Monsoon Wind Power Project, Sekong and Attapeu Provinces, Lao PDR

Environmental and Social Impact Assessment

19 October 2022

Project No.: 0598121

The business of sustainability

ERM

Document details	
Document title	Monsoon Wind Power Project, Sekong and Attapeu Provinces, Lao PDR
Document subtitle	Environmental and Social Impact Assessment
Project No.	0598121
Date	19 October 2022
Version	4.2
Author	Aurora Finiguerra, Cheryl Ng, Elaine Wong, Hoa Tran, Jacopo Ventura, Mingkwan Naewjampa, Shubhankar Khare, Tirapon Premchitt, Winee Tammaruk
Client Name	Impact Energy Asia Development Limited (IEAD)

Document history

				ERM approval to issue		
Version	Revision	Author	Reviewed by	Name	Date	Comments
1	1.1	As above	Kamonthip Ma-Oon, Sabrina Genter, Les Hatton, George Chatzigiannidis, Simone Poli, Aniket Jalgaonkar	Kamonthip Ma-Oon	18-02-22	Draft to IEAD
1	1.2	As above	As above	Kamonthip Ma-Oon	25-02-22	Draft to IEAD
1	1.3	As above	As above	Kamonthip Ma-Oon	23-03-22	Draft to IEAD and ADB
1	1.4	As above	As above	Kamonthip Ma-Oon	30-03-22	Draft to IEAD and ADB
1	1.4	As above	As above	Kamonthip Ma-Oon	21-04-22	Draft to IEAD and ADB
2	2.1	As above	As above	Kamonthip Ma-Oon	29-04-22	Final ESIA Report
2	2.2	As above	As above	Kamonthip Ma-Oon	03-05-22	Disclosure ESIA
3	3.1	As above	As above	Kamonthip Ma-Oon	08-07-22	Post-Disclosure ESIA
3	3.2	As above	As above	Kamonthip Ma-Oon	23-09-22	Final to IEAD
4	4.1	As above	As above	Kamonthip Ma-Oon	27-09-22	Final to ADB

4	4.2	As above	As above	Kamonthip Ma-Oon	19-10-22	Final to ADB for Disclosure

Signature Page

19 October 2022

Monsoon Wind Power Project, Sekong and Attapeu Provinces, Lao PDR

Environmental and Social Impact Assessment

Kamonthip Ma-oon
Partner

ERM-Siam Co., Ltd.

179 Bangkok City Tower 24th Floor, Room 2402, South Sathorn Road,

Thungmahamek, Sathorn, Bangkok 10120, Thailand

CONTENTS

List of Tables

List of Figures

List of Boxes

Acronyms and Abbreviations

Name	Description
AoI	Area of Influence
ADB	Asian Development Bank
ALARP	As Low As Reasonably Practicable
ASEAN	Association of Southeast Asian Nations
BOD5	Five-day biochemical oxygen demand
CAPE	Convective available potential energy
CARE	Cooperative for Assistance and Relief Everywhere
CCRA	Climate Change Risk Assessment
CEMP	Construction and Environmental Management Plan
CESMMP	Construction Environmental and Social Management and Monitoring Plan
CF	Carbon fraction of dry matter
CIA	cumulative impact assessment
CLO	Community Liaison Officers
CO	Carbon Monoxide
COD	Commercial Operations Date
dBA	Decibels A
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DFC	Development Finance Corporation
DMC	District Disaster Management Committees
DO	Dissolved Oxygen
DONRE	Department of Natural Resources and Environment
DTM	Digital Terrain Model
EAAA	Ecologically Appropriate Area of Analyses
EDL	The state power company Electricite du Laos
EHS	Environmental, Health and Safety
EIA	Environment Impact Assessment
EIB	European Investment Bank
EMMP	Environmental Management and Monitoring Plan
EP	Equator Principles
EPC	Engineering, Procurement and Construction
EPFI	Equator Principles Financial Institutions
EPSG	European Petroleum Survey Group
ERM	ERM-Siam Company Limited
ESCAP	Economic and Social Commission for Asia and the Pacific
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan

Name	Description
ESMS	Environmental and Social Management System
EVN	Vietnam Electricity
FGD	Focus Group Discussions
GAD	Gender and Development
GDP	Gross Domestic Product
GHG	Greenhouse gases
GII	Gender Inequality Index
GIIP	Good International Industry Practice
GL	Germanischer Lloyd
GLAD	German-Laos Association Development
GOL	Government of Laos
GOV	Government of Vietnam
GPG	Good Practise Guide
GPM	Global Precipitation Measurement
GW	Giga-Watt
GWP	Global warming potential
H&S	Health & Safety
HAWT	Horizontal Axis Wind Turbine
HCB	Hexachlorobenzenze
HDI	Human Development Index
HH	Household
HIV	Human Immunodeficiency Virus
HSE	Health and Safety Executive
HSSE	Health, Safety, Security and Environment
IA	Impact Assessment
IAO	Institute of Acoustics
IBTrACS	Best Track Archive for Climate Stewardship
IEAD	Impact Energy Asia Development Limited
IEC	The International Electrotechnical Commission
IEE	Initial Environmental Examinations
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
ILO	International Labour Organization
IOA	Institute of Acoustics
IP	Indigenous People
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
IWGIA	International Work Group for Indigenous Affairs
JICA	Japan International Cooperation Agency
KBA	Key Biodiversity Area

Name	Description
KII	Key Informant Interviews
LAeq	Equivalent Continuous Sound Level
LAK	Laotian Kip (Official national currency of Laos)
LCA	Life-Cycle Assessment
LCU	Landscape Character Unit
LDC	Least develop country
LMIC	Middle income country
LREMDP	Livelihood Restoration and Ethnic Minority Development Plan
LUC	Land Use Consultants
LWU	Lao Women's Union
MAB	Man and Biosphere
MLA	Multilateral Agencies
MONRE	Ministry of Natural Resources and Environment
MoU	Memorandum of Understanding
MPI	Multidimensional Poverty Index
MPN	Maximum Probable Number
MW	Megawatt
NA	Not Available/Not Applicable
NAPA	National Adaptation Programme of Action to Climate Change
ND	Not Detected
NDC	Nationally Determined Contribution
NDMC	National Disaster Management Committee
NGO	Non-Governmental Organisations
NGPES	National Growth Poverty Eradication Strategy
NOAA	National Oceanic and Atmospheric Administration
NTP	Notice to Proceed NTP
NSEDP	National Socio-Economic Development Plan
NSSL	National Severe Storm Laboratory
NT	Near threatened
NTFP	Non-Timber Forest Product
OCSC	Office of the Civil Service Commission
OESMMP	Operation Environmental and Social Management and Monitoring Plan
OH&S	Occupational Health And Safety
ORP	Oxidation Reduction Potential
PA	Protected Area
PAP	Project Affected People
PDA	Project Development Agreement
PDR	People's Democratic Republic
PHC	Primary Health Care
PM	Particulate Matter
POESMMP	Project Owners Environmental and Social Management and Monitoring Plan

Name	Description
RP	Resettlement Plan
PRF	Provider Relief Fund
PS	Performance Standards
PSAoI	Project Social Area of Influence
QC	Quality Control
RAMSAR	Convention on Wetlands of International Importance Especially as Waterfowl Habitat
RAP	Resettlement Action Plan
ROW	Right of Way
RPM	Revolutions Per Minute
SAR	Second Assessment Report
SEP	Stakeholder Engagement Plan
SPS	Safeguard Policy Statement
SRTM	Shuttle Radar Topography Mission
SUFORD	Scaling Up Participatory Sustainable Forest Management
SW	Surface Water
TCFD	Task Force on Climate-Related Financial Disclosures
TJ	Terajoule
TL	Transmission Line
TOR	Terms of Reference
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
UCRSEA	Urban Climate Resilience in Southeast Asia
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
UXO	Unexploded ordnance
VAWT	Vertical Axis Wind Turbine
VP	Vantage Point
VSR	Visual Sensitive Receptors
VU	Vulnerable
WBCSD	World Business Council for Sustainable Development
WBG	World Bank Group
WHO	World Health Organisation
WRI	World Resources Institute
WSDI	Wind Speed/Direction Indicator
WTG	Wind Turbine Generator
WWF	World Wide Fund

Name	Description
ZTV	Zone of Theoretical Visibility

1 EXECUTIVE SUMMARY

1.1 Introduction

Impact Energy Asia Development (IEAD and/or the Project Proponent) is developing the Monsoon Wind Farm with an installed capacity of approximately 600 MW in Dak Cheung District of Sekong Province and Sanxai District of Attapue Province in Lao People's Democratic Republic (Lao PDR). The development also includes a 500 kilovolt (kV) transmission line, which connects to the grid in Vietnam (“the Project”).

IEAD signed a Memorandum of Understanding (MoU) with the Government of Lao PDR in 2011 to explore the possibility of developing a wind power project. Following the initial feasibility study, IEAD signed a Project Development Agreement (PDA) with the Government of Lao PDR on August 7, 2015 for the development of a wind power project with a capacity of 600 MW. The concession period for the Project is understood to be 25 years from the commercial operations date (COD). Construction is estimated to take approximately 30 months and COD is anticipated to be December 2025.

An Environment Impact Assessment (EIA) study for local Lao PDR permitting requirements was conducted in June 2014 (EIA 2014), and a second and third revision was conducted in May 2018 (EIA 2018), and September 2020 (EIA 2020), respectively. Innogreen Engineering Co., Ltd (Innogreen) on behalf of the Project Proponent has revised the local EIA (EIA 2020) due to significant changes in the Project design and the local EIA has approved by MONRE on 28 July 2022.

ERM-Siam Company Limited (ERM) was contracted by IEAD to conduct an Environmental and Social gap analysis of the local EIA against the Lenders’ applicable standards including an initial biodiversity review (Phase 1). ERM completed Phase 1 and submitted the final gap analysis report to IEAD in March 2021. The Phase 1 report also recommended a Terms of Reference (TOR) to fill the gaps identified.

It is understood that part of the Project area is overlapping with a Bauxite mine concession area granted to Viet Phoung, which signed its concession with the Government of Laos (GOL) in 2018, therefore, the relocation of Project facilities in the overlapping areas is potentially required. This includes the cluster of nine WTGs, the main 500 kV substation, and a short portion of the 500 kV transmission line route. The Project facilities will be relocated once the final design is completed. Once the relocation areas are identified and the additional studies are complete, an addendum to address the relocation will be prepared to complement the final ESIA (“ESIA Addendum”). The ESIA Addendum will provide updates of the relocation of Project facilities, the additional survey results, the potential impacts, and additional mitigation measures and monitoring program that may be required. Any changes should also be aligned with the lenders’ E&S requirements. No pre-construction or construction work will be conducted at the proposed relocation sites until the required E&S assessments are completed. The detailed scope of the ESIA Addendum has been prepared and shared with ADB.

1.2 Legal and Institutional Framework

This ESIA has been undertaken with reference to the provisions of the requirements, standards, policies, laws, rules, guidelines, manuals, and international conventions and treaties. In addition, international standards and best practices on environmental and social safeguards were reviewed to identify all possible risks and impacts from project development and appropriate measures to minimize and mitigate the risks to the extent possible. The regulatory framework for this ESIA includes in the following.

- The Lao PDR legislation, policies, standards, and guidelines that have been ratified by Lao PDR and are applicable to the Project.
- The Project shall comply with comply with the ADB Safeguard Policy Statement (2009), ADB Social Protection Strategy (2001), ADB Gender and Development Policy (1998), ADB Access to

Information Policy (2018) and relevant World Bank / IFC EHS Guidelines / IFC PS / JICA ESC Guidelines.

- The Project will be undertaken to, as much as possible, comply with International Conventions including United Nations Convention on Biological Diversity (1996) and Coherence with Sustainable Developmental Goals and the Paris Climate Agreement as minimum.
- The Project shall comply with Lao environmental, social, health and safety laws, or associated WBG EHS Guidelines, whichever is more stringent.

1.3 Project Description

1.3.1 Project Background and Objectives

IEAD is developing a wind farm, with a total installed capacity of approximately 600 MW, and a 500 kV transmission line in Dak Cheung District of Sekong Province and Sanxai District of Attapue Province in Laos (the Project). The Project has been developed under an exclusive right granted by the GOL through a Memorandum of Understanding (MoU) and Project Development Agreement (PDA) executed in November 2011 and August 2015. This Project is also the first cross-border wind power project to be approved by the GOL and Government of Vietnam (GOV) in accordance with the MoU to supply power from Laos' projects to Vietnam Electricity (EVN).

The development also includes a 22 km 500 kV transmission line, which connects to the grid in Vietnam. The Right of Way (ROW) of the transmission line is 70 m (35 m on each side from the centre line). The generated electricity is expected to be sold to Vietnam Electricity (EVN).

1.3.2 Project Location

The Project is located in Dak Cheung District of Sekong Province, and Sanxay District of Attapeu Province in Laos (731355.38 m E, 1701111.82 m N). It lies approximately 560 km southeast of Vientiane, the capital of Laos, and approximately 48 km east of the provincial capital, Sekong.

The wind farm development area (excluding the transmission line) is approximately 70,828 hectares[1]. The 500 kV transmission line runs northeast from the development area, across Dak Cheung District, to the Laos-Vietnam international border.

1.3.3 Project Facilities and Components

The major facilities and components of the Project are described in the following.

- Permanent facilities include wind farm, transmission lines and Project access road as described in the following.
  - A wind turbine is a device that captures the wind's kinetic energy and converts the energy into electricity using a generator. A total of 133 wind turbines of Envision will be used for the Project.
  - The Project includes the development of a 22 km 500 kV overhead transmission line to evacuate power generated from the wind farm and connect it to the Vietnam electricity grid. The Right of Way (ROW), comprising a width of 70 m (35 m horizontally on each side from the transmission centerline), is the area of land that will be used to locate, construct, operate, and maintain the transmission line. In addition, the Project includes the construction of underground and overhead 35 kV and 115 kV transmission cables to transfer electricity to the substation within the development area. The substation will be connected with a 500 kV transmission cable to transmit electricity to Vietnam. The Right of Way (ROW) of 35 kV and 115 kV transmission lines are 25 m (12.5 m on each side from the centre line) and 8 m (4 m on each side from the centre line) respectively.
  - The internal road system within the Project development area will be newly built connecting to turbine towers with the pavement width of 5.5-6.0 m, 1 m width of drainage will be built parallel each side of internal road; designed speed of 15 km/h. type of internal road is covered with crushed stone layer (thickness is 30 cm). Sediment controls will be installed to collect sediment. The mortar rubble drainage ditch and the reinforced concrete pipe culvert with a diameter of 1 m will be set up according to the actual situation on site.

[1] It should be noted that the Projects' concession area will be the land required to install and construct project facilities and ROW for related transmission line, which is around 1,050 ha.

- Ancillary facilities include concrete batching plants, laydown areas, worker accommodation, spoil disposal areas. The ancillary facilities will be located in a flat and open area that is near the existing public road.
- Shared facilities of the Project have also been identified.

1.3.4 Project Associated and Related Facilities

Associated Facilities are defined in the ADB SPS as "*facilities that are not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project*."

Associated Facilities are defined in the IFC PS "Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable"

There are no associated facilities identified for this Project. Other related facilities have been assessed as to whether these are associated facilities. However, these have **not** been considered as associated facilities as per ADB SPS definition as per the rationale provided below:

- The 500 kV Station of Vietnam (Thanh My Station) and the transmission line route in Vietnam. As mentioned in ***Section 4.3.3***, this project is not funded by ADB or the Developer and is being conducted by ENV, which means that funding is provided separately by the borrower/client or by third parties. In addition, the viability and existence of the project is not exclusively for successful operation of the project, but are also being developed for more than just the Project Associated Facilities.EVN plans to use the 500kV line for other imported power projects from Sekong province. The maximum capacity of this 500kV double-circuit is approximately 4,000MW. Based on Vietnam's draft power development plan (PDP8), there is a planned 200MW hydro power project to connect to the Project substation and transmission line. In the agreed PPA and Concession Agreement, EVN and GOL, respectively, allow other Projects to connect to the transmission line and sell electricity to Vietnam.
- Road No. 16 B improvements that connecting Lao PDR, Thailand and Vietnam from west to east. This road will be used for the transportation of construction equipment. The upgrade of this road was completed in 2021 by the Government of Laos. As the Government of Laos funded the upgrade of the road, the road therefore is not considered as an associated facility, as it is not funded as part of the project. In addition, as the road network will not be utilized for only this Project and is not funded by the developer or ADB, it cannot be considered an associated facility since the viability and existence does not depend exclusively on the project, but is develop for other uses as well.

1.3.5 Waste Management

Solid waste disposal and wastewater management can be 4ecognize4 in the table below.

Topic	Phase	Estimated Volume	Details
Solid waste disposal	Construction Phase	■ The estimated waste generation rate of 0.8 kilogram/worker/day. For an average of 700 construction workers, the total volume of municipal wastes is estimated to 560 kilograms/day and is composed of food wastes, plastic bags and paper scraps (as per the EIA, 2020).	■ Solid waste generation can be divided into two categories that are from construction activities and from worker consumption. The solid waste generation from construction activities will include concrete, structural steel, wooden crates etc. ■ The hazardous waste will include diesel oil, paint, etc. ■ Bunded, hardstand and roofed areas are a general requirement for hazardous

Topic	Phase	Estimated Volume	Details
		■ The amount of solid waste will be depended on the actual situation of the project construction phase.	waste. The solid waste generated during the construction phase will be collected and segregated for recyclable and non-recyclable waste (i.e. paper, plastic). The solid waste will be stored in temporary storage areas, disposed, and recycled according to the requirement of Lao.
	Operational Phase	■ The actual amounts of waste to be generated by the Project are currently not available.	■ There is no waste generation from the production process. Waste generation will be from the consumption of employee. ■ The solid waste generation will include food wastes, scrap papers and plastics that will be sent to the authorized agencies for further disposal. Papers, water bottles, glasses, metal and plastics will be recycled. The hazardous material will include diesel oil, paint, etc. ■ A Waste Management Plan for construction and operation will be required including the estimated types, volumes, and disposal routes.
Wastewater	Construction Phase	■ Wastewater is mainly generated from the toilet used by construction workers that is equivalent to about 80% of the volume of consumption water or about 16 cubic meters/day.	■ The project requires the contractor to provide mobile toilet tanks with sufficient storage tanks for use by workers.
	Operational Phase	■ There is no water-use in the production process. ■ Wastewater is mainly generated from the consumption of the estimated 53 employees, the volume of wastewater from consumption, washing and other activities is approximately 1 cubic meter/day (as per the EIA, 2020).	■ The waste water will be treated initially by waste water treatment tank before using the service of the septic service company for disposal.

1.3.6 Project Activities

Key activities to be conducted over the life of the Project are outlined in the following.

Phase	Details	Schedule
Pre-construction Phase	■ All work will be conducted in accordance with the detailed master construction schedule, provided by the EPC Contractor. Prior to commencement of work, all contractors would be required to provide detailed site specific plans. ■ No land take, or dispossession of assets and no ground clearance or project activities shall take place unless consent has been obtained from affected ethnic communities and land acquisition and compensation activities are completed for the project component following a land acquisition and resettlement plan and Indigenous Peoples Plan which meets the International regulatory framework.	-
Construction Phase	■ The EPC Contractor will prepare the site for construction, erection, and installation of the Project facilities, which will include earthwork activities, such as site clearing and soil excavation. The construction, design, and testing will be undertaken in accordance with the appropriate construction standards and the Laos' Decision on National Environmental Standards (No. 81/GOV, 2017).	30 months
Operation, and Maintenance Phase	■ After the completion of the installation of wind turbines and the arrangement for the commencement of the production of electricity, there will be the officer to control, supervise, and maintain the wind turbine system in accordance with the agreement made with the manufacturer of the turbine. The frequency of the maintenance of 1 turbine generating electricity is approximately 2 times per year in order to verify the integrity of the hydraulic system, lubricants system, transformer and blade.	25 years
Operational Phase	■ No information is currently available on the decommissioning of the Project. It is noted that decommissioning will need to be conducted under the prevailing laws and standards of Lao at the time of decommissioning activities	-

1.3.7 Project Alternatives and Environmental and Social Considerations

This section provides an overview of the project alternatives considered for the project including alternative power generation, site selection, technology and locations. This data was provided by IEAD.

- No project alternative: The 'no project alternative' considers the consequences in case a decision not to proceed with the Project is made. In this scenario, the possible positive and negative impacts of the proposed activities on the receiving environment and social receptors would not occur.
- Alternative on wind turbine and facilities layout: From data provided by IEAD, it is noted that the turbine layout has been optimized from 240 turbines to 148 turbines and then further refined to 133 turbines, by considering the use of turbine technology that can generate more power per turbine, therefore reducing the total number of turbines required to achieve the desired power output. Numerous re-routing and micro-siting activities have been conducted for the ESIA including:
  - Re-routing of the access roads and internal transmission lines was conducted to avoid cemetery areas and biodiversity areas.
  - Relocating WTGs to avoid significant shadow flicker and noise impacts.
- Previously, Goldwind's technology (148 turbines) impacted a total of 246 HHs with a total loss of 130.47 ha of agricultural land (5.4 ha permanently affected and 125.07 temporarily affected) and

593.03 ha of NTFP collection area (153.05 ha permanently affected and 439.98 ha temporary affected) and overlap with 5 cemeteries and Phou Koungking Mountain.

- The layout 7ecognize7on to Envision's technology (133 turbines) has resulted in 378 affected HHs, 185.83 ha of agricultural land loss (29.31 ha permanently affected and 156.53 ha of temporarily affected, 535.48 ha NTFP collection area loss (150.79 ha permanently affected and 384.69 ha temporarily affected), 608.93 ha of communal land loss (160.37 ha permanently affected and 448.56 ha temporarily affected) and Phou Koungking Mountain. It is noted by the site team (Innogreen) that increased agricultural activities were observed during DMS survey in May – June 2022 compared to November – December 2021 when the asset registration survey was conducted. This may contribute to increased number of affected HHs and area of impacts despite the number of WTGs have been reduced from 148 to 133 WTGs.
- Envision layout also avoids impacts to all cemeteries; however, overhead transmission line will pass over Dak Bong cemetery. It is noted that the transmission line is 70 m above the ground and no physical impacts (e.g. land clearance, earthwork, etc.) will be made Dak Bong cemetery area. The consultation with Dak Bong village on 21 July 2022 suggested that cutting of trees within ROW in cemetery area to maintain the tree height under 3 m[2] is allowed; however, the Project is required to provide budget for the village to prepare and perform specific rituals to seek permission from spirits for such activities.
- Alternative on transmission line route: prior to the decision to export the electricity to Vietnam, the Project considered the transmission line was to connect the Project via a 150 km 230kV transmission line to the Ban Lak 25 substation in in Pakse, Champasak Province. This routing intersects with two Key Biodiversity Areas (KBAs). The plan was amended in order to connect to a 500 kV station of Vietnam (Thanh My Station) with an overall length of 66 km (around 22 km in Laos). The Laos to Vietnam option reduces the overall potential for impacts from forest clearing, impacts to agricultural land and livelihoods, and potential increased physical displacement. Two alternative alignments for the 500 kV transmission line were also considered. In addition, through the ESIA process, re-routing of facilities has been conducted to reduce impacts on environmental and social receptors, this has included:
  - Re-routing of the access roads and internal transmission lines was conducted to avoid cemetery areas (all cemetery area in the development area)
  - In July 2022, transmission line route and 500 kV substation have been slightly adjusted to avoid four (4) permanent residential buildings.
- Alternative on technology: A comparison of the wind turbine technologies in terms of axis of direction, efficiency, location, design complexity, safety, and noise generation of VAWT, HAWT, other technologies, are considered.
- Alternative on site selection: IEAD selected the site based on wind direction and speed in potential areas in Laos. The Wind Energy Resource Atlas of Southeast Asia conducted by the World Bank (World Bank, 2001), outlines the wind energy potential in the project location areas and the study areas (located in Dak Cheung District of Sekong province and Sanxay District of Attapeu Province). The site was selected prior to commencing the ESIA and as such, the alternatives assessment of the ESIA focuses on re-routing of facilities within the designated area.
- Alternative method of power generation: several alternatives including renewable energy alternatives as well as other alternatives for power generation such as conventional thermal power plants, are considered and compared.

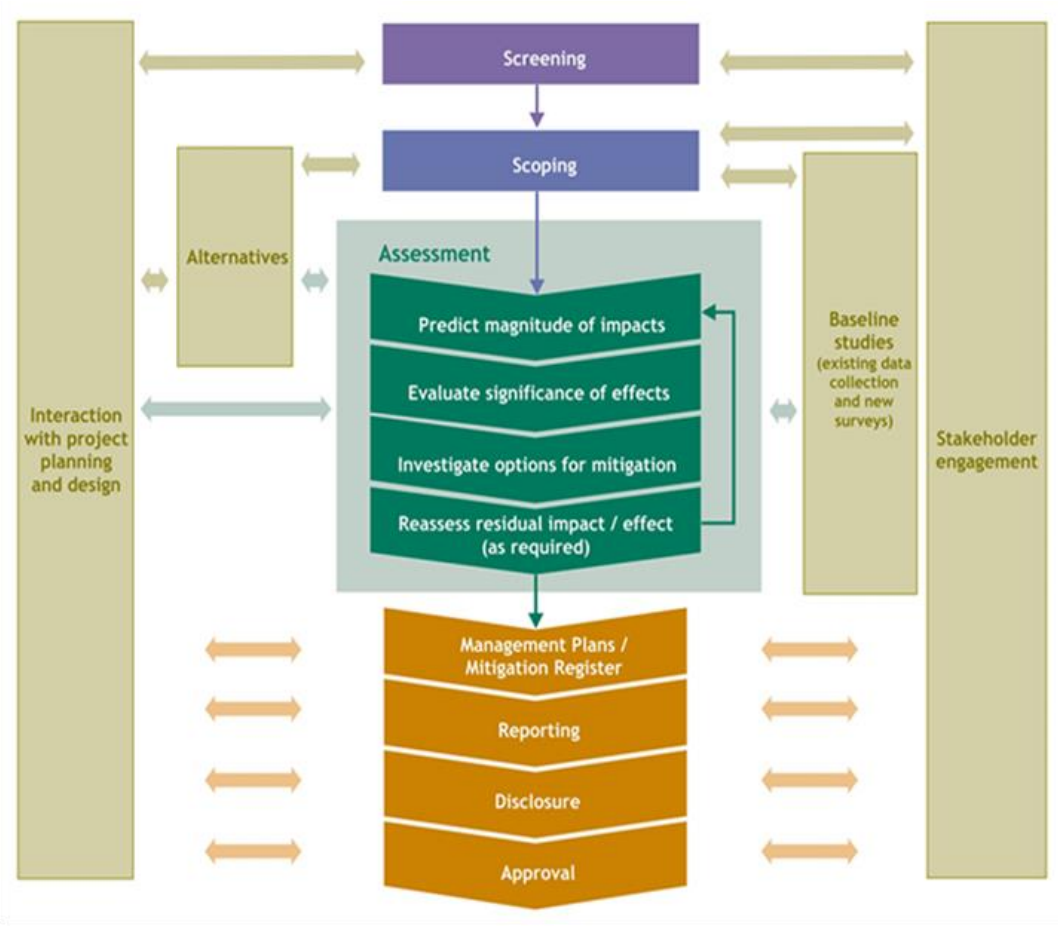
[2] The Regulation on Safety for High Voltage Transmission Line and Substation, EDL/ 2013 prescribes that trees taller than 3 m are prohibited within the ROW area. Therefore, there is a need for the Project or relevant authority to maintain the height of trees under 3 m.

