

## **APPENDIX T      CRITICAL HABITAT ASSESSMENT BIODIVERSITY**



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

## Appendix G: Critical Habitat Assessment

22 September 2022

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## Signature Page

22 September 2022

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

## Appendix G: Critical Habitat Assessment



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## CONTENTS

|                   |   |           |
|-------------------|---|-----------|
| <b>1.</b>         | <b>EXECUTIVE SUMMARY .....</b>  | <b>1</b>  |
| <b>2.</b>         | <b>INTRODUCTION .....</b>   | <b>4</b>  |
| 2.1               | Purpose and Scope of this Report.....   | 4         |
| 2.2               | ADB Safeguard Policy Statement (2009).....  | 4         |
| 2.3               | ADB SPS and IFC PS6 Requirements .....  | 5         |
| 2.4               | Project Description.....  | 5         |
| 2.5               | Ecological Context of the Project .....   | 6         |
| <b>3.</b>         | <b>APPROACH TO THE CRITICAL HABITAT ASSESSMENT .....</b>  | <b>7</b>  |
| 3.1               | Delineate the Ecologically Appropriate Area(s) of Analyses (EAAA) .....   | 7         |
| 3.1.1             | EAAA for Volant Species .....   | 7         |
| 3.1.2             | EAAA for Non-Volant Species.....  | 8         |
| 3.2               | Review and verification of available information .....  | 10        |
| 3.3               | Assess biodiversity Values against ADB SPS Critical Habitat Criteria.....   | 10        |
| 3.3.1             | Apply Critical Habitat Criteria and Thresholds.....   | 10        |
| 3.3.2             | Consult with Specialists to Verify Results .....  | 13        |
| 3.4               | Conduct Field Surveys to Verify Potential High Priority Species.....  | 13        |
| 3.5               | Identify Natural Habitat and Modified Habitat.....  | 14        |
| 3.6               | Identify Critical Habitat.....  | 16        |
| <b>4.</b>         | <b>FINDINGS OF THE CRITICAL HABITAT ASSESSMENT .....</b>  | <b>17</b> |
| 4.1               | Criteria 1-4 .....  | 17        |
| 4.2               | Criterion 5: Unique assemblages of species that are associated with key evolutionary processes<br>or provide key ecosystem services ..... | 21        |
| 4.3               | Criterion 6: Areas with significant social, cultural or economic importance .....   | 23        |
| 4.4               | Legally Protected Areas and Areas with Recognized High Biodiversity Values.....   | 23        |
| 4.4.1             | Legally Protected Areas.....  | 24        |
| 4.4.2             | Areas with Recognized High Biodiversity Values.....   | 24        |
| 4.5               | Defining ‘Critical Natural’ and ‘Critical Modified’ Habitats .....  | 27        |
| <b>5.</b>         | <b>IMPLICATIONS FOR THE PROJECT .....</b>   | <b>33</b> |
| 5.1               | Natural Habitat and Modified Habitat Designation .....  | 33        |
| 5.2               | Critical Habitat Designation.....   | 33        |
| 5.3               | Projects that overlap with Legally Protected Areas and Areas with Recognized High Biodiversity<br>Values.....                             | 33        |
| <b>6.</b>         | <b>CONCLUSIONS AND RECOMMENDATIONS.....</b>   | <b>35</b> |
| 6.1               | Summary of the Key Findings.....  | 35        |
| 6.2               | Next steps.....   | 35        |
| <b>7.</b>         | <b>REFERENCES .....</b>   | <b>37</b> |
| <b>8.</b>         | <b>APPENDICES.....</b>  | <b>41</b> |
| <b>APPENDIX A</b> | <b>FAUNA AND FLORA ASSESSED QUALIFYING FOR CRITICAL HABITAT<br/>CRITERIA 1-4.</b>   |           |
| <b>APPENDIX B</b> | <b>FLAURA AND FAUNA ASSESSED NOT QUALIFYING FOR CRITICAL<br/>HABITAT CRITERIA 1-4.</b>  |           |

## List of Tables

|  |    |
|--|----|
| Table 3-1: ADB SPS Critical Habitat Qualifying Criteria and Corresponding IFC PS6 Criteria .....   | 11 |
| Table 3-2: Key Experts Consulted .....   | 13 |
| Table 4-1: Generic Matrix used to Estimate Species Potential Occurrence Based on Documented Habitat Preferences and Species Distributions..... | 17 |
| Table 4-2: Critical Habitat-qualifying Species of Fauna & Flora .....  | 18 |
| Table 4-3: Legally Protected Areas, and Areas with Recognized High Biodiversity Values in the EAAAs .....                                      | 23 |
| Table 4-4: Classification of Natural and Modified habitat types .....  | 28 |

## List of Figures

|   |    |
|---|----|
| Figure 2-1: Project Location .....  | 5  |
| Figure 3-1: Project's EAAAs Defined for Volant Species (Left) and Non-Volant Species (Right) .....  | 9  |
| Figure 3-2: Land Cover / Land use Types Found in the EAAAs .....  | 15 |
| Figure 4-1: Legally Protected Areas, and Areas with Recognized High Biodiversity Values within and overlapping the EAAAs .....  | 26 |
| Figure 4-2: Map Showing the Extent and Distribution of Natural vs Modified Habitat .....  | 31 |
| Figure 4-3: Map showing the Extent and Distribution of Critical Habitat Classified for the Project, Subcategorised into Natural vs Modified Habitats .....                | 32 |
| Figure 6-1: Initial and Final BAP Process .....   | 36 |
| Figure 8-1: Map Showing the Recorded Locations of <i>L. Xanthops</i> at Phou Ayon Mountain Relative to Monsoon WF .....   | 56 |
| Figure 8-2: DEM Showing Altitudinal Differences between <i>L. Xanthops</i> Recorded Locations at Phou Ayon Mountain and the Monsoon WF TL through the Phou Ayon KBA ..... | 57 |

## Acronyms and Abbreviations

| <b>Name</b> | <b>Description</b>   |
|-------------|--|
| ADB         | Asian Development Bank   |
| ADB SPS     | Asian Development Bank: Safeguards Policy Statement (ADB, 2009)                                      |
| AMSL        | above mean sea level   |
| Aol         | Area of Influence  |
| AZE         | Alliance for Zero Extinction   |
| BAP         | Biodiversity Action Plan   |
| BCCP        | Biodiversity Conservation Corridor Project   |
| CHA         | Critical Habitat Assessment  |
| CR          | Critically Endangered (conservation/threat status for species, vegetation/habitat or ecosystem type) |
| DD          | Data Deficient (conservation/threat status for species, vegetation/habitat or ecosystem type)        |
| EAAA        | Ecologically Appropriate Area(s) of Analyses   |
| EIA         | Environmental Impact Assessment  |
| EN          | Endangered (conservation/threat status for species, vegetation/habitat or ecosystem type)            |
| EoO         | Extent of Occurrence   |
| ERM         | Environmental Resources Management   |
| ESIA        | Environmental and Social Impact Assessment   |
| ESMS        | Environmental and Social Management System   |

| <b><u>Name</u></b> | <b><u>Description</u></b>   |
|--------------------|---|
| GN                 | Guidance Note   |
| IBA                | Important Bird Area   |
| IBAT               | Integrated Biodiversity Assessment Tool   |
| IEAD               | Impact Energy Asia Development Limited  |
| IFC                | International Finance Corporation   |
| IFC PS6            | International Finance Corporation: Performance Standard 6: 'Biodiversity Conservation and Sustainable Management of Living Natural Resources' (IFC, 2012) |
| IUCN               | International Union for Conservation of Nature  |
| KBA                | Key Biodiversity Area   |
| Lao PDR            | Lao People's Democratic Republic  |
| LC                 | Least Concern (conservation/threat status for species, vegetation/habitat or ecosystem type)  |
| MW                 | Mega Watt   |
| NE                 | Not Evaluated (conservation/threat status for species, vegetation/habitat or ecosystem type)  |
| NT                 | Near Threatened (conservation/threat status for species, vegetation/habitat or ecosystem type)  |
| PA                 | Protected Area  |
| SPS                | Safeguards Policy Statement   |
| VU                 | Vulnerable (conservation/threat status for species, vegetation/habitat or ecosystem type)   |
| WF                 | Wind Farm   |
| WWF                | World Wildlife Fund   |

## 1. EXECUTIVE SUMMARY

This report presents the Critical Habitat Assessment (“CHA”) for the approximately 600-megawatt (“MW”) Monsoon Windfarm (the “Project”) in the Lao People’s Democratic Republic (“Laos”). The CHA was completed for the Project, in support of the Project’s alignment with the applicable international standards, which include the Asian Development Bank’s Safeguards Policy Statement (“ADB SPS”). 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 approach to the CHA was as follows:

- EAAAs (Ecological Appropriate Assessment Areas) were identified and delineated for volant (flying) species, and non-volant (non-flying) species, respectively, to determine the spatial extent and scope of the CHA;
- Modified and natural habitats were identified / differentiated and mapped;
- A desk-based review of available information on the biodiversity features within the EAAAs was undertaken to inform the CHA;
- The key findings of the baseline biodiversity surveys for fauna and flora were reviewed, with a key focus on species of conservation importance such as Red Data listed plants and animals recorded, with consultation with specialist to verify results;
- Biodiversity features identified as present or likely to occur within the volant and non-volant EAAAs were screened against the six (6) qualifying criteria for ‘critical habitat’ provided in the ADB SPS and the ADB Environment Safeguards, ‘A Good Practice Sourcebook’ (aligned also with IFC PS6), including:
  - **Criterion 1** - *Habitat required for the survival of critically endangered (CR) or endangered (EN) species,*
  - **Criterion 2** - *Areas with special significance for endemic or restricted-range species,*
  - **Criterion 3** - *Sites that are critical for the survival of migratory species,*
  - **Criterion 4** - *Areas supporting globally significant concentrations or numbers of individuals of congregatory species,*
  - **Criterion 5** - *Areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services,*
  - **Criterion 6** - *Areas with biodiversity that has significant social, cultural or economic importance to local communities, and*
  - *In addition, legally protected or officially proposed areas for protection.*

The Project area lies in a landscape mosaic of montane and 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, predominantly by local communities. The EAAAs assessed therefore contain both natural and modified habitat in terms of the ADB SPS definitions for these types (see **Section 1.2**):

- areas of natural habitat (least impacted) are concentrated in the northern and eastern sections and represent approximately 41% of the EAAA for non-volant species (109,665 ha) and 36% of the EAAA for volant species (86,753 ha); and
- modified habitat (59 - 64% of EAAAs for non-volant and volant species, respectively) is mostly found in the central and southern / south-western 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 volant and non-volant EAAAs both qualify as critical habitat in terms of the criteria assessed and therefore the Project is located entirely within an area classified as critical habitat.](#)

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. Several Protected Areas and KBAs (Key Biodiversity Areas) also qualify the EAAAs as critical habitat. A summary of the main outcomes of the CHA, is as follows: In terms of **Criterion 1: *Habitat required for the survival of critically endangered or endangered species***, several fauna species (mammals, reptiles, amphibians and birds) are represented with CR or EN threat status. One EN plant species was recorded for the forest habitats surveyed. Whilst modified forest habitat would typically support fewer species, some CR or EN species may utilise these habitats. Typically, the Natural Montane Forest and Wet Evergreen Forest habitats are considered the most important in supporting these species.

- In terms of **Criterion 2: *Areas with special significance for endemic or restricted-range species***, several mammal and bird species are also endemic and/or range-restricted species. Whilst modified forest habitat would typically support fewer species, some endemic or restricted-range species may utilise these habitats. Species recorded during field surveys as being potentially 'new to science' may also qualify as restricted-range species.
- In terms of **Criterion 3: *Sites that are critical for the survival of migratory species*** and **Criterion 4: *Areas supporting globally significant concentrations or numbers of individuals of congregatory species***, the requirements / thresholds for these criteria have not been met in terms of the key species identified.
- In terms of **Criterion 5: *Areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services***, the more intact (natural/primary) forest habitats are considered generally important for providing key ecosystem services at both a local/regional and global scale (these are also considered 'Priority ecosystem services' as per the definition provided in IFC PS6 for this criterion).
- In terms of **Criterion 6: *Areas with biodiversity that has significant social, cultural or economic importance to local communities***, despite the potential socio-cultural importance of an area of 'Sacred Forest' identified in the project area, it was subsequently established that the cultural importance is associated with cemeteries (burial grounds) rather than the actual forest and biodiversity per se. After further consideration, forest habitat does not qualify as critical habitat in terms of criterion 6, strictly speaking.

Specific project requirements with respect to natural habitats, critical habitat and protected areas in terms of the ADB SPS are as follows:

- There are several Project components that overlap with 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 habitat, and mitigation measures are designed to achieve at least an overall no net loss of biodiversity.
- Where impacts occur within identified 'critical habitats' (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."*
- In addition, **legally protected areas or areas officially proposed for protection** are also to be considered as critical habitats in terms of the ADB SPS. Phou Ahyon is a proposed protected area and will be crossed by the transmission line. As such, despite lack of clarity under ADB SPS Safeguard 1, paragraph 30 does apply. *The borrower/client will meet the following requirements:*
  - i. Act in a manner consistent with defined protected area management plans.*
  - ii. Consult protected area sponsors and managers, local communities, and other key stakeholders on the proposed project.*
  - iii. Implement additional programs, as appropriate, to promote and enhance the conservation aims of the protected*

## 2. INTRODUCTION

### 2.1 Purpose and Scope of this Report

This report presents the Critical Habitat Assessment (“CHA”) for the approximately 600-megawatt (“MW”) Monsoon Windfarm (the “Project”) in the Lao People’s Democratic Republic (“Laos”). This CHA is prepared in support of the Project’s alignment with the applicable international standards, which include the Asian Development Bank’s Safeguards Policy Statement (“ADB SPS”).

This CHA builds on the Environmental and Social Impact Assessment (“ESIA”) undertaken for the Project (ERM, 2022), and aims to:

- Assess for the critical habitat-qualifying biodiversity features associated with the Project based on a review of Project information, scientific literature and biodiversity expert consultation;
- Present the implications of the CHA findings for the Project; and
- Identify the recommended next steps for the Project.

### 2.2 ADB Safeguard Policy Statement (2009)

The ADB SPS is a consolidated policy framework that presents ADB’s operational policies on mitigating and managing adverse environmental and social impacts, while serving to protect the rights of people that are likely to be affected or marginalized by the development process. Safeguard requirements pertaining to biodiversity and natural resource management are an integral consideration under Safeguard Requirement 1: Environment.

Of relevance to this CHA is the guidance provided by the ADB SPS on how to identify three categories of land and water areas based on its condition and biodiversity value. These categories include: (i) modified habitat; (ii) natural habitat; and (iii) critical habitat.

Distinguishing an area as natural habitat or modified habitat is based on the extent of human modification of the area, i.e. the condition of the area. Areas of natural habitat<sup>1</sup> comprise largely native plant and/or animal species, and where primary ecological functions are still relatively intact. In contrast, modified habitats<sup>2</sup> contain a large proportion of non-native species, and/or are substantially altered by human activity thereby disrupting an area’s primary ecological functions and species composition (e.g. urban areas, monoculture plantations).

Critical habitat<sup>3</sup> is defined in the ADB SPS as being a subset of modified and natural habitat. These are “*areas with high biodiversity value*”, that are associated with the presence of significant types of biodiversity and are identified irrespective of the condition of the area. Both areas of natural and modified habitats may contain globally important biodiversity values, thereby qualifying as critical habitat.

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<sup>1</sup> **Natural habitat** as defined in the ADB SPS (2009): “...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”.

<sup>2</sup> **Modified habitat** is not defined explicitly in the ADB SPS (2009), however, there is reference made to areas “...where the natural habitat has apparently been altered, often through the introduction of alien species of plants and animals, such as in agricultural areas...”. IFC Performance Standard 6 (IFC, 2012) defines modified habitat more substantively as comprising “...areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area’s primary ecological functions and species composition” and which “...may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands”.

<sup>3</sup> **Critical habitat** as defined in the ADB SPS (2009): “A subset of both natural and modified habitat that deserves particular attention. Critical habitat includes areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species; areas having special significance for endemic or restricted-range species; sites that are critical for the survival of migratory species; areas supporting globally significant concentrations or numbers of individuals of congregatory species; areas with unique assemblages of species or that are associated with key evolutionary processes or provide key ecosystem services; and areas having biodiversity of significant social, economic, or cultural importance to local communities.”

## 2.3 ADB SPS and IFC PS6 Requirements

There is a high degree of overlap between the biodiversity requirements listed in the ADB SPS and IFC PS6 (*International Finance Corporation: Performance Standard 6: 'Biodiversity Conservation and Sustainable Management of Living Natural Resources'*). This CHA assesses biodiversity features together under equivalent requirements and criteria where possible (e.g. ADB SPS Paragraph 28, and IFC PS6 critical habitat criteria I-V). Where it is aligned with ADB SPS objectives, ERM utilised the IFC PS6 and its associated Guidance Note 6 to assist with refining the CHA approach where needed.

## 2.4 Project Description

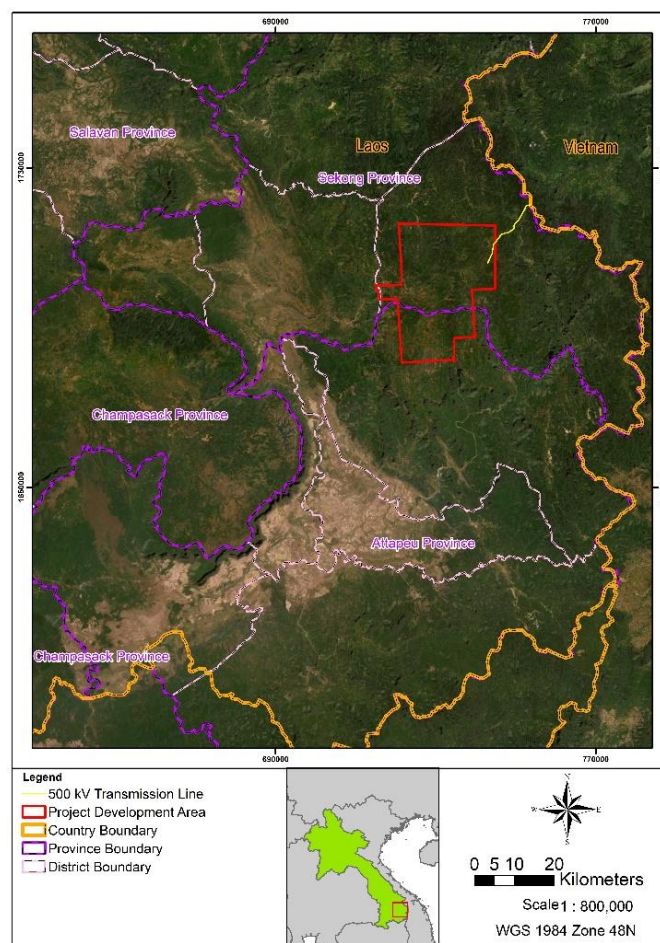
Impact Energy Asia Development ("IEAD" and/or "the Project Proponent") is developing the Wind Farm ("WF") Project in Dak Cheung District of Sekong Province and Sanxay District of Attapeu Province in Laos. The Project will connect to the grid in Viet Nam, and the generated electricity is expected to be sold to Viet Nam Electricity ("EVN").

The Project will construct the following permanent structures: (i) wind turbines; (ii) overhead conductor's/transmission cables between wind turbines; (iii) a 22 km 500 kV transmission line, which connects to the existing power grid in Viet Nam; (iv) site roads; and (v) access road improvement and upgrades.

Temporary site facilities constructed for the Project include concrete batching plants, stone crushing plants, construction laydown areas, worker accommodation areas, and spoil disposal areas.

The Project location is presented on the locality map in **Figure 2-1**.

**Figure 2-1: Project Location**



## 2.5 Ecological Context of the Project

The Project is located within the ‘**Southern Annamites Montane Rain Forests**’ ecoregion<sup>4</sup> (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)<sup>5</sup>. Project baseline biodiversity surveys conducted confirm that the study area does however harbour sensitive habitats and associated species (see **Section 7.4.3** and **7.4.4 of the ESIA**).

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<sup>4</sup> An **ecoregion**, as defined by 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.*”

<sup>5</sup> Areas with recognized high biodiversity values are listed in **ESIA Appendix G: Critical Habitat Analysis**.

### 3. APPROACH TO THE CRITICAL HABITAT ASSESSMENT

#### 3.1 Delineate the Ecologically Appropriate Area(s) of Analyses (EAAA)

A preliminary review of information on the region's ecology was carried out to define the Project's Ecologically Appropriate Area(s) of Analyses ("EAAA"), so as to determine the presence of each species or ecosystem that regularly occurs in the project's Area of Influence ("Aol") that may qualify as critical habitat. Two EAAAs were identified for volant (flying) species, and non-volant (non-flying) species, respectively.

Delineating an EAAA requires consideration of: (i) the likely geographic area or extent of anticipated project activities and impacts; (ii) the full extent of ecosystems that might be affected in any way; and (iii) any additional areas that have a functional role in supporting those ecosystems or their associated biodiversity (for example the limits of relevant river catchments or watersheds needed to support a wetland).

The spatial scope should be ecologically determined and defined, encompassing wider distributions of potentially affected biodiversity features and the ecological patterns, processes, and functions that are necessary for maintaining them throughout this distribution. EAAAs typically extend well beyond a Project's physical footprint and are usually anticipated to be greater than the Aol while considering individual species ecology. It is nevertheless permissible to have an EAAA that captures several species or to have a series of EAAAs depending on ecosystem or ecological factors.

##### 3.1.1 EAAA for Volant Species

For wind farm developments, identifying the Aol can be particularly challenging. This is because unlike other developments, the primary impacts arise from mortality or displacement of mainly volant species (e.g. bats and birds) that interact with the collision risk zone, created by the rotation of the turbine blades. In such circumstances, one way of understanding the potential Aol, and delineating an EAAA is to identify the likely suite of volant species likely to interact with the turbines. Migratory birds in particular trigger a requirement to include KBAs and/or IBAs (Important Bird Areas) up to tens of kilometres from the project if there is a likelihood of migratory flows through the site and towards or between KBAs and IBAs. In this instance, however the IBAs and/or KBAs within 50km of the project are designated primarily for their endemic and/or restricted range species.

Scottish Natural Heritage (now 'NatureScot') pioneered the concept of connectivity to understand potential effects on birds in relation to normal foraging and daily movement ranges<sup>6</sup>. Similarly, bat workers have identified that many species of bats may have large foraging ranges but rely on core sustenance zones to support colonies<sup>7</sup>. Although some species have the potential to forage over long distances, most will rarely travel beyond 10km on a daily basis<sup>8</sup>, becoming progressively more dispersed over the landscape where they do travel such distances. For volant species, an EAAA of a 10km buffer around the Project's concession area provides a reasonable ecological basis for analysis.

The EAAA for volant species (approximately 2,650 km) is presented on the map in **Figure 3-1**.

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<sup>6</sup> Pendlebury, C., Zisman, S., Walls, R., Sweeney, J., McLoughlin, E., Robinson, C., & Loughrey, J. (2011) Literature review to assess bird species connectivity to Special Protection Areas: Scottish Natural Heritage Commissioned Report No. 390.

<sup>7</sup> Collins, J. (Ed.). (2016) Bat surveys for professional ecologists: good practice guidelines. Bat Conservation Trust.

<sup>8</sup> Some examples of distances that volant species tend to travel can be found in the following document: Scottish Natural Heritage. (2016) Assessing Connectivity with Special Protection Areas (SPAs).

### 3.1.2 EAAA for Non-Volant Species

The EAAA for non-volant species was delineated based on an understanding of habitat connectivity and continuity in the wider landscape, the extent of the Project's potential impacts across the landscape, and the presence of distinct geographical barriers such as mountains, large rivers, and catchments.

Forest areas that occur in the ecoregion are widespread but fragmented across the landscape due to several ecological and anthropogenic factors. Numerous conservation-significant species such as the Annamite Muntjac, and Annamite Striped Rabbit are almost exclusively associated with wet evergreen forest, while other species such as passerine birds are strongly influenced by wet evergreen forest loss/degradation (W. Duckworth, pers. comm., October 13, 2021). This forest type mainly occurs in the eastern slopes of the mountain range located in Viet Nam due to the rain shadow effect in the Central Annamites.

