabaya, 75 km east of Mataram (the capital of NTB), and 70 km from Lombok International Airport. The site can be accessed by using the national road of Jl. Raya Labuhan Lombok (***Figure 3-7***). Pringgabaya site is located approximately 100 m from the nearest village road (***Figure 3-8***).

Figure 3-7 Jl. Raya Labuhan Lombok

Figure 3-8 Nearest Village Road to Pringgabaya Site

3.2.2 *Selong Site*

The 7 MWp (5 MWac) Lombok Solar Farm site is located at Geres Sub-District, Labuhan Haji District, Lombok Timur Regency, NTB Province. A representative geographical coordinate of the site is 8°39'29.34"S and 116°34'25.75"E. Selong site is located approximately 9.2 km to PLN Selong 150/20 kV substation and 400 m to the nearest village road. The nearest residential areas are located approximately 250 m south, 700 m southwest and 400 m east of the site.

Site Land use and Zoning

According to Spatial Plan of NTB Province (NTB Province Local Regulation No. 3 Year 2010) and Spatial Plan of Lombok Timur Regency (Lombok Timur Local Regulation No. 2 year 2012), Selong Solar Farm location is suitable for solar power plant development. This site has been granted a recommendation from Local Development Planning Agency (BAPPEDA) of East Lombok Regency No. 050/378/PD/2017 dated 21 July 2017 regarding Recommendation of Spatial Use for Construction of Solar Power Plant. A Location Permit with total area of 9.5 Ha (No. 1904/503/PM.II/2017) from Integrated Permit and Investment Agency of Lombok Timur Regency has also been secured for this site. Land area acquired in Selong is 8.63 Ha, therefore the land acquired is still within the allowable range granted in the permit. The site and surrounding area have historically been used for rain fed dry land agriculture, containing cassava, with coconut trees also commonly found in this area.

Figure 3-9 Project Boundaries and Land Cover for Selong Solar Farm and Transmission Line

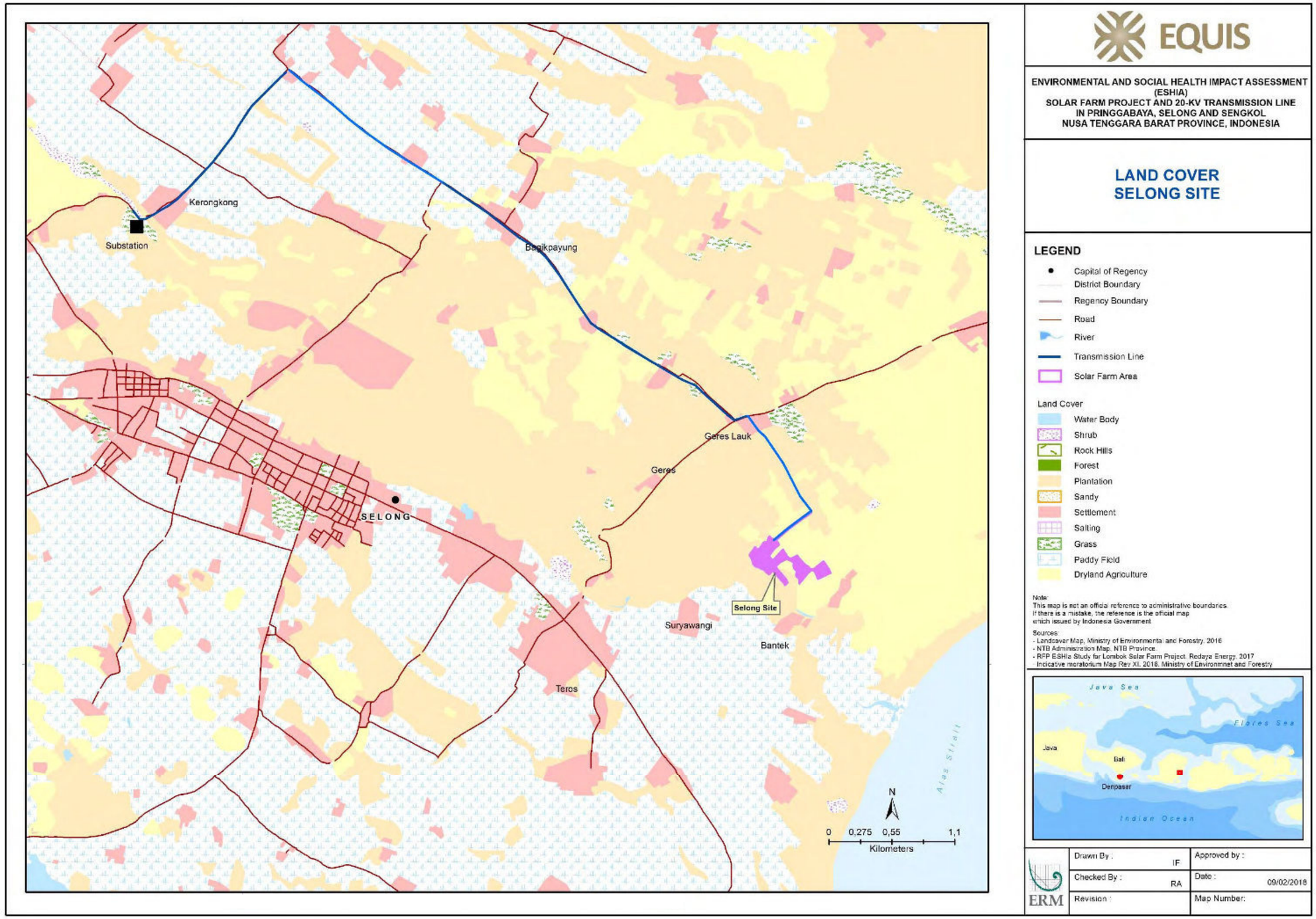


Figure 3-10 Selong Site Overview

Site Access

The site is located approximately 4.5km away from the city of Selong, 55 km east of Mataram, and 50 km from Lombok International Airport. The site can be accessed by using the national road of Jl. Raya Kerongkong and other local roads. Selong site is located approximately 400 m to the nearest village road (***Figure 3-11***).

Figure 3-11 Nearest Regency Road to Selong Site

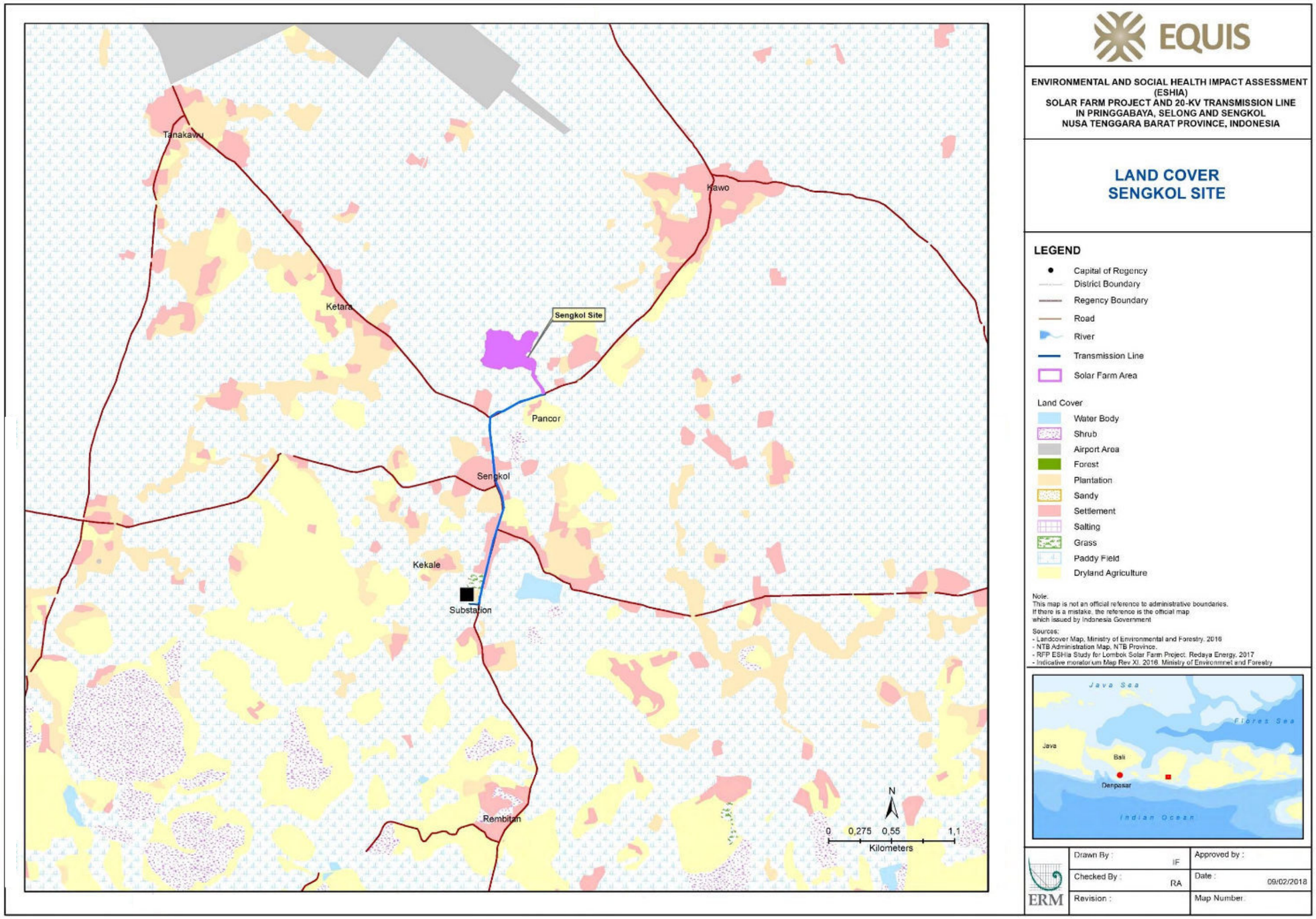
3.2.3 Sengkol Site

The 7 MWp (5 MWac) Lombok Solar Farm site is located at Sengkol Village, Pujut District, Lombok Tengah Regency (***Figure 3-12***). A representative geographical coordinate of the site is 8°47'41.09"S and 116°17'47.38"E. Sengkol site is located approximately 2.6 km to PLN Sengkol 150/20 kV substation. Houses are located alongside regency road, which is approximately 120 m of the site.

Site Land use and Zoning

According to Spatial Plan of NTB Province (NTB Province Local Regulation No. 3 Year 2010) and Spatial Plan of Lombok Tengah Regency (Lombok Tengah Local Regulation No. 7 year 2011), Sengkol Solar Farm location is suitable for solar power plant development. This site has been granted a recommendation from Spatial Planning Coordination Agency of Lombok Timur Regency (BKPRD) No. 650/159/BKPRD/2017 dated 10 July 2017 regarding Recommendation of Spatial Use for Construction of Solar Power Plant. A Location Permit with total area of 9.2 Ha (No. 503.31/977/2017) from Integrated Licensing Service Agency of Lombok Timur Regency has also been secured for this site. Land area acquired in Sengkol is 8.73 Ha, therefore the land acquired is still within the allowable range granted in the permit.

Figure 3-12 Project Boundaries and Land Cover for Selong Solar Farm and Transmission Line



The site and surrounding areas have historically been used for rain fed dry land agriculture, containing corn, soybean, and other bean crops. Areas of the site are also used for rain fed rice field cultivation. ***Figure 3-13*** shows an overview of the Sengkol Site.

Figure 3-13 Sengkol Site Overview

Site Access

The site is located approximately 4 km away from the city of Sengkol, 40 km southeast of Mataram, and 7 km from Lombok International Airport. The site can be accessed by using the national road of Jl. Bypass Bandara International Lombok and other local roads. The Sengkol site is located approximately 120 m to the nearest regency road (***Figure 3-14***).

Figure 3-14 Nearest Regency Road to Sengkol Site

3.3 *SOLAR FARM MAJOR COMPONENTS*

A process flow diagram of the Project indicating main components is provided in ***Figure 3-15***. The key equipment selection and design is summarised in **Table 3-1** and ***Table 3-2***. Each main component is described under the following sub headings.

Figure 3-15 Power Generation Process

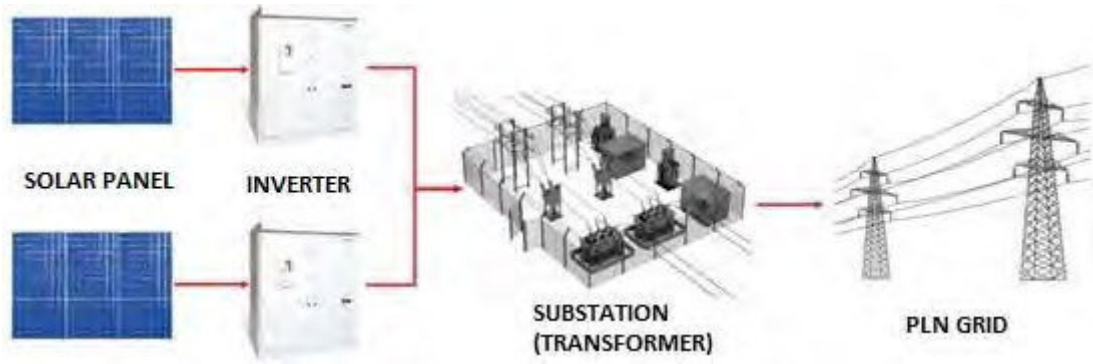


Table 3-1 Major Components

Component	Manufacturer	Model
PV Modules	JA Solar, Trina, Jinko	Polycrystalline 325 Wp
Inverter	Schneider Electric	Conext Core XC680
Transformer (Step-up MV)	Schneider Electric	1,360 kVA 20/0.38 kV
Mounting Structure	Schletter	3 x 20 Fixed tilt
Monitoring System	Schneider Electric	Conext Control

Source: Feasibility Report, 2016

Table 3-2 Technology Design Parameter

Description	Technology
DC Installed Capacity	3 x 7 MWp
AC Installed Capacity	3 x 5 MWac
Number of Installed Module/Plant	21,540
Number of Strings/Plant	1,077
Number of Inverters/Plant	8 x 680kW
Tilt	10°
Azimuth	0°
Number of MV Transformers/Plant	4 x 1,360 kVA

Source: Feasibility Report, 2016

3.3.1 *Photovoltaic Modules*

Photovoltaic (PV) modules generate electricity directly from sunlight through an electronic process which occurs naturally in some type of materials (semi-conductors). Electrons in this material are released by the sunlight and are pushed through an electrical circuit in the form of electricity to the grid.

This Project will use Polycrystalline 325 Wp, manufactured by JA Solar, Trina, Jinko. The principal specifications of the PV module are shown in ***Table 3-3***.

Table 3-3 PV Module Specifications

Test Criteria	Test Condition
Irradiance	1,000 W/m^2
Air Mass	1.5
Cell Temperature	25^{o}C

Source: JA Solar

The PV modules are connected together in a series, using MC plugs, which are then connected to an array box. The array box shall be attached to the PV support structure. Cables shall be 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 an inverter station.

3.3.2 *Inverter*

The inverter is a grid-tie type mostly used within grid connected solar PV systems. In summary, grid-tie inverters use the grid frequency as reference when converting the Direct Current (DC) power output to Alternate Current (AC) power compatible with the grid, which helps maintain the output voltage to not exceed the local grid voltage. Grid-tie inverters also have the added safety feature to disconnect from the grid if there is a sudden large drop in frequency or voltage.

The key technical characteristics of the selected inverter model are summarised in the ***Table 3-4***.

Table 3-4 Characteristics of Selected Inverter Model

Characteristics	Units	Schneider Electric Conext Core XC 680
Input (DC)		
Nominal DC voltage	V	550-850
Input voltage range, MPPT	V	550-800 (at PF=1)
Maximum input voltage, open circuit	V	1000
Maximum input current	A	1280
Maximum input power	kWp	782
Output (AC)		
Nominal AC power	kVA	680
Frequency	Hz	50/60
Nominal output current	A	1040
Output voltage	V	380
Maximum efficiency/Euro	%	98.7/98.5
Number of phases	-	3
General specifications		
IP degree of protection	IP20	
Enclosure material	Steel	
Ambient air temperature for operation	°C	(-10) – (40)
Relative humidity	%	0 – 95% non-condensing humidity
Dimension (W/H/D)	Mm	2400/2085/660
Weight	Kg	1590

Source: Feasibility Report, 2016

The project will use Schneider Conext Core XC680 inverter which is an indoor central inverter with fan-forced cooling. The inverter is specified for up to 95% non-condensing relative humidity. The fan-forced cooling is dependent on the dew point temperature, not ambient temperature alone. The temperature and humidity control should be adequate in preventing condensation in the inverter cabinet.

Figure 3-16 Schneider Conext Core XC680 Inverter

Source: Feasibility Report, 2016

The inverters will be installed inside the PV box or the container, which has ventilation fans and air conditioning system to control the ambient temperature.

Configurations for inverter station design shall include:

- Conventional building, provided for Indoor Inverters;
- Shaded Area for weatherproofed (IP65) inverters mounted on concrete pad; and
- Optional design to be prepared as Pre-fabricated container enclosure via OEM as a complete unit mounted on elevated concrete pad.

A total of 8 inverters will be installed onsite, with four inverters to be combined at each PV box, making a total of two locations. The PV box locations are shown in ***Figure 3-1*** while an image of typical inverter station is shown in **Figure 3-17**.

Figure 3-17 Inverter Station

(a) Concrete Inverter Station

(b) Container Inverter Station

Source: Feasibility Report, 2016

3.3.3 Transformer (MV)

The Project will use 1,360kVA Schneider transformers for voltage that steps up to 20kV. There will be 4 transformers installed at each site. Selected transformer specification is outlined in ***Table 3-5.***

Table 3-5 Characteristics of Selected Transformer Model

Characteristic	Schneider 2040
Rated primary ON LOAD voltage(1) (kV)	20-22-23-33
Frequency (Hz)	50/60
Rated secondary voltage (V)	380
Off load tap changer (%)	±3,5% and ±7%
Rated secondary power (kVA)	1,360
Vector group	Dy11y11y11
Maximum no load losses (W) EN50541	C_0
Maximum On load losses (W) EN50541	B_k
Short circuit impedance (%)	6
Sound power level LWA dB(A)	72

Source: Feasibility Report, 2016

3.3.4 *Mounting Structure*

Mounting structure and foundation installation will be manufactured and supplied by Schletter. The foundation type used will be a screw pile type which made from galvanised steel, a material class that is appropriate for the project location.

The foundation has been specified as the 3x20 fixed tilt and the length of the foundation may vary for different project sites depending on the soil conditions.

Mounting structure specifications are described in ***Table 3-6***.

Table 3-6 Characteristics of Mounting Structure

Characteristics	Versol Solar
Stand	3x20 panels in vertical orientation
Pitch	6.5 m
Row to Row spacing	2.0 m
The tilt angle	10°
Height above ground	0.8 m
Structure material	Galvanized
Clamp material	Stainless Steel

Source: Feasibility Report, 2016

3.3.5 *Monitoring System*

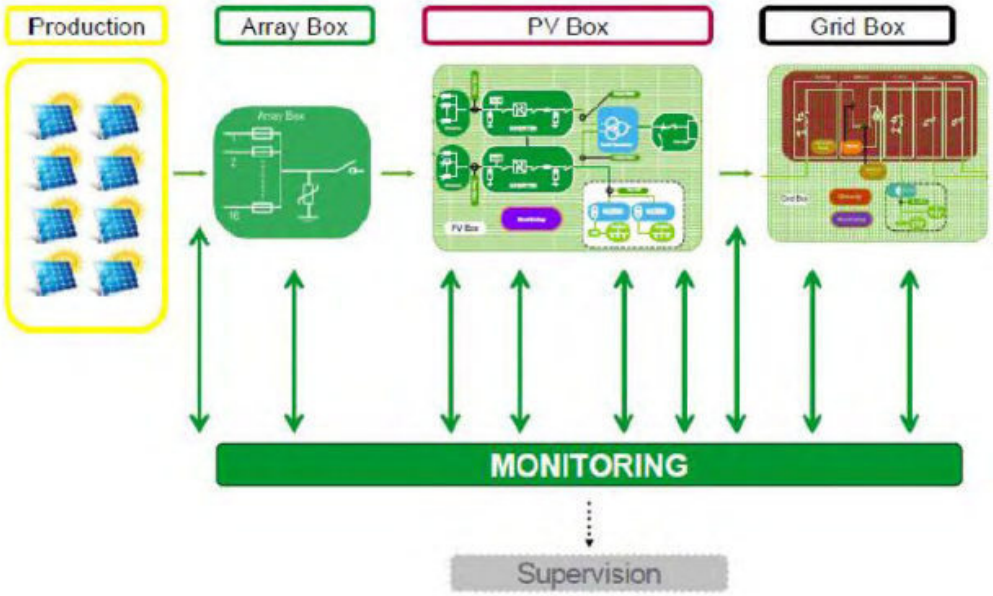
The monitoring system is a fundamental part of the solar PV plant as it allows the owners and operators to monitor the real time as well as expected plant performance. The real-time performance of the plant is monitored based on the output power from the inverters. The expected performance of the plant is calculated based on the actual weather conditions at the site location relating to, irradiation, temperatures of the solar cells and ambient temperature.

The proposed Control System is supplied by Schneider Electric, which is a reputable company with considerable experience in electrical instruments, automation and control, and power electronics. The scheme of monitoring system is presented in ***Figure 3-18***.

Scheider Electric's monitoring system encompasses:

- Array box, where all the string electrical parameters are measured as well as the meteorological station sensors;
- PV box, where the inverter output and input values are measured, as well as the medium voltage parameters, if available. These PV boxes also collect the data from the array boxes through modbus communication protocol; and
- Grid box, where plant energy values are measured and the breakers and switches status are monitored.

Figure 3-18 Monitoring System Schematic Overview (Source: Schneider)



Source: Feasibility Report, 2016

The grid boxes also collect the data from the PV boxes via a fibre optic and optic ring. The data is then sent to the web server through its incorporated router. Additionally, the monitoring allows remote access through a web interface; enabling access of the project status and operation conditions can be accessed from any location.

Monitored parameters will be sampled within a two second interval and an average value will be stored every minute. With this configuration, 20 years of data could be stored in the online server.

Furthermore, in case that a communication error occurs and the monitored data cannot be uploaded to the SQL database, the data can be stored in the PLC located in the measurement boxes of the monitoring system six months of data.

3.4 *AREA OF PROJECT DISTURBANCE*

Pringgabaya, Selong, and Sengkol solar farm and all associated infrastructure will occupy approximately 8 Ha. The approximate areas of the main components are summarised in ***Table 3-7***. The land acquired for all sites (see ***Table 1-1*****)** are larger than what actually required. This is to accommodate landowners who refused to sell only a fraction of their land.

Table 3-7 Approximated Area Required

Project Component	Land Required		
	Pringgabaya	Selong	Sengkol
PV Field	7.91 ha	7.91 ha	7.91 ha
Main station	0.05 ha	0.05 ha	0.05 ha
Inverter station	0.02 ha	0.02 ha	0.02 ha

Project Component	Land Required		
	Pringgabaya	Selong	Sengkol
Internal roads	0.02 ha	0.02 ha	0.02 ha
Total	**8.00 ha**	**8.00 ha**	**8.00 ha**

Source: PT ITA, PT ITB, PT ITC, 2017

3.5 *PROJECT PHASES AND ACTIVITIES*

3.5.1 *Pre-Construction Phase*

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 which will be described in social baseline (**Chapter 6**).

Based on the Project's schedule (***Table 3-19***), the EPC selection and final project design are expected to be confirmed in March 2018, with construction commencing soon after. More detailed pre-construction activities are described in the subsequent sections.

Site Survey

Survey activities including topography, soil investigation/geotechnical survey, and hydrology will be undertaken for technical and structural design. Bore piling test will also be conducted as part of a study in order to understand the required civil preparation works. 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.

Socialisation and Public Consultation

Socialisation and public consultation activities have been undertaken by the Project Proponent and UKL-UPL consultant team in the Pringgabaya, Selong, and Sengkol Sites. These activities were intended to provide information on the Project plan, its potential impacts, and mitigation measures to the villagers and also provide a forum for questions, detailed consultation results is presented in ***Section 5.1***.

Permitting Process

The project is within the administrative boundary of the Lombok Timur Regency (Pringgabaya and Selong) and Lombok Tengah Regency (Sengkol). The Regent and one-door integrated services offices for both regencies are responsible for key development permits including the Principal Permit, Location Permit and Construction Permits. The Proponents will have to work closely with the Regent's officers in ensuring that the procedures are undertaken correctly.

Before the location permit can be issued, the Spatial Planning Coordination Agency of Lombok Tengah and Lombok Timur Agency needed to assess whether the Project location plans are in line with the spatial plan. When it is confirmed that the Project will be developed in the designated area according to spatial plan, the government

institution issues a recommendation of the spatial plan. This recommendation, along with the principal permit, are then used to obtain the location permit. The principal permit and location permit have been granted for all three locations, which is shown in ***Table 3-8*****.**

Regarding the environmental permit, the UKL-UPLs for Pringgabaya, Selong, and Sengkol sites has been approved and the Environmental Permits were obtained in March, July, and August 2017, respectively.

Table 3-8 Permits for Pringgaya, Selong and Sengkol Sites

Type of Permit	Name of Issuing Institution	Number	Issuance Date	Expiration Date
Pringgabaya				
Principal permit	Lombok Timur Regent	188.45/38/503/PPT/2016	9 February 2016	NA
Location permit	Integrated Permit and Investment Agency of Lombok Timur Regency	1185/503/PPT.II/2016	24 March 2016	1 year – 18 April 2018
Recommendation of spatial plan	Spatial Planning Coordination Agency (BKPRD) of Lombok Timur Regency	090/160/PD/2016	4 March 2017	NA
Technical consideration	National Land Agency (BPN)	13/2016	23 March 2017	NA
Environmental permit	Environmental Agency (DLH) of Lombok Timur Regency	188.47/14/DLHK/2017	20 March 2017	NA
Selong				
Principal permit	Lombok Timur Regent	188.45/347/503/PM/2017	16 February 2017	16 February 2018
Location permit	Integrated Permit and Investment Agency of Lombok Timur Regency	1904/503/PM.II/2017	14 June 2017	1 year – 14 June 2018
Recommendation of spatial plan	Local Development Planning Agency (BAPPEDA)	050/378/PD/2017	21 July 2017	NA

Type of Permit	Name of Issuing Institution	Number	Issuance Date	Expiration Date
Technical consideration	National Land Agency (BPN)	07/2017	21 July 2017	NA
Environmental permit	Environmental Agency (DLH) of Lombok Timur Regency	188.47/121/ DLHK/2017	31 July 2017	NA
Sengkol				
Principal permit	Lombok Tengah Regent	/35/DPMPTSP/2017	14 February 2017	NA
Location Permit	Integrated Permit and Investment Agency of Lombok Tengah Regency	503.31/977/ 2017	19 July 2017	6 months
Recommendation of spatial plan	Spatial Planning Coordination Agency (BKPRD) of Lombok Tengah Regency	650/159/BKPRD/2017	10 July 2017	6 months
Technical consideration	National Land Agency (BPN)	32/2017	17 July 2017	NA
Environmental Permit	Environmental Agency (DLH) of Lombok Tengah Regency		August 2017	NA

Source: PT ITA, PT ITB, PT ITC, 2017

3.5.2 Construction Phase

Construction Site Office Construction

Prior to the physical activity in the construction phase, a construction site office for the construction worker will be built at each site to carry out company activities at the construction sites. The construction of the site office and workshop will use semi-knock down building materials and equipment. Toilet facilities will be installed at the construction site office on each site in accordance with the number of workers utilising the construction site office, which is estimated to be about 5 – 20 people. Approximately 2 – 3 toilet facilities are therefore required.

Mobilisation of Equipment and Materials

Construction activities require materials and a number of adequate heavy equipment. The necessary heavy equipment includes excavators for excavation, dump trucks for transporting materials, welding equipment, dumper for compaction. This equipment is generally already available in the NTB area. Transportation of the equipment can

cause disruption of traffic. Estimated types of equipment used during the construction phase for each solar power plant can be seen in ***Table 3-9***.

Table 3-9 Equipment Plan on Each Site

Equipment	Quantity	Rated (kW)
Electric welder	18	18
Steel bar cutter	2	5.5
Steel bar bending machine	2	4.0
Abrasive wheel cutting machine	2	2.2
Bar straightener	2	9.5
Electric hand drill	10	0.6
Bench drill	2	6.0
Percussion drill	4	1.5
Backhoe	2	100
Grader	1	150
Dump truck	1	100
Boom truck	1	100
Crane	1	30 tons
Forklift	2	37.5

Source: UKL-UPL of Pringgabaya, Selong, and Sengkol, 2017

The material needed for the construction of Solar Farm has a very specific specification as it relates to the technology in the field of solar energy which is still relatively new. Most of the material for each solar power plant consists of PV modules, inverters, and transformers with the model as can be seen in ***Table 3-10***. In its development, some materials will be assembled in Indonesia but with the technology/patent from an institution that has been recognised internationally.

Besides the use of imported materials and/or materials assembled domestically, local materials for each solar power plant such as stone, sand, cement, wood and others will also be used on each site as listed in ***Table 3-11***.

Table 3-10 Material Quantity According to Type of Activities on Each Site

Material	Unit	Quantity
Civil		
Site clearing and grubbing	m^2	101,500
Grading Cut and Filled	m^2	6,500
Drainage	m^2	200
Road	m^2	2,100
Perimeter fence	m.	700
Site topography, soil investigation and hydrological	lot	1
Main station	m^2	400
Inverter station	m^2	400

Material	Unit	Quantity
Water distribution	lot	1
Sanitary system	lot	1
Security and Main entrance	lot	1
Car parking	lot	1
Landscape	lot	1
Electrical		
PV Modules 310Wp	pcs	19,360
Mounting Structure horizontal single axis tracking	sets	484
Step-up transformer 2720 kVA	unit	4
Inverter 680kW	sets	8
Array box	unit	30
DC & AC cabling	lot	1
SCADA and communication	set	1
AC Equipment	lot	1
DC Equipment	lot	1
MV Equipment	lot	1
Weather sensor	lot	1

Source: UKL-UPL of Pringgabaya, Selong, and Sengkol, 2017

Table 3-11 Rough Estimation of Material Plan on Each Site

Item	Description	Unit	Quantity
1	Concrete	m^3	420
	- cement	kg	146,300
	- sand	m^3	170
	- aggregate	m^3	250
2	Rebar	kg	58,510
3	Sand	m^3	300
4	Gravel	m^3	705
5	Brick	m^2	160

Source: UKL-UPL of Pringgabaya, Selong, and Sengkol, 2017

Marine Transportation

Kayangan Port is located in Labuhan Lombok Town, Pringgabaya Village, Lombok Timur Regency (***Figure 3-19***). This port has been used for ferries which carry passengers from and to Pototano, Sumbawa Island.

Figure 3-19 Kayangan Port Overview

Lembar Port is an international port located in Labuan Tereng Village, Lembar District, Lombok Barat Regency. It has four docks in total with the longest dock length of 162.5 m and stacking field facility extents to 1,425 m^2. This port has adopted ISO 9001:2008 for quality management system.

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.

Road Transportation

It is expected that most of the equipment will be delivered to Pringgabaya and Selong site via Kayangan Port and transported via truck and heavy vehicles along the main road. The distance of Kayangan Port to Pringgabaya and Selong are approximately 6 km and 27 km respectively.

For the Sengkol site, most of the equipment will be delivered via Lembar Port and transported via truck and heavy vehicles along the main road. The distance of Lembar Port to the Sengkol Site is 36 km.

Predicted vehicle movements are unknown at this point and will be confirmed as part of the detailed construction planning by the EPC. 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.

Construction will result in increased vehicle movements around the site and along the main transport route to site from Kayangan Port and Lembar Port over the 12 month construction period.

Deliveries to the 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 mini batching plant from the onsite

location. ***Table 3-9***, ***Table 3-10***, and ***Table 3-11*** show material and equipment deliveries for the construction phase. No road upgrades are expected along this main transport route.

The route for mobilisation is depicted in ***Figure 3-20*** and ***Figure 3-21***.

Figure 3-20 Transportation Route to Pringgabaya and Selong Site

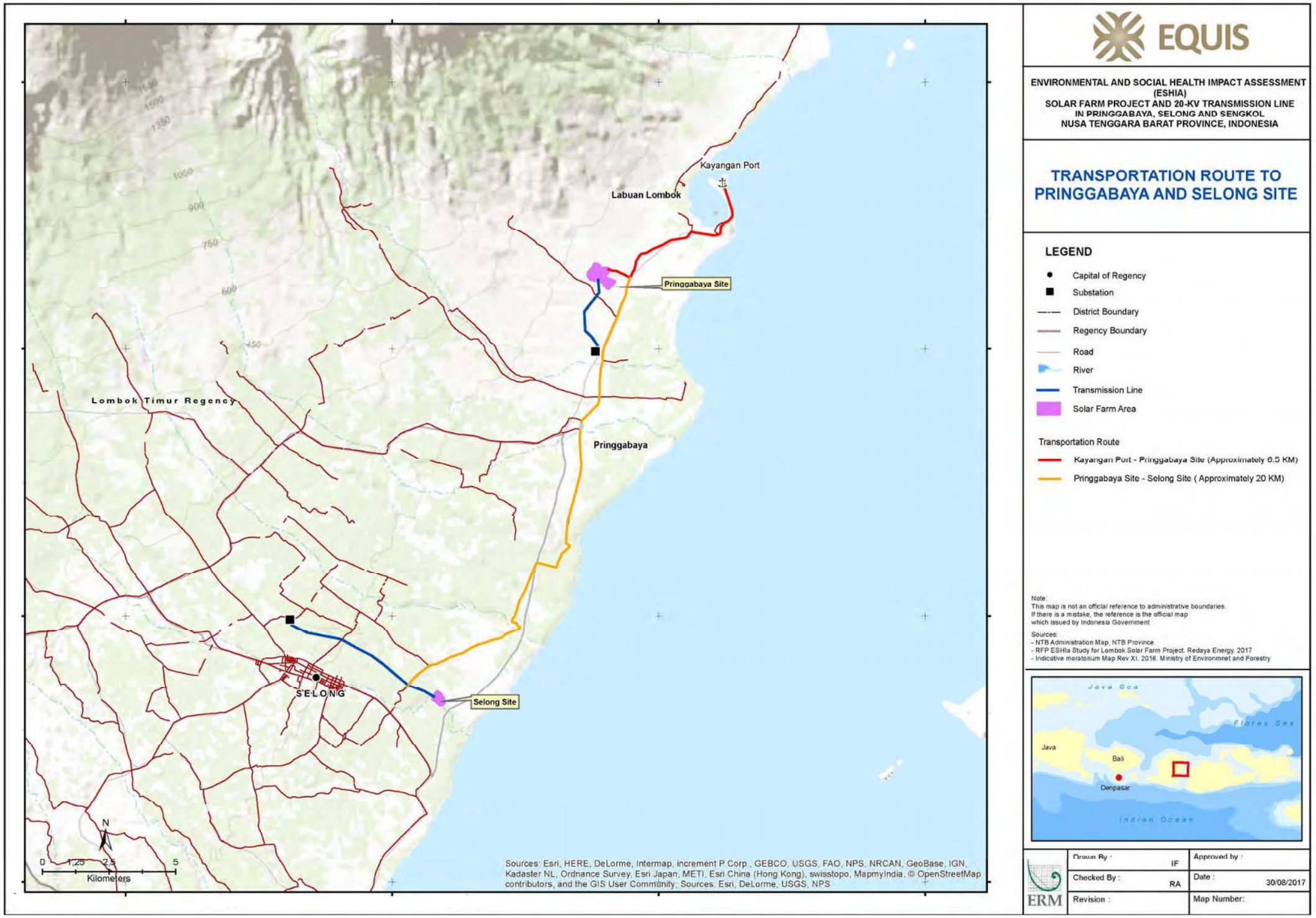
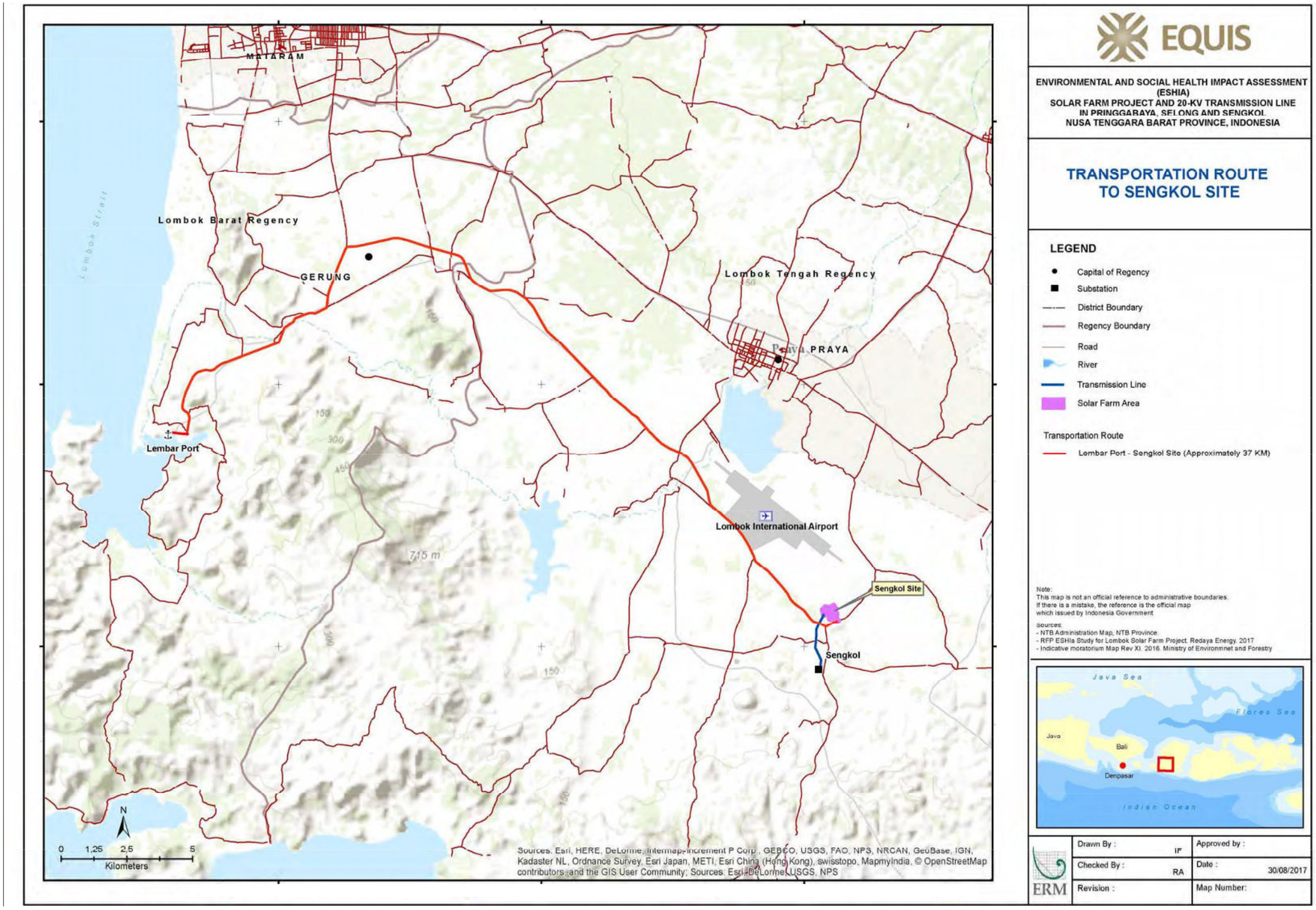


Figure 3-21 Transportation Route to Sengkol Site



Pringgabaya Site Access Road

From Kayangan Port, equipment will be mobilised through province road and regency road, district road, and village road. An access road will need to be constructed from village road (***Figure 3-22***) to site. This road will have 6 meters wide and 100 meters length. As mentioned in ***Section 2.2.2.1***, there is a part of the village road that is crossed by a creek and will get inundated during rainy season.