1.4 Impact Assessment Methodology

This section presents the methodology used to conduct the Environmental and Social Impact Assessment (ESIA) for the Project. The Impact Assessment (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 is planning to avoid, reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable.

The methodology has followed the approach illustrated in ***Figure 1-1***

Figure 1-1: Overall Impact Assessment Approach



Source: ERM, 2019

This section also details the methodology used for the collection and analysis of primary and secondary data used in this report. Primary and secondary information from the Project Owner, government sources, non-governmental organisations (NGOs) and other Project-related stakeholders have been collected to support the preparation of this report.

Screening

The screening was conducted utilizing a high-level description of the Project and its associated facilities, including available information regarding the project design and existing environmental and social conditions, applicable regulatory framework for the Project etc. in order to provide a summary of initial findings on potential project impacts and to guide development of the ESIA.

Scoping

Scoping has been undertaken to delineate the potential Area of Influence for the Project (and therefore the appropriate Study Area) and to identify potential interactions between the Project and resources/ receptors in the Area of Influence. It also helps in developing and selecting alternatives to proposed action and in identifying the issues to be considered in this ESIA. A scoping exercise was completed as part of the gap analysis undertaken by ERM.

Project Boundary and Area of Influence

In order to set out the scope of the Project features and activities, with particular reference to the aspects, which have the potential to impact the environment, a Project Description has been prepared. Details of the Project facilities' design characteristics, as well as planned and possible unplanned Project activities, are provided in ***Section 4*** of this ESIA Report. The Project Area of Influence (AoI) is also defined in ***Section 8*** of this ESIA Report.

Baseline Data Collection

To provide the 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 presented. The baseline includes information on all resources/receptors that were identified during scoping as having the potential to be significantly affected by the Project.

The baseline takes into account current conditions, as well as those changing conditions apparent in the Baseline and takes into consideration other developments within the Project area, which are underway or certain to be initiated in the near future. These developments are considered in the assessment of cumulative impacts and effects.

Impact Assessment Process

Impact identification and assessment starts with scoping and continues through the remainder of the ESIA Process. The principal ESIA steps comprise:

- Potential 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 Measures: to identify appropriate and justified measures to mitigate potential negative impacts and enhance potential positive impacts; and
- Residual Impact Evaluation: to evaluate the significance of potential impacts assuming effective implementation of mitigation and enhancement measures.
- Cumulative Impact Assessment Process

In order to gain an understanding of the projects overall contribution to impacts, a cumulative impact assessment (CIA) was undertaken. Whilst total cumulative impacts due to multiple projects within a given area should be identified within government-led spatial planning efforts, the Project owner needs to determine the degree to which it is contributing to these overall cumulative impacts. The ESIA and CIA are prepared based on similar logical framework, analytical process and tools. Unlike the ESIA that centers on the Project as a source of impacts, the CIA focuses on VECs under influence from different projects. In a CIA, the overall resulting condition of the VEC and its related viability are assessed.

- Management, Monitoring, and Audit

The final stage in the IA Process is the 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/ guidelines; and b) mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted.

Risk Assessment for Unplanned Events

To evaluate potential impacts from unplanned events, a risk-based approach is used to define: 1) the most likely unplanned events leading to environmental, social and/or community health impacts; and 2) those unplanned events with the most significant potential environmental, social and/or community health impacts overall. Impact significance for unplanned events is therefore determined by evaluating the combination of likelihood and consequence.

1.5 Stakeholder Engagement

The Project's information disclosure and consultation activities have been driven by the principles of meaningful consultation and Informed Consultation and Participation (ICP). The Project started to engage affected IPs in 2014 when the Project was initiated. PAPs and relevant participants such as governmental organizations and relevant Ministries were included in the stakeholder engagement activities. Such activities included consultation meetings at the village level (November 2014 and September 2020), district level (May 2016), and a meeting with technical personnel (July 2018).

During the ESIA preparation in November – December 2021, the engagements sought to update its understanding of project impacts, including perspectives of IPs and vulnerable groups such as women and youth through focus group discussions (FGDs). FGDs with livelihood groups, IPs, women, youth and vulnerable groups and key informant interviews (KIIs) with village head and healthcare representative were undertaken in 31 villages directly and indirectly affected by the Project. The consultations were two-way communications undertaken in atmosphere without coercion/intimidation whereby views of affected peoples were included in the Project design, ESIA and management plans. The consultations were conducted in Lao where the village head or Village Coordinator was present during the consultation to facilitate translation to Triang language, particularly for women and elderly who have limited capability in communication in Lao language.

In February 2022, the Compensation Committee arranged a meeting to consult village heads of 23 villages in Dak Cheung District, Sekong Province on compensation unit rates which were later approved on 31 March 2022. During 30-31 March 2022, the Compensation Committee consulted with five villages including Dak Nong, Dak Padou, Dak Samor, Dak Xeum, and Dak Yok on compensation unit rates which were later approved on 12 May 2022. It is noted that the Committee utilized this approach as a means to conduct market price survey for its consideration of determination of compensation unit rates.

Detailed measurement survey was conducted during 17 May to 21 June 2022 in Dak Cheung District, Sekong Province and 14-18 June 2022 in Sanxay District, Attapeu Province.

Following the completion of ESIA study and development of management plans (MPs), information related to ESIA findings, proposed mitigation measures and MPs were disclosed to PAPs in July 2022 in 16 villages through a presentation and disclosure booklet in Lao. The participants of the consultation include village heads and PAPs – women were ensured to participate in the sessions in all villages, Project developer (IEAD) and its local E&S consultant (Innogreen) and international E&S consultant (ERM), lenders' E&S representatives including ADB (and Artelia as its lender E&S advisor), DEG (also representing FMO), AIIB and JICA. After the presentation, the participants were also given opportunities to ask questions, share their concerns or needs to the Project developer or the E&S consultants. The participants were consulted after the information disclosure activity with focus on understanding villagers' beliefs towards the Phou Koungking (Koungking Mountain), villagers' concerns regarding Project development in Phou Koungking area and Dak Bong cemetery and villages' requirements for such activities and their assessment on the impact of the project on their dignity, culture and community as defined by them. These consultations also served as venue for everyone to understand resettlement and compensation process and receive feedback on proposed livelihood restoration plan and community and ethnic group development plan (CEGDP).

The information disclosure and consultations were undertaken with the following villages in September 2022 with the same objectives and approach as those conducted in July 2022.

PAPs' Concerns and Project's Addressal of the Concerns

The PAP's concerns and how they have been addressed are summarized in ***Table 1-1***.

Table 1-1: Summary of Consultations

Date	Location	Issues and Concerns	Considerations in the ESIA or Project Design/Actions Taken
12-21 Nov 2014	16 villages located in the Project area and nearby areas	■ The Project should provide funding and assistance to improve water supply system (e.g., gravity-fed) to the villages and irrigation systems for rice paddies. ■ The Project should help to improve the access road to the village and within village and the access roads to production land e.g., rice, coffee, and cassava plantations. ■ The Project should provide funding and assistance to establish and improve school facilities, supplies and personnel. ■ The Project should provide funding and assistance to establish and improve dispensary and healthcare centres in the villages. ■ The Project should provide funding assistance to establish a village administrative office. ■ People in the potentially affected villages should be able to benefit (i.e., access to electricity generated by the Project). ■ The Project should provide reasonable and fair compensation to those households affected by land acquisition. ■ The Project should provide assistance to poor families in the affected villages. In addition, the Project should provide assistance for improvement of vocations in the villages and offer job opportunities for the village members to work on the Project. ■ Request for the Project to provide financial support to the villages/village fund/monthly tax to the villages.	■ Information dissemination is considered in the ESIA and SEP. A SEP will be prepared for the Project including future and on-going engagement required to ensure stakeholders are provided sufficient information on the potential impacts. ■ The impact assessment including information on mitigation measures for the social receptors is provided in ***Section 9.5*** of the ESIA Report. ■ Impacts to livelihoods and land use, including rice paddies, is included in ***Section 9.5.3*** of the ESIA Report. This includes proposed mitigation measures. ■ Land and economic displacement is assessed in ***Section9.5.3*** of the ESIA Report. This includes proposed mitigation measures. The Project will ensure all required processes for land acquisition are conducted in conjunction with relevant stakeholders. ■ Impacts and processes for land acquisition are provided in ***Section 9.5.3*** of the ESIA Report. Note that this is based on preliminary land and asset registration undertaken by Innogreen in November and December 2021. ■ Village heads will be informed prior to construction, this commitment is included in ***Section 10 (ESMP***) of the ESIA Report.
7-26 Sep 2020	18 villages located in the Project area		
November – December 2021	31 villages located in the Project area	The Project should minimise impacts to sensitive receptors and houses and paddy field as much as possible.	■ The impact assessment including information on mitigation measures for the social receptors is provided in ***Section 9.5*** of the ESIA Report. ■ Impacts were minimized by reducing the number of WTGs

Date	Location	Issues and Concerns	Considerations in the ESIA or Project Design/Actions Taken
			under a new design and avoiding houses and minimize impacts to paddy fields.
		The Project development will impact the cultivation land, particularly rice paddy field as suitable land for rice cultivation is highly limited due to mountainous terrain of the region.	■ Impacts to livelihoods and land use, including rice paddies, is included in ***Section 9.5.3*** of the ESIA Report. This includes proposed mitigation measures.
		The Project should ensure that there will be no encroachment into villagers' land containing houses/dwellings.	■ Land and economic displacement is assessed in ***Section 9.5.3*** of the ESIA Report. This includes proposed mitigation measures. ■ The Project will ensure all required processes for land acquisition are conducted in conjunction with relevant stakeholders.
		Concern about nuisance from noise from wind turbines during operation.	■ Noise impacts (including from turbines) are assessed in ***Section 9.3.7*** and ***Section 9.5.7***of the ESIA Report. This includes proposed mitigation measures. ■ WTGs have been relocated to ensure distance from villages. The nearest WTG to village is located more than 500 m from the village
		Concern about nuisance from shadow flicker and negative impacts on agricultural productivity.	■ Shadow flicker impacts are assessed in ***Section 9.3.10*** and ***Section 9.5.7*** of the ESIA Report. This includes proposed mitigation measures. ■ Impacts were minimized by reducing the number of WTGs under a new design and avoiding houses and minimize impacts to paddy field
		Concern that the Project development may impact cemeteries of the village.	■ Impacts to cemeteries and other cultural heritage are assessed in ***Section 9.5.9*** of the ESIA Report. This includes proposed mitigation measures. ■ Project layout has been optimized to avoid impacts to all cemeteries
		Some people expressed that they cannot articulate their concerns as they do not have sufficient information about the Project and its potential impacts	■ Information dissemination will be considered in the ESIA and SEP. A SEP (this document) has been prepared for the Project including future and on-going engagement required to ensure stakeholders are provided sufficient information on the potential impacts. ■ Project Information disclosure and consultations were

Date	Location	Issues and Concerns	Considerations in the ESIA or Project Design/Actions Taken
			conducted in July 2022. Refer to ***Section 8.5.2*** for more details.
		Concerns about unfair compensation for those impacted by land acquisition of the Project, and there will be no replacement land for cultivation and animal husbandry and therefore people will lose their main source of livelihood.	■ Impacts and processes for land acquisition are provided in ***Section 9.5.3*** of the ESIA Report. Note that this is based on preliminary land and asset registration undertaken in November and December 2021. ■ RP and livelihood restoration programs have been developed.
		Concerns around safety of life and property and livestock of households nearby the wind towers and safety of those that conduct agricultural activities under the transmission line.	■ Impacts to community health and safety are assessed in ***Section 9.5.4*** of the ESIA Report. This includes proposed mitigation measures.
		Prior to commencement of the Project construction, the village heads should be informed.	■ Village heads will be informed prior to construction, this commitment is included in ***Section 10*** (ESMP) of the ESIA Report.
		The people in the affected villages were not sure if they can use electricity generated by the Project.	■ Household solar power systems will be provided to the affected villages. Priority will be given to the households affected by the Project's land acquisition, then poor households within the Project's affected communities, and finally the entire the affected villages if possible. Refer to ***Section 9.5.2*** and CEGDP for more details.
		During construction and operation of the Project, there will be influx of workers and people from outside to the villages. There are concerns that these people may bring transactional sex to villagers, disrupt community dynamics, increase gender-based violence, and/or negatively impact on public infrastructure and resources.	■ Impacts from worker influx are assessed in ***Section 9.5.6*** of the ESIA Report. This includes proposed mitigation measures.
		Concerns about the Project's impact on landslides	■ Impacts from unplanned events (including those impacts as a consequence of natural hazards) are assessed in ***Section 9.6.3*** of the ESIA Report. This includes proposed mitigation measures.
		Concerns about the Project's impacts to forest resources as people are highly dependent on NTFP collection from the forests.	■ Impacts on communities' livelihoods associated with NTFPs are assessed in ***Section 9.5.3*** of the ESIA Report. This includes proposed mitigation measures.

Date	Location	Issues and Concerns	Considerations in the ESIA or Project Design/Actions Taken
			■ Livelihood restoration programs and CEGDP has been prepared.
July and September 2022		**Main concerns include** ■ Impacts to agricultural land ■ Safety risks associated with transportation of Project components during construction. ■ Wastewater and sedimentation from project construction activities will enter the water sources of the village ■ Impacts of WTGs during operation to productivity of agricultural land. ■ Noise from WTGs ■ Dust from construction activities ■ Concerns about impact of Project land acquisition on rice paddies as currently they hardly have sufficient rice for consumption ■ The Project must compensate for any impacts on land according to the laws ■ Concerns related to influx ■ CDP Needs and priority ■ Healthcare facility improvement and medical supplies and transportation to healthcare facility ■ Support plantation of fruit trees such as pomelo, rambutan, etc. ■ Support on education supplies and sport equipment ■ The Project to ensure that the roads are not too dangerous where villagers can also use it ■ Water supply and Irrigation system as the village experiences water shortage during dry season ■ Village office with computers ■ The Project to comply with village's Heet-Kong ■ Scholarship for higher education ■ Livelihood/Occupation/Vocational training ■ Project employment ■ Support on livestock raising and agriculture ■ Water supply and irrigation system ■ The Project to provide support on village office ■ The Project to provide assistance to poor households	■ Impacts to livelihoods and land use, including rice paddies, is included in ***Section 9.5.3*** of the ESIA Report. This includes proposed mitigation measures. ■ Land and economic displacement is assessed in ***Section 9.5.3*** of the ESIA Report. This includes proposed mitigation measures. The Project will ensure all required processes for land acquisition are conducted in conjunction with relevant stakeholders. ■ Noise impacts (including from turbines) are assessed in ***Section 9.3.7*** and ***Section 9.5.7***of the ESIA Report. This includes proposed mitigation measures. ■ Impacts associated with shadow flickers are assessed in ***Section 9.3.8*** of the ESIA report. This includes proposed mitigation measures. ■ WTGs have been relocated to ensure distance from villages. The nearest WTG to the village is located more than 500 m from the village ■ Impacts were minimized by reducing the number of WTGs under a new design and avoiding houses and minimize impacts to paddy field. ■ Impacts on surface water quality is assessed in ***Section 9.3.6*** of the ESIA report. This includes proposed mitigation measures. ■ Impacts on air quality are assessed in ***Section 9.3.4*** of the ESIA report. This includes proposed mitigation measures. ■ Shadow flicker impacts are assessed in ***Section 9.3.10*** and ***Section 9.5.7*** of the ESIA Report. This includes proposed mitigation measures. ■ Community Health and safety impacts are assessed in ***Section 9.5.4*** of the ESIA report. This includes proposed mitigation measures. ■ RP and Livelihood restoration plan have been prepared to

Date	Location	Issues and Concerns	Considerations in the ESIA or Project Design/Actions Taken
			minimize impacts to affected people from Project land acquisition. ■ CEGDP has been prepared to reflect community needs. ■ CHMP has been developed to ensure Project's compliance to villages' Heet-Kong. ■ Village heads will be informed prior to construction.This commitment is included in ***Section 10*** (ESMP) of the ESIA Report

1.6 Environmental and Social Baseline Conditions

This chapter summarizes the existing physical, biological and social conditions in the Area of Influence (AOI), focusing on the resources/receptors that may be impacted by the Project. Information in this chapter is based on studies undertaken by the local EIA (Innogreen & Greener Consultant, 2022), a desktop review of publicly available information, and the additional noise, landscape and visual, biodiversity, and social baseline studies undertaken in 2021 to 2022 by Innogreen, with ERM's guidance, during preparation of this ESIA.

The environmental setting of the site is presented in ***Table 1-2***.

Table 1-2: Summary of Environmental and Social Baseline Conditions

Receptor	Description
Topography	■ The Project Area is mostly on the slopes of hills and high mountainous area, the elevation ranges from about 1,000 – 1,200 m above sea level.
Geology and soil	■ Soil in Dak Cheung District, Sekong Province is divided into six soil groups and nine types of soil based on the original rocks, condition of the location, identified layer, and identified characteristics of the soils. The area is primarily composed of heavy clay, clay loam, and loamy sand ■ Soil in Sanxay District of Attapeu Province is divided into six soil groups that is classified into 13 types of soil based on the original rocks, condition of the location, identified layer, and identified characteristics of the soils. The soil areas are primarily composed of clay loam, hard clay and loamy sand.
Climate and mereology	■ The weather condition of Dak Cheung District and Sanxay District is mostly cold and with light drizzling rain over almost the entire year. The rainy season is between March and July, whereas the dry season runs from August to October. Over the past five years, a slight change in the temperature has been observed, with an increase of about 1-2 degrees Celsius (EIA, 2020).
Ambient air quality	■ Based on the local EIA (EIA, 2022), parameters measured were in line with the Laos national air quality standards for all parameters. ■ This indicates that the ambient air quality within and around the Project area is in good condition.
Ambient noise	■ Noise sampling conducted for the ESIA demonstrates that the four (4) monitoring locations met the World Bank Group (WBG) Criteria which is more stringent than Lao National Ambient Noise Standard for most of the monitoring duration in the daytime (07:00 – 22:00). The exceeded noise level measured in the night-time (22:00-7:00) were likely due to interference of the local activities such as household activities, the movement of in-used vehicles, and animal (chicken, dogs, and buffalo).

Receptor	Description
Surface water quality	■ Based on the local EIA (EIA, 2022), the parameters of SW01, SW02, and SW05 were within Laos regulations. The parameters of SW03 and SW04 were mostly within the standards except for measurements of phenol (C6H6O). The area consists of natural high and steep rock mountains, which may contain minerals underground. There is frequent rainfall that causes water to flow over various sources that may cause the water contamination. ■ Surface water sampling conducted for the ESIA demonstrates that most of parameter were in line with the National Environmental Standards No.81/MONRE 2017 except COD at SW03-5 and Coliform Bacteria at SW03.
Landscape values and visual amenity	■ 19 viewpoints have been identified within the Study Area, in order to be exhaustive of different landscape components. These viewpoints are referred to as Visual Sensitive Receptors (VSRs). They represent points within the view shed from where people will be able (or not) to see the Project, and where the quality of the landscape and visual resources of people could be affected by the presence of the Project. ■ When assessing the visual impact of the wind turbines, it is assumed that the largest horizontal component is the entire rotor, which would be a maximum of 165 m wide. The calculations suggest that the impact of a 165 m wide wind turbine rotor would reduce to be insignificant at about 3.8 km, as it would form less than 5% or 2.5° of the horizontal field of view.
Natural Hazards	■ The topographic conditions of the Project area and nearby area is composed mostly of hills and high mountains, and there are no large rivers that will cause flooding in this area. And according to global flood data there is no historical flood event is recorded for the Project area.[3] [4] ■ There is no record of earthquake occurrence in the Project site or in Sekong and Attapeu provinces. However, the Project will be designed in accordance with standards so that the Project is capable of withstanding an earthquake. ■ Attapue and Sekong Province are identified as highly susceptible to landslides according to UNDP Support National Hazard Profile in 2020. Increasing incidence of landslides is being observed in the upper catchments of the Sedon and Sekong rivers, while increased flooding is being observed in the lower catchments and along the Mekong River.[5] The Project is at least 30 km distance to Sekong River.
Biodiversity	■ Field data were collected to further inform the understanding of the important biodiversity values within the study area and this included A Rapid Ecological Assessment (REA). Monthly bird field survey campaigns across 12 months and covering all relevant seasons, five bat field survey campaigns covering dry and wet seasons, two mammal surveys, herpetofauna (reptiles and amphibians) and plant field survey campaigns in the wet season and dry season were undertaken based on the results of the REA. ■ A Critical Habitat Assessment (CHA) was completed for the Project (***Appendix T***), in support of the Project's alignment with the applicable international standards, which include the Asian Development Bank's Safeguards Policy Statement (ADB SPS). ■ The Project area has been described to be located in a mosaic of evergreen forest, shifting cultivation, shrub land and grassland, waterbodies, and built-up areas. In several areas, there has been extensive modification for agriculture and clearance of forests by local communities predominantly. The EAAAs assessed therefore contain both natural and modified habitat in terms of the ADB SPS definitions. ■ Requirements in terms of natural habitat identified: there are a number of Project components that overlap with terrestrial and aquatic areas that are designated as 'natural habitat' and in these instances, the ADB SPS requires that the Project does not significantly convert or degrade areas of natural

[3] Global Flood Map, Laos Flood Map | Map of Potential Flooding in Laos (globalfloodmap.org)

[4] Reliefweb, UNOSAT Training activities (reliefweb.int)

[5] UNDP, Project Document - Deliverable Description (undp.org)

Receptor	Description
	habitat, and mitigation measures are designed to achieve at least an overall no net loss of biodiversity. This information is detailed in the Initial Biodiversity Action Plan (BAP). ■ Requirements in terms of critical habitat identified: the volant and non-volant species EAAAs both qualify as critical habitat based on several of the ADB SPS critical habitat qualifying criteria. ■ Requirements in terms of legally protected areas: the project footprint does not overlap with any identified formally legally protected areas therefore the requirements under ADB SPS Paragraph 28 and 30 do not apply.
Population and Demographics	■ The Project area including wind turbine towers, transmission line, and access roads are located in the administrative boundaries of 24 villages in Dak Cheung District of Sekong Province and 8 villages in Sanxay District of Attapeu Province. ■ Five ethnic groups were identified in the Project affected villages, namely Triang (89%), Yae (4%), Katu (4%), Ha Luk (2%) and Lao (1%). Triang makes up the majority of the surveyed households, with the exception of Dak Rant village (Dak Cheung District) where Yae makes up 85.7% of the village population and Dak Xeum village (Sanxay District) where Ha Luk is the main population of the village. ■ The majority (98%) of the population of the surveyed villages practice in animism and 2% practices Buddhism. ■ The average level of education for girls is 3rd to 4th year of secondary school (equivalent to years 8 and 9) and 4th year of secondary school (9 years of education) for boys. 53% or 1,472 people of the surveyed population have completed primary education, followed by 30% (745 people) attending secondary education. These figures are considerably lower compared to those of Sekong and Attapeu Provinces. ■ Migration is not high in the area
Livelihoods	■ The main livelihoods are land-based livelihoods i.e. engagement in agricultural activities including rice farming, coffee and cassava cultivation, livestock and non-timber forest products (NTFPs) collection and processing. ■ Of the 2,302 surveyed population, 1,022 people (44%) have a second occupation, of which 735 people (31%) work are engaged in farming activities, 214 people (10%) work as day laborers, and 81 people (4%) are engaged in livestock. The remaining supplementary livelihoods include NTFPs collection, small businesses, handicraft productions, and others such as homemakers, carpenters, etc. ■ The communities are dependent on the forest resources for food, medicine, hunting, firewood, wood for construction of houses and cash income.. ■ The villagers experience rice and food deficiency, particularly during the months October to April as it is dry season, with low to no productivity. ■ The average monthly household income of surveyed households is LAK (Laotian Kip) 1,272,593 (approximately USD 110), and the average monthly income per capita (per person) is LAK 199,954 (approximately USD 18), which are lower than provincial and national average of LAK 1,200,000 per month (approximately USD 104) per capita ■ The average monthly expenditure of 443 surveyed households is LAK 8,740,498 (approximately USD 775) and the expenditure per capita is LAK 728,375 per month (approximately USD 65) – this is approximately 6.87 times higher than the average monthly household income (LAK 1,272,593) ■ Most people do not have land titles (only 15 land parcels out of 396 affected land parcels have land titles), only land use rights (i.e. land tax receipt) and booking land (a traditional system which is not recognized in Laos law).
Education, Health and infrastructure	■ Most youths attend primary schools in their villages; however secondary schools are only available in some bigger villages including Xiengluang, Dak Cheung, and Dak Dor. Therefore, some students are required to travel from 4 to 10 km to secondary schools. The common means of travel include walking and biking.