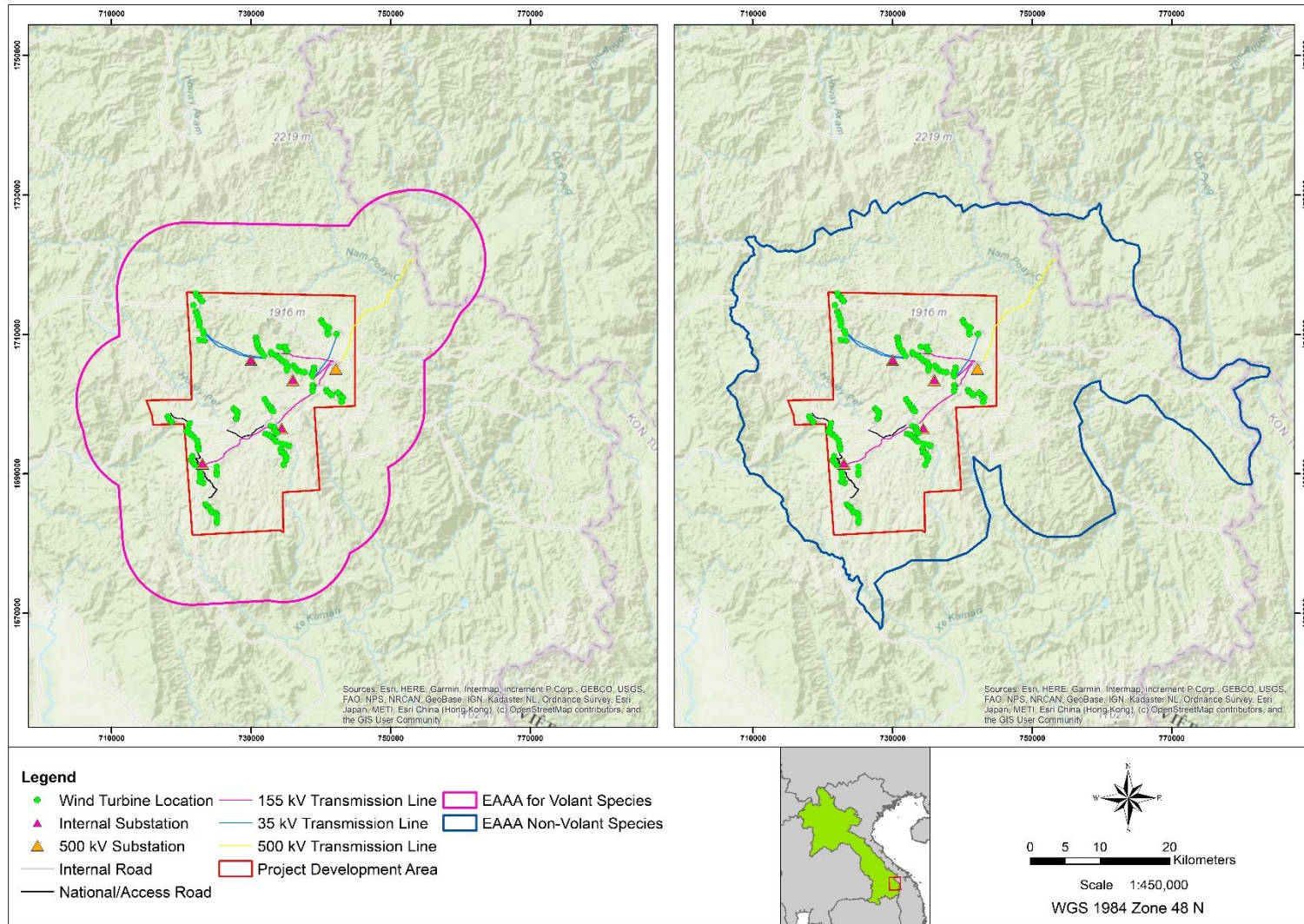
Other montane forest types in the landscape are also important as they are known to harbour significant endemic species. Given the widespread nature of these habitat types, and that impacts on such areas are likely to affect the Project's priority biodiversity features, a reasonable contiguous area of these habitats was therefore considered a sensible unit of analysis to capture species that regularly occur in the project's Aol. Limits of the EAAA were based on established areas of importance for the distribution of species and ecosystems, and/or the ecological patterns, processes, features and functions that are necessary for maintaining them. This was defined using the boundaries of the following areas of particular importance for biodiversity:

- **Northern boundary:** Phou Ahyon KBA, an area recognised for its biodiversity value, and delineated based on biodiversity elements which trigger the established biological criteria (International Union for Conservation of Nature: IUCN, 2016);
- **Southern and western boundaries:** Xekaman-Houay Ang-Houayvi watershed National Protection Forest Area, an area designated for the conservation of important national watersheds and a dense forested area; and
- **Southern and eastern boundary:** Southern Viet Nam Lowland Dry Forests and Southeastern Indochina Dry Evergreen Forests ecoregions, including areas representing the distribution of distinct species and natural plant community assemblages which differ from the Southern Annamites Montane Rain Forests ecoregion the Project is located within.

The EAAA for non-volant species (approximately 2,670 km<sup>2</sup>) is also presented on the map in **Figure 3-1**.

Appendix G: Critical Habitat Assessment

**Figure 3-1: Project’s EAAAs Defined for Volant Species (Left) and Non-Volant Species (Right)**





## 3.2 Review and verification of available information

A desk-based review of available information on the biodiversity features within the EAAA was undertaken to inform the CHA. This included a review of global biodiversity datasets, project-specific biodiversity information, and published and publicly available information (as needed).

A long list of biodiversity features (i.e. species, KBAs, and PAs), potentially present in the EAAAs was compiled from a spatial analysis of global datasets available through the Integrated Biodiversity Assessment Tool (IBAT). IBAT is a tool that draws from the IUCN (International Union for Conservation of Nature) Red List of Threatened Species, KBAs, and The World Database on Protected Areas (covering nationally and internationally recognised sites, including IUCN management categories I-VI, Ramsar Wetlands of International Importance and World Heritage sites).

Project biodiversity information was also reviewed to support the identification of biodiversity that may qualify the area as critical habitat and natural habitat. This included the following sources of information:

- **Local EIA Report** (English Translation), prepared by Innogreen Engineering Co., Ltd and Greener Consultant Co., Ltd, (Sep. 2020)
- **Rapid Ecological Assessment** at Monsoon Windfarm Power Project, Dakcheung District, prepared by Phiapalath, P., Khotpathoom, T., Soukhavong, M. and Phiravong, S., and Environmental Resource Management (ERM) (Feb. 2020)
- **Bird field survey** report on windfarm project at Dakchung District, Xekong Province, Laos, prepared by Xayyasith, S. and Khotpathoom, T. (Dec. 2020 to Nov. 2021)
- **Baseline Bat Assessment** 2021 Dry & Wet Seasons for the 600 MW Monsoon Wind Power Station, Xekong & Attapu Provinces, Lao PDR, prepared by Furey, N.M. and Douangboubpha, B. (Sep. 2021)
- **Mammal, Herpetofauna, and Plant Assessment** of the Monsoon Windfarm Power Project in Dak Cheung, Sekong Province (Final Draft Report), prepared by Phiapalath, P., Khotpathoom, T. and Souladeth, P. (Jan. 2022)

## 3.3 Assess biodiversity Values against ADB SPS Critical Habitat Criteria

### 3.3.1 Apply Critical Habitat Criteria and Thresholds

The biodiversity features likely to occur within the EAAAs were screened against the six (6) criteria provided in the ADB SPS paragraph 28 (footnote 5), and the ADB Environment Safeguards, 'A Good Practice Sourcebook', paragraph 151:

1. *"Habitat required for the survival of critically endangered or endangered species,*
2. *Areas with special significance for endemic or restricted-range species,*
3. *Sites that are critical for the survival of migratory species,*
4. *Areas supporting globally significant concentrations or numbers of individuals of congregatory species,*
5. *Areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services,*
6. *Areas with biodiversity that has significant social, cultural or economic importance to local communities"*

In addition, footnote 5 to Appendix 1 of the SPS states that "...*Critical habitats include those areas either legally protected or officially proposed for protection, such as areas that meet the criteria of the World Conservation Union classification, the Ramsar List of Wetlands of International Importance, and*

the United Nations Educational, Scientific, and Cultural Organization's world natural heritage sites...". Such areas were therefore also included in the selection criteria for critical habitats.

To refine the approach, the screening process was further informed by additional guidance provided in GN69 to GN97 of the IFC Guidance Note (GN) 6: 'Biodiversity Conservation and Sustainable Management of Living Natural Resources' (2019). **Table 3-1** details the ADB SPS critical habitat criteria and corresponding requirements under the IFC: PS6 critical habitat criteria.

The six (6) criteria are 'triggers' in that if an area of habitat meets any one of the qualifying criteria, it will be considered critical habitat irrespective of failing to meet any other criterion. The critical habitat criteria therefore have two distinctive characteristics:

- firstly, components of biodiversity are essentially assigned to only two levels of conservation significance, those that trigger critical habitat and those that do not; and
- secondly, each criterion is applied separately and not in combination, meaning that the scores are not cumulative, such that a species may be screened in more than one criterion [e.g. a Critically Endangered (CR) species that is also endemic or range restricted].

In the absence of reliable population data, proxies such as the proportion of a species' distribution in the area, have been used to inform the critical habitat determination for criteria 1-3. Appropriate population surrogates including Extent of Occurrence ("EoO"), range, or known sites of occurrence (mainly derived from the IUCN Red List data), were used to determine significance with respect to the global population (see IFC, 2019: Guidance Note 77). Expert opinion and professional knowledge were sought to inform a reasonable judgement of potential significance. Where there is uncertainty about the population, range and distribution of potentially occurring biodiversity features within the EAAAs, a precautionary approach has been applied, and the feature is retained for further assessment.

**Table 3-1: ADB SPS Critical Habitat Qualifying Criteria and Corresponding IFC PS6 Criteria**

| ADB SPS qualifying criteria for Critical habitat  | Alignment with IFC PS6  |   |
|---|---|---|
|   | Criteria  | Thresholds  |
| <b>Criterion 1:</b> Habitat required for the survival of critically endangered or endangered species. | Criterion 1: Habitat of significant importance to Critically Endangered (CR) and/or Endangered (EN) species.          | (a) Areas that support globally-important concentrations of an IUCN Red-listed EN or CR species (0.5 % of the global population <b>AND</b> 5 reproductive units of a CR or EN species);<br>(b) Areas that support globally-important concentrations of an IUCN Red-listed VU species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in (a).<br>(c) As appropriate, areas containing nationally/regionally-important concentrations of an IUCN Red-listed EN or CR species. |
| <b>Criterion 2:</b> Areas with special significance for endemic or restricted-range species.          | Criterion 2: Habitat of significant importance to endemic and/or restricted-range species.                            | (a) Areas that regularly hold $\geq 10$ % of the global population size <b>AND</b> $\geq 10$ reproductive units of a species.   |
| <b>Criterion 3:</b> Sites that are critical for the survival of migratory species.                    | Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species. | (a) Areas known to sustain, on a cyclical or otherwise regular basis, $\geq 1$ % of the global population of a migratory or congregatory species at any point of the species' lifecycle.  |

| ADB SPS qualifying criteria for Critical habitat   | Alignment with IFC PS6   |   |
|--|--|---|
|  | Criteria   | Thresholds  |
| <b>Criterion 4:</b> Areas supporting globally significant concentrations or numbers of individuals of congregatory species.  |  | (b) Areas that predictably support $\geq 10\%$ of the global population of a species during periods of environmental stress.  |
| <b>Criterion 5:</b> Areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services.  | Criterion 4: Highly threatened and/or unique ecosystems.   | (a) Areas representing $\geq 5\%$ of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.<br><br>(b) Other areas, not yet assessed by IUCN, but determined to be of high priority for conservation by regional or national systematic conservation planning.  |
|  | Criterion 5: Areas associated with key evolutionary processes.   | No set thresholds.  |
|  | GN6 (IFC, 2007) <sup>9</sup> , G18. vii) areas recognized as particularly important for the protection of ecosystem services (such as aquifer protection).   | Priority ecosystem services are considered to be two-fold: (i) those services on which project operations are most likely to have an impact and, therefore, which result in adverse impacts to Affected Communities; and/or (ii) those services on which the project is directly dependent for its operations (e.g., water).<br><br>When Affected Communities are likely to be impacted, they should participate in the determination of priority ecosystem services  |
| <b>Criterion 6:</b> Areas with biodiversity that has significant social, cultural or economic importance to local communities.   | GN6 (IFC, 2007), G18. vi) areas that include biodiversity that has significant social, cultural or economic importance to local communities.   | No set thresholds.  |
| <b>Additional:</b> legally protected areas or areas officially proposed for protection (such as areas that meet the criteria of the World Conservation Union classification, the Ramsar List of Wetlands of International Importance, and the United Nations Educational, Scientific, and Cultural Organization's world natural heritage sites). | IFC PS6, line 20: In circumstances where a proposed project is located within a legally protected area or an internationally recognized area, the client will meet the requirements for critical habitats. | Legally protected area: IFC PS6 recognizes legally protected areas that meet the IUCN definition: "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values." This includes areas proposed by governments for such designation.<br><br>Internationally recognised area: IFC PS6 recognises internationally recognised areas as being "Exclusively defined as UNESCO Natural World Heritage Sites, UNESCO Man and the |

<sup>9</sup> GN6 (IFC, 31 July 2007). Biodiversity Conservation and Sustainable Natural Resource Management. This Guidance Note corresponds to IFC Performance Standard 6: 'Biodiversity Conservation and Sustainable Management of Living Natural Resources'

| ADB SPS qualifying criteria for Critical habitat | Alignment with IFC PS6 |  |
|--|------------------------|--|
|  | Criteria               | Thresholds   |
|  |                        | <i>Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Convention on Wetlands of International Importance (the Ramsar Convention)</i> ". |

### 3.3.2 Consult with Specialists to Verify Results

Since the determination of critical habitat 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. The expert stakeholders consulted are listed in **Table 3-2** below, with details of the consultation provided in **Appendix A**.

**Table 3-2: Key Experts Consulted**

| No. | Name             | Designation  | Expertise   |
|-----|------------------|--|---|
| 1.  | Andrew Tilker    | <ul style="list-style-type: none"> <li>■ Chair of the IUCN SSC Large-antlered Muntjac Working Group</li> <li>■ Doctoral student at Leibniz Institute for Zoo and Wildlife Research</li> </ul>  | Ecology and conservation of threatened Annamite endemic species                   |
| 2.  | Truong Nguyen    | <ul style="list-style-type: none"> <li>■ Professor, The Institute of Ecology and Biological Resources, Viet Nam Academy of Science and Technology</li> </ul>   | Ecology of reptiles and amphibians in Southeast Asia                              |
| 3.  | Maurice Kottelat | <ul style="list-style-type: none"> <li>■ Commissioner, International Commission on Zoological Nomenclature</li> <li>■ Honorary Research Associate, Lee Kong Chian Natural History Museum, National University of Singapore</li> </ul>    | Eurasian freshwater fish  |
| 4.  | Will Duckworth   | <ul style="list-style-type: none"> <li>■ Species Advisor, Asian Species Action Partnership</li> <li>■ Member of 14 IUCN SSC Species Specialist Groups</li> <li>■ IUCN SSC Red List Authority Coordinator for Small Carnivores</li> </ul> | Mammals and birds of Lao PDR, and across Southeast Asia<br>KBAs in Southeast Asia |
| 5.  | Robert Timmins   | <ul style="list-style-type: none"> <li>■ Species Advisor</li> </ul>  | Mammals of Lao PDR, and across Southeast Asia                                     |

### 3.4 Conduct Field Surveys to Verify Potential High Priority Species

Baseline field surveys were used to verify the presence, distribution and/or abundance of the potential high priority species that were initially screened based on desk-based information, expert consultation and opinion, and professional knowledge. These field surveys were designed to target the potential high priority species in order to validate findings from desk-based analysis and identify any additional biodiversity features likely to qualify areas as critical habitat. Further details of the baseline survey methodology and findings are detailed in **Section 7.4 of the ESIA**.

While a number of fish species have been identified as potentially critical habitat-qualifying species, field surveys have not been recommended for this animal group as there are no Lao based experts with expertise or sufficient skills to identify this rare and under-surveyed group of endemic and restricted range fish species. Covid-19 travel restrictions also prevented the deployment of external international experts into Lao. Options for eDNA sampling were also discussed with NatureMetrics,

but the eDNA catalogue for many of Lao's endemic fish species is poorly developed. The Project will therefore take a pragmatic approach to manage risks to these fish species by undertaking expert consultation to help determine species presence and significance in the EAAA for non-volant species. Where data is equivocal, species qualifying the Project as critical habitat will be screened-in in accordance with the 'precautionary principle'.

### 3.5 Identify Natural Habitat and Modified Habitat

Remote sensing and field investigations were undertaken to identify the distribution of land cover types within the Project Area and EAAAs. Remote sensing classification methods using Copernicus sentinel-2 satellite imagery (ESA, 2021) was first employed to generate a land cover map. Indices such as the Normalized Difference Vegetation Index (NDVI), water indices and Bare Ground Index (BGI) were also inspected to support the mapping process. To help further categorise different types of forest areas in the EAAAs, elevation information was used to refine the categorisation of forest areas based on the approach in Stibig, H-J. and Beuchle (2003). All forest labelled pixels between elevations of 500m-1500m AMSL were reassigned as wet evergreen forest. Evergreen forest areas were subsequently classified as montane forest (>1000m elevation), and wet evergreen forest (<1000m elevation). This remotely sensed data was validated with ground-truthed data at pre-selected field survey points in each of the main turbine areas and the transmission line corridor, supplemented by information from available national land cover maps.

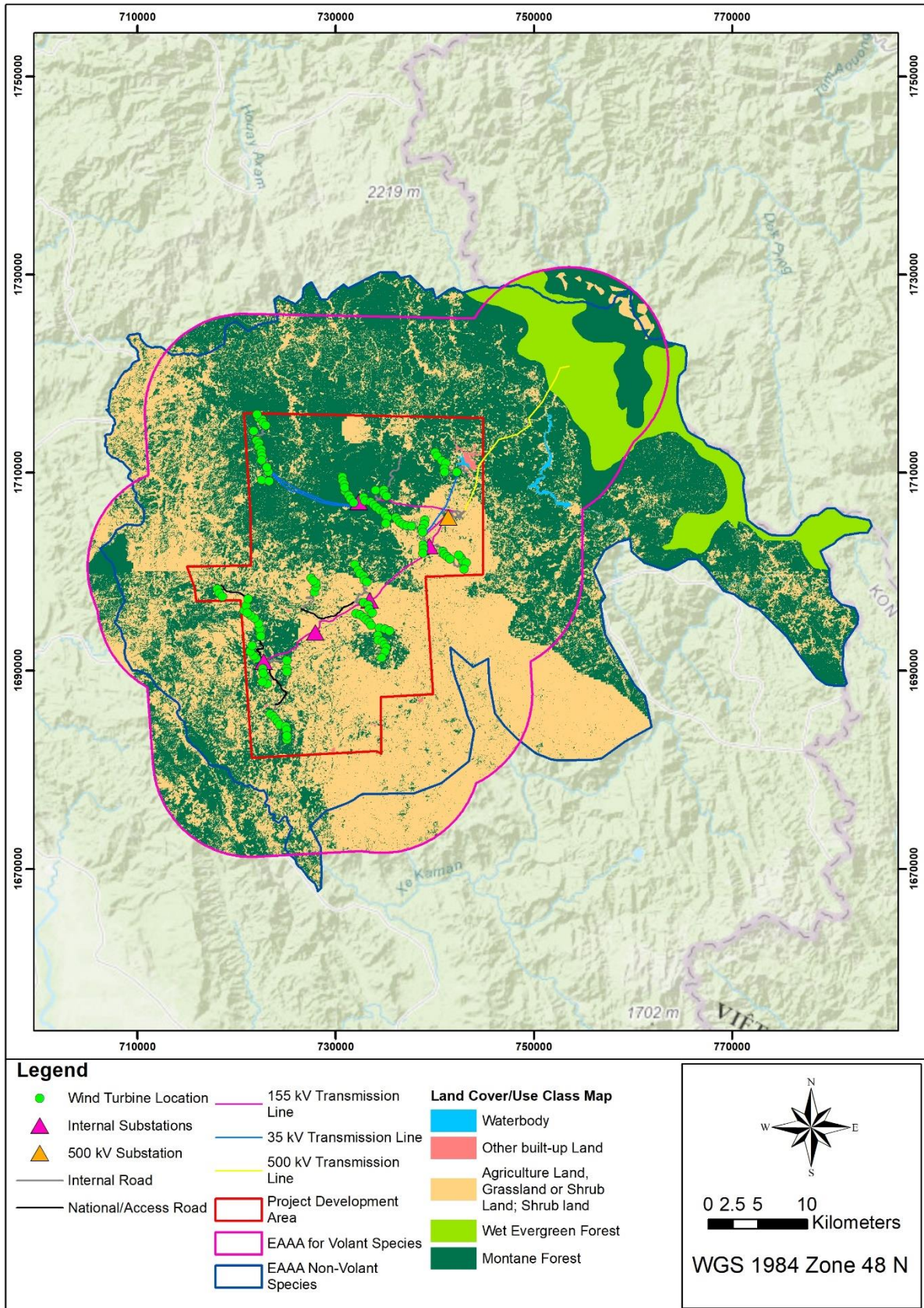
This produced a land cover map with the following five (5) categories (see **Figure 3-2**):

- Montane Forest;
- Wet Evergreen Forest;
- Agriculture Land, Grassland or Shrubland (mosaic characterised by shifting cultivation);
- Waterbodies; and
- Built-up and Related Areas (infrastructure).

The reader is also referred to **Section 7.4.3 of the ESIA** for the detailed baseline land cover and land use descriptions.

*Note that since no universal thresholds exist for classifying a habitat as natural habitat or modified habitat, expert analysis was relied on to assign the derived land cover categories from the mapping exercise described above as natural or modified habitat.*

Figure 3-2: Land Cover / Land use Types Found in the EAAAs



### 3.6 Identify Critical Habitat

In accordance with the ADP SPS (2009) guidance on CHA, critical habitats will be defined at the scale of the EAAAs, such that an entire EAAA would qualify as critical habitat, or not. This applies to the EAAAs identified for volant and non-volant species.

An approach has been taken towards also identifying the specific individual habitats or ecosystems considered critical for supporting key biodiversity (such as CR/EN, endemic, migrant species) and within which common environmental impact and management issues are defined relative to other adjacent areas.

## 4. FINDINGS OF THE CRITICAL HABITAT ASSESSMENT

### 4.1 Criteria 1-4

Criteria 1-4 of the ADB SBS deal primarily with species that are of conservation importance or concern (i.e. CR/EN status, endemic or restricted-range species, significant concentrations of congregatory species), the presence of which may typically qualify habitats as 'critical habitat'.

Initially, species potential occurrence (or likelihood of occurrence) was assessed at a desktop level based on available information and supplemented by the findings of the biodiversity baseline assessment (refer to **Section 7.4 of the ESIA**). The habitat requirements/preferences for each plant/animal species of conservation concern were reviewed (based on the available literature) and was then compared against the known species distributions and habitat types documented for the Project area and EAAAs (see **Section 2.5**) in order to estimate the potential occurrence of each priority species identified, using the matrix below in **Table 4-1**.

**Table 4-1: Generic Matrix used to Estimate Species Potential Occurrence Based on Documented Habitat Preferences and Species Distributions**

|                      |   | SPECIES HABITAT REQUIREMENTS / PREFERENCES |             |                               |
|----------------------|---|--|-------------|-------------------------------|
|                      |   | Fully met                                  | Largely met | Not met / Unsuitable          |
| SPECIES DISTRIBUTION | Habitat occurs within documented species geographical/altitudinal range         | Highly likely                              | Likely      | Unlikely                      |
|                      | Habitat occurs on the edge of documented species geographical/altitudinal range | Possible                                   | Possible    | Unlikely                      |
|                      | Habitat occurs outside of documented species geographical/altitudinal range     | Unlikely                                   | Unlikely    | Highly unlikely or Improbable |

**Table 4-2** (below) provides a summary of the critical habitat-qualifying species of fauna and flora. A total of 26 (twenty six) species that potentially qualified the Project habitats as critical habitat were considered in the assessment (8 species of mammals, 3 species of reptiles/amphibians, 3 species of birds, 2 fish species and 10 species of plants).

**Appendix A** provides the justification for the likelihood of assessment undertaken for each species. Species that did not qualify for further assessment (i.e. if available information clearly indicated that the species will not meet any of the critical habitat criteria or thresholds) were excluded from the assessment and are listed in **Appendix B**.



**Table 4-2: Critical Habitat-qualifying Species of Fauna & Flora**

| S/N  | Common Name                  | Scientific Name                  | Status: IUCN Red Data List <sup>a</sup> | Potential Occurrence in the EAAA | Critical habitat Qualifying Criteria (ADB SPS) | Associated Habitat  |
|--|------------------------------|----------------------------------|---|----------------------------------|--|---|
| <b>Mammals</b>                                 |                              |                                  |   |                                  |  |   |
| 1  | Bengal Slow Loris            | <i>Nycticebus bengalensis</i>    | EN                                      | Confirmed                        | Criterion 1                                    | Montane Forest, Wet Evergreen Forest (including secondary and degraded habitat) |
| 2  | Pygmy Slow Loris             | <i>Nycticebus pygmaeus</i>       | EN                                      | Confirmed                        | Criterion 1                                    | Montane Forest, Wet Evergreen Forest (including secondary and degraded habitat) |
| 3  | Northern Buff-cheeked gibbon | <i>Nomascus annamensis</i>       | EN                                      | Confirmed                        | Criterion 1                                    | Montane Forest, Wet Evergreen Forest  |
| 4  | Red-shanked Douc Langur      | <i>Pygathrix nemaeus</i>         | CR, range-restricted                    | Confirmed                        | Criterion 1<br>Criterion 2                     | Montane Forest, Wet Evergreen Forest (including secondary habitat)              |
| 5  | Owston's Civet               | <i>Chrotogale owstoni</i>        | EN                                      | Confirmed                        | Criterion 1                                    | Montane Forest, Wet Evergreen Forest  |
| 6  | Large-antlered Muntjac       | <i>Muntiacus vuquangensis</i>    | CR, range-restricted                    | Highly likely                    | Criterion 1<br>Criterion 2                     | Montane Forest, Wet Evergreen Forest  |
| 7  | Annamite Striped Rabbit      | <i>Nesolagus timminsi</i>        | EN                                      | Possible                         | Criterion 1                                    | Wet Evergreen Forest  |
| 8  | Silver langur <sup>10</sup>  | <i>Trachypitecus sp.</i>         | EN                                      | Possible                         | Criterion 1                                    | Wet Evergreen Forest  |
| <b>Herpetofauna: Reptiles &amp; Amphibians</b> |                              |                                  |   |                                  |  |   |
| 1  | Maason Horned Toad           | <i>Xenophrys cf maasonensis</i>  | NE, range-restricted                    | Confirmed                        | Criterion 2 possibly                           | Unknown: potentially 'new to science' First record for Lao PDR <sup>11</sup>    |
| 2  | Yellow-eyed spadefoot toad   | <i>Leptobrachium xanthops</i>    | EN range-restricted                     | Likely                           | Criterion 1 possibly<br>Criterion 2 possibly   | Wet Evergreen Forest  |
| 3  | Three horned-scaled pitviper | <i>Protobothrops sieversorum</i> | EN range-restricted                     | Likely                           | Criterion 1 possibly                           | Wet Evergreen Forest  |

<sup>10</sup> There could be two similar silver langur species in the Project area, namely *T. germaini* and *T. margarita*. Interviews will not be a reliable source to precisely identify the species. In the face of uncertainty, *Trachypitecus spec.* will be used. However, criterion 1 is fulfilled by both species.

