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

Initial Biodiversity Action Plan

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24 June 2022

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

Initial Biodiversity Action Plan

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Acronyms and Abbreviations

Name	Description
ADB	Asian Development Bank
AMSL	Above mean sea level
BAP	Biodiversity Action Plan
CHA	Critical Habitat Assessment
CR	Critically Endangered
EIA	Environmental Impact Assessment
EN	Endangered
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
HH	Habitat Hectares
IEAD	Impact Energy Asia Development
KBA	Key Biodiversity Area
NG	Net Gain
NNL	No Net Loss
PBF	Priority Biodiversity Features
SPS	Safeguards Policy Statement
WF	Wind Farm
WWF	World Wildlife Fund

1. INTRODUCTION

1.1 Context

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"). For a detailed description of the Project background see ***ESIA Chapter 1***.

To support the alignment of the Project with the applicable international standards, that being the Asian Development Bank's Safeguards Policy Statement (ADB SPS), a Critical Habitat Assessment (CHA) was conducted. Critical habitat is considered a subset of natural and modified habitat (identified irrespective of the condition of these areas), and encompasses areas with high biodiversity value associated with the presence of significant types of biodiversity (ADB SPS, 2009).

The CHA identified residual impacts on natural and critical habitat and Priority Biodiversity Features (PBF)[1], and hence the need to develop a Biodiversity Action Plan (BAP) in accordance with paragraph 27 of the ADB SPS (2009), to demonstrate how the Project will apply the mitigation hierarchy and achieve a 'no net loss' or preferably 'net gain' for critical habitat and key biodiversity.

1.2 Purpose

This document contains the initial Biodiversity Action Plan (BAP), and its purpose is to inform the development of the detailed BAP by providing information on the following[2]:

- an overview of the impacts on priority biodiversity;
- an overview of how the mitigation hierarchy has been followed in the Project design;
- a summary of the residual impacts from the Project on critical modified and critical natural habitats[3];
- targets required to deliver no net loss (NNL), or net gain (NG);
- an explanation of the Project's mitigation strategy to achieve NNL or NG including possible options;
- consultation requirements and likely key stakeholders;
- indicative monitoring plan to identify progress against NNL and NG targets; and
- identification of key roles and responsibilities for delivering the actions set out in the BAP.

The BAP is designed to be a 'living document' that will be regularly updated as the Project develops, in line with the Environmental and Social Action Plan (ESAP) requirements, as well as the Project's adaptive management approach that focuses on long-term monitoring to inform the implementation of biodiversity management actions.

[1] See Critical Habitat Assessment Report for definitions.

[2] An indicative budget will be prepared for the detailed BAP once more precise and comprehensive details on mitigation and offsets become known

[3] Species-specific offsets won't be considered separately in this BAP, but rather habitat will be used as a proxy for quantifying residual impacts and informing offset requirements.

1.3 Ecological Setting

The Project is located within the 'Southern Annamites Montane Rain Forests' ecoregion[4] (IM0152) as defined by the World Wildlife Fund (WWF) and mapped by Olson *et al.* (2001), which is considered to be 'Vulnerable' in terms of conservation/threat status. Located along the border between Lao PDR and Viet Nam, the diverse ecosystems are dominated by remote montane forests that are considered globally significant in terms of biodiversity, harbouring some of the world's rarest plants and animals.

Given the geological, topographic, and climatic complexities facing this ecoregion, highly variable forest ecosystems ranging from lowland areas with wet evergreen forests at elevations of 600-900m above mean sea level (AMSL), to montane evergreen hardwood and conifer forests above 900m AMSL, occur in the area. Where primary forest habitat remains in the region, such areas are distributed in small, isolated fragments or patches and are predominantly made up of the following two evergreen forest vegetation communities which are structurally and compositionally distinct:

- Wet evergreen forests at 600-900 m elevation are dominated by species of *Fagaceae*, *Myrtaceae*, and *Lauraceae*, with high overall species richness; and
- Montane hardwood forests above 900 m elevation in this ecoregion vary in structure and composition depending on geological substrate and moisture availability, best represented by species of *Fagaceae* and typically having tall forest canopies reaching up to about 30m height, with epiphytes and orchids forming a notable part of the biodiversity.

Due to the high elevations and steep topography that characterises the ecoregion, human population density is considered moderate, however anthropogenic impacts are pervasive in the form of regular burning to create open woodlands and shifting cultivation on the upper slopes. In some areas, particularly those in the centre of the Project and associated with the Dak Cheung Plateau Key Biodiversity Area (KBA), there has been extensive modification for agriculture and clearance of forests. Wildlife poaching and excessive harvesting of forest products are also particularly threatening to the biodiversity of the region and according to the WWF, more than 75% of the ecoregion's natural habitat has been converted or degraded (WWF, 2021a).

2. PROJECT IMPACTS ON BIODIVERSITY

2.1 General

Impacts on biodiversity (direct, indirect, and induced) have been identified for the Monsoon WF project, related activities and infrastructure and are conceptualized and discussed in detail in ***Chapter 8.4.3.3 of the ESIA report*** (ERM, 2022). Additionally, the significance of each potential impact (ranging from negligible to moderate) has been identified, and mitigation measures to minimise and reduce the impacts have been recommended in line with the 'impact mitigation hierarchy' (see ***ESIA Chapter 8.4.3.5*** specifically).

To avoid and/or reduce impacts to biodiversity, a proactive approach has been adopted to anticipate and avoid risks and impacts where possible. The typical steps in the mitigation hierarchy include[5]:

- Identify and anticipate risks of potential adverse impacts, through analysis and stakeholder engagement;
- Avoid potential adverse impacts, applying an alternatives analysis including a no project scenario;

[4] An **ecoregion**, as defined by the Olson *et al.* (2001) are biogeographic units "*which are defined as relatively large units of land or water containing a distinct assemblage of natural communities sharing a large majority of species, dynamics, and environmental conditions. There are 867 terrestrial ecoregions, classified into 14 different biomes such as forests, grasslands, or deserts. Ecoregions represent the original distribution of distinct assemblages of species and communities*."

[5] https://www.adb.org/sites/default/files/institutional-document/779341/summary-analytical-study-spru-environmental-social-impacts-risks-management-draft.pdf

- Minimize or reduce the impacts, for example by reducing the physical footprint of a project through changes in design of civil works;
- Restore or rehabilitate where possible, for example by providing alternative access to water sources that have been cut off by a project; and
- Compensate or offset remaining and unavoidable impacts, for example by providing resettlement assistance to displaced populations.

Despite measures aimed at avoidance of impacts (see ***ESIA Chapter 8.4.3.5)*** through project design and realignment considerations and the recommendation of good practice controls and site-specific mitigation to reduce impact extent, potential and/or intensity, residual impacts that are not easily mitigatable (e.g. physical destruction and/or disturbance of vegetation; see Chapter 7) have been identified for the Project.

2.2 Impacts to Critical Habitat

The CHA screened the impacted biodiversity features against the six criteria provided in the ADB SPS paragraph 28 (footnote 5), and the ADB Environment Safeguards, *'A Good Practice Sourcebook'*, paragraph 151 and found that the EAAAs for volant and non-volant species associated with the Project qualify as critical habitat. For a detailed description and evaluation of these criteria, see ***ESIA Appendix G: Critical Habitat Analysis***).