Receptor	Description
	■ Of the 23 surveyed villages in Dak Cheung District, 10 villages have healthcare centres located within the village. Local healthcare facilities usually have x-ray room, nativity room, and rehabilitation room and a doctor and nurses. For the villages without healthcare facilities, they have to travel to healthcare facilities in other villages or bigger cities such as Xiengluang Health centre, Dakdor Health Centre, Prao Health Centre, and Dakchueng Hospital. ■ The most common diseases in the surveyed villages are cold, diarrhoea particularly among children. Women experience endometritis and concerns around health risks related to giving birth. For the elderly, common diseases are kidney disease and gastritis. Other diseases identified include malaria, stomach pain and leucorrhoea.
Public Infrastructures and Utilities	■ The main source of water identified across surveyed villages is gravity-fed water system which is sourced from streams and stored in common tank for water supply of households. . Rainwater is stored in tanks for drinking and domestic use during rainy season. It is noted that piped water supply system (Nam Papa) is not available in the surveyed villages (water is not pumped into homes). ■ All surveyed villages in Dak Cheung District have access to electricity, except Dak Dom village where the electricity grid is not available, and the village depends on dynamo generators. The main sources of electricity supply include transmission line and solar cells. Only three villages (i.e. Dak Yok, Dak Padou, and Nam Ngonnuea) in Sanxay District have access to electricity. The main source is power grid and solar cells. ■ Firewood is predominately used for cooking in the villages and is collected from the nearby forest areas. ■ There is no waste collection and disposal system in the surveyed villages; therefore, the village members' burn, bury, and throw waste around the house or into the forests as means of waste disposal. ■ Surveyed population indicated to have access to the internet ■ Dirt roads are available in all 32 surveyed villages. The means of transport of the locals include motorbike, walking, biking, and farm tractor. During rainy seasons, the (red soil) dirt roads get muddy from heavy rain and make it inconvenient to travel and increase travel times ■ In Dak Chueng District, markets are available in Dak Bong, Dak Cheung, and Ngon Don Villages. For the villages located far from the markets, there are occasional markets, 2-3 times per month. The people usually purchase or exchange products at retail shops available in the villages. In Sanxay District, Dak Nong, Dak Smor, Dak Sied, and Dak Xuem villages have access to markets, whereas the remainder do not have market access.
Cultural Heritage and Indigenous Peoples	■ One of the core beliefs of animism is the belief of environmental spirits but in the case of the surveyed villages, ancestral spirits are worshiped as well. Cemeteries are considered sacred in all surveyed villages and mostly located in forested areas. ■ All ethnic groups have their own spoken languages. Triang, Yae, Katu and Ha Luk are classified under Mon-Khmer Linguistic Group while Lao ethnic group is Lao-Tai Linguistic Group. They believe in animism and worship ancestral spirits. They have traditional costumes, housing styles, ceremony and skill sets (ironsmith, bamboo handicrafts, and weaving). ■ Based on the site visit conducted in November 2021, the communities have absorbed cultures and ways of life from the mainstream Lao society as evidenced in their clothing, housing styles and celebrating mainstream Laos festivals and ceremonies.
Gender considerations	■ The ratio remains roughly at 1:1 male to female across surveyed villages ■ Females have slightly lower average level of education than men. The average level of education for females is up to year 3-4 of secondary school, while for males it was identified that the average education is year 4-5 of secondary school. ■ The average age of women getting pregnant is 15-18 years old. Mostly, women give birth at home or at local healthcare centres.

Receptor	Description
	■ Based on the FGDs and site visit observation, gender-based violence does not seem to be an issue in the villages within the Study Area. However, measures will be put in place to avoid GBV and other forms of exploitations such as a Worker Code of Conduct and grievance mechanism. The Worker Code of Conduct will incorporate IFC Emerging Good Practice for Private Sector for Addressing Gender-based Violence and Hassassment.[6] ■ Female-headed households and male-headed households have similar livelihoods. It is, however, noticeable that female-headed households, particularly if the rest of the family is composed of females, children or elderly, have a significant fewer cultivation land areas and smaller animals holding size. ■ Men and women usually have joint ownership of land. However, one women's group asserted that despite joint land ownership, most of land use certificates are in the husband's names. ■ Female support networks and organizations available in the surveyed villages include Lao Women's Union (LWU) and CARE International Laos in Dakchueng District, Sekong Province, and District Health Office ■ Mostly women and men jointly make decisions related to households finances ; however, in most cases women do not have their own bank accounts. Women are more dominant in making decisions related to household chores, e.g. cooking and daily expenditure, e.g. food consumption. ■ The FGDs with women groups have identified their main needs are improved healthcare and support on livelihoods.

1.7 Environmental and Social Impact Assessment

The impact assessment has been conducted of the potential environmental and social impacts attributable to the construction and operation phases of the Project. Qualitative and quantitative (where relevant) assessments of impacts have been presented, significance of each potential impact has been identified, and mitigation measures to 19ecogniz and reduce the impacts have been recommended. Cumulative impacts, particularly on community health and safety and biodiversity, have also been assessed. ***Table 1-3*** presents a summary of residual impact significance and ***Table 1-4*** presents a summary of risks from climate change. Refer to ***Section 9 Impact Assessment*** for full impact assessments.

Table 1-3: Summary of Residual Impact Significance

Impact Type	Residual Impact Significance	
	Construction	Operation
Physical Environment Impact Assessment		
Impacts on Topography	**Moderate**	**Moderate**
Impacts on Geology and Soil	**Minor**	**Minor**
Impacts on Air Quality	**Minor**	**Scoped out of the assessment**
Impacts on Noise	**Minor**	**Minor**
Impacts to Surface Water Quality	**Minor**	**Negligible**
Impact to Water Resources	**Moderate**	**Minor**
Impacts to Landscape Values	**Moderate**	**Moderate**
Impacts to Visual	**Negligible to Moderate**	**Moderate**
Impacts Associated with Shadow Flicker	Not Applicable	**Minor**

[6] https://www.ifc.org/wps/wcm/connect/f1645167-7eff-439b-922b-7656c75320ab/GPN_AddressingGBVH_July2020.pdf?MOD=AJPERES&CVID=nddokiS

Impact Type	Residual Impact Significance	
	Construction	Operation
Biological Environment Impact Assessment		
Physical destruction and/or disturbance of vegetation	**Moderate**	Not Applicable
Reduction in habitat for supporting key globally and/or nationally threatened species	**Moderate**	Not Applicable
Illegal hunting/poaching and collection of forest resources	Minor	Negligible
Bird & bat collisions with wind turbines resulting in injury or mortality	Not Applicable	Negligible
Bird & bat collisions with transmission lines resulting in injury or mortality	Not Applicable	Negligible
Vehicular collisions with wildlife	Negligible	Negligible
Dust pollution caused by earthworks and vehicle/machinery operation	Negligible	Negligible
Water and soil pollution caused by potential accidental spills of hazardous substances	Negligible	Negligible
Soil erosion and sedimentation of watercourses	Negligible	Negligible
Disturbance and nuisance caused by increased noise, light and/or vibrations	Negligible	Negligible
Barriers or interference with species movement	**Minor**	**Minor**
Increased susceptibility of forest habitat to disturbance	**Minor**	**Minor**
Introduction of alien plant species and/or disturbance leading to invasion by alien plants and weeds	**Minor**	**Minor**
Reduced habitat connectivity caused by fragmentation of habitat	**Minor**	**Minor**
Loss of ecosystem services	Negligible	Negligible
Increased hunting/harvesting pressure due to enhanced accessibility to the area	**Moderate**	**Moderate**
Increased fire risk	Scoped out of the assessment	Scoped out of the assessment
Trophic cascade impacts	Scoped out of the assessment	Scoped out of the assessment
Social Impact Assessment		
Impacts on Economic Opportunities	**Positive**	**Positive**
Economic Displacement and Impacts to Livelihoods	**Moderate**	**Moderate**
Impacts on Community Health and Safety	**Negligible**	**Not Applicable**
Impacts Associated with Influx	**Minor**	**Not Applicable**
Impacts of Wind Farm Operation on Local Amenity	Not Applicable	**Negligible to Moderate**

Impact Type	Residual Impact Significance	
	Construction	Operation
Impact on Ethnic Groups Erosion of Ethnic Culture)	**Negligible**	Not Applicable
Impact on Cultural Heritage (Tangible and Intangible)	**Minor**	**Minor**
Climate Change Risk and Impact Assessment		
Impacts on Climate Change	**Negligible**	**Negligible**
Unplanned Events		
Leakage and Spill Incidents	**Minor**	**Minor**
Traffic Accidents	**Moderate** for workers and communities **Minor** for communities (livestock)	Not Applicable
Unexploded Ordnances (UXOs)	**Minor**	**Moderate** for workers and communities **Minor** for the environment
Fire and Explosion	**Minor**	**Moderate** for workers and communities **Minor** for the environment
Natural Hazards (Flood and Landslide)	**Moderate**	**Moderate**
Blade Ejection Failure	Not Applicable	**Minor**
Transmission Line Snapping and Transmission Pylon Collapse	Not Applicable	**Moderate**
Cumulative Impacts		
Cumulative Impact 1: *Avifauna collisions*	Not Applicable	**Minor**
Cumulative Impact 2: *Regional loss of important forest habitat*	**Moderate**	Not Applicable
Cumulative Impact 3: *Forest habitat fragmentation and reduced connectivity*	**Minor**	**Minor**
Cumulative Impact 4: *Regional loss of RDL species*	**Minor**	**Moderate**
Cumulative Impact 5: *Reduction in ecosystem services*	**Minor**	**Minor**
Cumulative Impact 6: *Contribution to clean energy sector and move away from non-renewables (positive impact)*	Not Applicable	**Positive**

Table 1-4: Risks from Climate Change

Hazard Type	Hazard Level	
	2030	2050
Water Availability	**Low**	**Low**
Riverine Floods	**None**	**None**

Hazard Type	Hazard Level	
	2030	2050
Landslides	**High**	**High**
Extreme Heat	**High**	**High**
Cyclone and Wind Speed	**High**	**High**
Lightning	**No direct projections**	**No direct projections**

1.8 Environmental and Social Management Plan

For all the impacts identified in the study, mitigation, management, and monitoring measures have been proposed and included in the Environmental and Social Management (ESMP) in this ESIA Report, including the schedule for monitoring.

The purpose of the Environmental and Social Management Plan (ESMP) is to specify the standards and controls required to manage and monitor environmental and social impacts during construction and operation phase. The ESMP (in ***Section 10***) 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 Project's Environmental and Social Management System. This implementation will be under the responsibility of the EPC (Engineering Procurement and Construction) Contractor and IEAD.

The ESMP covers all in built controls and additional mitigation measures proposed to reduce the impacts as well as a list of all required management plans. Monitoring will be required for the Project to ensure compliance. This will include regular auditing of the Project during construction and operation as detailed in ***Section 10.8***.

Standalone management plans will be required for the Project. These will include:

- Community Health and Safety Management Plan
- Occupational Health and Safety Management Plan
- Traffic Management Plan
- Worker's Camp Management Plan
- Construction Material Sourcing Plan
- Air Quality Management Plan
- Water Quality Management Plan
- Hazardous Materials Management Plan
- Waste Management Plan
- Noise and Vibration Management Plan
- Spoil Management Plan
- Soil Erosion and Sediment Control Management Plan
- Site Restoration Management Plan
- Local Content and Influx Management Plan (including Labour Management Plan and Local Procurement Management Plan)
- Cultural Heritage Management Plan
- Emergency Preparedness and Response Plan
- Stakeholder Engagement Plan

- Resettlement Plan
- Community and Ethnic Group Development Plan
- Initial Biodiversity Action Plan
- Unexploded Ordinance Survey and Clearance Plan

2 INTRODUCTION

2.1 Project Background

Impact Energy Asia Development (IEAD and/or the Project Proponent) is developing the Monsoon Wind Farm with an installed capacity of approximately 600 MW in Dak Cheung District of Sekong Province and Sanxay District of Attapeu Province in Lao People's Democratic Republic (Lao PDR). The development also includes a 22 km 500 kilovolt (kV) transmission line, which connects to the grid in Vietnam ("the Project"). The Project location including the wind farm and transmission line is provided in ***Figure 2-1***.

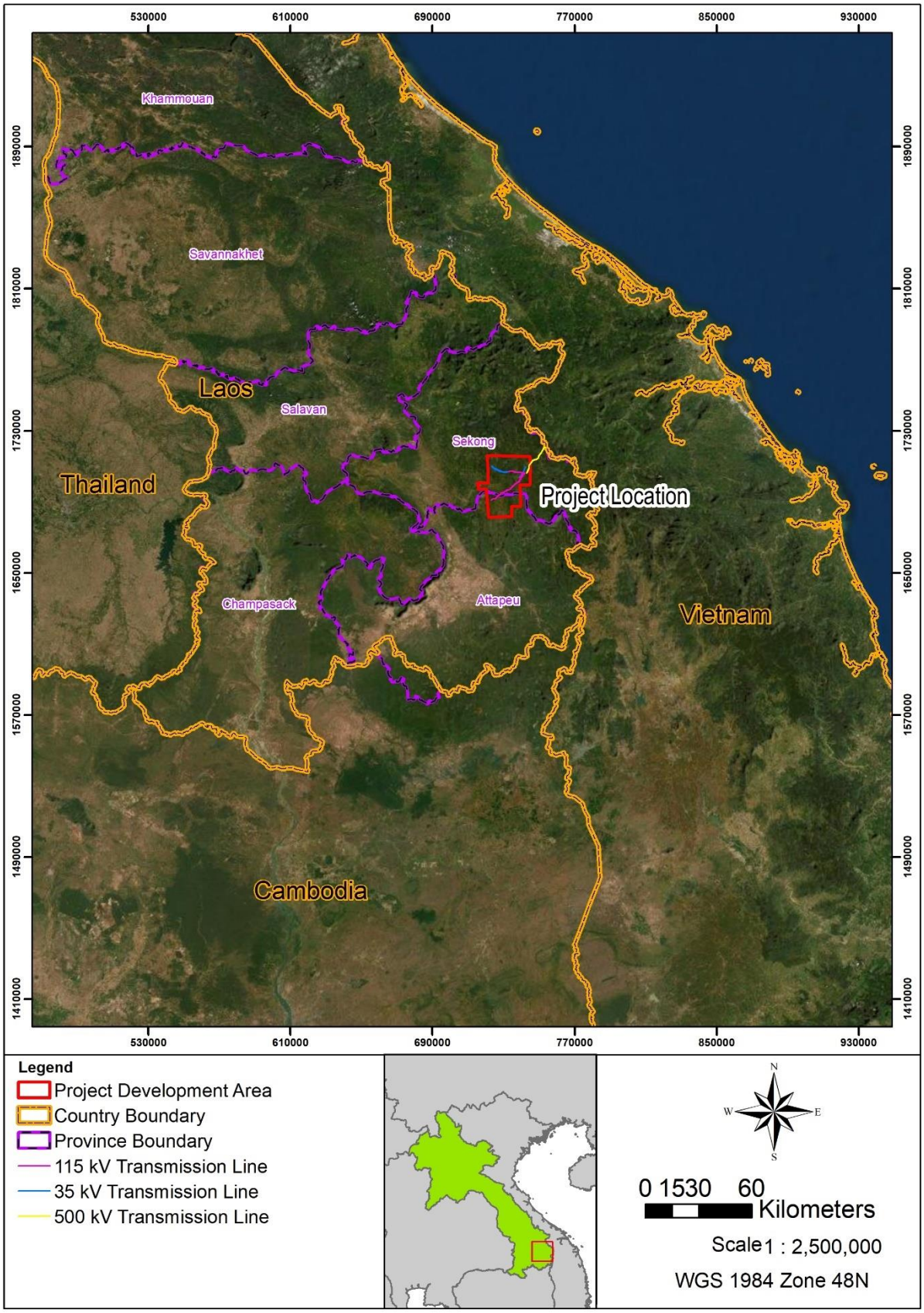
IEAD signed a Memorandum of Understanding (MoU) with the Government of Lao PDR in 2011 to explore the possibility of developing a wind power project. Following the initial feasibility study, IEAD signed a Project Development Agreement (PDA) with the Government of Lao PDR on August 7, 2015 for the development of a wind power project with a capacity of 600 MW. The concession period for the Project is understood to be 25 years from the commercial operations date (COD). Construction is estimated to take approximately 30 months and COD is anticipated to be December 2025.

An Environment Impact Assessment (EIA) study for local Lao PDR permitting requirements was conducted in June 2014 (EIA 2014), and a second and third revision was conducted in May 2018 (EIA 2018), and September 2020 (EIA 2020), respectively. Innogreen Engineering Co., Ltd (Innogreen) on behalf of the Project Proponent has revised the local EIA (EIA 2020) due to significant changes in the Project design and the local EIA has approved by MONRE on 28 July 2022 (EIA 2022).

ERM-Siam Company Limited (ERM) was contracted by IEAD to conduct an Environmental and Social gap analysis of the local EIA against the Lenders' applicable standards including an initial biodiversity review (Phase 1) (***Appendix A***). ERM completed Phase 1 and submitted the final gap analysis report to IEAD in March 2021. The Phase 1 report also recommended a Terms of Reference (TOR) to fill the gaps identified.

It is understood that part of the Project area is overlapping with a Bauxite mine concession area granted to Viet Phoung, which signed its concession with the Government of Laos (GOL) in 2018, therefore, the relocation of Project facilities in the overlapping areas is potentially required. This includes the cluster of nine WTGs, the main 500 kV substation, and a short portion of the 500 kV transmission line route. The Project facilities will be relocated once the final design is completed. Once the relocation areas are identified and the additional studies are complete, an addendum to address the relocation will be prepared to complement the final ESIA ("ESIA Addendum"). The ESIA Addendum will provide updates of the relocation of Project facilities, the additional survey results, the potential impacts, and additional mitigation measures and monitoring program that may be required. Any changes should also be aligned with the lenders' E&S requirements. No pre-construction or construction work will be conducted at the proposed relocation sites until the required E&S assessments are completed. The detailed scope of the ESIA Addendum has been prepared and shared with ADB.

Figure 2-1: Project Location



2.2 Purpose and Objective of this ESIA

This Environmental and Social Impact Assessment (ESIA) Study includes the supplementary environmental, social and health studies (Phase 2) that have been conducted between April 2021 and February 2022 as identified during Phase 1. The purpose of this ESIA is to inform IEAD and their Project lenders (ADB and other potential lenders) of the environmental and social impacts associated with the Project. The ADB and potentially other lenders are considering financing the construction of the Project. The Project therefore needs to document conformance with their respective environmental and social policies. The ADB requires borrowers to conduct an environmental and social assessment of projects proposed for Bank support pursuant to its ADB Safeguard Policy Statement (SPS) (ADB 2009); other ADB social policies and requirements such as the Social Protection Strategy (2001) and Gender and Development Policy (1998) and relevant operations manuals, as applicable. This ESIA has been prepared to support the management of environmental and social (E&S) risks in accordance with international good practice, which include the ADB SPS, and relevant World Bank Group (WBG) Environmental, Health and Safety (EHS) Guidelines.

The objectives of the ESIA process are to:

- Provide a description of the Project;
- Establish the existing status of the physical, biological, socio-economic, and cultural environments of the Project area;
- Identify, evaluate, and manage the environmental and social risks and impacts of the Project in a manner consistent with the ADB SPS;
- Propose a mitigation measure to anticipate and avoid risks and impacts, where avoidance is not possible to minimize or reduce risks and impacts to acceptable levels, once risks and impacts have been minimized/reduced and mitigated, and where significant residual impacts remain, compensate for or offset them, where technically and financially feasible;
- Demonstrate commitment to applicable with national environmental and social institutions, systems, laws, regulations, and procedures in the assessment, development, and implementation of the Project, where applicable;
- Document project conformance with the ADB SPS and the WBG EHS Guidelines.

In order to document conformance with the Government of Laos' requirement and to obtain government authorization for the Project, several separate environmental documents have been submitted or are in the process of being prepared for submission to the government, including:

- Environmental and Social Impact Assessment Report, 600 MW Monsoon Wind Farm Project Dak Cheung District, Sekong Province and Sanxay District, Attapeu Province – This was prepared by Innogreen in 2020, to obtain early approval for the windfarm development. This is being updated to account for the current design of the Project;
- Environmental and Social Impact Assessment Report, 500 kV High Voltage Transmission Line Project of the 600 MW Monsoon Wind Farm Project Dak Cheung District, Sekong Province – This was prepared by Innogreen in 2020, to obtain approval for the transmission line component of the Project.

These documents have been prepared separately from this ESIA to meet Laos permitting requirements. A summary of the key findings of these documents have been integrated into this ESIA, with reference to the original report for further details, where relevant.

2.3 Limitations and Assumptions of this ESIA

This report has been prepared by ERM with all reasonable skill, care, and diligence within the terms of the Contract with the Client, and taking account of the resources devoted to it by agreement with the Client. Specific limitations and assumptions on this assessment are as follows:

- The COVID-19 pandemic presented a major challenge for undertaking field surveys where face to face interaction, and/or coming into close contact with the local community was required, for example, household surveys and FDGs/KIIs for the social baseline data collection. COVID-19 restrictions and clearances also resulted in multiple delays to the field visits and engagements. This resulted in an approximately five month delay in the baseline field data collection schedule. Environmental and social baseline data was collected as much as possible given that site access restrictions were still imposed during the time of writing this ESIA.
- ERM's findings are accurate and complete only to the extent that information provided to ERM was itself accurate and complete; and
- The information provided in this report is not to be construed as legal advice.

For this ESIA Study; the Project facilities include the following:

- Project facilities: Wind turbines and wind turbine boundary area (development area), 22 km 500 kV transmission line from the development area to the Laos/Vietnam international border, and Project site roads in the development area; and
- Ancillary facilities: Internal road, workers camps, laydown areas, spoil disposal areas, and batching plants within the development area.

The section of the transmission line to be developed within Vietnam that will run from the Laos/Vietnam international border to the Thanh My substation in Nam Giang District, Quang Nam Province, Vietnam is the responsibility of Vietnam Electricity (EVN) and is not part of the Project for ADB financing and therefore not part of the scope of this ESIA. This facility is being constructed for other energy projects in Vietnam and is not solely developed for the Project. As such, it is not considered an associated facility.

2.4 ESIA Report Structure

The structure of this report is as follows:

- **Section 1** Executive Summary
- **Section 2**: Introduction
- **Section 3**: Legal and Institutional Framework
- **Section 4**: Project Description
- **Section 5**: Project Alternatives and Environmental and Social Considerations
- **Section 6**: Impact Assessment Methodology
- **Section 7**: Stakeholder Engagement
- **Section 8**: Environmental and Social Baseline Condition
- **Section 9**: Environmental and Social Impact Assessment
- **Section 10**: Environmental and Social Management Plan
- **Section 11**: Conclusions and Recommendations

The supporting documents are inserted as Appendices, as follows:

- **Appendix A**: E&S Gap Analysis and Initial Biodiversity Review: Wind Farm in Lao PDR (Final Report)

- **Appendix B**: Noise Field Logs, Calibration Sheets, and Sampling Raw Data
- **Appendix C**: Surface Water Field Logs, Calibration Sheets, and Sampling Raw Data
- **Appendix D**: Landscape and Visual Field Logs, and Sampling Raw Data
- **Appendix E**: Turbine Coordinates
- **Appendix F**: Specifications of the Transmission Line
- **Appendix G:** Summary of EIA Consultation
- **Appendix H**: ESIA PowerPoint Presentation
- **Appendix I:** Summary of ESIA Consultation
- **Appendix J:** FGDs/KIIs Questionnaire
- **Appendix K:** Meeting Note, Sekong**,** 17 February 2022
- **Appendix L:** Meeting Note, Sekong, 31 March 2022
- **Appendix M:** Meeting Note, Attapeu, 30 March 2022
- **Appendix N:** Meeting Note, Attapeu, 12 May 2022
- **Appendix O:** Registration of July 2022 Consultation
- **Appendix P:** Presentation July 2022 Consultation
- **Appendix Q:** Disclosure Booklet
- **Appendix R:** Minutes of meeting and attendee registration of September 2022 Consultation
- **Appendix S:** Biodiversity Baseline Survey Reports
- **Appendix T:**Critical Habitat Assessment
- **Appendix U**: Socio-economic Household Survey Database
- **Appendix V**: Shadow Flicker Field Logs, and Sampling Raw Data

3 LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 Overview

This ESIA has been undertaken with reference to the provisions of the requirements, standards, policies, laws, rules, guidelines, manuals, and international conventions and treaties as outlined in this Chapter. In addition, international standards and best practices on environmental and social safeguards were reviewed to identify all possible risks and impacts from project development and appropriate measures to minimize and mitigate the risks to the extent possible.

3.2 Lao PDR Legal and Institutional Framework

The Lao PDR legislation, policies, standards, and guidelines that have been ratified by Lao PDR and are applicable to the Project are described in the following sections.

3.2.1 National Laws and Regulations

3.2.1.1 Decision on the Pollution Control No. 1687/MONRE, 2021

The Decision prescribes the measures on control, monitoring, and inspection of pollution; the measures to control pollution in case of emergency; the designation of hazardous areas; and identification of pollution risks in order to minimize the impacts to the air, soil, water, and public nuisance and not to exceed the National Environmental Standard threshold. The Decision applies to the individual, enterprise, or organization of both domestic and overseas that perform activities in Laos.

The content on the Decision is outline below:

- Survey, Registration of the Pollution Sources, and Establishment of Plans for Pollution Control and Importation of Wastes and Hazardous Substances

  The Office of the Natural Resources and Environment of the District, Municipality, and City is responsible for conducting a survey and registration of pollution sources of family business, including small scale agriculture, micro forestry, and handicraft business while the Department of Natural Resources and Environment of the Province and Capital work for agriculture, micro and mega forestry, industry, mining activities, and infrastructure projects. Collected information related to hazardous chemicals and wastes will be compiled by the Department of Pollution Control, Monitoring, and Inspection and reported to the Minister of Natural Resources and Environment. The information is utilized to develop pollution control plans.

- Management and Measures on Air Pollution Control

  The individual, enterprise, and organization that operates any business shall comply with the primary measures regarding air or water pollution control to meet the National Environmental Standard. Business operators shall;

  - prepare air or wastewater treatment system to meet the National Environmental Standard
  - monitor the air emission or wastewater effluent on a regular basis
  - plant trees for the area that covers 10% of the total area or more in accordance with the environmental management and monitoring plans to prevent dust pollution
  - In case of air or water pollution caused by the business operator, the project investor or the operator shall be responsible for all the associated expenses and shall promptly report to the related local administrative bodies.

- Management and Measures on Soil Pollution Control

- Application of substances, especially pesticides and fertilizers in agriculture and forestry shall comply with the related laws and regulations as well as the handbook for Agriculture and Forestry Sector
- Application of substances, especially cyanide and mercury in mining shall comply with the related laws and regulations as well as the handbook for Energy and Mining Sector
- The disposal, dumping, landfill, or destruction of contaminated and hazardous substances shall comply with the specific regulation and technical specification

- Management and Measures on Water Pollution Control

  The individual, enterprise, and organization that operates any business shall manage water pollution at source as follows:

  - Establish wastewater treatment system at each industrial factories and service industries (e.g. hotels, accommodations, restaurants, hospitals, markets, etc. and ensure that discharged water complies with the National Environmental Standards
  - Households located near natural waterbodies are to establish wastewater treatment system to treat wastewater before discharge to natural water bodies and discharged water should comply with the National Environmental Standards
  - Use of chemicals such as pesticides and fertilizers in agricultural activities, it must be ensured that there is no leakage into natural waterbodies

  In case of water pollution/contamination caused by the business operator, the project investor or the operator shall be responsible for all the associated expenses and mitigation measures.

- Management and Measures on Nuisance Pollution Control

  The individual, enterprise, and organization that operates any business shall ensure control of nuisances including noise, vibration, heat, light and odour at source. These entities are to be responsible for mitigation measures for nuisances. If the nuisances are not mitigated, the entities will be given warning and fined.

- Preventive Measures and Pollution Control in case of Emergency and Identification of Hazardous Zones and Pollution Risks

  The individual, enterprise, and organization that operates any business shall develop emergency preparedness and response plan for emergency incidents and be responsible for costs associated with emergency incidents including costs for evacuation of people and property, costs for remediation affected areas and costs for compensation.