<sup>11</sup> Herpetologist that conducted the field surveys state that *X. maasonensis* is a species complex, and the individual found will certainly be split as a new species in the near future.

| S/N   | Common Name                   | Scientific Name                    | Status: IUCN Red Data List <sup>a</sup> | Potential Occurrence in the EAAA | Critical habitat Qualifying Criteria (ADB SPS) | Associated Habitat  |
|---|-------------------------------|------------------------------------|---|----------------------------------|--|---|
| <b>Avifauna: Birds</b>  |                               |                                    |   |                                  |  |   |
| 1   | Vietnamese Crested Argus      | <i>Rheinardia ocellata</i>         | CR                                      | Confirmed                        | Criterion 1                                    | Montane Forest, Wet Evergreen Forest (including secondary and degraded forest)              |
| 2   | Black-crowned Barwing         | <i>Actinodura sodangorum</i>       | NT, endemic, range-restricted           | Confirmed                        | Criterion 2                                    | Montane Forest, Wet Evergreen Forest (natural and modified), shifting cultivation and scrub |
| 3   | Chestnut-eared Laughingthrush | <i>Ianthocincla konkakinhensis</i> | VU, range-restricted                    | Possible                         | Criterion 2                                    | Montane Forest  |
| <b>Avifauna: Bats</b>   |                               |                                    |   |                                  |  |   |
| n/a<br>(Species screened are not CR/EN and typically not endemic or range-restricted) |                               |                                    |   |                                  |  |   |
| <b>Fish</b>   |                               |                                    |   |                                  |  |   |
| 1   | -                             | <i>Schistura imitator</i>          | LC, endemic, range-restricted           | Possible                         | Possibly Criterion 2                           | Waterbodies (rivers & streams)  |
| 2   | -                             | <i>Schistura clatrata</i>          | LC, endemic, range-restricted           | Possible                         | Possibly Criterion 2                           | Waterbodies (rivers & streams)  |
| <b>Plants</b>   |                               |                                    |   |                                  |  |   |
| 1   |                               | <i>Camellia sp.</i>                | NE potentially 'new to science'         | Confirmed                        | Criterion 2 possibly                           | Unknown: potentially 'new to science'   |
| 2   |                               | <i>Garcinia sp.</i>                |   |                                  |  |   |
| 3   |                               | <i>Lasianthus sp. 1</i>            |   |                                  |  |   |
| 4   |                               | <i>Lasianthus sp. 2</i>            |   |                                  |  |   |
| 5   |                               | <i>Machilus sp.</i>                |   |                                  |  |   |
| 6   |                               | <i>Melastoma sp.</i>               |   |                                  |  |   |
| 7   |                               | <i>Neolitsea sp.</i>               |   |                                  |  |   |
| 8   |                               | <i>Polyosma sp.1</i>               |   |                                  |  |   |
| 9   |                               | <i>Polyosma sp.2</i>               |   |                                  |  |   |
| 10  |                               | <i>Smilax sp.</i>                  |   |                                  |  |   |

**Key to table:**

<sup>a</sup>: **IUCN Global Red List status:** **CR** = Critically Endangered; **EN** = Endangered; **VU** = Vulnerable; **NT** = Near Threatened; **LC** = Least Concern; **DD** = Data Deficient; **NE** = Not Evaluated. *Note that there is no national Red List available for Laos.*

### Criterion 1: Habitat required for the survival of critically endangered or endangered species

11 out of these 26 candidate species are identified as qualifying as critical habitat under the ADB SPS qualifying criteria 1 for critical habitat (i.e. based on the associated CR or EN species threat status)<sup>12</sup> (refer to **Table 3-2** for critical habitat qualifying criteria and **Table 4-2** for the species summary table), and these include:

- all 8 species of CR/EN candidate mammal species assessed (which includes 7 confirmed species and 1 species that could possibly occur in the non-volant species EAAA);
- 2 EN reptile species that are likely to occur in the non-volant species EAAA (Yellow-eyed spadefoot toad and three horned-scaled pitviper); and
- 1 CR bird species confirmed for the Project area and volant species EAAA (Vietnamese Crested Argus, *Rheinardia ocellata*); and

Given that both volant and non-volant species (CR/EN threat status) have been identified as occurring or with a high probability of potentially occurring in the EAAAs defined for the Project, both the volant and non-volant species EAAAs essentially qualify as critical habitat by definition in terms of the ADB SPS.

Associated habitat types identified for supporting these species include the following<sup>13</sup>:

- Montane Forest: primary and secondary forest (including modified/degraded forest);
- Wet Evergreen Forest: primary and secondary forest (including modified/degraded forest);
- Waterbodies (forested streams).

### Criterion 2: Areas with special significance for endemic or restricted-range species

18 out of these 26 candidate species are identified as triggering critical habitat under the ADB SPS qualifying criteria 2 for critical habitat (i.e. based on the associated species being endemics and/or range-restricted fauna)<sup>14</sup> (refer to **Table 3-2** for critical habitat qualifying criteria and **Table 4-2** for the species summary table), and these include:

- 2 species of range-restricted mammals assessed (which includes 1 confirmed species and 1 species that is highly likely to occur in the non-volant species EAAA);
- 2 species of range-restricted reptiles (1 confirmed and first records for Lao PDR, 1 likely occurring in the Project area);
- 2 endemic/range-restricted bird species (Black-crowned Barwing and Chestnut-eared Laughingthrush) were identified;
- 2 species of range-restricted freshwater fish that may possibly occur in the EAAAs; and
- 10 species of plants confirmed for the Project area and which could potentially be 'new to science' and first records for Lao PDR (note that these species were included as their endemism and range restrictions are unknown at this stage but may be significant to the project).

<sup>12</sup> For the detailed rationale as to why each species has been considered for Criterion 1 see Appendix A

<sup>13</sup> This is based on confirmed or known/documentated CR/EN species associations or affinities to the mapped habitat types.

<sup>14</sup> For the detailed rationale as to why each species has been considered for Criterion 2 see Appendix A.

Endemic and/or range restricted mammal, reptile, amphibian, fish, bird and plant species have been identified and associated with the volant and non-volant species EAAAs, which qualify as critical habitat in terms of criterion 2.

Typical habitat types identified in the project area as supporting key endemic and/or range-restricted species of flora/fauna included<sup>15</sup>:

- Montane Forest: primary and secondary forest;
- Wet Evergreen Forest: primary and secondary forest (natural and modified/degraded);
- Shifting cultivation and scrub (for Black-crowned Barwing); and
- Waterbodies (forested streams, rivers).

### Criterion 3: Sites that are critical for the survival of migratory species

The requirements/thresholds for criterion 3 (areas critical for migratory species) have not been met in terms of the key species identified.<sup>16</sup>

### Criterion 4: Areas supporting globally significant concentrations or numbers of individuals of congregatory species

The requirements/thresholds for criterion 4 (areas critical for congregatory species) have not been met in terms of the key species identified.<sup>17</sup>

## 4.2 Criterion 5: Unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services

The Southern Annamites Montane Rain Forests (IM0152) ecoregion represents a large extent of lowland to montane evergreen forests and the conservation status of this ecoregion is 'Vulnerable' (VU) due to wide-scale forest conversion to agriculture and continues to be subject to significant land degradation activities. Nevertheless, this ecoregion encompasses a relatively large area estimated to be 46,620 km<sup>2</sup> and spans the trans-frontier area across Laos and Viet Nam. The habitat types within the EAAAs are therefore widespread nationally throughout Laos and Viet Nam and are not considered to be particularly unique or contain species assemblages that would be of particularly high conservation significance or with a high level of endemism.

The Project area is unlikely to comprise highly unique ecosystems or containing unique species assemblages that would otherwise qualify the Project as containing critical habitat in terms of criterion 5.

Although the Project is located within the Southern Annamites Montane Rain Forests (IM0152) ecoregion, the species assessments did not identify any species subpopulations known to be phylogenetically or morpho-genetically distinct that rely primarily on the project site and EAAAs. However, as previously discussed, the broader landscape contains a number of KBAs specifically designated for endemic species, which overlap with or are located within the EAAAs, including: Phou Kathong KBA and Upper Xe Kaman KBA in the south; Phou Ahyon KBA in the northeast; Song Thanh KBA and Ngoc Linh in east; and Dakchung KBA located in the EAAA. The EAAAs also overlap with the southern extremity of the Kon Tum Plateau Endemic Bird Area (EBA), identified as containing

<sup>15</sup> This is based on confirmed or known/documented CR/EN species associations or affinities to the mapped habitat types.

<sup>16</sup> For the detailed rationale as to why no species has been considered for Criterion 3 see Appendix B.

<sup>17</sup> For the detailed rationale as to why no species has been considered for Criterion 4 see Appendix B.

numerous range-restricted bird species. *There are also several species of plants and amphibians that were recorded during field surveys that may potentially be 'new to science', however their status remains to be confirmed.*

As a result of the potentially high level of animal and plant endemism associated with the ecoregion, it is considered likely that the Project Area and both the volant and non-volant species EAAAs may be important in the conservation of key evolutionary processes, and thus triggering qualifying criterion 5 for critical habitat.

Forest ecosystems are known to provide a range of important ecosystem goods and services which society values; and in broad terms these typically include the following (adapted from Hassan *et al.* (Eds), 2005<sup>18</sup>):

- *Regulating and Supporting Services*: including the role of trees and soils in forests stabilising and regulating global and local climate, disease regulation, water purification, controlling soil erosion, mitigating floods, soil formation and nutrient cycling, pollination and supporting habitat for maintaining biodiversity;
- *Provisioning Services*: includes the role of forest components (biotic and abiotic) in the provision of food for animals and humans, sustaining livelihoods through the provision of 'clean' water, fuel, timber, medicinal plants, etc.; and
- *Cultural and Tourism Services*: importance as potential educational, research, aesthetically important sites and their use for recreation and tourism, including cultural heritage values attached to forests.

The specifics of course vary from site to site and depend on (amongst other factors), the status, structural and compositional characteristics, habitat quality, use by faunal species, extent, connectivity, local use context, position relative to other important sites and management of the forest ecosystem in question. Some services may be globally relevant, whilst other ecosystem services provided by the forests in the EAAA are likely to be largely of local importance, possibly of regional significance. These are described as follows:

- The role of forests in general in combating climate change is considered to be a service rendered as important on both the local and global scale, in light of the current climate-change crisis;
- National Protected Forest in the area is also designated as a protected area to protect the local catchment areas, which signifies the potential importance of the forests in the watershed in enhancing water quality and regulating stream flows, which likely has a strong influence on water resources lower down in the catchment; and
- The forest ecosystem therefore presents a potentially significant source of provisioning materials and goods for sustaining local livelihoods and this is highlighted in findings of the social assessment component of the ESIA (see **Section 8 of the ESIA**, specifically sub-section 8.5.3 'Economic Displacement and Impacts to Livelihoods'), where the social assessment team identified several concerns raised by the local villager's, one being the potential impact of the project on access to the forest as an important source of food, firewood, medicinal species and valuable forest products that can be sold to buyers from nearby cities and Viet Nam

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<sup>18</sup> Hassan, R, Scholes, R, and Ash, N., 2005. Ecosystems and human well-being: current state and trends: findings of the Condition and Trends Working Group. Part of the Millenium Ecosystems Assessment series, 2005.

Given the potential for the forest ecosystems to provide key ecosystem services at both a local/regional and global scale, which are also considered ‘Priority ecosystem services’ as per the definition provided in IFC PS6 for this criterion (*as impacts to these ecosystems may result in adverse impacts to Affected Communities, in terms of undermining cultural values and conflicting with subsistence resource needs*), the evergreen forest ecosystems are considered to qualify both the volant and non-volant species EAAAs as critical habitat under criterion 5 from the perspective of key ecosystem services.

#### 4.3 Criterion 6: Areas with significant social, cultural or economic importance

The forest habitats have been flagged as being of potential significance from an economic and cultural/heritage perspective. One of the concerns of the local villager’s being the potential impact of the project on access to the forest as an important source of food, firewood and valuable forest products that can be sold to buyers from nearby cities and Viet Nam. The forest ecosystems at the project locality therefore present a potentially significant source of provisioning materials and goods for sustaining the livelihoods of local villagers (see **Section 8 of the ESIA**, specifically sub-section 8.5.3 ‘Economic Displacement and Impacts to Livelihoods’).

The role of ‘sacred forest’ sites in local culture and community’s beliefs and practices was identified during the social assessment and relevant community/stakeholder engagement process, during which local villagers identified a ‘Potential Intangible Cultural Heritage Area’ in Phou Koungking to the south-west. After further investigation, the cultural importance appears to be tied to cemeteries (burial grounds) rather than the actual forest associated with the national protected area (Phou Kathong) and associated biodiversity (the cemeteries just so happen to be located within forest areas). See also **Section 8 of the ESIA**, specifically sub-section 8.5.8 ‘Impact on Cultural Heritage’ for further information.

Strictly speaking then, it was decided that the forest habitat does not qualify the EAAAs as ‘critical habitat’ in terms of criterion 6, however other critical habitat qualifying criteria do apply, as discussed in **Sections 3.1** and **3.2**.

#### 4.4 Legally Protected Areas and Areas with Recognized High Biodiversity Values

In addition to the six qualifying criteria for identifying areas as comprising critical habitat, legally protected areas or areas officially proposed for protection are also included as qualifying the EAAAs as critical habitat in terms of the ADB SPS.

Two legally protected areas and a total of six areas with recognised high biodiversity values overlap with, or are located within, the EAAAs. These are summarised in **Table 4-3** and shown in **Figure 4-1**.

Note however that no project infrastructure is planned to be located within the 2 legally protected areas, and therefore the requirements under ADB SPS Safeguard 1, paragraph 30 do not apply.

**Table 4-3: Legally Protected Areas, and Areas with Recognized High Biodiversity Values in the EAAAs**

| No. | Name         | PA | KBA | IBA | AZE | Overlap with EAAAs? | Overlap with Project footprint? |
|-----|--------------|----|-----|-----|-----|---------------------|---------------------------------|
| 1   | Song Thanh   | Y  | Y   |     |     | Yes                 | No                              |
| 2   | Phou Kathong | Y  | Y   |     |     | Yes                 | No                              |

| No. | Name             | PA              | KBA | IBA | AZE | Overlap with EAAAs? | Overlap with Project footprint? |
|-----|------------------|-----------------|-----|-----|-----|---------------------|---------------------------------|
| 3   | Dakchung Plateau |                 | Y   | Y   |     | Yes                 | Yes                             |
| 4   | Phou Ahyon       | Y <sup>19</sup> | Y   | Y   | Y   | Yes                 | Yes                             |
| 5   | Ngoc Linh        |                 | Y   | Y   | Y   | Yes                 | No                              |
| 6   | Upper Xe Kaman   |                 | Y   | Y   |     | Yes                 | No                              |

Source: IBAT (2020)

#### 4.4.1 Legally Protected Areas

There are two legally protected areas, **Song Thanh Nature Reserve** and **Phou Kathong**, which overlap with the EAAAs for both volant and non-volant species. Phou Ahyon also overlaps with the EAAAs for both volant and non-volant species. It is a proposed protected area. All protected areas contain sufficient concentrations of key species to qualify the EAAAs as critical habitat.

Song Thanh Nature Reserve located on the Laos-Viet Nam border, that overlaps with the eastern boundary of the EAAA for non-volant species is not officially designated an IUCN management category, however it is known to be an important area of the Annamite Ranges, comprising one of the most extensive contiguous forests in Viet Nam. It reportedly contains a good population of the critical habitat-qualifying Vietnamese Crested Argus *Rheinardia ocellata* which is CR globally (Vu and Van Tran, 2020), and therefore qualifies the Reserve as comprising critical habitat.

Phou Kathong has been identified as a protected area, situated to the south-west and overlapping with the EAAA for volant species. Whilst the site is not officially designated an IUCN management category, from the perspective of mobile flying (volant) species the area is known to provide habitat supporting several key bird species of conservation importance. **Song Thanh** (north-east) overlaps with the project EAAAs for volant and non-volant species and qualifies both EAAAs as critical habitat. **Phou Kathong** (south-west) overlaps only with the volant species EAAA and qualifies this EAAA as critical habitat. **Phou Ahyon** overlaps with the project EAAAs for volant and non-volant species and qualifies both EAAAs as critical habitat. It is also classified as an IBA, KBA and AZE site.

#### 4.4.2 Areas with Recognized High Biodiversity Values

The area is situated within one of the designated biodiversity corridors of the ADB-funded Biodiversity Conservation Corridor Project (“BCCP”), in recognition of its importance in maintaining the forest ecosystem connectivity between Xe Sap National Protected Area (“PA”) in Sekong province, and Dong Ampham NPA in Attapeu province (ADB, 2021).

Six areas with recognized high biodiversity values are located within or overlap with the EAAAs. These include Song Thanh, Phou Kathong, Dakchung Plateau, Phou Ahyon, Ngoc Linh, and Upper Xe Kaman (**Table 4-3**). These are KBAs that are nationally important sites for, and/or hold globally important concentrations of, certain bird, mammal, plant, amphibian, and reptile species. The transmission line planned in the north-east towards then Viet Nam border comes within proximity to Song Thanh Nature Reserve and PA (within a minimum distance of approximately 1.6 km). The EAAA for volant species also overlaps with Phou Kathong PA to the south-west. Both PAs are discussed under **Section 3.4.1**.

<sup>19</sup> Phou Ahyon is a proposed protected area.

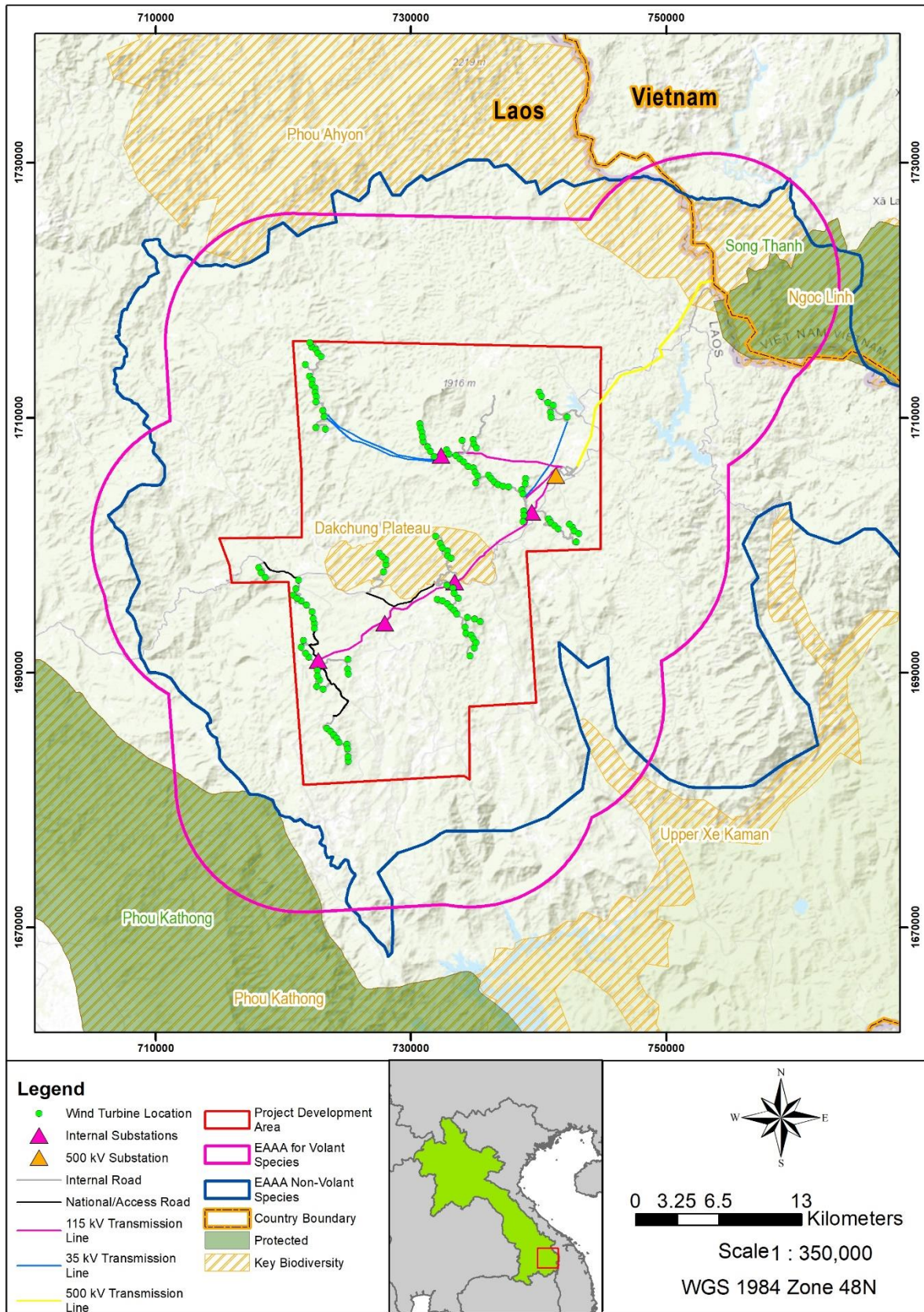
Dakchung Plateau, Phou Ahyon, and Ngoc Linh KBAs contain critical habitat-qualifying species, and therefore qualify the Project as being located in an area of critical habitat. Noteworthy is Dakchung Plateau and Phou Ahyon which overlap with the Project footprint and as a result, may directly affect the KBA and critical habitat trigger species. Details on these KBAs are as follows:

- **Dakchung Plateau** is both a KBA and IBA located in the Sekong Province of Laos. It is located entirely in the central section of the EAAAs. Although extensively degraded, it is thought to hold important concentrations of the critical habitat-qualifying Black-crowned Barwing (NT), and the stakeholder concern species Yellow-billed Nuthatch (NT) as these species have adapted to disturbed and secondary habitats. Both RDL species were recorded during bird surveys (see findings of the baseline assessment contained in **Section 7.4.4 of the ESIA**).
- **Phou Ahyon** and **Ngoc Linh** are designated as KBAs, IBAs and Alliance for Zero Extinction (AZE) sites. They marginally overlap with the north-eastern section of the EAAAs and the transmission line towards the Viet Nam border traverses the designated area for Phou Ahyon for approximately 2.5 km. These areas hold some of the last remaining populations of restricted-range bird species found in the Kon Tum Plateau EBA, such as the Vietnamese Crested Argus (CR), and Yellow-billed Nuthatch (NT). Additionally, Ngoc Linh also contains populations of the Black-crowned Barwing (NT), which also qualify the Project as being in critical habitat. The Phou Ahyon AZE Site is triggered by the frog species *Leptobrachium xanthops* (see also **Table 4-2**).
- **Upper Xe Kaman** is a KBA and an IBA supporting relatively intact old-growth semi-evergreen forest and riverine habitats. Key species include Masked Finfoot *Heliopais personata* (EN), hornbill species, a range of gibbon species and Siamese crocodile *Crocodylus siamensis* (CR).

**The 6 KBAs identified within the EAAAs include the 2 PAs (Song Thanh and Phou Kathong) and an additional 4 sites: Dakchung Plateau, Phou Ahyon, Upper Xe Kaman and Ngoc Linh. All six sites qualify the EAAAs as critical habitats based on notable biodiversity value and capacity to support critical biodiversity, endemic species and range-restricted species potentially.**



**Figure 4-1: Legally Protected Areas, and Areas with Recognized High Biodiversity Values within and overlapping the EAAAs**



## 4.5 Defining 'Critical Natural' and 'Critical Modified' Habitats

As discussed in **Section 1.5**, anthropogenic impacts in the region are considered pervasive, in the form of regular burning to create open woodlands and shifting cultivation on the upper slopes, wildlife poaching and excessive harvesting of forest products by local communities. According to the WWF, more than 75% of the ecoregion's natural habitat has been converted or degraded (WWF, 2021a). Where primary forest habitat remains in the region, such areas are distributed in small, isolated fragments or patches and are comprised predominantly of Wet Evergreen Forests at 600-900 m elevation and Montane Evergreen Forest at elevations above 900m AMSL, with these two forest communities being structurally and compositionally distinct from each other. 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, particularly those in the centre of the Project and associated with the Dakchung Plateau Key Biodiversity Area (KBA), there has been extensive modification for agriculture and clearance of forests by local communities predominantly.

The EAAAs therefore contain both critical natural and critical modified habitat:

- areas of **natural habitat** 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 habitat types within the EAAA that meet the ADB SPS definition of natural habitat or modified habitat are described in detail in **Table 4-4**, and are shown spatially on the map in **Figure 4-2**.

The natural forest habitats typically support populations of critical habitat qualifying species in terms of criteria 1 and 2 (CR/EN, endemic, range-restricted), however modified habitats are also considered important for some of the qualifying species that are also recognised as utilising these areas for foraging purposes in particular. This was based on the findings of the CHA for criteria 1-6 and the location of Protected Areas and KBAs.

Input from recognised international experts has helped refine the understanding of the areas of highest conservation value within the wider EAAA landscape, and it is recognised that much of the faunal interest of the EAAAs have been compromised through human impacts, most notably shifting agriculture, hunting and logging. This is particularly marked at lower elevations, with the Dakchung plateau and areas to the south and west most heavily impacted. This was reflected in the condition scores generated during the REA survey. Areas of highest value are associated with the band of wet evergreen forest on the Lao-Viet Nam border, where the transmission line will be located, close to the existing overhead line and main Lao-Viet Nam road. The other important area was the less impacted Montane Forest associated with the Phou Koungking mountain ridge (see **Figure 4-3**).