With residual impacts remaining, and the outcomes of the CHA reflecting potential impacts to critical habitat, a BAP must be compiled to align with the ADB SPS and to include options to offset residual impacts so as to achieve at the minimum a NNL (for natural habitats) or potentially a NG (for critical habitats) outcome in terms of biodiversity.

3. PROJECT POLICIES AND COMMITMENTS

3.1 Overview

The ESIA this BAP is based on 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 ***Chapter 2 of the ESIA***. 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 International Regulatory Framework

3.2.1 ADB Safeguard Policy Statement (2009)

ADB adopts a set of specific safeguard requirements that are needed to address environmental and social impacts and risks (for a detailed description of the ADB SPS see ***ESIA Chapter 2.3***):

- 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.

The main Environmental Safeguard requirements are the following:

- Categorization and Information disclosure;

- Assessment process;
- Type of impacts;
- Project area of influence;
- Transboundary impacts;
- Environmental planning and management;
- Consultation and participation, grievance mechanism;
- Reporting and monitoring;
- Unanticipated environmental impacts; and
- Biodiversity conservation and sustainable natural resource management.

The Biodiversity Safeguard of the ADB states that the borrower/client will need to identify measures to avoid, minimize, or mitigate potentially adverse impacts and risks and, as a last resort, propose compensatory measures, such as biodiversity offsets, to achieve no net loss or a net gain of the affected biodiversity.

Mitigation measures for natural habitats[6] must be designed in such a way that no net loss of biodiversity occurs.

Where impacts occur within identified 'critical habitats[7] (modified and natural), the Project is required to fully exercise the mitigation hierarchy and demonstrate an overall net gain of critical habitat-qualifying biodiversity associated with Project site. This is aligned with ADB SPS, paragraph 28 – "*No project activity will be implemented in areas of critical habitat unless the following requirements are met:*

i. There are no measurable adverse impacts, or likelihood of such, on the critical habitat which could impair its high biodiversity value or the ability to function.

ii. The project is not anticipated to lead to a reduction in the population of any recognized endangered or critically endangered species or a loss in area of the habitat concerned such that the persistence of a viable and representative host ecosystem be compromised.

iii. Any lesser impacts are mitigated in accordance with para. 27', whereby mitigation measures will be designed to achieve at least no net loss of biodiversity."

4. ENGAGEMENT WITH STAKEHOLDERS

The ADB defines 'stakeholders' as individuals, groups or institutions who can or are likely to

- influence (promote, support, disrupt, or stop) the course of a program or project; and/or
- be affected (favourably or adversely) by the program or project.

Since the determination of critical habitats requires professional expertise and judgment, expert stakeholders with relevant experiences or knowledge on the region and/or its biodiversity values were consulted to support the assessment of critical habitat-qualifying values. This was performed through filling information gaps and providing a better understanding of the potential occurrence of priority and lesser-known species. Their expertise included mammals and birds of Lao PDR, and KBAs, reptiles

[6] Land and water areas where the biological communities are formed largely by native plant and animal species, and where human activity has not essentially modified the area's primary ecological functions.

[7] Critical habitat is defined by the ADB as a subset of both natural and modified habitat. It can include e.g. areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species or areas having special significance for endemic or restricted-range species.

and amphibians in Southeast Asia. The expert stakeholders consulted are listed in ***ESIA Chapter 4.1.1***, and details of the consultation provided can be found in ***ESIA Appendix A***.

Further stakeholders identified include NGOs, community groups, governmental organizations and relevant ministries that may have interest in the Project in the area e.g. environmental protection, the Project's mitigation plan and development opportunities and the conversation of forests, wildlife and biodiversity[8]. The activities aimed to inform and receive feedback on the Project, understand and explain the Project's potential social and environmental impacts, and provide updates on the progress Such activities included consultation meetings at the village level (November 2014 and September 2020), district level (May 2016), and a meeting with technical personnel prior to endorsement of the EIA (July 2018).

As of June 2022, stakeholder engagement continues to be undertaken for the project. A detailed measurement survey is in the process of being completed and it is anticipated that additional information will be available in the coming weeks. Next steps see the preparation of a Stakeholder Engagement Plan, which will outline the type and method of engagement for the various stakeholders. Local EIA stakeholder engagement is summarised in ***ESIA Chapter 6.2*** and detailed in ***ESIA Appendix I***.

5. PRIORITY BIODIVERSITY AND IMPACTS

5.1 Priority Biodiversity

The EAAAs of volant and non-volant species contain both natural and modified habitat in terms of the ADB SPS definitions (see also Chapter 2). Areas of natural and modified habitat support populations of critical habitat-qualifying species (CR/EN, endemic and/or range-restricted) and/or provide for key ecosystem services, and are therefore considered to be 'critical natural habitat' and 'critical modified habitat' in terms of the sub-classification of these areas.

- **natural habitats** are concentrated in the northern and eastern sections and represent approximately 36% to 41% of the EAAAs; and
- **modified habitat** (59% to 64**%** of EAAAs) is mostly found in the central and southern sections of the EAAAs, comprising primarily agricultural areas (currently or historically cultivated lands) that have been cleared and transformed through human activity and associated disturbance of the native vegetation and soils.

The two natural forest types, Montane Forest and Wet Evergreen Forest, are considered the most important ecosystems in the EAAAs in terms of providing key ecosystem services, and – while structurally and compositionally distinct from each other – equally the most important habitats for supporting CR/EN species, endemics and range-restricted species[9]. Figure 5-1 shows the extent of both the EAAs of volant and non-volant species classified as critical habitat. A map showing the overall extent and distribution of Natural vs Modified Habitat can be found in ***ESIA Appendix G***.

[8] Due to the Covid-19 pandemic, government restrictions were imposed on the districts where the Project is located, for the majority of the duration in the second half of 2021. As such, the Project was not able to undertake focus group discussions. The local villagers were also hesitant to engage in group activities due to the risk of spreading Covid-19.

[9] This could also be considered 'priority biodiversity'