- Adoption of International Standards and Technical Inspection (in the case that a threshold for a pollutant is not proscribed in the National Environmental Standard, international standard will be adopted)

3.2.1.2 Law on Electricity (amended), 2017

The objective of this Law is to:

- Define the principles, regulations, and measures governing the implementation, operation, management, monitoring, and inspection of electricity activities to enable the electricity operations and business to become highly effective, conform with the potential in sustainable power generation, ensuring environment protection, and upgrading the living conditions of the multi-ethnic Lao people;
- Promote electricity generating activities and the use of advanced technology in the electricity generating activities, expanding transmission line network to cover all regions of the country, linking with international grid, ensuring expeditious and safe services, and beneficial use.

Article 6. Principles Relating to Electricity:

The operations and business in the power energy development shall be undertaken in accordance with the main principles as follows:

- Ensuring consistence with policy, strategy, laws, National Socio-Economic Development Plan, national defence, and public security activities in each period;
- Ensuring development of electricity generation along with environmental protection in line with green, clean and sustainable direction;
- Ensuring efficient and effective use of natural resources;
- Undertaking the production and supply of electricity energy in a stable, effective, open, transparent, and accountable manner and with reasonable price;
- Using the electricity economically and effectively.

Article 60. Social and Natural Environmental Impact Assessment:

The social and natural environmental impact assessment will help the electricity generating activities to be undertaken without affecting the environment and the livelihoods of the multi ethnic people and must comply with the specified regulations as follows:

- Assessing the damages, resettlement of the people, and preservation forest affected by the project development including the allocation of production land, compensation, protection of rights and interests of the affected people, and livelihood rehabilitation plan.
- Having measures to address or mitigate the adverse impact on environment, such as: impact on water source, land resource, eco-system, biodiversity, and habitat of wildlife and aquatic animals.
- Conducting other assessments and analysis as determined by the Natural Resources and Environment sector and the Energy and Mines sector.
- The Environmental and Social Impact Assessment shall be reviewed and approved by the Natural Resources and Environment sector in coordination with the Energy Sector and other sectors concerned.

Article 75. Use of Land for Power Project:

In order to ensure the management of land of the people, the use of land of the project developer shall be carried out in compliance with the policy, laws, and regulations of Lao PDR as follows:

- The project developer shall clearly define the scope of land use, conduct the study or explore the potential impact and measures for mitigating the impact on social and natural environment.
- All sectors concerned must coordinate and cooperate in conducting the land use planning in the granted concession area.
- The Natural Resources and Environment sector shall issue the document of assignment of land use right to the project company in accordance with the Law on Land upon receiving the authorization.
- If the power project activities have affected the social and natural environment, the sector concerned must assess the damages for reporting to the relevant local administration, and to the Government for consideration, as the case may be.

3.2.1.3 Law on Land (amended) No. 70/NA, 2019

The objective of this Law is to determine the regime of the management, protection, and use of land in order to ensure effectiveness, compliance with the objectives and with the laws and regulations, and to contribute to the enhancement of the national socio-economic development as well as to the protection of environment and territory of Laos.

Article 3 (amended) on Land Ownership specifies that the State holds ownership and manages land across the country through land use planning, land allocation, and land development. The State is able to grant land use rights to its citizens, as well as legal persons, collectives and organization of Lao citizens. Foreigners have the rights to lease, receive concession, or purchase land use rights (with an agreed timeline). Foreign organizations that have been established with the authorization of the State have the right to lease or receive concession only. In case of infringement of laws or contract, the State has the right to revoke the land use rights without compensation to the land right users.

Article 6 on Land and Environmental Protection has specified that all individuals and organizations shall have the obligation to protect land in order to maintain it in a good condition, preventing erosion, sinking, degradation, maintaining the quality appropriately for each category of land, and not causing decrease of land area and land category without authorization. The use of land shall not cause an adverse impact to social and natural environment.

Article 28 specifies the conversion of land from one category to another category, which can be carried out by ensuring that it has no negative impact on social or natural environment and must receive prior approval from the relevant authority. In addition, Article 65 (new) defines land leasing or land concession periods for various projects investment and development.

3.2.1.4 Law on Forestry (amended) No. 04/NA, 2019

This Law on Forestry defines the fundamental principles, regulations, and measures relating to the management, protection, development, use and inspection of forest resources and forest land, promotion of the restoration, plantation and expansion of forest resources to ensure abundance and the increase of forest coverage; creation of tourism sites, and the sustainable sources of livelihood and use of the people: ensure the protection of the quality of land, water, air, and environment in line with the green and sustainable direction; and contribute to the national socio-economic development.

This law classifies forests into three categories: Protection Forests; Conservation Forests; and Production Forests. Protection Forests are classified for ecosystem services, Conservation Forests for nature and biodiversity protection and conservation, and Production Forests for the production of wood and forest products, and for the purposes of national socio-economic development as needed.

The project must comply with Articles 80, 82, 87 in this amended Forestry Law.

3.2.1.5 Law on Land Transportation (No. 036/NA, dated 12 December 2012)

This Law on Land Transportation specifies the maintenance of order and safety of land transportation, which shall be performed in accordance with the regulations and measures, management, follow-up, and inspection of land transportation operations in order to supervise the development of passengers and other transportation operations both inside the country and trans-border with the aim of making the transportation convenient, expeditious, timely, effectively, modernized, sustainable, and have no impact on social and natural environment, strengthen the international trade and international integration and promote the socio-economic development of the country.

Article 5 (new). Principles of Land Transportation:

- Ensuring consistence with the National Socio-Economic Development Plan; ensuring socio-economic efficiency and sustainability, national defence and public security and environmental protection;
- Ensuring the quality, convenience, comfort, rapidity, safety for life, health, property; ensuring the protection of the legitimate rights and interests of the service users and service providers;
- Ensuring transparency, fairness and politeness in the provision of services;
- Ensuring economic and technical norms, advanced technology, services standard relating to land transportation;

- Ensuring the coordination with various sectors, local administrations, and the participation of the public in the management and monitoring of land transport activities.

3.2.1.6 Law on Water and Water Resources (amended), 2017

This Law is comprised of 14 Parts and a total of 103 Articles. The objective of this Law is to determine the principles, regulations, and measures relating to the administration, management, protection, development, and use of water and water resources, prevention of loss from water, rehabilitation of affected area to ensure the quality, volume of water, and water resources to become sustainable with the aim of meeting the requirements for livelihood of the people and for agricultural, industrial production and services related to the protection of social and natural environment, and the green development linked with national security and international integration to contribute to the protection and the socio-economic development of the nation.

In each Article of this Law, it is required to control the use of water sources in the project area to ensure optimal benefits through the identification of strategies for the management, administration, and use of the water sources and water resources. In addition, the Law also emphasizes the survey, protection of water and water resources (management of area of protected water source, standards of waste water before discharging to the natural water source), the water and water resources use and services (goals and right of small, medium and large-scale water use), and water service operations. The Law also explains the protection of water sources against loss, the rehabilitation of water sources, including the prohibitions, dispute resolution, inspection, and management of water sources, and measures against violator of this Law in relation to projects.

3.2.1.7 Law on Labour (No. 021/NA, 2013)

The objective of this Law is to ensure the protection of labour, skill building, and development to increase the skill quality and the productivity of the workforce in the society to respond to the transformation toward industrialization and modernization, and to enable the protection of right of workers and employers. If foreign workers are to be employed, a labour unit must give the first priority to Lao workers. The rest time for workers must be determined in accordance with the policy of the State allowing the living condition of the workers to be improved gradually, contributing to the promotion of investment, socio-economic development, and international and regional integration.

Article 51 specifies that employees must determine the hours of work and rest time for the employees under their responsibility in conformance with the location of the labour unit and the actual conditions of the work. The normal hours of work of the employees in all labour units should not exceed six days per week and eight hours per day or forty-eight hours per week, and the rest time for taking lunch should not be less than 1 hour per day.

The determination of the minimum level of salary or wages must be in compliance with Article 108. The State is entitled to promulgate the minimum level of salary or wages in each period based on the outcome of tripartite consultation.

Article 68 (improved). Recruitment of Foreign Workers specifies that the employers shall have the duty to prepare the Labour Use Plan in their labour unit and give priority to Lao workers; however, in necessary cases due to the inability to recruit Lao workers to adequately meet the demand, they have the right to request for using foreign workers.

The proportion of the employment of foreign workers to work at the labour unit shall be as follow:

1. Fifteen percent of the total number of Lao workers in the labour unit, for workers with specialized skill who perform physical works; and
2. Twenty-five percent of the total number of Lao workers in the labour unit, for workers with specialized skill who perform intellectual works.

For large-scale projects and priority projects of the Government with a period of five years or less, the use of foreign workers shall be in accordance with the agreement between the project owner and the Government.

In case of professional workers who are able to move according to the cooperation framework with other countries, particularly South-East Asian countries, their use, if any, shall be in accordance with the specific regulations.

Foreign workers who come to work in Lao PDR shall be protected and administered in accordance with this Law and other relevant laws and regulations of the Lao PDR.

3.2.1.8 Prime Minister Decree on Occupational Health and Safety, No 22/GOL, dated 05/02/2019 in addition to the Amended Labour Law (2013)

To support and protect Lao PDR's workers, in February 2019, a new decree on Occupational Safety and Health (OSH) was promulgated, along with an amendment to the Prime Ministers Decree No. 68 on migrant workers abroad, in an effort to reduce workers' vulnerability to labour exploitation and human trafficking. The law requires employers to provide annual health check-ups for its employees, and re-enforces that work accidents and occupational diseases need to be recorded and reported to the Labour Management Authorities. An employer or the social security organization is responsible for covering the cost of treatment, allowances, and compensation to victims of work accidents or occupational diseases.[7]

3.2.1.9 Law on Investment Promotion (No.02/NA, 2009)

The objective of the Law on Investment Promotion, for both domestic and foreign investment, aims at expanding the economic and trade development to rural areas through the determination of regulations and measures relating to the promotion and management of the investment, both domestic and foreign, in order to ensure the rights and interests of the investors as well as of the state and the peoples.

Article 4 of this Law specifies that the state promotes the investment in all sectors, including industrial, agricultural, and service sectors and other activities and in all regions throughout the country, except those zones and activities that are detrimental to national security and peace, have harmful impacts to the environment at present time and in the long run, to the public health and the fine culture of the nation.

3.2.1.10 Law on Wildlife and Aquatic Animals (No. 07/NA, 2008)

The Law on Wildlife and Aquatic Animals defines the principles, regulations, and measures governing the natural aquatic animals and wildlife in order to promote the raising, breeding, and use of the aquatic animals and wildlife by avoiding the impacts to the environment and habitats, limiting the decrease and extinction of the aquatic animals and wildlife, as well as mobilizing the people to be aware of the importance, raising the consciousness of love, care, cherishing and responsibly involving in the management, inspection, conservation, protection, development and use of wildlife and aquatic animals in a sustainable manner with the aim of ensuing the abundance of the ecosystem, contributing to the improvement of the living conditions of the multi-ethnic peoples and the potential in the national socio-economic development.

Article 25 of this Law defines protection of wildlife and aquatic animals as the safeguard of wildlife and aquatic animals of restricted, managed, and general categories to allow them to become abundant and sustainable; the protection and safeguard of animal habitats, preservation areas for aquatic

[7] https://documents1.worldbank.org/curated/en/713271609771956267/pdf/Environmental-and-Social-Management-Framework-ESMF-Lao-Landscapes-and-Livelihoods-Project-P170559.pdf

animals, area for conservation of animal species; and the formulation of the protection measures to prevent the invasion and destruction from human action or from nature.

3.2.1.11 Law on Construction (No. 05/NA, 2009)

The objective of the Law on Construction is to ensure the quality and conformance with the National Socio-Economic Development Plan, ensuring the development of infrastructure in a safe manner and not causing negative impacts to the social and natural environment as confirmed in Article 5 of this Law. This Article specifies that development shall be in conjunction with conservation, protection of cultural, historical and natural heritage, construction materials should meet required standards, construction of buildings, roads and public places must have the facilities for disabled persons, elderly persons, and for ensuring the health of the people. If the project development site cover individual's land or the people's land, it is required to contact the competent authority and reasonably pay the compensation.

Article 34. Maintenance of Safety:

The maintenance of safety, in general cases, consists of using measures as prescribed in the regulations of the concerned sector, particularly the installation of danger warning signs, fence around the construction site, labour safety equipment, such as: helmets, shoes, gloves, goggles.

In case of occurrence of force majeure during the construction stage, such as: flood, storm, fire, earthquake, land-slide, or other disaster that affect the works of the project construction, the contractor must timely take protecting and remedying measures as follows:

- Give the alarm in the construction site;
- Stop the construction work temporarily and use reasonable measures to resolve the incident in a timely manner to ensure safety for workers and to protect the property of the construction project; and
- Immediately report the incident to the project owner, relevant authority, local administration so that measures can be timely taken to deal with the incident.

3.2.1.12 Law on Hygiene, Disease Prevention and Health Promotion (No. 08/NA, 2011)

The development of construction projects shall be undertaken in accordance with laws, regulations, and measures on the maintenance of cleanliness, prevention of diseases that may occur from the project operations. The project owner must ensure health promotion to allow the people to have good health, good quality of life, and must raise the awareness on the importance of hygiene, protection of natural environment to allow it to become abundant and beautiful with the aim of reducing the rate of sickness, mortality and combating against various diseases.

Article 20 specifies the regulation on labour hygiene that employers must provide labour safety equipment to workers and shall ensure the hygiene of the workplace, which shall have sufficient light, ventilation and have temperature, humidity, vibration, noise, smell, and dust that are not exceeding defined standards provided in the relevant regulations. Workers and professionals, particularly in sectors and works that are hazardous to health, shall receive health protection, health check, treatment and care in accordance with the regulations.

3.2.1.13 Environmental Protection Law (2012)

The objective of the Environmental Protection Law is to define the regulations, principles, and measures related to environmental management, monitoring of protection, preservation, control, and rehabilitation. In addition, it also defines, with quality, the impacts of mitigation and pollution created by human or by nature, aiming to provide balance between social and natural environment, to protect and to sustain natural resources and public health, meanwhile also contributing to the national socio-economic development and reduction of global warming.

3.2.1.14 Law on National Heritage (2021)

The objective of the Law on National Heritage is to determine the regulations, principles, and measure for the protection, administration, conservation, use, restoration, and rehabilitation of the national heritage. It also determines the rights and duties of the State, individuals, and social organizations to preserve the value of the national cultural, historical, and natural heritage, aiming to educate citizens to love and treasure the national traditions of the country, as well as assuring the elements for the sustainability of the nation.

3.2.1.15 Law on Social Security (2018)

The Law on social security serves as principles, rules and provisions for the organization, implementation, management, monitoring and inspection of social security affairs. Its objective is to construct more systematic and effective protecting rights, as well as employers and employees who have a tight bond with social security by contributing to the fund and earning its benefits. The valid Law on social security leads to an improvement of livelihoods, social solidarity, and national social-economic growth. This law mainly covers security fund for medical expenses, maternity, abortion, loss of ability to work etc. The National Social Security Fund is managed by the government. Benefit calculation is based on insured income. Benefit calculation is based on insured income

3.2.1.16 Amended Hygiene and Health promotion law, No. 73/NA date 22 November 2019

The Law on Hygiene, Disease Prevention and Health Promotion prescribes the principles, regulations and measures associated with actions regarding hygiene, disease prevention and health promotion. The Law, moreover, functions as a foundation to maintain people's good health, well-being, and long life, which hence lead to preservation and development in a national scale.

In the context of construction and maintenance site, hygiene is the implementation of necessary measures and methods which should behave in the same way as the principles of hygiene in the construction of roads and buildings, including other activities, with an aim of preventing concerns that may severely jeopardize health or life of people both inside and outside the site.

3.2.2 National Decisions and Decrees

3.2.2.1 Ministerial Decision No. 8056/MONRE, 17 December 2013

The *Decision on the Endorsement and Promulgation of List of Investment Projects and Activities Requiring for Conducting the Initial Environmental Examination or the Environmental and Social Impact Assessment* (No. 8056/MONRE, dated on 17 December 2013) specifies a list of investment projects and activities that are grouped into two types based on the nature and scale of the projects / activities. Group 1 projects / activities shall prepare an Initial Environmental Examination (IEE), whereas Group 2 projects / activities shall prepare an Environmental Impact Assessment (EIA).

The investment projects and activities are divided into five types:

- Type I: Energy Sector;
- Type II: Agricultural and Forestry Sector;
- Type III: Industrial processing Sector;
- Type IV: Infrastructure and Service Sector; and
- Type V: Mineral Sector.

According to this Ministerial Decision, the Project falls into Group 2 and Type I Investment Projects and Activities (Energy Sector) relating to the wind power generation sector, using turbines of more than 10 units. Therefore, the Project is required to conduct an EIA.

3.2.2.2 Decree on Environmental Impact Assessment (No. 21/GOV, 2019)

This Decree supersedes the Ministerial Instruction on the *Process of Environmental and Social Impact Assessment of the Investment Projects and Activities* No. 8030/MONRE, dated on 17 December 2013. The objective of this Decree on Environmental Impact Assessment (No. 21/GOV, 2019) is to define the principles, methods, and measures relating to the management, monitoring, and inspection of the Environmental Impact Assessment (EIA) to enable the process to be implemented correctly, transparently, and consistently. The Decree aims to protect the natural environment and mitigate and address any negative impacts to the environment, ensuring reasonable compensation for damages and rehabilitation of livelihoods of affected peoples.

This Decree consists of 8 Parts and a total of 87 Articles. Part III, Section 2 details the rules, procedure, and review of the environmental impact assessment; and Section 4 specifies details of the required public participation. Article 36, Public Participation, specifies public participation is a process of consultation, provision of information and receipt of comments of all sections in the society on the investment projects and activities during the phases of formulation and review of the EIA report and the Environment Management and Monitoring Plan (EMMP) as well as during the monitoring and inspection of the implementation of the environment management activities in each phase of the investment projects and activities in order to ensure transparency, fairness and effectiveness.

- Public participation consists of the following phases:
- Project preparation and planning phase;
- Project construction and operation phase; and
- Project completion (ending) phase.

The Natural Resources and Environment sector that is responsible for investment projects and activities, the local administrations, and the Project owner shall have a joint-responsibility to ensure and create conditions to allow all stakeholders to participate in the environmental impact assessment process.

The project owner shall develop a Public Participation Plan for the environmental impact assessment in each phase and conduct the public participation with a focus on issues on related to ethnic groups, gender roles, vulnerable groups, and disadvantaged groups who are affected by the Project.

3.2.2.3 Decree on Criteria for Poverty Graduation and Development (No. 348/ GOL, 2017)

This Decree on *Criteria for Poverty Graduation and Development* No. 348/GOL, dated on 16 November 2017, defines the criteria for the poverty graduation and development. It provide basic for defining goals for poverty reduction, focuses on building families, developing villages, making large village into towns in rural area and development of districts.

3.2.2.4 Decree on Poverty Graduation and Development Standards (No. 0830/MAF, 2018)

Decree on *Poverty Graduation and Development Standards* No. 0830/MAF, dated on 6 April 2018, provides the implementation guideline for Criteria for Poverty Graduation and Development (No. 348/ GOL, 2017).

3.2.2.5 Ministerial Decision No. 2796.1/MONRE, 19 December 2016

The Decision on the *Endorsement and Promulgation of the Technical Guide to the Formulation of the Environmental and Social Impact Assessment Report* No. 2796/MONRE dated on 19 December 2016 provides advice to project owners and environment services providers in the formulation of the EIA report for projects in the Lao PDR in order to ensure that the EIA Report is conducted correctly, completely, and consistently.

3.2.2.6 Ministerial Decision No. 707/MONRE, 05 December 2013

The objective of the *Decision on the Endorsement and Promulgation of the Guide to Public Participation in the Process of Environmental Impact Assessment of the Investment Projects* No. 707/MONRE, dated on 5 December 2013, is to ensure that the implementation of public participation is conducted correctly, with transparent and comprehensive engagement, particularly the involvement of the affected peoples in the participatory process.

This Ministerial Decision aims to provide opportunities to the public to participate in planning and decision-making related to the investment projects as well as in dealing with the environmental and social impacts and the potential benefits from the projects in a fair manner in order to avoid or 15ecogniz any conflicts related to the investment projects. It also provides the opportunity to the public to present their opinions on the projects implementation as well as to learn and exchange lessons with relevant parties concerning the vocation development, local economy, and protection and management of natural resources.

3.2.2.7 Decision on National Environmental Standards (No. 81/GOV, 21 February 2017)

The Decision on *National Environmental Standards* No. 81/GOV, dated on 21 February 2017, is used as the reference for the monitoring of the environment and control of water, soil, air and noise pollution. This Decision consists of six Sections and a total of 18 Articles that specifies in detail the environmental standards, the pollution emissions standards, types of pollution, concentration ratio, concentration parameters and indicators in the measurement to be the standards to assist in the control of pollutants to be released to the environment that have the potential impact to the life, health of human, animals and ecosystem from the investment projects. The standards are listed in further detail in ***Section 3.5***.

3.2.2.8 Decree on Compensation and Resettlement (No. 84/GOV, 2016)

This Decree on *Compensation and Resettlement of People Affected by Development Projects* (No. 84/GOV, 2016) defines the principles, regulations, and measures relating to the management, monitoring and inspection of the compensation for damages and the resettlement of the peoples. The aim is to allow affected people to receive the compensation, resettlement, assistance to build a stable occupation, improving living condition to a higher level or the previous level, as well as allowing the investment projects to contribute to socio-economic development.

Article 8. Implementation of Compensation Plan:

The compensation for damages from large projects development is related, in many cases, to lawful land use right and construction assets of individuals and legal entities. If a part of the land is affected and the remaining part becomes unusable, the project owner shall provide compensation for the entire holding, through the provision of land-to-land arrangement of equivalent replacement cost including the documents relating to land tenure and the payment for the cost for obtaining such documents. In cases where the land arranged for the replacement is not suitable or the replacement value is lower than the land value of the affected persons, the project owner must seek compensation through other forms based on the replacement cost. For damages caused to the infrastructure and facilities of the community, the project owner must undertake the repair to allow them to be in the same condition as before.

In cases where the affected people have no documents related to land use as specified above in this Article, they will not be entitled to receive compensation for the loss of such land, but will receive the compensation for the loss of construction structure, trees, and produce located in such land from the project owner according to the replacement value.

The affected people must be informed that all activities undertaken after the date of entitlement registration of the affected people (conducted for the Project) will not be eligible to receive

compensation from the project owner, except in case the Compensation Plan is not implemented on time as specified in Clause 2 of this Article:

- The project owner must complete the implementation of the Compensation Plan within twenty-four months from the officially approved date. If the project owner fails to complete the compensation within the specified time period, the project owner must submit the request for extension to the Provincial/Capital City Compensation and Resettlement Committee, which may be granted for not more than twelve months to enable the compensation to be completed. If the compensation is not completed within this extended period, it is required to make the reassessment of the compensation amount which is not completed;
- In case, through the assessment conducted by the Provincial/Capital City Compensation and Resettlement Committee, it is found that the compensation has not been implemented within twelve months after the date of entitlement registration of the affected persons, it is required to make a reassessment of the compensation amount which has not been implemented.

Article 9. Valuation and Assessment of Replacement Cost:

The project owner shall, in coordination with the relevant Compensation and Resettlement Committee, undertake the evaluation and assessment of the replacement cost for the land, construction structure, produce, livestock, and income which, are eligible to receive the compensation and shall hold the consultation and make consensus with the affected persons by identifying correct and reasonable options based on the estimate of state price, purchase, and sale price in market or the average price in the relevant period in each area, for each category and each locality.

Regarding the state price (reference price), it shall be determined in a specific regulation and the Ministry of Natural Resources and Environment shall be charged with the determination of such price in a correct and suitable manner.

3.2.2.9 The Resettlement Law and the National Assembly Promulgation (No. 45/2018)

The objective of this Resettlement Law and the National Assembly Promulgation defines the regulations, and management, monitoring and inspection of the compensation for damages and the resettlement of the Special Areas include border areas, Conservation and Protection Forests.

Article 15. Special Areas notes that these include national defense and security, border, Conservation Forest, Protection Forest, toxic or radio-active areas, and archaeological areas.

3.2.2.10 Decree on State Land Leasing or Concession (No. 135/PM, 2009)

The objective of this Decree is to define the principles, methods, and measures relating to the lease or concession of state land in order to ensure uniform practice in the whole country, allowing state land to be developed, converting land into capital, promoting investment in the production of commercial goods and services, as well as creating sources of revenue for state budget.

Article 37. Contents of State Land Lease or Concession Agreement:

The state land lease contract or land concession agreement must specify the purposes, term, conditions, rental charge, concession royalty; and shall also specify that in every five years, the rental charge or concession royalty shall be increased by not less than five percent of the rental charge or concession royalty of that year as in accordance with the contract form provided in the relevant law.

The implementation of the approved state land lease contract or concession agreement shall be subject to the preparation of report on the evaluation of the implementation in each phase of the activity submitted to the National Land Management Authority and concerned agencies for information.

Article 43: Calculation of Compensation for the People Affected by the Land Lease and Concession

If the area of state land lease and concession includes land owned by people who have a legal right to use it, compensation should be computed according to the following scenarios:

- In general, agricultural land for cultivating rice or annual crops should be kept for farmers, however in exceptional circumstances, compensation should be paid to the farmers by adding together the estimated value of the land and the estimated value of crops in a normal year, then multiplying the value by ten (10).
- Compensation for agricultural land used for orchard tree cultivation must be determined and paid by adding together the estimated value of the land and the estimated value of crops in a year, then multiplying the value by ten (10).
- Compensation for agricultural land used for the planting of industrial trees and medicinal plants must be determined and paid by combining the estimated value of the trees or other plants on a plot of land.
- Compensation for agriculture land used for livestock must be determined and paid by adding together the estimated worth of the land and the estimated value of the animals raised in a normal year, then multiplying the value by three (3).
- Paddy field areas should not be used for any other purposes. Authorization from the Land Management Authority and the Agricultural and Forestry Sector must be acquired, if necessary.
- Compensation must be computed by adding together the estimated worth of the land and the value of the structures and crops on the land, in the case of construction land.
- Compensation by the state will be given to the investor in the case that the land is used for the lease and concession of the public interest, to compensate for the loss of properties associated with the land, as specified in the Law on Investment Promotion.
- A written memo must be prepared and signed by all participants, specifically the line agencies, local administrative authorities, naiban, and the villagers involved, in order to estimate the compensation.