**Table 4-4: Classification of Natural and Modified habitat types**

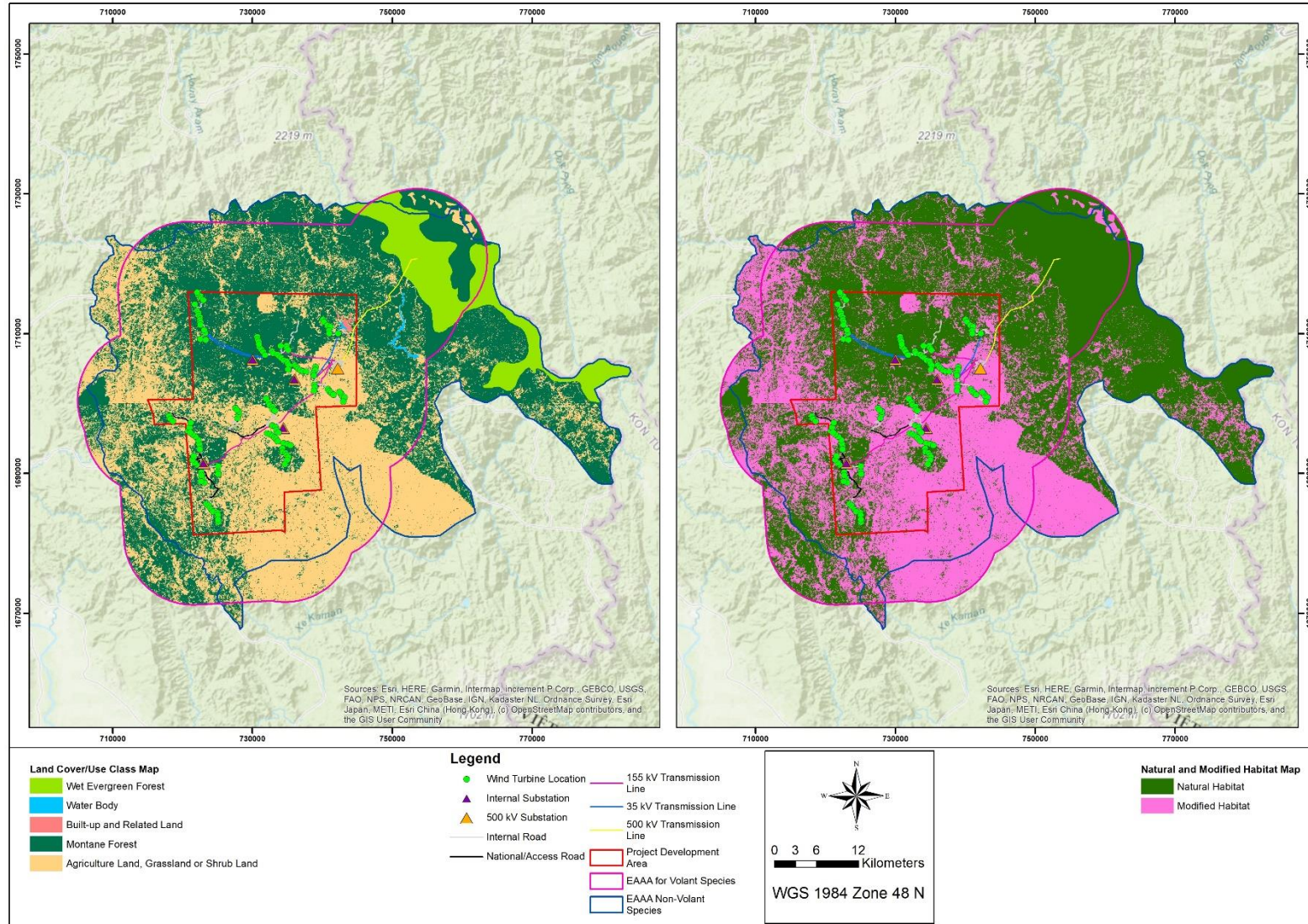
| Land cover type        | Area (ha)        | Description  | Habitat Classification |
|------------------------|------------------|--|------------------------|
| 1 Montane Forest       | 69,712 to 81,262 | <p>1a Evergreen Montane Forest represents the dominant land cover and forest type in the EAAAs. This forest type occurs in mountainous areas, at elevations above 1000 m AMSL. The forest canopy is tall and typically dominated by evergreen tree species such as <i>Hopea pierrei</i>, <i>Cinnamomum iners</i>, and <i>Lithocarpus polystachyus</i>. These communities are found in the northern and eastern section of the EAAAs.</p> <p>Most of these areas are heavily degraded, except for the central and central-northern sections of the concession area which are in a less impacted state, characterized by patches of primary forest. The habitat provided by these forest communities are considered suitable for harboring and maintaining populations of the following critical habitat-qualifying species:</p> <ul style="list-style-type: none"> <li>• <b>6 mammal species:</b> Bengal Slow Loris, Pygmy Slow Loris, Northern Buff-cheeked gibbon, Red-shanked Douc Langur, Owston's Civet, and Large-antlered Muntjac;</li> <li>• <b>1 amphibian species</b> that is 'potentially new to science': <i>Xenophrys cf maosonensis</i>;</li> <li>• <b>3 bird species:</b> Vietnamese Crested Argus, Black-crowned Barwing and Chestnut-eared Laughingthrush;</li> <li>• <b>10 plant species:</b> 10 species potentially new to science, including <i>Camellia sp.</i>, <i>Garcinia sp.</i>, <i>Lasianthus sp. 1</i>, <i>Lasianthus sp. 2</i>, <i>Machilus sp.</i>, <i>Neolitsea sp.</i>, <i>Polyosma sp. 1</i>, <i>Polyosma sp. 2</i> and <i>Smilax sp.</i></li> </ul> | Natural Habitat        |
|                        |                  | <p>1b Certain higher altitude forested areas belonging to the 'Montane Forest' category appear to resemble a form of secondary or young/seral forest growth that appears to be on a recovering successional pathway following anthropogenic disturbance. These areas have been classified as modified habitat given their early successional state following complete or majority clearance for cultivation which has shifted out of these areas now. The habitat provided by these secondary/seral forest communities is still considered suitable for harboring and maintaining populations of the following critical habitat-qualifying species:</p> <ul style="list-style-type: none"> <li>• <b>3 mammal species:</b> Bengal Slow Loris, Pygmy Slow Loris and Red-shanked Douc Langur</li> <li>• <b>1 amphibian species</b> that is 'potentially new to science': <i>Xenophrys cf maosonensis</i>;</li> <li>• <b>2 bird species:</b> Vietnamese Crested Argus and Black-crowned Barwing; and</li> <li>• <b>10 plant species:</b> 10 species potentially new to science, including <i>Camellia sp.</i>, <i>Garcinia sp.</i>, <i>Lasianthus sp. 1</i>, <i>Lasianthus sp. 2</i>, <i>Machilus sp.</i>, <i>Neolitsea sp.</i>, <i>Polyosma sp. 1</i>, <i>Polyosma sp. 2</i> and <i>Smilax sp.</i></li> </ul>   | Modified Habitat       |
| 2 Wet Evergreen Forest | 17,040 to 27,732 | <p>2a Wet Evergreen Forest has a similar forest structure and composition to evergreen mountain forest but receives less precipitation. These typically comprise a mix of broad-leaved tree species, with <i>Quercus sp.</i>, <i>Lithocarpus sp.</i>, and <i>Castranopsis sp.</i> being dominant, and coniferous tree species that include the dominant species <i>Pinus kesiya</i>, <i>Morella cerifere</i>, etc. Most of these areas were found to be natural but relatively heavily</p>   | Natural Habitat        |

| Land cover type                    | Area (ha)  | Description  | Habitat Classification |
|------------------------------------|------------|--|------------------------|
|                                    |            | <p>degraded and subject to existing fragmentation impacts, especially in the southern, central and central-northern sections of the project area.</p> <p>The habitat provided by these forest communities are considered suitable for harboring and maintaining populations of the following critical habitat-qualifying species:</p> <ul style="list-style-type: none"> <li>• <b>8 mammal species:</b> Bengal Slow Loris, Pygmy Slow Loris, Northern Buff-cheeked gibbon, Red-shanked Douc Langur, Owston's Civet, Large-antlered Muntjac, Annamite Striped Rabbit, Silver Langur;</li> <li>• <b>2 reptile species:</b> Yellow-eyed spadefoot toad, three horned-scaled pitviper;</li> <li>• <b>1 amphibian species</b> that is 'potentially new to science': <i>Xenophrys cf maosonensis</i>;</li> <li>• <b>2 bird species:</b> Vietnamese Crested Argus and Black-crowned Barwing; and</li> <li>• <b>3 plant species:</b> <i>Lasianthus sp. 1</i>, <i>Lasianthus sp. 2</i>, and <i>Melastoma sp.</i></li> </ul>   |                        |
|                                    |            | <p>2b Several lower-altitude forested areas belonging to the 'Wet Evergreen Forest' category also appear to resemble a form of secondary or young/seral forest growth that appears to be on a recovering successional pathway following anthropogenic disturbance. These areas have been classified as modified habitat given their early successional state following complete or majority clearance for cultivation which has shifted out of these areas now. The habitat provided by these secondary/seral forest communities is still considered suitable for harboring and maintaining populations of the following critical habitat-qualifying species:</p> <ul style="list-style-type: none"> <li>• <b>3 mammal species:</b> Bengal Slow Loris, Pygmy Slow Loris, Red-shanked Douc Langur</li> <li>• <b>2 reptile species:</b> Yellow-eyed spadefoot toad, three horned-scaled pitviper</li> <li>• <b>1 amphibian species</b> that is 'potentially new to science': <i>Xenophrys cf maosonensis</i>;</li> <li>• <b>2 bird species:</b> Vietnamese Crested Argus and Black-crowned Barwing; and</li> <li>• <b>3 plant species:</b> <i>Lasianthus sp. 1</i>, <i>Lasianthus sp. 2</i>, and <i>Melastoma sp.</i></li> </ul> | Modified Habitat       |
| <b>3 Waterbody</b>                 | 671 to 697 | <p>Rivers and streams occur throughout the EAAA (Innogreen Engineering Co., Ltd. and Greener Consultant Co., Ltd, 2020) and are considered suitable for maintaining populations of the two critical habitat qualifying fish species: <i>Schistura imitator</i> and <i>Schistura clatrata</i>. These areas also typically support important amphibian species and are considered important water sources for the other species identified as contributing to the critical habitat status of forest areas.</p>   | Natural Habitat        |
| <b>4 Built-up and Related Land</b> | 492 to 590 | <p>Built-up land use in the EAAA comprise residential buildings and basic infrastructure (e.g., road, hospital, and school) (Innogreen Engineering Co., Ltd. and Greener Consultant Co., Ltd, 2020). These are artificial/transformed landscapes where the natural characteristics of the land has been irreversibly altered or totally lost in some instances. Whilst some of these arterially modified areas may be visited by species such as</p>   | Modified Habitat       |

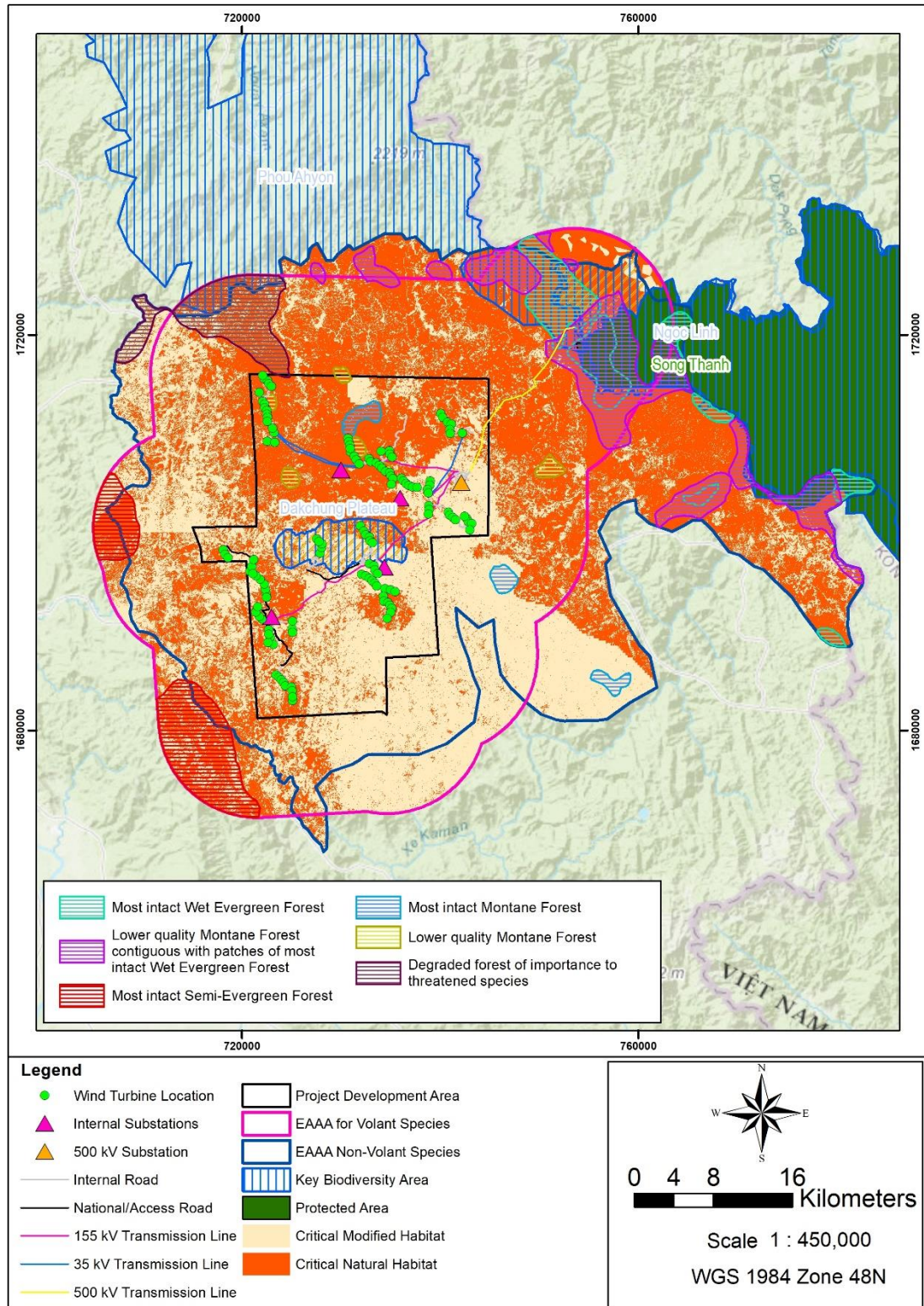
## Appendix G: Critical Habitat Assessment

| Land cover type  | Area (ha) | Description  | Habitat Classification |
|--|-----------|--|------------------------|
|  |           | Pangolins, the possibility of these areas sustaining conservation-important plant or animal species is typically considered improbable and of little significance to the CHA assessment.   |                        |
| <b>5 Agricultural Land, Grassland, Shrub land Mosaic</b> | 58,2      | <b>5a Agricultural Land:</b> Agricultural areas are transformed habitats that are now used for active cultivation of food crops, including the growing of coffee, sugarcane, and maize (CEIC, 2021). Rice is grown in upland areas for mainly subsistence purposes (Alexander <i>et al.</i> , 2018). Whilst some of these areas are visited by species such as Pangolins and certain birds of conservation importance (e.g. Black-crowned Barwing), the possibility of these areas sustaining conservation-important plant or animal species is typically considered relatively low to negligible.   | Modified Habitat       |
|  | 21,3      | <b>5b Shrub Land:</b> Shrub land in the EAAAs include small patches of vegetation that represent transitional evergreen/semi-evergreen forest-shrub areas that have been subject to degradation, forest regeneration and/or natural succession. This habitat is dominated by grass and short shrub and tree species (Rundel, 1999).<br>At lower elevations of >1000m AMSL, these habitats are considered suitable for maintaining populations of the Black-crowned Barwing.<br><i>*Note that given the small, isolated patches of shrub land and grassland which occur and are perceived to be linked with former anthropogenic disturbance, grassland and shrub land areas have been included as a mosaic land cover amongst the shifting cultivation amidst the forest communities.</i>  | Modified Habitat       |
|  | 1,3       | <b>5c Grassland:</b> Grassland occupies a very small proportion of the EAAA and occurs as small patches scattered throughout the area investigated, typically occurring in the southern and central sections of the concession area. Grasslands are typical of fire-adapted ecosystems, or where or where herbivore activity maintains the short, herbaceous vegetation cover and woody species are notably absent. These are often found on the high-lying plateaus such as the Dakchung Plateau and are considered modified habitats that typically would not occur within the forest dominated region.<br><i>Note that given the small, isolated patches of grassland which occur and are perceived to be linked with former anthropogenic disturbance, grassland and shrub land areas have been included as a mosaic land cover amongst the dominant forest communities.</i> | Modified Habitat       |

Figure 4-2: Map Showing the Extent and Distribution of Natural vs Modified Habitat



**Figure 4-3: Map showing the Extent and Distribution of Critical Habitat Classified for the Project, Subcategorised into Natural vs Modified Habitats**



## 5. IMPLICATIONS FOR THE PROJECT

### 5.1 Natural Habitat and Modified Habitat Designation

The findings indicate that there are several Project components<sup>20</sup> that overlap with terrestrial and aquatic areas that are designated as natural habitat. The ADB SPS requires that the Project does not significantly convert or degrade areas of natural habitat, and mitigation measures are designed to achieve at least an overall no net loss of biodiversity.

Key requirements of the ADB SPS with respect to natural habitat is presented below:

- **ADB SPS, paragraph 26** – *“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*
  - iii. *will substantially outweigh the project costs, including environmental costs.*
  - iv. *Any conversion or degradation is appropriately mitigated.”*
- **ADB SPS, paragraph 27** – *“Mitigation measures will be designed to achieve at least no net loss of biodiversity. 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.”*

### 5.2 Critical Habitat Designation

This CHA found that the Project<sup>20</sup> contains biodiversity values that would result in the categorization of the EAAAs for both volant and non-volant species as critical habitat. Where impacts do occur to the ‘critical habitats’ identified, 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.

Key requirements of the ADB SPS with respect to critical habitat is presented below:

**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.

### 5.3 Projects that overlap with Legally Protected Areas and Areas with Recognized High Biodiversity Values

Legally protected areas, and areas with recognised biodiversity values overlap with, or are located within the Project’s EAAAs. Nevertheless, the project footprint does not overlap with legally protected areas therefore the requirements under ADB SPS Paragraph 28 and 30 do not apply.

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<sup>20</sup> The term ‘Project components’ in this context includes ancillary facilities. **Figure 3.7** in the ESIA presents locations of preliminary ancillary facilities. Based on the site visit conducted in November to December 2021, these facilities will be located on communal land, which is mostly unused land, grassland and degraded forest.



A number of KBAs contain critical habitat-qualifying species, and therefore qualify the Project as being located in an area of critical habitat. The ADB SPS requirements listed in **Section 5.2** will also apply to these areas.

## 6. CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Summary of the Key Findings

Desk study, field surveys and expert consultation indicate that the EAAAs for volant and non-volant species associated with the Project qualify as critical habitat. The Project area is 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. The EAAAs assessed therefore contain both natural and modified habitat in terms of the ADB SPS definitions. 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. A summary of the main outcomes of the CHA, per critical habitat qualifying criterion, is as follows:

- In terms of **Criterion 1: *Habitat required for the survival of critically endangered or endangered species***, several fauna species (mammals, reptiles, amphibians, and birds) are represented with CR or EN threat status. One EN plant species was recorded for the forest habitats surveyed. Whilst modified habitat would typically support fewer species, still some CR or EN species may utilise these habitats. Typically, the Natural Montane Forest and Wet Evergreen Forest habitats are most important in supporting these species.
- In terms of **Criterion 2: *Areas with special significance for endemic or restricted-range species***, several mammal and bird species are also endemic and/or range-restricted species. Whilst modified habitat would typically support fewer species, still some endemic or restricted-range species may utilise these habitats for foraging. Species recorded during field surveys as being potentially 'new to science' could also be restricted-range species. .
- In terms of **Criterion 3: *Sites that are critical for the survival of migratory species*** and **Criterion 4: *Areas supporting globally significant concentrations or numbers of individuals of congregatory species***, the requirements / thresholds for these criteria have not been met in terms of the key species identified.
- In terms of **Criterion 5: *Areas with unique assemblages of species that are associated with key evolutionary processes or provide key ecosystem services***, the more intact (natural/primary) forest habitats are considered generally important for providing key ecosystem services at both a local/regional and global scale (these are also considered 'Priority ecosystem services' as per the definition provided in IFC PS6 for this criterion).
- In terms of **Criterion 6: *Areas with biodiversity that has significant social, cultural or economic importance to local communities***, despite the potential socio-cultural importance of an area of 'Sacred Forest' identified in the project area, it was subsequently established that the cultural importance is associated with cemeteries (burial grounds) rather than the actual forest and biodiversity per say. After further consideration, forest habitat does not qualify as critical habitat in terms of criterion 6, strictly speaking.

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 equally the most important habitats for supporting CR/EN species, endemics and range-restricted species.

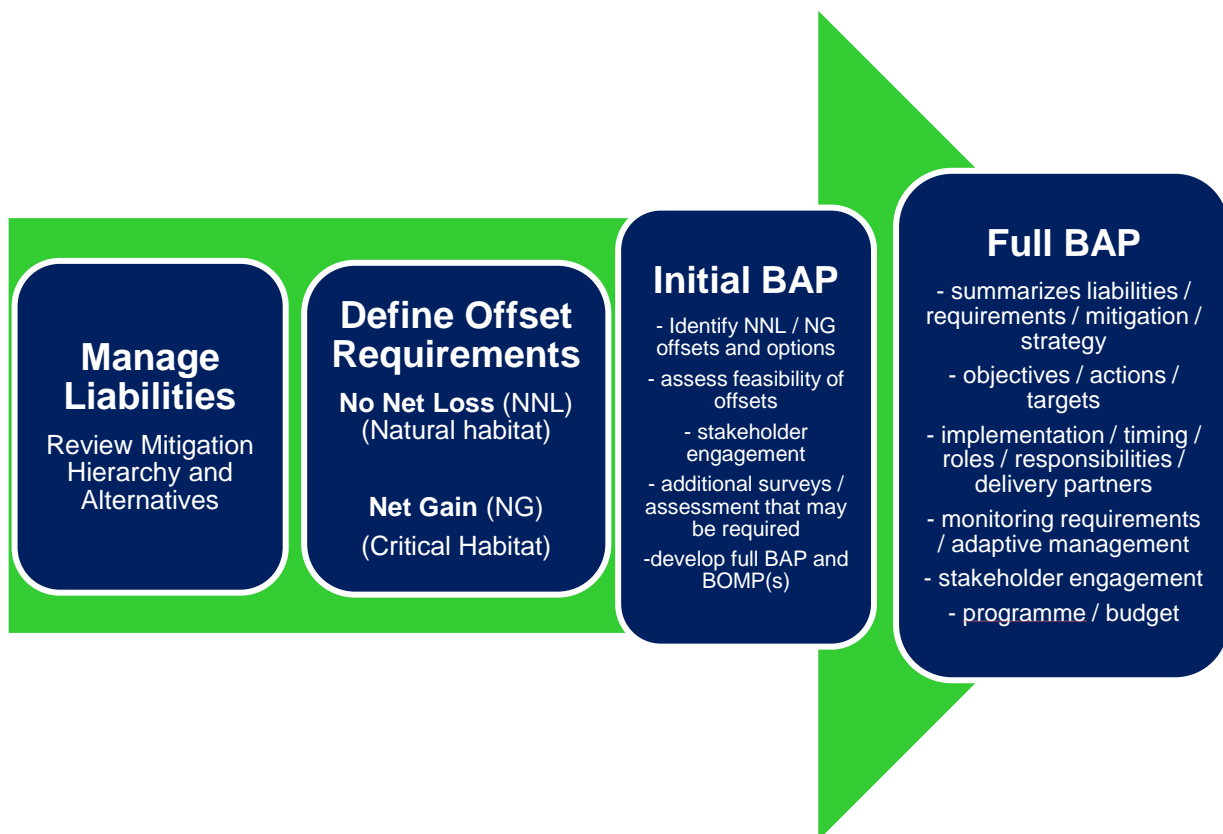
### 6.2 Next steps

To demonstrate alignment with the ADB SPS, the following next steps are recommended:

1. Assess the ecological impacts on the critical habitat-qualifying biodiversity features, the habitat supporting those features, and stakeholder priority biodiversity. This include developing appropriate avoidance and minimisation measures and quantifying the residual impacts to

- understand biodiversity losses and establish targets for biodiversity offset compensation that may be required to achieve ‘no net loss’ or ‘net gain’ scenarios.
2. Investigate the possibility to further avoid/minimise significant impacts as predicted by the residual impact assessment with information flowing into an analysis of possible project alternatives (e.g. micro siting of specific project infrastructure, where considered technically and financially feasible).
  3. Develop an initial Biodiversity Action Plan (BAP), including options to offset residual impacts (*where deemed necessary based on the outcomes of the Impact Assessment*) to demonstrate how the Project will apply the mitigation hierarchy and achieve either a ‘no net loss’ or ‘net gain’ for critical habitats and key biodiversity features of concern (e.g. fauna & flora of conservation importance). See outline of the BAP process in **Figure 6-1**.
  4. As part of the BAP, develop a Biodiversity Offset Strategy presenting the Project’s framework for offset design and implementation considerations including broad actions that will be taken to meet necessary biodiversity offset targets (where necessary). The strategy can then be used to inform the development of specific Biodiversity Offset Management Plan(s) (BOMP) where required, that will sit within the overall BAP.