Figure 3-22 Village Road near Pringgabaya Site

Selong Site Access Road

From Kayangan Port, equipment will be mobilised through province road, regency road and village roads. An access road will need to be constructed from the regency road to site of 6 m width and 400 m in length (***Figure 3-23***).

Figure 3-23 Location Plan for Access Road from Village Road to Selong Site

Sengkol Site Access Road

From Lembar Port, equipment will be mobilised through province road and regency road (**Figure 3-24**). An access road will be constructed from the regency road to the site, with a width of 6 m and 120 m in length (***Figure 3-25***).

Figure 3-24 Regency Road near Sengkol Site

Figure 3-25 Location Plan for Access Road from Regency Road to Sengkol Site

Road construction is further discussed in ***Section 3.5.2***.

Land Preparation

The construction works will begin with measurement of building site and land clearance requirements. 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 that will include clearing and removal of existing vegetation. The requirement for cut and fill activity is limited due to the location having a slope angle ranging from 4.7% to 7.5% for Pringgabaya and Selong Site, and also 2.0% to 1.9% for Sengkol Site. The areas of all three sites are mostly covered by weeds, cassava, and coconut tree that will be removed. Large trees will be maintained as shaded areas, unless in the installation location of PV modules and main buildings.

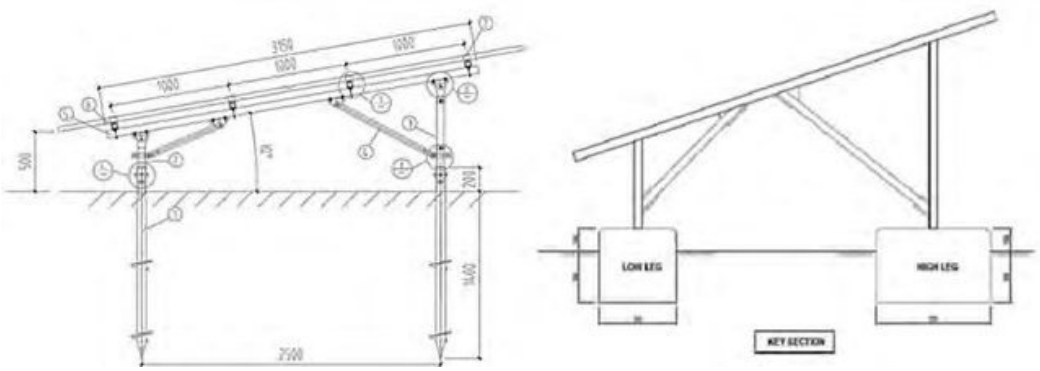
Photovoltaic Field Installation

Following site preparation, the PV module foundations will be established, prior to delivery and installation of each module. A small hole will be drilled into the soil

surface and concrete foundations and supporting structures established. An image of a prepared site, module foundation establishment and typical of PV foundation is depicted in ***Figure 3-26*** and ***Figure 3-27.***

Figure 3-26 PV Module Foundation Establishment

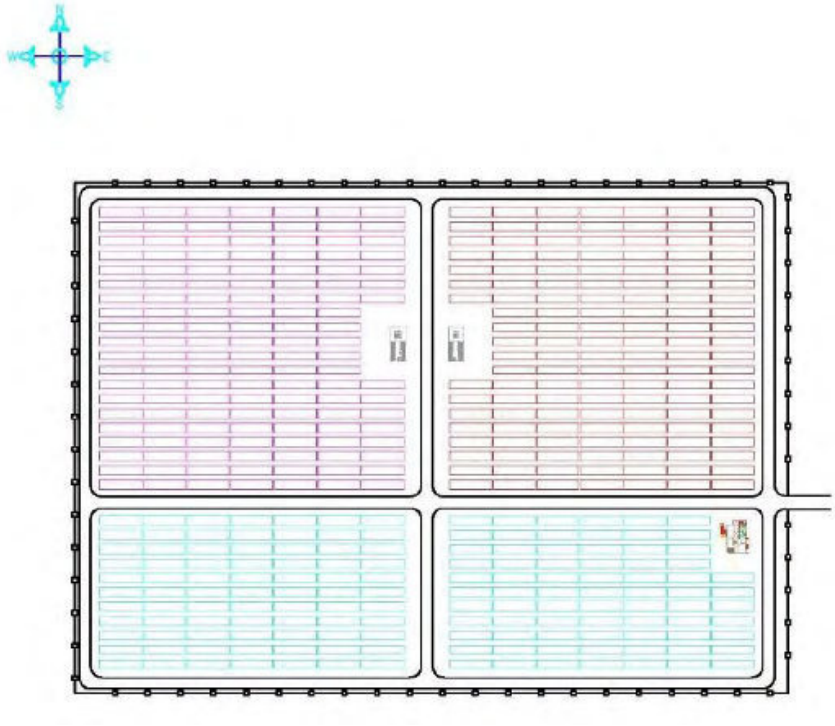
Figure 3-27 Typical PV Foundation



There will be a total of 21,880 PV modules installed at each site, divided into 1,094 strings lined up on a 7.91 ha area. The PV modules are designed to have 8.08 m row to row spacing and 10° tilt angle (with respect to horizontal), in order to minimize shading loss as depicted in ***Figure 3-29***.

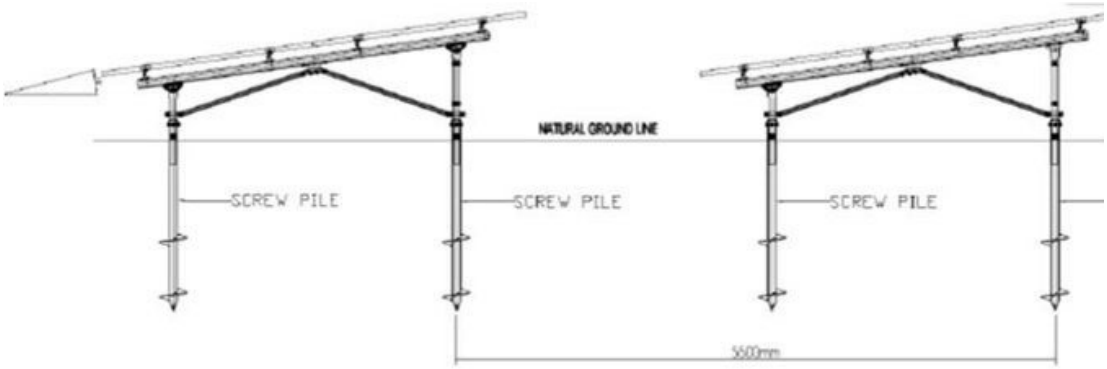
The main station building will consist of a control room, switchgear room, meeting room, O&M storage room, pantry and toilets. Rooms will be fully furnished as required (i.e., table, shelves, control desk, whiteboard and epoxy floor).

Figure 3-28 PV Field Preliminary Layout



Source: UKL-UPL of Pringgabaya, Selong, and Sengkol

Figure 3-29 Typical PV Module



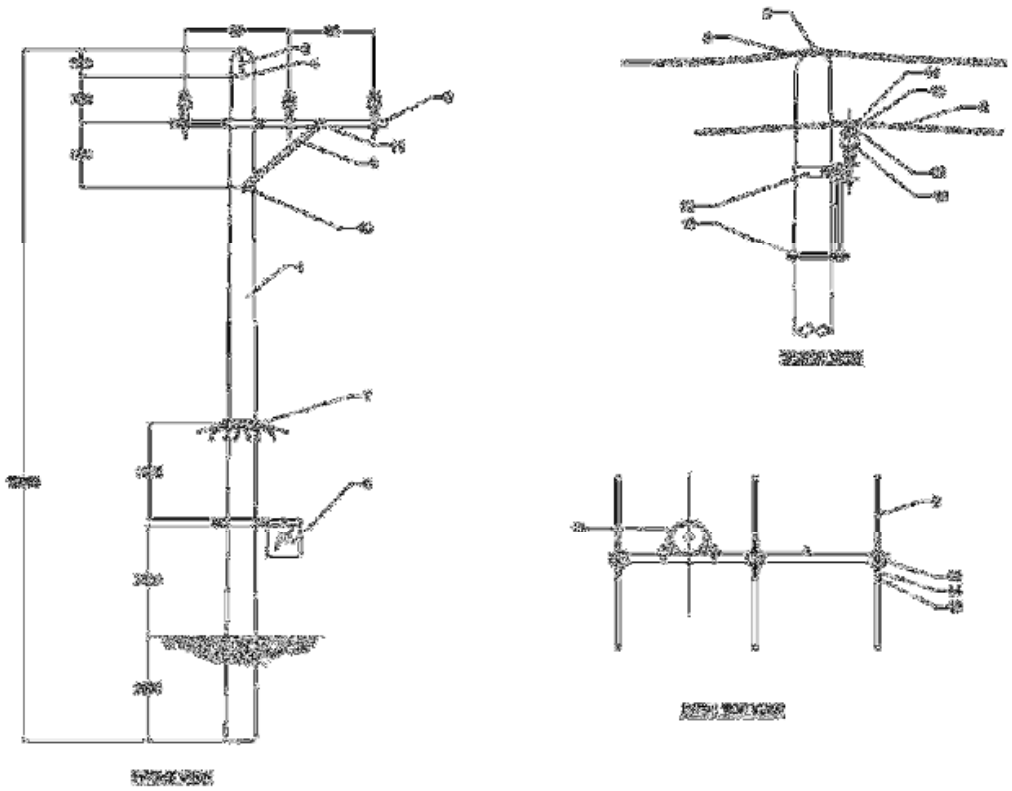
Source: UKL-UPL of Pringgabaya, Selong, and Sengkol

Transmission Line

An overhead 20 kV transmission line will be constructed from each site to the nearest PLN substation. The 20 kV transmission line is a medium voltage overhead line which comprises non-insulated and insulated wire network. Typical of 20 kV transmission line is shown ***in Figure 3-30***.

The Pringgabaya, Selong, and Sengkol substation is currently connected to the PLN supply grid. Additional feeder facilities such as a 20kV switchgear panel including protection control and metering systems will be constructed at the each Substation.

Figure 3-30 Typical of 20 kV Transmission Line



Source: UKL-UPL of Pringgabaya, Selong, and Sengkol

As part of transmission line installation, conductor stringing will be conducted by pulling winches. Following installation the wire will be tuned to the specified tensile stress and height of slope. Conductor stringing will be performed after all the towers have been completed and the insulators are installed in place.

The project proponent is responsible for constructing the transmission line to the corresponding PLN substations. Once the construction of transmission line is completed, the operation and maintenance of the transmission line will be the responsibility of PLN. This including all provision stipulated on the environmental permit and requirement on the UKL-UPL document.

Supporting Facilities

Road work is one of the activities that will be conducted as part of supporting facilities construction. All roads will be constructed align with standard from Equis or United Nation Principles of Responsible Investment (UNPRI) considering road hardness, vehicle loads, frequency of use, traffic alerts, turns, and road monitoring management.

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. Road type and finishing that have been identified for all Solar Farms are described in ***Table 3-12***.

Table 3-12 Project Road Requirements

Road Type	Usage	Pavement Type	Width (m)
Site Access Road	Provide access to project site from nearest local roads and highways. Used by construction equipment, heavy duty vehicles for easy access to sites.	Compaction/gravel	6.0
Perimeter Road	Runs adjacent to boundary of project site.	Compaction/gravel	3.0
Main Road	Provide main access from main entrance to main station. Used by construction workers, vehicles and maintenance vehicles and personnel.	Compaction/gravel	5.0
Service Road	Provide access from perimeter road to inverter station. Provide easier access to inverter by maintenance vehicles and personnel.	Compaction/gravel	3.0

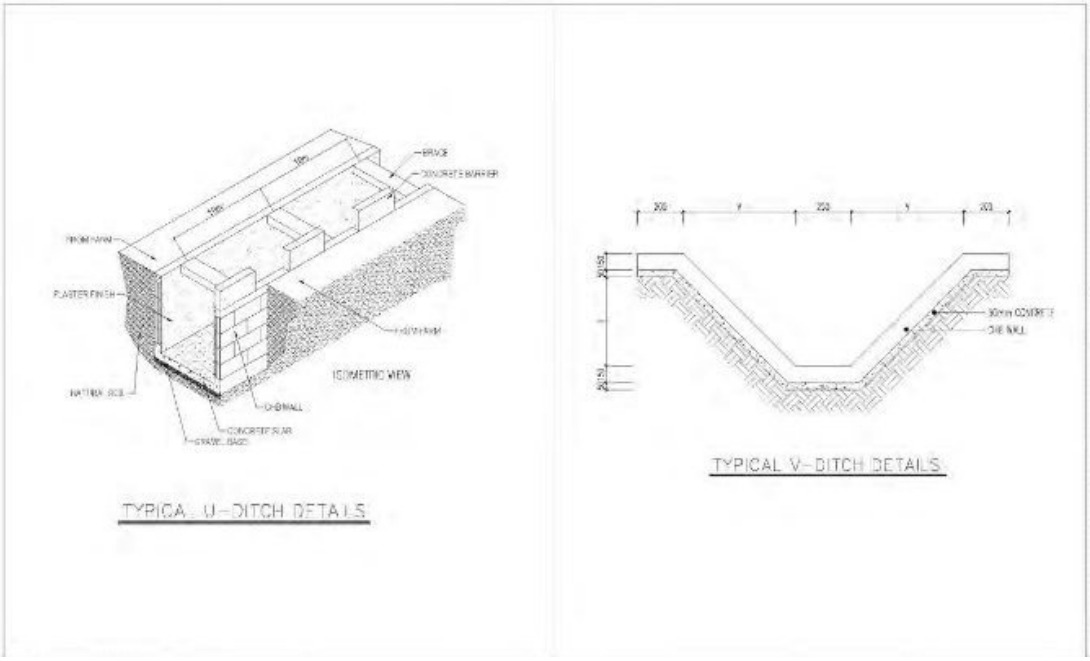
Source: Feasibility Report, 2016

In addition to the main processing facilities, the Project also requires supporting facilities such as drainage and fencing as set out in ***Table 3-13***.

Table 3-13 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 3-31**.
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 3-31 Typical Drainage Detail



Source: PT ITA, PT ITB, PT ITC

Temporary facilities will be built to support construction phase which are shown in ***Table 3-14***. Other supporting facilities are buildings for security personnel consisting of security offices, storage rooms, fire extinguishers, meeting rooms, security guard rooms, toilets and visitor registration facilities. In addition, areas will be designed for open spaces in the form of gardens with adequate lighting equipment.

Table 3-14 Temporary Facilities and Permanent Facilities

Area Type	Construction Area (m^2)	Occupation Area (m^2)	Note
Site office and living area	200	257	Including labour canteen, rest area.
Fabrication/machine area	200	50	The site for steel structure processing, mechanical repairing and assembling and parking the machines.
Warehouse	200	50	Storage for modules, mounting structures, mechanical and electrical equipment and steel bar and other items.
Area for disposal	100	50	Area for the waste and non-conformance construction products
Area for the sensitive/electronic products	200	50	Area for the sensitive products and electronic products
Area for modules	1000	50	PV Module storage
Total	**1,900**	**507**	**Overall area**

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.

Demobilisation of Construction Workers and Equipment

After the construction has been completed, the final step taken by the proponent prior to entering the operational period is the demobilisation of the workforce to the place of origin and location cleaning of project material remnants including base camp dismantling. The total of workers for construction phase is approximately 221 people, including skilled and unskilled labour. The detail of workers requirement will be described in ***Section 3.6.1***.

3.5.3 Operation Phase

Power plant capacity from each site will be 5 Mwac and will be connected to existing substation in Pringgabaya, Selong and Sengkol. Each solar power plant is predicted to give additional service for 21,000 household. Electricity selling procedure will be in line with Minister Regulation of Energy and Mineral Resource № 17 Year 2013.

Solar farm projects have limited activities for the operations and maintenance phases which involve:

- Regular monitoring of the solar power plant operation;
- Normal greasing and cleaning activities;
- Solar PV module cleaning for minimum twice per year; and
- Internal road repairs as and when required.

The design life of the project is expected to be 20 years from the date of commissioning. Regular maintenance will be required to ensure that all components are kept in optimal working order. Most day to day facility operations will be done remotely through the use of computer networks as explained in ***Section 2.3.1.5*** but some limited maintenance and repair activities would be undertaken on site.

3.5.4 Post-Operation Phase

After 20 years of operation (according to the PPA), solar farm and its supporting facilities will be handed over to PLN. It is to be decided by PLN whether the plant operation will be continued or demolished.

3.6 RESOURCE REQUIREMENTS

3.6.1 Manpower

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 people during peak construction for each solar farm. A breakdown of expected construction roles are provided in ***Table 3-15***. The vast majority of roles are unskilled which may present short term employment opportunities for local workers. Local labour from surrounding communities will be prioritised; however the Project may need to source labour from elsewhere for specific roles and depending on the skill levels of the local workforce.

Table 3-15 Estimated Total and Type of Employment Required During Construction on Each Site

Skill Type	Skilled Labours (Total)	Unskilled Labours (Total)
Construction Manager	1	
Integration Manager	1	
EPC Contract Manager	1	
Quality Manager	1	
Project Controller	1	
EHS Coordinator	1	
Steel bar working	4	20
Brick layer	-	15
Welder	4	10
Crane/Machine operator	4	-
Electrician	5	15

Skill Type	Skilled Labours (Total)	Unskilled Labours (Total)
Measurement/Survey	3	10
Ordinary works	-	120
Security & Safety	3	-
First Aiders	2	-
Total	**31**	**190**
Total Skilled and Unskilled Labours	**221**	

Source: PT ITA, PT ITB, PT ITC, 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 10-15 unskilled labours and 4-5 skilled operators. A breakdown of operational workforce requirements is provided in ***Table 3-16***.

Table 3-16 Estimated Total and Type of Employment Required During Operation on Each Site

Roles	Total Employees
Site Asset Manager	1
Operator	3
CboP O&M Supervisor	1
Accounts Officer	1
Security Guards	6
ESG Coordinator	1
Total	**13**

Source: PT ITA, PT ITB, PT ITC, 2017

3.6.2 Labour Accommodation Facility

As explained in ***Section 2.5.2***, a base camp will be provided during the construction phase for non-local workers. The operational workforce is expected to be housed within the local community. The project will try to maximize the use of local manpower to avoid on-site worker camp being required. However, if it is deemed necessary, the worker accommodation plan will follow IFC/EBRD requirements regarding worker accommodation.

3.6.3 Water Requirement

Water will 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. Estimation of water volume required in construction phase is depicted on ***Table 3-17***.

Table 3-17 Estimated Volume of Water Supply Required During Construction Phase

Items	Factor		Water Requirement (litre/day)	Water Requirement (m^3/day)
	Unit	Litre/day per unit		
Construction workers (stay overnight)*	20 persons	150	3000	3
Construction workers (not stay overnight)*	201 persons	50	10050	10.05
Water for concrete mixing**	420 m^3	0.59	247.8	0.25
Car wash (1 dump truck)			1500	1.5
Total			**14,797.8**	**14.80**

Source:
*Indonesian Standard SNI 03-7065-2005; Guidelines for Plumbing System Planning;
**Indonesian Standard SNI DT 91-0008-2007, Procedures for calculating the unit price of concrete work for the construction of buildings and housing.

The estimated volume of water required for the construction phase is ±14.80 m^3/day. Drinking water is expected to be delivered to site, while construction water supply will also be sourced from the existing water distribution line.

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 twice a year.

Figure 3-32 PV Module Washing

Operations are expected to require approximately 250 m^3 for each PV washing. Pringgabaya site, the project will most likely to have its owned groundwater well (depth of 100 m), since there is no existing water distribution line near the project site.

For Selong and Sengkol, water will be sourced from an existing water distribution line (PDAM). However, the water from PDAM does not flow continuously, the Selong and Sengkol Project will have to groundwater well as main source of water.

3.6.4 Fuel Requirement and Storage

The onsite fuel requirement during construction phase will be about approximately 600 l for each site, which will be procured from outlets located close to the project site. For operation, it is predicted that 150 l fuel will be used per month for each site. For example, during construction and operation activities, the Project will require the use of fuel for running the machine equipment i.e. back up of electricity power (diesel genset) when PLN electricity is shut-off for field office, workers accommodation, and maintenance workshop.

3.6.5 Batching Plant

A batching plant will be installed at each location for providing ready mix concrete for PV foundation and other civil work.

3.6.6 Power Requirement

Electricity supply during construction will be tapped from PLN's existing 20kV line. An emergency diesel generator will be provided for backup to support construction only if there is an interruption to the PLN supply.

During operations, power will be provided by the Project (during the daytime) and/or existing PLN 20kV line. Maximum necessity of electricity is predicted to be approximately 15 kW.

3.7 POLLUTION CONTROL MEASURES

Wastes generated from the construction phase and from various operational activities will require management to prevent and minimise pollution to the environment.

3.7.1 Air Emissions

Air emissions during construction are predominantly generated by the mobilisation 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 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.

3.7.2 *Greenhouse Gas Emissions*

Further to above, Greenhouse Gas (GHG) emissions will largely be limited to the nine to twelve month construction period, with smaller emissions during the operations phase from worker transportation to the project and maintenance activities requiring vehicle use.

3.7.3 *Lighting and Visual Amenity*

The Project will generate electricity during the day. Night time operations will introduce some general security and safety lighting. Visually, the Project is within a low lying area and elevated structures will be limited to single story buildings and low lying electricity infrastructure, such as the PV modules.

The Project is located at distance range of 120 – 250 m from the nearest surrounding houses. 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. An example of a typical solar field layout is shown in ***Figure 3-33***.

Figure 3-33 Typical PV Layout

3.7.4 *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.

3.7.5 *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.

Other than the 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.

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.

3.7.6 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 3-18***.

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. Crystalline silicon (c-Si) is the major component of the modules hence it is not classified as a hazardous material, according to Government Regulation No. 74/2001 regarding Management of Hazardous and Toxic Waste. 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 3-18***. Recycling would be of a higher priority but this will depend on the availability of a recycling facility.

Table 3-18 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.
Mounting Structure (of PV Modules)	Mechanical disassembly.	Sold as scrap.

Component	Disassembly/Removal Method	Disposal Method
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		
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 transorted 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 eqipment, 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	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.

Component	Disassembly/Removal Method	Disposal Method
	stripped off using equipment such as a wheel loader.	
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, ensuring any buried portion is removed.	The poles will be transported off-site to be sold as scrap or disposed off directly.
Perimeter Fencing	To be dismantled	Recycling potential would be dependent on the material of the fece (e.g. steel or wood). If recycling is not possible, it is to be transported off-site for disposal.

3.7.7 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 require a permit from the central government.

Hazardous wastes expected to be generated by the Project during construction and operation is transformer oil and wastes from the battery control system.

3.8 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.

3.9 CURRENT PROJECT STATUS AND SCHEDULE

The Proponents have created a development plan for which it believes that the major milestones of Lombok Solar Farm can be achieved. This development plan seeks to achieve financial close on Lombok Solar Farm within 6 months and to complete construction of the solar project within 12 months (***Table 3-19***). The EPC company is expected to be appointed in the third to fourth quarter of 2017. A summary of the development and construction plan is set out below.

- Stage 1: Development involving land, permits, design, tendering and raising bank debt;
- Stage 2: Construction involves the procurement and construction of the project; and
- Stage 3: Operations of the project is expected to be for 20 years with the potential for this to be longer with leading operations and maintenance.

Table 3-19 Proposed Project Schedule

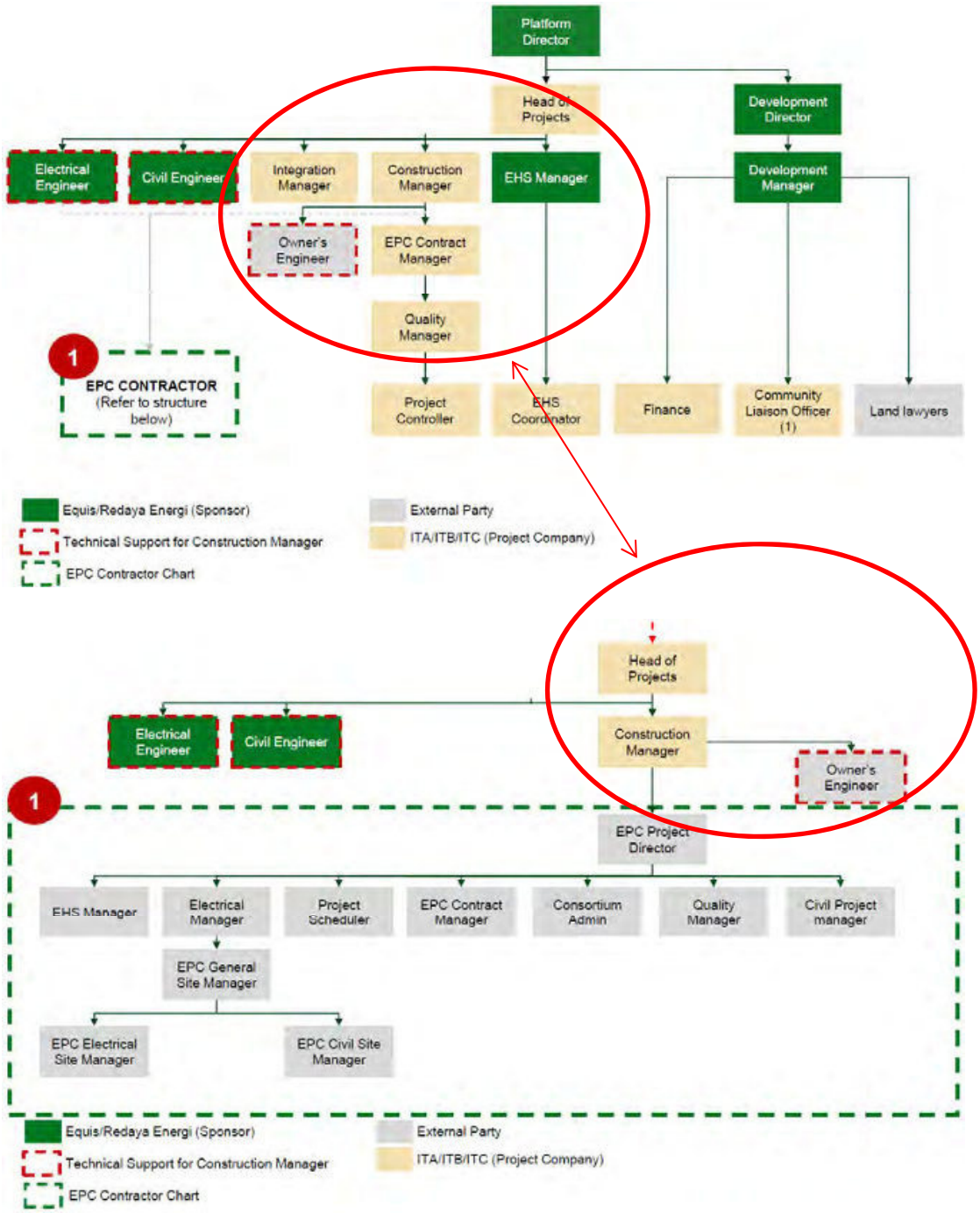
Description	2017					2018												2019			
	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
PPA																					
Financial Close																					
NTP and Construction																					
Testing and Commissioning																					
COD																					
Start Operation until 20 years																					

Source: PT ITA, PT ITB, PT ITC, 2016

3.10 *PROJECT ORGANISATIONAL STRUCTURE*

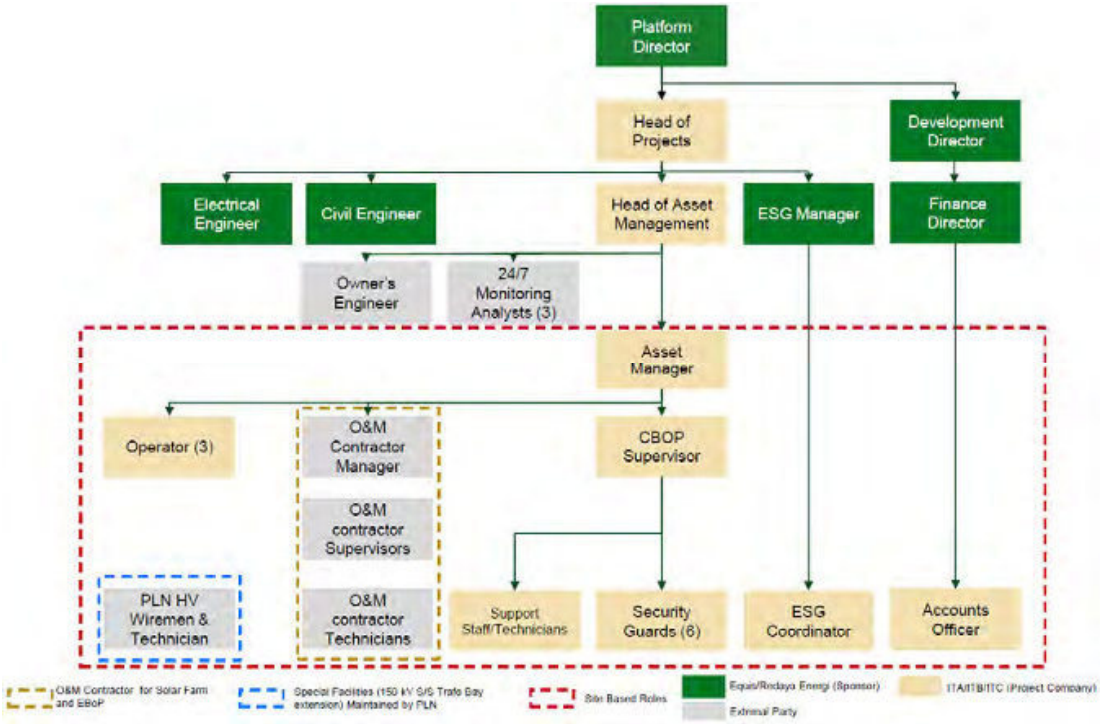
The structure for construction phase is presented in ***Figure 3-34***. According to the structure, EHS coordinator of each project company (ITA, ITB and ITC) will report to EHS manager of sponsor (Equis Energy) for various aspects during the construction phase. EHS manager of EPC Company will report to EPC project director which is under construction manager of each project company.

Figure 3-34 Project Organisational Structure for Construction Phase



The organisation structure for the operation phase is shown in ***Figure 3-35***. During operation, an EHS coordinator role will be implemented by the ESG coordinator of each project company. ESG coordinator will report to the ESG manager of the sponsor (Equis Energy).

Figure 3-35 Project Organisational Structure for Operation and Maintenance Phase



4 ESHIA SCOPING

4.1 OVERVIEW

This ESHIA 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.

Currently, there are 3 separate UKL-UPL documents for each site. The UKL-UPL documents which is in fulfilment of the Indonesian regulation, does not detail the scoping process. It is important to understand that there are differences in terminology used, primarily as a result of the different audiences that the UKL-UPL and ESHIA report are targeted towards.

The ESHIA is prepared to target only the important environmental and social risks including risks already covered in the UKL-UPL 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;
- ESHIA will conduct scoping prior to impact identification;
- Environmental baseline data will be included in the main content while in UKL-UPL acts as appendix;
- More detailed impact assessment expectations of ESHIA;
- ESHIA will include Stakeholder Engagement which is not present in UKL-UPL; and
- ESHIA consideration of cumulative impacts, associated facilities and non-routine events, which are all not assessed under UKL-UPL.

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

4.2 SCOPE OF THE ASSESSMENT

The Project has been subject to an Indonesian Regulatory approval through the local UKL-UPL process. A certified environmental consultant, assigned by Equis, was responsible for the UKL-UPL production and environmental permit.

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

Since this is a UKL-UPL process, therefore all impacts generated are generally identified as insignificant impact. However, due to data and analysis gaps between UKL-UPL and ESHIA, this Project requires further impact assessment in ESHIA to address all additional potential impacts.

The list of environmental, social and health impacts identified during the UKL-UPL process is provided at ***Table 4-1***. These have been taken into account as part of the scoping of impacts for this ESHIA process.

Table 4-1 Impacts Identified in the UKL-UPL

Phase	Environmental and Social Components
Pre-construction	Community perception (+/-)
	Increase in Land and Building Values (+)
Construction	Increase in Employment Opportunity and Community Income Level (+)
	Disturbance to Biodiversity (-)
	Decrease in sanitation including solid waste pile (garbage)
	Social Jealousy (-)
	Social/Security Conflict (-)
	Disturbance to the Comfort of Area (-)
	Road Infrastructure Damage (-)
	Traffic Accident (-)
	Increase in People, Goods and Service Traffic (+)
	Reduced Air Quality (-)
	Increase in Noise (-)
	Occupational Health (+)
	Increase in Vibration (-)
	Increase in Run Off Volume (-)
	Community perception (+/-)
Operation	Increase in Employment opportunity and Community Income Level (+)
	Social Jealousy (-)
	Social/Security Conflict (-)
	Increase in Community Economic Level (+)
	Increase in Regional Revenue (+)
	Occupational Health (+)
	Hydrant & Fire Extinguisher Supplies (+)
	Wastewater (-)
	Domestic solid waste (-)
	Hazardous waste (-)
Post Operation	Reduced Community Income Source (-)
Specifically for Pringgabaya Site	
Post Operation	Air and Noise Quality Restoration (+)

Management and monitoring efforts in the UKL-UPL for the Project has been incorporated into the ESHIA and must be implemented and reported on every six months to comply with Indonesian regulations.

4.3 *SCOPING METHODOLOGY*

For this ESHIA study, scoping has been undertaken to identify the potential Area of Influence for the Project 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 prioritise these impacts in terms of their likely significance. This stage is intended to ensure that the impact assessment focuses on issues that are most important decision-making and stakeholder interest.

It is to be noted here that during the period of ESHIA study, Project is in the Planning and Pre-Construction phase, therefore, the scoping exercise includes all the phases of the project, i.e., planning and pre-construction, construction, operation and maintenance and post-operation into consideration.

The scoping exercise was undertaken on the basis of the information available on the project and the discussions with the Project team. Potential impacts have been identified through a systematic process whereby the features and activities (both planned and unplanned) associated with the operation and post-operation phases of the Project have been considered with respect to their potential to interact with resources/receptors. However, social impacts are assessed retrospectively for the land purchase process during preconstruction phase.

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. Each resulting cell on the Potential Interactions Matrix thus represents a potential interaction between a Project activity and a resource/receptor.

Potential impacts have each been classified in one of three 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);
- **Interaction likely**, but not anticipated to be significant: where there is likely to be an interaction, but the resultant impact is unlikely to change baseline conditions in an appreciable/detectable way; 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.

The proposed solar Project will involve the key activities during its life cycle which will include planning and pre-construction, construction, operation and post-operation phases as detailed in **Section 2.4**.

4.4 *ESHIA SCOPING RESULTS*

One of the key results of the Scoping stage is the identification of resources/receptors that can be significantly impacted by the Project, and development of requirements for collection of additional Baseline information relevant to these resources/receptors.

The completed Potential Interactions Matrix for Project activities and likely impacted resources/ receptors is presented in ***Table 4-2***. Those cells that are white are 'scoped out' for no further consideration in the ESHIA Process.

Those interactions that are grey are also 'scoped out', but the ESHIA report includes a discussion that presents the evidence base (e.g., past experience, documented data, etc.) used to justify the basis upon which this decision was made. Those interactions that are shaded black are retained for further consideration in the ESHIA Process.

Table 4-2 Impact Interaction Matrix

Project Phase and Activity \ Environmental and Social Resources/ Receptors	Environment						Health & Social							
	Vegetation/ Flora	Soil/ Geology	Ambient Air Quality	Water	Ambient Noise Quality/ Vibration	Fauna	Demography (Influx & Displacement	Land Use and Economic Displacement	Visual/Aesthetics	Local Economy & Employment	Natural/ Common Property Resources	Community Health and Safety	Infrastructure & Services	Cultural & Heritage
PRE-CONSTRUCTION														
Land Acquisition								■			■			
CONSTRUCTION														
Mobilisation of labour and equipment			■		■		■			■		■	■	
Clearance of vegetation, site grading foundation and drainage works	■		■		■	■								
Establishment of labour camp, batching plant, storage areas for solar PV module parts and other equipment and construction materials		■		■										
Upgrading/construction of access roads		■	■		■	■								
Internal road construction		■	■		■	■								
Construction at substation complex		■	■		■									
Erection of internal electrical lines inside solar farm site			■		■									
Solar PV modules erection and installation					■									
Commissioning														
Transmission line installation	■	■	■		■									
Demobilisation of construction workforce										■				
OPERATIONS AND MAINTANANCE														
Operations of solar power plant and transmission lines				■		■			■					
Scheduled maintenance activities (Solar PV Panels cleaning, electrical lines, storage yard)				■						■				
POST OPERATIONS														
Handover of solar farm facilities to PLN													■	
NON-ROUTINE EVENTS														
Spillage of fuel, oil, chemicals and hazardous materials		■		■								■		
Fire/explosion			■									■		
Vehicle accident												■		

Note: The activity-impact interaction matrix has considered one single project component, i.e. the solar farm site.