3.2.2.11 Decree on Protection Forest (No. 333/PM, 2010)

Protection forests are areas designated for the protection of Laotian natural resources, such as water, river ecosystems, soil quality, protection from natural disasters, and environmental conservation, i.e. for ecosystem services. The objective of this Decree is to define the principles, regulations, and measures relating to the management, protection and conservation, development, and use of protection forest in a sustainable manner in line with the provisions in the Forestry Law. Important points of the Decree are:

Article 19. Conversion of Protection Forest and Protection of Forest Land:

In case it is necessary to convert the protected forest to other purposes with optimal benefits to the country, it is required to perform as follows:

- The conversion of protected forest at national and provincial levels must be approved from the Standing Committee of the National Assembly upon the request by the Government;
- The conversion of the protected forest at district and municipality levels must be approved by the Government upon the request of the National Land Management Authority in agreement with the Ministry of Agriculture and Forestry; and
- The conversion of the protected forests at village levels must be approved by the Provincial or Capital City Administration upon the request by the Provincial/Capital City Land Management Authority in agreement with the Provincial/Capital City Department of Agriculture and Forestry.

Article 31. Performance of Obligations of the Projects:

Projects that create impacts to and/or have received benefits from the protected forest land directly and indirectly must contribute to the fund for the development of forest and forest resources as specified in the Project Development Agreement, and this fund shall be used in the management, maintenance, and development of the protected forest and the protected forest land. The contribution relevant to this Project shall be performed as follows:

- Project developers in construction of road, transmission line route, and other development projects that cause permanent conversion of protected forest and protected forest land must contribute to the fund for forest rehabilitation and reforestation based on the size of the area which is directly affected.

3.2.2.12 Climate Change Decree (2019)

The Climate Change Decree (2019) was enacted in 2019 to provide an overarching legal framework for climate change adaptation and mitigation. It clarifies the legal mandates and reporting lines among relevant ministries and different administrative bodies in relation to climate change. The decree identifies sources of climate finance and the management of these funds. Moreover, the decree also specifies the responsibility of Ministry of Energy and Mine to develop strategy and **promote renewable energy** and technology to minimize the emission of GHG.

3.2.2.13 Prime Minister's Decree No 15 Regarding Forest Clearance

The Prime Minister's Decree No. 15 was enacted in 2016, where the objective is to strengthen the strictness of timber harvest management and inspection, timber transport and business. This means strengthening the implementation of forest management, timber harvest, timber business, timber trade, and timber processing, while strictly respecting the laws and regulations established by the Government in an effective manner, and also to prevent and address drawback phenomenon within forest sector, aiming to reduce and eliminate these drawbacks step by step.

3.2.2.14 Decree on the establishment of the National Regulatory Authority for UXO Programme (No. 406 /PM, 2011)

The decree on the establishment of the NRA to tackle the issue of unexploded ordnance (UXO) in Laos, by enhancing the effectiveness of the NRA as the governing authority in the UXO sector. The NRA's work specifically focuses on the clearance of UXO and accident victim assistance. Outputs of the National Regulatory Authority for UXO in 2011 includes the following:

- Better Mine Risk Education (MRE) approaches in Laos
- Better information and strategies for victim assistance in the Lao PDR
- Release of priority land for agriculture and development, coordinated and regulated in accordance with risk reduction and priority needs
- Effective coordination and regulation of the UXO Sector, integrated into the regular set-up of the Lao Government
- International Treaty Obligations under the CCM are met

3.2.2.15 NRA Decision 04

The decree characterizes the role, rights, position, organizational structure, duties, working principles and methods of the National Regulatory Authority (NRA) for UXO in Lao PDR. It is to be utilized as a legal reference for NRA to supervise and implements UXO activities countrywide in an effective and efficient conduct. Some of the duties listed in the decree include:

- Assisting the Ministry of Labour and Social Welfare in examining and converting policies, plans, strategies, projects and resolutions on UXO matters into fine projects and strategies

- Supervising the establishment of a database for UXO/Mine clearance operations and its wide dissemination
- Monitoring, inspecting and assessing all of UXO clearance Organization activities and reporting periodically

3.2.2.16 NRA 2009

The NRA introduced the National Strategic Plan for the UXO Sector called, “The Safe Path Forward II” (SPF), a strategy aiming to guide the implementation of important international declarations and conventions, such as the Convention on Cluster Munitions, the UNESCAP Declaration on the Decade of the Disabled, and the Convention of the Rights of People with Disabilities. The SPF has been established to achieve an end-state of people who were impacted to live free from UXO and landmines. 46 priority districts in 9 provinces, namely, Attapeu, Champassak, Huapahn, Khammuane, Luangprabang, Savannakhet, Saravane, Sekong, and Xiengkhuang are named as the most highly affected provinces. To reduce the number of UXO casualties’ major actions the government has taken include:

- Delivering risk education activities for the identified risk groups, raise awareness of UXO accidents and provide classroom-based education for school children in contaminated areas
- Providing aid to village volunteers who act as peer educators
- Promoting a timelier and coordinated response to prevent accidents by establishing mine risk education (MRE), clearance or Victim Assistance cooperation
- Developing and enforcing legislation

3.2.3 National Plans and Strategies

3.2.3.1 National Socioeconomic Development plan 2021-2025, with Vision to 2030

The goal of National Socioeconomic Development plan[9] for the period 2021-2025, date on 26 March 2021, aims to translate the Resolution of the 11th Party Congress, as well as continue the implementation of the National Strategy on Socio-Economic Development 2025 and Vision 2030 of the Lao PDR.

This plan is sets out the fundamental direction for creating a new turning point in socio-economic development in the coming years, particularly ensuring quality establishment of the political ideological factors, the economic system and the material and technical basis; continuing to 19ecognize economic development as the central task of the entire Party and all citizens, in conjunction with socio-cultural development, including the development of human resources, and strengthening of the existing structural elements such as public governance and administration, national defence, public security and foreign affairs.

3.2.3.2 National Pollution Control Strategy and Action Plan 2018-2025, with Vision to 2030

The Strategy on Environment Pollution Control[10] is an indispensable component of Laos’ socio-economic development strategy and the sustainable development strategy. The Strategy presents the guiding views, vision, mission, principle, objectives, activities, and solutions to environmental pollution control, and priority programs to pursue sound environmental management, and provides a series of options for the Government of Laos (GOL) to implement their commitments to pollution prevention and control.

[9] https://data.opendevelopmentmekong.net/library_record/9th-five-year-national-socio-economic-development-plan-2021-2025
[10] http://www.gms-eoc.org/uploads/resources/922/attachment/Laos-Pollution-Strategy-Plan-2018-2025-draft.pdf

These action plans are grouped as short-term (2018-2020), medium-term (2021-25), and long-term (2026-30) based on their nature and importance. For each action, principle responsible agency and supporting agencies are also identified. The Strategy is seen as an extremely important guiding instrument for the country's environmental pollution control work.

3.2.3.3 National Biodiversity Strategy and Action Plan 2016-2025

The goal of National Biodiversity Strategy and Action Plan (NBSAP)[11] for the period 2016-2025 is to enhance the role of biodiversity as a national heritage and as a substantial contributor to poverty alleviation, as well as sustainable and resilient economic growth.

The key objectives to support the goal, which are also aligned to the global goals for biodiversity are:

- Institutionalize innovative multi stakeholder efforts to arrest the degradation and enhance conservation of ecosystems and biodiversity resources therein.
- Provide clear and enforceable guidance for the sustainable use of biodiversity resources to support poverty alleviation and sustainable economic growth.
- Establish practical mechanisms for ensuring fair and equitable sharing of benefits from the use of biodiversity resources.

NBSAP for the period 2016-2025 consist of five key strategies:

- NBSAP-Strategy 1: Protect the country's diverse and economically important ecosystems including the species and genetic diversity
- NBSAP-Strategy 2: Integrate the value of biodiversity to socio-economic decision making to ensure sustainable use and funding.
- NBSAP-Strategy 3: Strengthen the knowledge base for strategic decision making
- NBSAP-Strategy 4: Inspire and enable actions through better communication, education and public awareness.
- NBSAP-Strategy 5: Enable effective preparation and implementation of plans and programs.

The five key strategies with cross-cutting themes are proposed to support the goals and objectives of the NBSAP 2016-2025. These strategies and targets address the status and trends of change in biodiversity as well as gaps in the implementation of the first NBSAP. They are also designed to address key biodiversity issues/threats, as well as well as consider Lao PDR priorities and its commitments to the Aichi global targets set by Convention on Biological Diversity in 2010.

3.2.3.4 National Strategy on Climate Change

The National Steering Committee on Climate Change Strategy was established in 2008. The committee chaired by the Deputy Prime Minister began a critical policy process with formulation of climate change strategies, programmes and projects for Lao PDR.

As a result, a National Strategy on Climate Change was developed in 2010 with action plan for 2013-2020 with following objectives[12].

- The goals of the National Climate Change Strategy are aligned with vision of sustainable development, poverty reduction, enhanced quality of the natural environment, and strengthened public health for all Lao people.

[11] https://www.cbd.int/doc/world/la/la-nbsap-v2-en.pdf

[12] https://www.la.undp.org/content/dam/laopdr/docs/Reports%20and%20publications/2013/SNC_Eng.pdf

- The National Climate Change Strategy, realizing the high vulnerability to climate change of the country's physical, biological and socioeconomic development, has given special attention to climate change vulnerabilities and adaptations.
- State-supported precautionary programmes to manage climate risks should produce benefits at household and community levels in addition to reducing transitory poverty.

3.2.3.5 Laos PDR's Draft Action Plan on Climate Change (2013-2020)

To support the implementation of the National Climate Change Strategy[13], the Action Plan on Climate Change (2013-2020) was drafted to set out climate change actions for the seven priority sectors in the National Climate Change Strategy. Priority climate change adaptation actions include: (i) climate resilient agriculture, land use change and forestry, (ii) water resource management; (iii) ecosystem based adaptation solutions, (iv) climate resilient transport and urban development and (v) adaptation in health sector. Priority climate change mitigation actions include: (i) increasing and maintaining national forest cover, (ii) increasing use of renewable energy sources and energy efficiency in rural electrification, (iii) emission reduction by developing public transport services.

The priority climate related adaptations actions identified, include:

- Climate resilient agriculture, land use change and forestry,
- Water resource management,
- Ecosystem based adaptation solutions,
- Climate resilient transport and urban development and
- Adaptation in health sector.

3.2.3.6 Laos PDR's National Determined Contribution (NDC)

Lao PDR's Nationally Determined Contribution (2015) (NDC)[14] to the United Nations Climate Change Paris Agreement sets out adaptation and mitigation activities to be implemented over 2015-2030, including promotion of renewable energy. The Government of Lao PDR has also laid the foundations for the implementation a renewable energy strategy that aims to increase the share of small scale renewable energy to 30% of total energy consumption by 2030.

Lao PDR's Revised Nationally Determined Contribution (2021) (NDC)[15] – sets forth increased transparency and consistency between quantitative targets, new short-term objectives for climate change adaptation towards a strengthened measurement, reporting and verification system, as well as the country's expression of interest to pursue voluntary cooperation to allow for higher ambition, in accordance with the Paris Agreement. The Government of Lao PDR aims to increase solar and wind energy to 1 GW total installed capacity (2020-2030) as part of 2030 Conditional mitigation scenario and targets towards net zero emissions 2050.

3.2.3.7 Draft Renewable Energy Development Strategy (2011)

Draft Renewable Energy Development Strategy (2011)[16] seeks to increase the share of renewable energy within total energy consumption to 30% by 2025. The Government aims to develop around 50 MW of wind power by 2025.

---

[13] http://www.la.undp.org/content/lao_pdr/en/home/library/environment_energy/climate_change_strategy.html

[14] Lao PDR First Nationally Determined Contribution (2015). Retrieved from: http://extwprlegs1.fao.org/docs/pdf/lao186537.pdf

[15] Lao PDR Nationally Determined Contribution (NDC) (2021). Retrieved from: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Lao%20People's%20Democratic%20Republic%20First/NDC%202020%20of%20Lao%20PDR%20(English),%2009%20April%202021%20(1).pdf

[16] https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/laws/8161.pdf

3.2.3.8 The National Green Growth Strategy of the Lao PDR Till 2030 (2018)

The National Green Growth Strategy of the Lao PDR Till 2030 (2018)[17] identifies six priority sectors/areas to support the country's vision of green growth: agriculture, forestry, urban development, transport, energy, and tourism. Wind energy development is one of the key focuses of the National Green Growth Strategy of the Lao PDR; the strategy will encourage and promote investments of the public sector and private sector in production of renewable energy – including wind energy, to meet the increasing demand for energy both inside the country and in foreign countries.

3.2.3.9 National Strategic Plan for Disaster Risk Management (2013)

The current National Strategic Plan for Disaster Risk Management identifies four key strategic objectives:

- Safeguard sustainable development and reduce the impacts and damages caused by natural and man-made disasters,
- Shift from relief to mitigation of disaster impacts to community, society and the economy, and preparedness before a disaster strikes with emphasis on hazards such as floods, drought, landslide and fire,
- Ensure that disaster management is a joint responsibility of both the government and the people through building community capacity, and
- Promote sustainable protection of the environment and the country's natural wealth such as forests, land and water resources18.

3.3 International Regulatory Framework

3.3.1 ADB Safeguard Policy Statement (2009)

ADB uses a classification system to reflect the significance of a project's potential environmental impacts. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories:

- Category A. A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
- Category B. A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.
- Category C. A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
- Category FI. A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI (paras. 65-67).

[17] The National Green Growth Strategy of the Lao PDR (2018). Retrieved from: https://data.opendevelopmentmekong.net/dataset/e7db2aa8-c294-47dc-a2da-aa6e41493a12/resource/861b9f4c-cf6c-413b-aeff-e4f6b9346fd7/download/final_version_of_national_green_growth_strategy_english_feb_2019_.pdf
18 http://www.adpc.net/igo/ category/ID1020/doc/2016-mQHt38-ADPC-CBDRR_ Manual_Lao_PDR_.pdf

According to the project's activity and impact, the project is classified as **Category A projects**. The Policy Delivery Section (Chapter VB, paras.53-64) lists general requirements that the ADB is obliged to follow in regard to: project screening and classification, information disclosure, consultation and participation, due diligence, monitoring and reporting, local grievance redress mechanism and the Bank's Accountability Mechanism.

In July 2009, ADB's Board of Directors approved the Safeguard Policy Statement (SPS) governing the environmental and social safeguards of ADB's operation. The SPS builds upon ADB's previous safeguard policies on the Environment, Involuntary Resettlement, and Indigenous Peoples, and combines them into one consolidated policy framework with enhanced consistency and coherence, and more comprehensively address environmental and social impacts and risks. The SPS also provides a platform for participation by including the effected people and other stakeholders into the Project design and implementation. ADB is currently revising its Safeguard Policy Statement, hence new policies are to be expected in September 2022.

ADB adopts a set of specific safeguard requirements that are required to address environmental and social impacts and risks:

- Safeguard Requirement 1: Environment;
- Safeguard Requirement 2: Involuntary Resettlement;
- Safeguard Requirement 3: Indigenous Peoples;
- Safeguard Requirement 4: Special Requirements for Different Finance Modalities; and
- ADB's Prohibited Investment Activities List.

It should be noted that none of the project activities are included in ADB's list of prohibited activities.

3.3.1.1 General Requirements

The Policy Delivery Section (Chapter VB, paras.53-64) lists general requirements that the ADB is obliged to follow in regard to: project screening and classification, information disclosure, consultation and participation, due diligence, monitoring and reporting, local grievance redness mechanism and the Bank's Accountability Mechanism.

- **Project screening and classification**: The Policy stipulates that the ADB will undertake project screening as early as possible to i) determine the significance of adverse impacts; (ii) identify the level of assessment and institutional resources required; (iii) determine disclosure requirements (para.50).
- **Information disclosure**: In line with the ADB's Access to Information Policy, which requires that for environment Category A projects, draft environmental impact assessment must be posted on the ADB's website 120 days before project approval. For draft environmental assessment and review frameworks, draft resettlement frameworks and/or plans and draft Indigenous Peoples planning frameworks and/or plans, the Policy only stipulates that these documents must be provided by the borrower/client and posted on ADB's website before project appraisal, as follows: (i) final or updated environmental impact assessments and/or initial environmental examinations, resettlement plans, and Indigenous Peoples plans upon receipt (by the ADB) and ii) environment, involuntary resettlement and Indigenous Peoples monitoring reports submitted by borrowers/clients during project implementation upon receipt (by the ADB).
- **Consultation and participation**: The Policy states that the ADB "is committed to working with borrowers/clients to put processes of meaningful consultation and participation in place". Meaningful participation is defined as: (i) beginning early in the project preparation stage and being carried out on an ongoing basis throughout the project cycle; (ii) providing timely disclosure of relevant and adequate information that is accessible to affected people; (iii) being free of intimidation and coercion; (iv) being gender inclusive and responsive; and v) enabling the incorporation of all relevant views of affected people and other stakeholders in decision making

(para.54). For projects with significant adverse environmental, involuntary resettlement, or Indigenous Peoples impacts, ADB project teams will participate in consultation activities to understand the concerns of affected people and ensure that such concerns are addressed in project design and safeguard plans.

- **Due diligence and review of safeguard assessments and plans**: Due diligence refers to the ADB's process of assessing safeguard issues through field visits and desk reviews as well as through examining relevant safeguard documents (such as environmental impact assessments, resettlement plans, Indigenous People's plans). Through its due diligence processes, the ADB confirms that all potential environmental and social risks are identified. If they cannot be avoided, it ensures that appropriate mitigation measures are identified (SPS, para.56).
- **Monitoring and reporting**: The monitoring obligations are merely required to be "commensurate with the project's risks and impacts". For highly complex and sensitive projects, the ADB requires the borrower/client to engage an independent advisory panel" (SPS, para.57)
- **Local grievance redress mechanisms**: The Policy requires the borrowers/ client to set up and maintain a grievance redress mechanism at project level (SPS, para.59). This mechanism does not replace the ADB's accountability mechanism, but is intended to solve grievances at the local level. Affected people can also take complaints to the ADB's Accountability Mechanism. The Accountability Mechanism Policy merely requires complainants to demonstrate that they have sought to address their complaint with management.

3.3.1.2 Environmental Requirements

The main Environmental Safeguard requirements are the followings:

- **Categorization and Information disclosure**: The Policy uses a categorization system to reflect the significance of a project's potential environmental impacts. "A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative and induced impacts in the project's area of influence" (SPS, para.50). The following categories exist:
- **Category A**: A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA), including an environmental management plan (EMP), is required.
- **Category B**: A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE), including an EMP, is required.
- **Category C**: A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.
- **Category FI**: A proposed project is classified as category FI if it involves the investment of ADB funds to, or through, a financial intermediary.
- **Assessment process**: The assessment process will be based on current information, including an accurate project description, and appropriate environmental and social baseline data. Environmental impacts must be determined in consultation with stakeholders including affected people and concerned non-government organizations (NGOs). For Category A projects, the borrower/client is required to undertake an assessment of options that looks at alternatives to the project's location, design, technology and components. The options assessment will also examine the "no project" alternative. The borrower/client must present the rationale for selecting the

particular project details, including a cost-benefit analysis that takes into account environmental costs and benefits of the various alternatives considered (SPS, Appendix 1, para. 4).

- **Type of impacts**: The types of impacts related to the environment include physical, biological and socioeconomic impacts. These can relate to occupational health and safety; community health and safety; vulnerable groups; gender issues; and impacts on livelihoods through environmental media and physical cultural resources (SPS, Appendix 1, para. 5). The environmental assessment will examine whether particular individuals and groups may be differentially or disproportionately affected by the project's potential adverse environmental impacts because of their disadvantaged or vulnerable status, in particular, the poor, women and children, and Indigenous Peoples. (SPS, Appendix 1, para. 6).
- **Project area of influence**: The project Area of Influence covered by the environmental safeguard provisions in the Policy is defined as: "*This area of influence encompasses (i) the primary project site(s) and related facilities that the borrower/client (including its contractors) develops or controls, such as power transmission corridors, pipelines, canals, tunnels, access roads, borrow pits and disposal areas, and construction camps; (ii) associated facilities that are not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project; (iii) areas and communities potentially affected by cumulative impacts from further planned development of the project, other sources of similar impacts in the geographical area, any existing project or condition, and other project-related developments that are realistically defined at the time the assessment is undertaken; and (iv) areas and communities potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location. The area of influence does not include potential impacts that might occur without the project or independently of the project. Environmental impacts and risks will also be analysed for all relevant stages of the project cycle, including preconstruction, construction, operations, decommissioning, and post closure activities such as rehabilitation or restoration*'' (SPS, Appendix 1, para. 6).
- **Transboundary impacts**: The environmental assessment process must identify potential transboundary effects, such as air pollution and increased use or contamination of international waterways. It must also identify global impacts, such as the impact of greenhouse gases and impacts on endangered species and habitats (SPS, Appendix 1, para. 7).
- **Environmental planning and management**: If environmental impacts are identified, the borrower/ client is required to prepare an environmental management plan describing how potential impacts and risks will be addressed (SPS, Appendix 1, para. 12).
- **Consultation and participation, grievance mechanism**: The consultation process and grievance mechanism process follows the same provisions as laid out in the general requirements (see above) (SPS, Appendix 1, paras. 19 and 20).
- **Reporting and monitoring**: The Policy states that "the extent of monitoring activities will be commensurate with the project's risks and impacts" (SPS, Appendix 1, para. 21). For Category A projects, the borrower/client is required to retain qualified external experts or qualified NGOs to verify its monitoring information. The minimum requirements are semi-annual reports during construction for Category B projects, and quarterly monitoring reports during construction for Category A reports. For projects with likely ongoing impacts during operation, annual monitoring is required. Monitoring reports must be posted in a location accessible to the public (SPS, Appendix 1, paras. 21 & 22).
- **Unanticipated environmental impacts**: If unanticipated impacts occur during project implementation, the borrower/client is required to update the environmental assessment and environmental management plan or prepare a new assessment and plan (SPS, Appendix 1, para.23).

- **Biodiversity conservation and sustainable natural resource management**: This section (SPS, Appendix 1, paras. 24 – 49) contains requirements regarding the following issues: modified habitats; natural habitats; critical habitats; legally protected areas; invasive alien species; management and use of renewable resources; pollution prevention and abatement (resource conservation, energy efficiency, waste, hazardous materials, pesticide use and management, greenhouse gas emissions); health and safety (occupational health and safety and community health and safety); and physical cultural resources (SPS, Appendix 1, para. 24).

3.3.1.3 Involuntary Resettlement Requirements

ADB's Safeguard Requirements 2 (SR2) on involuntary resettlement apply to full or partial, permanent or temporary physical displacement (relocation, loss of residential land, or loss of shelter) and economic displacement (loss of land, assets, access to assets, income sources, or means of livelihoods) resulting from (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas. Resettlement is considered involuntary when displaced individuals or communities do not have the right to refuse land acquisition that results in displacement. This occurs in cases where (i) lands are acquired through expropriation based on eminent domain; and (ii) lands are acquired through negotiated settlements, if expropriation process would have resulted upon the failure of negotiation. (SPS, Appendix 2, para. 5).

If potential adverse economic, social, or environmental impacts from project activities other than land acquisition (including involuntary restrictions on land use, or on access to legally designated parks and protected areas) are identified, such as loss of access to assets or resources or restrictions on land use, they will be avoided, or at least minimized, mitigated, or compensated for, through the environmental assessment process. If these impacts are found to be significantly adverse at any stage of the project, the borrower/client will be required to develop and implement a management plan to restore the livelihood of affected persons to at least pre-project level or better. (SPS, Appendix 2, para. 6).

ADB's 2013 Operations Manual F1 (OMF1) on Safeguards provides guidance on categorization of projects based on its potential involuntary resettlement impacts. The involuntary resettlement impacts of an ADB – financed project are considered significant if 200 or more persons will be physically displaced from their homes, or lose 10% or more of their productive or income generating assets. (2013 ADB OMF1/OP, para 9)

Where projects involve involuntary resettlement of people, 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.

The Policy uses a categorization system to reflect the significance of a project's potential impacts related to involuntary resettlement. This includes:

- **Category A**: A proposed project is classified as Category A if it is likely to have significant involuntary resettlement impacts. A resettlement plan, including assessment of social impacts, is required.
- **Category B**: A proposed project is classified as Category B if it includes involuntary resettlement impacts that are not deemed significant. A resettlement plan, which includes assessment of social impacts, is required.
- **Category C**: A proposed project is classified as Category C if it has no involuntary resettlement impacts. No further action is required.
- **Categories FI**: A proposed project is classified as Category FI if it involves the investment of ADB funds to, or through, a financial intermediary.

ADB's SPS SR2 provides key requirements covering compensation, assistance and benefits for displaced persons, social impact assessment, resettlement planning, negotiated land acquisition,

information disclosure, consultation and participation, grievance redress mechanism, monitoring and reporting, unanticipated impacts; and special considerations for indigenous peoples

3.3.1.4 Indigenous Peoples Requirements

ADB's Safeguard Requirements 3 (SR3) on Indigenous Peoples aims to design and implement projects in a way that fosters full respect for Indigenous Peoples' identity, dignity, human rights, livelihood systems, and cultural uniqueness as defined by the Indigenous Peoples themselves so that they (i) receive culturally appropriate social and economic benefits, (ii) do not suffer adverse impacts as a result of projects, and (iii) can participate actively in projects that affect them. (SPS Appendix 3, para 3). It is triggered if The Indigenous Peoples safeguards are triggered if a project directly or indirectly affects the dignity, human rights, livelihood systems, or culture of Indigenous Peoples or affects the territories or natural or cultural resources that Indigenous Peoples own, use, occupy, or claim as their ancestral domain. (SPS Appendix 3, para 9).

The impacts of an ADB-financed project on Indigenous Peoples is determined by assessing the magnitude of impact in terms of the following:

- 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.

The ADB Safeguard Policy identified Project categories in term of Involuntary Resettlement is summarized below:

- **Category A**: A proposed project is classified as Category A if it is likely to have significant impacts on Indigenous Peoples. An Indigenous Peoples plan (IPP), including assessment of social impacts, is required.
- **Category B**: A proposed project is classified as Category B if it is likely to have limited impacts on Indigenous Peoples. An IPP, including assessment of social impacts, is required.
- **Category C**: A proposed project is classified as Category C if it is not expected to have impacts on Indigenous Peoples. No further action is required.
- **Category FI**: A proposed project is classified as Category FI if it involves the investment of ADB funds to, or through, a financial intermediary.

3.3.2 ADB Social Protection Strategy (2001)

The Social Protection Strategy was approved by ADB on September 13, 2001. It is defined as the 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 Social Protection Strategy spells out the scope of social protection and commitment of the ADB to develop priority interventions in five major elements:

- Labour market policies and programs designed to generate employment, improve working conditions and promote the efficient operations;
- Social insurance programs to cushion the risks associated with unemployment, ill health, disability, work-related injury and old age;

- Social assistance and welfare service programs for the vulnerable groups with inadequate means of support, including single mothers, the homeless, or physically or mentally challenged people;
- Micro and area-based schemes to address vulnerability at the community level, including micro insurance, agricultural insurance, social funds and programs to manage natural disasters; and
- Child protection to ensure the healthy and productive development of children.