**Figure 6-1: Initial and Final BAP Process**



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## 8. APPENDICES



## APPENDIX A FAUNA AND FLORA ASSESSED QUALIFYING FOR CRITICAL HABITAT CRITERIA 1-4.<sup>21</sup>

| S/N            | Common Name       | Scientific Name               | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat  | Description & Rationale (IUCN) <sup>d</sup>   |
|----------------|-------------------|-------------------------------|----------------------------|----------------------|----------------------------|--|---|---|---|
| <b>Mammals</b> |                   |                               |                            |                      |                            |  |   |   |   |
| 1              | Bengal Slow Loris | <i>Nycticebus bengalensis</i> | EN                         | -                    | -                          | Criterion 1                                    | Confirmed                                     | Montane Forest, Wet Evergreen Forest (including secondary and degraded habitat) | <p>This species occurs in Bangladesh, Cambodia West of the Mekong River, China (southern and western Yunnan and possibly in southwestern Guangxi), north-eastern India, Lao PDR, Myanmar, Thailand north of the Isthmus of Kra, and Viet Nam.</p> <p>The Bengal slow loris is an arboreal, nocturnal species that inhabits tropical evergreen rainforest, semi-evergreen forest, and mixed deciduous forest. In Viet Nam it is found only in secondary forests, and on the edge of primary forests; the species also occurs in agricultural fields and plantations.</p> <p>In Laos, the species is often found in protected evergreen forests, and has also been observed in plantation forests and bamboo stands. It can live in heavily disturbed agricultural areas if suitable foods are available.</p> <p>It was reported in all Survey blocks from Ban Dak Dom, Ban Dak Dreun and Ban Prao, and confirmed in the Project area during biodiversity baseline field surveys. It is likely that the area supports a globally important concentration <math>\geq 0.5\%</math> of the global population and <math>\geq 5</math> reproductive units.</p> |
| 2              | Pygmy Slow Loris  | <i>Nycticebus pygmaeus</i>    | EN                         | -                    | -                          | Criterion 1                                    | Confirmed                                     | Montane Forest, Wet Evergreen Forest (including secondary and degraded habitat) | <p>This species is found east of the Mekong River in eastern Cambodia, southernmost China (south eastern Yunnan), Lao PDR, and Viet Nam. The western limit of distribution in Lao PDR and Cambodia is uncertain, but it appears to be absent or at least naturally very scarce in the extreme west of the Mekong plain.</p>   |

<sup>21</sup>For detailed information on the criteria against which the fauna and flora were assessed, see IFC GN6, which ADB uses as a guide.

Appendix G: Critical Habitat Assessment

| S/N | Common Name                  | Scientific Name            | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat                   | Description & Rationale (IUCN) <sup>d</sup>  |
|-----|------------------------------|----------------------------|----------------------------|----------------------|----------------------------|--|---|--------------------------------------|--|
|     |                              |                            |                            |                      |                            |  |   | degraded habitat)                    | <p>Overall, the pygmy slow lorries has been sighted in a variety of habitats up to 1,500 m high, including primary evergreen and semi-evergreen forest, forest on limestone, secondary and highly degraded habitats, and bamboo thickets.</p> <p>It was reported in all survey blocks with high confidence and confirmed in the Project area during biodiversity baseline field surveys. The species is reported to be widespread in forested areas in Lao PDR, where exploitation of lorises is lower than in neighbouring Viet Nam.</p> <p>The Survey area would support a very small population of this species. Due to its endangered status, and its recent and suspected future decline, it is likely that the area supports <math>\geq 0.5\%</math> of the global population and <math>\geq 5</math> reproductive units.</p>  |
| 3   | Northern Buff-cheeked gibbon | <i>Nomascus annamensis</i> | EN                         | -                    | -                          | Criterion 1                                    | Confirmed                                     | Montane Forest, Wet Evergreen Forest | <p>In Lao PDR, <i>N. annamensis</i> is distributed in the south of the country, East of Mekong River up to the Banhiang River in Savannakhet Province. It occurs in the central and southern provinces of Attapu, Champasak, Salavan, Savannakhet and Xekong. The country may support the largest global population of <i>N. annamensis</i>, but there is little data for the country.</p> <p>The northern buff-cheeked gibbon inhabits broadleaf evergreen and semi-evergreen forests, at elevations between 100-1,200 m asl. The species is frugivorous but also consumes significant proportions of leaves, young shoots and flowers.</p> <p>Based on expert opinion (Timmins &amp; Duckworth, February 2022), the stronghold for the species within the project area is undoubtedly within the WEF corridor, with an almost certain presence in forest strips on the northern edge of the project area. Densities there might be the highest in the Project area. Presence might also be likely in the forest to the west, but it is unlikely that the species occurs away from these areas. Confirmed in the Project area during biodiversity baseline field surveys, and it can be assumed that the area</p> |

Appendix G: Critical Habitat Assessment

| S/N | Common Name             | Scientific Name           | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat   | Description & Rationale (IUCN) <sup>d</sup>  |
|-----|-------------------------|---------------------------|----------------------------|----------------------|----------------------------|--|---|--|--|
|     |                         |                           |                            |                      |                            |  |   |  | supports ≥ 0.5% of the global population and ≥ 5 reproductive units.   |
| 4   | Red-shanked Douc Langur | <i>Pygathrix nemaeus</i>  | CR                         | -                    | Yes                        | Criterion 1                                    | Confirmed                                     | Montane Forest, Wet Evergreen Forest (including secondary habitat) | <p>This species is associated with primary and secondary evergreen and semi-evergreen forests in both broadleaf and mixed broadleaf-coniferous forest, from lowland to montane habitats (recorded up to 1,600 m AMSL in Lao PDR) and also associated with forests on limestone (e.g., in Hin Namno NPA and Phong Nha Ke Bang NP).</p> <p>The world's largest remaining population of red-shanked douc langur is in Lao PDR, particularly in the near-contiguous Nakai-Nam Theun and Hin Namno NPA, which are likely to represent the largest contiguous suitable habitat for the species. These NPAs are located outside the EAAAs.</p> <p>Based on the commentary received from Timmins &amp; Duckworth (2022), presence of this species is almost certain in forest strips on the northern edge of the project area contiguous with the forested Phou Ajol massif to the north, and densities here might be the highest in the project area. Presence is also likely in the forest to the west with relatively large patches of relatively mature closed canopy tall forest. The species was confirmed in the Project area during biodiversity baseline field surveys. It can therefore be assumed that ≥ 0.5% of the global population and ≥ 5 reproductive units occur within the EAAA, thus qualifying for Criterion 1.</p> |
| 5   | Owston's Civet          | <i>Chrotogale owstoni</i> | EN                         | -                    | -                          | Criterion 1                                    | Confirmed                                     | Montane Forest, Wet Evergreen Forest                               | <p>This species is known to occur across eastern Laos, Viet Nam, and a small area of southernmost China in a variety of habitats, all within evergreen biomes that have a non-harsh dry season. <i>C. owstoni</i> is likely to occur mostly in hill and montane altitudes, and reportedly as low as 550 m asl. Commentary received from Timmins &amp; Duckworth (2022) suggests the species' tolerance of degraded and fragmented habitats is not well known, although the single project record suggests a significant level of resilience to these factors, consistent with</p>  |

Appendix G: Critical Habitat Assessment

| S/N | Common Name            | Scientific Name               | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat                   | Description & Rationale (IUCN) <sup>d</sup>  |
|-----|------------------------|-------------------------------|----------------------------|----------------------|----------------------------|--|---|--------------------------------------|--|
|     |                        |                               |                            |                      |                            |  |   |                                      | <p>inconclusive indications from northern Lao PDR and northern Viet Nam.</p> <p>Suitable methodology (camera-trapping and/or spotlighting) has been applied widely enough in the southern half of Lao PDR to be confident the species is entirely or largely restricted to the east in the south and latitudinal centre. Unlike in Viet Nam, wet evergreen forests in Laos are expected to still retain at least one-several large populations due to the presence of larger areas of forest with less road intrusion, and a lower human population. Commentary received from Timmins &amp; Duckworth (2022) suggests that the documented presence towards the centre of the project area indicates a greater range extent.</p> <p>Village interviews during the wet season suggest that this species, although rare, has been sighted at study blocks 2, 3 and 4, and it was caught on camera in study block 3. This species is considered rare and present especially in Annamite Range. It cannot be ruled out, that ≥ 0.5% of the global population and ≥ 5 reproductive units occur within the EAAA, thus qualifying for Criterion 1.</p> |
| 6   | Large-antlered Muntjac | <i>Muntiacus vuquangensis</i> | CR                         | -                    | Yes                        | Criterion 1<br>Criterion 2                     | Highly likely                                 | Montane Forest, Wet Evergreen Forest | <p>The species is known only from the Annamite mountain chain and associated hill ranges of Lao PDR, Viet Nam and, marginally, eastern Cambodia. The habitat preferences of the large-antlered muntjac remain unclear, although it is suggested that its presence is tied to the evergreen and semi-evergreen forests characteristic of the Annamites, and cannot use the climatically drier hill semi-evergreen forests further north and west (IUCN).</p> <p>The EAAA contains suitable habitat for this species and overlaps with the species EOO. Of note, findings from the village interviews conducted during the Rapid Ecological Assessment (REA), and the wet season surveys suggests that there is a high likelihood that this species, although rare, could be present in the eastern section of the Dakchung Plateau KBA.</p>   |

## Appendix G: Critical Habitat Assessment

| S/N | Common Name             | Scientific Name           | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat   | Description & Rationale (IUCN) <sup>d</sup>  |
|-----|-------------------------|---------------------------|----------------------------|----------------------|----------------------------|--|---|----------------------|--|
|     |                         |                           |                            |                      |                            |  |   |                      | <p>With more than 0.5% of this species' distribution (c.2.2%) overlapping with the EAAA, and its presence being reported during the REA and wet season surveys, it is likely that significant concentrations of this species could be present and thus qualify for Criterion 1 and 2.</p> <p>Commentary received from Timmins &amp; Duckworth (2022) suggests that this species was probably at one time distributed across most if not all of the project area, but is now likely to be very localised and possibly extirpated. Whilst a localised presence in or very closely adjacent to the project area is likely, any remnant population is likely to be small. Elevations above 1,000 m, especially steep terrain, are likely to be naturally unsuitable.</p>   |
| 7   | Annamite Striped Rabbit | <i>Nesolagus timminsi</i> | EN                         | -                    | -                          | Criterion 1                                    | Possible                                      | Wet Evergreen Forest | <p>The species occurs at low and medium altitudes (approximately 50-1,300m AMSL) in the northern and central Annamite Mountains along the Viet Nam and Lao PDR border. In Lao PDR it is believed to occur also in six provinces (from north to south): Xiangkhouang (unconfirmed), Bolikhamxai, Khammouan, Savannakhet, Salavan and Xekong. There are no records from the southern parts of the central Annamites or from the southern Annamites but these regions are not ecologically unsuitable.</p> <p>It has been previously confirmed in Lao only in areas close to the border with Viet Nam: a pattern shown by various other wet evergreen forest indicator species. The Annamite ridge forms most of the international border between the two countries and places most of Laos in the rain-shadow of moisture-laden air masses from Viet Nam in the Lao dry season. The vast majority of habitat suitable for this species is therefore in Viet Nam. It is clear that it occurs predominantly in wet evergreen forest, which has little to no dry season (probably no month with rainfall below 40 mm. Most records come from low- to mid-elevation broadleaved forests.</p> |

## Appendix G: Critical Habitat Assessment

| S/N | Common Name   | Scientific Name             | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat   | Description & Rationale (IUCN) <sup>d</sup>   |
|-----|---------------|-----------------------------|----------------------------|----------------------|----------------------------|--|---|----------------------|---|
|     |               |                             |                            |                      |                            |  |   |                      | <p>Although population size and density have not been established anywhere in its range, Annamite Striped Rabbit appears to be noticeably less abundant in heavily hunted areas than in areas perceived on the basis of other evidence to have had lower hunting intensity. Nevertheless, interviews with villagers during the REA, and wet season surveys revealed that species has been reportedly sighted along the proposed TL section, close to the Viet Nam border. Hunting of this species has also occurred as recently as last year.</p> <p>With more than 0.5% of this species' distribution overlapping with the EAAA, and its presence being reported during the REA and wet season surveys, it is possible that this species could be present. Commentary received from Timmons &amp; Duckworth (2022) suggests that the WEF 'corridor' along the eastern edge of the project area provides ecological continuity with adjacent sites known to have this species present. Also, the fact that Owston's Civet, a species with strong WEF associations, was verified towards the centre of the project area, gives support to a potentially more extensive distribution of the rabbit across the north eastern half of the project area, but presumably now very patchily. Nevertheless, it can be assumed that <math>\geq 0.5\%</math> of the global population and <math>\geq 5</math> reproductive units occur within the EAAA, thus qualifying it for Criterion 1.</p> |
| 8   | Silver langur | <i>Trachypithecus spec.</i> | EN                         | -                    | -                          | Criterion 1                                    | Possible                                      | Wet Evergreen Forest | <p>While <i>T. germaini</i> was reported by the villagers, no evidence was found during the surveys. There could be two similar silver langur species in the Project area, namely <i>T. germaini</i> and <i>T. margarita</i>, since they both are found in a wide variety of primarily lowland habitats, including evergreen and semi-evergreen forest. Interviews will not be a reliable source to identify these species. In the face of uncertainty, <i>Trachypithecus spec.</i> is used.</p> <p>In Laos, <i>T. germaini</i> is thought to be localized, and even common in areas where it is present; however, no large continuous area is known to support high populations. This species is probably</p>  |

Appendix G: Critical Habitat Assessment

| S/N  | Common Name        | Scientific Name                 | IUCN Red List <sup>a</sup> | Endemic to Laos PDR?                  | Restricted -range Species?            | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat                    | Description & Rationale (IUCN) <sup>d</sup>   |
|--|--------------------|---------------------------------|----------------------------|---------------------------------------|---------------------------------------|--|---|---------------------------------------|---|
|  |                    |                                 |                            |                                       |                                       |  |   |                                       | <p>the rarest and most threatened monkey in Lao PDR. According to the IUCN database, <i>T. margarita</i> is present in the border region of the Dak Cheung province and Viet Nam.</p> <p>Findings from the REA suggests that <i>T. spec.</i> could possibly be present in the northern section of the Project area, and within and in the vicinity of the transmission line alignment. Village interviews during the wet season survey suggest that this species was sighted at survey blocks 2, 3 and 4.</p> <p>Given the range overlap with the terrestrial EAAA (c.0.7%), and its presence being reported during the REA and wet season surveys, it is possible that significant concentrations of this species may be present.</p> <p>Based on the commentary received from Timmins &amp; Duckworth (2022), there is slight possibility that a <i>T. cristatus sensu lato</i> taxon does occur, and that current understanding of the distribution and habitat use of silvered leaf monkeys in Indochina is incomplete.</p> |
| <b>Herpetofauna: Reptiles &amp; Amphibians</b> |                    |                                 |                            |                                       |                                       |  |   |                                       |   |
| 1  | Maoson Horned Toad | <i>Xenophrys cf maosonensis</i> | NE                         | Unknown: potentially 'new to science' | Unknown: potentially 'new to science' | Criterion 2 possibly                           | Confirmed: potentially 'new to science'       | Unknown: potentially 'new to science' | <p>There is some evidence however that the species <i>X. maosonensis</i> may have been previously described from Viet Nam <sup>22</sup>. However, the herpetologist experts that conducted the field surveys state that <i>X. maosonensis</i> is a species complex, and the individual found will certainly be split as a new species in the near future. Therefore, the amphibian found is a potential new species to science, and has yet to be formally evaluated under the IUCN Red List.</p>   |

<sup>22</sup> The American Museum of Natural History states that it is “known with confidence only from Viet Nam” ([Xenophrys maosonensis \(Bourret, 1937\) | Amphibian Species of the World \(amnh.org\)](#)). Tapley et al. (2020) also found the species in Hoang Lien Range.

## Appendix G: Critical Habitat Assessment

| S/N | Common Name                | Scientific Name               | IUCN Red List <sup>a</sup> | Endemic to Laos PDR?  | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat                | Description & Rationale (IUCN) <sup>d</sup>  |
|-----|----------------------------|-------------------------------|----------------------------|---|----------------------------|--|---|-----------------------------------|--|
|     |                            |                               |                            |   |                            |  |   |                                   | <p>The species was detected in the concession area at both study block 4, and close to the transmission line route, near the Laos – Viet Nam border at study block 2, during wet season field surveys.</p> <p>Given that limited global/regional/national evidence is available on the presence and extent of this species in Laos, this species is considered as restricted-range as anywhere from 1 - 95 percent of the (known) global population could be present in the EAAA. It is therefore possible that this species could trigger Criterion 2. In accordance with the precautionary principle, this species could possibly qualify the Project as being located in Critical Habitat.</p>  |
| 2   | Yellow-eyed spadefoot toad | <i>Leptobrachium xanthops</i> | EN                         | Currently only known only from the Dak Cheung Plateau (although larger EOO reaching into Viet Nam possible) | Yes                        | Criterion 1<br>Criterion 2                     | Possible                                      | Wet Evergreen Forest, Waterbodies | <p><i>Leptobrachium xanthops</i> is a rare, restricted range species with an EOO of 1,225 km<sup>2</sup> according to the IUCN. Very little is currently known about this species, however the species is thought to inhabit swift, rocky streams (and their immediate vicinity) in wet montane evergreen forest, based on the first records from 2011. The species is currently known with certainty only from 4 locations in Laos, where it was recorded between 17-19 May 2011, at an altitude ranging from 1,450m to 1,500 m a.m.s.l. (Stuart et al., 2012<sup>23</sup>; see also Figure 8-1). These locations are clustered within 400 m of each other and positioned near a mountain stream (individuals were found within 15 m of a stream) a associated with the Phou Ayon Mountain, approximately 22 km north of the Monsoon WF.</p> <p>The location of the recorded species is outside of the EAAAs, and it was not found during project-specific surveys. While it has been reported by villagers, this was done with low confidence.</p> |

<sup>23</sup> Stuart, B.L., Phimmachak, S., Seateun, S. and Sivongxay, N. (2012). A new *Leptobrachium* (Anura: Megophryidae) from the highlands of southeastern Laos. *Zootaxa* 3155: 29-37, DOI: 10.5281/zenodo.212443. Available online at: <https://www.biotaxa.org/Zootaxa/article/view/zootaxa.3155.1.3>



Appendix G: Critical Habitat Assessment

| S/N | Common Name                  | Scientific Name                  | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat   | Description & Rationale (IUCN) <sup>d</sup>  |
|-----|------------------------------|----------------------------------|----------------------------|----------------------|----------------------------|--|---|----------------------|--|
|     |                              |                                  |                            |                      |                            |  |   |                      | <p>Therefore, it would be simple to exclude <i>L. xanthops</i> from the CHA. However, the IUCN acknowledges that this species' range may extent into Xe Sap National Protected Area, Laos, and Song Thanh Nature Reserve, Viet Nam. Since the Phou Ayon KBA extends south-east and a portion of planned Transmission Line (TL) to Vietnam is located within this KBA, ERM looked at the potential for similar habitat to be present within this area. Additionally, Phou Ayon KBA also classifies as an Alliance for Zero Extinction (AZE) site triggered by <i>L. xanthops</i>.</p> <p>Based on a Digital Elevation Model (DEM), shown on the map in Figure 8-2, the potential for <i>L. xanthops</i> to occur within this portion of the EAAA was considered. Whilst no formal modelling has been done for the species, based on the presence of similar wet evergreen forest habitat, the potential for this species to exist at this location was considered in light of the local elevations as well. The portion of the TL within the Phou Ayon KBA is at altitudes of between 1,075m and 1,175m, which is roughly 300m lower than the lower altitudinal range for this species as per IUCN. There is the possibility that this species could exist at lower altitudes as is still unknown whether <i>L. xanthops</i> is truly an altitudinally range-restricted species based only on the 4 location records that are now over a decade ago.</p> <p>In the absence of detailed information on this species, the potential exists for the amphibian to occur at lower altitudes within wet evergreen forest associated with the Phou Ayon KBA which is within the EAAA for non-volant species. On this basis, <i>L. xanthops</i> is included as a potential critical habitat qualifying species.</p> |
| 3   | Three horned-scaled pitviper | <i>Protobothrops sieversorum</i> | EN                         | No                   | Yes                        | Criterion 1                                    | Possible                                      | Wet Evergreen Forest | This species is only known from the Annamite Mountains of Lao PDR and Viet Nam and endemic to evergreen karst forests at low and possibly mid-elevations (it has been recorded at 200 and 600 m asl), in both primary and disturbed forest. It has   |

## Appendix G: Critical Habitat Assessment

| S/N             | Common Name              | Scientific Name            | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat                    | Description & Rationale (IUCN) <sup>d</sup>  |
|-----------------|--------------------------|----------------------------|----------------------------|----------------------|----------------------------|--|---|---------------------------------------|--|
|                 |                          |                            |                            |                      |                            |  |   |                                       | <p>been found in Phong Nha-Ke Bang National Park (Viet Nam) and the Hin Nam No National Park, which are part of the biggest continuous karst formation in Indochina. Occurrence in mid-elevation is considered possible.</p> <p>It was not reported nor recorded in the survey area. However, the Project area lies completely within the EOO, and in accordance with the precautionary principle, this species could possibly qualify the Project as being located in Critical Habitat. It is possible that the Project area holds <math>\geq 0.5\%</math> of the global population and <math>\geq 5</math> reproductive unit. However, due to the large total area of the Annamite Mountains (1,100 km from North to South) in comparison to the Project area, it is unlikely that the threshold for criterion 2 (see Table 3-2 is fulfilled).</p>   |
| <b>Avifauna</b> |                          |                            |                            |                      |                            |  |   |                                       |  |
| 1               | Vietnamese Crested Argus | <i>Rheinardia ocellata</i> | CR                         | -                    | -                          | Criterion 1                                    | Confirmed                                     | Montane Forest (natural and modified) | <p>This species is endemic to South-East Asia, found across Laos, Malaysia, and Viet Nam, with an EOO of 591,000 km<sup>2</sup>. The nominate subspecies <i>R. o. ocellata</i> occurs along the Annamite mountain chain in central and southern Viet Nam and neighbouring eastern Laos, between the Nghe An province and the Da Lat Plateau in southern Viet Nam.</p> <p>The species is known to occur in primary and secondary evergreen forest, and degraded forest habitat, including active logging concessions, at elevation limits of 1,700-1,900 m asl based on surveys on the Da Lat Plateau. It has also been recorded from degraded forest habitats. Highest densities have been recorded in moist primary forest in lowlands up to c.900 m. The population size is preliminarily estimated to fall into the band 10,000-19,999 individuals. Commentary received from Timmins &amp; Duckworth (2022) suggests that the mountains (Phou Ajol) directly on the northern edge of the Dakchung Plateau, together with Xe Sap NPA are likely to be a particularly significant</p> |

Appendix G: Critical Habitat Assessment

| S/N | Common Name           | Scientific Name              | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat   | Description & Rationale (IUCN) <sup>d</sup>   |
|-----|-----------------------|------------------------------|----------------------------|----------------------|----------------------------|--|---|--|---|
|     |                       |                              |                            |                      |                            |  |   |  | <p>global stronghold for the species, contiguous with the Saola Nature Reserves in Viet Nam.</p> <p>Considering that: (i) this species has been detected at the northern section of Project site and along the transmission line during the wet season surveys; (ii) the EAAA comprises more than 0.5% of this species' range (c.1.8%); and (iii) the presence of a fairly small number of individuals (50-100 individuals, i.e. 0.5% of the global species population) would trigger criterion 1, this species is considered as qualifying the Project as critical habitat.</p>  |
| 2   | Black-crowned Barwing | <i>Actinodura sodangorum</i> | NT                         | Yes                  | Yes                        | Criterion 2                                    | Confirmed                                     | <p>Montane Forest, Wet Evergreen Forest (natural and modified), shifting cultivation and scrub</p> | <p>This species is known from c.10 locations, seven localities are in Viet Nam, and three localities in Laos, of which one locality, Dakchung Plateau KBA is found within the Project site.</p> <p>It occurs mainly in secondary growth and evergreen forest at c. 1,000-2,400 m, including small forest fragments with banana groves amid shifting cultivation and scrub on steeply sloping hillsides. Recent observations in Laos suggest that it favours disturbed and secondary habitats, with no obvious reliance on the presence of nearby mature forest remnants. However, there are also recent records from hill evergreen and Ericaceous cloud-forest, as well as tall, damp grassland and scrub adjacent to evergreen forest and open pine woodland. It appears to be genuinely localised to mature forest. Suitable habitat therefore occurs in the EAAA for this species. Based on the commentary received from Timmins &amp; Duckworth (2022), this species has been recorded from the Dakchung Plateau within the project area, with many observations of the species coming from secondary mosaic habitats at elevations similar to the north-eastern parts of the project area and therefore the species is likely to be widespread if not relatively common within this area. Bird surveys detected this species in the Project area.</p> |