= Represents "no" interactions is reasonably expected

= Represents interactions reasonably possible but not predicted to lead to significant impacts

= Represents interactions reasonably possible with one of the outcomes leading to potential significant impact

Table 4-3 Identified Interactions and Potential Impacts

Project Activities	Interaction (between Project Activity and Resource/Receptor)
• Land acquisition.	Change in land use and loss of agricultural land
Construction	
• Mobilisation of labour and equipment	• Increased vehicle pressure on roads and potential disturbance to community from traffic, noise, vibration and dust. • Potential pressure on goods and services from influx of labour. • Migrant workers may carry communicable disease. • Community Health, Safety, and Security risks from vehicle movements and presence of labour workforce. • Positive benefits from local employment and business opportunity.
• Vegetation clearing and grading in areas designated for solar PV project (site and transmission line) and supporting infrastructure.	• Ecological changes from removal of plants and habitat changes. • Disturbance to fauna. • Dust, noise and vibration affecting background quality. • Changes to topography and alteration of drainage patterns.
• Construction of temporary structures such as construction site office, worker camp, store yard, batching plant; • Construction/upgradation of access roads; • Erection of solar PV modules and associated transformer yard and permanent site office. • Installation of transmission lines.	• Dust, noise and vibration affecting background quality. • Disturbance to fauna.
• Water use during construction	• Decreased water availability from the water resources of the area due to consumption of water for carrying out project activities.
• Demobilisation of construction workers.	• Impact on local economy and employment opportunities (commissioning of the project construction)
Operation and maintenance	
• Physical presence of transmission line.	• Potential risk to birds and bats from towers and lines.
• Maintenance activities along transmission line.	• May disrupt wildlife and their habitat especially in vegetation control using mechanical and chemical method.
Unplanned/Accidental Events	

Project Activities	Interaction (between Project Activity and Resource/Receptor)
• Spillage of fuel, oil, chemicals and hazardous materials; • Fire/explosion	• Decreased soil/water quality due to wastewater release and spills/leaks from project activities. • Air quality reduction. • Potential impacts on community health.
• Vehicle accident	• Risk of injury/fatality to worker/community.

The results of Scoping are used to provide an appropriate level of Environmental and Social Baseline information (***Chapter 5***) in order to conduct an informed assessment of the significance of these potential impacts (***Chapter 6***).

5 ENVIRONMENTAL AND SOCIAL BASELINE

5.1 INTRODUCTION

This Chapter presents information on the environmental and social conditions in the Project areas and vicinity, focussing on the potential impacts identified from Scoping from Project activities and interaction with resources and receptors. Where project activities have been scoped out, no information is given on the baseline conditions unless required for the Impact Assessment (***Chapter 6***).

The description of the baseline has the following objectives:

- To identify the key environmental, socio-economic, cultural and health conditions in a defined Area of Influence, focusing on the resources/receptors that may be impacted by the Project;
- To describe and, where possible, quantify their characteristics (nature, condition, quality, extent); and
- To inform judgments where possible about the sensitivity, vulnerability and/or importance of resources/receptors.

5.2 AREA OF INFLUENCE

For the purpose of the baseline establishment and impact assessment, an Area of Influence (AoI) has been identified. This sub section provides an understanding of the AoI thus identified and the reasons for the same.

5.2.1 Study Area

The study area considered for ESHIA includes an area within 5 km radius from farthest of solar farm. The study area of 5 km has been selected based on the location of Project site and its footprint, nature and spatial distribution of potential social and environmental impacts (based on similar type of projects).

Project footprint Area

The Project Footprint is the area that may reasonably be expected to be physically touched by Project activities, across all phases. Each solar farm site covers approximately 9 hectares of land situated in Lombok Timur (Pringgabaya and Selong Site) and Lombok Tengah Regency (Sengkol Site). Physically, there is no demarcation or fencing for the Project Site boundary at the moment and hence it is contiguous with the rest of the area.

The Project Footprint for Project includes land used for solar farm, substation, storage of materials, site office, access roads, and internal and external transmission lines.

Project Area of Influence (AOI)

The effects of the Project and Project activities on a particular resource or receptor will have spatial (distance) and temporal (time) dimensions, the scale of which is dependent on a number of factors. These factors are incorporated in the definition of the Project's Area of Influence (AoI).

The AoI considered for the Project with respect to the environmental and social resources is derived from consideration of the following:

- **Environmental parameters**: Project site boundary, immediate vicinity, access road and surroundings, i.e. a study area of approximately 5 km (hereafter referred to as the AoI) distance from project line has been used to depict these parameters;
    - **Air Quality**: Dust emissions, fugitive dust –typically up to 100 m from operations and maintenance area;
    - **Noise**: Noise impact area (defined as the area over which an increase in environmental noise levels due to the Project can be detected) – typically 1 km from operations;
    - **Land environment**: The impacts on soil and land- typically up to 100 m from project foot print area;
    - **Ecological Environment (Terrestrial and Aquatic)**: This includes: (a) the direct footprint of the project comprising the solar farm; (b) The areas immediately adjacent to the project footprint within which a zone of ecological disturbance is created through increased dust, human presence and project related activities (e.g., trampling, transportation activities).;
- **Social and Cultural**: The project footprint for each site is limited to 1 village/sub-district (3 villages in total), which lie within the study area of 5 km for each site. This is taken as the area of influence, as social impacts largely remained confined to these villages.

Core and Buffer Zone

This AoI is in turn, divided into a core and buffer zone. This division of the AoI into two zones is based on the understanding that the majority of the impacts from the project (during the mobilisation , construction, operations and decommission phase) would be contained within a 1 km radius from the Project Footprint in terms of spread and intensity, with the buffer zone appearing to have limited interaction with the Project.

Area of Influence Maps presented in **Annex B**.

5.3 ENVIRONMENTAL CHARACTERISTICS

5.3.1 Environmental Data Sources

The baseline conditions within the Project area have been characterized based on a consideration of secondary data from published sources, baseline data collected during preparation of the UKL-UPL by Universitas Mataram, and scoping site visit by ERM conducted on 25-28 July 2017.

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

- IUCN Red List;
- Government Regulation of Indonesia Number 7 Year 1999;
- UKL-UPL baseline data, which include:
  - Climate (secondary data);
  - Topography (secondary data); and
  - Terrestrial biodiversity (primary data)
- Field observations during the ERM site visit.

5.3.2 Climate

Lombok Tengah Regency is a regency of Nusa Tenggara Barat Province which is located between 116° - 117° E and 8° - 9° S. Lombok Timur Regency area is 2,679.88 km² consist of terrestrial area of 1,605.55 km² (59.91%) and sea area of 1,074.33 km² (40.09%), have a tropical climate.

Typically there is a wet season in the Lombok Tengah Regency from November to April. In Pringgabaya, Selong and Sengkol, September is the driest month with precipitation at 8 mm, 5 mm, and 14 mm respectively, whereas in January, the precipitation reaches its peak at an average of 200 mm, 254 mm, and 302 mm respectively. ***Table 5-1*** describes average monthly rainfall at Pringgabaya, Selong, and Sengkol sites during the year.

Table 5-1 Average Monthly Rainfall

Site	Average Monthly Precipitation (mm)											
	Jan	Feb	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	Nov	Dec
Pringgabaya	200	143	122	63	4	26	27	10	8	20	68	166
Selong	254	166	146	52	36	8	38	15	5	29	84	215
Sengkol	267	241	175	141	103	66	67	29	14	81	182	302

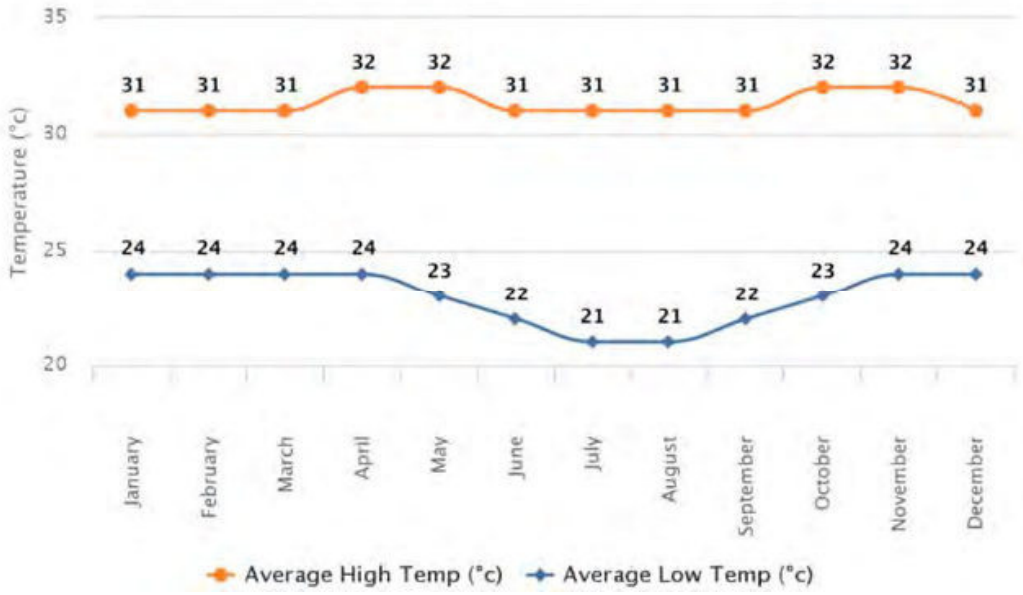
Source: FS Study, 2016.

Air temperature is relatively constant throughout the year, with a typical 3 °C range in the average high temperature during the year, and average low temperatures

recorded for the region. The average air temperature for the year in Lombok Timur Regency is 27.0°C (***Figure 5-1***).

Due to limited data available from UKL-UPL, climate section only describes average monthly rainfall of Lombok Tengah Regency and average monthly temperature of Lombok Timur Regency.

Figure 5-1 Average Temperature in Lombok Timur Regency



Source: FS Study, 2016.

5.3.3 *Topography*

The site topography in Pringgabaya and Selong is generally flat. The altitude of Pringgabaya sites is 730 meters above mean sea level (msl), whereas Selong site is 190 meters above mean sea level (msl). Both sites can be classified as simple terrain. It is shown that both sites have a high elevation from North to South with maximum slope of 4.7%. The site also has a high elevation from West to East with a maximum slope of 7.5%.

In Sengkol Site, the topography is mostly flat with some terraced area. The terraced landscape was not found to have irrigation function. The altitude of the sites is 90 meters above mean sea level (msl). The PV area in Sengkol can also be classified as simple terrain. It is shown that the site has a high elevation from North to South with maximum slope of 2.0%. The site also has a high elevation from West to East with a maximum slope of 1.9%.

5.3.4 *Soil Conditions*

According to National Land Agency of Lombok Tengah Regency, the soil types in Lombok Tengah Regency are described in ***Table 5-2***.

Table 5-2 Soil Type in Lombok Tengah Regency

Soil Type	Area (Ha)	Percentage
Alluvial	2,414	2.00
Grey Regosol	26,416	21.86
Brown Regosol	7,222	5.98
Brown Forest Soil	9,150	7.57
Dark Grey Grumosol	30,771	25.46
Dark Grey Grumosol Complex, Mediterranean Brown Lithosol	6,494	5.37
Brown Mediterranean Complex, Brown Regosol, and Lithosol	38,372	**31.75**
Total	**120,839**	**100.00**

Source: National Land Agency of Lombok Tengah Regency, 2016

5.3.5 Hydrology, Drainage and Water Quality

Pringgabaya Site

Pringgabaya site is adjacent to a creek which is filled with river water during rainy season; the creek was dry by the time of the site visit in the end of July 2017 (***Figure 5-2***). This creek crosses a village road which will be used as access for the mobilisation of equipment and material.

Figure 5-2 Creek Adjacent to Pringgabaya Site

Source: ERM Site Visit, 25-28 July 2017

Figure 5-3 Creek Passing Village Road

Source: ERM Site Visit, 25-28 July 2017

It is understood that local communities rely on groundwater wells (±100 m depth) owned by Pringgabaya Utara Village, which is located approximately 100-200 m from the site.

Selong Site

The nearest river is located approximately 200 m from residential area in Geres Sub-District. Most of the communities use water from local water company (PDAM), however sometimes the water does not flow continuously. Therefore, most of the houses have a water tank to collect water from Belimbing River which is streamed through a channel.

Sengkol Site

A watercourse is located in the northern boundary of the site (***Figure 5-4***). During the site visit in July 2017, this watercourse was filled with water but there was no visible flow.

Figure 5-4 Natural Watercourse near Sengkol Site

There is a man-made pond located within the area of the Sengkol site which is only filled with water in rainy season (***Figure 5-5***). It is within the boundary of private property of one of the landowners that was acquired for the Project.

Figure 5-5 Water Pond in Sengkol Site

In addition, the water quality data has been obtained from the document established by the Environmental Agency of Nusa Tenggara Barat province titled *Informasi Kinerja Pengelolaan Lingkungan Hidup Daerah Provinsi NTB* (Environmental Management Performance of NTB Province) dated 2016. According to this document, the government of NTB has conducted environmental monitoring to following rivers; Ancar, Dodokan, Babak, Brang Biji, Sori Padolo, Rabaluju, Meninting and Moyo Rivers located in Lombok Island. The sampling has been conducted on February, March, May and November 2016. The water quality parameter used for the testing has referred to the Government Regulation No. 82 of 2001 regarding the Water Quality Management and Water Pollution Control.

Based on the sampling result it is concluded that some rivers are considered as moderately polluted as some parameters tested exceeded the established threshold. The exceeded parameter comprises of TSS, BOD, COD, DO, Nitrate, Chloride and Zinc. It is suspected that the exceedance is caused by the domestic waste and domestic wastewater. It is quite common in Lombok Island that the private and public toilets are not equipped with septic tank. Domestic waste is also observed to be improperly managed as the people sometimes throw the waste to the river.

Figure 5-6 Jangkok River at Mataram, some garbage observed filling the river

5.3.6 *Air Quality*

Based on the *Informasi Kinerja Pengelolaan Lingkungan Hidup Daerah Provinsi NTB* (Environmental Management Performance of NTB Province) dated 2016, the result of air quality sampling conducted at East Lombok regency and Central Lombok Regency are shown on the below table.

Table 5-3 Air Quality Sampling Result at Central and East Lombok

Parameter	Unit	Threshold limit as per GR no 41/1999	Center Lombok Regency	East Lombok Regency
Dust (TSP)	µg/Nm3	-	2.28	1.43
Pb	µg/NM3	-	< 0.2	< 0.2
SO2	µg/Nm3	900	< 1	< 1
CO	µg/NM3	30,000	< 1	< 1
NO2	µg/Nm3	400	< 1	< 1
NO	µg/NM3	-	< 1	< 1
NOx	µg/Nm3	-	< 1	< 1
CO2	%	-	<0.1	<0.1
O2	%	-	20.9	20.9
Ambient temperature	°C	-	29	30
Gas Temperature	°C	-	30	31
Noise	dB	55	59.8	58.5

Source: Informasi Kinerja Pengelolaan Lingkungan Hidup Daerah Provinsi NTB, 2016

Based on the table above, it can be concluded that the air quality within the two regencies is considered in a good condition as no parameter exceeds the threshold. However, based on the site observation at Pringgabaya site, it is understood that some stone crushers are operating close to the site area. This can be a source of dust which can affect the workers' health during construction and operation as well as affecting the solar panel efficiency. It is recommended to take some representative sampling points to further assess the air quality, especially at the area that is close to the stone crusher – at the southern part of the site.

5.3.7 *Biodiversity and Ecosystem Services*

A flora/fauna survey was undertaken in 2016 by Universitas Mataram for all 3 sites. 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. The data are reported in the UKL-PL as species lists, with no information provided on distribution in relation to the Project sites or seasonality. The UKL-UPL report also does not provide the survey (transect) location, coordinates, and survey maps.

Using this information, ERM has completed additional desktop research in order to confirm species status according to Indonesian applicable regulation and IUCN Red List.

The site has been subject to past clearing and disturbance to support agricultural; hence there is limited natural habitat in the site. No significant flora or fauna values were identified on the site refers to available documents.

Flora and Vegetation

Pringgabaya Site

Based on the UKL-UPL document, ERM's site visit, and Google Earth imagery interpretation, the Pringgabaya Solar Farm and transmission line are located in a cultivated (dryland agriculture) area and categorised as Modified Habitat. This field condition is similar with the land cover map provided by MoEF in 2016 as described in ***Section 3.2***. Corn and other dryland farming are the main products of this area. The farmers also cultivate other plants such as teak, tamarind, neem tree, and various fruits trees, with other tree species used as hedgerows and protection of the riverside area.

A flora survey in Pringgabaya site was conducted in April 2016. The result shows that project area is dominated by agricultural plants and some natural-grow wild plants. Seventeen flora species were identified in and around the project site. There are 12 cultivated plants and 5 other species are defined as wild plants that spread throughout Indonesia. Some wild plants were deliberately left due to their benefits for farmers like Doub Palm. Flora species found in the Project area and surrounding area are described in ***Table 5-4***.

Table 5-4 Flora Species in Pringgabaya Site

Local Name	Latin Name	IUCN Red List	Government Regulation No. 7 Year 1999	Abundance/ Condition
Tamarind*	*Tamarindus indica*	-	-	+
*Banten**	*Aphanamixis grandifolia*	-	-	+++
Morning Glory	*Merremia sp.*	-	-	++
Dope	*Bauhinia sp.*	-	-	++
Corn*	*Zea mays* L.	-	-	+++
Teak*	*Tectona grandis*	-	-	+++
*Jarak tangan**	*Ervatamia sphaerocarpa*	-	-	+
Moringa*	*Moringa oleifera*	-	-	+
Soapberry	*Schleichera oleosa*	-	-	++
*Kemiri**	*Canarium commune* L.	-	-	+
Doub Palm	*Borassus flabellifer*	-	-	+
Neem Tree*	*Azadirachta indica*	-	-	+++
Pelas	*Saripelus asper*	-	-	+

Local Name	Latin Name	IUCN Red List	Government Regulation No. 7 Year 1999	Abundance/ Condition
Scutch grass	*Cynodon dactylon*	-	-	+
Cassava*	*Manihot utilissima* Pohl.	-	-	++
Sugar Apple*	*Annona squamosa* L.	-	-	+++
Sesame*	*Sesamum indicum* L.	-	-	+

Source: UKL-UPL Pringgabaya, 2017

Note:
* = Cultivated plants
\+ = Few (1-5 plants)
++ = Moderate (6-10 plants)
+++ = Dominant (> 10 plants)

Based on species list above, there is no endemic flora species identified and no flora species defined as significant conserved species according to IUCN Red List and Government Regulation No. 27 Year 1999.

Scutch grass (*Cynodon dactylon*) was also recorded as an invasive species. Considering that the project area is agricultural area and there are various livestock, this species is commonly found in the project location and mainly used for various purposes such as for livestock feed, anchoring erosion and medicinal plant.

Selong Site

The Selong Solar Farm is located in a cultivated area and categorised as Modified Habitat. This condition was confirmed by ERM during the site visit in July 2017 and based on Google Earth Imagery interpretation. The proposed site for the solar farm area is predominantly dryland agricultural area with corn and other dryland farm as the main products. The farmers also cultivate other plants such as teak, tamarind, neem tree and various fruits trees, with other tree species used as hedgerows and protection of the riverside area.

The transmission line route will cross coconut plantation and settlement areas such as Kelayu, Sekarteja, and Geres Village. The coconut plantation and settlement area are also being categorised as modified habitat.

Referring to the land cover map provided by MoEF in 2016. The modified habitat where the project is located is categorised as dryland agricultural, plantation and settlement area. Dryland agriculture is the predominant land cover in the Solar Farm area and coconut plantation is the predominant vegetation in the area crossed by transmission line.

A flora and fauna survey at the Selong site was conducted in December 2016. The result shows that project area is dominated by agricultural plants and some natural grow wild plants. Nine flora species were identified in and around the site with three cultivated plants and six wild plants that are commonly spread throughout Indonesia. Flora species local and names are described in ***Table 5-5***.

Table 5-5 Flora Species in Selong Site

Local Name	Latin Name	IUCN Red List	Government Regulation No. 7 Year 1999	Abundance/ Condition
Banten	*Aphanamixis grandifolia*	-	-	+++
Flat Top Acacia	*Acacia abyssinica*	-	-	+
Soapberry	*Schleichera oleosa*	-	-	++
Coconut*	*Cocos nucifera*	-	-	+++
Neem Tree *	*Azadirachta indica*	-	-	+++
Scutch grass	*Cynodon dactylon*	-	-	+
Pandan	*Pandanus odoratissimus*	-	-	++
Cassava*	*Manihot utilissima* Pohl.	-	-	+++
Sugar Apple*	*Annona squamosa* L.	-	-	+++

Source: UKL-UPL Selong

Note:
* = Cultivated plants
+ = Few (1-5 plants)
++ = Moderate (6-10 plants)
+++ = Dominant (> 10 plants)

Based on the species list above, there is no endemic flora species and no significant conserved flora species according to IUCN Red List and Government Regulation № 7 Year 1999.

As per the Pringgabaya Site, Scutch grass (*Cynodon dactylon*) was also recorded as an invasive species at Selong.

Sengkol Site

The Sengkol Solar Farm and transmission line sites are also located in a cultivated area and categorised as Modified Habitat. The solar farm area is mostly occupied by paddy fields that rely on heavily on rain for planting. Outside the paddy planting time, the land is planted with other types of crops such, corn, beans, cassava and tobacco. The transmission line route also crosses a settlement area in Senggol Village with yard vegetation and paddy field as vegetation types.

Refers to landcover map (***Figure 3-12***) provided by MoEF in 2016, the solar farm area is categorised as paddy field. The transmission line will cross paddy fields, dryland agricultural area, and part plantation areas.

A flora and fauna survey in Sengkol site was conducted in December 2016. The result shows that the project area is dominated by agricultural plants and some natural grow wild plants. A total of 19 flora species were identified in and around the site. From the 19 species, 9 total vegetation species were identified. Flora species are described in ***Table 5-6***.

Table 5-6 Flora Species in Sengkol Site

Local Name	Latin Name	IUCN Red List	Government Regulation No. 7 Year 1999	Abundance/ Condition
Asian Rice*	*Oryza sativa* L.	-	-	+++
*Banten**	*Aphanamixis grandifolia*	-	-	++
Cashew*	*Anacardium occidentale*	-	-	++
Corn*	*Zea mays* L.	-	-	++
Cowpea*	*Vigna sinensis* (L.)	-	-	++
Elephant Grass*	*Pennisetum purpureum* Schumacher	-	-	++
Flat Top Acacia	*Acacia abyssinica*	-	-	+
Goa Bean*	*Psophocarpus tetragonolobus* Dc.	-	-	++
Guava*	*Psidium guajava*	-	-	+
Kapok	*Ceiba pentandra*	-	-	++
Mango*	*Mangifera indica*	-	-	++
Morning Glory	*Merremia sp.*	-	-	++
Mung Bean*	*Phaseolus radiatus* L.	-	-	++
Nut Grass	*Cyperus rotundus*	-	-	+++
Timus	*Protium javanicum*	-	-	+
Tobacco*	*Nicotiana tabacum* L.	-	-	++
Turkey Berry	*Solanum torvum* Swartz	-	-	+
Ubi Kayu*	*Manihot utilissima* Pohl.	-	-	++
Vegetable Hummingbird*	*Sesbania grandiflora* Pers	-	-	+++

Source: UKL-UPL Sengkol
Note:
* = Cultivated plants
\+ = Few (1-5 plants)
++ = Moderate (6-10 plants)
+++ = Dominant (> 10 plants)

Based on the table above, four species were identified as cultivated trees species, i.e. mango, guava, cashew, and the vegetable hummingbird. The vegetable hummingbird (or *Timus*) is the predominant cultivated trees species found in the study area. This tree has an important role in supporting soil fertility and livestock feed. Furthermore, the vegetable hummingbird grows relatively faster than other trees. The tree stem can be used for house construction materials and fuel.

The remaining 5 tree species are wild plants beneficial for the community such as Kapok (*Ceiba pentandra*) that produces cotton material for mattress or pillows.

Based on the species list above, there is no endemic flora species and no significant conserved flora species according to IUCN Red List and Government Regulation № 7 Year 1999.

Referring to the Global Invasive Species Database (GISD), Nut Grass (*Cyperus rotundus*) is listed as invasive species. This species is commonly found in the project site and has been identified as a weed in Indonesia for agricultural area. Furthermore, this species is also beneficial for humans used as medicinal plants, livestock feed, and as soil stabiliser.

Fauna

Pringgabaya Site

Fauna field observations in April 2016 was limited only to mammals, birds, herpetofauna (reptiles and amphibians), and insect. Observation results showed at least 45 fauna species were identified in the project site and surrounding areas. ***Table 5-7*** described about observed fauna species in and around the site.

Table 5-7 Fauna Species in Pringgabaya Site

Local Name	Latin Name	IUCN Red List	Government Regulation No. 7 Year 1999	Abundance/ Condition
Arthropode				
Belalang pohon	*Petanga sp.*	-		++
Long-horned meadow	Tettigoniidae	-		++
True Bugs	Hemiptera	-		+++
Praying mantis	*Mantis sp.*	-		+
Four-spotted chaser	*L. quarrimaculata*	LC		+++
Steam glory	*C. neurobasis*	LC		++
Dragonfly	*M. magnifica* M	-		++
Cricket	*Gryllidae*	-		++
Small tortoiseshell	*Aglais urticae*	-		++
Honey Bee	*Apis ceira*	-		++
Common wasp	*Vespa sylvestris*	-		++
Tonggeret	*Cryptotympnus accuta*	-		++
Rang-rang	*O. samaradigna*	-		+++
Ant	*Dolichoderus sp.*	-		++
Broad Headed Bugs	*Alydus sp.*	-		+++
Reptiles				
Monitor lizard	*Varanus sp*	-	Protected (for some species)	+++
Flat-tailed house gecko	*Cosymbotus platyurus*	-		++
Lizard	*Mabouya multifasciata*	-		+++
Gecko	*Geyco sp.*	-		++
Cobra	*Naja sp.*	-		++
Aves				++

Local Name	Latin Name	IUCN Red List	Government Regulation No. 7 Year 1999	Abundance/ Condition
White-headed munia	*Lonchura maja*	LC		++
Eurasian Tree Sparrow	*Passer montanus*	LC		++
Long-tailed shrike	*Lanius schach*	LC		++
Lesser coucal	*Centropus bengalensis*	LC		++
Paddybird	*Lanchura sp.*	-		+++
Starling	*Sturnus sp.*	-		+++
White-eye	*Zosterops sp.*	-		+++
Asian house-martin	*Delicon dasypus*	LC		+++
Water rail	*Rallus aquaticus*	LC		+
King Quail	*Coturnix chinensis*	-		+
Zebra Dove	*Geopelia striata*	LC		+++
Mountain white-eye	*Zosterops montanus*	LC		+++
Red avadavat	*Amandava*	LC		++
Spotted turtle-dove	*Streptopelia chinensis*	LC		++
Island collared-dove	*Streptopelia bitorquata*	LC		++
Oriental white-eye	*Zosterops palpebrosus*	LC		+++
Sriti/walet	*Collocalia sp.*	LC		++
Mammals				
Dogs	*Canis lupus familiaris*	-		+++
Fruit Bats (Flying fox)	*Pteropus sp.*	-		++
Goat	*Capra hircus*	-		+++
Bats	*Chiroptera sp.*	-		++
Cats	*Felis domistica*	-		+
Banded linsang	*Prionodon linsang**	LC	Protected	Rare
Cow	*Bos taurus*	-		+++
Rats	*Rattus* sp.	-		+++

Note: LC = Least Concern

Given the Pringgabaya site is located in a modified habitat with agricultural area as the predominant vegetation type, fauna in this area have adapted to human activities.

No endemic species are found in the area. All species listed have spread quite widely in Indonesia, especially in agricultural areas.

According to IUCN Red List, no significant conserved fauna species are identified. However according to Government Regulation № 7 Year 1999, one species is classified as a protected species i.e. Banded linsang (*Priodon linsang*). Lizard (*Varanus*

sp) species from Varanus genus found in the project site has potential to be regarded as protected species based on Indonesia regulations.

Selong Site

Field observations on the presence of fauna were conducted in December 2016 limited to mammals, birds, herpetofauna (reptiles and amphibians) and insects. Observations suggest there are at least 28 fauna species in the project and surrounding areas (***Table 5-8***).

Table 5-8 Fauna Species in Selong Site

Local Name	Latin Name	IUCN Red List	Government Regulation No. 7 Year 1999	Abundance/ Condition
Arthropode				
True Bugs	Hemiptera	-		+++
Praying mantis	*Mantis sp.*	-		+
Four-spotted chaser	*L. quarrimaculata*	LC		+++
Cricket	*Gryllidae*	-		++
Honey Bee	*Apis ceira*	-		++
Common wasp	*Vespa sylvestris*	-		++
Rang-rang	*O. samaradigna*	-		+++
Ant	*Dolichoderus sp.*	-		++
Broad Headed Bugs	*Alydus sp.*	-		+++
Reptiles				
Monitor lizard	*Varanus sp*	-	Protected (for some species)	+
Lizard	*Mabouya multifasciata*	-		+++
Gecko	*Geyco sp.*	-		++
Cobra	*Naja sp.*	-		++
Aves				++
White-headed munia	*Lonchura maja*	LC		++
Eurasian Tree Sparrow	*Passer montanus*	LC		++
Lesser coucal	*Centropus bengalensis*	LC		++
Paddybird	*Lanchura sp.*	-		+++
Starling	*Sturnus sp.*	-		+++
Eye-girdle	*Zosterops sp.*	-		+++
Asian house-martin	*Delicon dasypus*	LC		+++
Red avadavat	*Amandava amandava*	LC		++
Swift	*Collocalia sp.*	LC		++
Mammals				
Dogs	*Canis lupus familiaris*	-		+++

Local Name	Latin Name	IUCN Red List	Government Regulation No. 7 Year 1999	Abundance/ Condition
Fruit Bats (Flying fox)	*Pteropus sp.*	-		++
Goat	*Capra hircus*	-		+++
Bats	*Chiroptera sp.*	-		++
Cow	*Bos taurus*	-		+++
Rats	*Rattus* sp.	-		+++

Note: LC = Least Concern

Based on the species list above, no endemic species were found in the survey area. All species listed are spread quite widely in Indonesia, especially in dry land agricultural areas and also have good adaptation in this area.

No fauna species are listed as protected species under Government Regulation № 7 Year 1999 or under the IUCN Red List. Lizard from Varanus genus that found in the project location during UKL-UPL field observation is potentially a protected species, because some species from *Varanus* genus (lizard) are classified as protected species based on Indonesia regulation.

Sengkol Site

The following ***Table 5-9*** describes observed fauna species in and around the site as reported in the UKL-UPL based on observation in December 2016.

Table 5-9 Fauna Species in Sengkol Site

Local Name	Latin Name	IUCN Red List	Government Regulation No. 7 Year 1999	Abundance/ Condition
Arthropode				
True Bugs	*Oxya chinensis*			+++
Praying mantis	*Mantis* sp.			+
Four-spotted chaser	*L. quarrimaculata*	LC		+++
Cricket	*Gryllus bimaculatus*			++
Honey Bee	*Apis ceira*			++
Spiders	*Argipe* sp.			++
Atlas moth	*Attacus* sp			+++
Common wasp	*Vesva sylveseris*			++
Rang-rang	*O. samaradigna*			+++
Ant	*Dolichoderus* sp.			++
Broad Headed Bugs	*Alydus* sp.			++
Reptiles				
Monitor Lizard	*Varanus* sp.		Protected (for some species)	+

Local Name	Latin Name	IUCN Red List	Government Regulation No. 7 Year 1999	Abundance/ Condition
Lizard	*Mabouya multifasciata*			+++
Gecko	*Geyco* sp.			++
Cobra	*Naja* sp.			++
Whip snake	*Ahaetulla* sp			
Aves				
Chicken	*Gallus domesticus*			+++
Chicken (broiler)	*Gallus domesticus*			+++
White-headed munia	*Lonchura maja*	LC		++
Muscovy duck	*Cairina moschata*	LC		++
Eurasian Tree Sparrow	*Passer montanus*	LC		++
Lesser coucal	*Centropus bengolensis*			++
Paddybird	*Lanchura* sp.			+++
Starling	*Sturnus* sp.			+++
eye-girdle	*Zosterops* sp.			+++
Asian house-martin	*Delicon dasypus*			+++
Red avadavat	*Amandava*	LC		++
Swift	*Collocalia* sp.			++
Mammals				
Dogs	*Canis lupus familiaris*			+++
Goat	*Capra hircus*			++
Bats	*Chiroptera* sp.			+++
Horse	*Equus caballus*			++
House Cat	*Felis catus*			++
Cow	*Bos taurus*			++
Rats	*Rattus* sp.			++

Note: LC = Least Concern

All species that recorded in the sengkol project and surrounding area is the common species in cultivated area and no endemic species was identified. In this site also no species that identified as species of concern (endangered or critically endangered) Based on IUCN Red List. However, Monitor lizard (*Varanus Sp*) which observed in this area potentially listed as protected species under Government Regulation № 7 Year 1999.

Species of Concern

a. Banded Linsang (*Prionodon linsang*)

The presence of the Banded Linsang has been recorded in the fauna survey for the Pringgabaya site. This species is listed as Least Concern in IUCN Red List of Threatened Species.; however, it is protected by Indonesian Government Law (Peraturan Pemerintah) № 7 Year 1999 and listed under Appendix II of CITES. Since it is being protected by the Government of Indonesia, mitigation measures will be explained in ***Section 6.3.6.***

b. Monitor Lizard (*Varanus Sp*)

In all three solar farm areas Monitor lizard (*Varanus Sp*) was identified. Although the species level was not identified, there are several species that are protected under Government Regulation № 7 Year 1999; namely Borneo monitor (*Varanus borneensis*), Gould's monitor (*Varanus gouldi*), Mangrove monitor (*Varanus indicus*), Komodo (*Varanus komodoensis*), Clouded monitor (*Varanus nebulosus*), (*Varanus prasinus*), Tomor monitor (*Varanus timorensis*), and Togian Monitor (*Varanus togianus*). Current data does not enable it to be determined whether the species identified in the surveys is one of these species.

c. Bats (*Chiroptera* Sp)

Bats (*Chiroptera* sp.*)* were recorded at all three project locations but only identified to the Genus level. Referring to species distribution from the IUCN Red List, 3 Chiroptera species listed as Vulnerable species have the potential to be found in the project area, namely Sunda Fruit Bat[6] (*Acerodon mackloti),* Flores Woolly Bat[7] (*Kerivoula flora),* Javan Tailless Fruit Bat[8] (*Megaerops kusnotoi*). It is not known whether these are actually present in the project locations.

5.3.8 Legally Protected Area and International Recognised Areas

The project sites are located in areas that have been developed as agricultural land. The areas have been established as Other Use (APL) refers to the forestry status which means it can be converted for Project activities. There is no protected area, protected forest or conservation forest directly within or near to the Project locations. Baseline study on air quality, noise, and water quality were not conducted by UKL-UPL consultant because those baseline data are not required for UKL-UPL process. However, a secondary data/information has been obtained to cover the air and water quality aspect. The data published by the Environmental Agency of Nusa Tenggara Barat province titled "Environmental Management Performance of Nusa Tenggara Barat Province", published in 2016 is used for the project baseline data/information.

Lombok Island has a large area of Mount Rinjani as National Park and Protection Forest. Internationally, Mount Rinjani area (National Park and Protection Forest) is established as Important Birds Area (IBA) [9] and Key Biodiversity Area (KBA) [10].

[6] http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T142A21989107.en
[7] http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T10973A3232793.en
[8] http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T12945A3400651.en
[9] http://datazone.birdlife.org/site/mapsearch
[10] http://www.keybiodiversityareas.org/site/mapsearch

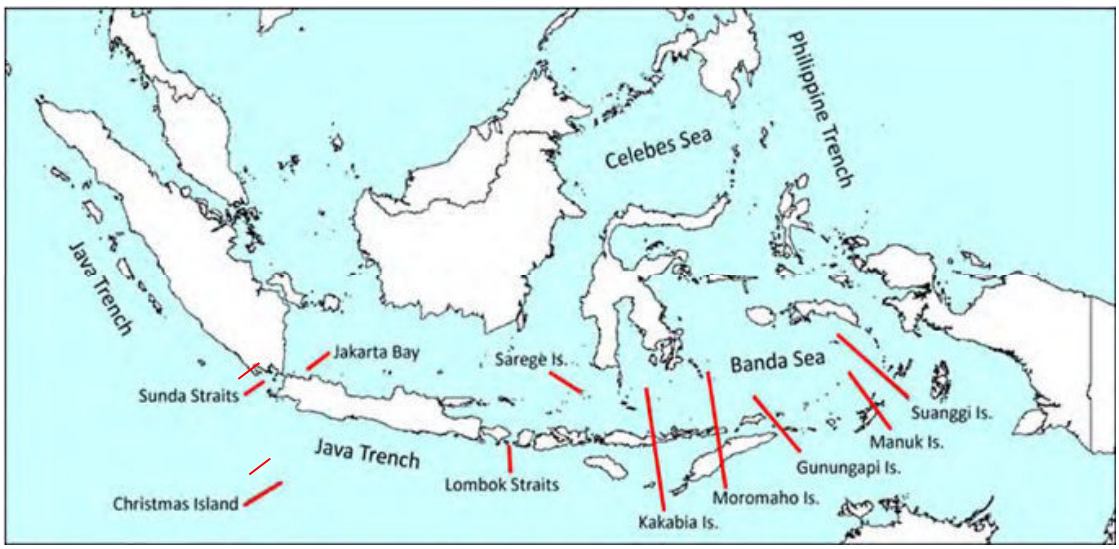
The IBA criteria for Rinjani area Global Threatened species (A1) dan restricted range species A2. At least Rinjani have 3 global threatened species which trigger this area as IBA, namely Green Pigeon (*Treron floris*) , Yellow-crested Cockatoo (*Cacatua sulphurea*) Chestnut-backed Thrush (*Zoothera dohertyi*). Rinjani also have the Lombok cross frog (*Oreophryne monticola*) as endemic species of Lombok island and Bali Island. This frog species covers less than 5,000 km^2 which triggers the IBA area for Criteria A2 and listed as endangered species based on IUCN Red List

Lombok Island also has other protected forests especially in the southern part of the island (***Figure 5-8***). However Mount Rinjani and other protected areas are located at a considerable distance from the project area. The Mont Rinjani National park is located 5-6 km from the Pringgabaya site, 17 km from the Selong site and 30 km from Sengkol Site. The Pringgabaya site is the closest site to the Mount Rinjani forest area, around 5 km north of the project area.

Given the considerable distance between the project location and the Rinjani National Park area bird biodiversity in Rinjani Area will not be affected by any Project activities.