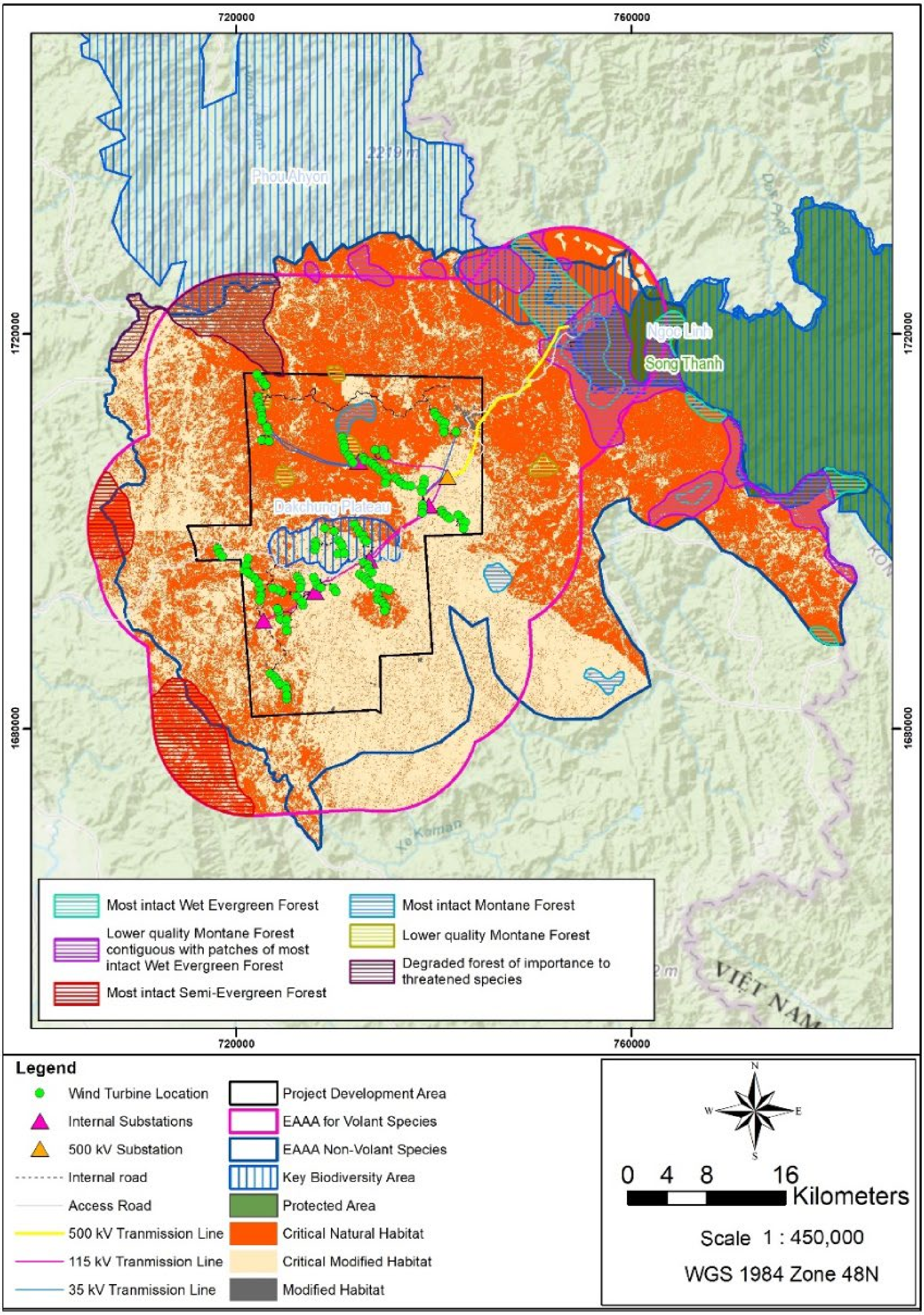

Figure 5-1: Map showing the extent and distribution of Critical Habitat classified for the Project, subcategorised into natural vs modified habitats

It can be seen in Figure 5-1, that the volant and non-volant EAAAs both qualify as critical habitat in terms of the criteria assessed (***ESIA Appendix G***). Since areas of modified habitat also support populations of critical habitat-qualifying species (CR/EN, endemic and/or range-restricted) and/or provide for key ecosystem services, they are considered to be 'critical modified habitat' in terms of the sub-classification of these areas. Therefore, the Project is located entirely within an area classified as critical habitat.

6. MITIGATION APPROACH FOR BIODIVERSITY MANAGEMENT

The protection of natural ecosystems and biodiversity generally begins with the avoidance of adverse impacts and, where such avoidance is not feasible; to apply appropriate mitigation in the form of reactive practical actions that minimizes or reduces impacts. Mitigation requires proactive planning that is enabled by following the mitigation hierarchy. The application of the mitigation hierarchy is intended firstly, to avoid disturbance and/or loss of ecosystems, and where this cannot be avoided, to minimise, rehabilitate, and then finally offset any remaining significant residual impacts. For a detailed list of mitigation measures in the different project phases (pre-construction, construction, and operation), see ***ESIA Chapter 8.4.3.5.***

Avoidance planning has already been conducted. These measures included a reduction in the number of turbines, realignment of transmission lines and roads to avoid sensitive forest areas and KBAs where possible and avoiding locating infrastructure within the Montane Forest and Wet Evergreen Forest habitat. More information on avoidance planning can be found in ***ESIA Chapter 8.4.3.6***.

Existing mitigation measures and controls (from the local EIA) are designed to reduce construction and operational phase impacts and include. These measures will be supplemented with the additional mitigation measures contained in ***ESIA Chapter 8.4.3*** (***Table 8.49***), in order to minimize and remediate/rehabilitate impacts, reduce forest habitat loss significantly as well as avoiding impacts to key biodiversity as far as possible.

Key mitigation measures are listed in ***ESIA Chapter 8.4.3*** (***Table 8.49***) and in ***Chapter 9 (ESMP).*** To avoid duplication, the biodiversity mitigation measures detailed in the ESIA and ESMP (Environmental and Social Management Plan) have not been considered again in detail here, however those where further action is required to develop these further are listed below in Table 6-1, with further actions and timeframes indicated.

Table 6-1: Mitigation measures requiring further actions/inputs

Mitigation Measure	Further Actions Required	Timeframes	Responsibility
■ Implement appropriate biodiversity buffer zones from core areas of primary forest	An ecologist / biodiversity specialist will need to be appointed to identify core primary forest patches and consider what buffer zones may be considered appropriate.	*Prior to construction commencing*	Ecologist
■ Undertake micro-siting of construction camps, batching plants, turbines, substations and roads to avoid least-impacted primary forest habitats	The Environmental Clerk of Works (ECoW) will need to work with the construction teams to site key infrastructure away from the least-impacted primary forest areas on the ground.	*Prior to construction commencing*	EPC Contractor
■ Compile and implement Construction Method Statement for working in natural habitats	An ecologist / biodiversity specialist will need to be appointed to work with the project engineers to develop a site-specific Construction Method Statement.	*Prior to construction commencing*	Ecologist / Engineer
■ Compile and implement a post-construction rehabilitation plan for temporary areas used during construction	An ecologist / biodiversity specialist will need to be appointed to develop a post-construction rehabilitation plan for temporary areas disturbed by construction.	*Prior to construction being completed*	Ecologist
■ Develop and implement appropriate access management plans and suitable control measures to restrict access and unnecessary disturbance of natural habitat	IEAD would need to work together with the appointed EPC Contractor to develop access control plans.	*Prior to construction commencing*	IEAD / EPC Contractor
■ Where known species of protected/Red Data Listed plant species occur and are at risk of being destroyed, prepare and implement a protected plant rescue and translocation plan and programme (this includes all CH-qualifying species, CR/EN species and any species potentially 'new to science')	An ecologist / biodiversity specialist will need to be appointed to consider the practicality of implementing a protected plant rescue and translocation plan for key plant species by reviewing botanical traits and requirements. If considered feasible, a translocation plan or (replacement plan alternatively) would then be developed.	*Prior to construction commencing*	Ecologist
■ Compile and implement appropriate Construction Method Statement for working in watercourses (for implementation at all stream crossings), this is to be informed by good practice guidelines on construction methods, such as SEPA (2009)	An ecologist / biodiversity specialist will need to be appointed to work with the project engineers to develop a site-specific Construction Method Statement.	*Prior to construction commencing*	Ecologist / Engineer
■ Compile and implement a suitable post-construction rehabilitation plan for stream beds and banks modified but not entirely transformed by construction activities, any bare soil surfaces need to be revegetated as soon as practically possible to reduce erosion risk	An ecologist / biodiversity specialist will need to be appointed to develop a post-construction rehabilitation plan for temporary areas disturbed by construction.	*Prior to construction commencing*	Ecologist / Engineer