At the project level, the following social protection requirements are applicable in the design and formulation of ADB projects,

- compliance with the internationally recognized core labour standards; and
- taking all necessary and appropriate steps to ensure that for ADB-financed procurement of goods and services, contractors, subcontractors and consultants will comply with the country's labour legislation (e.g., minimum wages, safe working conditions, and social security contributions, etc.) and the Core Labour Standards
- The Core Labour Standards include:
- Elimination of all forms of forced or compulsory labour (Conventions 29 and 105)
- Effective abolition of child labour (Conventions 138 on minimum age, 182 on worst form)
- Freedom of association and effective recognition of the right to collective bargaining (Conventions 87 and 98)
- Elimination of discrimination in respect of employment and occupation (Conventions 100 equal remuneration and 111 on discrimination)

3.3.3 ADB Gender and Development Policy (1998)

The ADB Gender and Development Policy, which was approved in 1998, is the guiding framework for gender and development activities. The Policy adopts gender mainstreaming as the key strategy for promoting gender equality and women's empowerment across the full range of ADB operations—from country partnership strategies to the design and implementation of gender-inclusive projects and programs. The key elements of ADB's policy include gender sensitivity, gender analysis, gender planning, mainstreaming, and agenda setting. To operationalize the policy, ADB's focus of activities will be to:

- Provide assistance to its developing member countries (DMCs) in the areas of policy support, capacity building, Gender and Development (GAD) awareness, and formulation and implementation of policies and programs directed at improving the status of women;
- Facilitate gender analysis of proposed projects, including program and sector loans, and ensure that gender issues are considered at all the appropriate stages of the project cycle, including identification, preparation, appraisal, implementation, and evaluation;
- Promote increased GAD awareness within ADB through training workshops and seminars, development of suitable approaches, and staff guidelines to implement the policy on GAD;
- Assist the DMCs in implementing commitments made at the Beijing World Conference on Women; and
- Explore opportunities to directly address some of the new and emerging issues for women in the region.

3.3.4 ADB Access to Information Policy (AIP) (2019)

The objective of the Access to Information (AIP) Policy is to promote stakeholder trust in ADB and to increase the development impact of ADB activities. The policy reflects ADB's commitment to transparency, accountability, and participation by stakeholders in ADB-supported development

activities in Asia and the Pacific. It also recognizes the right of people to seek, receive, and impart information about ADB's operations.

- The policy applies to documents and information that ADB produces, requires to be produced by its borrowers or clients, or are produced and provided to ADB by other parties in the course of ADB operations. The policy will be implemented in accordance with detailed arrangements approved by ADB Management and made publicly available in accordance with ADB's normal procedures.
- The AIP outlines the following:
- Policy Principles in which the AIP is based on, this includes, but not limited to, for example:
- Clear, timely, and appropriate disclosure about its operations
- Limited exceptions. The policy provides a limited set of exceptions that balances the rights and interests of various parties.
- Proactive disclosure. ADB proactively shares its knowledge products and information about its operations in a timely manner to facilitate participation in ADB decision-making
- Sharing of information and ideas. The AIP includes processes by which people may equally seek, receive, and convey information and ideas about ADB operations.
- Providing information to project-affected people and other stakeholders.
- Clear appeals process. A clear process to appeal an ADB decision not to disclose requested information is an important part of a meaningful disclosure framework
- Continuous monitoring. ADB monitors the effectiveness of the policy, learns lessons from its successes and shortcomings, and stays abreast of new technologies and practices.
- Information Requests and Appeals which outline the procedure and process for requests for ADV information and documents.
- There is an Access to Information Committee (AIC) overseeing established to interpret, monitor, and review the policy and its implementation arrangements.

ADB has a two-stage appeals process that requesters can use when they believe that ADB has denied their request for information in violation of this policy.

3.3.5 World Bank / IFC EHS Guidelines / IFC PS / AIIB ESF Guidelines / JICA ESC Guidelines

The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). They are categorized by environment, occupational and community health and safety, and construction and 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 within specific industry sectors. The EHS Guidelines most relevant to the Project are identified below:

- WBG General EHS Guidelines (2012);
- WBG EHS Guidelines for Wind Energy (2015);
- WBG EHS Guidelines for Electric Power Transmission and Distribution (2007);
- WBG EHS Guidelines for Construction Materials Extraction (2007);
- IFC/EBRD Workers' Accommodation: Processes and Standards; and
- IFC Guidance Note 6: Biodiversity Conservation and Sustainable Natural Resource Management (2007).

- JICA Guidelines for Environmental and Social Considerations (2010)

3.4 International Conventions

3.4.1 United Nations Convention on Biological Diversity (1996)

Under this Convention, Lao PDR has agreed to:

- Develop the legislation for the protection of threatened species and population;
- Develop the national strategy for the conservation and sustainable use of biodiversity;
- Integrate conservation and sustainable use of the biological resources in the decision-making of the country; and
- Undertake the environmental impact assessment for development projects with a view to mitigating the negative impacts.

3.4.2 Coherence with Sustainable Developmental Goals and the Paris Climate Agreement

Due to the high exposure to extreme weather and climate change related disaster climate resilient development has become an integral part of development in Lao DPR over the past few years. The country's commitment towards climate resilient development is demonstrated through its various development related policies and planning frameworks.

The Disaster Risk Reduction (DRR) had been an integral part of National Social and Economic Development Plan since the 7th Plan of 2011-2015 with an aim of protection of development and investment processes from natural disasters and to preclude exacerbation or creation of new risks. The sectors in which DRR was considered highly relevant and mainstreaming DRR in policies has evolved over the past many years are agriculture and forestry, public work and transportation, water resources management and public health. DRR is also an integral part of 8th National Social and Economic Development Plan.

3.4.3 Basel Convention

Under the Basel Convention, Lao PDR is to aim to help decrease the number of transboundary movements and minimize the number of hazardous wastes, and to dispose and manage the wastes in an environmentally friendly manner. To achieve this, a few objectives need to be completed:

- Transboundary movements of wastes are reduced to a minimum consistent through environmentally friendly and efficient management, and any permitted transboundary movement is controlled under the terms of the Convention
- The amount and hazardousness of the wastes generated are minimized, and their environmentally sound management, which includes the treatment of the wastes, is ensured to be as close to their source of generation as possible
- Provide help to developing countries in environmentally sound management of hazardous and other waste they generate

3.4.4 CITIES

Annually, it is estimated that international wildlife trade is worth billions of dollars and includes hundreds of millions of plants and animal specimens. As levels of exploitation for some of these animal and plant species are high and destroying some of their natural habitats, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITIES) was conceived to safeguard certain species from over-exploitation.

As a party of the CITIES, Lao PDR is to ensure that international trade does not threaten the survival of plants and animals in the wild. As of today, more than 37,000 species of animals and plants are under the protection of CITIES, to protect them from being traded as live specimens, dried herbs, or fur coats. Even though CITIES is legally binding, it does not replace any national laws; it is rather used as a framework to be respected by each Party.

3.4.5 Kyoto Protocol

Under the Kyoto Protocol, Lao PDR is committed to limit and reduce greenhouse gases (GHG) emissions in accordance with the agreed individual targets. An important element of the protocol is the establishment of flexible market mechanisms. The mechanisms should encourage GHG abatement to start where it is most cost-effective; as long as emissions are removed from the atmosphere, it does not matter where it is reduced from. As a party to the Convention, Lao PDR has actively. The Convention has encouraged each Party to adopt policies and measure on mitigation, and as a party to the Convention, Lao PDR has actively been participating in the Convention process and even submitted its First National Communication (FNC) to the UNFCCC as part of its commitments.

Lao PDR is not a major contributor to climate change as of yet but is likely to be disproportionably affected. By ratifying the UNFCCC and Kyoto Protocol, it will build on the country's commitment to its climate change adaption efforts.

3.4.6 Ramsar Convention

Th Convention has made possible for a wide variety of natural and man-made habitat types to be classified as wetlands. In particular, the Ramsar Convention encourages the designation of sites containing unique, representative, or rare wetlands that are important for biological diversity conservation. As a Party of this Convention, Lao PDR is to aim to put a pause to the loss of wetlands worldwide and to conserve those that remain through wise use and good management.

Under the Ramsar Convention on "Wetlands of International Importance", which covers every aspects of wetland wise use and conservation, Lao PDR has defined two wetland areas, namely Xe Champone in Savannakhet province and Beung Kiat Ngong in Champassak Province. The commitment from the Lao government to protect its important natural wetland resources comes at a crucial point in the nation's transformative and quick economic development.

3.4.7 International Labor Organization (ILO) No. 138

As a member under one of the ILO Conventions on child labor, Lao PDR has the obligation to respect, realize, and promote the abolition of child labor. The aim of ILO Convention No. 138 on Minimum Age and Convention is to effectively eliminate child labor by requiring country members to:

1. Establish a minimum age for entry into employment and work; and
2. Establish national policies to abolish child labor

Lao PDR ratified ILO Convention No. 138 on June 13, 2005 and has currently set its minimum working age to be 14 years old, where the range is between 14 and 16.

3.5 Environmental and Social Standards

The Project shall comply with Lao environmental, social, health and safety laws, or relevant GIIP Guidelines, whichever is more stringent. The relevant environmental standards for the Project is presented in ***Table 3-1*** - ***Table 3-5*** The more stringent local or WBG EHS guidelines standards is presented in bold text in the tables.

Table 3-1: Ambient Air Quality Standards

Parameters	Averaging Period	Laos Standard [1, 3]		WHO Air Quality Guideline [2, 3]	
		(ppm)	(mg/m3)	(µg/m3)	(mg/m3)
Carbon monoxide (CO)	1 hour	30	31.0	35	**35** [3/]
	8-hour	9	11.1	10	**10** [3/]
Nitrogen dioxide (NO_2)	1 hour	0.11	0.223	200	**0.2**
	1 year	0.02	0.0405	10	**0.01**
Sulphur dioxide (SO_2)	10-minute	-	-	500	0.5
	1 hour	0.13	**0.367**	-	-
	24-hour	0.05	0.141	40	**0.04**
Total Suspended <100 micron (TSP)	24-hour	-	0.33	-	-
	1 year	-	0.10	-	-
Particulate Matter ≤10 micron (PM10)	24-hour	-	0.12	45	**0.045**
	1 year	-	0.05	15	**0.015**
Particulate Matter ≤2.5 micron (PM2.5)	24-hour	-	0.05	15	**0.015**
	1 year	-	0.015	5	**0.005**
Ozone (O_3)	1 hour	-	0.20	-	-
	8-hour	-	0.14	100	**0.1**
Lead (Pb)	1 year	-	**0.00015**	-	0.0005 [3]

Note:

[1] General Air Quality Standard. National Environmental Standard (No 81 NA). 21 February 2017.

[2] Environmental, Health, and Safety Guidelines. IFC. April 30, 2007.

[3] World Health Organization. (2021). WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulphur dioxide and carbon monoxide. World Health Organization. https://apps.who.int/iris/handle/10665/345329. License: CC BY-NC-SA 3.0 IGO

[3] Values in **bold text** represents the more stringent standard between local or WBG EHS guidelines standards that is applicable to the Project

Table 3-2: Ambient Noise Standards

Laos Standard [1] (dBA)		Noise Level Guideline [2, 3] One Hour L_{Aeq} (dBA)		
Parameter	**Permissible Value**	**Receptor**	**Day Time 7:00-22:00**	**Night Time 22:00-7:00**
Maximum Sound Level	115	Residential, institutional, educational	**55**	**45**
Leq 24hour	70	Industrial, commercial	70	70

Note:

[1] Ambient Noise Standard. National Environmental Standard (No 81 NA). 21 February 2017

[2] EHS Guidelines. IFC. April 30, 2007.

[3] Values in **bold text** represents the more stringent standard between local or WBG EHS guidelines standards that is applicable to the Project

Table 3-3: Toilet Wastewater Discharge Standard

Parameters	Units	Toilet Wastewater Discharge Standard[1, 3]	Water Quality EHS Guidelines (Treated Sanitary Sewage Discharges) [2, 3]
pH	-	6-9	6-9
BOD_5	mg/L	30	30
COD	mg/L	125	125
Total suspended solids	mg/L	50	50
Total Nitrogen	mg/L	10	10
Pheno	mg/L	**2**	-
Fats, Oil, Grease	mg/L	**5**	10
E.coli	mg/L	**400**	-
Faecal coliform bacteria	MPN/100 ml	-	**400**

Note:

[1] Water Pollution Control Standard for Toilet. National Environmental Standard (No 81 NA). 21 February 2007.

[2] EHS Guidelines. IFC. April 30, 2007.

[3] Values in **bold text** represents the more stringent standard between local or WBG EHS guidelines standards that is applicable to the Project

Table 3-4: Domestic Wastewater Discharge Standard

Parameters	Units	Domestic Wastewater Discharge Standard [1, 3]	Water Quality EHS Guidelines (Treated Sanitary Sewage Discharges) [2]
pH	-	**5.5 - 8.5**	6-9
Electro-conductivity	mg/L	2,000	-
Total Dissolved Solid	mg/L	1,300	-
BOD_5	mg/L	30	30
Total suspended solids	mg/L	**30**	50
Per-manganese	mg/L	6.0	-
Hydrogen Sulphide	mg/L	1.0	-
Cyanide	mg/L	0.2	-
Fats, Oil, Grease	mg/L	**5.0**	10
Formaldehyde	mg/L	1.0	-
Phenol & Cresol	mg/L	1.0	-
Residual Cl	mg/L	1.0	-
Radioactive	mg/L	None	-
Colour & odour	mg/L	Not visible	-
Tar	mg/L	None	-
Heavy metal			
Zinc	mg/L	5.0	-
Chromium Hexavalent	mg/L	0.3	-
Arsenic	mg/L	0.25	-
Copper	mg/L	1.0	-
Mercury	mg/L	0.005	-
Cadmium	mg/L	0.03	-
Barium	mg/L	1.0	-
Selenium	mg/L	0.02	-
Lead	mg/L	0.1	-
Nickel	mg/L	0.2	-
Manganese	mg/L	0.5	-

Note:

[1] Water Pollution Control Standard to Public Drainage. National Environmental Standard (No 81 NA). 21 February 2007.

[2] EHS Guidelines. IFC. April 30, 2007.

[3] Values in **bold text** represents the more stringent standard between local or WBG EHS guidelines standards that is applicable to the Project

Table 3-5: Electric and Magnetic Fields Standards

Frequency	Electric Field (V/m[a])	Magnetic Field (μT[b])
50 Hz[c]	5000	100
60 Hz	4150	83

[a] Volts per meter; [b] Micro tesla; [c] Hertz, Source: WBG EHS Guidelines – Electric Power Transmission and Distribution (2007)

4 PROJECT DESCRIPTION

4.1 Project Background and Objectives

IEAD is developing a wind farm, with a total installed capacity of approximately 600 MW, and a 500 kV transmission line in Dak Cheung District of Sekong Province and Sanxay District of Attapeu Province in Laos (the Project). The Project has been developed under an exclusive right granted by the GOL through a Memorandum of Understanding (MoU) and Project Development Agreement (PDA) executed in November 2011 and August 2015. This Project is also the first cross-border wind power project to be approved by the GOL and Government of Vietnam (GOV) in accordance with the MoU to supply power from Laos' projects to Vietnam Electricity (EVN).

The development also includes a 22 km 500 kV transmission line, which connects to the grid in Vietnam. The Right of Way (ROW) of the transmission line is 70 m (35 m on each side from the centre line). The generated electricity is expected to be sold to Vietnam Electricity (EVN).

It is understood that part of the Project area is overlapping with a Bauxite mine concession area granted to Viet Phoung, which signed its concession with the Government of Laos (GOL) in 2018, therefore, the relocation of Project facilities in the overlapping areas is potentially required. This includes the cluster of nine WTGs, the main 500 kV substation, and a short portion of the 500 kV transmission line route. The Project facilities will be relocated once the final design is completed. Once the relocation areas are identified and the additional studies are complete, an addendum to address the relocation will be prepared to complement the final ESIA ("ESIA Addendum"). The ESIA Addendum will provide updates of the relocation of Project facilities, the additional survey results, the potential impacts, and additional mitigation measures and monitoring program that may be required. Any changes should also be aligned with the lenders' E&S requirements. No pre-construction or construction work will be conducted at the proposed relocation sites until the required E&S assessments are completed. The detailed scope of the ESIA Addendum has been prepared and shared with ADB.

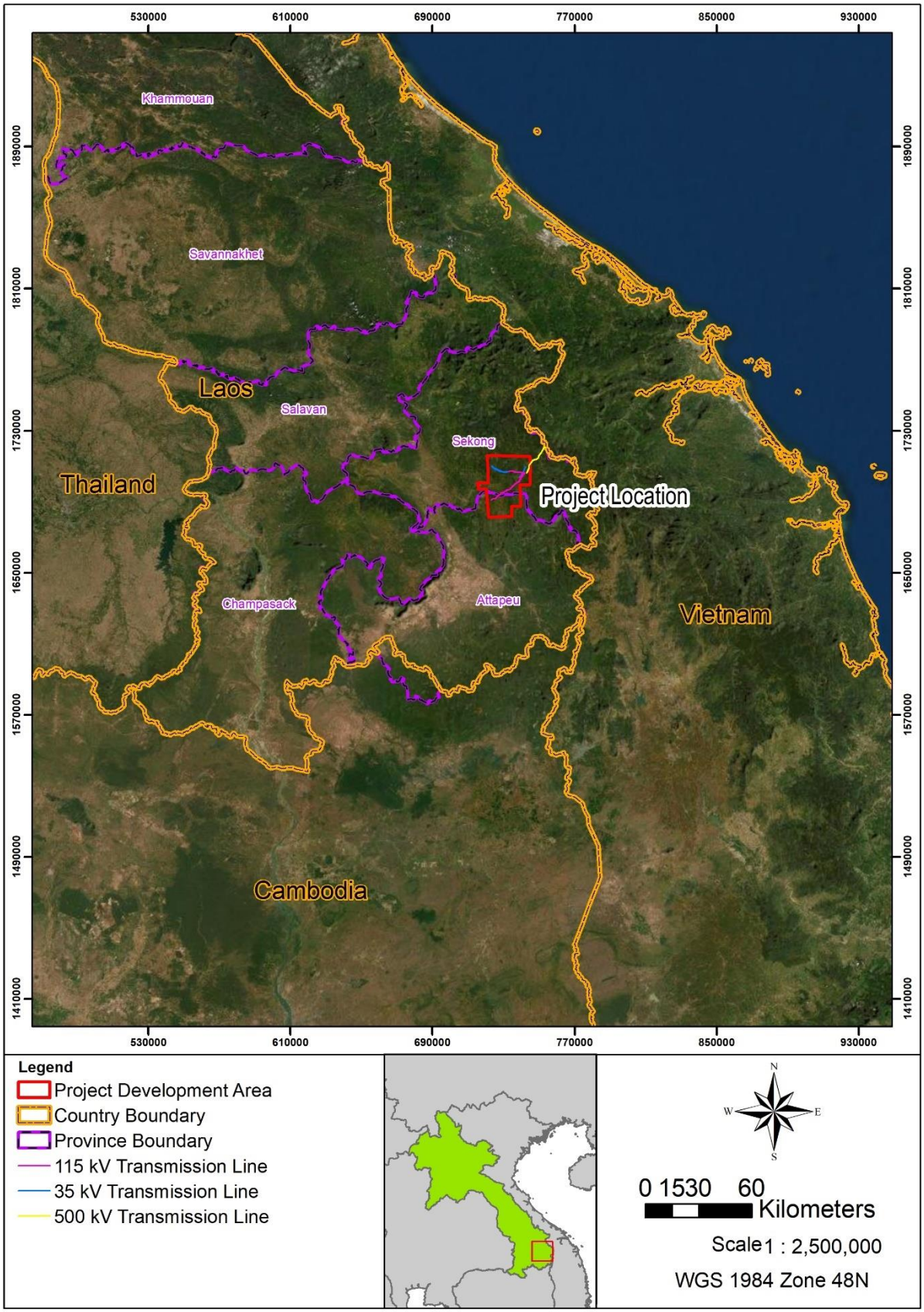
4.2 Project Location

The Project is located in Dak Cheung District of Sekong Province, and Sanxay District of Attapeu Province in Laos (731355.38 m E, 1701111.82 m N). It lies approximately 560 km south east of Vientiane, the capital of Laos, and approximately 48 km east of the provincial capital, Sekong.

The wind farm development area (excluding the transmission line) is approximately 70,828 hectares[19]. The area impact to topography will be mainly focus on the turbine base which is around 1 ha per turbine, the total area required for turbine base will be 133 ha. Area required for other facilities (Laydown area, potential batch plant, potential camp, potential crush stone production plant, potential stone resource point) is around 169 ha. Area required for access road is around 397.67 ha. Area required for pylon of 500 kV is 1.20 ha, pylon of 115 kV is 1.63 ha and pylon of 35 kV is 1.05 ha. The 500 kV transmission line runs northeast from the development area, across Dak Cheung District, to the Laos-Vietnam international border. The overall Project location is shown in ***Figure 2-1*** .

[19] It should be noted that the Projects' concession area will be the land required to install and construct project facilities and ROW for related transmission line, which is around 1,050 ha.

Figure 4-1: Project Location



Source: IEAD, 2020 (modified by ERM)

4.3 Project Facilities and Components

This section briefly describes the major facilities and components of the Project. This includes: (i) the Project's three major components – wind farm, transmission lines and Project access road; and (ii) ancillary facilities (e.g. worker camps, concrete batching plant(s), laydown areas). Shared facilities of the Project have also been identified.

4.3.1 Permanent Facilities

The permanent facilities of the Project include: wind turbines, the 22 km 500kV, 39 km 115kV and 27 km 35 kV overhead transmission line, underground and aboveground collector transmission cables between the wind turbines, internal 33/115kV substations, 500kV substation, and internal access roads. The total length of new internal road that will be built is approximately 180 km and the total length of internal road including the existing road that will be expanded is approximately 200 km The underground cables will be routed along the access roads and will form part of the permanent land use of the Project.

The layout of the Project's permanent facilities is shown in ***Figure 4-2***.

4.3.1.1 Wind Turbines

A wind turbine is a device that captures the wind's kinetic energy and converts the energy into electricity using a generator. A total of 133 wind turbines will be used for the Project that all 133 turbines will be Envision EN 171-4.5 turbines.

A summary of the wind turbine specifications is provided in ***Table 4-1***, with the exact location of each turbine presented in ***Appendix E***.

Table 4-1: Main Wind Turbine Specifications

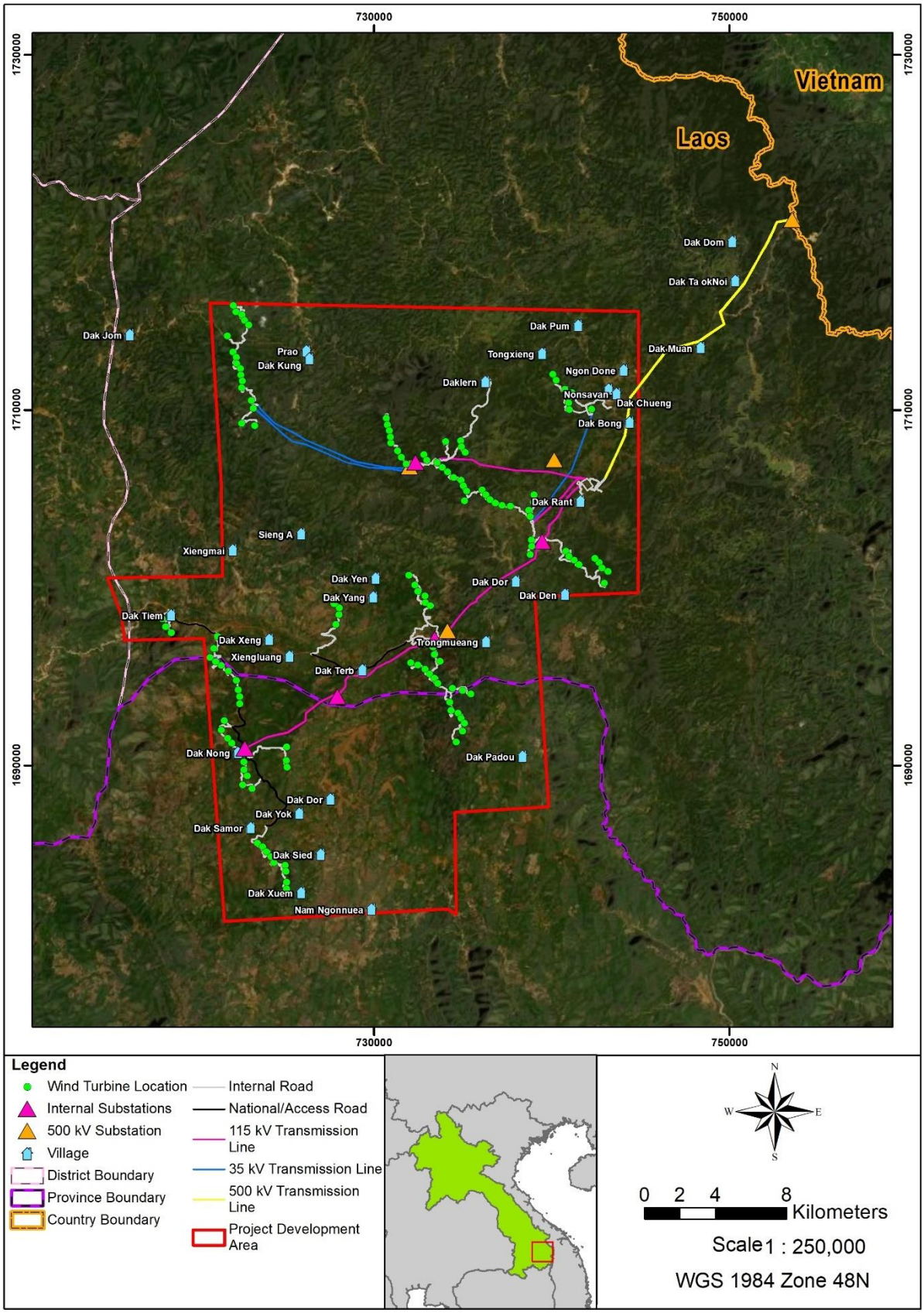
Item	Unit	Parameter (EN-171/4.5-MW)
Basic wind turbine data		
Rated power	kW	4,500
Rotor diameter	m	171
Hub height	m	110
Swept area	m^2	22,965
Design grade	-	IEC-S
Rated wind speed	m/s	10.5
Turbulence density	-	B/0.14
Cut-in wind speed	m/s	3
Cut-out wind speed	m/s	25
Maximum wind speed (10min average)	m/s	42.5
Operating temperature range	°C	Normal t type -10 to 40
Survival temperature range	°C	-20 to 50
Design life time	year	20

Item	Unit	Parameter (EN-171/4.5-MW)
Blade		
Number of blades	-	3
Blade length	m	83.9
Weight	t	20.5
Material	-	GFRP
Blade processing technology	-	Vacuum infusion
Blade root connection	-	Metal flange
Pitch system		
Pitch control	-	Electric pitch control
Pitch range	-	-5°~90°
Hub castings		
Material	-	EN-GJS-400-18
Type	-	Casting
Wind deflector		
Material	-	GFRP
Type	-	Split
Main bearing		
Type of spindle bearing	-	SRB
Lubrication of spindle bearing	-	Automatic lubrication
Gearbox		
Number of gear stages	-	3
Gearbox efficiency	-	>0.975
Gearbox cooling	-	Air cooled
Spindle-gearbox connection	-	Connection with expanding ring
Gearbox-generator connection	-	Flexible coupling
Nacelle baseplate		
Material	-	EN-GJS-400-18-LT
Baseplate type	-	Casting
Rear frame		
Material	-	Q355
Type of rear frame	-	Welding
Yaw System		

Item	Unit	Parameter (EN-171/4.5-MW)
Yaw concept	-	Electro-mechanical yaw
Type of yaw brake	-	Yaw ring gear + passive brake
Lightning Protection		
Design Standards	-	In accordance with GBT 33629-2017 Wind turbine lightning protection(IEC61400-24 2010)
Tower		
Type	-	Steel tower

Source: Envision, 2022

Figure 4-2: Layout of Permanent Facilities of Project



Wind Turbine Nacelle

The nacelle assembly consists of a drive chain system, a yaw system, nacelle housings and a nacelle structure system, etc. In addition, electrical components such as generators and control cabinets are also arranged in the nacelle.