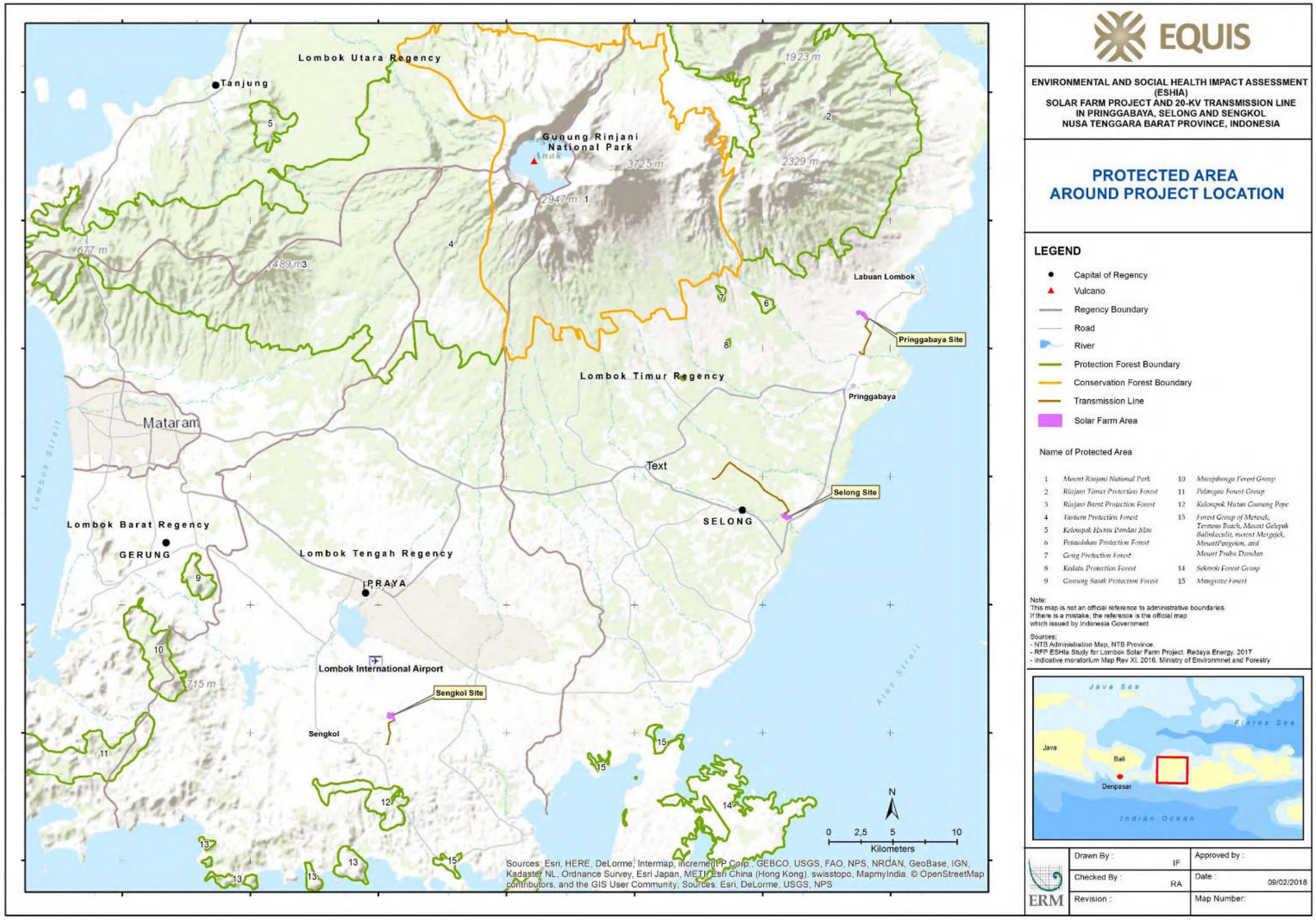
Based on the migratory route by Burung Nusantara, there are no migratory areas close to the project location. The closest area of migratory birds includes the Lombok strait that lies between the Lombok and Bali islands (***Figure 5-7***). Key species include Swinhoe's and Matsudaira's Petrel, Streaked Shearwater and Christmas Island Frigatebird. The migration season occurs during August to October and March to May. Based on the UKL-UPL document, no migratory species were identified in the three project areas.

Figure 5-7 Migration Route in Indonesia



Source: Burung Nusantara - http://burung-nusantara.org/network/burung-laut-indonesia/

Figure 5-8 Protected Areas in Lombok Island



5.4 *SOCIAL BASELINE*

5.4.1 *Scope of Baseline Study*

The following sections present the description of social and health conditions within the Project area. Information presented in this report has been obtained from published documentation available, 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 mitigation measures.

5.4.2 *Social Data Sources*

Secondary Data

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

- 2017 UKL-UPL Sengkol, 2017 UKL-UPL Selong, Pringgabaya Permit, Selong Permit and Sengkol Permit;
- Notes of Public Consultation at Pringgabaya Utara Village office, 4th June 2016;
- Notes of Inspection of UKL-UPL Sengkol conducted on 27th July 2017;
- Notes of Public Consultation on project socialization of Selong Solar Project conducted at Geres Village on 6th July 2017;
- 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:
  - West Nusa Tenggara Province in Figures, 2017
  - Lombok Tengah Regency in Figures, 2017
  - Lombok Timur Regency in Figures, 2017
  - Pringgabaya District in Figures, 2016
  - Pujut District in Figures, 2016
  - Labuhan Haji in Figures, 2016
  - Pringgabaya Village Profile, 2017
  - Geres Village Population Data, 2016
  - Sengkol Village Profile, 2016
- Published online news:
  - Wikipedia regarding Sasak Tribe
  - http://DataResmi.web.id/
  - http://www.ntbprov.go.id/
  - http://www.lomboktimurkab.go.id/
  - http://www.bnp2tki.go.id/
  - Pokja AMPL Website.

Key Informant Interviews

Key informant interviews were conducted by two ERM consultants between July 25th and 28th 2017 to gather social baseline information. The information gathered from the key informants and stakeholders and discussed topics is listed in ***Table 5-10***.

For each site, ERM interviewed the village heads and midwifes, as well as land owners (except for Sengkol since identification of land owners was still underway). Particularly in Sengkol, by the time of ERM visit, the Project Proponent has not conducted socialization with the nearby community so it was suggested to avoid intense discussion with the communities to avoid disturbance to the LAQ process.

During the interview with the land owner in Pringgabaya, female members of the family were present however did not involve in the discussion. No interview with female family members of the affected persons in Selong and Sengkol was conducted.

Table 5-10 Key Informant Interviews

Key Informant	Issues Discussed
Head of Integrated Licensing Service Agency of Lombok Timur	Projects' permit approval, perception towards the Projects, hopes and concerns regarding the Project.
Village head of Pringgabaya Utara	Socio-economic condition of the village, social and cultural arrangements, knowledge about the project, concerns and expectations related to the project.
Midwife of Pringgabaya Utara Village	There was no available data on health profile of Sengkol Village. However the midwife of the village indicated that influenza was the most common disease in the village.
Land owner of Pringgabaya Site	Information related to the land acquisition process, compensation payment, income generating activities, knowledge about the project, hope and concern.
Village Head of Geres Barat	Socio-economic condition of the village, social and cultural arrangements, knowledge about the project, concerns and expectations related to the project.
Midwife of Geres Barat Village	There was no available data on the health profile of Geres Barat village However the midwife of the village indicated that influenza was the most common disease in the village.
Land owner of access road in Selong Site	Information related to the land acquisition process, compensation payment, income generating activities, knowledge about the project, hope and concern.
Village head of Sengkol	Socio-economic condition of the village, social and cultural arrangements, knowledge about the project, concerns and expectations related to the project.
Midwife of Sengkol Village	Health profile of Sengkol Village; top ten diseases recorded in Sengkol village within 2017 first semester were febris, typhoid, gastritis, urinary tract infection, diarrhoea, hypertension, stroke, asthma and tuberculosis.

Key Informant	Issues Discussed
Department of Environment of Lombok Tengah	Environmental impact of the Project, permits requirement and process.
Land acquisition team on site	Information related to the land acquisition process.

Source: Primary Data Gathering, 2017

Field Observations

Field observations were carried out during the ERM survey covering the following aspects:

- Proposed land in Sengkol, Pringgabaya, and Selong Village;
- Nearby community to the Project locations;
- Health facilities in each of the village;
- Village government facilities;
- Public transportation services and infrastructure;
- Kayangan Port; and
- Economic facilities and infrastructures.

5.4.3 Social Setting

Pringgabaya Utara and Geres Villages

Pringgabaya Utara Village (part of Pringgabaya District) and Geres (part of Labuhan Haji District); both are located in the Regency of Lombok Timur.

Lombok Timur Regency, Pringgabaya District has 13,620 hectares consists of paddy fields (2,397 hectares), non-paddy fields (10,618 hectares) and non-agricultural land (605 hectares). While Labuhan Haji has 4,957 hectares consisting of paddy fields (1,794 hectares), non-paddy fields (2,323 hectares) and non-agricultural land (840 hectares).

Sengkol Village

Based on Pujut District in Figures 2016, Sengkol is a District Capital of Pujut and Sengkol has an area of 1,836 km² or 7.86% of total area of Pujut District (23,355 km²). Sengkol has 725 hectares of paddy and 719 hectares of dryland.

Like other villages in Pujut District, Sengkol village applies "go-go rancah or rain-fed system meaning farmers have to cultivate their fields during the dry season with the aim, during the rainy season, the treated soil is ready for planting and the short rainy season will provide enough water than if the rice fields are processed during the rainy season.

5.4.4 *Demographics*

Population

Based on village profile data in 2017, the total population of Pringgabaya Utara Village is 5,682 people; consisting of 2,453 males and 3,229 females. There are 1,588 households with population density is 586 people per km². Based on village profile data of Labuhan Haji District in Figures 2016, the total population of Geres Village is 4,742 people; consisting of 2,349 males and 2,393 females. There are 1,463 households with a population density is 838 people per km².

The sex ratio in Pringgabaya Utara is 75.96 and the sex ratio in Geres is 98.16.

For Sengkol Village, according to the 2016 Sengkol village profile data, the total population is 12,296 with composition of 5,892 males and 6,404 females. The number of households is 3,802 with a total population density of 670 people per km². The sex ratio in Sengkol Village is 91.

In summary, ***Table 5-11*** indicates the population density in the three villages (Pringgabaya Utara, Geres and Sengkol).

Table 5-11 Population Density

Village	Household	Population			Sex Ratio	Area (km²)	Population Density (person/ km²)
		Male	Female	Total			
Pringgabaya Utara	1,588	2,453	3,229	5,682	75.96	9.70	586
Geres	1,463	2,349	2,393	4,742	98.16	5.66	838
Sengkol	3,802	5,892	6,404	12,296	91	18.36	670

Source: Various (Village Profile of Pringgabaya 2017, Geres Village Population 2016 and Sengkol Village Profile 2016, BPS District of Pujut 2016, BPS District of Pringgabaya 2016 and BPS District of Labuhan Haji 2016)

Growth and Migration

Data obtained from three different BPS sources: Pringgabaya District in Figures 2016, Pujut District in Figures 2016 and Labuhan Haji District in Figures 2016 show that the population growth based on natural increase in three districts are different based on the information provided.

In 2014, Pringgabaya Utara Village had population of 4,010 people. Compared with population data in 2016, Pringgabaya Utara Village indicated 5,682. Therefore, the population grew in this village from 2014 to 2016 was 0.29% or 0.15% per year.

In 2014, Geres Village had population of 3,545 people. Compared with population data in 2015, Geres Village indicated 4,742 people. Therefore, the population grew in this village from 2014 to 2015 was 0.25% per year.

In 2014, Sengkol Village had population of 10,941 while in 2015, it showed 12,296 people. That means, the population grew in this village from 2014 to 2015 was 0.11 percent per year.

From three villages, the highest population growth per year is in Geres Village. The population growth is characterized by three main components: birth rate, mortality and migration.

Regarding the migration rate, there is no official data available for three villages. However, in West Nusa Tenggara, the common reasons for the migration are work or business. In 2013, BPS West Nusa Tenggara recorded that the number of Official Indonesian Workers by Country Destination showed there were 45,699 people, comprised of 36,702 males and 8,997 females. Those people are called "TKI or *Tenaga Kerja Indonesia*" or Indonesian migrant workers who work overseas.

In addition to that, based on data from the National Agency for the Placement and Protection of Indonesian Workers (BNP2TKI), Lombok Timur is on the first rank of the largest pockets of Indonesian migrant workers in Indonesia. While Lombok Tengah is on the 5th rank.

Lack of local employment in both regencies is a key reason why local people go overseas for work.

5.4.5 Religion

The majority religion of Pringgabaya Utara Village is Islam accounting for approximately 99.8% of the total population in 2016 (the rest is Hindu, Christian and Catholic). The same situation was observed at Geres Village where 100% of the population is Muslim. In Sengkol Village 95.44% of the population is Muslim (0.23% is Hinduism) as shown in ***Table 5-12*** to ***Table 5-14***.

Table 5-12 Religion Distribution in Pringgabaya Utara, Pringgabaya District

No	Religion	Religion Distribution in Pringgabaya Utara Village	
		Number	Percentage
1	Islam	2,592	99.8
2	Christian	1	0.02
3	Catholic	3	0.05
4	Hinduism	4	0.71
Total		**5,586***	**100**

Source: Pringgabaya Utara Village Profile, 2017
*the number of total population of religion indicates differently with the total number population in general even though the data is received from same source

Table 5-13 Religion Distribution in Geres Village, Labuhan Haji District

No	Religion	Religion Distribution in Geres Village	
		Number	Percentage
1	Islam	3,545	100
	Total	**3,545***	**100**

Source: Labuhan Haji District in Figures 2016
*there is no information or data on number of religion population received from the current Geres Village profile

Table 5-14 Religion Distribution in Sengkol Village, Pujut District

No	Religion	Religion Distribution in Sengkol Village	
		Number	Percentage
1	Islam	10,443	95.44
2	Hinduism	25	0.23
	Total	**10,941***	**95.67**

Source: Pujut District in Figures 2016
*there is no information or data on number of religion population received from the current Geres Village profile

People of Pringgabaya Utara, Geres, and Sengkol Villages practice their religion in various facilities located within the villages as showed in ***Table 5-15*** below.

Table 5-15 Religion Facilities in Pringgabaya Utara Village

No	Village	Religion Facilities			
		Mosque	Small Islamic Prayer Room	Christian Church	Catholic Church
1	Pringgabaya Utara	11	0	0	0
2	Geres	4	6	0	0
3	Sengkol	17	23	0	0

Source: BPS Pringgabaya District in Figures 2016, BPS Labuhan Haji District in Figures 2016, BPS Pujut District in Figures 2016

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 both regencies (Lombok Timur and Lombok Tengah) are considered to be low.

5.4.6 Education

Three villages have a good distribution of education facilities, ranging from elementary school to private-owned universities and academies located in Lombok Timur Regency. There is only one State-University (University of Mataram or UNRAM) located in Mataram City. As seen in ***Table 5-16,*** the education facilities in

three villages (Pringgabaya Utara, Geres and Sengkol) range from elementary to senior high.

Table 5-16 Education Facilities in Villages of Districts of Pringgabaya, Labuhan Haji and Pujut

District/ Village	Elementary School (ES)		Junior High School (JHS)		Senior High School (SHS)		Total		
	Public	Private	Public	Private	Public	Private	ES	JHS	SHS
Pringgabaya / Pringgabaya Utara	2	0	2	0	2		2	2	2
Labuhan Haji/ Geres	2	0	0	1	0	0	2	1	0
Pujut/ Sengkol	4	5	3	0	1	0	9	3	1
Total	**8**	**5**	**5**	**1**	**2**	**0**	**13**	**6**	**3**

Source: 2016 BPS Districts of Pringgabaya, Labuhan Haji and Pujut

Additional information regarding data on the number of graduated students based on the level of education from BPS Lombok Timur Regency in Figures 2017 is as follows:

- Elementary school graduates: 292,698 people;
- Junior high graduates: 88,875 people; and
- Senior high and above graduates: 137,295 people.

Local BPS doesn't provide sex-disaggregated data therefore no additional information regarding that data can be added in this report. From the above data Lombok Timur has the highest pass rate at the elementary school level.

Furthermore, based on BPS Lombok Tengah Regency in Figures 2017, the data on number of graduated students based on level of education is, as follows:

- Elementary school graduates: 6,203 people;
- Junior high graduates: 3,211 people;
- Senior high and above graduates: 1,838 people;
- Vocational high graduates: 140 people;
- Diploma or academy graduates: 78 people; and
- University graduates: 431 people.

Similarly, in Lombok Tengah Regency, the highest pass rate is at the elementary school level.

There are various reasons why students in Lombok Timur and Lombok Tengah do not continue their education to higher education. This includes the inability of the parents to finance the school despite is "BOS or *Bantuan Operasional Sekolah* or School

Operational Assistance" in the form of the funds distributed from local government. BOS is utilised for 13 types of funded programs; one of the programs finances poor students. Other reasons include many children are expected to help make a living for their parents, early marriage, following their parents to the nearest islands such as Bali.

5.4.7 Community Livelihood

The main livelihood source in the three villages (Pringgabaya Utara, Geres, and Sengkol) where the project is located is contributed from agriculture activities

In addition to that, based on BPS Lombok Timur Regency in Figures 2017, the population aged 15 years and over who worked in agriculture was 221,549 people or 45% of the total population (485,340).

While based on BPS Lombok Tengah Regency in Figures 2017, the number of registered job applicants by sector in 2016 totalled 7,700 people in the agriculture sector or 86% of total registered job applicants (8,963).

5.4.8 Labour Market

The data from BPS Lombok Timur Regency in Figures (2017), mentioned the number of registered job seekers was 16,292 people, comprising 14,871 males and 1,421 females. Out of this number, most are elementary school graduates with 73 percent or 11,908 people. The remaining were 13.40% and 13.51% that includes junior high school and senior high school graduates, respectively.

Meanwhile, the data from BPS Lombok Tengah Regency in Figures (2017), mentioned the number of registered job seekers in Lombok Tengah Regency was 11,901 people, comprises 9,760 males and 2,141 females. Out of this number, most they are elementary school graduates with 52% or 11,908 people. For details, ***Table 5-17*** and

Table 5-18 show the number of registered job seekers both in Lombok Timur and Lombok Tengah Regencies.

Table 5-17 Number of Registered Job Seekers and Those Assigned by Educational Levels in Lombok Timur Regency

Educational Level	Job Seeker		
	Male	Female	Total
Elementary School	11,210	698	11,908
Junior High School	1,913	270	2,183
Senior High School	1,748	453	2,201
Total	**14,871**	**1,421**	**16,292**

Source: BPS Lombok Timur Regency in Figures, 2017

Table 5-18 Number of Registered Job Seekers and Those Assigned by Educational Levels in Lombok Tengah Regency

Educational Level	Job Seeker		
	Male	Female	Total
Elementary School	5,170	1,033	6,203
Junior High School	2,624	587	3,211
Senior High School	1,568	270	1,838
Vocational Senior High School	108	32	140
Diploma I/II/ III	45	33	78
University	245	186	431
Total	**9,760**	**2,141**	**11,901**

Source: BPS Lombok Tengah Regency in Figures, 2017

There is no data available for labour markets at the village and district level. However, from above both data, the labour markets in Lombok Timur Regency (where Pringgabaya Utara and Geres Villages are part of) and Lombok Tengah Regency (where Sengkol Village is part of) have a low education level hence typically enter into jobs such as construction workers or cleaning services.

5.4.9 Farming and Plantation

Lombok Timur Regency

Utilisation of land in Lombok Timur Regency is mostly used for agriculture. The total rice field's area in 2016 was 48,191 hectares, which is about 30.02% from total areas of regency. The rice fields are mostly planted with rice (93.64%), either once, twice, or three times a year.

Based on Pringgabaya Utara Village profile in 2017, the rice field area is 152.96 hectares; the production of paddy is 8 tonnes per hectare or 1,224 tonnes in total. The other commodities are maize, corn and cassava. However, field observation showed there is no paddy field near the Project site. Most of the lands are dry land utilized for rain fed agriculture with main commodities being cassava, tobacco, coconut, and sweetsop fruit.

There is no data from Geres Village regarding the paddy production. However, the data from BPS Labuhan Haji District in Figures 2016, indicated production of paddy is 15,734 tonnes for 3,588 hectares of rice field.

Figure 5-9 illustrates local people drying tobacco in the dryland. Tobacco is exported through middlemen to Central and East Java as raw materials for cigarettes due to the unavailability of a tobacco processing industry in Lombok Timur.

Figure 5-9 Local People in Pringgabaya Utara Drying Tobacco in the Dryland

For livestock population, cows are the main products in Pringgabaya and Labuhan Haji Districts. In Pringgabaya and Labuhan Haji Districts (4,377 and 6,894 respectively).

All the cows are sold to the traditional market, exported to other districts or provinces, cooperatives and retailers. In particular during the Eid-Mubarak festive, there are many orders from outside West Nusa Tenggara (NTB) due to the known high meat quality.

Lombok Tengah Regency

Utilisation of land in Lombok Tengah Regency is mostly used for agriculture. Total dry field/garden area in 2016 (BPS Lombok Tengah in Figures 2017) was 23,122 hectares, and total area of wetland paddy and dryland paddy were 84,065 hectares and 6,674 hectares respectively. Therefore, the rice fields are mostly utilised by local households.

In Lombok Tengah, there is no data available for paddy production from the village level to regency level.

Unlike Lombok Timur Regency, people in Lombok Tengah also rely on the top three crops, coconut (9,982.99 kilograms), cashew (908.09 kilograms), and coffee (398.90 kilograms).

In Sengkol Village, cows are the most favourable livestock population with 2,158.

5.4.10 Poverty

Lombok Timur Regency

Considering the population in Lombok Timur Regency, poverty has become a heavy burden, with about 18.46% or 216,000 people considered poor. Lombok Timur is

ranked as having the second largest percentage of poor people. The categorisation is decided by the local regency government (monthly income is Rp 382,861. or less).[11]

Rapid observation in the Project location of Selong site revealed diverse economic profiles of the neighbouring communities. In the Geres Barat neighbourhood, some houses are made of bamboo sheets whilst some are adequately built with concrete materials. Random interviews with community members during the field visit informed that typically concrete houses belong to those who work overseas as migrant workers. Some females (teenager and adult) sold stones which have been crushed manually using hammers to get additional income.

The national government has implemented a national program to eradicate poverty by distributing *Kartu Indonesia Pintar*/KIP (Smart Indonesia Card) and *Kartu Keluarga Sejahtera*/KKS (Wealth Family Card), a subsidy program in education and livelihoods for poor people. Village authorities confirmed that as of May 2016, there were 226 families receiving KKS and 205 students receiving KIS in Geres Village.

Figure 5-10 Village Activities in Geres Village

Pringgabaya village is observed to be more developed. According to the village head, Pringgabaya village has various sources of income streams such as agriculture, stone crushing, and the power industry. These contribute to the availability of employment opportunities in the village. Regardless, Pringgabaya Utara Village also receives subsidy programs from the national government in the health, education, and livelihood sectors. Pringgbaya Utara Village authority recorded 442 students receiving the KIP program, 430 people received *Kartu Indonesia Sehat*/KIS (Health

[11] BPS Lombok Timur Regency in Figures 2017

Indonesia Card), 105 families are beneficiaries of *Program Keluarga Harapan*/ PKH (Family Hope Program), and 543 families received subsidised rice or usually called *beras miskin*.

Perigi Village, located around 300 m from the Project site has a higher poverty level than in the Pringgbaya Utara Village. Most of the villagers rely on agricultural and livestock production as a main source of income. Interviews with some villagers revealed that water scarcity in their village has contributed to the low productivity of their agricultural land.

Lombok Tengah Regency

The number of pre-prosperous and prosperous families in Lombok Tengah Regency in 2016 (based on BPS Lombok Tengah Regency in Figures 2017) totalled 147,370 pre-prosperous families contributing 15.80 percent of total population of Lombok Tengah Regency. According to data from the Sengkol Village authorities, as of 2016, out of 3,094 families in Sengkol Village, 1,207 families are categorized as poor.

To tackle poverty, 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*. According with BPS West Nusa Tenggara Province in Figures 2017, in 2016, the raskin rice was delivered (84,881,88 tonnes). 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.

In addition to local government programs in both regencies, the private sector contributes its role to tackle poverty issues through community empowerment programs that support utilisation of local contents that bring benefits for local economy and employment.

5.4.11 Community Safety and Security

Transportation and Road Safety

The total length of roads in Lombok Timur Regency is about 2,638.72 km including village roads. The state road is 44.9 km and the provincial road is 214.64 km. The road condition from year to year continues to improve. The number of paved roads has also increased in number. In 2016, asphalt roads reached 719.25 km. In 2016, the total length of regency roads in good condition approximately is 596.53 km. The remaining condition of road were still moderate condition (79.26 km), damaged (125.99 km) and seriously damaged (277.71 km) (source: BPS Lombok Timur Regency in Figures 2017). In 2016, the total length of roads in Lombok Tengah Regency was recorded 974.13 km which consist of 65.85 km national road, 168.83 km provincial road, and 739.44 km regency's road. The road condition was dominantly good which about 745.92 km The remaining conditions of road were still moderate condition (24.61 km), damaged (189.40 km) and seriously damaged (14.20 km) (source: BPS Lombok Tengah Regency in Figures 2017).

In addition to the above information, based on 2014 Sengkol Village profile (Pujut District, Lombok Tengah Regency) indicated the village road was seriously damaged for 7 kilometres of asphalt road and 17 kilometres of dirt road. Road conditions between the village and district were 6 kilometres of asphalt road and 2.5 kilometres of dirt road were seriously damaged. The condition of regency road that passes by village indicated that 9 kilometres of asphalt road was good, and 8 kilometres of asphalt road was seriously damaged.

Referring to Pringgabaya Utara Village profile, 2016, all roads are asphalt or paved with a total length of 10.1 kilometres. However, 6 kilometres are seriously damaged.

There is no data or information regarding the road condition and its length for Geres village.

In 2016, there were 518 cases of traffic accidents reported in Lombok Timur Regency with 100 casualties (source: BPS Lombok Timur Regency in Figures 2017).

In Lombok Tengah Regency, in 2016, there were 184 cases of traffic accidents reported with 110 casualties (source: BPS Lombok Tengah Regency in Figures 2017).

No official data on the number of traffic accidents at District and Village levels of Lombok Tengah is available. 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 (***Figure 5-11***).

(a) ***(b)***

Figure 5-11 Motorcycle Rider without Helmet (a) and with Helmet (b)

Crime and Community Security Systems

In accordance with Pringgabaya Utara Village profile data 2017, crime such as robbery, theft, or violence cases are minimal in the village. While in Sengkol Village, based on Sengkol Village profile data in 2016, there were numbers of crime cases, such as theft, gambling and excessive alcohol consumption has been reported to often cause fighting between young men. There is no information regarding any crime cases in Geres Village. In addition to above information, in Lombok Tengah Regency, the number of additional prisoners by type of crimes and gender are outlined in ***Table 5-19.***

Table 5-19 Prisoners by Type of Crimes and Sex

Type of crimes/offences	Male	Female	Total
Forged Document	1	-	1
Morality	17	-	17
Gambling	19	-	19
Murder	6	-	6
Persecution	23	-	23
Theft/Burglary	93	-	93
Embezzlement	5	-	5
Total	164	-	164

Source: BPS Lombok Tengah Regency in Figures 2017

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

Community Perceptions of the Project

Based on UKL/UPL documents the community members of Sengkol and Geres Villages are aware of the Project. It also concluded there are both positive and negative attitudes towards the Project. The community expects that the Project will provide benefits through local employment, and other economic opportunities for increasing harvesting of local agriculture products

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 Pringgabaya Utara, Geres and Sengkol Villages. These are discussed in the subsequent sections of this report.

5.4.12 Socio Cultural

Ethnic Groups Diversity

There was no statistical information on the population of ethnic groups and the diversity in Lombok Timur and Lombok Tengah Regencies. However from the UKL UPL data and site visit it is confirmed that no IPs are impacted by the Project. This is based on the ADB's IP screening checklist in **Annex C**.

Eighty percent of Lombok Timur and Lombok Tengah Regencies are from the Sasak Tribe. Further, there are diverse ethnic groups also living in the three villages (Pringgabaya Utara, Geres and Sengkol) from other provinces (East Java, Madura, and Bali). Typically the in-migrants have opened food stalls (meatballs, chicken noodle), or working in the tourism industry.

Social/Customary Institutions and Figures

Based on consultation with a number of village stakeholders during the ERM survey, there are a number of respected key figures in Pringgabaya Utara, Geres and Sengkol Village; religious leaders are the most respected, followed by government officials and education professionals.

Based on 2016 Sengkol village profile data, there were 9 village institutions available in Sengkol Village such as customary institutions, farmer groups, PKK, Karang Taruna and Posyandu.

Based on 2017 Pringgabaya Utara Village profile data, there are 15 village institutions such as customary institutions, farmer groups, saving and loan cooperatives, PKK and Karang Taruna.

There is no available information regarding village institutions in Geres Village.

Female Roles in the Community

Women have an important role in the village of Geres, for example the Village Consultative Body or BPD or Badan Permusyawaratan Desa in Geres Village has 2 females (source: BPS Labuhan Haji District in Figures 2016). This situation is contrary with the other two villages (Pringgabaya Utara and Sengkol) where there are no female representatives in the Village Consultative Body or BPD (source: BPS Pringgabaya District in Figures 2016 and BPS Pujut District in Figures 2016).

The Family Welfare Guidance/ Pembinaan Kesejahteraan Keluarga (PKK) in three villages (Pringgabaya Utara, Geres and Sengkol) are active in terms of participating in the villages' development e.g. organizing the integrated health service (Posyandu) focusing on children and maternity health care.

5.4.13 Community Health

Key Health Indicator

The morbidity level and the average length of illness are indicators that can describe a community's health status. Data from the Lombok Tengah Regency in Figures (2017) identified that the life expectancy rate in Lombok Timur Regency in 2016 was 64.73 years. While in Lombok Tengah Regency in 2016 was 65.01 years.

Those figures were slightly below the West Nusa Tenggara Province life expectancy rate in 2016 which was 69.35 years. This number has increased from the previous year, i.e. 65.38 in 2015. According to the National Statistics Office, the life expectancy at the national level in 2010-2015 was at 70.1 year-old.

Regarding mortality rates, BPS Labuhan Haji District in Figures 2016, Geres Village indicated 13 people (11 males and 2 females) had died. In Pringgabaya Utara, BPS Pringgabaya District in Figures 2016, mortality rates indicated 25 people; consist of 15 males and 10 females died. No official data records are available on mortality rates at Sengkol Village.

At the time of ERM survey, the maternal mortality data was gathered from statistical bureau in the regency level (BPS kabupaten). The maternal mortality data was only available for Lombok Timur regency with a total of 20 maternal mortality cases reported. According to the report 3 maternal mortality cases occurred during pregnancy, 3 during birth and 14 within 40 days after giving birth.

Disease Status

The top ten common diseases in Lombok Timur Regency in 2016 are indicated in the following ***Table 5-20***.

Table 5-20 Top Ten Diseases in Lombok Timur Regency

No	Type of Diseases	Total (cases)
1	Common Cold	73,160
2	Primary Hypertension	34,885
3	Gastroenteritis infection	32,989
4	Unspecified acute respiratory infections	24,491
5	Influenza with other manifestations, virus non-identified	19,749
6	Identified influenza virus	18,935
7	Other acute gastritis	18,709
8	Other acute lower respiratory infections	16,533
9	Fever	13,373
10	Unspecified fever (observation)	13,167

Source: BPS Lombok Timur in Figures 2017

The common cold is the most prevalent disease in Lombok Timur Regency (which also covers Pringgabaya Utara and Geres Villages); an increase from the previous year (2015) which amounted to 72,874 cases. The following (***Table 5-21***) shows the top ten diseases occurred in Lombok Tengah Regency.

Table 5-21 The Top Ten Diseases in Lombok Tengah Regency

No	Type of Diseases	Total (cases)
1	Fever	1,488
2	Presbyopia	853
3	Dispnea (shortness of breath)	620
4	Hypertension	589
5	Vulnus appertum	571
6	Capitis Trauma (minor, moderate, heavy)	549
7	Acute gastroenteritis	532
8	Asthma	447
9	Dispepsia	441
10	Colic Abdomen	334

Source: BPS Lombok Tengah in Figures 2017

From above table, it indicates fever is the most prevalent disease in Lombok Tengah Regency (which also covers Sengkol Village).

Water Availability

Local people in Lombok Tengah Regency rely on water distributed from PDAM (regional water company). In 2015 there were 42,470 households customers recorded by PDAM (source: BPS Lombok Tengah Regency in Figures 2017).

Similar with Lombok Tengah, people in Lombok Timur Regency also rely on water distributed by PDAM. In 2015, there were 20,177 household customers benefitting from PDAM with the total water distributed reaching 419,842 m^3 (source: BPS Lombok Timur Regency in Figures 2017).

Figure 5-12 Water Hose for Water Connection from PDAM

With regards to water resources, based on random interviews with approximately seven (7) local people nearby the Project sites in three villages (Pringgabaya Utara, Geres, and Sengkol), they have difficulties in accessing clean water from their own dug well, due to the prolonged drought.

5.4.14 Environmental Sanitation

Access to latrines, waste disposal facilities (SPAL) and landfills (SPS) is still low. Based on the health profile of Lombok Timur Regency in 2015, number of people who access proper latrines until 2015 has reached 824,156 people or 70.80% of total population in Lombok Timur. Waste disposal in Lombok Timur Regency is not well managed. Only a small percentage of people are served by garbage trucks, so most people throw garbage in any place including river, sewer or drainage. In addition, the river or drainage is also used as a place to defecate the community (source POKJA AMPL website).

There is no specific information available from other sources such as BPS (Lombok Timur and Lombok Tengah Regencies) regarding number of sanitation or hygiene facilities that are recorded.

However, based on field survey, team found a house utilises water sources from rain fed water reservoir and water hose that connects to local PDAM.

Figure 5-13 Water Reservoir And Water Hose For Connecting PDAM Water Distribution

Waste Management

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 field observation, generally the community disposes of the waste in their backyards/gardens. This condition shows that waste 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.

Figure 5-14 Used Baby Diapers Disposed near Home

Health Facility and Infrastructure

With regard to health facilities, in Pringgabaya Utara Village of Pringgabaya District, it has two traditional midwives (*dukun beranak*) and 11 *Posyandu* or Integrated Health Post (source: BPS Pringgabaya District in Figures 2016). Geres Village of Labuhan Haji District, has one midwife, one Pustu or Supported-Health Care Centre, one Polindes

or Village Maternity Hut and five Posyandu (source: BPS Labuhan Haji District in Figures 2016).

In Lombok Timur Regency, there are three hospitals which consist of one regional public hospital (RSUD R Sudjono), two private hospitals (Risa Sentra Medika Lombok Timur and Islamic Hospital Namira) (source: DataResmi.web.id).

In Sengkol Village of Pujut District, the health facilities in that village, there were one Puskesmas, and three doctor practices. While number of health personnel in Sengkol Village, there were 18 Health Chiefs, three midwives, and 10 trained traditional midwives (source: BPS Pujut District in Figures 2016).

In Lombok Tengah Regency, there are three hospitals, one regional public hospital (RSUD Praya), and one private hospital (Islamic Hospital Yatofa).

5.4.15 Land Acquisition

This section reviews the land requirements for the Project and the land acquisition process conducted by the Project proponent. It is understood that the land acquisition is now complete as of November 2017. Information presented in this chapter is obtained from the land acquisition team, interviews with a number of land owners and land users, as well as direct observations in the proposed location in Pringgabaya Village, Selong Village, and Sengkol Village.

Land Requirement and Land Acquisition Process

As described in the Project description, plots of land are for PV field, main station and its facilities, inverter station, internal pathway, access road, and transmission line.

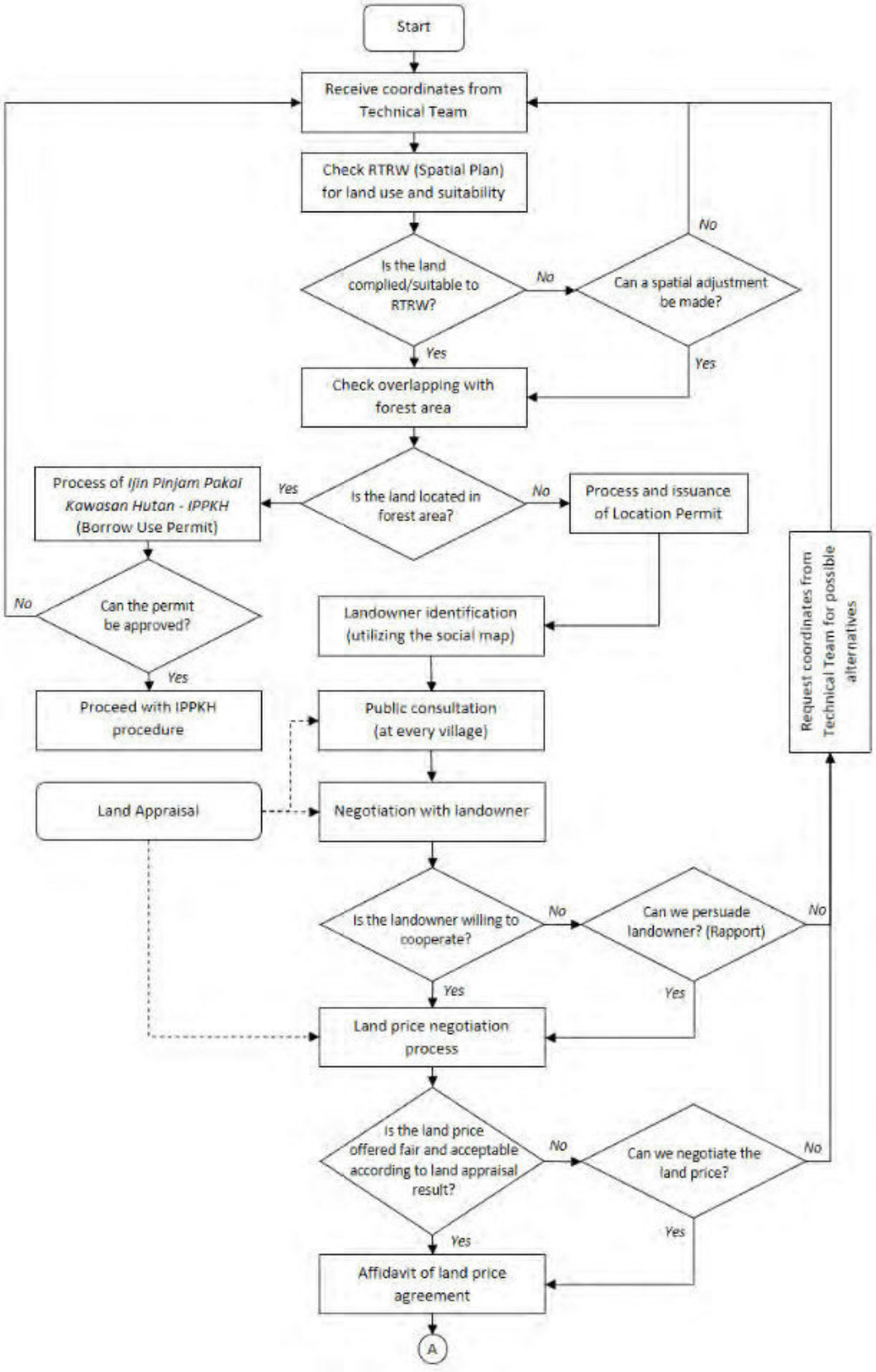
The three sites are located in the areas suitable for solar power development according to the following regulations:

a) NTB Province Local Regulation № 3 Year 2010 regarding Spatial Plan of NTB Province for 2009-2009;
b) Lombok Tengah Local Regulation № 7 year 2011 regarding Spatial Plan of Lombok Tengah Regency for 2011-2031; and
c) Lombok Timur Local Regulation № 2 year 2012 regarding Spatial Plan of Lombok Timur Regency for 2012-2032.