## Appendix G: Critical Habitat Assessment

| S/N | Common Name                   | Scientific Name                  | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat | Description & Rationale (IUCN) <sup>d</sup>   |
|-----|-------------------------------|----------------------------------|----------------------------|----------------------|----------------------------|--|---|--------------------|---|
|     |                               |                                  |                            |                      |                            |  |   |                    | The EOO of this species is 17,400 km <sup>2</sup> It likely qualifies under criterion 2 given the relatively large range overlap with the terrestrial EAAA (c.15%), and confirmation of presence during transect surveys of this species, close to vantage point 4 and 6. Global population size is estimated to range from 6,600 to 13,400 mature individuals, which equates 10,000 - 19,999 individuals. Due to overlap of EOO and EAAA, it is likely that ≥10% of the population size and ≥ reproductive units occur within the latter.  |
| 3   | Chestnut-eared Laughingthrush | <i>Ianthocincla konkakhensis</i> | VU                         | -                    | Yes                        | Criterion 2                                    | Likely  | Montane Forest     | <p>This is a restricted range species with an EOO of 19,400 km<sup>2</sup>. This species is known from only two locations in Viet Nam and one location, Xe Xap National Park (c. 50km from the EAAA), in Laos. It occurs in the undergrowth of primary upper montane evergreen forest between elevations of 1,200-1,750 m asl, and is also found to tolerate disturbed forest habitat (e.g. logged forest). The population is estimated at 1,000-2,499 mature individuals, which equates to c.1, 500-4,000 individuals.</p> <p>This species qualified under the IUCN RL category and criteria VU D2. To be up listed to EN status under criteria D would require this species' estimated population size to be fewer than 250 mature individuals. It is however unlikely that more than 80% (2249 mature individuals) of its current estimated global population of max. 2499 mature individuals is present in the EAAA and that the loss of individuals present in the EAAA would lead to this species' IUCN Red List status being up listed from VU (D2) to EN.</p> <p>To meet the threshold for Criterion 2, the EAAA will need to regularly hold 150-400 individuals (≥ 10% of the global population and ≥ 10 reproductive units). As the EAAA comprises c. 10% of this species' range, and this species' presence is not well known in the project area and the wider region, it is possible that 10% of the global population is present in the EAAA.</p> |

Appendix G: Critical Habitat Assessment

| S/N          | Common Name | Scientific Name         | IUCN Red List <sup>a</sup> | Endemic to Laos PDR?                  | Restricted -range Species?            | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat                    | Description & Rationale (IUCN) <sup>d</sup>   |
|--------------|-------------|-------------------------|----------------------------|---------------------------------------|---------------------------------------|--|---|---------------------------------------|---|
|              |             |                         |                            |                                       |                                       |  |   |                                       | Based on the commentary received from Timmins & Duckworth (2022), the species is very likely to occur in the WEF corridor, primarily in the highest elevation areas, and in the tongues of forest on the northern edge of the project area, contiguous with the forested Phou Ajol massif to the north, and possibly in the isolated tall forest fragments towards the centre of the project area. Presence more widely in the project area is hard to assess, but not impossible in secondary forest patches in the north-eastern quarter of the project area.   |
| <b>Flora</b> |             |                         |                            |                                       |                                       |  |   |                                       |   |
| 1            | -           | <i>Camellia sp.</i>     | NE                         | Unknown: potentially 'new to science' | Unknown: potentially 'new to science' | Criterion 2 possibly                           | Confirmed                                     | Unknown: potentially 'new science' to | These plant species were all detected during wet season surveys across various survey blocks. Following identification by regional and national experts from the Faculty of Forestry Science at the National University of Laos, these species have been considered as potential new species to science, and therefore have yet to be formally evaluated under the IUCN Red List.<br><br>Given that limited global/regional/national evidence is available on the presence and extent of this species in Laos, these species are considered as restricted-range as anywhere from 1 - 95 percent of the (known) global population could be present in the EAAA, although survey results suggest that they could be more widely distributed in the area than currently known. It is therefore possible that these species could trigger criterion 2. In accordance with the precautionary principle, these species could possibly qualify the Project as being located in critical habitat. |
| 2            | -           | <i>Garcinia sp.</i>     |                            |                                       |                                       |  |   |                                       |   |
| 3            | -           | <i>Lasianthus sp. 1</i> |                            |                                       |                                       |  |   |                                       |   |
| 4            | -           | <i>Lasianthus sp. 2</i> |                            |                                       |                                       |  |   |                                       |   |
| 5            | -           | <i>Machilus sp.</i>     |                            |                                       |                                       |  |   |                                       |   |
| 6            | -           | <i>Melastoma sp.</i>    |                            |                                       |                                       |  |   |                                       |   |
| 7            | -           | <i>Neolitsea sp.</i>    |                            |                                       |                                       |  |   |                                       |   |
| 8            | -           | <i>Polyosma sp.1</i>    |                            |                                       |                                       |  |   |                                       |   |
| 9            | -           | <i>Polyosma sp.2</i>    |                            |                                       |                                       |  |   |                                       |   |
| 10           | -           | <i>Smilax sp.</i>       |                            |                                       |                                       |  |   |                                       |   |
| <b>Fish</b>  |             |                         |                            |                                       |                                       |  |   |                                       |   |

## Appendix G: Critical Habitat Assessment

| S/N | Common Name | Scientific Name           | IUCN Red List <sup>a</sup> | Endemic to Laos PDR? | Restricted -range Species? | ADB SPS critical habitat criteria <sup>b</sup> | Potential Occurrence in the EAAA <sup>c</sup> | Associated Habitat            | Description & Rationale (IUCN) <sup>d</sup>  |
|-----|-------------|---------------------------|----------------------------|----------------------|----------------------------|--|---|-------------------------------|--|
| 1   | -           | <i>Schistura imitator</i> | LC                         | Yes                  | Yes                        | Criterion 2                                    | Possible                                      | Waterbodies (rivers & stream) | <p>This species has only been recorded from the Sekong basin, southern Lao PDR, where the EAAA is located. It has been assessed as Least Concern on the IUCN Red List due to the number of sites and lack of threats identified across its known range. The distance between occupied locations furthest apart is smaller than 500km (i.e. 195km), therefore the species is a restricted-range freshwater species.</p> <p>This species has only been collected from two surveys in the main Se Kong river, which does not overlap with the EAAA. Consultation with a regional fish expert revealed that the most recent (and likely only) field survey of the area was briefly undertaken in 2011. This species was not detected during surveys then (M.Kottelat pers. comm., October 11, 2021).</p> <p>While endemic to the Sekong drainage, no other information reviewed suggests that suitable habitat does not occur across this species' range. In accordance with the precautionary principle, as the EAAA comprises more than 10% of the species' range (c.15.8%), and limited surveys have been located within the Se Kong basin, it is possible that this species could trigger Criterion 2.</p> |
| 2   | -           | <i>Schistura clatrata</i> | LC                         | Yes                  | Yes                        | Criterion 2                                    | Possible                                      | Waterbodies (rivers & stream) | See comment as above   |

**Notes:**

<sup>a</sup> **IUCN Global Red List status:** **CR** = Critically Endangered; **EN** = Endangered; **VU** = Vulnerable; **NT** = Near Threatened; **LC** = Least Concern; **DD** = Data Deficient. *Note that there is no national Red List available for Laos.*

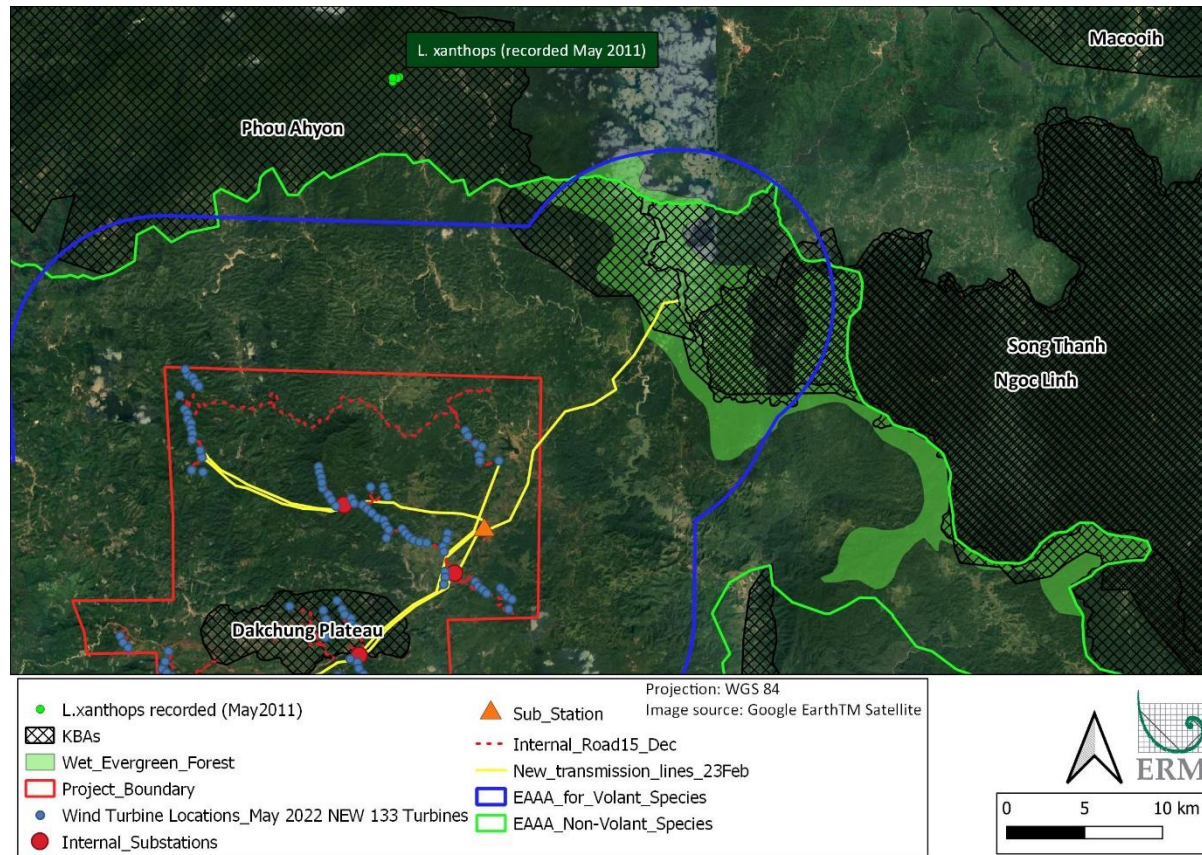
<sup>b</sup> **ASP SPS critical habitat criteria:** **Criterion 1** = critically endangered or endangered species, **Criterion 2** = endemic and/or restricted-range species.

<sup>c</sup> **Potential occurrence in the EAAA:** **Confirmed** = presence confirmed through Project field surveys; **Highly likely**: habitat requirements fully met and EAAA within documented species geographical/altitudinal range; **Likely**: habitat requirements largely met and EAAA within the documented species geographical/altitudinal range; **Possible**: habitat requirements largely met and EAAA on the edge of the documented species geographical/altitudinal range.

<sup>d</sup> Note that since reliable population data is mostly absent, the proportion of a species' distribution in the area was used as a proxy for population size to inform critical habitat-determination where applicable. Species that were identified as important by stakeholders / experts but did not meet any of the thresholds are listed in Appendix B.

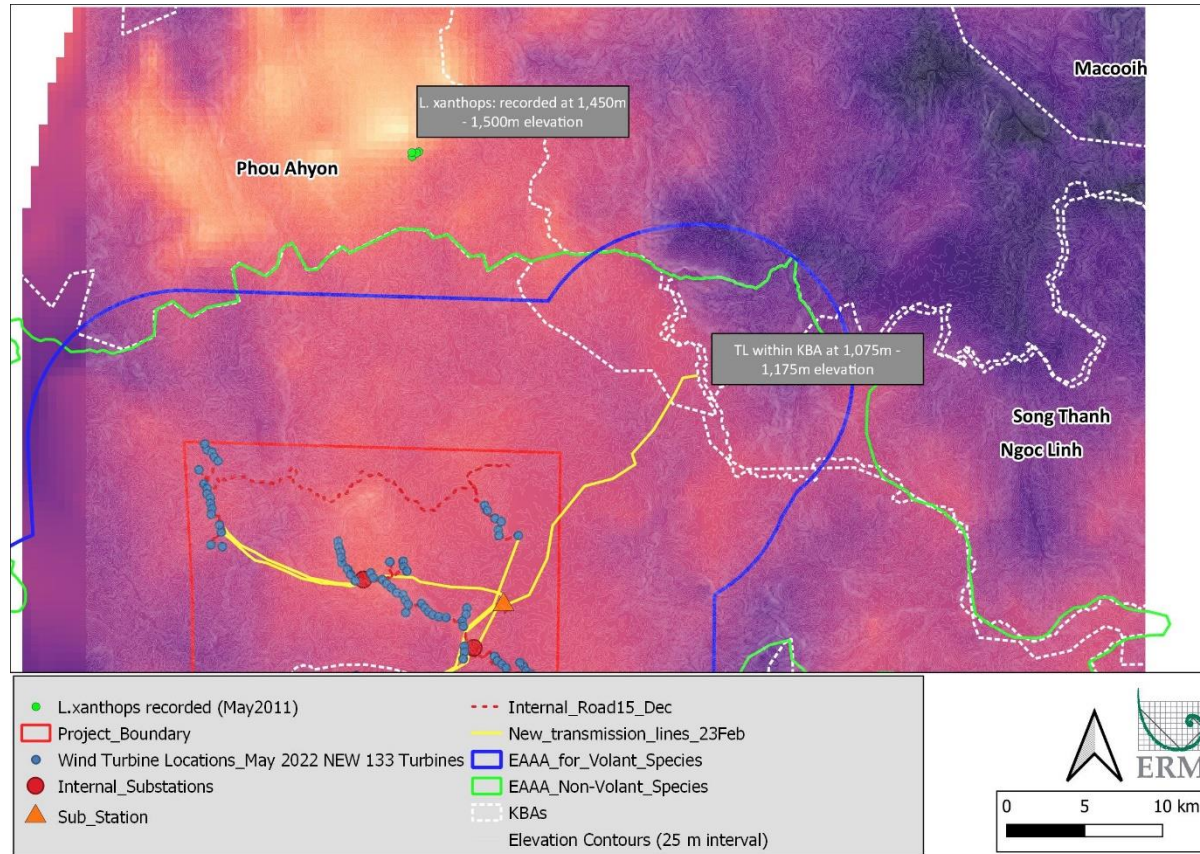
Appendix G: Critical Habitat Assessment

Figure 8-1: Map Showing the Recorded Locations of *L. Xanthops* at Phou Ayon Mountain Relative to Monsoon WF



Appendix G: Critical Habitat Assessment

**Figure 8-2: DEM Showing Altitudinal Differences between *L. Xanthops* Recorded Locations at Phou Ayon Mountain and the Monsoon WF TL through the Phou Ayon KBA**





## Appendix G: Critical Habitat Assessment

**APPENDIX B FLAURA AND FAUNA ASSESSED NOT QUALIFYING FOR CRITICAL HABITAT CRITERIA 1-4.<sup>24</sup>**

| S/N            | Common name                 | Scientific name                   | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|----------------|-----------------------------|-----------------------------------|-----------------------------|--|
| <b>Mammals</b> |                             |                                   |                             |  |
| 1              | Binturong                   | <i>Arctictis Binturong</i>        | VU                          | Species screened are not CR/EN and not endemic to Laos PDR or restricted-range or migratory/congregatory species. Therefore these species were screened out of the CHA as they are not considered relevant in terms of criteria 1, 2 and 3.  |
| 2              | Smooth-coated otter         | <i>Lutrogale perspicillata</i>    | VU                          |  |
| 3              | Asiatic black bear          | <i>Ursus thibetanus</i>           | VU                          |  |
| 4              | Sun bear                    | <i>Ursus malayanus</i>            | VU                          |  |
| 5              | Great hog badger            | <i>Arctonyx collaris</i>          | VU                          |  |
| 6              | Chinese serow               | <i>Capricornis milneedwardsii</i> | VU                          |  |
| 7              | Sambar deer                 | <i>Cervus unicolor</i>            | VU                          |  |
| 8              | Chinese goral               | <i>Naemorhedus greseus</i>        | VU                          |  |
| 9              | Black giant squirrel        | <i>Ratufa bicolor</i>             | NT                          |  |
| 10             | Stump-tailed macaque        | <i>Macaca arctoides</i>           | VU                          |  |
| 11             | Northern pig-tailed macaque | <i>Macaca leonina</i>             | VU                          |  |
| 12             | Dhole                       | <i>Cuon alpinus</i>               | EN                          | The dhole was listed from the village interviews with insufficient provisional information and not confirmed for the GT list. The most recent records of dholes from northern Lao (between 2010 and 2015) found the species in northern parts of the country, especially the Nam Et-Phou Louey. It is considered extirpated from the south, and there are no recent records of the species there. Given the uncertainty over its presence in the project area (with no confirmed observations, only anecdotal evidence from villagers which may not be correct), this species was not included in the CHA. |
| 13             | Chinese pangolin            | <i>Manis pentadactyla</i>         | CR                          | Both the Chinese and sunda pangolin have an EOO of several 100,000 km <sup>2</sup> , occurring across mainland and island Southeast Asia in a wide range of habitats Even while frequently detected in   |

<sup>24</sup> Species of LC and non-endemic / non-migratory species listed here were not considered further in the CHA. This list was also supplemented using information from the IUCN Red List Data Base. Note that since reliable population data is mostly absent, the proportion of a species' distribution in the area, available information and consultation with experts was used as a proxy to determine whether the species would qualify for Critical Habitat Criteria.

## Appendix G: Critical Habitat Assessment

| S/N | Common name         | Scientific name          | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|-----|---------------------|--------------------------|-----------------------------|--|
| 14  | Sunda Pangolin      | <i>Manis javanica</i>    | CR                          | the survey area, it is unlikely, that $\geq 0.5\%$ (or a globally significant part) of the population is found within the EAAA to classify for Criterion 1. Also, neither species of Pangolin are endemic, restricted-range or migratory/congregatory species in terms of CH qualifying criteria 2 and 3. Therefore, the species was screened out of the CHA.  |
| 15  | Large-spotted Civet | <i>Viverra megaspila</i> | EN                          | Several examinations of records over varying geographic scales have concluded that <i>V. megaspila</i> is basically a lowland species, almost 16 confined to areas of level or gentle terrain with records over 300 m asl relatively unusual. Since the Project is being located in Dak Cheung District of Sekong Province, with the average elevation of approximately 1,200 m above sea level (the lowest point is 529 m and the highest point is 1,397 m above the sea level), occurrence of the species is highly unlikely, and it was not found during surveys. According to the IUCN online database of RDL species, it is very scarce above about 500 m and occurs predominantly below 300 m. This precludes its potential persistence at any appreciable population numbers in the project area given the high altitude. The species is also not endemic, restricted-range or a migratory/congregatory species in terms of CH qualifying criteria 2 and 3. Therefore, the species was screened out of the CHA. |
| 16  | Asian Elephant      | <i>Elephas maximus</i>   | EN                          | The species was reported in the past, but it is highly unlikely that they occur in the area any longer. Local villagers also stated that this species is not present, and it was not detected during any of the field surveys. The Dong Ampham IBA <sup>25</sup> is home to the species, but lies 15km from the wind turbine boundary and 25km from the transmission line of the Project. Home range sizes likely depend not only on availability of forage, but also of water, needed for drinking, bathing and wallowing and given that there are no major perennial rivers in the project area to   |

<sup>25</sup>The IBA consists of around 200,000 ha covered by a heavily forested area and it forms one of the National Biodiversity Conservation Areas of Laos

Appendix G: Critical Habitat Assessment

| S/N | Common name | Scientific name                | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA  |
|-----|-------------|--------------------------------|-----------------------------|---|
|     |             |                                |                             | support large herbivores such as elephant, this largely precludes their potential presence. This species was therefore screened out of the CHA.   |
| 17  | Tiger       | <i>Panthera tigris</i>         | EN                          | <p>The species was reported in the past, but it is highly likely that they no longer occur in the area. Local villagers also stated that this species is not present, and it was not detected during any survey. The Dong Ampham IBA<sup>25</sup> is said to be home to the species, but lies 15km from the wind turbine boundary and 25km from the transmission line of the Project.</p> <p>Home ranges size heavily depends on the availability of suitable prey, especially large ungulates. Interviews and surveys found that gaur and banteng are absent from the area. While tigers are opportunistic hunters, species, the various muntjac species will not make up the bulk of their diet, especially with the largest species (<i>M. vuquangensis</i>) being very localised. While sambar deer were observed in the area, they are rare. The large absence of suitable prey largely precludes the tiger's potential presence. This species was therefore screened out of the CHA.</p>  |
| 18  | Saola       | <i>Pseudoryx nghetinhensis</i> | CR                          | <p><i>P. nghetinhensis</i> is a restricted range species, with an EOO of less than 50,000 km<sup>2</sup>. This species occurs only in the Annamite Mountains region of Laos and Viet Nam. In Laos, there is evidence of its occurrence in Xieng Khouang, Bolikhamxay, Khammouan, Savannakhet and Xekong Provinces. Records come from as far west as central Bolikhamxay Province, but occurrence in Laos away from the main spine of the Annamite Mountains is likely always patchy because of generally unfavourable climatic conditions. This hunting-sensitive species is probably absent from small forest fragments in the order of 100 km<sup>2</sup> or less, and is likely to be largely restricted to larger forest blocks with relatively low hunting pressure.</p> <p>Knowledge of this species' historical and current range suggests that it has a highly specific habitat association with wet evergreen forest. The number of Saola subpopulations—defined as those in non-contiguous blocks of habitat—probably numbers 6</p> |

## Appendix G: Critical Habitat Assessment

| S/N  | Common name                    | Scientific name                   | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA  |
|--|--------------------------------|-----------------------------------|-----------------------------|---|
|  |                                |                                   |                             | <p>to 15, and none likely holds more than 50 animals. Consequently, the total population is undoubtedly less than 750, and likely much less. Commentary received from Timmins &amp; Duckworth (2022) suggests that it is likely that the species would have historically occurred within the WEF corridor, especially the northern two-thirds of it, given its ecological continuity with the species' confirmed range just to the north. However, the species has declined catastrophically since its discovery in 1992 due to hunting pressures.</p> <p><i>P. nghetinhensis</i>' global range does not overlap with the EAAA, and there have been no reported sightings of this species from village interviews undertaken during the REA. Nevertheless, expert consultation confirms that it could possibly be present in the EAAA. If present, it will likely be restricted to 1-5 km from the Laos-Viet Nam border (A. Tilker, pers. comm, September 27 2021). Given that very limited suitable habitat is present in the EAAA for this rare species, and the area is subject to heavy hunting pressures as assessed from villager interviews during the REA and wet season surveys, it is unlikely that significant concentrations of this species would occur in the EAAA.</p> |
| <b>Herpetofauna: Reptiles &amp; Amphibians</b> |                                |                                   |                             |   |
| 1  | Asiatic Softshell Turtle       | <i>Amyda cartilaginea</i>         | VU                          | <p>Species screened are not CR/EN and not endemic to Laos PDR or restricted-range or migratory/congregatory species. Therefore these species were screened out of the CHA as they are not considered relevant in terms of criteria 1, 2 and 3.</p>  |
| 2  | King cobra                     | <i>Ophiophagus hannah</i>         | VU                          |   |
| 3  | Black and White Spitting Cobra | <i>Naja siamensis</i>             | VU                          |   |
| 4  | Burmese Python                 | <i>Python bivittatus</i>          | VU                          |   |
| 5  | Chinese Softshell Turtle       | <i>Pelodiscus sinensis</i>        | VU                          |   |
| 6  | -                              | <i>Acanthosaura prasina</i>       | VU                          |   |
| 7  | Serrate Frilled Treefrog       | <i>Kurixalus cf gryllus</i>       | VU                          |   |
| 8  | Tiny Bubble-nest frog          | <i>Gracixalus supercornutus</i>   | NT                          |   |
| 9  | Spinyback Torrent frog         | <i>Amolops spinapectoralis</i>    | LC                          |   |
| 10   | -                              | <i>Limnonectes poilani</i>        | LC                          |   |
| 11   | Truong DSon Bug-eyed frog      | <i>Theloderma truongsongensis</i> | LC                          |   |

## Appendix G: Critical Habitat Assessment

| S/N | Common name         | Scientific name              | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|-----|---------------------|------------------------------|-----------------------------|--|
| 12  | Firth's Litter Toad | <i>Leptobrachella firthi</i> | EN                          | A forest dwelling frog closely associated with small, shallow rocky streams within montane evergreen forest and particularly where riparian vegetation is absent. This species EOO is stated as less than 4,000 km <sup>2</sup> , along the border of southern Laos and Viet Nam. There is no information available based on the surveys. Despite its limited range, it is unlikely that the EAAA will support significant concentrations of this species (i.e. at least 10% of the global population and 10 reproductive units). Therefore, a judgement call was made to exclude the species from qualifying forest habitat as critical habitat in terms of criterion 2 given that the qualifying thresholds are unlikely to be exceeded.   |
| 13  | Elongated Tortoise  | <i>Indotestudo elongata</i>  | EN                          | The species is not endemic to Laos, having an EOO distributed across South and Southeast Asia. In the latter part of the 20th century <i>I. elongata</i> was already scarce and scattered throughout Lao, with records mostly from hilly areas of about 600 m altitude. Subpopulations have since been severely depleted and possibly locally extirpated. The species was reported in two survey blocks, but not detected during the surveys. Due to the low population it is difficult to detect, and it is overall uncertain whether it occurs in the area at all.<br><br>It cannot be determined with any certainty whether the forest habitats in the project area would meet the quantitative thresholds for criterion 1 that qualify habitat as critical for supporting the species at a global level. Therefore, the species was screened out of the CHA. |
| 14  | Bouret's Box Turtle | <i>Cuora boureti</i>         | CR                          | <i>C. boureti</i> is a restricted range species, with an EOO of less than 50,000 km <sup>2</sup> . The species is found from central Viet Nam, as well as from adjoining Savannakhet Province in Lao PDR (Obst and Reimann 1994, Nguyen et al., 2009, Stuart et al., 2011). The species inhabits upland, moist, closed-canopy evergreen forest, usually between 300 and 700 m altitude, and is not specifically associated with forest streams (Stuart and Platt 2004, Stuart et al. 2011, T. McCormack unpubl. data). Suitable habitat occurs in the EAAA for this species. Due to their cryptic nature, no population numbers or   |