Mitigation Measure	Further Actions Required	Timeframes	Responsibility
■ Schedule habitat clearance, grading and road construction activities outside of CH-qualifying and CR/EN species' breeding periods where known	An ecologist / biodiversity specialist will need to be appointed to advise on breeding periods for key CR/EN species of fauna and advise on construction scheduling to avoid impacting these species during key breeding periods.	*Prior to construction commencing*	Ecologist
■ Shepherding protocol to be prepared and implemented where road construction takes place, to check areas to be worked in prior to construction and remove or shepherd wildlife to safety in adjoining forest or habitat (species considered to be dangerous or poisonous/venomous to be handled by professionals)	An ecologist / biodiversity specialist will need to be appointed to advise on the shepherding protocol.	*Prior to construction commencing*	Ecologist
■ Develop and implement a post-construction fatality monitoring protocol for birds/bats	An ecologist / biodiversity specialist will need to be appointed to develop the operational carcass monitoring protocol for birds/bats and advise on timing and frequency of monitoring activities.	*Prior to operation*	Ecologist
■ Maintain connectivity around or across linear infrastructure (roads primarily) through use of appropriate animal crossings suitable for small mammals and slow-moving reptiles such as tortoises in particular	An ecologist / biodiversity specialist will need to be appointed to advise on where appropriate animal crossings for new access roads could be considered necessary and to provide recommendations for design of crossings.	*Prior to construction commencing*	Ecologist
■ Compile and implement a suitable Invasive Alien Plant (IAP) species control plan and programme to eradicate dense colonies of alien plants and control the spread of minor species and weeds (this plan must include wash stations to remove seeds from vehicle tyres and underbody)	An ecologist / biodiversity specialist will need to be appointed to develop the IAS control plan and programme.	*Prior to operation*	Ecologist
■ Compile biodiversity action plan (BAP) with offset strategy to compensate for residual forest impacts	Initial BAP developed.	*Prior to operation*	Ecologist
■ Implement an appropriate biodiversity offset	Implement offset plan once developed.	*Long-term commitment (during operation)*	IEAD
■ Monitor biodiversity offset implementation success	Implement offset plan once developed.	*Long-term commitment (during operation)*	IEAD
■ Prepare and implement a precautionary and adaptive management plan to be informed by long-term annual bat/bird carcass monitoring, to determine where additional mitigation may be	An ecologist / biodiversity specialist will need to be appointed to develop the adaptive management plan based on the outcomes of operational bird/bat carcass monitoring.	*During operation*	Ecologist

Mitigation Measure	Further Actions Required	Timeframes	Responsibility
necessary for specific turbines/clusters of turbines, such as: adjusting turbine cut-in speeds (increased) for site-specific and seasonal bat activity peaks, feathering of turbine blades, auditory deterrents and/or painting of alternate turbine blades to increase visibility for birds			
■ Implement habitat enhancement for bats (e.g. creation of pools) and provision of bat-boxes in areas under IEAD control away from wind turbines, may serve to reduce the number of bats in the wind farm area and therefore reduce collision risks	The need for this specific requirements will be informed by the outcomes of operational monitoring. Where deemed necessary, an ecologist / biodiversity specialist will need to be appointed to advise on the location and type of habitat enhancement required.	*During operation*	Ecologist
■ Creation of suitable alternative habitats or enhancement of existing ones to support displaced species	The need for this specific requirements will be informed by the outcomes of operational monitoring. Where deemed necessary, an ecologist / biodiversity specialist will need to be appointed to advise on the location and type of habitat enhancement required.	*During operation*	Ecologist
■ Support local villagers with the training, tools and finances needed to startup small-scale animal operations, such as chicken farms, etc. to support local livelihoods, to alleviate some of the local hunting pressures	Social specialist will need to be appointed to advise on the approach and measures.	*Prior to operation*	Social specialist

7. SUMMARY OF RESIDUAL IMPACTS

7.1 Summary of Residual Impacts

Despite the avoidance of impacts through project design and realignment considerations and the recommendation of good practice controls and site-specific mitigation to reduce impact extent, potential and/or intensity, there are still residual impacts that are not easily mitigatable (see Chapter 7 and ***ESIA Chapter 8.4.3.7***). Residual impacts that are likely to remain after other forms of mitigation (avoidance, minimization, and restoration) have been considered include:

1. Transformation or modification of areas of natural forest vegetation, providing key habitat for RDL forest-dependent species and considered ‘critical habitats’ (direct and indirect impacts); and
2. Loss of RDL species through increased hunting/harvesting pressure due to enhanced accessibility to the area (induced and cumulative impacts assessed).

Residual impacts of moderate significance relate to the potential loss of critical habitat identified in the CHA and which is aligned strongly with the remaining untransformed but highly fragmented natural and modified Wet Evergreen Forest and Montane Evergreen Forest vegetation communities and habitats represented in the project area. These impacts are likely to result in a net biodiversity loss unless adequately mitigated through an appropriate biodiversity compensation strategy. In this instance, biodiversity offsets are typically recommended to compensate for residual impacts to ecosystems and biodiversity, however this is advocated *only once all other forms of mitigation have been considered and exhausted*. Offsets are therefore normally only considered as the ‘last resort option’ in accordance with the mitigation hierarchy.

The outcomes of the CHA (***Appendix G***) require that a BAP be compiled to align with the ADB SPS SPS (2009) and to include options to offset residual impacts so as to achieve at the minimum a ‘no net loss’ (NNL) or potentially a ‘net gain’ (NG) outcome in terms of biodiversity and regarding ‘natural habitats’ and ‘critical habitats’, both of which are represented in the project area and will be affected to varying degrees:

1. **Natural Habitats**
“*In areas of natural habitat, the project will not significantly convert or degrade such habitat, unless the following conditions are met:*
(i) No alternatives are available.
(ii) A comprehensive analysis demonstrates that the overall benefits from the project will substantially outweigh the project costs, including environmental costs.
(iii) Any conversion or degradation is appropriately mitigated.

Mitigation measures will be designed to <u>achieve at least no net loss of biodiversity</u>. They may include a combination of actions, such as post project restoration of habitats, offset of losses through the creation or effective conservation of ecologically comparable areas that are managed for biodiversity while respecting the ongoing use of such biodiversity by Indigenous Peoples or traditional communities, and compensation to direct users of biodiversity.”

2. **Critical Habitats**
“*No project activity will be implemented in areas of critical habitat unless the following requirements are met:*
(i) There are no measurable adverse impacts, or likelihood of such, on the critical habitat which could impair its high biodiversity value or the ability to function.
(ii) The project is not anticipated to lead to a reduction in the population of any recognized endangered or critically endangered species6 or a loss in area of the habitat concerned such that the persistence of a viable and representative host ecosystem be compromised.
(iii) Any lesser impacts are mitigated in accordance with para.27.”

8. OFFSET STRATEGY

8.1 Introduction

The Safeguards Policy Statement (SPS) 2009 of the Asian Development Bank (ADB) states that ADB-funded projects are to achieve no net loss, or a net gain of affected biodiversity. Projects must identify measures to avoid, minimize or mitigate adverse impacts to natural or modified habitat, and as a last resort, propose compensatory measures such as biodiversity offsets to achieve no net loss or a net gain of the affected biodiversity.