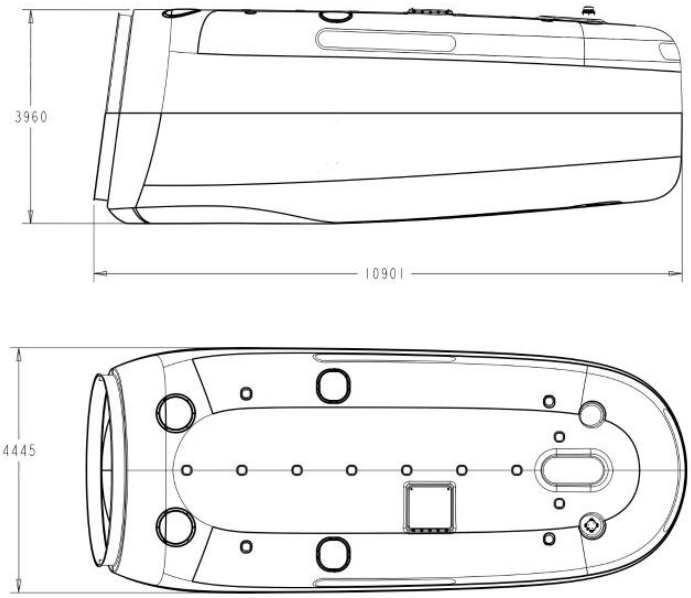
The nacelle structure is arranged at the top of the tower to provide support for the shafting, gearbox, generator, etc.The nacelle structure also supports the nacelle cover. The nacelle baseplate is connected to the d rear frame with bolts. Nacelle Specifications is shown in ***Table 4-2*** and Nacelle and Hub Drawings and Size is shown in ***Figure 4-3***.

Table 4-2: Nacelle Specifications

Component	Features and Specifications	
	Parameter	Value
Nacelle baseplate	Material	EN-GJS-400-18-LT
	Baseplate type	Casting
Rear frame	Material	Q355
	Type of rear frame	Welding

Source: Envision, 2022

Figure 4-3: Nacelle and Hub Drawings and Size



Source: Envision, 2022

The yaw system is for wind alignment and cable untwisting. The yaw system consists of yaw ring gears, yaw gearbox and yaw caliper. The yaw ring gear is arranged between the tower top flange and the yaw caliper, fixed on the flange with bolts. The yaw caliper and drives are bolted to the nacelle baseplate. By engaging the yaw ring gear with the yaw drive gear, the yaw caliper and the nacelle baseplate can slide relative to the yaw ring gear. Yaw System Specifications is shown in Table 4-3.

.

Table 4-3: Yaw System Specifications

Component	Features and Specifications	
	Parameter	Value
Yaw system	Yaw concept	Electro-mechanical yaw
	Type of yaw brake	Yaw ring gear + passive brake
	Material of yaw ring gear	42CrMo4

Source: Envision, 2022

Nacelle cover and the wind deflector are made of GFRP. There is an emergency escape hole at the tail of nacelle housing for emergency personnel to escape. The top of nacelle housing is equipped with a wind speed sensor and a skylight, through which people can reach the top of the nacelle from inside the nacelle.

Rotor Hub

The rotor hub consists of a three-bladed design with pitch system; it is attached to the main shaft via a two single-row tampered roller bearings. The rotor hub also holds the pitch system used for adjusting the blade pitch. The hub is a cast construction with a combination of star type and ball type. The nacelle elevation angle, cone angle and blade preflex are used to ensure that the minimum distance between blade tips and the tower meets safety requirements. The rotor structure and dimensions are shown in ***Table 4-4***

Table 4-4: Rotor Dimension and Weight

Item	Unit	Parameter (EN-171/4.5-MW)
Material	-	EN-GJS-400-18
Type	-	Casting

Source: Envision, 2022.

Pitch System

Pitch system consists of two part; electrical and mechanical. The mechanical assembly for pitch system consists of a pitch gearbox, pitch bearings and its connecting parts. The electrical assembly for pitch system consists of a control cabinet, a motor and a backup power supply. The pitch system functions by adjusting the pitch angle of each blade, which changes the amount of airflow that the blades capture, therefore increasing or decreasing the rotation speed. This pitch system is used for optimising the power production under varying wind speed conditions, and also as a safety system when rotation speed is required to slow or stop. The Pitch System consists of a motor attached to the Rotor Hub, which then drives a tooth belt attached to the base of the blade to rotate it.

Blade

Each turbine is designed to have three rotor blades. The specifications of the blade for each wind turbine model is shown in ***Table 4-5***.

Table 4-5: Blade Specifications

Item	Unit	Parameter (EN-171/4.5-MW)
Number of blades	-	3
Blade length	m	83.9
Weight	t	20.5
Material	-	GFRP
Blade processing technology	-	Vacuum infusion
Blade root connection	-	Metal flange

Source: Envision, 2022.

Generator

The generator includes, but is not limited to the following key components: stator, rotor, stator shaft, rotor shaft, permanent magnets, two single-row tapered roller bearings, and active air cooling system. The generator specifications for each wind turbine model is shown in ***Table 4-6***.

Table 4-6: Generator Specifications

Item	Unit	Parameter (EN-171/4.5-MW)
Generator type	-	Doubly fed induction generator
Number of pole pairs	-	2 pairs of poles
Rated voltage	v	950
Cooling method	-	Air cooling
Rated efficiency of generator	%	97
Rated power	kW	4,700
Rated frequency of generator	Hz	50
Generator protection class	-	IP54
Protection class of rotor slip ring	-	IP23
Insulation class	-	F
Lubrication method	-	Lubricated with grease

Source: Envision, 2022.

4.3.1.2 Transmission Line

The Project includes the development of a 22 km 500 kV overhead transmission line to evacuate power generated from the wind farm and connect it to the Vietnam electricity grid. This transmission line will run from the Project's substation located within the Project development area, to the Laos-Vietnam international border, and continuing eastwards to connect to the Thanh My substation in Vietnam (refer to ***Section 4.4*** for further details on the Vietnam section of the transmission line). The Right of Way (ROW), comprising a width of 70 m (35m horizontally on each side from the transmission centerline), is the area of land that will be used to locate, construct, operate, and maintain the transmission line. Based on local regulations, no specific requirements on electric and magnetic fields but the project will comply with applicable requirement on electric and magnetic fields (from WBG EHS Guidelines – Electric Power Transmission and Distribution (***Table 3-5***)

In addition, the Project includes the construction of underground and overhead 35 kV and 115 kV transmission cables to transfer electricity to the substation within the development area. The substation will be connected with a 500 kV transmission cable to transmit electricity to Vietnam. The Right of Way (ROW) for the transmission lines are provided in ***Table 4-7***.

Table 4-7: Transmission Line ROW

Transmission Line	Project ROW	Laos ROW Requirement	IFC ROW Requirement
500 kV	70 m (35 m on each side from the centre line)	70 m	61 m
115 kV	25 m (12.5 m on each side from the centre line)	25 m	21 m
35 kV	8 m (4 m on each side from the centre line)	6 m	8 m

The majority of the transmission line is routed alongside the existing road, only the 35 kV line in the northwest region of Project development area and one 115 kV line in the middle-west of the Project development area that are not routed along existing road networks.

The details of the 500 kV transmission line are provided in ***Table 4-8***.

Table 4-8: Characteristics of the 500 kV Transmission Line

Characteristic	Details
Level of voltage	500 kV
Starting point	115/500 kV station of the project, Ban Dak Bong, Dak Cheung District
Ending point of the route	500 kV station of Vietnam (Thanh My Station). *However, for the purposes of this ESIA, the scope covers up to the Laos / Vietnam Border.*
Total length (for this Project)	~22 km
Height of tower	58.7 m – 68.7 m
Type of tower	Steel lattice tower
Base (tower foundation)	Base is made with reinforced concrete

The total length of the overhead transmission line is approximately 105.92 km, where 22 km is for 500 kV, 49.79 km is for 115 kV, and 34.13 km is for 35 kV). Total length of 33 kV underground transmission line is approximately 280 km.

The specification of 35 kV, 115 kV and 500 kV transmission line is in ***Appendix F.***

4.3.1.3 Project Site Roads

The internal road system within the Project development area will be newly built connecting to turbine towers with the pavement width of 5.5-6.0 m, 1 m width of drainage will be built parallel each side of internal road; designed speed of 15 km/h. type of internal road is covered with crushed stone layer (thickness is 30 cm). The total length of internal road that will be newly built is approximately 135 km and the total length of public road which shall be modified is approximately 25 km. So, the total length of internal road including modification of public road is approximately 160 km. Sediment controls will be installed to collect sediment. The mortar rubble drainage ditch and the reinforced concrete pipe culvert with a diameter of 1 m will be set up according to the actual situation on site.

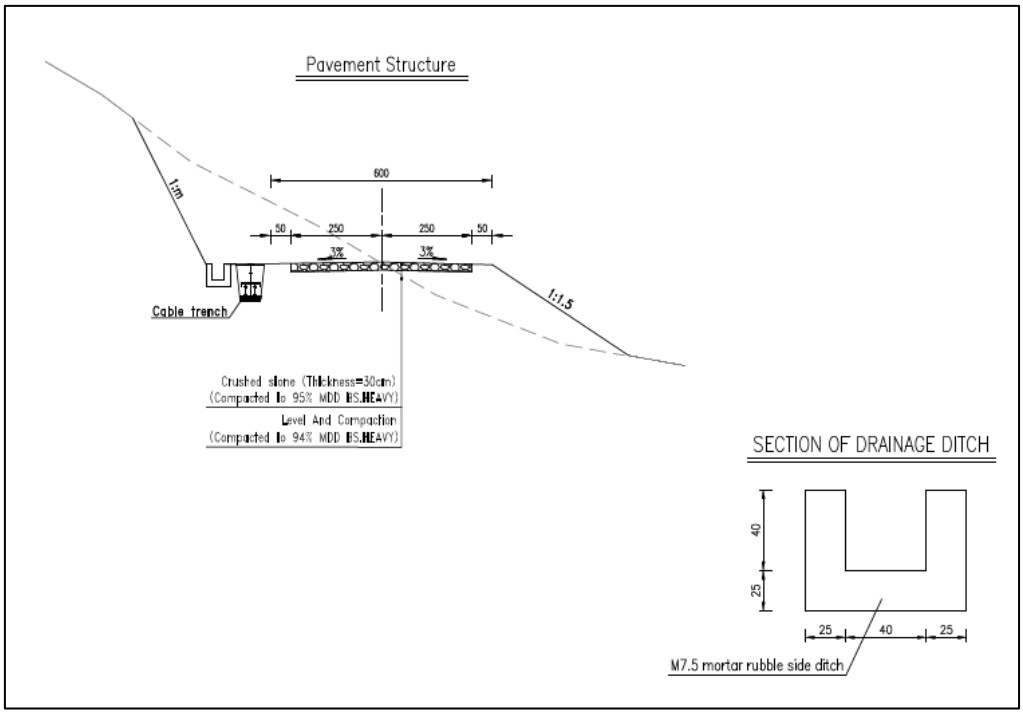
In order to reach all 133 wind turbine locations during construction, the Engineering, Procurement and Construction (EPC) contractor will construct site roads that will connect road no.16B to each wind turbine. However, following the completion of construction, the roads will be renovated and used for access during inspection and monitoring.

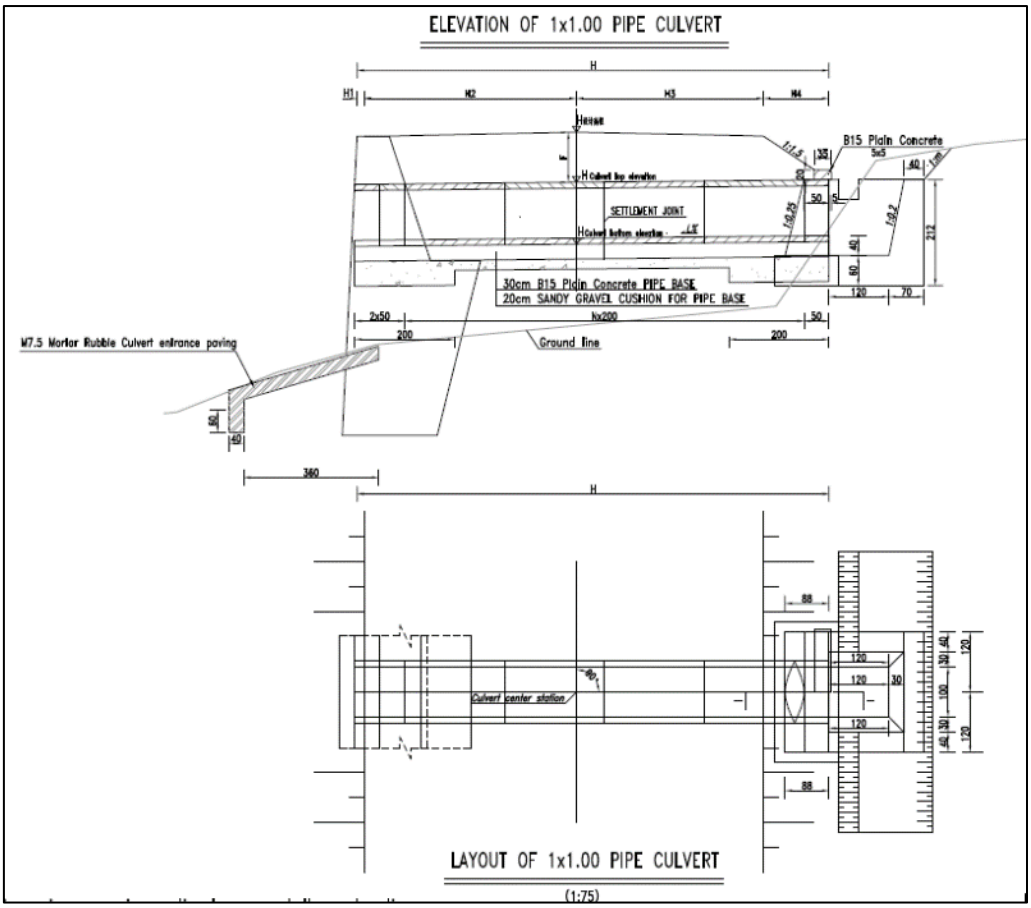
The Project will have mitigation measures regarding the drainage system and soil erosion management as follows:

- Construct an appropriate slope protection and suitable drainage system specifically in areas of high potential soil erosion;
- Undertake construction of a water drainage system at both sides of the access road to facilitate draining of water;
- Avoid earthworks during heavy rainfall to reduce erosion risk;
- Avoid earthworks at the sides of streams to reduce erosion and sedimentation risk to watercourses;
- Avoid digging and removal of stockpiling of soil at the sides of the stream or canal in order to prevent sedimentation and erosion into the water sources; and
- Monitoring / auditing conducted to inspect erosion control measures.

Drawing of the pavement structure and the drainage ditch can be found in ***Figure 4-4.***

Figure 4-4: Pavement Structure and Drainage Ditch





Source: IEAD, 2021

4.3.2 Ancillary Facilities

A brief description of ancillary facilities are provided below. The ancillary facilities will be located in a flat and open area that is near the existing public road. The location of the ancillary facilities is shown in ***Figure 4-5.***

4.3.2.1 Concrete Batching Plants

The Project will require a significant quantity of aggregate for concrete production during the construction. IEAD proposes to source the required aggregate locally and consistent with the IFC EHS guidelines for construction materials extraction (refer to Construction Material Sourcing Plan that will be delvelopled). The source should not from ecologically sensitive areas. In the preliminary assessments conducted for the Project, three potential locations for the concrete batching plant were considered. However, two potential locations of concrete batching plant with an area of 70,000 m^2 were focused on for the ESIA (***Figure 4-5***). The sites consist of the main plant and auxiliary plant. The third potential concrete batching plant will have about 10,000 m^2 and its location has not been identified at the time of writing this Report.

The concrete volume for each wind turbine is approximately 750 m^3 and the average concrete consumption will be approximately 500 m^3/d. Access road length is approximately 200 km with 6 m width and 0.2 m depth of aggregate will require approximately 350,000 m^3 of concrete.

The concrete batching plant will have a preliminary capacity of approximately 60-90 m^3/hr each. The total minimum capacity is approximately 200 m^3/hr (for three batching plants). Relevant materials obtaining (stone and water) should meet the general requirements of construction standardsboth local and international standards and follow all required mitigation measures if needed.

4.3.2.2 Laydown Areas

A laydown area with total area of 50 ha or 500,000 m^2 is mainly used for wind turbine parts, electrical equipment, and other raw material. The location of laydown area is shown in ***Figure 4-5.***

4.3.2.3 Worker Accommodation

There are three potential camp sites located in the Project area with an area of 6 ha or 60,000 m^2. These include office and accommodation areas. The preliminary location is shown in ***Figure 4-5***.

4.3.2.4 Spoil Disposal Areas

Spoil disposal sites, also known as soil dumping ground, where the excavated soil that will not be used for backfilling underground cable and turbine foundation construction activities, are left permanently. The disposal sites have a total area of 126.40 ha. The spoil location is shown in ***Figure 4-5***. However, the location of spoil disposal sites will be determined with local authorities before construction phase. Detail of environment and social aspect will be considered during the site selection for disposal site and IEAD will work with the relevant parties to ensure that the disposal sites meet both local and international standards. For more detail can be found in Waste and Spoil Management Framework.

4.3.3 Shared Facilities

In order to interconnect the electricity generated from the Wind Power Project to the National Power Grid System, and to export the electricity to interconnect with the 500 kV Station of Vietnam (Thanh My Station). It is necessary for the project to build the 500 kV transmission line system from the sub-station of the Wind Power Project in Dak Cheung District to the Laos / Vietnam border to interconnect with the 500 kV station of Vietnam (Thanh My Station) with a total distance of transmission line route of approximately 66 km. It should be noted that only the Lao section of the transmission line is included in this impact assessment.

The transmission line in Vietnam is double-circuit with maximum capacity of maximum approximately 4,000 MW which will be the responsibility of EVN. The EVN plans to utilize the transmission line for other imported power project from Sekong Province (Lao PDR). Based on Vietnam's draft power development plan (PDP8), there is a planned 200 MW hydropower project to connect to the Thanh My Station substation. In the negotiation of the PPA and Concession Agreement between the EVN and the Government of Lao (GOL), the two parties are focused on ensuring that other projects can also connect to the transmission line.

4.4 Project Associated Facilities

Associated Facilities are defined in the ADB SPS as "*facilities that are not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project*."

Associated Facilities are defined in the IFC PS "Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable"

There are no associated facilities identified for this Project. The rationale is provided in ***Section 4.5***.

4.5 Other Related Facilities

Other related facilities have been assessed as to whether these are associated facilities. However, they have **not** been considered as associated facilities as per ADB SPS and IFC PS definition as per the rationale provided below:

- *The 500 kV Station of Vietnam (Thanh My Station) and the transmission line route in Vietnam*: As mentioned in ***Section 3.3.3***, this project is not funded by ADB or the Developer and is being conducted by EVN, which means that funding is provided separately by the borrower/client or by third parties. In addition, the viability and existence of the project is not exclusively for successful operation of the project, but are also being developed for more than just the Project Associated Facilities. EVN plans to use the 500kV line for other imported power projects from Sekong province. The maximum capacity of this 500kV double-circuit is approximately 4,000MW. Based on Vietnam's draft power development plan (PDP8), there is a planned 200MW hydro power project to connect to the Project substation and transmission line. In the agreed PPA and Concession Agreement, EVN and GOL, respectively, allow other Projects to connect to the transmission line and sell electricity to Vietnam.
- *Road No. 16 B improvements that connecting Lao PDR, Thailand and Vietnam from west to east* (***Figure 4-6***): This road will be used for the transportation of construction equipment. The upgrade of this road was completed in 2021 by the Government of Laos. As the Government of Laos funded the upgrade of the road, the road therefore is not considered as an associated facility, as it is not funded as part of the project. In addition, as the road network will not be utilized for only this Project and is not funded by the developer or ADB, it cannot be considered an associated facility since the viability and existence does not depend exclusively on the project, but is develop for other uses as well.

Figure 4-5: Ancillary Facilities Location

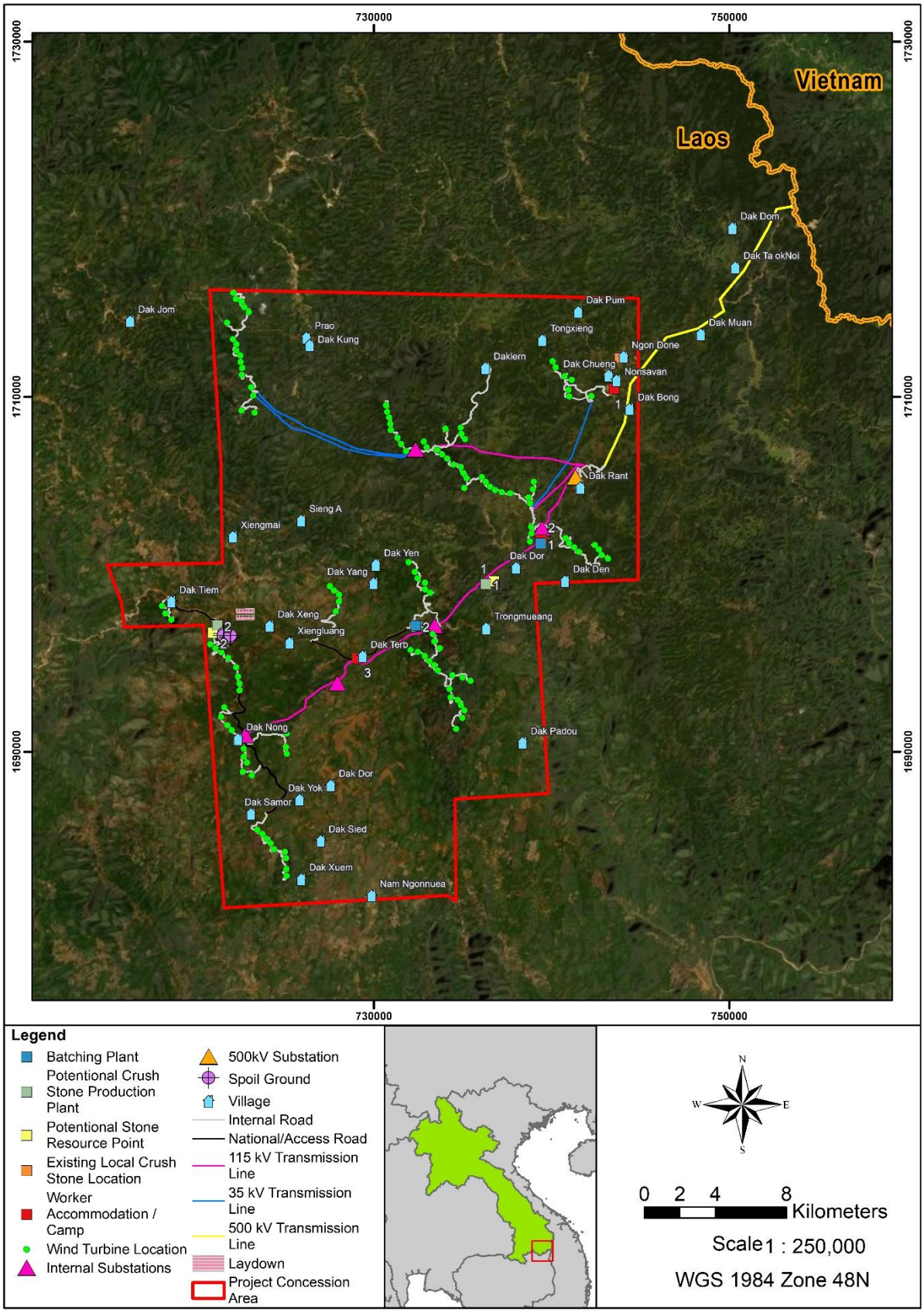
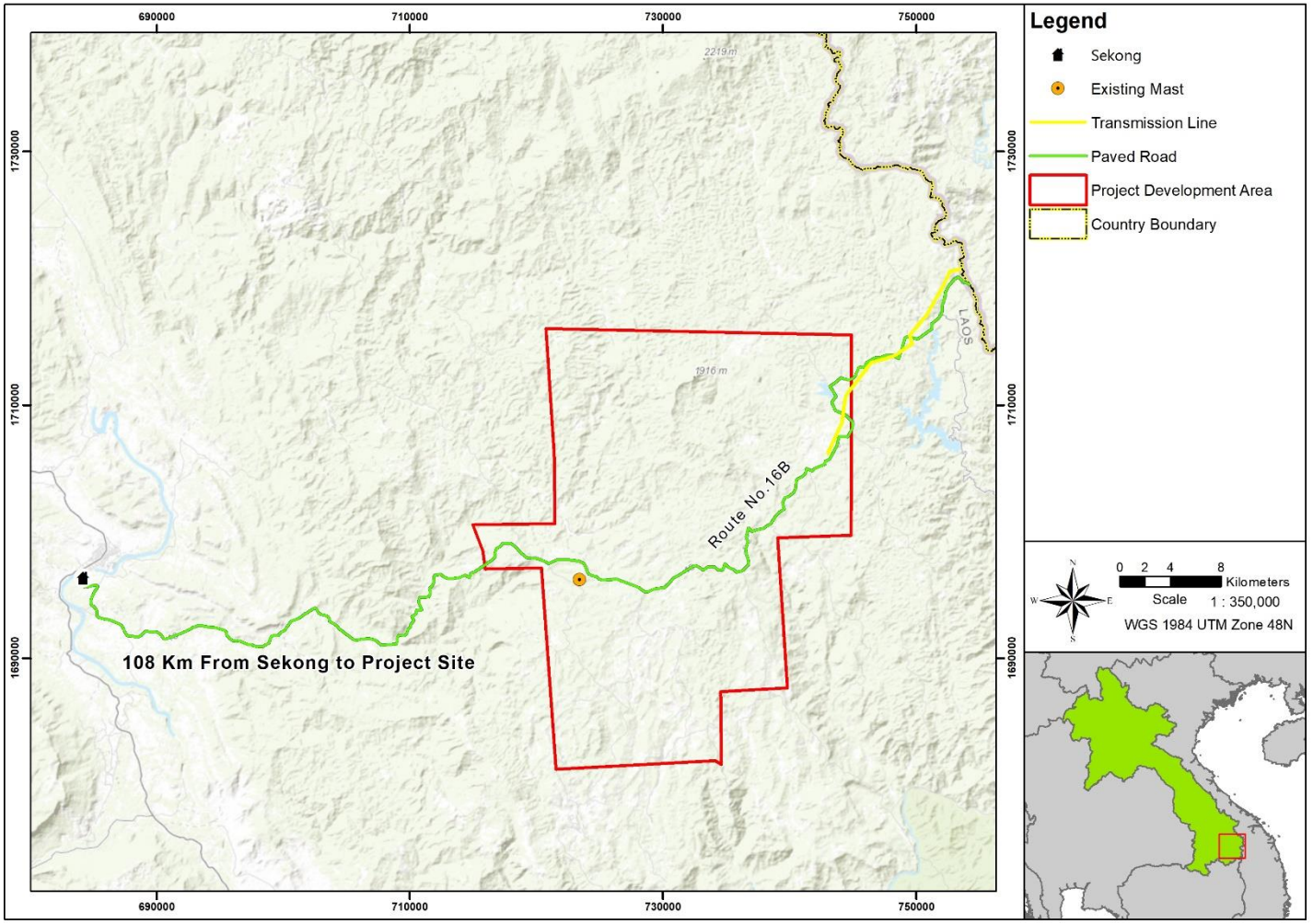


Figure 4-6: Transportation Route to the Project Area



Source: IEAD, 2020 (modified by ERM)

4.6 Project Accessibility

4.6.1 Vehicle Access

The Project is accessible via Chong Mek Border via road No. 16W, 16E and 16 to Sekong Province and road No.16 B from the municipality of Sekong Province to Dak Cheung District with a total distance of 108 km which passes to the project area. It is an asphalted road and most of the villages in the project area are situated along this road. Another access is via the road from the municipality of Sanxay District to Dak Cheung District, which passes to the project area at Ban Dak Yoin of Dak Cheung District with a distance of about 100 km. It is unpaved road which passes across high mountain area of Sanxay District and may be travelled during both seasons, but there is difficulty in some places in the rainy season.