The Project proponent has conducted land surveys at the three locations to identify suitable lands for the Project with the consideration of the following aspects:

- Topography condition;
- Proximity/ distance to PLN (state-owned electricity company) substation;
- Price/ affordability;
- Accessibility; and
- Logistical arrangement.

Based on these considerations, the Project proponent decided the best alternative and proceeded with the land acquisition process applying a standard procedure presented in ***Figure 5-15***.



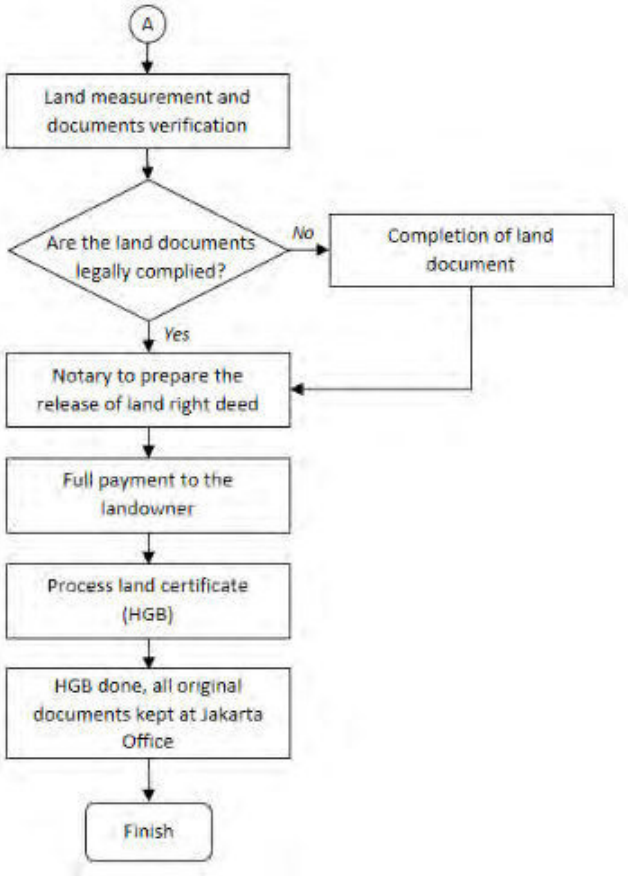


Figure 5-15 Equis' Land Acquisition Standard Operating Procedure

The total land acquired for all three sites is approximately 285,467 m^2. Based on the information from land acquisition team, all the acquired land is private properties owned by individual land owners. **Table 5-22** presents the ownership of the acquired lands. Purchased land is bigger than land requirement (8 ha) because some landowners did not want to sell if the company only buys a fraction of their land, as such Equis Energy purchased more land than needed from certain landowners.

Table 5-22 Size of Acquired Land and Number of Land Owner

Site location	Size of acquired land (m^2)	# land owner
Pringgabaya village	111,850	16 people
Selong village	86,334	18 people
Sengkol	87,283	17 people

According to the land acquisition procedure, the land procurement transaction is conducted based on the principle of willing buyer and willing seller where both parties agreed on the price after fair and transparent negotiation. Interviews with one land owner in Pringgabaya and one in Selong confirmed that the negotiation process has been fair and they are satisfied with the agreed price. Interviews with the Sengkol

land owners was not conducted during site visit due to the land owner identification process being underway and some identified land owner limited availability. As such it is recommended the Project conduct a comprehensive review of the land acquisition process to ensure that the process meets the ADB safeguard policy and develop necessary corrective measures if needed.

The Project proponent identified lands for the transmission line of 20 kV to PLN substation whereby no compensation was required for the tower footing land or the ROW of the 20 kV transmission line. Based on the Minister of Energy and Mineral Resource Decree Number 18 2015 compensation is only applicable for the transmission line with a capacity of more than 120 Kv.

Equis aimed to undertake the land acquisition following Indonesian regulations and where feasible ADB requirements; **Table 5-23** sets out a comparison of the two processes.

Table 5-23 Gap Analysis of ADB Policy and Equis Land Acquisition SOP

ADB Policy	Equis Land Acquisition SOP
Adequate and fair price for land and/or other assets	The rate of compensation is based on a fair and reasonable price which is agreed by both parties. An independent land acquisition consultant was engaged to conduct the land appraisal of the proposed project area.
Involuntary resettlement should be avoided.	No involuntary resettlement since the land purchase is based on agreement between Equis and land owners; willing buyer willing seller.
Meaningful consultation with affected persons, including those without legal title. Openly address the risks asymmetry of information and bargaining power of the parties involved.	Land owners were informed in advance in the public consultation and land acquisition discussions. The project also has an established grievance mechanism.

Land Owners and Land Use

The following data were obtained from Land Acquisition Procedure report, therefore it is assumed that all data are representative of all land owners identified for land acquisition.

Pringgabaya Site

Available data from the land acquisition team confirmed that the land owners have a diverse economic background. In Pringgabaya site, out of 17 land owners, five people are civil servant, five person works as farmer, another 3 land owners have their own business, and one people work as employee (driver) in a stone crusher business. Another three land owners are categorized as other, referring to living with their families since they are elderly.

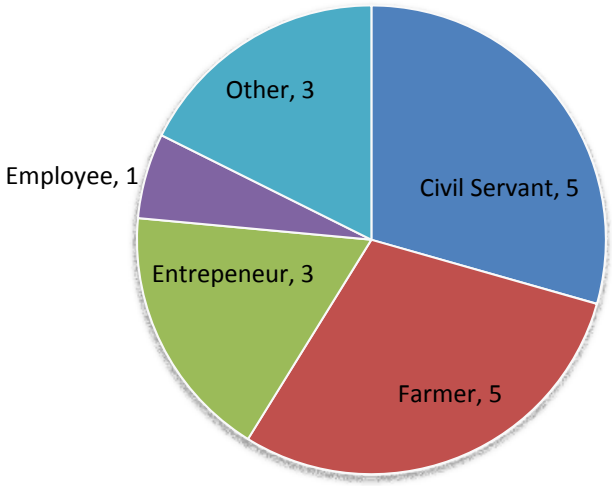


Figure 5-16 Economic Profile of Land Owners in Pringgabaya Site

Reportedly, only one land owner cultivates his own land in the location while the other 4 land owners who work as farmers are cultivating their lands in different locations. The non-farmer land owners typically abandoned the lands or let the land to be cultivated by sharecroppers.

It was informed that only one sharecropper worked on the acquired land in Pringgabaya site. There is no known agreement between the sharecropper and the land owner regarding the sharecropping arrangement. Reportedly, the sharecropper will share some part of the harvest with the land owner if it is profitable.

The land is used for rain-fed agriculture activities with main commodities of corn and sweetsop. Observation of the location during the site visit revealed that most of the plots are vacant due to the dry season. Interview with the land owner who cultivated the land during rainy season confirmed that farming activities during the dry season have a high cost due to water scarcity, hence is not profitable. A public well is available nearby the location however the farmer has to pay around IDR 35,000 – IDR 50,000 (USD 2.5 – USD 4) per hour to utilise the electric water pump depending on the size and capacity of the water pump.

To fulfil the daily needs of the family, the land owner also works on other income generating activities such as drying and selling tobacco. According to the land owner, he has received the money for land compensation and used it to buy goats, expecting a more stable and sustainable income.

Selong Site

The Project has conducted land transactions with 6 owners in the Selong site; 3 are retired, 1 has their own business, 1 is a civil servant, and 1 person works as a cow farmer. None of the land owners used the acquired land as their main source of income. Reportedly, out of six owners, only one is utilising the land to plant cassava and peanuts during rainy season.

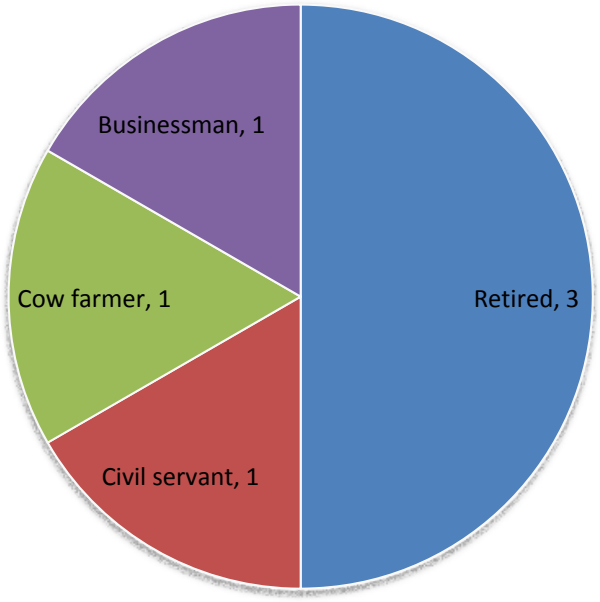


Figure 5-17 Land Owners Profile in Selong

The land acquisition team reported that there were two land users on the acquired land who rented the land from the owners with the amount of IDR 30,000,000 (USD 2,300) for a 15 year term. Site observations confirmed that although the land users paid the rent fee, they appeared to have abandoned the land. In an interview with one of the land owners it was suggested that farming activities on the land are not profitable due to the high reliance on natural rainfall. The land owners have repaid the outstanding rent fee using the compensation money received from the Project. Reportedly, the land users have used the money to buy cows and rent more fertile land in another location.

Sengkol Site

The Project has acquired 81,898.671 Ha of land from 8 land owners in the Sengkol site. Information from the land acquisition team reveals that out of 8 land owners, 3 are civil servants, 2 people are farmers; 1 is retired, 1 is a businessman, and 1 is an employee in a company working as excavator operator.

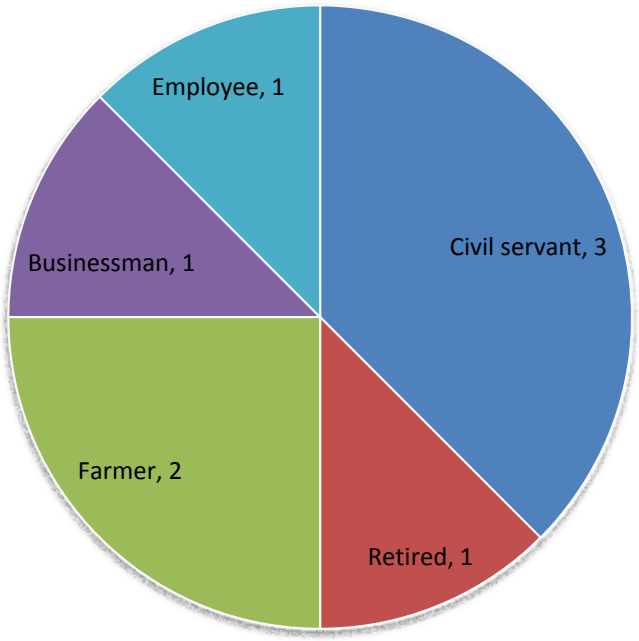


Figure 5-18 Land Owners Profile in Sengkol

Based on site observation, the land in Sengkol site is more fertile compared to the acquired land in Pringgabaya and Sengkol, the land is also used for rain-fed agriculture system. This can be seen from the main commodities planted on the land such as rice, tobacco, soy bean, and other secondary crops. Reportedly, only one of the land owners cultivates his land while another 7 land owners give the land to be cultivated by sharecroppers/care taker with arrangement called "Menyakap". "Menyakap" is a condition where the farming cost is paid by the sharecroppers and the harvest result will be divided equally with the land owner. Reportedly, other farming locations are available nearby the current location as alternative livelihood for the sharecroppers.

6 IMPACT ASSESSMENT

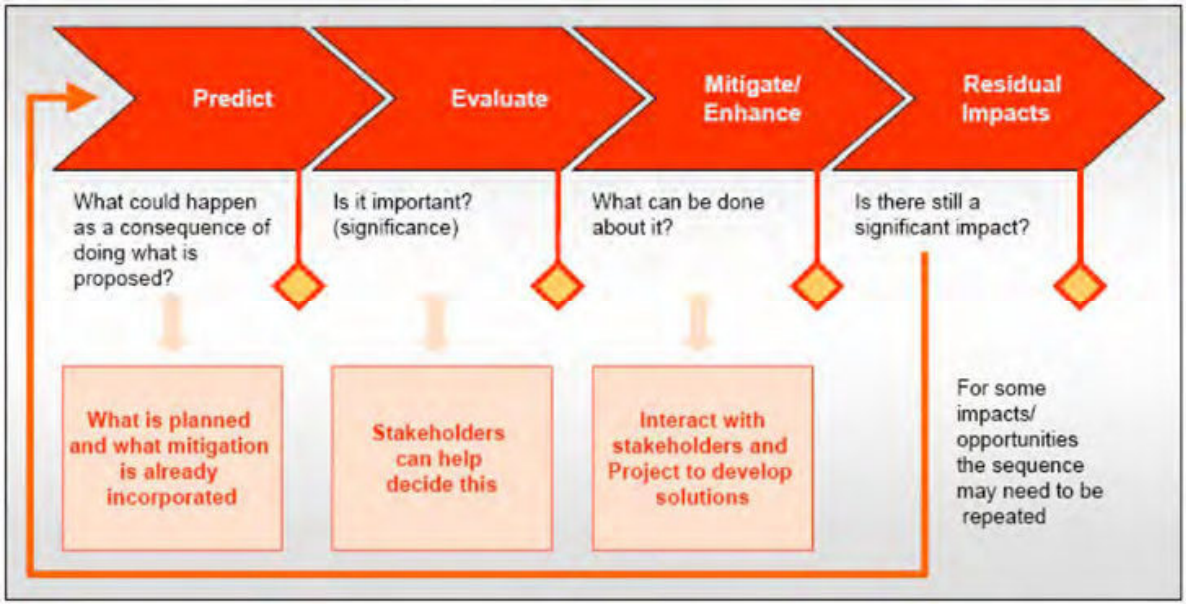
6.1 INTRODUCTION

This section provides the evaluation of the significance of potential environmental impacts identified during Scoping. Where resource/receptor specific magnitude or sensitivity/vulnerability definitions apply, these are discussed in the relevant subsections.

6.2 IMPACT ASSESSMENT METHODOLOGY

Impact identification and assessment starts with scoping and continues through the remainder of the IA Process. The principal IA steps are summarised in ***Figure 6-1***.

Figure 6-1 Impact Assessment Process



The principle steps illustrated in **Figure 6-1** 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.

6.2.1 *Prediction of Impacts*

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.

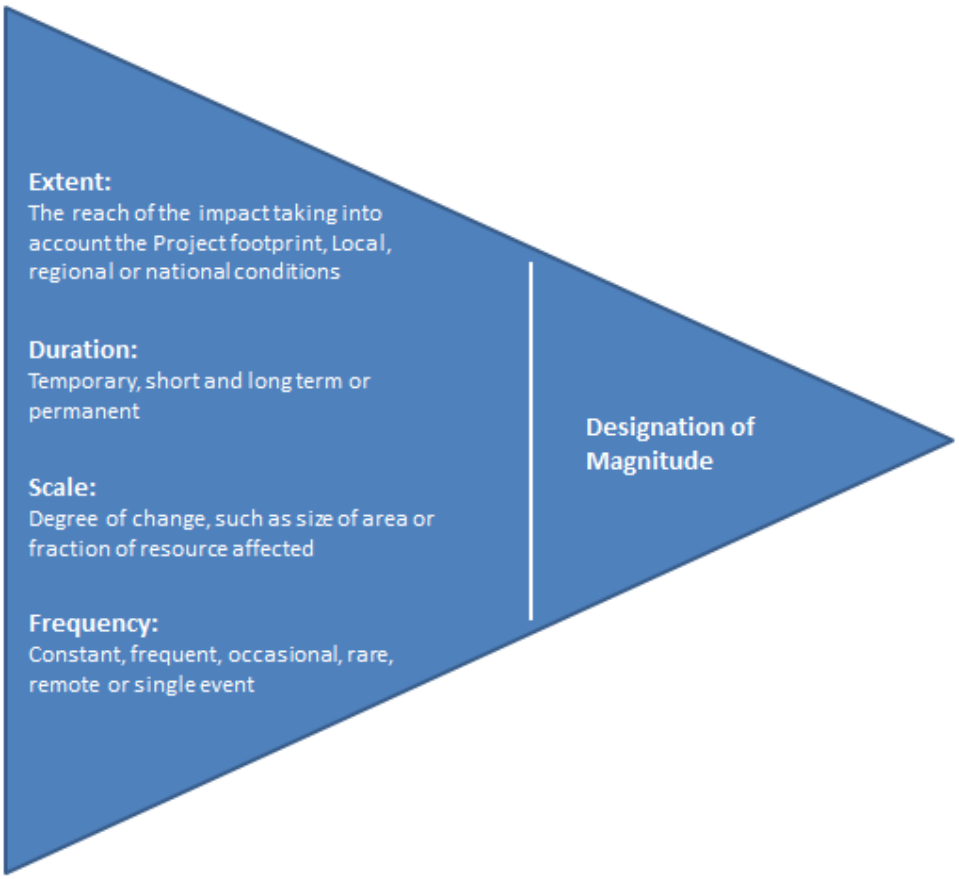
6.2.2 *Characterisation of Impacts*

Once the prediction of impacts is complete, each impact is described in terms of its various relevant characteristics (e.g., nature and type). The magnitude of the impact is assigned as a function of extent, scale, duration and frequency. The terminology used to describe impact characteristics is provided in ***Table 6-1*** and magnitude illustrated in ***Figure 6-2.***

Table 6-1 Impact Characteristic Terminology

Characteristic	Definition	Designations
Nature	A descriptor indicating the relationship of the impact	Positive Negative
Type	A definition of whether the impact occurs as a result of the interaction between Project activities and resource/receptor e.g. air emissions affecting air quality = direct e.g. reduced air quality affecting local health conditions = indirect	Direct Indirect
Extent	The "reach" of the impact (e.g., confined to a small area around the Project Footprint, projected for several kilometers).	Local (low) Regional (medium) International (high)
Duration	The time period over which a resource / receptor is affected.	Temporary Short-term Long-term/ irreversible
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected)	Defined from a numerical value or a qualitative description of "intensity"
Frequency	A measure of the constancy or periodicity of the impact.	Defined from a numerical value or a qualitative description.

Figure 6-2 Assessing the Level of Magnitude



Magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. The magnitude assessments as a function of extent, duration, scale and frequency vary on a resource/receptor basis but the designations are universal:

- Negligible;
- Small;
- Medium; and
- Large.

For a number of other resource/receptor specific interactions/impacts definitions have been developed where international standards or references exist, e.g. for noise or social and community health.

In the case of a positive impact, no magnitude designation is assigned. It is considered sufficient for the purpose of the IA to indicate that the Project is expected to result in a positive impact, without characterising the exact degree of positive change likely to occur.

Additionally, for unplanned events only, magnitude incorporates a 'likelihood' factor. The likelihood of an unplanned event occurring is designated using a qualitative scale, as described in ***Table 6-2***.

Table 6-2 Definitions for Likelihood Designations

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

In addition to characterising the magnitude of impact, the other principal impact evaluation step is definition of the sensitivity/vulnerability of the impacted resource/receptor. There are a range of factors to be taken into account when defining the sensitivity/vulnerability of the resource/receptor, which may be physical, biological, cultural or human. Other factors may also be considered when characterising sensitivity/vulnerability/importance, such as legal protection, government policy, stakeholder views and economic value.

Sensitivity/vulnerability/importance designations, as in the case of magnitude, are universally consistent, but the definitions for these designations vary on a resource/receptor basis (refer to **Chapters 10 and 11** Impact Assessment). The sensitivity/ vulnerability/ importance designations used herein for all resources/receptors are:

- Low
- Medium
- High

Once magnitude of impact and sensitivity/vulnerability/importance of resource/receptor have been characterised, the significance can be assigned for each impact. Impact significance is designated using the matrix shown in ***Figure 6-3***.

Figure 6-3 Impact Significance Rankings

		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

The Impact Significance matrix universally applies to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/importance designations that enter into the matrix.

Figure 6-4 provides the context for the impact significance rankings.

It is important to note that impact prediction and evaluation take into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the IA Process). An example of an embedded control is a standard acoustic enclosure that is designed to be installed around a piece of major equipment. This avoids the situation where an impact is assigned a magnitude based on a hypothetical version of the Project that considers none of the embedded controls.

Figure 6-4 Context of Impact Significance

An impact of negligible significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of minor significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of moderate significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

6.2.3 Identification of Mitigation and Enhancement Measures

Once the significance of an impact has been characterised, the next step is to evaluate what mitigation and enhancement measures are warranted. The following Mitigation Hierarchy is illustrated in ***Figure 6-5***.

Figure 6-5 Impact Mitigation Hierarchy

- **Avoid at Source; Reduce at Source:** avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
- **Abate on Site:** add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).
- **Abate at Receptor:** if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
- **Repair or Remedy***:* some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- **Compensate in Kind; Compensate Through Other Means:** where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

6.2.4 Residual Impact Evaluation

Once mitigation and enhancement measures are declared, the next step in the IA Process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the implementation of the proposed mitigation and enhancement measures.

6.2.5 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:

a) Impacts or their associated Project components remain in conformance with applicable standards; and

b) Mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted.

An Environmental and Social Management Plan (ESMP) is then compiled which summarises all actions which the Project has committed to executing with respect to

environmental/Social/ Health performance for the Project. The ESMP 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. The ESMP is provided as an Addendum to this ESIA.

6.3 *IMPACT ASSESSMENT RESULTS*

The following evaluates the significance of the potential environmental impacts identified in Scoping (***Section 4***). The following impacts activities are assessed:

- Impacts from loss of land resource;
- Impact to Local Economy from Employment and Business Opportunities during the Project Construction and Operation;
- Construction impacts on Air Quality;
- Construction impacts on Ambient Noise Levels;
- Construction impacts from Vegetation Clearing;
- Construction impacts on Habitat and Wildlife;
- Construction impacts Soil erosion and Surface Water Quality Impacts;
- Impacts from Project Construction and Operations Water Demand;
- Physical Presence of Transmission Lines on of Birds and Bats;
- Spills and Soil/Water Contamination;
- Impacts on Occupational Health and Safety of Workers; and
- Impact to Community Safety.

6.3.1 *Impacts from Loss of Land Resource*

Discussion of Impacts

Each PV field will occupy an area of ~8 Ha and together with the supporting facilities will require a total area of 24 Ha. The Pringgabaya site and 3 km transmission line will be located on dryland agriculture; the Selong solar farm and 6 km transmission line on dryland agriculture and plantation; and the Sengkol solar farm and 2.1 km transmission line will be located on paddy field. Once the land ownership is transferred to the Project, these sites will no longer be able to be used for agriculture and the current owners will have to find alternative sites if they wish to continue farming activities.

Table 6-3 and **Table 6-4** present the sensitivity and magnitude assessment criteria for decreased income from farming activities resulted from the land acquisition.

Table 6-3 Criteria for Impact Sensitivity for Assessment of Loss of Land Resource for Farming

Sensitivity Criteria	Contributing Criteria
Low	There are alternatives of income generating activities for the land owners, sharecroppers, and land users affected by the land acquisition which are easily accessible.
Medium	There are limited alternatives of income generating activities for the land owners, sharecroppers, and land users affected by the land acquisition.
High	There are no other options of income generating activities to replace the current livelihood of the land owners, sharecroppers, and land users affected by the land acquisition.

Table 6-4 Criteria for Impact Magnitude for Assessment of Loss of Land Resource for Farming

Magnitude	Criteria
Negligible	The land acquisition is not essentially affecting the income of the affected land owners, sharecroppers, and land users.
Small	The land acquisition poses minor impact on the income level of the affected land owners, sharecroppers, and land users. There may be a temporary disturbance to income generating activities however will be able to recover after the alternatives income generating activities are applied. The number of affected people is considerably small.
Medium	The land acquisition poses moderate impact on the income level of quite significant number of land owners, sharecroppers, and land users. The affected people encounter difficulties to recover their income level due to limited available options of income generating activities.
Large	The land acquisition poses significant negative impact on the income level of the majority of the land owners, sharecroppers, and land users. There are no other livelihood options for the land affected people to recover their income.

The land for the solar farm has been purchased from 42 land owners for all three sites. In Pringgabaya and Selong, the vegetation is modified habitat consisting of predominantly dryland plantation with corn and cassava; however during the survey scrub and bush covered most of the project area. The productivity of the land is low because of low average monthly rainfall, there is only 1-2 cropping seasons in a year. Sengkol consists of mostly rice field and plantation with paddy, coconuts, and cassava are dominant. The agriculture in this part is heavily rain dependent with average monthly rainfall of 139 mm.

Reportedly, the farming activities in Pringgabaya and Selong site are not profitable due to high reliance on rainfall and scarcity of water during the dry season. In the Sengkol site, the soil is reportedly more fertile however crop production also relies on seasonal rainfall. There is no installed irrigation at any of the sites.

The baseline study of the land acquisition confirms that the majority of the land owners work in non-agriculture sector hence the land acquired by the Project is not their main source of income. Thus the land acquisition will not negatively affect the income level of most of the land owners. Nevertheless, there are small numbers of people whose income will be affected by the land acquisition since they cultivate the land to be acquired, as follow:

1. Pringgabaya site: 1 land owner; 1 sharecropper;
2. Selong site: 2 land users; and
3. Sengkol site: 1 land owner, 7 sharecroppers.

Land acquisition has completed and landowners who worked in agriculture reportedly used the compensation money to buy cattle (goats or cows) as an alternative livelihood or purchased replacement land in other locations. The site visit confirmed that abundant replacement lands are available nearby the project location, providing alternative locations for farming activities.

Impact Evaluation and Significance

The magnitude of impact on the loss of agricultural land resulting from the land requirements of the Project are considered to be **Small,** given that the land used for rain-fed agriculture activities affected 12 people and a relatively small area in relation to the total area of arable land in the area. The nature of the impact is predicted to **Temporary** given that existing landowners have already purchased replacement land. The availability of replacement land is high and there are alternatives lands for farming available nearby the location for the land owners, sharecroppers, and land users, resulting in a **Low** Sensitivity. The significance of impact is therefore assessed as being **Negligible**. ***Table 6-5*** presenting summarises the impact assessment process.

Table 6-5 Impact on Assessment of Loss of Land Resource for Farming

Impact Description	Impact on Loss of Land Resource			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Magnitude	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major

Mitigation Measures

Impact assessment on the loss of agricultural land resulting from the land requirements of the Project is considered negligible.

It is understood that the land that has been acquired to date has been by a willing buyer willing seller process under Indonesian regulations.

In order for the Project to meet ADB Safeguards policy, the Project should conduct the following mitigation measure:

- Ensure proper documentation for the consultation and negotiation process with land owner;
- 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;
- Identify all landowner including poorest Landowner and vulnerable groups, where possible, the project will prioritise these group to be employed by the Project during the construction phase;
- Develop and implement corporate social responsibility programs where the affected people will be prioritised as the beneficiaries;
- Inform all Landowner during public consultation;
- Identify all affected social and cultural institutions and prepare plan for protecting and supporting them;

Residual Impact Significance

The residual impact of the impact of change in land resource from the Project remains ***Negligible***.

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

Discussion of Impacts

The project is expected to create short-term and long-term beneficial impacts on the local economy and employment. Construction and maintenance of infrastructure of solar PV during operation activities can be an adequate means to create short-term jobs and build long-term capacity for local development. Local job creation for skill and unskilled labour is needed during construction and operation activities.

Regarding the labor and working conditions, it is understood that Indonesia has ratified 20 ILO conventions regarding labor and working conditions including 8 fundamental conventions (forced labor convention, freedom of association and protection of rights to organize convention, right to organize and bargaining convention, equal remuneration convention, abolition of forced labor convention, discrimination convention (employment and occupation) convention, a minimum age convention and the worst form of child labor convention). Therefore, Equis Energy and/or EPC contractors must follow the Indonesian national and international labor laws to be implemented during the construction and operation phases.

Local economy opportunities can also be created through utilising local material procurement and local service sub-contracting.

The assessment of identifying the impact on local economy and employment, involves the application of standard multipliers that assess the direct (project), indirect (supplier) and induced (employees/workers) effects of expenditures on overall income and employment in the local economy. The sensitivity and magnitude criteria of impact assessment for local economic and employment will follow the criteria explained in ***Table 6-6*** and
Table 6-7 respectively.

Table 6-6 Sensitivity Assessment Criteria for Local Economy and Employment

Sensitivity Criteria	Contributing Criteria
Low	The Project has a policy that regulates the use of more local content (>60 percent) for its activities
Medium	The project has a policy that balances the use of non-local contents and local-content for its activities.
High	The project has a policy that regulates the use of non-local contents for its activities.

Table 6-7 Criteria for Impact Magnitude for Assessment of Impact to Local Economy and Employment

Magnitude	Criteria
Negligible	Project not only contributes to the local economic empowerment and employment development, project also contributes to the creation of entrepreneurship development program for local communities.
Small	Project contributes to the local economic empowerment and employment development.
Medium	Project does contribute only to the local economic empowerment.
Large	Project does not contribute to the local economic empowerment and employment development.

Impact Evaluation and Significance

Based on the data from the National Statistics Bureau, the number of poor in Lombok Timur is 18.46 percent of the total population. The number is slightly lower in Lombok Tengah Regency where 15.80% of the total population is reportedly categorized as being poor. In Lombok Timur, the poor totals 18.46 percent of total

population of Lombok Timur Regency. While in Lombok Tengah, it has reached 15.80 percent of Lombok Tengah total population. Compared with statistical data of Nusa Tenggara Barat province, Lombok Timur was higher than the average of poor population in the provincial level which was 17.1% of the total population while nationally; number of poor population at the same period was recorded in 10.7%.

The Project's positive impact to the local economy and employment is limited to the project footprint area where considered geographical conditions of three villages located adjacent to the project; they are Pringgabaya Utara Village, Geres Village and Sengkol Village. Pringgabaya Utara Village is located in Pringgabaya District of Lombok Timur Regency. Geres Village is located in Labuhan Haji District of Lombok Timur Regency, and Sengkol Village is located in Pujut District of Lombok Tengah Regency.

With regards to periodic alteration of local economy and employment, the project will need more local workers (unskilled) during construction than operations and it will create local economy opportunities for local communities such as opening food stall, catering services, rental accommodation and so on. While during the operation phase, the project will reduce number of labour due to project only maintaining the solar PV and its equipment hence only recruiting skilled labour for security and maintenance activities. The periodic alteration for local economy and employment is described in ***Table 6-8***. Whilst benefits are positive, the duration of construction is short and so there are potential negative impacts associated with worker retrenchment at the end of construction.

Table 6-8 Periodic alteration of Local Economy and Employment

Activity	Duration
Construction activities	Short term (8-12 months)
Operation activities	20 years/ permanent
Maintenance of solar PV and its equipment.	20 years/ permanent

For benefits to the local economy, Project opportunities are greater during the construction than operation phase. These impacts are potentially positive (***Table 6-9***).

Table 6-9 Impact on Local Economy and Employment as the result of the Project

Impact	Local Economy and Employment		
Impact Nature	Negative	Positive	Neutral

Mitigation Measures

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

- Have a clear stipulation of using local labour in the Equis and/or EPC contract and instruct the EPC to prioritize qualified people from the affected villages and also surrounding villages as construction and/or operational workers in accordance with the needs of the Project;
- Conduct due diligence throughout local suppliers to identify and evaluate the quality of services and products provided by local suppliers in line with the required standards;
- Determine numbers of skilled, semi-skilled and unskilled labour requirements for each phase and assess local resource levels through involving local village heads, customary heads or community leaders;
- Provide and communicate clear information about the Project's requirement related to employment and business opportunities and prioritise locals where feasible;
- Implement Project specific training and 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;
- Workers will have contracts in place prior to commencement setting out working conditions, terms of employment and EHS responsibilities;
- Prior to the construction phase is ended where the project will reduce number of labours during operation phase, the project will carry out an analysis of alternatives to retrenchment. The retrenchment plan will be developed and implemented to reduce the adverse impacts of retrenchment on workers;
- A grievance mechanism will be developed for workers and included in the ESMS. Workers will be informed about this mechanism at the time of hiring. Grievance mechanism will be extended to non-employee workers in future; and
- Ensure Equis and/or the EPC contractors adhere to the national and international core labour standards and implement those in throughout the Project's construction and/or operation phases.

6.3.3 Impacts on Air Quality

Discussion of Impacts

Air emissions generated during construction activities will come from vehicle engine exhausts, generators, construction equipment and dust from earthworks and vehicles movement.

For the assessment of air quality, the sensitivity criteria outlined in ***Table 6-10*** is been used. Further, ***Table 6-11*** outlines the magnitude criteria which include the nature of soil that might generate dust, impact extent and duration. In determining impact magnitude, impact scale and frequency have been as well taken into account.

The standards considered for assessment of potential impacts to air quality are covered in **Annex A**. The air quality impacts associated with the construction activities have been assessed qualitatively, using professional judgement and based on past experience from similar projects.

Table 6-10 Sensitivity Assessment Criteria for Air Quality

Sensitivity Criteria	Contributing Criteria	
	Human Receptors	Ecological Receptors
Low	Locations where human exposure is transient.[12]	Locally designated sites; and/or areas of specific ecological interest, not subject to statutory protection (for example, as defined by the project ecology team).
Medium	Few Receptors (settlements) within 100 m of project activity area as roads, batching plant, solar PV modules etc.	Nationally designated sites.
High	Densely populated receptors (settlements) within 100 m of project activity area as roads, batching plant, solar PV modules.	Internationally designated sites.

Table 6-11 Criteria for Impact Magnitude for Assessment of Impact to Air Quality

Magnitude	Criteria
Negligible	• Low levels of emissions/dust generation due to Project activity • Impact extent is local • Temporary dust generation and emissions from Projects
Small	• Soil type with large grain size (e.g. sand) • Impact extent is local • Dust generation and emissions from Projects for short duration
Medium	• Moderately dusty soil type (e.g. silt) • Impact extent is local to regional • Dust generation and emissions from Projects for long duration
Large	• Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • Impact extent is local to international • Significant process emissions from Project for the entire Project cycle

Impact Evaluation and Significance

Air quality impacts are likely to be restricted to increased dust generation and small and heavy vehicle emissions during construction. During mobilisation of equipment and personnel, emissions from vehicles will be transient, intermittent and spatially

[12] As per the NAAQS and World Bank/IFC guidelines, there are no standards that apply to short – term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain.

variable, therefore it is expected only a small incremental increase in combustion-based air pollutants will be generated by the Project.

Onsite earth works and deliveries will occur over a maximum period of twelve months and will result in localised of air quality impacts.

Air quality will largely be impacted from the following sources during the construction phase:

- Fugitive dust emissions from road upgrade and construction, site clearing, excavation work, cutting and levelling work at sites and access/ internal roads, stacking of soils, handling of construction material, transportation of material, emission due to movement of vehicles and heavy construction machinery, etc.;
- Vehicular emissions due to traffic movement on site and on access roads;
- Particulate emissions from operation of batching plant;
- Existing stone crushers in Pringgabaya village;
- Exhaust emissions from construction machineries, other heavy equipment like bull dozers, excavators, and compactors; and
- Emissions from emergency power diesel generator required during construction activity.

The nearest human receptors are located within 500 m for all three sites. For Pringgabaya, Selong, and Sengkol site, the nearest houses are located 200 m, 250 m, and 120 m for each site, respectively and limited to 2 to 3 houses only. Localised dust generation may occur from site access, with the level of dust generation depending on the road condition (covered/uncovered road).

Within the site air quality impacts would largely be limited to 100 m-200 m of the construction activity area, batching plant and material storage area during dust generating activities.

The magnitude of impact on air quality is considered to be **Small**. Although the nearest human receptors are located within 500 m for all three sites, the nearest houses distance from Pringgabaya, Selong, and Sengkol sites are located in the range of 120 m – 250 m for each site, then impact sensitivity is assessed as being **Medium**, considering there are residential area located near access road. Impacts are expected to be short-term, while the natures of proposed activities are unlikely to significantly reduce initial air quality conditions. The significance of impact is therefore assessed as being ***Minor***.

The impact assessment for air quality during construction phase is summarised in ***Table 6-12.***

Table 6-12 Impact on Air Quality during Construction Phase

Impact Description	Impact on Air Quality from Construction			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Magnitude	Negligible	Small	Medium	Large

Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major

Mitigation Measures

- Preventive measures such as storage of construction under cover, covering of construction materials during transportation will be undertaken, for reducing dust;
- Emissions from the emergency generator set and other stationary machines will be controlled by ensuring that the engines are always properly tuned and maintained;
- Minimise stockpiling by coordinating excavations, spreading, re-grading and compaction activities;
- Speed of vehicles on site will be limited to 10-15 km/hr which will help in minimising fugitive dust emissions due to vehicular movement;
- Cease or phase down work if excess fugitive dust is observed. Investigate the source of dust and ensure proper suppression measures;
- Proper maintenance of engines;
- Idling of vehicles and equipment will be prevented;
- Ambient air monitoring during construction period to be established, for all three sites, ambient air quality monitoring locations are in and outside of the solar farm, for Pringgabaya site one of the monitoring location points will be located adjacent with the existing stone crusher nearby the site;
- Coordinate with owner of the stone crushers to implement a necessary mitigation measure to reduce particulate and dust emission during its operation; and
- Equis will construct new access road wide enough to accommodate the delivery trucks since the project in Selong site will not use existing access road.

Residual Impact Significance

Considering the lack of water in the project locations during the dry season, use of dust suppression on access roads, and exposed areas onsite through the watering of roads used during dry periods will require a consideration of water supply and other users given the low levels of water availability in the area. As a result of the residual negative impact associated with decreased air quality will remain as ***Minor*** significance.