Biodiversity offsets are measurable conservation outcomes designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken (BBOP, 2012). Under the SPS, the establishment of a biodiversity offset requires the project developer to identify a suitable area of land that contains ecosystems comparable in size, quality and function to those impacted by the project, and to ensure that the area is managed to deliver the required conservation outcomes.

8.2 Key Offset Design Principles

The following biodiversity offset design principles and rules have been recommended for the Project (in line with BBOP, 2012):

- Offsets should be 'like-for-like' with trading only permitted within the same land class type;
- If 'like-for-like' is not possible, offsets should address the same features and habitats within the broader landscape area;
- Environmental contributions for specific programs can be used to substitute for the direct management of biodiversity;
- Incremental loss and fragmentation of biodiversity values is to be avoided;
- Management of offset sites can be used to improve biodiversity values, however this may not replace actions that are already funded;
- Areas with existing or potential land uses that are likely to be in conflict with the objectives of biodiversity offsets will need to be avoided (mining, forestry leases;
- Offsets to be located in close proximity to the impacted area as possible, such that the gains of offset mitigation are retained in the local area impacted and not transferred to elsewhere;
- Location of offsets in the landscape that facilitate connectivity with adjacent habitats are considered preferable;
- Large offset sites that are connected to existing protected areas are also seen as preferable;
- Also, sites similarly used by comparable ethnic groups sharing similar cultural values will be of preference;
- Fairness and equity should be ensured for affected stakeholders; and
- Offsets chosen should be permanent and ongoing in perpetuity.

8.3 Habitat Targets for Achieving No Net Loss / Net Gain Outcomes

The underlying theoretical assumption is that the offset should address all residual losses for all affected biodiversity, but it is rarely either possible or practical to document and quantify losses for every component of biodiversity or for all dimensions of structure and function. Most approaches therefore demonstrate no net loss using metrics based on surrogates for the entirety of biodiversity which can realistically be measured (see also BBOP, 2012)[10].

[10] In order to build understanding and support for this approximate approach to quantifying loss and gain, it is very valuable for offset planners to select, develop and apply the metrics with the participation of stakeholders and to report the approach used and results transparently.

The most logical way to offset the forest habitat loss is through an offset designed to restore key ecological linkages between the patchy forest cover near the project infrastructure, with a focus to restore larger, more contiguous areas of forest cover[11]. More details on the offset opportunities considered initially can be found in ***ESIA Chapter 8.4.3.7***.

Initial estimates of anticipated natural forest habitat loss were undertaken to inform the impact assessment (based on anticipated WTG locations, substation positions, access road widths and TL corridor widths), which were determined to be conservatively in the region of approximately 150 ha of natural forest loss for the project. This has been split also between the loss of Montane Forest (140 ha) and Wet Evergreen Forest (10 ha) habitat types, as per Table 8-1 which is shown visually on the map in Figure 8-1.

Note that once designs have been finalised, a formal detailed GIS analysis will be undertaken to confirm more precise estimates of forest losses linked with the development footprint anticipated and the target calculations will be updated at this stage.

Given that Lao PDR does not have a national offset policy in place at the moment to guide the development of biodiversity offsets in the country, ERM decided to align the offset approach and strategy with good international practice as far as possible, namely the guidelines and methodology contained in the 'Biodiversity Offset Design Handbook' (BBOP, 2012). The approach taken by ERM for the 'Nam Ngiep 1 Hydropower Project Biodiversity Offset' (ERM, 2014) was also used to inform the calculation of preliminary offset targets for the Project, using an appropriate biodiversity offset metric used to calculate habitat targets has been based on the Habitat Hectare Equivalents model of BBOP (2012). This approach considered habitat type, extent and condition for both the impacted areas and candidate offset receiving sites with the residual habitat hectare loss calculated by multiplying loss extent by land condition value (see Table 8-1)

Table 8-1: Calculation of habitat losses and offset targets

Habitat Type	Preliminary Estimated Loss (A)	Land Class Condition, Value (B)	Residual Impact expressed as Habitat Hectares (HH) (C = A x B)	Offset Target expressed as Habitat Hectares (HH)
Montane Forest	140 ha	High / natural, 0.8	**112 HH**	112 HH
Wet Evergreen Forest	10 ha	High / natural, 0.8	**8 HH**	8 HH

MAP TO BE PROVIDED BY GIS TEAM ONCE ANALYSIS COMPLETED – based on new layout

Figure 8-1: Map showing the extent of habitat loss estimated through GIS analysis

8.4 Species Targets

Since direct/indirect species impacts are unlikely to be significant for the project to warrant the need for offsetting, there will be no need for a specific species offset for the project. That being said, offsetting potential over-harvesting / over-hunting practises that may be induced by the project will require a different approach, focused more on averting loss of species through measures aimed at ensuring sustainable harvesting practices are followed and ensuring appropriate protection of offset sites from illegal activities.

[11] Species-specific offsets won't be considered separately in this BAP, but rather habitat will be used as a proxy for quantifying residual impacts and informing offset requirements. That being said, offsetting potential over-harvesting / over-hunting practises that may be induced by the project will require a different approach, focused more on averting loss of species through measures aimed at ensuring sustainable harvesting practices are followed and ensuring appropriate protection of offset sites from illegal activities. Community engagement and education is required.

8.5 Potential Offset Receiving Areas

While there may be opportunities for Monsoon WF to support several existing projects and conservation initiatives in Laos PDR (these are mentioned briefly in ***Section 8.4.3.7 of the ESIA report***), comments received from the ADB support the general approach that offsets to compensate for biodiversity losses need to be additional, and not within existing conservation areas or overlapping existing initiatives.

Therefore, offsetting forest habitat loss (which is the most significant direct impact of the project) would need to be achieved through actively restoring forest habitat as a means of direct compensation for the forest habitat losses anticipated.

Offset Site A (see map in Figure 8-2)

The highly fragmented landscape associated with the Dak Chung KBA has been identified as a logical starting point for planning an offset for Montane Evergreen Forest (see map in Figure 8-2), as the site is in close proximity to the impacted forest areas, such that the gains of offset mitigation are retained in the local area impacted and not transferred to elsewhere in the country. There may be key opportunities for the Project specific offset to support the existing Protected Area network, or local KBAs or to align with already existing initiatives and/or areas and cumulatively contribute to them. Increasing habitat connectivity in the highly fragmented landscape and improving movement of CH species in the wider landscape (also in regards to the continued occurrence of endemic bird species) can be seen as a good reason to pursue this.

Examples could include working with the Lao PDR Ministry of Natural Resources and Environment (MoNRE) to create a protected area covering the mountain area in Survey Blocks 3 & 4, using the data collected for the Monsoon WF application to support such a designation.

Offset Site B (see map in Figure 8-2)

Offsetting of forest loss associated with Wet Evergreen Forest would probably be best achieved by locating the offset receiving area along the existing access road through the Wet Evergreen Forest habitat to the north-east, associated with the Phou Ayon KBA (see Figure 8-2). The opportunity here would be to restore degraded forest habitat impacted by the access road.