4.6.2 Airport Access

There is no airport in Sekong Province and transport in this area is mainly on land transport. However, the Government and Attapeu Province have constructed a new large airport at Ban Had Xanh and Ban Kaeng Nhai of Xaysettha District, Attapeu Province, which is the airport located nearest to the project area. The location of this airport is about 150 km from the Project area and is accessible via passing through Sanxay District of Attapeu Province to Dak Cheung District of Sekong Province to the project area at Ban Dak Yoin. The airport is no longer considered a commercial airport as it has been handed over to the Lao People's Liberation Air Force. The airport was officially shut down in 2017 because passenger numbers were low and flights were infrequent.

4.6.3 Railroad and Waterway Access

The Project is not near any railroads and the Project area is mostly hill and high mountain areas with no large rivers suitable for use as a commercial waterway. Therefore, neither of these methods can provide construction access to the Project site.

4.7 Waste Management

4.7.1 Solid Waste Disposal

In Laos PDR, similar to the other countries within the region, the main responsibilities on solid waste management are delegated to provincial authorities and district offices. With regards to the policy framework, it was found that there are currently very few policies or regulations that exist in relation to the solid waste management sector, either at the national or city level. In particular, there is no framework placed to support waste-to-resource approaches or the 3R principle (Reduce, Reuse, Recycle). There are two main bodies responsible for issues related to solid waste management at a national level: The Ministry of Public Works and Transport (MPWT), and the Ministry of Natural Resources and Environment (MoNRE). The MoNRE's main tasks and responsibilities include preparing environmental regulations and laws; however, most of these regulations and laws do not specifically target the solid waste sector. There is even a regulation that restricts the use of compost produced from solid waste in agriculture, which is a significant policy barrier for the country[20].

During the construction phase, solid waste generation can be divided into two categories that are from construction activities and from worker consumption. The solid waste generation from construction activities will include concrete, structural steel, wooden crates etc. The amount of solid waste will be depended on the actual situation of the project construction phase. The hazardous waste will include diesel oil, paint, etc.

[20] Global Green Growth Institute, 2018 (Solid-Waste-Management-in-Vientiane-Lao-P.D.R_Publication-3.pdf (gggi.org))

Appropriate storage and disposal facilities for waste shall be constructed on Site. Bunded, hardstand and roofed areas are a general requirement for hazardous waste. The solid waste generated during the construction phase will be collected and segregated for recyclable and non-recyclable waste (i.e., paper, plastic). The solid waste will be stored in temporary storage areas, disposed, and recycled according to the requirement of Lao. Locations for temporary facilities are not yet finalized at this stage but the locations will be compliant with local regulations and have no E&S legacy issues. This will be assessed in the Waste Management Plan (WMP) and the WMP will be prepared to set out responsibilities and the management practices associated with the management of waste during construction and operation phase of the Project. The management of waste generated by the project will ensure no off-site impacts that exceed internation standards of international best practice. It is recommended that IEAD conduct a waste facility audit prior to construction. Waste facility management will be in the following.

- Firstly, to establish a temporary storage area for solid waste on the project site, and try to recycle solid waste to reduce the amount of solid waste.
- Secondly, to separate and classify solid waste on site in order to make the treatment easier.
- Thirdly, EPC contractor will find a qualified companies or team in Laos (If any) to deal with solid waste, and then they will monitor and audit their waste disposal facilities and disposal records.
- Finally, to treat the solid waste in accordance with the local designated or authorized place for disposal, such as landfill.

From the EIA, 2020, the estimated waste generation rate of 0.8 kilogram/worker/day. For a maximum of 1,400 construction workers, the total volume of municipal wastes is estimated to 1,120 kilograms/day and is composed of food wastes, plastic bags and paper scraps.

The hazardous waste will be stored in temporary storage area and disposed according to the requirement of country. Locations for temporary facilities are not yet finalized at this stage but the locations will be compliant with local regulations and have no E&S legacy issues.

The hazardous waste from the construction phase will be properly contained, collected and disposed of in compliance with applicable regulations and rules. No hazardous waste will be disposed of unlicensed hazardous waste disposal sites.

For spoil generated by the Project, there is a risk of release of Persistent Organic Pollutants (POPs), which may include PCBs, dibenzofurans, and dioxins (from the use of Agent Orange during the war). As such, pre-construction soil sampling will be conducted to determine the potential presence of POPs. If identified, the spoil will be treated as hazardous waste and will need to be managed and disposed of according to country requirements and Project hazardous Waste Management Plan.

During the operation phase, there is no waste generation from the production process. There will be some waste from maintenance works generated such as waste oil, lubricant etc. This type of waste will be collected and disposed of in compliance with applicable regulations and rules as mentioned above. Waste generation will be from the consumption of employee. The solid waste generation will include food wastes, scrap papers and plastics that will be sent to the authorized agencies for further disposal. Papers, water bottles, glasses, metal and plastics will be recycled. The hazardous material will include diesel oil, paint, etc.

The actual amounts of waste to be generated by the Project are currently not available. As such, a Waste Management Plan for construction and operation will be required including the estimated types, volumes, and disposal routes.

4.7.2 Wastewater

During the construction, the estimated number of construction workers is estimated to be maximum of 1,400 persons. Wastewater is mainly generated from the toilet used by construction workers that is

equivalent to about 80% of the volume of consumption water or about 800 m^3/day. The project requires the contractor to provide mobile toilet tanks with sufficient storage tanks for use by workers.

The estimated water use for batching plant is approximately 30 m^3/hr for 3 batching plants that will be sourced either nearby surface water (e.g. rivers and lakes) or groundwater or outside resources. Water source obtaining and wastewater management from batching plant will meet the local requirements. In addition, the location of batching plants and design will consider the availability of water use.

During operation of the WTGs, wastewater is mainly generated from the consumption of the employees. With estimated 53 employees during the project operation period, the volume of wastewater from consumption, washing and other activities is approximately 1 cubic meter/day (as per the EIA, 2020). The waste water will be treated initially by waste water treatment tank before using the service of the septic service company for disposal.

4.8 Safety

There is the potential for unplanned events to occur during the construction, operation or decommissioning phase of the project. The project will implement a good safety practice including Unexploded Ordinance, potential organic pollutants, safety inspection, fire prevention and emergency plan that can be described in the following.

4.8.1 Unexploded Ordinance

Risks of presence of Unexploded Ordnances (UXOs) should also be considered. UXO Clearance will be conducted after notice to proceed, it will be part of pre-site clearing activities. Based on its safety feature, UXO clearance will be the priority work and is the first activity to be undertaken in site preparation and that no other works can be implemented at a site until an UXO clearance certificate is issued for that specific area.

The subcontractor will prepare procedures of the UXO Clearance Plan and conduct UXO clearance located on or in any part of the project including (i) surveying for; (ii) detecting; and (iii) where detected, taking appropriate protective action to safe the location that UXOs are detected. The protective action consists of removal and subsequent destruction and / or in situ destruction of the UXOs. For more information of UXO clearance will be found in UXO management plan that will be developed by EPC.

In addition, the project propose mitigation measures for UXO as mention in ***Section 9.7 Unplanned Events***.

4.8.2 Potential Organic Pollutants

Based on destop review, Agent Orange was sprayed around the southern part of Laos, including the project location. It has impacted human health, where grandchildren or great grandchildren of those who were affected by Agent Orange still are born with deformities. Full assessment of the potential impacts of Agent Orange in Laos has not been conducted, as very little information is known compared to Vietnam. There is potential presence of Persistent Organic Pollutants (POPs) from the use of Agent Orange during the war.

Therefore, the project propose mitigation measures for soil by conduct pre-construction soil sampling at 5 locations to identify the potential presence of Persistent Organic Pollutants (POPs), which may include PCBs, dibenzofurans, and dioxins. If POPs are identified in the soil, the spoil will be treated as hazardous waste and will need to be managed and disposed of according to country requirements and Project hazardous waste management plan. In addition, the Emergency Response Plan and the Spoil Management Plan will be prepared and updated following the results of POPs analysis in soil. If POPs are identified in soil, spoil must be treated as hazardous waste in order to cover these risks.

4.8.3 Safety Inspection

A safety officer and HSE team will be responsible for ensuring safety inspection during construction and operation, including the supervision of the compliance with safety rules and regulations. The safety officer will report any non-compliances to the construction / operation teams.

Considering HSE management team from EPC side, they plan to use 2-3 Chinese HSE managers/engineers, 3-4 lao HSE engineers, 1-2 other country HSE engineers (Pakistani or Vietnamese). Meanwhile, they also will assign their own HSE management team. If necessary, the HSE affairs will report to the local related government\clients\company head office and other related departments as requested.

4.8.4 Fire Prevention

The project will install fire protection equipment, such as: portable fire extinguishers, at various places in appropriate areas including control building and substation in accordance with the National Fire Protection Association (NFPA) standards and will have measures to inspect the fire protection equipment every three months to ensure they are in good condition and ready to use.

4.8.5 Emergency Plan

The project will have an emergency plan in order to control and address any emergency event and prevent the danger and damage. Depending on the scale of the emergency, this will be handled by the project's Emergency Response Team or, where necessary, will be escalated to local / regional agencies. Further details will be provided in the Projects Environmental and Social Management Plan (***Chapter 9***).

4.9 Project Activities

Key activities to be conducted over the life of the Project are outlined in the following sections.

4.9.1 Pre-construction Phase

All work will be conducted in accordance with the detailed master construction schedule, provided by the EPC Contractor. Prior to commencement of work, all contractors would be required to provide detailed site specific plans related to:

- Equipment use;
- Excavation and backfilling management;
- Soil erosion management;
- Traffic management;
- Storm water pollution prevention plan;
- Dust prevention plan;
- Environmental and Social Management Plan;
- Waste Management Plan; and
- Plan drawings of laydown, traffic flow, parking, trash storage, and recycling areas.

It is assumed that as a part of the mobilisation phase, the Project site including laydown areas, etc. will be fenced and a construction worker camp(s) will be located inside the Project boundary.

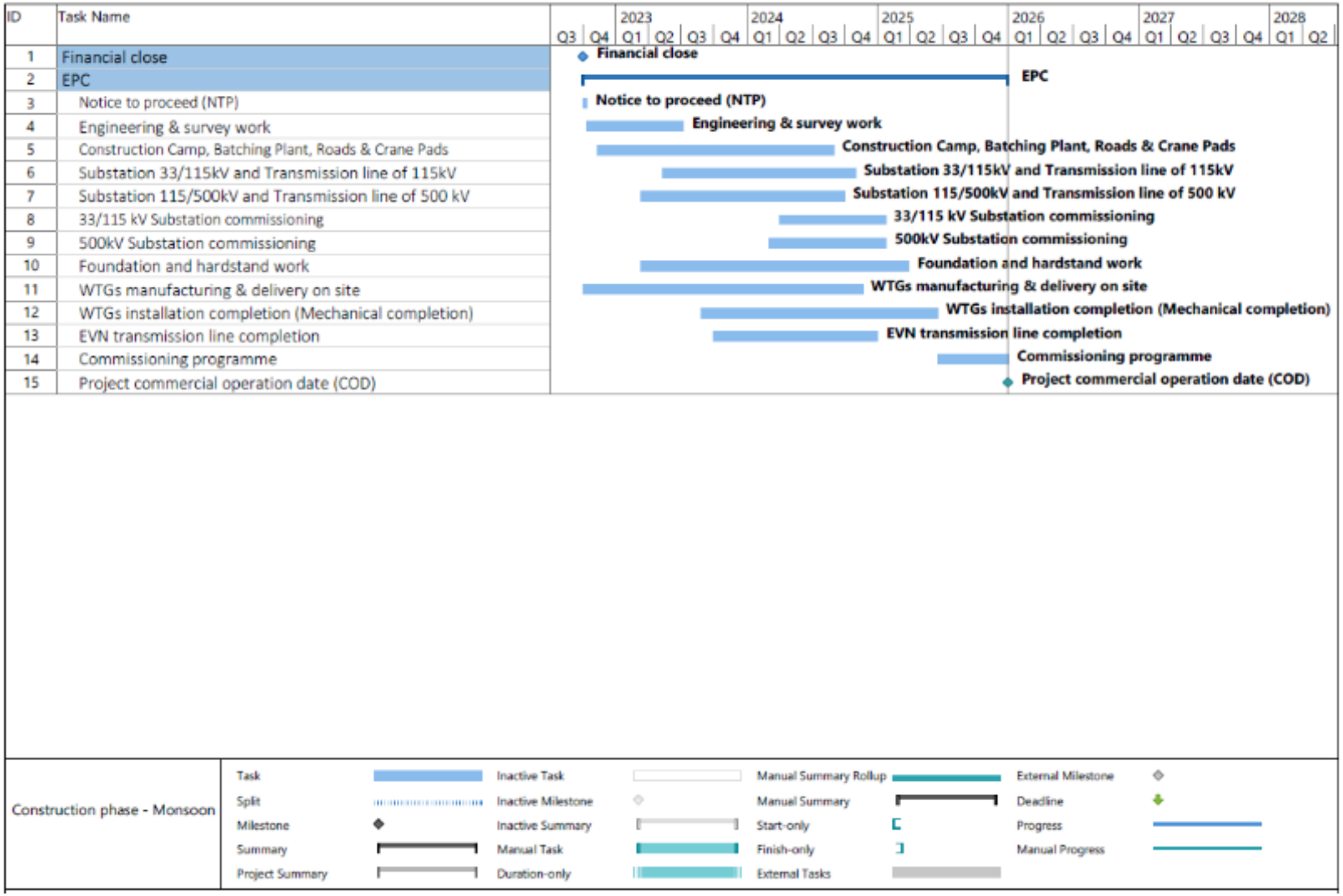
4.9.1.1 Construction Schedule

The Project's construction phase is expected to take approximately 30 months, with the wind turbines expected to take approximately 14 months, and the sub-station and transmission line are expected to take 17 months. COD is expected to be in December 2025.

The EPC Contractor will prepare the site for construction, erection, and installation of the Project facilities, which will include earthwork activities, such as site clearing and soil excavation. The construction, design, and testing will be undertaken in accordance with the appropriate construction standards and the Laos' Decision on National Environmental Standards (No. 81/GOV, 2017).

The tentative schedule of the project is shown in ***Figure 4-7***.

Figure 4-7: Tentative Schedule of the Project



4.9.1.2 Earthworks

Earth works will include clearing of vegetation and grading of Wind Turbine, Sub-station, and Transmission Line locations. It is anticipated that the subsoil, which will be stripped and removed, shall be utilised for levelling/ backfilling, it is also anticipated that the amount of soil that will be removed due to excavation activities and then backfilled is approximately 29,600 m^3. The spoil generated will be located close to the WTGs. At the time of writing this Report, this location was not confirmed. The potential risk from POPs is discussed in ***Section 4.8.2***.

Grading of the site will be conducted by the design team, considering sufficient height to protect the Project from potential flood damage. Such elevation will be studied further as part of the detailed design stage in order to confirm that the site elevation does not pose a flood threat to the surrounding areas. In addition, the Project will construct an appropriate slope protection and suitable drainage system specifically in areas of high potential soil erosion. Earthworks, digging and removal of stockpiling of soil at the sides of the stream or canal will be avoided in order to prevent sedimentation and erosion into the water sources.

4.9.1.3 Wind Turbine Construction

Once the construction of internal access roads have been completed to an extent that allow for access to the turbine location, construction of crane hardstand areas and turbine foundations will commence. The crane hardstand area should be used for main crane assembly and wind turbine erection. There will also be a crane and equipment lay down area at each of the turbine location. Lifting equipment will required for the turbine erection transported to the site via the access roads.

The wind turbines components will be assembled as follows:

- The tower will be dissembled and brought for assembling on the foundation by using cranes;
- The wind turbine body consist of electricity generation equipment, such as: generator which shall be assemble on the ground before lifting to install on the top of the tower by large crane;
- The blades and rotor hub will be lifted by large crane and installed on tower and nacelle. During the construction, the ground base to hold the crane must be prepared to withstand the weight of the crane.
- Other parts of the wind turbine will be assembled including the installation of electricity cable system and signal cables.
- Underground cables will connect the wind turbines to the substations which would be constructed within the Windfarm Site. It is expected that the underground cables will follow the internal road alignment and finally be connected to the substation.

4.9.1.4 Transmission Line Construction

For the construction of the transmission lines, the following will be conducted:

- Survey of transmission line route and locations of high-voltage power towers by selecting the points which are easily accessible and have minimum impact;
- After completing the survey, conduct the examination and boundary markings of the transmission line location;
- Test and analysis of the soil characteristics;
- Clearance of access road to the power transmission tower foundations;
- Cutting or clearance of the area of the transmission line route with a RoW of 70 m (35 m in each side the centre line) of the transmission route and land clearing and levelling;
- Tower foundation work that requires excavation of soil for making the reinforced concrete base;

- Erection of high-voltage power transmission towers;
- Installation and stringing of high-voltage electrical conductors;
- Final examination and inspection; and
- Test and hand-over to the project owner.

4.9.1.5 Project Site Road Upgrades

Access roads will be created within the development area and to the Highway for the Project. The road to the highway will be paved. The road will pass through the locations of 133 turbines to enable the construction and installation of the turbines. After completing the construction and installation of the turbines, the road will be renovated for using as access road for turbine inspection and maintenance.

4.9.1.6 Construction Traffic

The following vehicular frequency is expected during the construction phase:

- Transportation of construction materials and workers with a maximum frequency of 15 times/day via highway no.16 and Project's access road; and
- Transportation of components and machinery for installation of wind turbine generators consisting rotor blade, nacelle, and tower through a trailer truck with a maximum frequency 10 times / per one wind turbine (50 times/day) via highway no.16 and Project's access road.
- Transportation of concrete truck with frequency of approximately 100 times/day which will be used for foundation pouring.
- During construction, there are excavators, loaders, graders and compactors, which will be used in the road construction. Trailer trucks and different kind of cranes (approximately 15 times/day) will be used for erection and transportation work.

4.9.1.7 Construction Phase Workforce

The overall anticipated workforce during construction is shown in ***Table 4-9***. The workforce for the wind turbine, sub-station, and transmission line is shown in ***Table 4-10***.

Table 4-9: Anticipated Workforce during Construction

Workforce Origin	Average No. of Skilled Workers	Average No. of Semi-Skilled Workers	Average No. of Unskilled Workers	Total Average Workforce (per day)	Total Peak Workforce (per day)
Local Workforce	300	210	90	420	840
Migrant Workforce	200	140	60	280	560
Total	**500**	**350**	**150**	**700**	**1,400**

Source: IEAD, 2021.

Table 4-10: Anticipated Construction Workforce for each Project Facility

Project Facility	Local Workforce	Migrant Workforce	Total
Wind Turbine	60	40	100
Sub-station	600	400	1,000[1/]
Transmission Line	180	120	300

Note: [1/] 1,000 workers will be required for all 5 substations

Source: IEAD, 2021.

4.9.1.8 Power Supply

During construction phase, power requirement will be sourced from Lao grid (EDL) and/or diesel generators as backup. The estimated electricity consumption during construction is 4,000 MWh/year used for site office, camp, batching plant, crush rock plant etc.

4.9.1.9 Water Supply

During the construction phase, water will be required for construction activity, such as during civil work, dust suppression, domestic use, etc., which will be sourced either nearby surface water (e.g. rivers and lakes) or groundwater or outside resources. The Project should prepare and implement a Water Use Plan. This plan must be communicated and agreed with the local people and with the District and Provincial Authorities. The estimated total water consumption during construction is 1,000 m^3/day or 30,000 m^3/month. The potential impact from water resource use is considered in ***Section 9.3.6***.

For goundwater, the EPC contractor will have to manage it in order to not cause environmental concerns. The main water resource shall come from the surface of the ground and then seized properly using the pump system and water collection system. However, at this stage, the location of water resource has not been designated.

4.9.2 Operation, and Maintenance Phase

4.9.2.1 Project Operations

After the completion of the installation of wind turbines and the arrangement for the commencement of the production of electricity, there will be the officer to control, supervise, and maintain the wind turbine system in accordance with the agreement made with the manufacturer of the turbine. The frequency of the maintenance of 1 turbine generating electricity is approximately 2 times per year in order to verify the integrity of the hydraulic system, lubricants system, transformer blade including changing lubricanting oil once a year.

Maintenance and cleaning work will also be required annually along the RoW area of the transmission line route. The project will maintain strict cleanliness of the area, commercial/residential buildings or villages cannot be built in this area for safety reasons. People cannot use the land above the underground cable because of the concrete structure. However, the project will not be restricting access, people can access the internal road.

4.9.2.2 Site Restoration

After the construction and installation of wind turbines are completed, the project will undertake the restoration of the landscape of the construction area to return it to its original condition as close as possible. A more detailed explanation regarding site restoration is discussed in the Site Restoration Management Plan. The outline of the ESMP can be found in ***Section 10.7***.

4.9.2.3 Operation Phase Workforce

The operation phase will require up to 40 workers for operational, maintenance and administrative activities. The anticipated workforce during operation is shown in ***Table 4-11***.

There are 10 operation engineers, implementing an 8-hour work system with three shifts/day (morning shift is 08:00-16:00, mid-time shift is 16:00-24:00 and night shift is 00:00-08:00).

Table 4-11: Anticipated Workforce during Operation

Description	Staff Number
IEAD	
Management	1
Operation Staff	24
O&M Contractor	
Migrant Workforce [1/]	8
Localized Workforce [2/]	20

Note: 1/ consists of 1 project manager; 1 site manager and administrative manager; 2 equipment managers; 2 operation managers; 1 safety manager; 1 chef

2/ consists of 3 electrical engineers; 10 operation engineers; 1 safety engineer; 1 administrative engineer; 5 auxiliary employees (including 2 chefs and 3 cleaners)

Source: IEAD, 2021.

4.9.2.4 Power Supply

During operation phase, power requirements will be sourced from either electricity generated from the Project, or from Lao grid (EDL) or diesel generator as a backup. Electricity consumption during operation is 150 MWh/year or 400 kWh/day used for only O&M accommodation and warehouse.

4.9.2.5 Water Supply

During the operation phase, water will be required for domestic use and drinking water for operational workforce at the project site. Water will be sourced either nearby surface water (e.g. rivers and lakes) or groundwater or outside resources. The Project will obtain all necessary permits to utilize these water sources (if applicable). The estimated total water consumption during operation is 20 m^3/day that will be 10 m^3/day for domestic use and drinking water and 10 m^3/day for the plants.

For grounwater, the EPC contractor will have to manage it in order to not cause environmental concerns. The main water resource shall come from the surface of the ground and then seized properly using the pump system and water collection system. However, at this stage, the location of water resource has not been designated.

4.9.2.6 Operational Traffic

During the operation phase, transportation of materials will not be required and the road usage will be limited to vehicular movement for 25 employees.

4.9.3 Decommissioning Phase

The draft Concession Agreement (CA) states that the Project is responsible for the feasibility and cost of all works required in connection with the rehabilitation and decommissioning of the Project Facilities at the end of the Concession Period (4.7 (t) (ii) and more detailed conditions in 21.7 Rehabilitation and Decommissioning.

The concession period of the Project is 25 years. No information is currently available on the decommissioning of the Project. At the time of writing the ESIA, the Annex H2 ‘Rehabilitation Works and Decommissioning Activities’ of the CA is preparing. After the end of the concession period, Annex H2 states that detailed plans and procedures, including waste management, will have to be agreed with GOL two years prior to end of concession. It is noted that decommissioning will need to be conducted under the prevailing laws and standards of Lao at the time of decommissioning activities including a detailed impact assessment and decommissioning plan (repowering option, dismantling option) that should be developed prior to decommissioning.