6.3.4 *Impact on Ambient Noise Levels*

Discussion of Impacts

The impact assessment with respect to ambient noise level of the study area has been undertaken for construction phase included activities described below:

- Vehicle disturbance to local community from transportation of solar PV module components, construction material, construction machinery and personnel;
- Construction activities including site preparation, construction of solar PV modules foundation, erection of internal and external transmission line, construction of support building;
- Operation of batching plant and operational of stone crushers near project area;
- Operation of generator set for emergency power backup; and
- Complaints tracking and grievance log will be established to address community complaints.

The process of impact assessment for noise will follow the process explained in ***Figure 6-6***. Rather than applying a two-dimensional matrix for noise impact significance, the process for noise instead considers the type of receptor, draws on relevant standards or guidance to determine impact magnitude, and then considers other factors to determine significance.

Figure 6-6 Noise Impact Significance Assessment Process

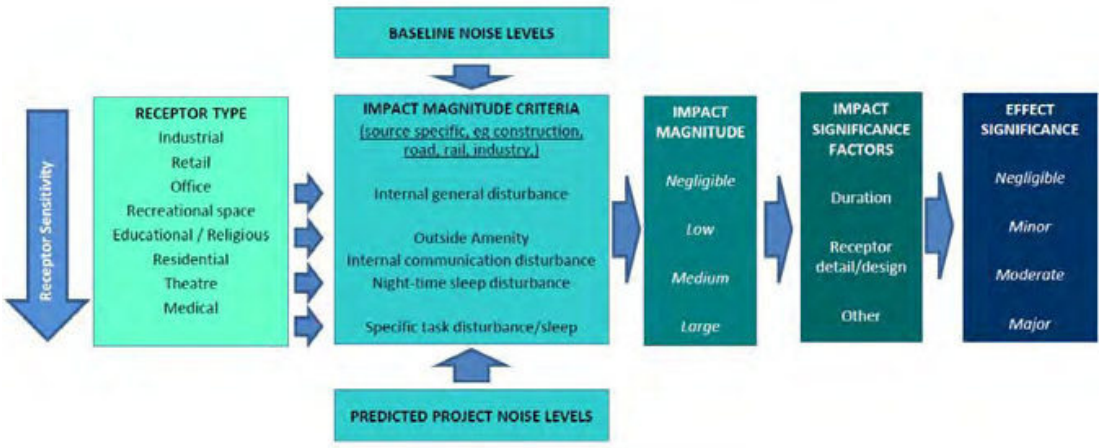


Table 6-13 outlines the magnitude criteria which include predicted noise level, receptor sensitivity, impact extent and duration. In determining impact magnitude, impact scale and frequency have been as well taken into account. Impact magnitude will then being used to determine impact significance rating as presented in ***Table 6-14***.

The standards considered for assessment of potential impacts to ambient noise level are covered in **Annex A**. The noise impacts associated with the construction activities have been assessed qualitatively, using professional judgement and based on past experience from similar projects.

Table 6-13 Criteria for Impact Magnitude for Assessment of Impact to Noise Level

Magnitude	Criteria
Negligible	• Predicted noise levels are at or less than 3 dB (A) above the relevant limits / thresholds (Refer to Annex A)* • Human exposure is transient within 500 m of project site • No designated sites and/or areas of specific ecological interest, not subject to statutory protection (for example, as defined by the project ecology team) within 500 m of project site • Impact extent is local • Temporary exposure
Small	• Predicted noise levels are 3 to less than 5 dB (A) above the relevant limits / thresholds (Refer to Annex A)* • Receptors include industrial, retail or transient receptors within 500 m of project site • Locally designated sites; and/or areas of specific ecological interest, not subject to statutory protection (for example, as defined by the project ecology team) within 500 m of project site. • Impact extent is local • Short-term exposure
Medium	• Predicted noise levels are between 5 and 10 dB (A) above the relevant limits / thresholds (Refer to Annex A)* • Receptors include residential and recreational space' within 500 m of project site • Nationally designated sites and/or areas of specific ecological interest within 500 m of project site • Impact extent is local to regional • Long-term exposure
Large	• Predicted noise levels are at or more than 10 dB (A) above the relevant limits / thresholds (Refer to Annex A)* • Receptors include educational/ religious/ medical facilities within 500 m of project site • Internationally designated sites and/or areas of specific ecological interest within 500 m of project site • Impact extent is local to international • Permanent exposure

Table 6-14 Noise Significance Terminology

Impact Magnitude Classification	Other Significant Factor	Impact Significance Rating
Negligible	• Duration of impact • Character of noise • Receptor detail/design • Meteorological condition	Negligible
Small		Minor
Medium		Moderate
Large		Major

Impact Evaluation and Significance

Nearest human receptors are located within 500 m for all three sites. For Pringgabaya, Selong, and Sengkol site, the nearest houses are located 200 m, 250 m, and 120 m for each site, respectively.

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

Project construction is unlikely to significantly increase noise above background conditions, however with the close distance to residential receptor (nearest distance to residential receptor is in the range of 120 – 250 m), noise impact sensitivity is considered to be **Medium**. Noise level increase during construction will generally occur from 7 am until 6 pm every day, so it is unlikely that the activity will cause noise disturbance during night time under routine conditions, then impact magnitude is considered as **Small**. The significance of impact is therefore assessed as being ***Minor*** (***Table 6-15***).

Table 6-15 Impact on Noise Level during Construction Phase

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

Mitigation Measures

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

- No night-time (6 pm – 7 am) transportation or construction activities under routine conditions;
- All the noise generating equipment such as emergency generator sets, batching plant etc. to be sited away from receptors such as settlements;
- 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.

Residual Impact Significance

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

6.3.5 *Impact from Vegetation Clearing*

Discussion of Impacts

Loss of vegetation is a direct impact of land clearing activity for the solar farm and facilities. Land clearing will occur within the area of 24 Ha for all three sites.

For assessment of impacts from land use, the sensitivity and magnitude criteria are outlined in ***Table 6-16*** and ***Table 6-17***.

Table 6-16 Sensitivity Assessment Criteria for Land Use

Sensitivity Criteria	Contributing Criteria
Low	The Project footprint is present in wasteland with no human settlement
Medium	The Project is present in agricultural land or combination of agricultural land and wasteland or residential land.
High	The Project is present in any forest land, or national park or of national Importance covered by international and/or national designation.

Table 6-17 Criteria for Impact Magnitude for Assessment of Impact to Land Use

Magnitude	Criteria
Negligible	An imperceptible, barely or rarely perceptible change in land use characteristics. The change may be short term.
Small	A subtle change in land use character over a wide area of a more noticeable change either over a restricted area or infrequently perceived. The change may be short term.
Medium	A noticeable change in landuse character, frequently perceived or continuous and over a wide area; or a clearly evident change over a restricted area that may be infrequently perceived. The change may be medium to long term and may not be reversible.
Large	A clearly evident, frequently perceived and continuous change in landuse characteristics affecting an extensive area. The change may be long term and would not be reversible.

In Pringgabaya and Selong, the vegetation is modified habitat consisting of predominantly dryland plantation with corn and cassava. In Sengkol the vegetation

is also modified and consists of mostly rice field and plantation with paddy, coconuts, and cassava dominant.

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 ***Negligible.***

Impact assessment for vegetation clearing is summarised in ***Table 6-18***.

Table 6-18 Impact from Vegetation Clearing

Impact	Impact from Vegetation Clearing			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Magnitude	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major

Mitigation Measures

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, no need to secure a tree cutting permit prior to site clearing if trees are cut or being removed since vegetation on the land site are non-economic valued plants;
- Restricting work to designated/cleared boundaries;
- Topsoil will be stored separately during clearing and will be used to fill and level the area once grubbing activities have been completed, thereby maintaining the seed bank;
- No disturbance to vegetation outside marked areas;
- Undertaking site revegetation to assist with soil stabilisation, where possible; and
- On completion of construction activities, land used for temporary facilities will be restored to the extent possible

Residual Impact Significance

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***.

6.3.6 *Impacts on Habitat and Wildlife*

Discussion of Impacts

Land clearing for solar farm and supporting facilities will remove the existing vegetation in the project boundary permanently. Existing vegetation has become a habitat for various species in the project area, include Banded linsang (*Prionodon linsang*) in Selong site and Monitor lizard in three sites. Habitat disturbance may also expose the species to venture to new areas and be exposed to poaching and hunting.

For assessment of habitat disturbance impact, the sensitivity and magnitude criteria are outlined in ***Table 6-19*** and ***Table 6-20***.

Table 6-19 Sensitivity Assessment Criteria for Habitat Disturbance Impact

Sensitivity Criteria	Contributing Criteria
Low	The presence of species with no specific value, species of LC on the IUCN Red List, or not meeting the criteria for medium or high
Medium	The presence of species DD, NT and VU on IUCN Red List, protected species under national regulation, Nationally restricted range species, nationally important numbers of migratory, and species not meeting criteria for high value.
High	Species on IUCN Red List as CR, or EN. Species having a globally restricted range (i.e. plants endemic to a site, or found globally at fewer than 10 sites, fauna having a distribution range (or globally breeding range for bird species) less than 50,000 km^2), internationally important numbers of migratory, or congregatory species, key evolutionary species, and species vital to the survival of a high value species

Table 6-20 Criteria for Impact Magnitude for Assessment of Impact to Habitat Disturbance

Magnitude	Criteria
Negligible	Effect is within the normal range of variation for habitat area
Small	Effect does not cause a substantial change in the population of the species in the habitat type
Medium	Effect causes a substantial change in species abundance and / or reduction in distribution of a population over one, or more generations, but does not threaten the long term viability / function of that population, or any population dependent on the habitat
Large	Affects entire species population on this habitat, or a significant part of it causing a substantial decline in abundance and / or change in and recovery of the population (or another dependent on it) is not possible either at all, or within several generations due to natural recruitment (reproduction, immigration from unaffected areas).

Impact Evaluation and Significance

The habitat that will be affected in the three project areas are dryland farming and paddy fields which are modified habitat. Habitat with this type of vegetation is common and widespread throughout the surrounding area, with the Project area representing a small proportion of the wider available habitat. Disturbed habitat will not cause a substantial change in species population. Species that presence in this area will able to move and adapt to surrounding area of project that have similar habitat. Therefore impact on Habitat disturbance is assessed as **Small**. Criteria for magnitude determination is explained in ***Table 6-20***.

The presence of Banded Linsang has been recorded in the fauna survey for the Pringgabaya site. This species is listed as Least Concern in IUCN Red List of Threatened Species.; however, it is protected by Indonesian Government Law (Peraturan Pemerintah) No. 7/1999 and listed under Appendix II of CITES. Monitor lizard (*Varanus* sp.) which is recorded in three project location is possible to be categorised as protected species under Indonesia Government Regulation if the species level of *Varanus sp* is to be identified. Based on receptor criteria in ***Table 6-19***. Overall sensitivity criteria for impact on loss of Habitat is assessed as **Medium.**

Considering the wildlife species which are categorised as **Medium** sensitivity criteria and impact magnitude as **Small**, the impact significance rating is assessed as **Minor**.

Impact assessment is summarised in ***Table 6-21***.

Table 6-21 Impact on Habitat Disturbance to Wildlife as a result of the Project

Impact	Habitat Disturbance to Wildlife			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Magnitude	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major

Mitigation Measures

In addition to the mitigation measures outlined for the clearance of vegetation that will also assist in managing habitat loss, the following will further manage the impact on habitat and species:

- Worker training on wildlife through induction, posters.
- Establishment and implementation of a clearance protocol to manage encounters with fauna;
- Apply no hunting and no poaching policy inside project area;
- Strict prohibition on use of fuel wood and shrubs from nearby areas as fuel;
- Non constructed area will be rehabilitated and revegetated as soon as land clearing and land preparation has been completed; and
- Local species should be prioritised in rehabilitation and re-vegetation program.

Residual Impact Significance

The impact of habitat disturbance will be limited in the project area and the residual impact is judged to be ***Negligible.***

6.3.7 Soil Erosion and Surface Water Quality Impacts

Discussion of Impacts

During the construction phase, top soil will be susceptible to erosion to some extent due to site clearance activities. The scale of site clearance activities would be 8.77 ha at the three development sites, whereas in areas of new internal road construction, excavated loose soil would be susceptible to erosion.

The removal of stabilised top soil has the potential to result in slope destabilisation and increased soil erosion. Soil erosion has the potential to result in increased sedimentation in surface water runoff, and potential impact to surface water quality.

Impact Evaluation and Significance

The land use change will be primarily for PV Field, Main station, inverter station, and internal roads. The diversion of land for the solar facility will lead to a permanent change in land use. This change has the potential to affect run off when raining. The run off may carry soil to surface waters and increase the turbidity, Total Dissolved Solids (TDS), Total Suspended Solids (TSS) in the water body and downstream.

There are surface water bodies in the project area which could be directly impacted by soil erosion and increased sedimentation. The majority of rivers and ponds are seasonally water fed and not utilised by residents for daily needs. Groundwater levels are very deep due to low water recharge rates.

Based on climate data the highest rain fall will be in January and December (two months in a year). On consideration of the low rainfall levels in the area, the impact magnitude is considered to be **Small**. Sensitivity is deemed to be **Low** and impact significance is therefore considered to be ***Negligible* (*Table* 6-22)**.

Table 6-22 Soil Erosion and Surface Water Quality Impacts during Construction

Impact	Soil erosion and surface water quality impacts			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Magnitude	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major

Mitigation Measures

The impact significance is predicted to be negligible, however 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;
- Vegetation cover will be maintained for as long as possible in order to prevent the erosion (water) of soil.
- 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
- Topography shall be restored to the extent possible and re-vegetated to prevent soil erosion to the extent possible.

Residual Impact Significance

The significance of residual impacts will be **Negligible**.

6.3.8 *Impacts from Project Water Demand*

Discussion of Impacts

Water will be required for civil work during the construction of the foundation and building structure of all facilities, as well as for worker needs water for their daily use. The Project's water use has the potential to result in decreased water availability for other users, particularly in the Project area where there are known water resource challenges.

For the assessment of water quality, the sensitivity and magnitude criteria outlined in ***Table 6-23*** and ***Table 6-24*** respectively have been used. Currently there is no data available related with water quality data taken from existing water sources (dug well, spring sources, shallow hand pump, creeks, etc.) within the project site/community.

Table 6-23 Sensitivity Assessment Criteria for Water Resources (Surface Water and Groundwater)

Sensitivity Criteria	Contributing Criteria	
	Environment	Social
Water Resources - Surface water and ground water (quality/	The extent to which the water resource plays an ecosystem or amenity role in terms of supporting biodiversity either directly or	The extent to which the water resource provides or could provide a use (drinking water, agricultural uses, washing and other domestic or industrial, use as waterways) to the local communities and businesses, or is

Sensitivity Criteria	Contributing Criteria	
	Environment	Social
quantity related criteria)	indirectly, particularly with respect to dependent ecosystems.	important in terms of national resource protection objectives, targets and legislation.
Low	The water resource does not support diverse aquatic habitat or populations, or supports aquatic habitat or population that is of low quality.	The water resource has little or no role in terms of provisioning services as agricultural water source, other domestic uses as washing, bathing, industrial use and waterways for the local community. The groundwater resource is not currently abstracted and used in the vicinity of the Project, but is of sufficient quality and yield to be used for that purpose in the future (and there is a reasonable potential for future use).
Medium	The water resource supports diverse populations of flora and / or fauna but available in the surface water bodies in the region.	The surface water resources have local importance in terms of provisioning services but there is ample capacity and / or adequate opportunity for alternative sources of comparable quality. The groundwater resource is an important water supply, and is currently used, but there is capacity and / or adequate opportunity for alternative sources of comparable quality.
High	The water resource supports economically important or biologically unique aquatic species or provides essential habitat for such species	The surface water resources are wholly relied upon locally, with no suitable technically or economically feasible alternatives, or are important at a regional or transboundary watershed level for provisioning services. The groundwater resource is wholly relied upon locally, with no suitable technically or economically feasible alternatives, or is important at a regional or national level for water supply or contribution to groundwater dependent ecosystems (e.g. transboundary rivers).

Table 6-24 Criteria for Impact Magnitude for Assessment of Impact to Water Resources (Surface Water and Groundwater)

Magnitude / Impact	Negligible	Small	Medium	Large
General	No perceptible or readily measurable change from	Perceptible change from baseline conditions but likely to be within applicable norms	Clearly evident (e.g. perceptible and readily measurable) change from baseline	Major changes in comparison to baseline conditions and / or likely to regularly or continually exceed

Magnitude / Impact	Negligible	Small	Medium	Large
	baseline conditions.	and standards for mode of use.	conditions and / or likely to approach and even occasionally exceed applicable norms and standards for mode of use.	applicable norms and standards for mode of use.
Water Availability	*Surface Water*			
	There is likely to be negligible (less than 1% of lean season flow) or no consumption of surface water by the Project at any time	The Project will consume surface water, but the amounts abstracted are likely to be relatively small in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation)	The Project will consume surface water, and the amounts abstracted are likely to be significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation)	The Project will consume surface water, and the amounts abstracted are likely to be very significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation)
	Groundwater			
	There is likely to be negligible or no abstraction, use of or discharge to the groundwater by the Project at any time.	The Project will consume groundwater or deliver discharge to groundwater, but the amounts abstracted /discharged are likely to be relatively small in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation).	The Project will consume groundwater or discharge to groundwater, and the amounts abstracted / discharged are likely to be significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation).	The Project will consume groundwater or discharge to groundwater, and the amounts abstracted /discharged are likely to be very significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation).
Water Quality	*Surface Water*			
	Discharges are expected to be well within statutory limits	Discharges are expected to be within statutory limits	Occasional breach(es) of statutory discharge limits (limited periods) expected	Repeated breaches of statutory discharge limits (over extended periods) expected
	Groundwater			
	Abstractions from or discharge to aquifer(s) are	Groundwater quality be within ambient levels or allowable criteria	Groundwater quality exceeds ambient levels or allowable criteria	Groundwater quality exceeds

Magnitude / Impact	Negligible	Small	Medium	Large
	unlikely to cause water quality issues.	or may exceed for 1-2 parameters which is common occurrence due to geological regime of the area. Abstraction or discharge to aquifer(s) may cause small but local changes in water quality in the aquifer system. These can be considered potential short-term localized effects on groundwater quality which is likely to return to equilibrium conditions within a short (months) timeframe.	for key parameters. Abstraction or discharge to aquifer(s) are expected to cause potential localized effects on groundwater quality which are likely to be fairly long lasting and / or give rise to indirect ecological and / or socioeconomic impacts.	ambient levels or allowable criteria. Abstractions or discharge to aquifer(s) are expected to cause potentially severe effects on groundwater quality which are likely to be long-lasting (e.g. years or permanent) and / or give rise to indirect ecological and / or socio-economic impacts.

Impact Evaluation and Significance

The estimated total numbers of workers for peak construction activity will be 221 persons. According to ***Table 3-17***, the total water needed by construction workers will be ±13.05 m^3/day. Conservatively assuming the maximum number of workers for the maximum construction period (12 months), this equal to a total of ±4,763.25 m^3. For construction work and the dump truck wash, each solar farm including all facilities, is estimated to require ±1.75 m^3/day, equals to ±638.75 m^3 of water over a 12 month construction period. The total water demand is ±5,402 m^3 for each site (±16,206 m^3 total).

For operations 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 twice a year.

Estimated water required for one time cleaning solar PV panels is approximately 250 m^3 for each site. Therefore estimated water required for solar PV per year of each site is 500 m^3. There is also a small operational workforce, however these do not reside onsite.

In December 2017, Equis Energy appointed PT Rekayasa Bumi Karya to conduct the geoelectric test in order to determine the aquifer layers where a substantial amount of water can be found, as well as to find the characteristics of aquifer layers to figure out the depth and positions of aquifer layers. In Sengkol, a total of four (4)

investigation points has been determined using Schlumberger method, and the data is analysed used IP2WIN and Progress software. Based on the survey, it is concluded that the depth of ground water (aquifer) level varies ranging from 14.81 – 115.19 m. Based on the resistivity value, the potential aquifer was encountered at the depth of 90 m. It is recommended that the project to drill the well within this depth at one of the assessed point.

Furthermore, in Pringgabaya using the same method at four (4) locations, the consultant concluded that potential aquifer was found at the depth of 120 m below the surface. Meanwhile, in Selong the consultant has also taken four (4) investigation points, which concluded that substantial aquifer can be encountered at the depth of 90 meter. The detailed information of the report can be found in the **Annex D**.

Figure 6-7 Consultant conducting resistivity test at site

In Pringgabaya, communities' only reliable supply of water is from wells. Surface water sources are only fed during the rainy season in this location. In Selong and Sengkol, the communities have supplied water from local water company (PDAM) besides well. The main source of water for all the project sites will be from the deep well (depth 100 m) and for the Selong and Sengkol sites the local water company (PDAM) is considered to be used as support during the construction phase. Community wells are at depths of approximately 100 m, therefore there is the potential for the Project to impact community wells at this location during construction. However, it is confirmed that there is no community wells within the radius of 500 m from the site, with exception at Pringgabaya which the community well (used for farming irrigation during dry season) is observed at the distance of 250 m from the site.

The use of ground water by the project will follow the government regulation and should be equipped with water use study which considers the other uses of water resources and includes the water balance study, as required in the permitting process. Therefore, the project will not have potential significant impact to the communities well.

The sensitivity of the water resource in the area is therefore considered as **Low** at this location due to the fact that there is no community wells within 500 metres proximity of the site and communities has an opportunity for alternative sources of water. The potential impact on water resource due to maximum 12 month construction activities and maximum usage of water for operation phase is 500 m^3 are ranked as **Small**, resulting in an impact significance of ***Minor*** (***Table 6-25*****).**

Table 6-25 Impact on Water Availability during Construction Phase

Impact	Reduction of water availability from Project demand			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Magnitude	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major

Mitigation Measures

The impact Minor is due to the project has conducted the georesistivity test which concluded that the amount of substantial water is available at the sites. Whilst this study can also be a basis for the water use permit requirements.

Residual Impact Significance

The residual impact is **Negligible**. The project proponent/EPC will follow the requirement in the water usage permit.

6.3.9 Physical Presence of Transmission Lines

Discussion of Impacts

Mortality of birds and bats due to electrocution is a direct impact from the operational of the transmission line. However, it is understood that the transmission line cable will be fully insulated. Thus, avoiding risk of bird electrocutions.

Mortality of birds and bats due to electrocution may occur in large numbers if the transmission lines are located within daily flyways or migration corridors, or if groups are travelling at night or during low light conditions. It is confirmed through the bird migration map that none of the sites located on the critical bird migratory path. Is also understood that the transmission line will be positioned at the residential area (disturbed area) with less diverse bird species (and most likely only local domestic bird that habituated in this area) comparing to transmission line that situated in the forestry/pristine area.

Sensitivity and magnitude criteria used in the assessment are provided in ***Table 6-26*** and

Table 6-27.

Table 6-26 Sensitivity Assessment Criteria for Mortality of Birds and Bats Due To Electrocution

Sensitivity Criteria	Contributing Criteria
Low	The presence of species with no specific value, species of LC on the IUCN Red List, or not meeting the criteria for medium or high
Medium	The presence of species DD, NT and VU on IUCN Red List, protected species under national regulation, Nationally restricted range species, nationally important numbers of migratory, and species not meeting criteria for high value.
High	Species on IUCN Red List as CR, or EN. Species having a globally restricted range (i.e. plants endemic to a site, or found globally at fewer than 10 sites, fauna having a distribution range (or globally breeding range for bird species) less than 50,000 km^2), internationally important numbers of migratory, or congregatory species, key evolutionary species, and species vital to the survival of a high value species

Table 6-27 Criteria for Impact Magnitude for Mortality of Birds and Bats Due To Electrocution

Magnitude	Criteria
Negligible	Effect is within the normal range of variation for habitat area
Small	Effect does not cause a substantial change in the population of the species in the habitat type
Medium	Effect causes a substantial change in species abundance and / or reduction in distribution of a population over one, or more generations, but does not threaten the long term viability / function of that population, or any population dependent on the habitat
Large	Affects entire species population on this habitat, or a significant part of it causing a substantial decline in abundance and / or change in and recovery of the population (or another dependent on it) is not possible either at all, or within several generations due to natural recruitment (reproduction, immigration from unaffected areas).

Impact Evaluation and Significance

The impact assessment for birds and bats mortality has been defined to birds and bats within a 2 km radius from project boundary. This limitation is due to the location of project area which is in the agriculture and surrounded by agriculture area and settlement area; no migratory species was identified, and no species with large home range was identified.

Referring to bats and birds species described in the baseline, protected species or critically endangered and endangered species based on IUCN Red List have not been identified. There are bird species included in the IUCN Red List as Least Concern such as White-headed munia, Eurasian Tree Sparrow, Spotted turtle-dove, Red

avadavat, Mountain white-eye and Island collared-dove. For bats species, the existing baseline has not identified to the species level, instead only identifying to the genus level. With this fact, it is possible that bat species of conservation significant may be identified in the future.

Based on current data and receptor criteria in ***Table 6-26***, overall the sensitivity criteria for impact on mortality of birds and bats is assessed as **Low.**

Some of birds and bats species are known as beneficial species for agriculture activities such as birds and bats as pollinator and become natural pest predators. Disturbance to this species might disturb other species especially predator species which can be agriculture pest due to its population increase. However, as the transmission line size is rather be small (20 Kv), it is not expected that predatory bird will use the cable line to perch while observing their prey. The transmission line will also be positioned close to residential area, which is not likely that this predatory bird looking for prey. It should also be noted that this transmission line will be handed over to PLN once it built. The environmental obligation will also falls to PT PLN instead to the project company. The project will only be responsible for this obligation during the construction phase.

Based on magnitude criteria in

Table 6-27**.** Overall magnitude criteria for impact on mortality of birds and bats is assessed as **Small** as the effect does not cause a substantial change in the population of the species in the habitat type.

Impact Significance

Considering the wildlife species which are categorised as of a Low sensitivity criteria and impact magnitude as small, the impact significance rating is assessed as **Minor**.

Impact assessment is summarised in ***Table 6-28***.

Table 6-28 Impact on Mortality of Birds and Bats due to Transmission Line

Impact	Impact on Birds and Bats due to Transmission Line			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Magnitude	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major

Mitigation Measures

Following appropriate mitigation measures are required to reduce the risk:

- Aligning transmission corridors to avoid critical habitats.

Residual Impact Significance

After implementation of mitigation measures, the significance of the residual impacts will be reduced to ***Negligible***.

6.3.10 Spills and Soil/Water Contamination

Discussion of Impacts

Diesel storage will be provided at batching plant onsite during construction phase. Other materials such as oil, paints and solvents will be stored in drums in storage area having impervious floors. The Sensitivity and magnitude of the impact is discussed on ***Table 6-29*** and ***Table 6-30***.

Table 6-29 Sensitivity Assessment Criteria for Spill and Soil/Water Contamination

Sensitivity Criteria	Contributing Criteria
Low	Nearest water source available on site has poor quality, not suitable for human, recreational or animal use; and Site is an industrial setting and nearest residences or sensitive land uses >250 from site boundary.
Medium	Aquifer is used for industrial process water supply, irrigation purposes, or source of supply for livestock, and as a potential resource or acts as a base flow for local surface water; Water acts as source of water supply for non-potable supply, suitable for secondary contact recreation (activities where contact with the water is minimal and where ingestion of the water is not probable i.e. boating, sport fishing); Water with moderate water quality classification; and Site is located in an industrial/commercial setting with nearest residences or other sensitive uses 100 m to 250 m from site boundary.
High	Aquifer is used as a potable water supply, as a potential future resource of potable water, or in continuity with nearby surface water; High quality water classification that supports strong or protected environmental bio-diversity, source of water supply for potable or domestic supply or food production, used for primary contact recreation (human body might come in direct contact with raw water e.g. swimming), or presence of fish and/or used for commercial or recreational fishing; and Residences and/or schools are located <100m from the site, site embedded within residential or mixed residential/commercial setting, or site is within 100m of sensitive area/receptor (wetland, national park, protected habitat or equivalent).

Table 6-30 Criteria for Impact Magnitude for Assessment of Spill and Soil/Water Contamination

Magnitude	Criteria
Negligible	An imperceptible, barely or rarely perceptible change in soil and water characteristics. The change may be short term.

Magnitude	Criteria
Small	A subtle change in soil and water characters over a wide area of a more noticeable change either over a restricted area or infrequently perceived. The change may be short term.
Medium	A noticeable change in soil and water characters, frequently perceived or continuous and over a wide area; or a clearly evident change over a restricted area that may be infrequently perceived. The change may be medium to long term and may not be reversible.
Large	A clearly evident, frequently perceived and continuous change in soil and water characteristics affecting an extensive area. The change may be long term and would not be reversible.

Impact Significance

Soil contamination during the construction phase may result from leaks and spills of oil, lubricants, or fuel from heavy equipment, improper handling of chemical/fuel storage and wastewater. These are required in small quantities during the construction phase; such spills could have an impact on soil and water quality, but are expected to be localised in nature. Considering that the water affected has moderate water quality classification and site is located in an industrial/commercial setting with nearest residences or other sensitive uses 100 m to 250 m from site boundary, the impact sensitivity is considered as **Medium**. Considering that spills may occur in a restricted area during the construction phase, the site will apply proper storage and handling for chemicals and fuel, and duration of impact is only short term, then the impact magnitude is considered as **Small**. Based on the above the impact after incorporating the embedded control the impact significance is considered to be ***Minor*** (***Table 6-31***).

Table 6-31 Soil Contamination due to Leaks/Spill during Construction Phase

Impact	Spills leading to soil/water contamination			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Magnitude	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major

Mitigation Measures

- Spill control measures such as the storage and handling of chemicals and fuel in concrete areas with secondary containment will be implemented to minimise impacts in the event of a spill;
- Use of spill control kits to contain and clean small spills and leaks;

- Transport vehicles and equipment should undergo regular maintenance to avoid any oil leakages; and
- Unloading, loading and refuelling protocols are required for the transfer of diesel, oil and used oil respectively and workers trained to prevent/contain spills and leaks.

Residual Impact Significance

The significance of impact will be reduced to **Negligible** on effective implementation of the mitigation measures.

6.3.11 Impacts on Occupational Health and Safety of Workers

Discussion of Impacts

Occupational Health and Safety (OHS) of workers is important during construction and operation phases where involve local and migrant workers. The activities include in the construction phase that have potentially impact to OHS of workers are land clearance for establishment of labour camp, batching plant, access road, mobilisation of equipment, solar PV installation, and other activities during construction phase. In addition, operation of solar PV and its maintenance also have risks and impacts to OHS of workers in their daily activities. Therefore, a primary area of concern is the potential adverse impact on workers, since they are the first people who are exposed to the potential hazards of construction and operation activities.

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.

There are five criterion actions may be considered that demonstrate responsible environment from occupational health and safety perspective:

- Identify, track, and anticipate potentially hazardous materials in the workplace;
- Assess workers' exposures to solar PV materials and its hazardous materials;
- Assess and communicate hazards and risks to workers; and
- Manage occupational safety and health risks.

Sensitivity and magnitude criteria for this impact are explained in ***Table 6-32*** and ***Table 6-35.***

Table 6-32 Sensitivity Assessment Criteria for Occupational Health and Safety of Workers

Sensitivity Criteria	Contributing Criteria
Low	The Project has implemented good practice of occupational health and safety policy and procedure
Medium	Communicate any potential hazards and risks to workers
High	Workers' exposure to solar PV materials and its hazardous materials in the workplace as well as physical environment that can cause health impact to workers such as physical injuries from accidents involving moving machinery, etc.

Table 6-33 Criteria for Impact Magnitude for Assessment of Impact to Occupational Health and Safety of Workers

Magnitude	Criteria
Negligible	Exposure to health hazard resulting in temporary discomfort.
Small	Exposure to physical and health hazards resulting in symptoms requiring medical intervention and full recovery (no lost time).
Medium	Exposure to physical and health hazards resulting in reversible impact on health and physical injuries (with lost time) or permanent change with no disability or loss of quality of life.
Large	Exposure to physical and health hazards resulting in irreversible impact on health and physical injuries with loss of quality of life and or single fatality or multiple fatalities.

Impact Evaluation and Significance

Considering the size of the workforce, numbers are highest during the construction phase. During the construction phase, the magnitude of impact on Occupation Health and Safety is considered to be **Medium**. Sensitivity is assessed as being **High**, considering there are many activities during construction phase. During the

operation phase limited activities will occur. The Project has planned a good practice of occupational health and safety policy and procedure, therefore the sensitivity during operation phase is **Low**. Impacts are expected to be temporary or permanent as they depend on case-by-case events, while the nature of proposed activities are likely to significantly reduce number of accidents and incidents. The significance of impact is therefore assessed as being ***Moderate*** during construction phase and significance of impact during operation phase is assessed as ***Minor*** **(*Table 6-36*)**.

Table 6-34 Impact on Occupational Health and Safety for Workers as a result of Construction

Impact	Occupational Health and Safety Impact on Workers			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Magnitude	Negligible	Small	Medium	Large
Receptor Sensitivity (Construction phase)	Low	Medium	High	
Receptor Sensitivity (Operation phase)	Low	Medium	High	
Impact Significance (Construction phase)	Negligible	Minor	Moderate	Major
Impact Significance (Operation phase)	Negligible	Minor	Moderate	Major

Mitigation 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:

- Develop and implement a health and safety plan to be followed throughout all phases of a project;
- Provide occupational health and safety orientation training to all employees consisting of basic hazard awareness, site-specific hazards, safe working practices, and emergency procedures;
- 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 during construction phase is considered as ***Minor*** and residual impact in operation phase is considered as ***Negligible***.

6.3.12 Impact to Community Safety

Discussion of Impacts

Community Health, Safety and Security impacts arising from the construction and operations are as follows:

- Increased risk of traffic hazards and incidents associated with the use of the public road for freight and local roads for workers;
- Increased incidence of communicable disease from an influx of non-local workers; and
- Personal safety and well-being impacts associated with worker influx.

The following sets out the impacts and risks resulting from project activities during construction and operation phases.

Construction Phase: Throughout this phase there will be many potential health and safety risks to the communities in the area. This includes risks associated with increased traffic and the influx of workers. The specific interactions of workers on local communities are discussed further.

It is also recognised that there will be some level of population influx to the area from a variety of sources (employment and business opportunity seekers and potentially worker families). The interactions between the various stakeholders will determine the level of impact.

Operations Phase: Permanent staff employed for normal operations will reside in the project areas. Similar issues for permanent workers and their impact on local communities exists although on a much smaller scale.

Table 6-35 and ***Table 6-36*** describe the criteria for determining sensitivity and magnitude for the Impact on Community Health, Safety and Security.

Table 6-35 Sensitivity Assessment Criteria for the Impact on Community Health, Safety and Security

Sensitivity Criteria	Contributing Criteria
Low	Communities with sufficient coping strategy who feel little or no challenge to their wellbeing as a result of project activities. They may share resources with the project occasionally and broadly understand the hazards associated with project components.

Sensitivity Criteria	Contributing Criteria
Medium	Communities with some coping strategy and some vulnerabilities, who are classed as less sensitive than the high sensitivity group. They are likely to experience temporary inconvenience as a result of changes in environmental or social determinants of health. They may share resources occasionally with the project. The communities express some concerns and anxieties of the impact of the project on their wellbeing. They have some, but far from complete, understanding of the technical hazards associated with project components.
High	Community groups who are very vulnerable because they have high sensitivity to the impacts of the project and very limited coping strategies. The technical hazards of a project component may be unfamiliar and poorly understood by a community; and this could increase sensitivity.

Table 6-36 Criteria for Impact Magnitude for Assessment of Impact on Community Health, Safety and Security

Magnitude	Criteria
Negligible	Project does not impact on environmental, health and safety issues to the surrounding community as the project implements good international industry practices and environmental, health, safety guidelines, following national law/regulations on Environmental, Health and Safety as well as other Recognised internationally sources.
Small	Project will impact on community health, safety and security within the project footprints in three villages: Pringgabaya Utara, Geres and Sengkol.
Medium	Project will impact on community health, safety and security at regional level (regency).
Large	Project impacts on community health, safety and security at national level (Province level).

Impact Evaluation and Significance

The Project's impact on Community Health, Safety and Security is limited to the areas where the project footprint is located adjacent to the three villages: Pringgabaya Utara Village, Geres Village and Sengkol Village.

With regards to periodic alteration of the impact on community health, safety and security (***Table 6-37***), the project is required to manage the issues during construction and operation phases.

Table 6-37 Periodic Alteration of the Impact on Community Health, Safety and Security

Activity	Duration
Construction activities	Short term (12 months)
Operation activities	20 years/ permanent
Maintenance of solar PV and its equipment.	20 years/ permanent

Embedded/In-Built Control

The project will evaluate the risks and impacts to the health and safety of the Affected Communities during the project life-cycle and will establish preventive and control measures consistent with good international industry practice (GIIP), Environmental, Health and Safety Guidelines (EHS Guidelines) or other internationally recognised sources. The project will identify risks and impacts and propose mitigation measures that are commensurate with their nature and magnitude. These measures will favour the avoidance of risks and impacts over minimisation.

The magnitude of impact on Community Health, Safety and Security is considered to be **Small**. Sensitivity is assessed as being **Medium**, considering the influx of workers during construction residing in the local population. The significance of impact is therefore assessed as being ***Minor*** (***Table 6-38*****).**

Table 6-38 Impact on Community Health and Safety

Impact	Impact on Community Health, Safety and Security			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Magnitude	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major

Mitigation 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:

Vehicle/Equipment/Personnel Movements:

- 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;
- 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; and
- Develop traffic management plan or traffic study (ANDAL LALIN) associated with the project activities.

Influx on 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, the implementation of this procedure will be included in company regulation (both Project companies and contractor). Written warning will be issued to the relevant personnel upon inappropriate behavior, if it is not improved, dismissal will follow. This will be applicable to all workers onsite;
- 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 will remain ***Minor***.

7 ANALYSIS OF ALTERNATIVES

7.1 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 Lombok 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 Lombok where it supplies 84% of all production in 2014. 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.