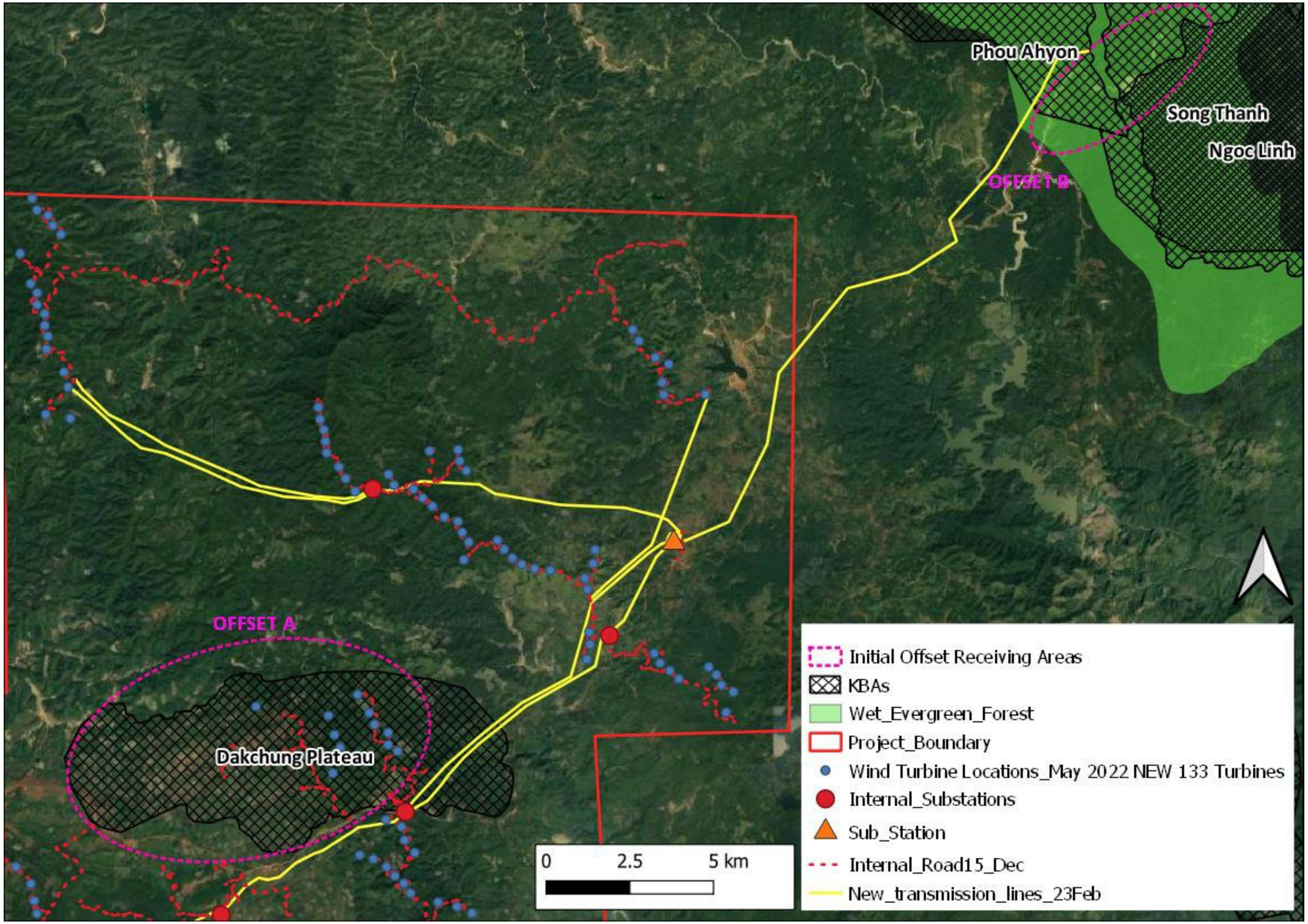

Figure 8-2: Map showing the location of potential offset receiving areas for Montane Forest and Wet Evergreen Forest

8.6 Anticipated Offset Gains

Given that active reforestation efforts and active management will increase the biodiversity value and condition of target sites, but with limited evidence of existing conservation management actions undertaken on offsets in Lao PDR, a conservative approach to predict likely gain in terrestrial biodiversity has been used, based on the approach by ERM (2014). This suggests that gains in condition value relative to the existing value of the site prior to offset intervention, with sites with lower baseline condition likely to have a greater capacity for improvement (ERM, 2014). A conservative estimate of ~38% proportional improvement in condition over a 30-year period from low condition forest has been assumed for the project, based on ERM (2014) (see table below for offset gain calculations).

In order to achieve no net loss of biodiversity through the target of 112 habitat hectares (see Table 8-2), a minimum area of 410 ha of low value/poor condition forest will need to be rehabilitated and managed as part of the offset. The highly fragmented landscape associated with the Dak Chung KBA has been identified as a logical starting point for planning an offset, as the site is in close proximity to the impacted forest areas, such that the gains of offset mitigation are retained in the local area impacted and not transferred to elsewhere in the country. There may be key opportunities to support the existing Protected Area network, or local KBAs (Key Biodiversity Areas) which should be investigated further. Such an example could include working with the Lao PDR Ministry of Natural Resources and Environment (MoNRE) to create a protected area covering the mountain area in Survey Blocks 3 & 4, using the data collected for the Monsoon WF application to support such a designation. Rough estimates based on the habitat mapping and classification undertaken for the biodiversity baseline assessment, suggests that for the Dak Chung KBA alone (which has a total extent of 51 km^2 or 51 000 ha) the extent of degraded/low condition forest habitat could easily exceed 50% of the area, or equating to around 25 000 ha. To secure an area of approximately 400 ha which can result in a potential no net loss and even net-gain in terrestrial biodiversity (see table below) should be relatively easy to achieve for this area alone, as this would be an estimated 1.5% of the Dak Chung KBA.

The target for Montane Forest habitat can therefore be quite readily achieved on Dak Chung Plateau, but not for Wet Evergreen Forest. Therefore, a second site will be required to offset the comparatively far lower losses to Wet Evergreen Forest (10 ha, equating to 8 habitat hectare equivalents), with a possible location being the existing forest disturbance caused by the formal road located to the east of the TL in the north-eastern section where this affect Wet Evergreen Forest habitat. Forest restoration along a roughly 4-5 km stretch of road through Wet Evergreen Forest can potentially net a gain of 30 ha of forest. To meet a target of 8 habitat hectare equivalents (see table above) requires the rehabilitation and management of more than 30 ha of low condition forest of this type. The candidate 30 ha forest offset site associated with the road disturbance would net an estimated gain of 8.3 habitat hectare equivalents, which is potentially a no net loss of biodiversity outcome (see Table 8-2 below).

Table 8-2: Calculation of estimated offset gains

Habitat Type	Candidate Offset Site Extent (A)	Base Condition Value (B)	Estimated Gain over 20-year period (20%) (C)	Gain Overall in habitat hectares (HH) (D = A x C)	Target in habitat hectares / Target Met?
Offset A: Montane Forest	410 ha	Low, 0.2	**+0.275**	112.8 HH	112 HH, target met
Offset B: Wet Evergreen Forest	30 ha	Low, 0.2	**+0.275**	8.3 HH	8 HH, target met

As the final positions of WT's and access roads may change through micro-siting to avoid loss of natural forest, and TL corridors are also still to be finalised, the final loss calculations will need to be refined through a more detailed analysis in GIS. This will be used to inform final targets and to determine the proposed boundary of the biodiversity offset to meet targets and thus achieve at least a no net loss, possibly net gain in biodiversity.