## Appendix G: Critical Habitat Assessment

| S/N | Common name                | Scientific name           | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|-----|----------------------------|---------------------------|-----------------------------|--|
|     |                            |                           |                             | <p>estimates are known. Wet season surveys did not confirm the species' presence in the EAAA, but village interviews suggest its potential presence within study block 2. However, this species is thought to be very rare in the area, as locals have not recently come across this species.</p> <p>It is unlikely that the EAAA will support significant concentrations of this species (i.e. at least 10% of the global population and 10 reproductive units). Therefore, a judgement call was made to exclude the species from qualifying forest habitat as critical habitat in terms of criterion 2 given that the qualifying thresholds are unlikely to be exceeded.</p>   |
| 15  | Black-breasted leaf turtle | <i>Geoemyda spengleri</i> | EN                          | <p><i>G. spengleri</i> is found across southern China, northern Viet Nam, and adjoining areas of Laos. The extent of its southern range remains unclear. The species is primarily terrestrial but occasionally uses streams. It inhabits closed-canopy forest at mid to high elevations (from 500 to over 1,000 m asl). Suitable habitat therefore occurs in the EAAA for this species.</p> <p>Very few field encounters of this species during biological surveys have been reported despite extensive survey efforts in suitable habitat. Wet season surveys did not detect the presence of this species, but village interviews suggest that it has been known to occur in study block 2 and 3. Given the difficulties of detecting this species in the field, and their reported presence in the area, the lack of records of this species to date is likely a result of the area being poorly surveyed. With a range overlap with the EAAA of &lt;0.5% (c.0.06%), it is unlikely that the EAAA will support significant concentrations of this species (i.e. at least 10% of the global population and 10 reproductive units). Therefore, a judgement call was made to exclude the species from qualifying forest habitat as critical habitat in terms of criterion 2 given that the qualifying thresholds are unlikely to be exceeded.</p> |
| 16  | Keeled Box Turtle          | <i>Cuora mouhotii</i>     | EN                          | <p>The species is associated with limestone karst in central and northern Lao PDR and occurs in north-eastern India, Myanmar, northern Thailand, southern China and</p>  |

## Appendix G: Critical Habitat Assessment

| S/N | Common name       | Scientific name                  | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|-----|-------------------|----------------------------------|-----------------------------|--|
|     |                   |                                  |                             | Viet Nam. No evidence of the species was found during surveys, and there was only insufficient provisional information. It was not confirmed for the GT list. With a range overlap with the EAAA of <0.5%, it is unlikely that the EAAA will support significant concentrations of this species (i.e. at least 10% of the global population and 10 reproductive units). Therefore, a judgement call was made to exclude the species from qualifying forest habitat as critical habitat in terms of criterion 2 given that the qualifying thresholds are unlikely to be exceeded.   |
| 17  | Siamese Crocodile | <i>Crocodylus siamensis</i>      | CR                          | Siamese crocodiles occur in a wide range of freshwater habitats, including slow-moving rivers and streams, lakes, seasonal oxbow lakes, marshes and swamplands. While extant populations were found in several provinces, this did not include Sekong and Attapeu. Overall, the Project area offers no longer any habitat potential for the species  |
| 18  | Big-headed Turtle | <i>Platysternon megacephalum</i> | CR                          | The turtle is a habitat specialist requiring steep clearwater cascading streams in forested hill areas at elevations between 100 and 800 m. The species has a wide range of distribution (From Central China to northern Viet Nam, Thailand, Lao People's Democratic Republic, Cambodia and Myanmar), but is now rare throughout its range due to hunting pressure. It was neither reported by villagers nor detected during surveys. Its extent of range overlaps with the EAAA, but the total population is suspected to have decreased by over 90% in the last three generations. It is unlikely that the EAAA will support significant concentrations of this species (i.e. at least 0.5% of the global population and 5 reproductive units). Therefore, a judgement call was made to exclude the species from qualifying forest habitat as critical habitat in terms of criterion 1 given that the qualifying thresholds are unlikely to be exceeded. |
| 19  | Red River Krait   | <i>Bungarus slowinskii</i>       | VU                          | This species occurs in mountain regions, in or near streams in secondary or primary evergreen forest. It is also known to occur in heavily modified areas  |

## Appendix G: Critical Habitat Assessment

| S/N | Common name        | Scientific name          | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA  |
|-----|--------------------|--------------------------|-----------------------------|---|
|     |                    |                          |                             | <p>across its range. There is therefore suitable habitat for this species in the EAAA.</p> <p><i>B. slowinskii</i> is a restricted range species with an EOO of 18,000 km<sup>2</sup>, which was known only from Viet Nam. Wet season surveys have confirmed the presence of this species in survey block 2, presenting one of the first official records for Laos, while village interviews revealed that this species is likely to be present in all survey blocks.</p> <p>Even if the EAAA was found to support this species, it is unlikely that the loss of the entire area (2,670 km<sup>2</sup>) would result in the reduction of this species' range by as much as approximately 72%, from 18,000km<sup>2</sup> to 5,000 km<sup>2</sup> to uplist this species' IUCN Red List status from VU to EN. Therefore, this species has been excluded from qualifying for Criterion 1. The species is not endemic to Laos, occurring primarily in neighbouring Vietnam. It is considered a restricted-range species, both altitudinally and geographically within Vietnam, yet its recorded presence in Laos suggests that the species range may be larger than previously thought. That being said, there is limited information available for this very rare snake, which according to IUCN is known only from four specimens from some of the best-surveyed areas of Vietnam, so it cannot be determined with any certainty whether the forest habitats in the project area would meet the quantitative thresholds for criterion 2 that qualify habitat as critical for supporting the species at a global level. Therefore, the species has been excluded from criterion 2 as despite being considered restricted-range, species range may be broader than previously considered given the lack of information on this rare species and since the reported range at this time is largely in Vietnam and not determined for Laos PDR</p> |
| 20  | Impressed Tortoise | <i>Manouria impressa</i> | EN                          | <p>The impressed tortoise is a resident species of Cambodia; China (Hainan, Yunnan), Lao, Malaysia (Peninsular Malaysia), Myanmar, Thailand and Viet Nam.</p> <p>It inhabits upper evergreen montane forests between 900 and 1,600 m of elevation (above 1,200 m asl in China) and does not tolerate degraded</p>   |



## Appendix G: Critical Habitat Assessment

| S/N | Common name    | Scientific name          | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA  |
|-----|----------------|--------------------------|-----------------------------|---|
|     |                |                          |                             | <p>forests. <i>M. impressa</i> shelters beneath logs, and is inactive for long periods of the year (aestivate). It was confirmed during the baseline biodiversity surveys. The species occurs at high densities in appropriate habitat (protected forest habitat according to IUCN and closed-canopy evergreen forest in mountainous areas according to Calame <i>et al.</i>, 2013<sup>26</sup>), however outside of protected habitat the population is suspected to be decreasing due to collection for the pet trade and habitat loss from agriculture and logging. Remaining good condition, closed-canopy primary evergreen montane forest habitat in the project area may be considered important for this species, however the extent to which this habitat is considered critical in supporting the remaining population of this cryptic reptile is uncertain. Indeed, Calame <i>et al.</i> (2013) report that there are very few published observations of <i>M. impressa</i> in the wild and most records, particularly in Indochina (Laos, Vietnam, and Cambodia), are from hunted individuals found for sale in local markets, seizures from traders, or empty shells seen in villages. Given the limited data on the species, it cannot be determined with certainty whether the forest habitats in the project area would meet the quantitative thresholds for criterion 1 that qualify the habitat as critical for supporting the species at a global level.</p> |
| 21  | Annam Keelback | <i>Hebius annamensis</i> | DD                          | <p>It is a restricted-range species with an EOO of approximately 23,000 km<sup>2</sup> and also altitudinal restriction to higher elevations between 1,000 – 1,500 m AMSL. This species is only known from Da Nang and Kon Tum Provinces in central Viet Nam, and Sekong Province in south eastern Laos. It occurs in rocky streams on steep terrain, in wet evergreen forest at higher between elevations of 1,280–1,500 m. No population data is available as</p>   |

26 Calame *et al.* (2013). Field observations of the Vulnerable Impressed Tortoise, *Manouria impressa*, from Southern Laos and Notes on Local Chelonian Trade. Asian Herpetological Research, 4 (2): 151-154. DOI: 10.3724/SP.J.1245.2013.00151. Available online: [https://www.researchgate.net/publication/264240397\\_Field\\_Observations\\_of\\_the\\_Vulnerable\\_Impressed\\_Tortoise\\_Manouria\\_impressa\\_from\\_Southern\\_Laos\\_and\\_Notes\\_on\\_Local\\_Chelonian\\_Trade](https://www.researchgate.net/publication/264240397_Field_Observations_of_the_Vulnerable_Impressed_Tortoise_Manouria_impressa_from_Southern_Laos_and_Notes_on_Local_Chelonian_Trade)

## Appendix G: Critical Habitat Assessment

| S/N | Common name | Scientific name           | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA  |
|-----|-------------|---------------------------|-----------------------------|---|
|     |             |                           |                             | <p>this species is only known from fewer than six specimens to date. Baseline surveys to date have not observed or recorded this species. Nevertheless, the expert consulted considers this species as likely to be present within the EAAA, and more widespread than currently known (Nguyen, pers. comms., September 21, 2021).</p> <p>Given the extent of range overlap with the EAAA (c.1.1%), and that this species is expected to have a larger range than currently known, it is unlikely that the EAAA will support significant concentrations of this species (i.e. at least 10% of the global population and 10 reproductive units). Therefore, a judgement call was made to exclude the species from qualifying forest habitat as critical habitat in terms of criterion 2 given that the qualifying thresholds are unlikely to be exceeded.</p>                 |
| 22  |             | <i>Quasipaa sp.</i>       | NE                          | <p>This amphibian species is a potential new species to science, and therefore has yet to be formally evaluated under the IUCN Red List. It was detected close to transmission line route, near the Laos – Viet Nam border, north of study block 1 during the wet season field surveys.</p> <p>Given that limited global/regional/national evidence is available on the presence and extent of this species in Laos, this species is considered as restricted-range as anywhere from 1 - 95 percent of the (known) global population could be present in the EAAA. It is therefore possible that this species could trigger Criterion 2, however with no quantitative data on this species to evaluate exceedances of CH qualifying thresholds, an evaluation cannot be done with any degree of certainty and at this stage the species has been excluded from the CHA.</p> |
| 23  |             | <i>Rhacophorus sp nov</i> | NE                          | <p>This amphibian species is a potential new species to science, and therefore has yet to be formally evaluated under the IUCN Red List. This species was detected in an open area close to transmission line route, near the Laos – Viet Nam border at study block 2, during wet season field surveys.</p> <p>Given that limited global/regional/national evidence is available on the presence and extent of this</p>   |

## Appendix G: Critical Habitat Assessment

| S/N                          | Common name           | Scientific name               | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|------------------------------|-----------------------|-------------------------------|-----------------------------|--|
|                              |                       |                               |                             | species in Laos, this species is considered as restricted-range as anywhere from 1 - 95 percent of the (known) global population could be present in the EAAA. It is therefore possible that this species could trigger criterion 2, however with no quantitative data on this species to evaluate exceedances of CH qualifying thresholds, an evaluation cannot be done with any degree of certainty and at this stage the species has been excluded from the CHA.  |
| <b>Avifauna<sup>27</sup></b> |                       |                               |                             |  |
| 1                            | Besra                 | <i>Accipiter virgatus</i>     | LC                          | <p>Species observed during the VP survey are not CR/EN and typically not endemic or range-restricted. The majority of species are confirmed residents, while eleven surveyed during the VPs are confirmed migrants. These proved to be broad-front migrants, which is unsurprising given that there are no IBAs designated for migratory and/or congregatory species identified within the EAAAs.</p> <p>The great hornbill (as the only VU species detected during VP surveys) is restricted to large tracts of undisturbed forest within a region. The EOO of the species is stated with over 10 million km<sup>2</sup>, but it appears to have declined considerably in Lao since being historically described as common. Due to the extensive EOO (ranging from China and Nepal to Sumatra), none of the CHA qualifying criteria (see <b>Section 3.1</b>) are fulfilled.</p> |
| 2                            | Black baza            | <i>Aviceda leuphotes</i>      | LC                          |  |
| 3                            | Black eagle           | <i>Ictinaetus malaiensis</i>  | LC                          |  |
| 4                            | Black-winged kite     | <i>Elanus caeruleus</i>       | LC                          |  |
| 5                            | Changeable hawk-eagle | <i>Nisaetus cirrhatus</i>     | LC                          |  |
| 6                            | Chinese pond heron    | <i>Aredola bacchus</i>        | LC                          |  |
| 7                            | Cinnamon bittern      | <i>Ixobrychus cinnamomeus</i> | LC                          |  |
| 8                            | Crested goshawk       | <i>Accipiter trivirgatus</i>  | LC                          |  |
| 9                            | Crested serpent eagle | <i>Spilornis cheela</i>       | LC                          |  |
| 10                           | Eastern buzzard       | <i>Buteo japonicas</i>        | LC                          |  |
| 11                           | Eurasian kestrel      | <i>Falco tinnunculus</i>      | LC                          |  |
| 12                           | Eurasian sparrowhawk  | <i>Accipiter nisus</i>        | LC                          |  |
| 13                           | Great hornbill        | <i>Buceros bicornis</i>       | VU                          |  |
| 14                           | Grey-faced buzzard    | <i>Butastur indicus</i>       | LC                          |  |
| 15                           | Japanese sparrowhawk  | <i>Accipiter gularis</i>      | LC                          |  |
| 16                           | Jerdon's baza         | <i>Aviceda jerdoni</i>        | LC                          |  |
| 17                           | Mountain hawk-eagle   | <i>Nisaetus nipalensis</i>    | NT                          |  |
| 18                           | Northern goshawk      | <i>Accipiter gentilis</i>     | LC                          |  |

<sup>27</sup> The species listed are based on the results of the VP and transect surveys. Note that while the VP results are listed completely, only species with elevated threat status are listed from the transect surveys, since the majority of the species encountered during the transect surveys were LC status species (249 species). The rufous-bellied eagle was found during both VP and transect surveys. The Black-crowned Barwing (found during transect surveys) is listed under Appendix A.

## Appendix G: Critical Habitat Assessment

| S/N | Common name             | Scientific name                | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|-----|-------------------------|--------------------------------|-----------------------------|--|
| 19  | Oriental hobby          | <i>Falco severus</i>           | LC                          |  |
| 20  | Oriental honey buzzard  | <i>Pernis ptilorhynchus</i>    | LC                          |  |
| 21  | Osprey                  | <i>Pandion haliaetus</i>       | LC                          |  |
| 22  | Red-wattled lapwing     | <i>Vanellus indicus</i>        | LC                          |  |
| 23  | Rufous-bellied eagle    | <i>Lophotriorchis kienerii</i> | NT                          | <p>The species from the transect survey listed here exclude the encountered LC species. They are not CR/EN and typically not endemic or range-restricted.</p> <p>The EOO of the wreathed hornbill (as the only VU species detected during the transect surveys that doesn't qualify for the CHA) is stated with over 7 million km<sup>2</sup>. Due to the extensive EOO (ranging from China and Nepal to Sumatra), none of the CHA qualifying criteria (see <b>Section 3.1</b>) are fulfilled.</p>   |
| 24  | Shikra                  | <i>Accipiter badius</i>        | LC                          |  |
| 25  | Blossom-headed parakeet | <i>Psittacula roseata</i>      | NT                          |  |
| 26  | Grey-headed parakeet    | <i>Psittacula finschii</i>     | NT                          |  |
| 27  | Red-breasted parakeet   | <i>Psittacula alexandri</i>    | NT                          |  |
| 28  | Wreathed Hornbill       | <i>Rhyticeros undulatus</i>    | VU                          |  |
| 29  | Yellow-billed nuthatch  | <i>Sitta solangiae</i>         | NT                          |  |
| 30  | Green peafowl           | <i>Pavo muticus</i>            | EN                          | <p>The green peafowl been reported to historically occur in a wide variety of habitats, including a range of primary and secondary, evergreen and deciduous forest-types, mixed coniferous forest, grasslands, scrub and farmland edge, from sea-level to at least 2,100 m. Considered possibly extinct in all but the most southern part of Lao due to intense habitat conversion and extremely high hunting levels. The estimated EOO is extent of over 4 million km<sup>2</sup>, and it is therefore unlikely that any of the CHA criteria are fulfilled.</p> |
| 31  | Black-bellied Tern      | <i>Sterna acuticauda</i>       | EN                          | <p>The species is found on large rivers (usually breeding on sandspits and islands) and marshes, occasionally on smaller pools and ditches, in</p>   |

## Appendix G: Critical Habitat Assessment

| S/N | Common name            | Scientific name          | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA  |
|-----|------------------------|--------------------------|-----------------------------|---|
|     |                        |                          |                             | <p>lowlands (but not on the coast), up to 730 m. It's EOO extents across India, Nepal, Pakistan, Myanmar and Laos. Despite its large range, the species could now number fewer, perhaps significantly fewer, than 10,000 mature individuals.</p> <p>According to the REA, the Project area may no longer contain potential habitats (which might only exist in Xekhaman) but no further information is available). IUCN lists the species as possibly extinct in Laos.</p> <p>Due to an overall lack of local information and given that fairly extensive surveys have been conducted to date in the EAAA, it is unlikely that <i>S. acuticauda</i> could be present at significant concentrations to qualify the Project as being in critical habitat for Criterion 1. It is therefore screened out of the CHA</p> |
| 32  | White-rumped Vulture   | <i>Gyps bengalensis</i>  | CR                          | <p>The REA did not find any information on these species and stated that they might only occur as visitors. All three species suffered an extremely rapid population decline, primarily as a result of feeding on carcasses of animals treated with diclofenac. According to IUCN, they are considered possibly extinct in the region.</p>  |
| 33  | Red-headed Vulture     | <i>Sarcogyps calvus</i>  | CR                          | <p>White-rumped vultures occur mostly in plains and less frequently in hilly regions where it utilises light woodland, villages, cities, and open areas.</p> <p>The red-headed vulture frequents open country usually away from human habitation, well-wooded hills and dry deciduous forest with rivers, usually below 2,500 m.</p>  |
| 34  | Slender-billed Vulture | <i>Gyps tenuirostris</i> | CR                          | <p>Slender-billed vultures inhabit dry open country and forested areas usually away from human habitation. In South-East Asia it was found in open and partly wooded country, generally in the lowlands.</p> <p>Due to an overall lack of local information and given that fairly extensive surveys have been conducted to date in the EAAA, it is unlikely that these vultures could be present at significant</p>   |

## Appendix G: Critical Habitat Assessment

| S/N | Common name             | Scientific name             | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|-----|-------------------------|-----------------------------|-----------------------------|--|
|     |                         |                             |                             | concentrations to qualify the Project as being in critical habitat. They are therefore screened out of the CHA.  |
| 35  | Yellow-breasted Bunting | <i>Emberiza aureola</i>     | CR                          | This migratory bird winters in Southeast Asia in cultivated areas, rice fields and grasslands, preferring scrubby dry-water rice fields for foraging and reedbeds for roosting. Trapping in its passage and non-breeding ranges have led to a dramatic decline. The current habitat of the Project area is seriously degraded which limits suitability. It was not found during surveys or reported by local villagers. Due to an overall lack of local information and given that fairly extensive surveys have been conducted to date in the EAAA, it is unlikely that this species could be present at significant concentrations to qualify the Project as being in critical habitat under criterion 1 and 2. It is therefore screened out of the CHA. |
| 36  | White-winged duck       | <i>Asarcornis scutulata</i> | EN                          | Historically widely distributed, the species is now estimated to consist of only c. 1000 individuals, of which c. 200 might be in Laos. Overall very small and fragmented population. While there are no confirmed recent records from Laos, however, a few birds probably survive in the Nam Theun catchment which lies to the North of the Project area within Khammouane and Bolikhamsai province. Due to an overall lack of information and given that fairly extensive surveys have been conducted to date in the EAAA, it is unlikely that this species could be present at significant concentrations to qualify the Project as being in critical habitat under criterion 1 and 2. It is therefore screened out of the CHA.                         |
| 37  | Masked finfoot          | <i>Heliopais personatus</i> | EN                          | This elusive species has a very small, and very rapidly declining population as a result of the ongoing loss and degradation of wetlands and especially riverine lowland forest in Asia. It is not endemic to Lao and has an estimated EOO of 1,8 million km <sup>2</sup> . All records of the species in Laos are from along lowland forested rivers (100–300 m asl) in southern Laos, particularly in the Xe Pian and Dong Ampham National Biodiversity Conservation Areas (NBCAs). Dong Ampham is located 15 km from the  |

## Appendix G: Critical Habitat Assessment

| S/N | Common name                 | Scientific name                    | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA  |
|-----|-----------------------------|------------------------------------|-----------------------------|---|
|     |                             |                                    |                             | <p>wind turbine boundary and 25 km from the transmission line of the Project, Xe Pian over 70 km. Given the severity of human disturbance and encroachment at Xe Pian, including a hydro-electric dam on the Xe Pian River, and in spite of the large areas of suitable habitat in riverine forest at low elevation, the Masked Finfoot is most likely on the brink of extinction in Laos, if it indeed persists there.</p> <p>The habitat breadth of the Masked Finfoot is wide, and includes lowland, forested waterways such as rivers, ponds, oxbow lakes and tidal creeks in mangroves.</p> <p>Due to the decline, it is now known from comparatively few sites, occurring at low densities everywhere. The REA states that no information is available, and that it might occur in upper Xekhaman. Given that fairly extensive surveys have been conducted to date in the EAAA, it is unlikely that this species could be present at significant concentrations to qualify the Project as being in critical habitat under criterion 1 and 2. It is therefore screened out of the CHA.</p> |
| 38  | Golden-winged laughingtrush | <i>Trochalopteron ngoclinensis</i> | EN                          | <p>This restricted range and endemic species is currently only known from Mt Ngoc Linh and Mt Ngoc Boc on the Kon Tum plateau of central Viet Nam, southeast, outside of the EAAA. This species has been recorded from upper montane, evergreen forests, between elevations of 1480-2200m AMSL. Based on the commentary received from Timmins &amp; Duckworth (2022), this species appears to be a high elevation, high montane specialist. Suitable forest habitat has been recognized as present in Attapu and Se Kong provinces of Laos, where the EAAA is located.</p> <p>From consultation with a regional expert (W. Duckworth pers. comm., April 6, 2021), the area is likely of particular importance to endemic bird species. Given that suitable habitat is present in the EAAA for this species, and it has a very small extent of occurrence (590 km<sup>2</sup>), an extension of this species' range to encompass the entire EAAA will still result in this species being categorized as a restricted range species (EOO &lt; 50,000 km<sup>2</sup>). Due</p>                     |

## Appendix G: Critical Habitat Assessment

| S/N         | Common name                    | Scientific name                | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA  |
|-------------|--------------------------------|--------------------------------|-----------------------------|---|
|             |                                |                                |                             | to this range, it is placed in the band 1,000-2,499 mature individuals. This equates to 1,500-3,749 individuals in total. Nevertheless, this species has remained undetected during the monthly bird transect surveys. Given that fairly extensive surveys have been conducted to date in the EAAA, it is unlikely that this species could be present at significant concentrations to qualify the Project as being in critical habitat under criterion 1 and 2. It is therefore screened out of the CHA.   |
| <b>Bats</b> |                                |                                |                             |   |
| 1           | Horsfield's fruit bat          | <i>Cyanopterus horsfieldii</i> | LC                          | Species screened are not CR/EN and typically not endemic or range-restricted.   |
| 2           | Blanford's fruit bat           | <i>Sphaerias blanfordi</i>     | LC                          |   |
| 3           | Long-tongued fruit bat         | <i>Macroglossus sobrinus</i>   | LC                          |   |
| 4           | Francis's woolly horseshoe bat | <i>Rhinolophus francisi</i>    | DD                          |   |
| 5           | Thai horseshoe bat             | <i>Rhinolophus siamensis</i>   | LC                          |   |
| 6           | Wall-roosting mouse-eared Bat  | <i>Myotis muricola</i>         | LC                          |   |
| 7           | Elery's tube-nosed bat         | <i>Murina eleryi</i>           | LC                          |   |
| 8           | Fiona's tube-nosed bat         | <i>Murina fionae</i>           | LC                          |   |
| 9           | Formosan golden tube-nosed bat | <i>Harpiole isodon</i>         | LC                          |   |
| 10          | Lesser hairy-winged bat        | <i>Harpiocephalus harpia</i>   | LC                          |   |
| 11          | Flat-skulled woolly bat        | <i>Kerivoula depressa</i>      | LC                          |   |
| <b>Fish</b> |                                |                                |                             |   |
| 1           | -                              | <i>Schistura bolavenensis</i>  | EN                          | <p>This species is an upland species found only on the Boloven Plateau, Paksong District, Champasak Province, southern Laos PDR, is common on the plateau in the Xenamnoy sub-basin. The distance between occupied locations furthest apart is smaller than 500km (i.e. 194km), therefore the species is a restricted-range freshwater species. The species is found in clear rocky streams approximately 800–1,200 m asl. and feeds on insects.</p> <p>While thought to be restricted to the Boloven Plateau which is outside the boundaries of the EAAA, &gt;0.5% of its distribution (c.5.7%) overlaps with the EAAA. Therefore, this species was initially considered as possibly triggering Criterion 1, but not Criterion 2 given this species' extent of range</p> |