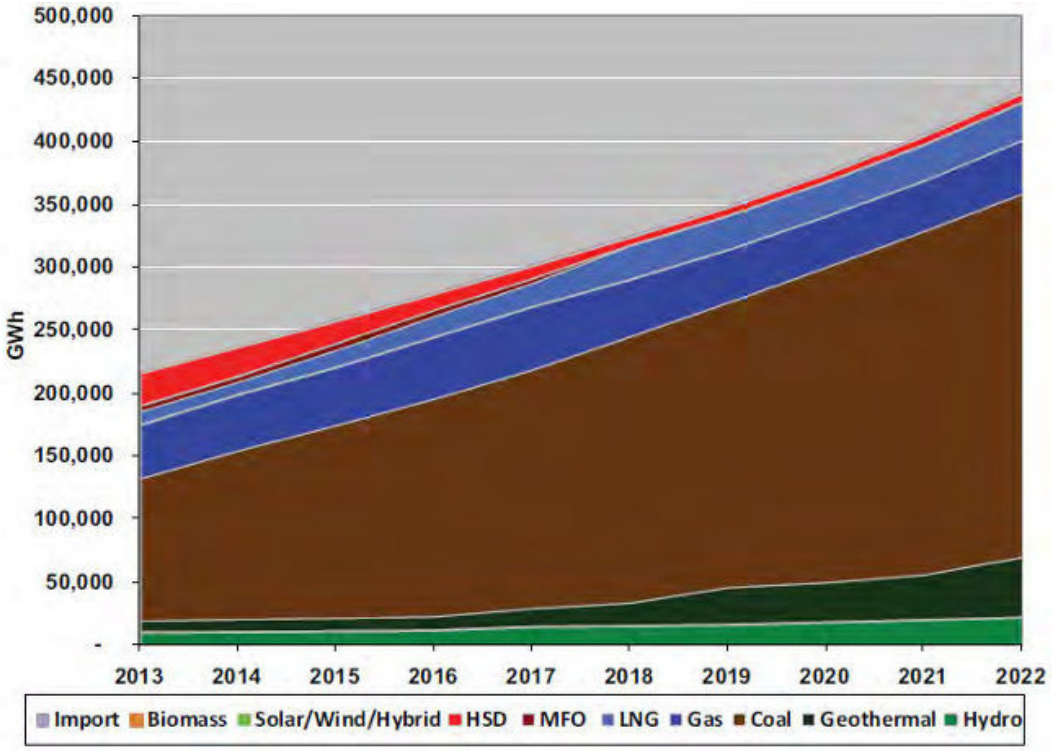
Indonesia's reliance on fossil fuels is a contributor to the country being the world's third largest emitter of GHGs. In recognition of the challenges associated with air pollution and climate change, Indonesia has committed to a significant reduction of GHG emissions. As part of this commitment the 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 7-1*** 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.

Indonesia has a total of 760GW of renewable energy resources including 63GW of solar, with 90% of the overall capacity still remains untapped as described in ***Table 7-1***.

A review of the Indonesian Electricity Market from previous study provided by Equis Energy 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 7-2***.

Figure 7-1 Projected Electricity Production by Fuel Type for Indonesia



Source: PT PLN (Persero), 2011-2020

Table 7-1 Renewable Energy Potential

Renewable Energy	Potential Resources	Installed Capacity	Ratio of IC/Resources (%)
Hydro	75,000 MW	7,572 MW	10.1 %
Geothermal	28,910 MW	1,404 MW	4.9 %
Biomass	32,654 MW	1,718 MW	5.4 %
Wind	63,000 MW	1.87 MW	0.0 %
Solar	560,000 MW	48.1 MW (Off-Grid)	
Total	760,000 MW	10,743 MW	

Source: RUPTL PT PLN 2015-2024 and MEMR

Figure 7-2 Projected Electricity Consumption

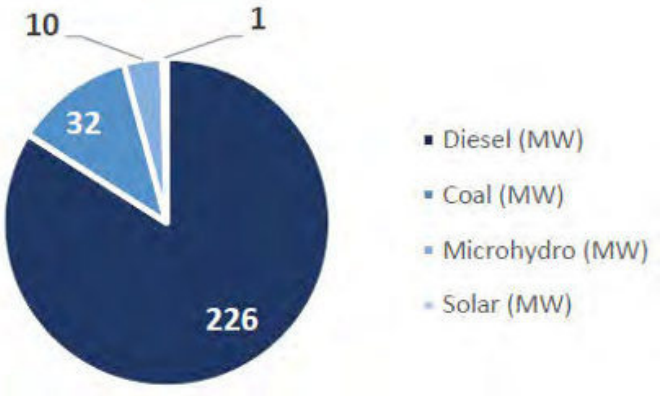
The predicted growth is supported by the following statistics:

- 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.

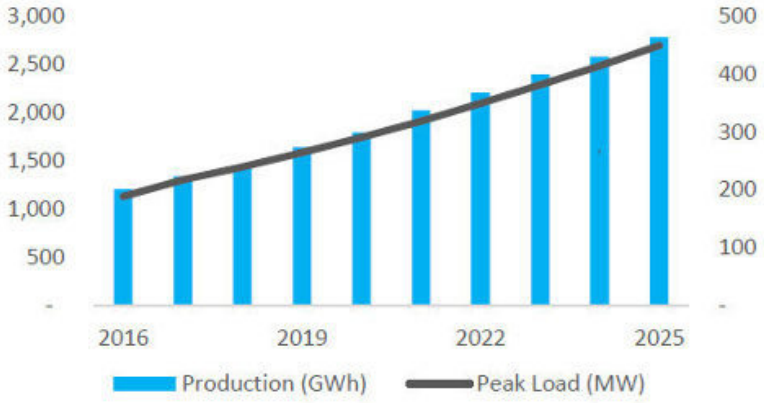
In regards to Lombok's future electricity market as explained in ***Chapter 1***, the current peak load demand in Lombok is 187.76MW; while the installed capacity is 269.56MW in which diesel contribute 226 MW (***Figure 7-3***). The peak demand and electricity sales are projected to grow at 10.2% and 9.7% CAGR, respectively, between 2016 and 2025 (***Figure 7-4***). The expected demand is mainly driven by the healthy economic growth driven by tourism sector. PLN intends to install 685MW of additional capacity in order to increase the reserve margin's range to be within 32% and 66% by 2024.

Figure 7-3 Lombok Electricity Generation



Source: RUPTL

Figure 7-4 Lombok Electricity Demand Projection



Source: Feasibility Study, 2016

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 ITA, ITB, and ITC 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.

7.2 *ALTERNATIVE SITE LOCATIONS*

Site evaluation visit was done by representative from Equis Energy and Soleq (company associated with Equis Fund Group) in October 2015 to Pringgabaya, Lombok Timur Regency. The initial plan was to build solar power plant with the capacity of 50 MWp, located in 60 Ha land. One site was available and was considered suitable for the project.

It is then decided that the capacity of solar power plant reduced to 21 MWp (15 MWac) divided into three different sites. Hence, Equis Energy conducted another site evaluation in January 2017 for other potential solar farm locations in Labuhan Haji District, Lombok Timur Regency and Sengkol Village, Lombok Tengah Regency. There was limited available site in Labuhan Haji District, and one site considered suitable for the project. In Sengkol Village, four site alternatives were considered.

Lombok was investigated due to the favourable long term average of annual sunlight, as well as known electricity demand. The evaluation for each site 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.

7.3 *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.

Selected solar PV modules need to demonstrate the following essential characteristics:

- An operating track-record, ideally at utility scale, showing low defect rates and energy output levels in-line with supplier claims;
- Certification by a qualified and credible independent testing agency to meet applicable international standards;
- Standard minimum warranties on defects and performance; and
- Manufacturing in an ISO 9001 certified facility, with good practice factory testing on a sample basis.

Generally solar panels can be classified as follows:

- Crystalline PV (mono-crystalline and poly-crystalline); and
- Thin-film PV (amorphous silicon (a-Si), copper indium gallium (di) selenide (CIGS) and cadmium telluride (CdTe)).

Crystalline silicon solar technology was the first type of PV technology to be widely commercialized. Based on the crystal type and size, crystalline cells are categorised as monocrystalline and poly-crystalline.

Thin-film technology comprises of a thin semiconductor layer deposited on a low cost flexible substrate. The lower consumption of silicon reduces the manufacturing costs of the module considerably but leads to lower panel efficiency than the crystalline silicon technology.

Lombok Solar Farm may use poly-crystalline JA Solar 310Wp modules. The technology of the module type chosen for this project has been successfully deployed on large scale solar PV plants.

7.4 *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 Lombok's generation mix.

Comparisons between power generation methods are described in ***Table 7-2***.

Table 7-2 Comparison of Power Generation Methods

System	Advantage	Disadvantage
Thermal Power	• Large-scale production potential • Moderate gestation period Wider distribution potential	• 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	• 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	• 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	• Pollution levels are low • Inexpensive power generation • Inexhaustible solar resource • GHG emissions as low as 8.2gCeq/kWh for the production chain	• Large land requirement • Site-specific, dependent on solar insolation • Expensive installation
Wind power	• Pollution levels are low • Inexpensive power generation • Inexhaustible wind resource	• Large land requirement • Site-specific, dependent on wind pattern • Expensive installation

System	Advantage	Disadvantage
	• GHG emissions as low as 2.5gCeq/kWh for the production chain	
Nuclear power	• 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	• 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

8 STAKEHOLDER ENGAGEMENT PLAN

Sengkol, Selong and Pringgabaya Solar Farm Projects have committed to an ongoing consultation and engagement process. The process focuses on a broad range of activities, including information sharing and consultation.

This stakeholder engagement section sets out the approach with which the Project proponent will adopt in order to implement an effective engagement program with stakeholders over the life of the Project.

8.1 PROJECT HISTORICAL STAKEHOLDER ENGAGEMENT ACTIVITIES UNDERTAKEN TO DATE

The historical consultation outlines the main phases undertaken to date in the public consultation process prior to construction. The main focus of the historical consultation was during the environmental approval process for each site (UKL-UPL (commencing in late 2016), the land acquisition phase of each solar farm site location and access road and this ESHIA.

Table 8-1 summarises the stakeholder consultation activities conducted during the UKL-UPL phase.

Table 8-1 Stakeholder Consultation during Regulatory Environmental Approval Process (UKL-UPL)

Date	Location	Event	Parties Involved	Issue / Topic Discussed
23 February 2016	Pringgabaya Utara Village	Community Consultation	• Project Community Liaison Officer • Head of Village of Pringgabaya Utara	• Project information disclosure and site planning; and • Social and Economic condition of the Pringgabayu village;
24 February 2016	Pringgabaya Utara Village	Community Consultation	• Project Community Liaison Officer • Secretary of Village of Pringgabaya Utara	• Village Organisation Structure • Village Profile
1 March 2016	Not stated	Government Consultation	• Project Community Liaison Officer • Public Work Services • Development Planning Agency	• Obtaining principle permit for Project construction and operation.

Date	Location	Event	Parties Involved	Issue / Topic Discussed
			• Land Agency • Office of Mineral Resource • District Security Force Agency (Pol PP)	
4 March 2016	Pringgabaya Utara Village	Face to Face meeting	LSM GAGAS (Local NGO)	Local employment and education for young generation.
14 – 18 March 2016	Not stated	Government Consultation Meeting	• Director of Redaya Energi • Governor of Nusa Tenggara Barat (NTB) Province • Head of BKPMD; • PLN (National Electric Company) • Representative of Indonesian Parliament (DPR-RI)	Project information disclosure and site planning and development.
23 March 2016	Pringgabaya Utara Village	Socialization	Community of Pringgabaya Utara Village.	Project information disclosure and site planning and development
4 June 2016	North Pringgabaya Village Office	Public Consultation	• Head of Village of North Pringgabaya • Village Consultative Body of North Pringgabaya Village • PT Infrastruktur Terbarukan Adhiguna (ITA) • BPPT – Agriculture	• Environmental and social impact of the Project; • Electricity produce by the Project provided to the community; • Greenhouse gas and radiation effect of the Project • Loss of livelihood for landowners (economical displacement) • Benefits of Project to the environment and

Date	Location	Event	Parties Involved	Issue / Topic Discussed
			Counselling Body • Head of Sub-Village • Head of District of Pringgabaya • Member of DPRD – Local Legislative Body • Project Environmental Impact Assessment Consultant (UNRAM)	surrounding communities.
2 August 2016	Pringgabaya Utara Village	Land Measurement	• Landowners; • Land Acquisition Team	Land coordinate data collection of land had been acquired and paid for the Project.
3 August 2016	Mantang Substation	Village Meeting	• Head of Village of Mantang	Baseline information to be used for land identification in Matang substation.
13 February 2017	Not stated	Consultation to landowners	• Head of Sub-Village • Landowners	Land acquisition for the access road.
15 & 16 February 2017	Not stated	Consultation to landowners	• Landowners for Sengkol Project.	Alternative access road for Sengkol Solar Power Plant Project.
17 April 2017	Not stated	Coordination Meeting	• Head of Permitting Office	Extension permit for PT. Infrastruktur Terbarukan Adhiguna in Pringgabaya
20 April 2017	Pringgabaya Utara Village	Community Consultation	• Head of Village of Pringgabaya Utara	Land required for Pringgabaya Solar Power Plant Project.
6 July 2017	Geres Village Office	Public Consultation	• Head of Village of Geres • PT Infrastruktur Terbarukan Buana (ITB)	• Project information and development • Environmental and social impact of the Project

Date	Location	Event	Parties Involved	Issue / Topic Discussed
			• Representative of community of Geres Village	• Project's permitting requirement and process • Land compensation • Opportunity for local workforce
27 July 2017	Environmental Agency Office of Loteng Regency	Project Socialization Meeting	• Head of Village of Sengkol • PT Infrastruktur Terbarukan Cemerlang (ITC) • Environmental Agency of Loteng • Village Consultative Body of Sengkol Village • Representative of community of Geres Village • Project Environmental Impact Assessment Consultant (UNRAM)	• Project information and development • Environmental and social impact of the Project (Noise, Air Quality, Waste Management, Biodiversity) • Project Health, Safety and Security • Opportunity for local workforce • Land acquisition and compensation to landowners.

Community and Government consultations were also conducted in July 2017 as part of ESHIA development process prior to construction of the Project. ESHIA has been developed to provide an understanding of the Project's alignment with applicable international standard. Alignment with these expectations is a requirement of Equis Energy parent company. ***Table 8-2*** present the summary of consultation undertaken during the ESHIA development phase.

Table 8-2 Stakeholder Consultation as Part of ESHIA Development Process

Date	Location	Parties Involved	Issue / Topic Discussed
25 – 28 July 2017	Lombok Timur	Head of Integrated Licensing Service Agency of Lombok Timur	• Projects' permit approval; • Perception towards the Projects; • Concerns and expectations regarding the Projects

Date	Location	Parties Involved	Issue / Topic Discussed
25 – 28 July 2017	Pringgabaya Utara Village	Head of Village	• Socio economic condition of Pringgabayu Utara village; • Social and cultural arrangements; • Community awareness on the Project to be developed; and • Concerns and expectations regarding the Projects
25 – 28 July 2017	Pringgabaya Utara Village	Midwife	Health profile of community of Sengkol Village.
25 – 28 July 2017	Pringgabaya	Landowner	• Land acquisition process; • Compensation payment; • Project information; • Income generating activities; and • Concerns and expectations regarding the Projects
25 – 28 July 2017	Geres Barat Village	Head of Village	• Socio economic condition of Pringgabayu Utara village; • Social and cultural arrangements; • Community awareness on the Project to be developed; and • Concerns and expectations regarding the Projects
25 – 28 July 2017	Geres Barat Village	Midwife	Health profile of community of Sengkol Village.
25 – 28 July 2017	Selong Site	Landowner of access road	• Land acquisition process; • Compensation payment; • Project information; • Income generating activities; and • Concerns and expectations regarding the Projects
25 – 28 July 2017	Sengkol Village	Head of Village	• Socio economic condition of Pringgabayu Utara village; • Social and cultural arrangements; • Community awareness on the Project to be developed; and • Concerns and expectations regarding the Projects
25 – 28 July 2017	Sengkol Village	Midwife	Health profile of community of Sengkol Village.
25 – 28 July 2017	Lombok Tengah	Department of Environment of Lombok Tengah	• Environmental impact of the Project; and • Permits requirement and process
25 – 28 July 2017	Selong Site	Land acquisition team	Land acquisition process

Source: Primary Data Gathering, 2017

8.2 *APPROACH AND METHOD FOR STAKEHOLDER IDENTIFICATION*

A range of approaches and methods to undertake stakeholder identification were adopted and implemented including:

- Desktop review or secondary research regarding the area from the available published documentation as well as face to face discussions with the Project team onsite;
- Key stakeholder interviews to gather data on items not included in the UKL UPL document such as the Head of Integrated Licensing Service Agency of Lombok Timur, Department of Environmental of Lombok Tengah, and the Land Acquisition Team to enrich the information on relevant issues, perceptions and concerns and to confirm unclear information found during the secondary research; and
- Field observations through visual inspection, taking photos and GPS coordinates to triangulate information from different sources such as published documentation and interviews.

8.3 *STAKEHOLDERS & ISSUES IDENTIFIED*

A stakeholder is defined as those who are 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, two principal groups of Equis Project stakeholders' are:

1. **Affected Parties**; people / entities directly affected by the Project or have been identified as most vulnerable to change or who need to be engaged in identifying impacts and their significance, as well as in decision-making on mitigation and management measures. Stakeholders identified under this category include:
   - Village and Sub-District Government;
   - Landowners of the land acquired for the Project; and
   - Community of Sengkol, Pringgabaya Utara and Geres villages

2. **Other interested Parties**; people / entities that are interested in the project and / or could affect the three Projects in some way. Stakeholders identified under this category include:
   - Environmental Agency;
   - Regional Development Planning Agency;
   - Land Agency; and
   - Local Based Non-Governmental Organisation

Project stakeholders identified in the above categories are presented in ***Table 8-3***.

Table 8-3 Summary of Project's Stakeholders and Analysis

Stakeholder	Location	Interest	Power or Influence	Perception
Head of Village	Village of Sengkol, Pringgabaya	Project to contribute to the local / village social and economic	Formal position as the village authorities and	*Positive:*

Stakeholder	Location	Interest	Power or Influence	Perception
	Utara and Geres	development through providing opportunity for local workforce and Corporate Social Responsibility Programs	considered to be the representative of the community which can easily influence the perception of community toward the Project.	Supportive to the Project as long as the Project supports the local economy and manages its adverse impacts.
Head of Sub-District	Sub-Districts of Pringgabaya, Labuhan Haji and Pujut	Project to contribute in the development of local economy	Formal position as the District authorities and considered to be the representative of the community which can easily influence the perception of community toward the Project.	*Positive:* Supportive to the Project as long as the Project supports the local economy and manages its adverse impacts.
Land Owners	Village of Sengkol, Pringgabaya Utara and Geres	Gain benefit from compensation received due to land being acquired by the Project.	Expectation only to receive proper and adequate compensation due to loss of land. Complaints / Grievances will be intensively submitted if the Project considered not providing sufficient compensation.	*Positive:* Supportive to the Project as long as the Project provide adequate compensation for the loss of land and manages its adverse impacts.
Badan Lingkungan Hidup (Environmental Agency)	East and Central Lombok Regency	Project to contribute in the development of local economy whilst managing its environmental and social issues properly	Legal and formal position in the government. The Government through the Environmental Agency has the authority to monitor Project environmental and social performance based on UKL-UPL. Should any non-compliance occur, the Government have the authorities to stop all activities related to the Project.	*Positive* Supportive to the Project as long as the Project meets the regulations and manages its adverse impacts properly.
Regional Development Planning Agency	East and Central Lombok Regency	Project to contribute in the development of local economy	Legal and formal position in the government.	*Positive* The Project is part of a regional development program. As long as it meets the regulations it will bring economic

Stakeholder	Location	Interest	Power or Influence	Perception
				development for the local area.
Land Agency	East and Central Lombok Regency	Provision on land acquisition process	Legal and formal position in the government	*Positive* Supportive to the Project as long as the Project meets the regulations and manages its adverse impacts properly.
Residents of Sengkol, Pringgabaya Utara and Geres	Village of Sengkol, Pringgabaya Utara and Geres	Project to contribute to the local / village social and economic development in terms of providing for local employment and social investment.	If the Project doesn't consider local employment and provide minimum benefits to the affected communities it could lead to social unrest and may disrupt the Project activities and schedule.	*Positive:* Supportive to the Project as long as the Project supports the local economy and manages it adverse impacts.
Local Based Non-Governmental Organisation.	Pringgabaya Utara Village	To gain economic benefit from the existence	Local organisation comprised of local residents established for economic and employment opportunity interest. If their demands are not met they may report negative aspect of the projects activities which in turn could have negative effect on the company's reputation.	*Neutral:* Supportive to the Project as long as the NGOs received benefits from the Project otherwise will tend to oppose the Project.

The following section summaries the issues and concerns raised by stakeholders during the consultation processes undertaken during the Regulatory Environmental Approval process and ESHIA development. A summary is presented in ***Table-4***.

Table 8-4 Issues and Concerns Raised by Stakeholders Related to the Project

Issue	Description	Category of Stakeholder Raising the Issue / Concerns	Equis Responses
Information Regarding the Project	Information was only provided to a small number of village authorities and community leaders through socialization / Public Consultation sessions.	• Head of Villages • Affected Communities of Sengkol, Geres and Pringgabaya Utara Village.	Company will do continuous public socialization and formal/informal meetings through CLO. Company will also establish and socialize grievance mechanism.
Labour / Local Workforce	Providing opportunities for local employment both for skilled and non-skilled with attention to the capacity and capability of the locals.	• Head of Sub-Districts • Head of Villages • Affected Communities of Sengkol, Geres and Pringgabaya Utara Village.	Company will socialize the recruitment plan that includes recruitment process, the number of workers required, the skill and competence needed from the workers. Company will liaise closely with head of village and sub-villages in sourcing local workforce.
Project Social Investment / Corporate Social Responsibility	Supporting local economic development through implementing a Social Investment / CSR program for the affected villages of Sengkol, Geres and Pringgabaya Utara.	• Head of Sub-Districts • Head of Villages • Affected Communities of Sengkol, Geres and Pringgabaya Utara Village. • Landowner	Company will consult with local community in preparing CSR initiatives.
Environmental, Health and Safety	Community concerns on Project impact to air quality, noise disturbance, effect on solar radiation and community safety due to Project traffic mobilisation.	• Affected Communities of Sengkol, Geres and Pringgabaya Utara Village.	Company will take measures for managing and monitoring EHS parameters of the projects in accordance with the applicable regulations.

Issue	Description	Category of Stakeholder Raising the Issue / Concerns	Equis Responses
UKL-UPL Permitting	Project to adhere to the obligations stated within the UKL-UPL with regards to managing environmental and social impacts of the Project.	• Environmental Agency • Head of Sub-Districts • Head of Villages • Affected Communities of Sengkol, Geres and Pringgabaya Utara Village.	Company will follow all the applicable laws and regulations regarding environmental obligations of the projects.
Land Acquisition and Compensation	Project to provide adequate compensation for displaced communities due to land acquisition for the Project.	• Landowners • Head of Villages • Head of Sub-Districts	Company will make sure the project does not involve physical displacement. Company will socialize land acquisition process to all relevant parties and make sure the compensation is given fairly in accordance with appraised value of the land.

8.4 PLANNED FUTURE STAKEHOLDER ENGAGEMENT ACTIVITIES

Relevant stakeholder groups, key messages to be delivered, approach and tools of engagement, timeline and responsible parties were identified to include all relevant stakeholders and issues to cover the entire lifecycle of the three Projects. However, the plan is a dynamic and requires periodic updating and adapting to the current social, economic and political situation of the area. ***Table 8-5*** provides a summary of proposed stakeholder engagement activities for all three developments.

Table 8-5 Summary of Proposed Stakeholder Engagement Activities for Sengkol, Selong and Pringgabaya Solar Farm Project

Stakeholder Group	Location	Key Message	Approach &	Responsibility	Timeline
Village and Sub-District Governments	• Village of Sengkol, Geres and Pringgabaya Utara. • Districts of Pringgabay, Labuhan Haji and Pujut.	• Project design and development, impacts and opportunities. • Project Environmental Approval Permit (UKL-UPL) • Environmental, health and social impacts generated from Project development and activities. • Project local labour requirement and procurement mechanism. • Project Grievance Mechanism for affected communities.	Approach: Socialization and Consultation Tools: • Socialization forum in each village or sub-district involving village governments.	• PT. Infrastruktur Terbarukan Adhiguna (ITA) • PT. Infrastruktur Terbarukan Buana (ITB) • PT. Infrastruktur Terbarukan Cemerlang (ITC)	Prior to construction, construction and operation phase
Residents of Sengkol, Geres and Pringgabaya Utara Village	Village of Sengkol, Geres and Pringgabaya Utara.	• Project development and activities • Environmental, health and social impacts generated from Project development and activities. • Benefits and opportunities provided by the Project. • Project local labour requirement and procurement mechanism • Project Grievance Mechanism for affected communities	Approach: Socialization and Consultation Tools: • Socialization forum in each village • Posters in location where it is easily accessible to the community.	• PT. Infrastruktur Terbarukan Adhiguna (ITA) • PT. Infrastruktur Terbarukan Buana (ITB) • PT. Infrastruktur Terbarukan Cemerlang (ITC)	Prior to construction, construction and operation phase.

Stakeholder Group	Location	Key Message	Approach &	Responsibility	Timeline
		(system and process, person in charge and grievance submission).			
Landowners	Village of Sengkol, Geres and Pringgabaya Utara.	• Project Grievance Mechanism for affected communities (system and process, person in charge and grievance submission).	Approach: Socialization and Consultation Tools: • Socialization forum in each village • Posters in location where it is easily accessible to the community.	• PT. Infrastruktur Terbarukan Adhiguna (ITA) • PT. Infrastruktur Terbarukan Buana (ITB) • PT. Infrastruktur Terbarukan Cemerlang (ITC)	During land acquisition process
Environmental Agency (BLH)	East and Central Lombok Regency	Regular / Bi-annual reporting of the implementation of UKL-UPL or Environmental and Social Management and Monitoring Plan under the Project Environmental Approval.	Consultation and Reporting Tools: • Direct one-on-one meeting as required • Workshop	• PT. Infrastruktur Terbarukan Adhiguna (ITA) • PT. Infrastruktur Terbarukan Buana (ITB) • PT. Infrastruktur Terbarukan Cemerlang (ITC)	Throughout the life cycle of the Project
Regional Development Planning Agency	East and Central Lombok Regency	Project plan to contribute to regional economic development through providing social investment / CSR program for the affected communities.	Consultation Tools: • Direct one-on-one meeting as required Workshop	• PT. Infrastruktur Terbarukan Adhiguna (ITA) • PT. Infrastruktur Terbarukan Buana (ITB) • PT. Infrastruktur Terbarukan Cemerlang (ITC)	During construction and operation phase.

Stakeholder Group	Location	Key Message	Approach &	Responsibility	Timeline
Land Agency	East and Central Lombok Regency	Provide update / progress on land acquisition process.	Consultation Tools: • Direct one-on-one meeting as required	• PT. Infrastruktur Terbarukan Adhiguna (ITA) • PT. Infrastruktur Terbarukan Buana (ITB) • PT. Infrastruktur Terbarukan Cemerlang (ITC)	During land acquisition process
Local Based Non-Governmental Organisation.	Pringgabaya Utara Village	• Project labour requirement and procurement mechanism. Project Grievance Mechanism for affected communities (system and process, person in charge, grievance submission).	Socialization Tools: • Focus group discussion in the village involving local NGO	• PT. Infrastruktur Terbarukan Adhiguna (ITA) • PT. Infrastruktur Terbarukan Buana (ITB) • PT. Infrastruktur Terbarukan Cemerlang (ITC)	Prior to construction, construction and operation phase

9 GRIEVANCE REDRESS AND ENGAGEMENT

A grievance mechanism is a process for systematically receiving, investigating and responding to community complaints associated with a Project's activities. When carefully designed, properly implemented and embedded in an effective community engagement program, the mechanism shall provide significant benefits to both the Project and communities in which it operates.

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.

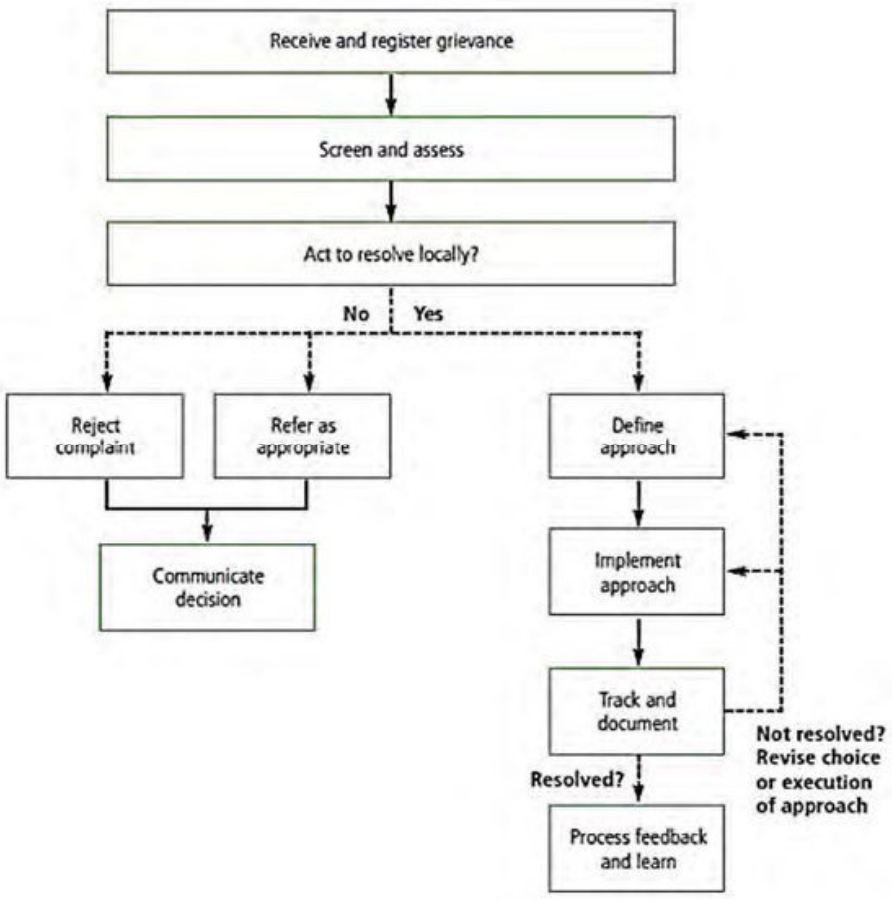
9.1 PROPOSED GRIEVANCE MECHANISM FOR PROJECT AFFECTED COMMUNITIES

It is understood at the current stage of the Project a formal mechanism for managing community complaints has not been established. Although the Project will seek to reduce potential negative impacts arising from the Project, it is inevitable that community queries and grievances will arise throughout the construction (land acquisition, dust, noise etc.) and operation phase. For these reasons, a Grievance Tracking and Redress Mechanism (GTRM) should be established. The GTRM will be triggered in all instances where a complaint is received by the Project or its contractors. A typical GTRM is characterized by five basic steps illustrated and further detailed in ***Figure 9-1*** and ***Figure 9-2***.

Figure 9-1 Basic Steps of Grievance Tracking and Redress Process

Submission, reporting or indirect capture of grievance	Grievance recorded; assigned case number; and delegated to resolution agent	Investigation of complaint – including gathering inputs and perspectives from parties involved	Implement remedial actions. Claim remains open for potential appeals	Get feedback from aggrieved. Claim can be closed upon satisfactory outcome

Figure 9-2 Typical Steps of a Grievance Mechanism



Complaints and grievances can be directed to the Community Liaison Officers (CLO) or through the head of the village who then conveys them to the CLO. The dedicated CLO will then have the responsibility to monitor the resolution progress, record all discussions and ensure all grievances are responded to where feasible in a timely and proper manner. The total allowable days to process the grievances is 30 days.

To the greatest extent possible the Project will treat community complaints confidentially, and in all cases grievances will be addressed without prejudice.

9.2 *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 recognised as part of the business' function. ***Table 9-1*** below summarises the basic roles and responsibilities required to implement the grievance management.

Table 9-1 Summary of Roles and Responsibilities

1. Development Manager (Construction Phase) & ESG Manager (Operation Phase):
• Oversees the allocation of necessary resources to ensure that grievance tracking and resolution mechanism are implemented in accordance with the Project' plans and guidelines. • Serves as a focal point for resolution of community complaints and grievances and will facilitate the overall processing, delegating responsibility for redress, coordinating fact-finding missions, facilitating decisions on resolution actions with the aggrieved parties, and generating reports of grievance activities.
2. Community Liaison Office - Grievance Administrator
• Responsible for administering the grievance mechanism (recording complaints, arranging for collection of additional information, consulting relevant departments or persons within the organisation, tracking progress, aggregating and forwarding feedback to complainants, and reporting). • To serve as an entry point to receive and log complaints, Responsible primarily for obtaining contextual data on a grievance from the aggrieved parties, community members, as well as through first-hand observational data.

Based on the organisation and staffing plan chart provided to ERM, the function to manage the Grievance Mechanism would be under the Development Manager during the construction phase assisted by Community Liaison Officers (CLOs). Once the Project shifts to the operation phase the management of the Grievance Mechanism will be under the ESG Manager also assisted by the CLOs.

9.3 *MONITORING AND REPORTING OF GRIEVANCES*

An internal monitoring process will be conducted 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 organisational improvement in implementing the procedure;
- Evaluating the progress of resolution implementation and identify intervention needs from the Project management to manage overdue or 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 CLOs or persons within the organisation with a 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 each of the Project's management and distributed to other relevant parties as required to identify the need for organisational and procedure improvement.

The content of the report will at minimum contain the following information:

- Summarise 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.

9.4 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 and format that is understandable to all project affected peoples.

The following information will be disclosed (internally and externally):

- Steps of Project-based Grievance Mechanism;
- Who can raise complaints – focusing on the affected communities;
- 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; and
- What type of responses complainants can expect from the Project including timing of response.

In regard to disclosing the mechanism, each of the three Projects will undertake communication in group discussions, community meetings and through the Project's CLOs as well as by using other communication tools.

It is essential that the local government and all contractors also fully understand 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.

10 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

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, minimise 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 UKL-UPL;
- 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).

10.1 ESMF PLANNING BACKGROUND

The Project has signed EPC contract in November 2017. ESHS-MS for the Project has been developed by ITA, ITB, ITC together (**Annex E**) which describes 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 ITA, ITB, and ITC prepare to commence construction.

10.2 RESPONSIBILITY FOR IMPLEMENTING THE ESMF

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

- ITA, ITB, and ITC – 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 Equis Energy; and
- Other operational contractors – responsible for complying with the ESMF requirements set out by ITA, ITB, and ITC.

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

10.2.1 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 UKL-UPL);
- 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.

10.2.2 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.

10.2.3 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.

10.2.4 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 preforming. The contractor will make sure that all activities under his/her responsibility shall follow all safety regulation/requirements, coordinating with the ITA, ITB, and ITC 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.

10.2.5 Employees

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

- Familiarise 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.

10.3 REPORTING AND DOCUMENTATION

ITA, ITB, and ITC will develop and implement a programme of regular reporting through the stages of the project lifecycle. The personnel delegated HSE roles shall be required to fully comply with the monitoring programme in terms of timely submissions of reports as per acceptable level of detail. Reporting will be done in form of environmental check list, incident record register, training records, and environmental and social performance reports (e.g. weekly, monthly, quarterly, half yearly and yearly).

10.3.1 External Reporting and Communication

The personnel delegated HSE roles shall be responsible for ensuring that the communication with the regulatory agencies and stakeholders is maintained as per the requirement. All complaints and enquiries are to be appropriately dealt with and records be maintained. All communication made to the regulatory agencies shall also be reported to ITA, ITB, and ITC's regional and corporate HSE head.

10.3.2 Internal Reporting and Communication

Internally, the personnel delegated HSE roles will share inspection and audit findings with their suggested measures regularly to the senior management for their consideration. The same are also to be communicated within the staff working on the project. To maintain an open communication between the staff and management on HSE and social issues the followings are being used:

- Team Briefings,
- On-site work group meetings; and
- Work Specific Instructions.

10.3.3 Documentation

Documentation is an important step in the implementation of the ESMP. ITA, ITB, and ITC will establish a documentation and record keeping system in keeping with their ESMS, to ensure recording and updating of documents as discussed in the ESMP. Responsibilities have to be assigned to relevant personnel for ensuring that the ESMP documentation system is maintained and that document control is ensured through access by and distribution to, identified personnel in form of the following:

- Master Environment Management System document;
- Legal Register;
- Operation control procedures;
- Work instructions;
- Incident reports;
- Emergency preparedness and response procedures;
- Training records;
- Monitoring reports;

- Auditing reports; and
- Complaints register and issues attended/closed.

10.3.4 ESMP Review and Amendments

The ESMP acts as an environment and social management tool which needs to be periodically reviewed to address changes in the organization, process or regulatory requirements.

Following a review, Site in charge in coordination with personnel delegated HSE will be responsible for making the amendments in the ESMP and seeking approval from the Regional and Corporate heads. The amended ESMP will be communicated to all the staff on the project.

10.4 TRAINING, AWARENESS AND COMPETENCY

The Project is required to 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.

The training programme will ensure that all concerned members of the team understand the following aspects:

- Purpose of management plan for the project activities;
- Requirements of the management plan and specific Action Plans;
- Understanding of the sensitive environmental and social features within and surrounding the project areas; and
- Aware of the potential risks from the Project activities.

10.5 MONITORING, REVIEW, AUDIT

A monitoring, review and auditing program will be implemented during construction to monitor implementation of the Projects HSE requirements and environment and social commitments. Ultimately ITA, ITB, and ITC would normally be responsible for ensuring that the EPC and its contractors are complying with the applicable regulatory and Lender HSE and social requirements.

10.6 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 ITA, ITB, and ITC, 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 UKL-UPL) 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 **Chapter 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 uncertainties regarding the environmental or social baseline, recommendations for the development of specific management plans or procedures or follow-up actions have been made.

10.7 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 ITA, ITB, and ITC. This ESMF is a live document and will be updated periodically, for example, depending on Project execution and performance.

10.8 *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 10-1***). These plans are intended as framework documents which will be developed by ITA, ITB, and ITC to manage specific risks or issues and also align the Project with the expectations of the IFC PS and HSE Guidelines.

Table 10-1 Specific Management Plans and Policies

Management Plan	Description
Stakeholder engagement plan	A stakeholder engagement framework has been developed, to include: • 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	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 ITA, ITB, and ITC will develop more detailed planning and implementation of these programs prior to commencement of construction. 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.
Occupational health and safety (OHS) plan	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.
Labour management	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: • 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.

Management Plan	Description
Solid and hazardous waste management plan	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.

10.9 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:

- Land use management;
- Soil erosion and contamination management;
- Air quality management;
- Noise management;
- Terrestrial biodiversity;
- Surface water and sedimentation management;
- Social management; and
- Occupational and community health and safety.