8.7 Opportunities and Constraints

The 'Biodiversity Offset Design Handbook' (BBOP, 2012) lists a variety of factors contributing to the potential success of offsets in delivering no net loss or a net gain of biodiversity. The following will need to be taken into consideration when developing the offset implementation plan:

- Political support;
- A stable and predictable socioeconomic situation;
- Willing and supportive stakeholders;
- Adequate funds and time to devote to the design process;
- Reliability and accountability of governance and financing;
- Institutional capacity and resources for implementation and maintenance;
- Accessible and detailed information on affected biodiversity;
- Recently compiled spatial development or land use plans;
- Clearly defined biodiversity priorities;
- Human needs integrated into the natural landscape, and;
- Fair benefit-sharing and sustainability for local biodiversity users.

It will be useful to undertake a review of legal and policy frameworks that may influence a biodiversity offset prior to developing and implementing it, and list its strength/ weaknesses and potential to achieve the offset. While Lao PRD does not have a national offset policy in place at the moment, some more general law and policy, such as EIA and land rights, governs or affects project planning and can have a bearing on the procedure for designing a biodiversity offset as well as the nature of the offset likely to be required. Additionally, research needs to be conducted on whether legal processes for extending forest areas exist.

In addition, it will be necessary to evaluate potential technical constraints on delivering offset mitigation actions. As an example, during the baseline study 250 species of tree belonging to 58 families were recorded (see ***ESIA Chapter 7.4***). The *Rubiaceae*, *Lauraceae* and *Fagaceae*, *Annonaceae* and *Fabaceae* were the dominant tree families sampled within the forest habitats, with 83 species recorded in total within the forest habitats sampled. The implementation and realization of a successful offset strategy (such as reforestation of degraded areas, see Chapters 8-10) is therefore based on choosing the correct type of trees for the Wet Evergreen Forests (e.g. *Quercus* sp., *Lithocarpus* sp, *Pinus kesiya* and *Morella cerifere*) and the Montane Evergreen Forests (e.g. *Hopea pierrei*, *Cinnamomum iners*, and *Lithocarpus polystachyus*). It is unclear at this stage if these trees are commercially available or if indigenous plant exist, and further investigations will therefore be required. The alternative would be to collect and propagate trees from seed, adopting for example a community-driven reforestation programme.

8.8 Offset Actions and Timeline

In theory, the biodiversity offset recommended should be capable of achieving at least a no net loss of biodiversity based on the loss calculations, targets and rationale for the selected offset receiving areas. Whilst the estimates are conservative at this stage, once designs have been finalised, a formal detailed GIS analysis will be undertaken to confirm more precise estimates of forest losses linked with the development footprint anticipated and the target calculations will be updated at this stage. The following actions are recommended to inform the development of the offset implementation plan for the project:

1. Investigate land ownership rights and opportunities to secure the offset site properties;
2. Review of legal and policy frameworks that may influence the biodiversity offset positively or negatively;
3. Understand what alternative land uses may be proposed for the site (e.g. mining) which could conflict with the intended offset activities;
4. Update loss calculations, targets and offset gain calculations once designs are final;
5. Map more precisely the areas of degraded forest associated with KBAs at Offset Receiving Sites A and B to confirm the boundary of the offset where targets can be met;
6. Focused field investigations may be necessary to assess and document the baseline status of offset receiving areas;
7. Undertake a comprehensive opportunities and constraints analysis, building on that included in the BAP to undertake what opportunities can be maximised and which constraints need to be accounted for in offset design and management;
8. Determine commercial availability of selected forest tree species or alternatives;
9. Consult with local communities to discuss opportunities for developing a community restoration / rehabilitation project, such that the people who are most dependent on the forest resources in the area are the ones who also can benefit from the project[12];
10. Identify and engage with an appropriate delivery partner with a track record of supporting such biodiversity protection and rural poverty alleviation projects'
11. Compile the detailed implementation plan with activities, roles, responsibilities and timeframes for delivering on the offset including short- and long-term management measures[13];
12. Compile an initial estimate of offset costs for implementation, short- and long-term management (it will be particularly important that cost estimates for implementing the biodiversity offset required to achieve no net biodiversity loss at a minimum for the Project, be evaluated and understood by all stakeholders during offset planning process, from the perspective of initial costs and the anticipated long-term management of the offset essentially in perpetuity or for as long the Project infrastructure remains in place).

9. BIODIVERSITY MONITORING AND EVALUATION PLAN FRAMEWORK

9.1 Biodiversity Indicators and Metric

Biodiversity can be measured at multiple spatial scales in terms of "*genetic diversity and the identity and number of different types of species, assemblages of species, biotic communities, and biotic processes, and the amount (e.g., abundance, biomass, cover, rate) and structure of each*" (Swingland, 2013). The ability to monitor changes in biodiversity, and their societal impact, is critical to conserving species and managing ecosystems (Navarro, 2017). There is a need to track and monitor the contributions of biodiversity offset projects to meeting NNL or NG commitments and to facilitate

[12] The 'Village Forest Management Planning Guideline' developed through the 'Climate Protection through Avoided Deforestation Project' (2016[12]) supports sustainable use, protection and restoration of village forests in Lao PDR, and may provide a useful reference and guidelines to support offset planning and community forest management.

[13] It is suggested that the relevant FSC (Forest Stewardship Council) guidelines, norms or standards that focus on natural forest management and impact mitigation be used, where appropriate, to inform the development of the BAP (most notably "FSC Principles and Criteria for Forest Stewardship" - FSC, 201513).

monitoring and evaluation, and it is therefore necessary to develop a simple standardized suite of 'biodiversity indicators[14]' that can be measured and reported on whilst also providing the flexibility to tailor and customize indicators for the project.

Indicators essentially underpin the applicability of monitoring & evaluation systems, as it is not practically feasible to document every relevant process, parameter or change that takes place across an entire social-ecological system (GIZ *et al.*, 2020). Since the biodiversity of even a small area is far too complex to be comprehensively measured and quantified, suitable indicators have to be found and one needs to focus on identifying and monitoring indicators that represent key aspects of a particular system (Duelli and Obrist, 2003). Biodiversity indicators not only provide an important basis for communicating progress towards meeting targets but can also be used to evaluate policies underpinning conservation measures (Parliamentary Office of Science and Technology, 2021).

Since the final offsets are yet to be agreed on, the following indicators and metrics can only be seen as an indicative in terms of a draft monitoring and evaluation plan[10]. Monitoring and evaluation of these metrics is recommended throughout the Project life cycle and should continue until the end of project closure where relevant. In this regard, the following points should be considered throughout the Project's life cycle:

- Review and update the BAP annually;
- Regularly monitor biodiversity offset areas and areas of high biodiversity value within the Project area included in this plan;
- Regularly monitor status of IUCN Red List Species[15] present within the area of influence of the site;
- Regularly monitor and validate management measures as outlined in the BAP for critical habitat, natural habitat, protected areas, key biodiversity areas, the resilience of habitat restoration and rehabilitation programs based on agreed success criteria within the area of influence of the site;
- Establish data collection and reporting systems to meet both internal and external reporting requirements in relation to biodiversity baseline.

The recommended mitigation measures (see also ***ESIA Chapter 8.4.3***) can be evaluated based on the preliminary indicators and metrics contained in Table 9-1

[14] An indicator can be defined as "a measure based on verifiable data that conveys information about more than itself" (Biodiversity Indicators Partnership 2011). "Indicators are quantitative or qualitative statements or measured parameters that can be used to describe existing situations and measure changes or trends over time. Indicators simplify complex phenomena so that communication of information is enabled or enhanced." Indicators are also purpose-dependent in that "…the interpretation or meaning given to the data depends on the purpose or issue of concern" (Biodiversity Indicators Partnership, 2011).

[15] Note that there is no national Red List available for Laos.

Table 9-1: Evaluation of Mitigation Measures using Indicators and Metric

Indicator	Metric(s)	Explanation / Rationale	Target	Monitoring Activities
Scale of intervention	Spatial area (expressed in ha)	The spatial scale of interventions is a critical measure of impact of an intervention.	100%	This indicator simply expresses the spatial scale of the intervention by reporting on the extent of the area targeted for offsetting. It is important to note here that reporting should reflect the specific spatial footprint of interventions (e.g. forest restoration).
Security of biodiversity values	Rate the security of biodiversity values	Whilst offset interventions can lead to considerable improvements in biodiversity values, unless appropriate mechanisms are put in place to secure maintenance, management and long-term protection, these values can decline over time.	Well secured: Mechanisms are in place to ensure that the site is secured and managed in the long-term (>30 years). This includes both legal protection and financing and management capacity necessary to manage pressures and impacts so as to ensure that biodiversity benefits are secured.	Determine supplementary controls and / funding to ensure long-term security.
Forest growth	Tree measurements (e.g. height and diameter of trees, health of trees (e.g. diameter at breast height / DBH)	. It is unlikely that every seedling / young tree will survive. However, some metrics could be taken to identify potential reasons for loss (e.g. annual branch extension, trunk diameter growth, leaf color and appearance,	Comparison with reference type.	Define 'exemplary' trees and indicator species that will be measured every 2-5 years to document growth and other metrics.
Species composition	Species composition	The correct species of trees (and their likelihood of survival) has to be identified for each habitat	Comparison with reference type.	Forest survey plots.
Species diversity	Species diversity index	By measuring changes in the overall number (abundance) or diversity of different plant and animal species and families/groups, a measure of overall biodiversity change can be attained and various levels depending on the groupings.	>95% native species	At the simplest level, differentiating between native and non-native species can provide a relatively straightforward measure in the form of monitoring trends in the overall

Indicator	Metric(s)	Explanation / Rationale	Target	Monitoring Activities
				abundance of native species for a defined area or per habitat type.
Structural integrity	Gaps in forest canopy	Habitat fragmentation leads, among others, to reduction in habitat size, population fragmentation and detrimental edge effects.	95% canopy cover	Pre-mitigation condition surveys and photographs will be undertaken to establish baseline conditions. Post-mitigation monitoring will be undertaken to monitor the success of the measure using photography and habitat mapping. Remote sensing (e.g. multiscale RS, LiDAR) can be utilized to gain an overview and allow comparison of pre- and post-mitigation status. Additionally, a reference state (control site) must be established that the progress is measures against. The baseline of the offset area has to be surveyed prior to implementation of any measures.
Structural diversity	Tree cover % Forest pattern Area restored % or ha	The appropriate diversity of key structural components of a landscape, including demographic stages, trophic levels, vegetation strata and spatial habitat diversity (SER, 2019). At its simplest level, the configuration of natural spaces and the types of natural environments supporting biodiversity in the form of habitat for fauna and flora of different types can be measured.	All strata present. Spatial patterning evident and substantial trophic complexity developing relative to the reference ecosystem type.	As above.
Connectivity between forest patches	Patchiness of vegetation cover	Barber et al. (2020) emphasise the importance of “re-establishing landscape-scale ecological connectivity among natural forests, woodlands, and other important natural areas (e.g., rivers and wetlands)” as being essential for biodiversity persistence and recovery. Protection and restoration strategies must therefore be intimately related to habitat connectivity, particularly in the terrestrial realm.	Low patchiness. Canopy cover	Deducing the proximity of natural habitat patches to one other through mapping exercises using spatial tools such as GIS and easily available satellite imagery.

9.2 Biodiversity Offset Management

Biodiversity Offset Management is an ongoing process from the initial actions (e.g. initial restoration/planting phase, to monitoring, adaptive management, management of unintended effects) to monitoring the success of offset implementation and any other long-term management requirements until the forest communities have reached an acceptable state. Since the offsetting strategy is still preliminary, this chapter will be prepared once final actions and plans are identified and stakeholders are engaged.

9.3 Plan Review and Update

The BAP will be a ‘living document’ that will be updated as actions are developed and implemented, and as the process of adaptive management guides delivery of no net loss and/or net biodiversity gain.

Target condition scores will be determined according to the expected success of the implemented actions, and regular reviews/monitoring will be undertaken in set intervals. The monitoring results will determine the actual condition and whether the actions are on track to reach the target score. Actions will be modified as appropriate where the trajectory of habitat condition improvement falls behind target.

9.4 Next Steps

The next steps will be to finalize the BAP based on the latest design and offset calculations and develop the individual actions as per Table 6-1 and the Offset Plan as per the strategy contained in Chapter 8. The timeframes for BAP implementation have been indicated in Chapter 10 which follows.

10. BIODIVERSITY ACTION PLAN IMPLEMENTATION PROGRAMME

Actions	**Responsibilities**	**Timeframe**								
		2022	2023	2024	2025	2026	2027	2028	2029	2030
Monitoring Actions										
Develop Management Plan	Ecologist									
Determine Baseline Biodiversity Values	Ecologist									
Establish Permanent Monitoring	IEAD / Ecologist									
Determine Conservation Priorities	Ecologist									
Determine Habitat Specific Management Actions	Ecologist									
Implement Habitat Specific Management Actions	IEAD					Annually				
Report of Performance	Ecologist					Annually				

Actions	Responsibilities	Timeframe 2022	2023	2024	2025	2026	2027	2028	2029	2030
Review Monitoring Results[16]	IEAD / Ecologist	Every five years								
Review Management Plan[16]	IEAD / Ecologist	Every five years								
Review Habitat Specific Management Actions[16]	IEAD / Ecologist	Every five years								
Enabling Actions										
Securing areas for offset	IEAD									
Interact with local communities	IEAD / Social Specialist									
Habitat Restoration Actions[17]										
Implement environmental management plan	IEAD / Ecologist	Throughout Project Lifetime / until Net Gain is achieved								

[16] Design, implementation and review of biodiversity offsets should be based on an adaptive management approach, incorporating monitoring and evaluation, with the objective of securing outcomes that last at least as long as the project's impacts and preferably in perpetuity. A recurring reviewing (and updating) of the monitoring results and consequentially reviewing (and updating) of the management plan is necessary.

[17] The listed actions are based on the evaluation plan framework of chapter 9. Since the final offsets are yet to be agreed on, the restoration actions are also still preliminary.

Actions	Responsibilities	Timeframe								
		2022	2023	2024	2025	2026	2027	2028	2029	2030
Rehabilitation of temp. sites after constructions are completed	IEAD									
Recovery of forest canopy [18]	-	Throughout Project Lifetime / until Net Gain is achieved								

[18] It has to be noted that achieving a real net gain will take several decades. At this stage, a timeframe is difficult to estimate

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