These are provided in ***Table 10-2*** to ***Table 10-5*** 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 10-2 Environmental and Social Management Plan – Pre-Construction

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
Social									
UKL-UPL	Survey and Investigation	The emergence of public perception, either positive or negative, regarding the solar farm development plan	Provide the necessary information to public about the solar farm development plan	PT ITA, PT ITB, PT ITC	Conduct interview to identify any public involvement, especially public figure, religious leaders or any other leaders such as head of village, to receive the positive or negative public perception regarding the presence of solar farm development project.	Once during pre-construction phase	PT ITA, PT ITB, PT ITC	• Pringgabaya Village officials • Geres Village Officials • Sengkol Village Officials • Pujut District Officials • East Lombok Environmental and Hygiene Agency • East Lombok National Land Agency • Central Lombok National Land Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Land procurement	The emergence of public perception, either positive or negative, regarding the solar farm development plan	• Conduct land acquisition that is well planned and well documented • Accommodate suggestions, opinions and responses from community related to the solar farm development plan	PT ITA, PT ITB, PT ITC	• Observation; • Questioner; • Descriptive and qualitative data analysis; • Conduct interview to identify any involvement of community, religious leaders and head of village, to receive the positive public perception on the project.	Once during pre-construction phase	PT ITA, PT ITB, PT ITC	• Pringgabaya Village officials • Geres Village Officials • Sengkol Village Officials • Pujut District Officials • East Lombok Environmental and Hygiene Agency • East Lombok National Land Agency • Central Lombok National Land Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Land procurement	Economic benefit of increased land and building value which may reduce the number of complaints received due to land acquisition	• Conduct land acquisition that is well planned and well documented • Accommodate suggestions, opinions and responses from community related to the solar farm development plan	PT ITA, PT ITB, PT ITC	• Observation; • Questioner; • Descriptive and qualitative data analysis; • Conduct interview to identify any involvement of community, religious leaders and head of village, to receive the positive public perception on the project.	Once during pre-construction phase	PT ITA, PT ITB, PT ITC	• Pringgabaya Village officials • Geres Village Officials • Sengkol Village Officials • Pujut District Officials • East Lombok Environmental and Hygiene Agency • East Lombok National Land Agency • Central Lombok National Land Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Public socialisation and consultation	The emergence of public perception, either positive or negative, regarding the solar farm development plan	• Accommodate suggestions, opinions and responses from community related to the solar farm development plan • Provide solution or input to public suggestions, opinions or responses on the solar farm development plan	PT ITA, PT ITB, PT ITC	Monitoring is conducted by counselling or taking personal approach to the farmers within the planned solar farm area and/or to the community that is impacted by the project activity through the Head of Village within the related district.	Once during pre-construction phase	PT ITA, PT ITB, PT ITC	• Pringgabaya Village officials • Geres Village Officials • Sengkol Village Officials • Pujut District Officials • East Lombok Environmental and Hygiene Agency • East Lombok National Land Agency • Central Lombok National Land Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Public socialisation and consultation	Economic benefit of increased land and building value which may reduce the number of complaints received due to land acquisition	• Accommodate suggestions, opinions and responses from community related to the solar farm development plan • Provide solution or input to public suggestions, opinions or responses on the solar farm development plan	PT ITA, PT ITB, PT ITC	Monitoring is conducted by counselling or taking personal approach to the farmers within the planned solar farm area and/or to the community that is impacted by the project activity through the Head of Village within the related district.	Once during pre-construction phase	PT ITA, PT ITB, PT ITC	• Pringgabaya Village officials • Geres Village Officials • Sengkol Village Officials • Pujut District Officials • East Lombok Environmental and Hygiene Agency • East Lombok National Land Agency • Central Lombok National Land Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Permit compliance	The emergence of public perception, either positive or negative, regarding the solar farm development plan	• Mitigation is conducted by counselling or taking a personal approach to the farmers within the planned solar farm area and/or to the community that is impacted by the project activity through the Head of Village within the related district.	PT ITA, PT ITB, PT ITC	• Observation; • Questioner; • Descriptive and qualitative data analysis; • Conduct interview to identify any involvement of community, religious leaders and head of village, to receive the positive public perception on the project.	Once during pre-construction phase	PT ITA, PT ITB, PT ITC	• Pringgabaya Village officials • Geres Village Officials • Sengkol Village Officials • Pujut District Officials • East Lombok & Central Lombok Environmental and Hygiene Agency • East Lombok & Central Lombok National Land Agency	UKL-UPL Implementation report every 6 months

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
								• East Lombok & Central Lombok Investment Board and One Stop Service Centre • East Lombok & Central Lombok Regional Disaster Management Agency • Public Works and Spatial Planning Agency	
Land Use Changes									
ESHIA	Land acquisition	Impact on Assessment of Loss of Land Resource for Farming	• Ensure proper documentation for the consultation and negotiation process with land owner; • 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; • Develop and implement corporate social responsibility programs where the affected people will be prioritised as the beneficiaries; • Identify all landowner including poorest Landowner and vulnerable groups, where possible, the project will prioritise the these group to be employed by the Project during the construction phase and priorities on CSR program. • Inform all Landowner during public consultation; • Identify all affected social and cultural institutions and prepare plan for protecting and supporting them;	PT ITA, PT ITB, PT ITC	• Documentation in place • Visual observation on sites • Period monitoring through audit and review of effectiveness of CSR program	Once during pre-construction phase	PT ITA, PT ITB, PT ITC	PT ITA, PT ITB, PT ITC Community Relations/CSR Officer	• CSR program report including its audit report • Number of affected people employed

Table 10-3 Environmental and Social Management Plan – Construction

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
Local Economy and Employment									
UKL-UPL	Procurement activities of Labour	Increase of Job Opportunity and Income	– Prioritising the local workforce, especially for unskilled workforce to be employed according to the qualification and requirements needed – Supervise the recruitment process by the contactor in accordance with Law No. 7 Year 1981	PT ITA, PT ITB, PT ITC and contractor	– The triangulation approach includes observation, interview and secondary data collection activities – Preparing employment reports	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok & Central Lombok Workforce and transmigration agency • East Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Procurement activities of Labour	Social gap/ inequalities	– Prioritising the local workforce, especially for unskilled workforce to be employed according to the qualification and requirements needed – Social issue will raise as a results of local community that fail during the recruitment process	PT ITA, PT ITB, PT ITC and contractor	– The triangulation approach includes observation, interview and secondary data collection activities	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• District leadership and community • East Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Procurement activities of Labour	Social issue	– Provide and communicate clear information about the Project's requirement related to employment and business opportunities and priorities locals where feasible	PT ITA, PT ITB, PT ITC and contractor	– The triangulation approach includes observation, interview and secondary data collection activities	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• Local public figure, religious leaders and the community • Local police • East Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
ESHIA	Construction of solar farm and its supporting facilities	Impact to local economy from business opportunities during the project construction and operation phases	– Conduct due diligence throughout local suppliers to identify and evaluate the quality of services and products provided by local suppliers in line with the required standards; – Provide and communicate clear information about the Project's requirement related to employment and business opportunities and prioritise locals where feasible.	PT ITA, PT ITB, PT ITC, and EPC Company	• Periodic monitoring through audit and review of contractors • Periodic monitoring through audit and review throughout local suppliers who provide services to company • Periodic monitoring through audit and review of effectiveness of capacity building/technical assistance and assistance	During construction phase	PT ITA, PT ITB, PT ITC	PT ITA, PT ITB, PT ITC: • Human resources officer • Community relations/CSR officer • Procurement officer	Quarterly report regarding workforce number and composition and consultation report
ESHIA	Construction of solar farm and its supporting facilities	Impact to local economy from employment during the project construction and operation phases	– Have a clear stipulation of using local labour in the Equis and/or EPC contract and instruct the EPC to prioritize qualified people from the affected villages and also surrounding villages as construction and/or operational workers in accordance with the needs of the Project; – Determine numbers of skilled, semi-skilled and unskilled labour requirements for each phase and assess local resource levels through involving local village heads, customary heads or community leaders; – Provide and communicate clear information about the Project's requirement related to employment and business opportunities and prioritise locals where feasible; – Implement Project specific training and 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; – Workers will have contracts in place prior to commencement setting out working	PT ITA, PT ITB, PT ITC, and EPC Company	• Periodic monitoring on recruitment plan such as number of local workers, payment of entitlements, outcomes of assistance provided. • Periodic monitoring through audit and review of contractors • Periodic monitoring through audit and review of effectiveness of capacity building/technical assistance and assistance	During construction phase	PT ITA, PT ITB, PT ITC	PT ITA, PT ITB, PT ITC: • Human resources officer • Community relations/CSR officer • Procurement officer	Quarterly report regarding workforce number and composition and consultation report

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
			conditions, terms of employment and EHS responsibilities; – Prior to the construction phase is ended where the project will reduce number of labours during operation phase, the project will carry out an analysis of alternatives to retrenchment. The retrenchment plan will be developed and implemented to reduce the adverse impacts of retrenchment on workers; – A grievance mechanism will be developed for workers and included in the ESMS. Workers will be informed about this mechanism at the time of hiring. Grievance mechanism will be extended to non-employee workers in future; and – Ensure Equis and/or the EPC contractors adhere to the national and international core labour standards and implement those in throughout the Project's construction and/or operation phases.						
Mobilisation of Equipment and Workers									
UKL-UPL	Mobilisation of equipment, material and worker	Disturbance to community activities as a results of project mobilisation	– Usage of haulers with minimum noise – Employing capable drivers – Limiting the speed of vehicles in the residential area (max 30 km/hr) – Avoiding exposure of materials during mobilisation – Placement of security guards in every junction on the project route.	PT ITA, PT ITB, PT ITC and contractor	– Observation and interview of local community and workers on site – Descriptive and qualitative data analysis – Enforce PPE and implementation of SOP on site.	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok & Central Lombok Workforce and transmigration agency • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Mobilisation of equipment, material and worker	Potential incident with community as a result of increase in Project traffic on a public road	– Ensure the involvement of community in obeying the traffic regulation – Placement of security in the area with high accident risk – Limiting the speed of project vehicles (max 30 km/hr)	PT ITA, PT ITB, PT ITC and contractor	Recording of traffic accident	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok communication agency • District and Regional Police • East Lombok Environmental and Hygiene Agency • Central Lombok Transportation Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Mobilisation of equipment, material and worker	Increase in people, materials and traffic activities	– Usage of haulers with minimum noise – Employing capable drivers – Manage the movement schedule to avoid disturbing the community bedtime	PT ITA, PT ITB, PT ITC and contractor	Observation and interview of local community and workers on site	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• Workforce and transmigration agency • East Lombok Environmental and Hygiene Agency • Central Lombok Transportation Agency • Central Lombok Public Works and Spatial Planning Agency	UKL-UPL Implementation report every 6 months

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
ESHIA	Mobilisation of equipment, material and worker	Potential incident with community as a result of increase in Project traffic on a public road	– 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; and – Develop traffic management plan or traffic study (ANDAL LALIN) associated with the project activities or traffic management plan.	PT ITA, PT ITB, PT ITC, and EPC Company	– Visual observation – Periodic monitoring through audit and review of effectiveness of community development plan (health, safety, and security program) – Monitoring the status of community health and safety grievances and how they are resolved	During Construction Phase	PT ITA, PT ITB, PT ITC	PT ITA, PT ITB, PT ITC: • Community Relations Officer • Health and Safety Officer • Security Officer	• Community development plan (health, safety, and security program) including its audit report • Community health, safety, and security incident report
ESHIA	Construction of solar farm and its supporting facilities	Community health and safety incident from influx on 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, the implementation of this procedure will be included in company regulation (both Project companies and contractor). Written warning will be issued to the relevant personnel upon inappropriate behavior, if not improved, further warnings will be given, and so on until termination of the worker by the company; – 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.	PT ITA, PT ITB, PT ITC, and EPC Company	– Visual observation – Periodic monitoring through audit and review of effectiveness of community development plan (health, safety, and security program) including management of influx population – Periodic monitoring on the implementation of worker CoC – Monitoring the status of security investigation for proper resolution of security incidents – Monitoring the status of community health and safety incidents and how they are resolved	During Construction Phase	PT ITA, PT ITB, PT ITC	PT ITA, PT ITB, PT ITC: • Community Relations Officer • Health and Safety Officer • Security Officer	• Community development plan (health, safety, and security program) including its audit report • Community health, safety, and security incident report
Construction of Project and Facilities									
UKL-UPL	Construction of 20kV transmission line	Public perception	– Acquisition of land is conducted periodically and recorded properly	PT ITA, PT ITB, PT ITC and contractor	Observation on site to identify any public involvement, especially public figure, religious leaders or any other	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• Pringgabaya Village officials • Geres Village Officials	UKL-UPL Implementation

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
			– Accommodate suggestions, opinions and responses from community related to construction of 20kV transmission line		leaders such as head of village, to receive the positive or negative public perception regarding the land acquisition and construction of 20kV transmission line			• Sengkol Village Officials • Pujut District Officials • East Lombok Environmental and Hygiene Agency • East Lombok National Land Agency • Central Lombok National Land Agency	report every 6 months
UKL-UPL	Commissioning	Public perception	– Informing the community about the commissioning schedule – Accommodate suggestions, opinions and responses from community related to the solar farm development plan	PT ITA, PT ITB, PT ITC and contractor	Observation on site to identify positive or negative public perception regarding the solar farm commissioning plan	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok & Central Lombok Environmental and Hygiene Agency • East Lombok Public Health Agency • PT PLN	UKL-UPL Implementation report every 6 months
Air Quality									
UKL-UPL	Land preparation	Reduced air quality	– Technology approach is used by maintaining project equipment or vehicles – Cleaning the vehicles from soil or materials – Cleaning the trucks' tyre prior to leaving the project site to avoid contamination on public road – Sprinkling the road to reduce dust – Conduct baseline studies of air quality and noise to determine the baseline conditions of the surrounding site;	PT ITA, PT ITB, PT ITC and contractor	– Air sampling by using spectrophotometer – Sampling of CO by using Non-Dispersive Infrared (NDIR) – Sampling of NOx, SOx and particulate by using High Volume Sampler	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok & Central Lombok Public Health Agency • East Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Construction of solar farm and its supporting facilities	Reduced air quality	– Managing the reduction of air quality to maintain it in accordance with Government Regulation No. 41 Year 1999 – Technology approach is used by maintaining project equipment or vehicles – Cleaning the vehicles from soil or materials – Cleaning the trucks' tyre prior to leaving the project site to avoid contamination on public road – Sprinkling the road to reduce dust – Covering the pick-up truck with tarpaulin to minimise dust	PT ITA, PT ITB, PT ITC and contractor	– Air sampling by using spectrophotometer – Sampling of CO by using Non-Dispersive Infrared (NDIR) – Sampling of NOx, SOx and particulate by using High Volume Sampler	During construction phase	PT ITA, PT ITB, PT I TC and contractor	• East Lombok & Central Lombok Public Health Agency • East Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
ESHIA	Air emissions generated during construction activities will come from vehicle engine exhausts, generators, construction equipment and dust from earthworks and vehicles movement, emission from existing stone crushers in	Impact on air quality	– Preventive measures such as storage of construction under cover, covering of construction materials during transportation will be undertaken, for reducing dust; – Emissions from the emergency generator set and other stationary machines will be controlled by ensuring that the engines are always properly tuned and maintained; – Minimise stockpiling by coordinating excavations, spreading, re-grading and compaction activities; – Speed of vehicles on site will be limited to 10-15 km/hr which will help in minimising fugitive dust emissions due to vehicular movement;	EPC Company	– Site inspection, training records, visual assessment	Monthly	PT ITA, PT ITB, PT ITC HSE Dept.	PT ITA, PT ITB, PT ITC HSE Dept.	Monthly HSE Report

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
	Pringgabaya village		– Cease or phase down work if excess fugitive dust is observed. Investigate the source of dust and ensure proper suppression measures; – Proper maintenance of engines; – Idling of vehicles and equipment will be prevented; – Ambient air monitoring during construction period to be established, for all three sites, ambient air quality monitoring locations are in and outside of the solar farm, for Pringgabaya site one of the monitoring location points will be located adjacent with the existing stone crusher nearby the site; – Coordinate with owner of the stone crushers to implement a necessary mitigation measure to reduce particulate and dust emission during its operation; and – Equis will construct new access road wide enough to accommodate the delivery trucks since the project in Selong site will not use existing access road.						
Noise									
UKL-UPL	Land preparation	Increase of noise	– Technology approach is used by maintaining project equipment or vehicle – Providing earplugs for workers – Limiting the working period in the high noise area	PT ITA, PT ITB, PT ITC and contractor	Measure the intensity of noise and exposure time against the standard noise level by using Sound Level Meter	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok & Central Lombok Public Health Agency • East Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Construction of solar farm and its supporting facilities	Increase of noise	– Socio culture approach is used through training or seminar to promote awareness on health and safety to the workers during construction phase – Technology approach is used through implementation of SOP on every equipment utilised during construction phase – Coordination with village and district officials as well as local clinics should there be any disease arise as a result of reduced air quality and increase vibration – Managing the increase of noise to maintain the noise level in accordance with Ministerial Decree No. 48 Year 1996	PT ITA, PT ITB, PT ITC and contractor	Measure the intensity of noise and exposure time against the standard noise level by using Sound Level Meter	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok Public Health Agency • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
ESHIA	Noise generated from all construction activities and machine and/or vehicle	Impact on ambient noise level	– No night-time (6pm – 7am) transportation or construction activities under routine conditions; – All the noise generating equipment such as emergency generator sets, batching plant etc. to be sited away from receptors such as settlements; – 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.	EPC Company	Site inspection, training records, visual assessment	Monthly	PT ITA, PT ITB, PT ITC HSE Dept.	PT ITA, PT ITB, PT ITC HSE Dept.	Monthly HSE Report
Vegetation Clearing									
ESHIA	Vegetation clearance, solar farm and transmission line	Change in land use	– Vegetation clearing only in designated areas for the Project footprint, no need to secure a tree cutting permit prior to site clearing if trees are cut or being removed since vegetation on the land site are non-economic valued plants; – Restricting work to designated/cleared boundaries; – Topsoil will be stored separately during clearing and will be used to fill and level the area once grubbing activities have been completed, thereby maintaining the seed bank; – No disturbance to vegetation outside marked areas; and – Undertaking site revegetation to assist with soil stabilisation, where possible.	EPC Company	Site inspection, visual assessment	Weekly	PT ITA, PT ITB, PT ITC HSE Dept.	PT ITA, PT ITB, PT ITC HSE Dept.	Weekly HSE Report
ESHIA	Vegetation clearance, solar farm and transmission line	Change in land use	– On completion of construction activities, land used for temporary facilities will be restored to the extent possible.	EPC Company	Site inspection, visual assessment	Monthly	PT ITA, PT ITB, PT ITC HSE Dept.	PT ITA, PT ITB, PT ITC HSE Dept.	Monthly HSE Report
Habitats and Wildlife									
UKL-UPL	Base camp preparation and operation	Deterioration of biodiversity	– Avoid the occurrence of reduced land flora around the base camp – Take a technology and social approach	PT ITA, PT ITB, PT ITC and contractor	– Ensure the greening effort is undertaken to conserve the habitat of biota – Undertake surveys, observations and inventories of biota condition around the power plant site – Monitor the presence of species in and around the power plant site	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok & Central Lombok Department of Agriculture • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Base camp preparation and operation	Deterioration of environmental sanitation conditions	Socialisation or taking a personal approach to the workers that reside in the base camp and/or undertake activities on site	PT ITA, PT ITB, PT ITC and contractor	– Observation; – Questioner; – Descriptive and qualitative data analysis; – Conduct interview to identify any involvement of community, religious leaders and head of village, to receive the positive public perception on the project.	During the operational of base camp	PT ITA, PT ITB, PT ITC and contractor	• Pringgabaya Village officials • Geres Village Officials • Sengkol Village Officials • Pujut District Officials • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
UKL-UPL	Mobilisation of equipment, material and worker	Deterioration of biodiversity	– Avoid the occurrence of reduced land flora around the base camp – Take a technology and social approach	PT ITA, PT ITB, PT ITC and contractor	– Ensure the greening effort is undertaken to conserve the habitat of biota – Undertake surveys, observations and inventories of biota condition around the power plant site – Monitor the presence of species in and around the power plant site	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok & Central Lombok Department of Agriculture • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Construction of 20kV transmission line	Disturbance on biodiversity	– Providing compensation for landowners that are affected in the area – Planting similar plant on other area around the SUTM	PT ITA, PT ITB, PT ITC and contractor	– Ensure the greening effort is undertaken to conserve the habitat of biota – Undertake surveys, observations and inventories of biota condition around the SUTM site – Monitor the presence of species in and around the SUTM site	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok & Central Lombok Department of Agriculture • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
ESHIA	Land clearing for Solar Farm and Facilities	Habitat disturbance to fauna	– Worker training on wildlife through induction, posters. – Establishment and implementation of a clearance protocol to manage encounters with fauna; – Apply no hunting and no poaching policy inside project area; – Strict prohibition on use of fuel wood and shrubs from nearby areas as fuel; – Non constructed area will be rehabilitated and revegetated as soon as land clearing and land preparation has been completed; and – Local species should be prioritised in rehabilitation and revegetation program.	PT ITA, PT ITB, PT ITC and contractor	– Observation in the project area during construction phase to make sure the land clearing just conducted in the constructed area and all policy is followed by ETC and Worker – Monitor and recording the rehabilitation and revegetation area and observing the biodiversity in the area every 6 month – Evaluation and awareness every three month to ensure all employee and worker understand with policy and applying in their activity – Monitor and record all sign board condition related to prohibition and awareness to ensure the sign board easy to read and understand	Every 3 months, during construction and operation	PT ITA, PT ITB, PT ITC and contractor	PT ITA, PT ITB, PT ITC HSE Dept.	Every 6 Month
Soil erosion and Surface Water Quality Impacts									
ESHIA	Vegetation clearance, site clearance	Soil erosion	– 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; – Vegetation cover will be maintained for as long as possible in order to prevent the erosion (water) of soil. – 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 – Topography shall be restored to the extent possible and re-vegetated to prevent soil erosion to the extent possible.	EPC Company	– Site inspection, visual assessment – Monitor and recorded the placement area of topsoil including the volume, condition and maintenance to keep the soil quality	Monthly	PT ITA, PT ITB, PT ITC HSE Dept.	PT ITA, PT ITB, PT ITC HSE Dept.	Monthly HSE Report

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
Water Resource Use									
UKL-UPL	Construction of solar farm and its supporting facilities	Increase of run off volume	– Preparing a retention water pool or equivalent at each project site to avoid muddy water from flowing directly into the road and drainage – Providing pump to pumping out the excess puddle water	PT ITA, PT ITB, PT ITC and contractor	Visual observation on sites	Daily during the construction of drainage	PT ITA, PT ITB, PT ITC and contractor	• East Lombok & Central Lombok Regional Disaster Management Agency • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
ESHIA	Daily water use for worker and water use for civil works	Impact on water availability	– Project to conduct a water study to assess the water availability and effect to local community. The project has conducted the water study which shows that the water availability within the site is sufficient for the intended use. This study will also form the basis for the issuance of the water abstraction permit. The project to apply and obtain the water abstraction permit (locally known as *Surat Izin Pengambilan Air* – abbreviated as SIPA) before install any wells at the site.	EPC Company	The amount of monthly water use is not exceed the permitted limit.	Before construction	PT ITA, PT ITB, PT ITC HSE Dept.	PT ITA, PT ITB, PT ITC HSE Dept.	Water study
Spills and Soil/Water Contamination									
ESHIA	Accidental leaks and spill	Soil and water contamination	– Spill control measures such as the storage and handling of chemicals and fuel in concrete areas with secondary containment will be implemented to minimise impacts in the event of a spill; – Use of spill control kits to contain and clean small spills and leaks; – Transport vehicles and equipment should undergo regular maintenance to avoid any oil leakages; – Unloading, loading and refuelling protocols are required for the transfer of diesel, oil and used oil respectively and workers trained to prevent/contain spills and leaks.	EPC Company	Site inspection, record keeping, training records, visual assessment	Monthly	PT ITA, PT ITB, PT ITC HSE Dept.	PT ITA, PT ITB, PT ITC HSE Dept.	Weekly HSE Report
Occupational Health and Safety									
UKL-UPL	Land preparation	Potential impacts to workers' health and safety during construction phase	– Socio culture approach is used through training or seminar to promote awareness on health and safety to the workers during construction phase – Technology approach is used through implementation of SOP on every equipment utilised during construction phase – Preparing first aid box	PT ITA, PT ITB, PT ITC and contractor	– Ensure the greening effort is undertaken to conserve the habitat of biota – Undertake surveys, observations and inventories of biota condition around the power plant site – Enforce PPE and implementation of SOP on site.	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok & Central Lombok Workforce and transmigration agency • East Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Construction of solar farm and its supporting facilities	Increase vibration	– Socio culture approach is used through training or seminar to promote awareness on health and safety to the workers during construction phase – Technology approach is used through implementation of SOP on every equipment utilised during construction phase – Coordination with village and district officials as well as local clinics should there be any disease arise as a result of reduced air quality and increase vibration	PT ITA, PT ITB, PT ITC and contractor	– Monitoring the PPV value	During construction phase	PT ITA, PT ITB, PT ITC and contractor	• East Lombok Public Health Agency • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 month

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
ESHIA	Construction of solar farm and its supporting facilities	Occupational Health and Safety of Workers	– Develop and implement a health and safety plan to be followed throughout all phases of a project. – Provide occupational health and safety orientation training to all employees consisting of basic hazard awareness, site-specific hazards, safe working practices, and emergency procedures. – 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.	PT ITA, PT ITB, PT ITC and contractor	– Periodic monitoring through a review of effectiveness of HSE training – Period monitoring on HSE report (injuries, illnesses, and fatalities) and how they are resolved – Visual observation on site throughout the safety signage in locations where physical and non-physical (e.g., chemical) hazards might occur – Regular monitoring and review of health and safety plan implementation – Periodic monitoring on HSE matters, ambient working environments and other HSE indicators.	During Construction Phase	PT ITA, PT ITB, PT ITC and contractor	PT ITA, PT ITB, PT ITC HSE Dept.	• Monthly OHS report (injuries, illnesses, and fatalities) • OHS training report every 6 months • OHS audit report every 6 months

Table 10-4 Environmental and Social Management Plan – Operation

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
Employment and Income									
UKL-UPL	Procurement activities of Labour	Increase of Job Opportunity and Income	– Socialising the recruitment process to the community, especially about the number of vacancies, qualifications and available positions – Prioritising the local workforce to be employed according to the qualification and requirements needed – Supervise the recruitment process by the contactor in accordance with Law No. 7 Year 1981	PT ITA, PT ITB, PT ITC	– The triangulation approach includes observation, interview and secondary data collection activities – Secondary data from Central Bureau of Statistics – Interviewing local community	During operation phase	PT ITA, PT ITB, PT ITC	• East Lombok & Central Lombok Public Health Agency • East Lombok Environmental and Hygiene Agency • Sengkol Village Officials • Pujut District Officials	UKL-UPL Implementation report every 6 months
UKL-UPL	Procurement activities of Labour	Social gap/ inequalities	Prioritising the local workforce to be employed according to the qualification and requirements needed	PT ITA, PT ITB, PT ITC	– The triangulation approach includes observation, interview and secondary data collection activities – Secondary data from Central Bureau of Statistics Interviewing local community	During construction phase	PT ITA, PT ITB, PT ITC	• East Lombok Environmental and Hygiene Agency • West Nusa Tenggara Environmental Agency • Sengkol Village Officials • Pujut District Officials	UKL-UPL Implementation report every 6 months
UKL-UPL	Procurement activities of Labour	Social and safety issue	Provide and communicate clear information about the Project's requirement related to employment and business opportunities and priorities locals where feasible	PT ITA, PT ITB, PT ITC	– The triangulation approach includes observation, interview and secondary data collection activities – Secondary data from Central Bureau of Statistics Interviewing local community	During construction phase	PT ITA, PT ITB, PT ITC	• Local public figure, religious leaders and the community • Local police • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Operation of Solar Farm	Economic benefit to locals as a result of the Project employment and business opportunities	Prioritising the local workforce to be employed according to the qualification and requirements needed	PT ITA, PT ITB, PT ITC	Increase in economic level of the community around the solar farms	During operation phase	PT ITA, PT ITB, PT ITC	• East Lombok & Central Lombok Environmental and Hygiene Agency • East Lombok & Central Lombok Local Income Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Operation of Solar Farm	Economic benefit to the regency	Coordinating with the regency officials in the operation of the Solar Farm to report and communicate transparently on the operation of the Solar Farm and help developing the regency	PT ITA, PT ITB, PT ITC	Increase in economic level of the regency	During operation phase	PT ITA, PT ITB, PT ITC	• East Lombok & Central Lombok Environmental and Hygiene Agency • East Lombok & Central Lombok Local Income Agency	UKL-UPL Implementation report every 6 months
Community Health, Safety and Security									

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
ESHIA	Vehicle and worker movements	Potential incident with community as a result of increase in Project traffic on a public road	– 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. – Develop traffic management plan or traffic study (ANDAL LALIN) associated with the project activities.	PT ITA, PT ITB, PT ITC, and EPC Company	– Visual observation – Periodic monitoring through audit and review of effectiveness of community development plan (health, safety, and security program) – Monitoring the status of community health and safety grievances and how they are resolved	During Operations	PT ITA, PT ITB, PT ITC	PT ITA, PT ITB, PT ITC: • Community Relations Officer • Health and Safety Officer • Security Officer	• Community development plan (health, safety, and security program) including its audit report • Community health, safety, and security incident report
ESHIA	Operation of Solar Farm	Worker interaction with community	– 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, the implementation of this procedure will be included in company regulation (both Project companies and contractor). Written warning will be issued to the relevant personnel upon inappropriate behavior, if it is not improved, further warnings will be given, and so on until termination of the worker conducted by the company; – 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.	PT ITA, PT ITB, PT ITC, and EPC Company	– Visual observation – Periodic monitoring through audit and review of effectiveness of community development plan (health, safety, and security program) including management of influx population – Periodic monitoring on the implementation of worker CoC – Monitoring the status of security investigation for proper resolution of security incidents – Monitoring the status of community health and safety incidents and how they are resolved	During Construction Phase	PT ITA, PT ITB, PT ITC	PT ITA, PT ITB, PT ITC: • Community Relations Officer • Health and Safety Officer • Security Officer	• Community development plan (health, safety, and security program) including its audit report • Community health, safety, and security incident report
Waste									

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
UKL-UPL	Management of environment sanitation system	Increase of liquid waste	– The liquid waste from toilet is directly flown through 3" PVC pipe to the portable sept tank. Then, the liquid waste inside the sept tank will be collected by licensed officer (an official agreement will be prepared separately) – Domestic waste from toilet is directly flown through 4" PVC pipe to the portable sept tank. Then, the liquid waste inside the sept tank will be collected by licensed officer (an official agreement will be prepared separately)	PT ITA, PT ITB, PT ITC	Monitor and control the collection of liquid waste by third party	During operation phase	PT ITA, PT ITB, PT ITC	• East Lombok & Central Lombok Public Health Agency • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Management of environment sanitation system	Increase of solid waste	– All solid waste is stored inside a black plastic bag and will be collected by the East Lombok Regency Hygiene officials or third party (village) officials who managing the waste	PT ITA, PT ITB, PT ITC	– Activation of lay stall – Separating organic and inorganic solid waste	During operation phase	PT ITA, PT ITB, PT ITC	• East Lombok & Central Lombok Public Health Agency • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Management of environment sanitation system	Increase of hazardous waste	– All hazardous waste is stored in hazardous waste lay stall – Hazardous waste is stored 30 working days at the maximum – Collection and management of hazardous waste is undertaken by a recommended third party	PT ITA, PT ITB, PT ITC	– Activation of lay stall – Reporting the number of hazardous waste produced	During operation phase	PT ITA, PT ITB, PT ITC	• East Lombok & Central Lombok Public Health Agency • East Lombok & Central Lombok Environmental and Hygiene Agency • West Nusa Tenggara Environmental Agency	UKL-UPL Implementation report every 6 months
Water Resource									
UKL-UPL	Monitoring and Evaluation	Reduction in groundwater volume due to cleaning of solar panel	– Using groundwater only if necessary – Groundwater extraction is adapted to the groundwater or well water supply available – Undertake reforestation program	PT ITC	-	During operation phase	-	• Central Lombok Environmental and Hygiene Agency • West Nusa Tenggara Energy and Mineral Resources Agency	UKL-UPL Implementation report every 6 months
ESHIA	Daily water use for worker and water use for solar PV cleaning twice per year	Impact on water availability	– All of the permit requirement (SIPA) for utilised ground water will be fulfilled prior to construction of deep well. – Water utilisation will consider the quantity of deep water resource and allowed amount according to SIPA – Optimizing water usage in all facilities area by application of water conservation measures such as sensor based taps, low flush urinal, etc.	PT ITA, PT ITB, PT ITC	Site inspection, record keeping, training records, visual assessment	Monthly	PT ITA, PT ITB, PT ITC	PT ITA, PT ITB, PT ITC HSE Dept.	Monthly HSE Report
Spills and Soil/Water Contamination									
ESHIA	Accidental leaks and spill	Soil and water contamination	– Spill control measures such as the storage and handling of chemicals and fuel in concrete areas with secondary containment will be implemented to minimise impacts in the event of a spill; – Use of spill control kits to contain and clean small spills and leaks;	EPC Company	Site inspection, record keeping, training records, visual assessment	Monthly	PT ITA, PT ITB, PT ITC HSE Dept.	PT ITA, PT ITB, PT ITC HSE Dept.	Weekly HSE Report

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
			– Transport vehicles and equipment should undergo regular maintenance to avoid any oil leakages; – Unloading, loading and refuelling protocols are required for the transfer of diesel, oil and used oil respectively and workers trained to prevent/contain spills and leaks.						
Occupational Health and Safety									
UKL-UPL	Operation of Solar Farm	Potential impacts to workers' health and safety during operation phase	– Socio culture approach is used through training or seminar to promote awareness on health and safety to the workers – Technology approach is used through implementation of SOP on every equipment utilised	PT ITA, PT ITB, PT ITC	– Observation and interview of workers on site – Enforce PPE and implementation of SOP on site.	During operation phase	PT ITA, PT ITB, PT ITC	• East Lombok & Central Lombok Workforce and transmigration agency • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
UKL-UPL	Monitoring and Evaluation	Potential impacts to workers' health and safety during construction phase	– Socialisation of health and safety by placement of safety board – Preparing first aid box – Technology approach is used through implementation of SOP on every equipment utilised	PT ITC	– Observation of safety board – Check the availability of first aid box – Observing the implementation of PPE while working	During operation phase	PT ITC	• Central Lombok Workforce and transmigration agency	UKL-UPL Implementation report every 6 months
ESHIA	Operation of Solar Farm	Potential impacts to workers' health and safety during operation phase	– Develop and implement a health and safety plan to be followed throughout all phases of a project. – Provide occupational health and safety orientation training to all employees consisting of basic hazard awareness, site-specific hazards, safe working practices, and emergency procedures. – 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.	PT ITA, PT ITB, PT ITC and contractor	– Periodic monitoring through a review of effectiveness of HSE training – Period monitoring on HSE report (injuries, illnesses, and fatalities) and how they are resolved – Visual observation on site throughout the safety signage in locations where physical and non-physical (e.g., chemical) hazards might occur – Regular monitoring and review of health and safety plan implementation – Periodic monitoring on HSE matters, ambient working environments and other HSE indicators.	During Construction Phase	PT ITA, PT ITB, PT ITC and contractor	PT ITA, PT ITB, PT ITC HSE Dept.	• Monthly OHS report (injuries, illnesses, and fatalities) • OHS training report every 6 months • OHS audit report every 6 months

Table 10-5 Environmental and Social Management Plan – Post-Operation

Source Document	Environmental / Social Parameters / Project Activities	Potential Impacts	Mitigation Measures	Responsibility for Ensuring Implementation of Mitigation	Means of Verification that Mitigation has been Met	Timing and Frequency of Monitoring	Monitoring Responsibility	Supervision Responsibility	Reporting Requirements
Ambient Air Quality									
UKL-UPL – Pringgabaya	Decommissioning of Solar Farm and re-forestation	Improvement on air quality and noise level	– Government Regulation of Republic Indonesia Number 41 Year 1999 regarding Air Pollution Control – Decree of State Minister for The Environment Number KEP-45/MENLH/10/1997 regarding Air Pollution Standard Index	PT ITA	– Undertake re-forestation effort by planting local plant which has economic value – Sampling by using grab sampling method	During operation phase	PT ITA	• East Lombok Workforce Agency • East Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months
Social									
UKL-UPL	Work termination	Decrease of Income leading to reduced community welfare as the solar farm is no longer in operation	Maximising the quality of workers that are terminated through training according to the agreed contract	PT ITA, PT ITB, PT ITC	– Providing information and communicating clearly to the worker about the work termination – Providing stipend fairly in accordance with the government regulation – Involve the community in monitoring and managing the project after operation phase	During operation phase	PT ITA, PT ITB, PT ITC	• East Lombok & Central Lombok Workforce Agency • East Lombok & Central Lombok Environmental and Hygiene Agency	UKL-UPL Implementation report every 6 months

11 CONCLUSION AND RECOMMENDATION

This ESHIA has been conducted to evaluate the impacts associated with the proposed solar farm project of 5MWac capacity each in three different locations, namely Pringgabaya Utara (Pringgabaya Site), Lombok Timur Regency by PT ITA, Geres Village (Selong Site), Lombok Timur Regency by PT ITB, and Sengkol Village (Sengkol Site), Lombok Tengah Regency by PT ITC. 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.

11.1 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 11-1*** 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 11-1 ESHIA Impact Assessment Summary

Impact Description	Impact Nature	Significance of Impact	Residual Impact
Impacts from loss of land resource	Negative	Negligible	Negligible
Impact to local economy from employment and business opportunities during the project construction and operation;	Positive	N/A	N/A
Construction impacts on air quality	Negative	Minor	Minor
Construction impacts on ambient noise levels;	Negative	Minor	Minor
Construction impacts from vegetation clearing	Negative	Minor	Minor
Habitat Disturbance	Negative	Negligible	Negligible
Construction impacts on habitat and wildlife	Negative	Minor	Negligible
Construction impacts soil erosion and surface water quality impacts	Negative	Negligible	Negligible
Impacts from project construction and operations water demand	Negative	Moderate	Minor
Physical presence of transmission lines on of birds and bats		Minor	Negligible
Spills and soil/water contamination	Negative	Minor	Negligible
Construction Impacts on Occupational Health and Safety of Construction Workers	Negative	Moderate	Minor
Operational Impacts on Occupational Health and Safety of Operation Workers	Negative	Minor	Negligible
Impact to community safety	Negative	Minor	Minor

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

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

11.2 RECOMMENDED FURTHER STUDIES

Due to data gaps and limitations, further study is required on:

- Considering the proximity of the project site to residential areas, ambient air quality and noise level baseline data collection is recommended to be conducted.
- In addition to air quality and noise level standards, it is also important to compare monitoring results with the baseline especially if the results exceed standards or cause nuisance to local communities. The Pringgabaya site in particular is located near stone crusher activities which most likely have decreased air quality in their surrounding area.