## Appendix G: Critical Habitat Assessment

| S/N | Common name | Scientific name                   | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|-----|-------------|-----------------------------------|-----------------------------|--|
|     |             |                                   |                             | overlap being <10%. Consultations with a regional fish expert suggests that the Bolaven Plateau is unlikely to be hydrologically connected with the Dakchung Plateau and its surrounding area (M.Kottelat pers. comm., October 11, 2021). Given this species is known to only occur on the Bolaven Plateau and nowhere else, it is unlikely that this species occur in the EAAA. It was therefore screened out of the CHA.   |
| 2   | -           | <i>Poropuntius solitus</i>        | EN                          | <p><i>Poropuntius solitus</i> is a fish species listed as Endangered on the IUCN Red List. This species is only known from tributaries of the Xe Kong River on the eastern half of the Bolaven Plateau, Lao PDR, and has an EOO of 2,500 km<sup>2</sup>. The distance between occupied locations furthest apart is smaller than 500km (i.e. 240km), therefore the species is a restricted-range freshwater species. The species is expected to occur in streams with clear, cool and fast water, over stones, rocks, rapids and waterfalls.</p> <p>While thought to be restricted to the Bolaven Plateau which is outside the boundaries of the EAAA, &gt;0.5% of its distribution (c.5.7%) overlaps with the EAAA. Therefore, this species was initially considered as possibly triggering Criterion 1, but not Criterion 2 given this species' extent of range overlap being &lt;10%. Consultations with a regional fish expert suggests that the Bolaven Plateau is unlikely to be hydrologically connected with the Dakchung Plateau and its surrounding area (M.Kottelat pers. comm., October 11, 2021). Given this species is known to only occur on the Bolaven Plateau and nowhere else, it is unlikely that this species would occur in the EAAA. It was therefore screened out of the CHA.</p> |
| 3   | -           | <i>Poropuntius lobocheiloides</i> | EN                          | <p><i>Poropuntius lobocheiloides</i> is a fish species listed as Endangered on the IUCN Red List. This species is only known from tributaries of the Xe Kong River on the eastern half of the Bolaven Plateau, Lao PDR, and has an EOO of 2,500 km<sup>2</sup>. The distance between occupied locations furthest apart is smaller than 500km (i.e. 240km), therefore the species is a restricted-range freshwater species. The species is</p>  |

Appendix G: Critical Habitat Assessment

| S/N | Common name | Scientific name                 | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA  |
|-----|-------------|---------------------------------|-----------------------------|---|
|     |             |                                 |                             | <p>expected to occur in streams with clear, cool and fast water, over stones, rocks, rapids and waterfalls. While thought to be restricted to the Boloven Plateau which is outside the boundaries of the EAAA, &gt;0.5% of its distribution (c.5.7%) overlaps with the EAAA. Therefore, this species was initially considered as possibly triggering Criterion 1, but not Criterion 2 given this species' extent of range overlap being &lt;10%. Consultations with a regional fish expert suggests that the Bolaven Plateau is unlikely to be hydrologically connected with the Dakchung Plateau and it's surrounding area (M.Kottelat pers. comm., October 11, 2021). Given this species is known to only occur on the Bolaven Plateau and nowhere else, it is unlikely that this species would occur in the EAAA, thereby triggering the critical habitat criterion 1 and/or 2. It was therefore screened out of the CHA.</p>  |
| 4   | -           | <i>Poropuntius bolovenensis</i> | EN                          | <p>This species is an upland species found only on the Boloven Plateau, Paksong District, Champasak Province, southern Lao PDR. The distance between occupied locations furthest apart is smaller than 500km (i.e. 245km), therefore the species is a restricted-range freshwater species. Found in clear rocky streams at c. 800–1,200 m asl, it feeds mainly on insects. The species exhibits local or short distance movements, therefore is probably not truly migratory.</p> <p>While thought to be restricted to the Boloven Plateau which is outside the boundaries of the EAAA, &gt;0.5% of its distribution (c.5.7%) overlaps with the EAAA. Therefore, this species was initially considered as possibly triggering Criterion 1, but not Criterion 2 given this species' extent of range overlap being &lt;10%. Consultations with a regional fish expert suggests that the Bolaven Plateau is unlikely to be hydrologically connected with the Dakchung Plateau and its surrounding area (M.Kottelat pers. comm., October 11, 2021). Given this species is known to only occur on the Bolaven Plateau and nowhere else, it is considered unlikely that this species would occur in the EAAA.</p> |

## Appendix G: Critical Habitat Assessment

| S/N | Common name | Scientific name                | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|-----|-------------|--------------------------------|-----------------------------|--|
| 5   | -           | <i>Poropuntius constermans</i> | EN                          | <p>This EN species is only known from tributaries of the Xe Kong River on the eastern half of the Bolaven Plateau, Lao PDR, and has an EOO of 2,500 km<sup>2</sup>. The distance between occupied locations furthest apart is smaller than 500km (i.e. 240km), therefore the species is a restricted-range freshwater species. The species is expected to occur in streams with clear, cool and fast water, over stones, rocks, rapids and waterfalls.</p> <p>While thought to be restricted to the Bolaven Plateau which is outside the boundaries of the EAAA, &gt;0.5% of its distribution (c.5.7%) overlaps with the EAAA. Therefore, this species was initially considered as possibly triggering Criterion 1, but not Criterion 2 given this species' extent of range overlap being &lt;10%. Consultations with a regional fish expert suggests that the Bolaven Plateau is unlikely to be hydrologically connected with the Dakchung Plateau and it's surrounding area (M.Kottelat pers. comm., October 11, 2021). Given this species is known to only occur on the Bolaven Plateau and nowhere else, it is unlikely that this species would occur in the EAAA. It was therefore screened out of the CHA.</p> |
| 6   | -           | <i>Devario salmonatus</i>      | DD                          | <p>This species is known from the Bolaven plateau, Xe Kong drainage, in Mekong basin, Lao PDR. The distance between occupied locations furthest apart is smaller than 500km (i.e. 192km), therefore the species is a restricted-range freshwater species. The species is expected to occur in streams under forest cover, with clear, moderate to fast flowing water.</p> <p>While thought to be restricted to the Bolaven Plateau which is outside the boundaries of the EAAA, &gt;0.5% of its distribution (c.5.7%) overlaps with the EAAA. Therefore, this species was initially considered as possibly triggering Criterion 1, but not Criterion 2 given this species' extent of range overlap being &lt;10%. Consultations with a regional fish expert suggests that the Bolaven Plateau is unlikely to be hydrologically connected with the Dakchung Plateau and it's surrounding area (M.Kottelat pers. comm., October 11, 2021). Given this species is known to only occur on the Bolaven</p>  |

## Appendix G: Critical Habitat Assessment

| S/N | Common name       | Scientific name                 | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|-----|-------------------|---------------------------------|-----------------------------|--|
|     |                   |                                 |                             | Plateau and nowhere else, it is unlikely that this species would occur in the EAAA. It was therefore screened out of the CHA.  |
| 7   | -                 | <i>Serpenticobitis octozona</i> | DD                          | <p>This species is found in the Sekong drainage in Lao PDR, where the EAAA is located. The distance between occupied locations furthest apart is smaller than 500km (i.e. 220km), therefore the species is a restricted-range freshwater species. The species is found in rapids and fast flowing waters in main rivers and larger tributaries, and stretches of river with large gravel. This species is uncommon, but this is possibly because its preferred habitat is not easily sampled.</p> <p>Consultation with a regional fish expert revealed that the most recent (and likely only) field survey of the area was briefly undertaken in 2011 (Kottelat, 2011). This species was not detected during surveys then. (M.Kottelat pers. comm., October 11, 2021).</p> <p>While endemic to the Sekong drainage, no other information reviewed suggests that suitable habitat does not occur across this species' range. Given that the EAAA comprises only c. 7.8% of this species' range, and assuming that there is suitable habitat for this species across most of its range, it is unlikely that this species could be present in significant concentrations. It was therefore screened out of the CHA.</p> |
| 8   | Thick-lipped barb | <i>Probarbus labeamajor</i>     | EN                          | <p>The species is endemic to the Mekong (which runs along the western border of Laos), and is only known from the Mekong mainstream from Nakorn Phanom Province (Thailand) and Sambor District, Kratie District (Cambodia). It is also found in the Sesan, Sekong and Srepok tributaries of the Mekong. While the Sekong and Sesan tributaries lie within the Project area, no reliable information on population data and geographical distribution is available. It was not detected during the surveys, nor reported by villagers. Given that there are no major perennial rivers in the project area that support this species, this largely precludes their potential presence. It was screened out of the CHA.</p>   |

## Appendix G: Critical Habitat Assessment

| S/N                       | Common name             | Scientific name                                 | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|---------------------------|-------------------------|---|-----------------------------|--|
| 9                         | Giant pangasius         | <i>Pangasius sanitwongsei</i>                   | CR                          | <i>P. sanitwongsei</i> is a benthopelagic, potamodromous species which inhabits large rivers surrounded by rainforest. According to the REA, there is no information available, and potential habitats might only exist in Xekhaman. With reliable information on population data and geographical distribution absent, one cannot assess this species with certainty against the CH qualifying criteria thresholds. It was excluded from the CHA.   |
| <b>Flora<sup>28</sup></b> |                         |   |                             |  |
| 1                         | Soum dok-noi            | <i>Pittosporum pauciflorum</i>                  | VU                          | The species is known from the Chao Phraya and Mekong basins in Cambodia, China, Lao PDR, Thailand and Viet Nam. It was found with a high frequency in certain survey blocks. There is no additional information available. Since the species is not CR/EN and typically not endemic, it does not qualify for the CHA.  |
| 2                         | -                       | <i>Zingiber mellis</i>                          | EN                          | A rhizomatous herb (ginger) found growing in broadleaved evergreen montane forest at altitude 1,150 to 1,500 m. Threatened by habitat loss due to agriculture, <i>Z. mellis</i> saw a dramatic population decline in the last decade. It was confirmed during botanical field surveys in the Project area. With only a few records of the species from central Vietnam and Da Nang, reliable population data is mostly absent and the geographical distribution has not been established. Due to its occurrence (it is also estimated to occur between the locations in central Viet Nam and Da Nang), it can not be classified as endemic. Therefore, one cannot assess with certainty against the CH qualifying criteria thresholds. |
| 3                         | Phaya mai               | <i>Nageia fleuryi</i>                           | NT                          | Species screened are not CR/EN and typically not endemic or range-restricted. Based on the known localities, the extent of occurrence for <i>N. fleuryi</i> and <i>P. dalatensis</i> var. <i>bidoupensis</i> is considerably in excess of 20,000 km <sup>2</sup> . <i>Q. langbianensis</i> can be found in sub-tropical and tropical seasonal forests of Cambodia, China (mostly Yunnan) and Viet  |
| 4                         | Peak habai / Dalat pine | <i>Pinus dalatensis</i> var. <i>bidoupensis</i> | NT                          |  |

<sup>28</sup> A total of 626 plants, representing 538 species from 178 families were recorded, of which some 250 tree species belong to 58 families

## Appendix G: Critical Habitat Assessment

| S/N   | Common name  | Scientific name              | IUCN RL status <sup>1</sup> | Rationale for exclusion from CHA   |
|---|--------------|------------------------------|-----------------------------|--|
| 5   | Kor langbian | <i>Quercus langbianensis</i> | NT                          | Nam. Since they are not endemic or restricted-range species in terms of CH qualifying criteria 2 and 3, they were screened out of the CHA. |
| <p><b>Notes:</b></p> <p><sup>1</sup> IUCN Global Red List (RL) status: <b>CR</b> = Critically Endangered; <b>EN</b> = Endangered; <b>VU</b> = Vulnerable; <b>NT</b> = Near Threatened; <b>LC</b> = Least Concern; <b>DD</b> = Data Deficient. <i>Note that there is no national Red List available for Laos.</i></p> <p><sup>2</sup> <b>ADB SPS critical habitat criteria:</b> <b>Criterion 1</b> = critically endangered or endangered species, <b>Criterion 2</b> = endemic and/or restricted-range species, <b>Criterion 3/4</b> = Key migratory/congregatory species.</p> |              |                              |                             |  |

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## **APPENDIX U      SOCIO-ECONOMIC HOUSEHOLD SURVEY DATABASE**



| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|-----------|----------|-------------------|
| 1      | ING02           | Triang        | Dak Tiem      | Xieng Luang  | Dakcheung | Sekong   | 8/11/2021         |
| 2      | ING09           | Triang        | daksang       | Xiengluang   | dakchueng | sekong   | 10/11/2021        |
| 3      | ING09           | Triang        | Sieang A      | Xiengluang   | Dakchueng | Sekong   | 12/11/2021        |
| 4      | ING08           | Triang        | Xieng Luang   | Xieng Luang  | Dakchueng | Sekong   | 10/11/2021        |
| 5      | ING04           | Triang        | Daktreub      | Xiengluang   | dakchueng | Sekong   | 18/11/2021        |
| 6      | ING12           | Triang        | Dakyang       | XeingLuang   | Dakchueng | Sekong   | 6/11/2021         |
| 7      | ING07           | Triang        | Dak Yen       | Xiengluang   | Dakchueng | Sekong   | 11/06/2021        |
| 8      | ING07           | Triang        | Tongmueang    | Xiengluang   | Dakchueng | Sekong   | 10/12/2021        |
| 9      | ING09           | Triang        | Dakdor        | Dakduem      | Dakchueng | sekong   | 13/11/2021        |
| 10     | ING09           | Triang        | Dakden        | Dakduem      | Dakchueng | sekong   | 11/11/2021        |
| 11     | ING09           | Triang        | Dakrun        |              | Dakchueng | Sekong   | 13/11/2021        |
| 12     | ING14           | Yae           | Dakbong       | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |
| 13     | ING14           | other         | Dakchueng     | Aekkalard    | Dakchueng | Sekong   | 11/24/2021        |
| 14     | ING12           | Triang        | Tongsxieng    | Aekkalard    | Dakchueng | Sekong   | 11/15/2021        |
| 15     | ING11           | Triang        | Dampum        | -            | Dakcheung | Sekong   | 17/11/2021        |
| 16     | ING15           | Triang        | Dalern        | Aekkalard    | Dakchueng | Sekong   | 13/11/2021        |
| 17     | ING09           | Katu          | Plao          | Namdae       | Dakchueng | Sekong   | 14/11/2021        |
| 18     | ING09           | Katu          | Dakkung       | Namdae       | Dakchueng | Sekong   | 14/11/2021        |
| 19     | ING09           | Triang        | Dakchom       | Namdae       | Dakchueng | Sekong   | 16/11/2021        |
| 20     | ING07           | Triang        | Ngonedone     | Aekkalard    | Dakchueng | Sekong   | 20/11/2021        |
| 21     | ING13           | Triang        | Dakmuan       | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 22     | ING14           | Triang        | Daktaorknoy   | Xekhaman     | Dakchueng | Sekong   | 11/17/2021        |
| 23     | ING12           | Triang        | Dakdom        | Xekhaman     | Dakchueng | Sekong   | 16/11/2021        |
| 24     | ING07           | Triang        | Dak Nong      | Namxou       | Xan Xay   | Attapue  | 12/6/2021         |
| 25     | ING13           | Triang        | Dak Samor     | Namxou       | Xan Xay   | Attapue  | 12/5/2021         |
| 26     | ING13           | Triang        | Dak Yok       | Nam Xou      | Xay Xay   | Attapue  | 12/5/2021         |
| 27     | ING12           | other         | Dak Xuem      | Namzou       | Xan Xay   | Attapue  | 12/7/2021         |
| 28     | ING13           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay   | Attapue  | 12/8/2021         |
| 29     | ING13           | Triang        | Dak Dor       | NamZou       | Xan Xay   | Attapue  | 12/7/2021         |

| HH No. | Enumerator Code | Ethnic origin | Village     | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|-------------|--------------|-----------|----------|-------------------|
| 30     | ING12           | Triang        | Dak Padoo   | Dak Ben      | Xan Xay   | Attapue  | 12/8/2021         |
| 31     | ING12           | Triang        | Dak Xied    | Namzou       | Xan Xay   | Attapue  | 12/6/2021         |
| 32     | ING07           | Triang        | Dak Tiem    | Xieng Luang  | Dakcheung | Sekong   | 8/11/2021         |
| 33     | ING11           | Triang        | Dakxeng     | Xiengluang   | Dakchueng | Sekong   | 10/11/2021        |
| 34     | ING14           | Triang        | Daksieng A  | Xiengluang   | Dakchueng | Sekong   | 12/11/2021        |
| 35     | ING06           | Triang        | Xieng Luang | Xieng Luang  | Dakchueng | Sekong   | 10/11/2021        |
| 36     | ING07           | Triang        | Daktreub    | Xiengluang   | dakchueng | Sekong   | 18/11/2021        |
| 37     | ING04           | Triang        | Dakyang     | XeingLuang   | Dakchueng | Sekong   | 6/11/2022         |
| 38     | ING08           | Triang        | Dak Yen     | Xiengluang   | Dakchueng | Sekong   | 11/06/2021        |
| 39     | ING13           | Triang        | Tongmueang  | Xiengluang   | Dakchueng | Sekong   | 11/10/2021        |
| 40     | ING13           | Triang        | Dakdor      | Dakduem      | Dakchueng | sekong   | 11/11/2021        |
| 41     | ING07           | Triang        | Dakden      | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 42     | ING09           | Triang        | Dakrun      |              | Dakchueng | Sekong   | 13/11/2021        |
| 43     | ING14           | Yae           | Dakbong     | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |
| 44     | ING07           | Triang        | Dakchueng   | Aekkalard    | Dakchueng | Sekong   | 11/24/2021        |
| 45     | ING05           | Triang        | Tongxieng   | Aekkalard    | Dakchueng | Sekong   | 11/15/2021        |
| 46     | ING06           | Triang        | Dakpum      |              | Dakchueng | Sekong   | 17/11/2021        |
| 47     | ING15           | Triang        | Dalern      | Aekkalard    | Dakchueng | Sekong   | 13/11/2021        |
| 48     | ING12           | Triang        | Plao        | Namdae       | Dakchueng | Sekong   | 14/11/2021        |
| 49     | ING12           | Triang        | Dakkung     | Namdae       | Dakchueng | Sekong   | 14/11/2021        |
| 50     | ING15           | Triang        | Dakchom     | Namdae       | Dakchueng | Sekong   | 16/11/2021        |
| 51     | ING12           | Triang        | Ngonedone   | Aekkalard    | Dakchueng | Sekong   | 19/11/2021        |
| 52     | ING13           | Triang        | Dakmuan     | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 53     | ING14           | Triang        | Daktaorknoy | Xekhaman     | Dakchueng | Sekong   | 11/17/2021        |
| 54     | ING12           | Triang        | Dakdom      | Xekhaman     | Dakchueng | Sekong   | 16/11/2021        |
| 55     | ING13           | Triang        | Dak Nong    | Namxou       | Xan Xay   | Attapue  | 12/06/2021        |
| 56     | ING13           | Triang        | Dak Samor   | Namxou       | Xan Xay   | Attapue  | 12/05/2021        |
| 57     | ING12           | Triang        | Dak Yok     | Nam Xou      | Xan Xay   | Attapue  | 12/05/2021        |
| 58     | ING12           | other         | Dak Xuem    | Namzou       | Xan Xay   | Attapue  | 12/07/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|-----------|----------|-------------------|
| 59     | ING07           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay   | Attapue  | 12/08/2021        |
| 60     | ING12           | Triang        | Dak Dor       | NamZou       | Xan Xay   | Attapue  | 12/07/2021        |
| 61     | ING12           | Triang        | Dak Padoo     | Dak Ben      | Xan Xay   | Attapue  | 12/08/2021        |
| 62     | ING12           | Triang        | Dak Xied      | Namzou       | Xan Xay   | Attapue  | 12/06/2021        |
| 63     | ING02           | Triang        | Dak Tiem      | Xieng Luang  | Dakcheung | Sekong   | 8/11/2021         |
| 64     | ING11           | Triang        | Dakxeng       | Xiengluang   | Dakchueng | Sekong   | 10/11/2021        |
| 65     | ING12           | Triang        | Daksieng A    | Xiengluang   | Dakchueng | Sekong   | 12/11/2021        |
| 66     | ING13           | Triang        | Xieng Luang   | Xieng Luang  | Dakchueng | Sekong   | 10/11/2021        |
| 67     | ING15           | Triang        | Daktreub      | Xiengluang   | Dakchueng | Sekong   | 18/11/2021        |
| 68     | ING10           | Triang        | Dakyang       | XeingLuang   | Dakchueng | Sekong   | 6/11/2021         |
| 69     | ING03           | Triang        | Dak Yen       | Xiengluang   | Dakchueng | Sekong   | 11/06/2021        |
| 70     | ING03           | Triang        | Tongmueng     | Xiengluang   | Dakchueng | Sekong   | 10/11/2021        |
| 71     | ING13           | Triang        | Dakdor        | Dakduem      | Dakchueng | sekong   | 11/11/2021        |
| 72     | ING07           | Triang        | Dakden        | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 73     | ING09           | Yae           | Dakrun        |              | Dakchueng | Sekong   | 13/11/2021        |
| 74     | ING14           | Yae           | Dakbong       | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |
| 75     | ING09           | Triang        | Dakchueng     | Aekkalard    | Dakchueng | sekong   | 15/11/2021        |
| 76     | ING01           | Triang        | Tongxieng     | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 77     | ING10           | Triang        | Dakpum        |              | Dakchueng | Sekong   | 17/11/2021        |
| 78     | ING15           | Triang        | Daklern       | Aekkalard    | Dakchueng | Sekong   | 13/11/2021        |
| 79     | ING13           | Katu          | Plao          | Namdae       | Dakchueng | Sekong   | 14/11/2021        |
| 80     | ING06           | Katu          | Dakkung       | Namdae       | Dakchueng | Sekong   | 14/11/2021        |
| 81     | ING15           | Triang        | Dakchom       | Namdae       | Dakchueng | Sekong   | 16/11/2021        |
| 82     | ING14           | Yae           | Ngonedone     | Aekkalard    | Dakchueng | Sekong   | 19/11/2021        |
| 83     | ING13           | Triang        | Dakmuan       | Xekhaman     | Dakchueg  | Sekong   | 18/11/2021        |
| 84     | ING07           | Triang        | Daktaorknoy   | Xekhaman     | Dakchueng | Sekong   | 17/11/2021        |
| 85     | ING07           | Triang        | Dakdom        | Xekhaman     | Dakchueng | Sekong   | 16/11/2021        |
| 86     | ING07           | Triang        | Dak Nong      | Namxou       | Xan Xay   | Attapue  | 12/06/2021        |
| 87     | ING07           | Triang        | Dak Samor     | Namxou       | Xan Xay   | Attapue  | 12/05/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|-----------|----------|-------------------|
| 88     | ING07           | Triang        | Dak Yok       | Nam Xou      | Xan Xay   | Attapue  | 12/05/2021        |
| 89     | ING12           | other         | Dak Xuem      | Namzou       | Xan Xay   | Attapue  | 12/07/2021        |
| 90     | ING12           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay   | Attapue  | 12/08/2021        |
| 91     | ING03           | Triang        | Dak Dor       | NamZou       | Xan Xay   | Attapue  | 12/07/2021        |
| 92     | ING12           | Triang        | Dak Padoo     | Dak Ben      | Xan Xay   | Attapue  | 12/08/2021        |
| 93     | ING12           | Triang        | Dak Xied      | Namzou       | Xan Xay   | Attapue  | 12/06/2021        |
| 94     | ING07           | Triang        | Dak Tiem      | Xieng Luang  | Dakcheung | Sekong   | 8/11/2021         |
| 95     | ING08           | Triang        | Dakcheng      | Xiengluang   | Dakchueng | Sekong   | 10/11/2021        |
| 96     | ING13           | Triang        | Dakzieng A    | Xiengluang   | Dakchung  | Sekong   | 12/11/2021        |
| 97     | ING09           | Triang        | Xieng Luang   | Xieng Luang  | dakchueng | sekong   | 10/11/2021        |
| 98     | ING15           | Triang        | Daktreub      | Xeingluang   | Dakchueng | Sekong   | 18/11/2021        |
| 99     | ING06           | Triang        | Dakyang       | XeingLuang   | Dakchueng | Sekong   | 6/11/2021         |
| 100    | ING12           | Triang        | dakdern       | Xiengluang   | dakchueng | Sekong   | 22/11/2021        |
| 101    | ING06           | Triang        | Trongmueang   | Xiengluang   | Dakchueng | Sekong   | 10/11/2021        |
| 102    | ING02           | Triang        | Dakdor        | Dakduem      | Dakchueng | sekong   | 11/11/2021        |
| 103    | ING07           | Triang        | Dakden        | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 104    | ING09           | Triang        | Dakrun        |              | Dakchueng | Sekong   | 20/11/2021        |
| 105    | ING03           | Triang        | Dakbong       | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |
| 106    | ING09           | Triang        | Dakchueng     | Aekkalard    | Dakchueng | sekong   | 20/11/2021        |
| 107    | ING04           | Triang        | Tongxieng     | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 108    | ING15           | Triang        | Dakpum        | -            | Dakchueng | Sekong   | 17/11/2021        |
| 109    | ING11           | Triang        | Daklern       | Aekkalard    | Dakcheung | Sekong   | 13/11/2021        |
| 110    | ING15           | Triang        | Plao          | Namdae       | Dakchueng | Sekong   | 14/141/2021       |
| 111    | ING15           | Triang        | Dakkung       | Namdae       | Dakchueng | Sekong   | 14/11/2021        |
| 112    | ING11           | Triang        | Dakchom       | Namdae       | Dakcheung | Sekong   | 16/11/2021        |
| 113    | ING12           | Triang        | Ngonedone     | Aekkalard    | Dakchueng | Sekong   | 28/11/2021        |
| 114    | ING13           | Triang        | Dakmuan       | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 115    | ING09           | Triang        | Daktaorknoy   | Xekhaman     | Dakchueng | Sekong   | 17/11/2021        |
| 116    | ING03           | Triang        | Dakdom        | Xekhaman     | Dakchueng | Sekong   | 16/11/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|-----------|----------|-------------------|
| 117    | ING07           | Triang        | Dak Nong      | Namxou       | Xan Xay   | Auttapue | 12/06/2021        |
| 118    | ING12           | Triang        | Dak Samor     | Namxou       | Xan Xay   | Auttapue | 12/05/2021        |
| 119    | ING13           | Triang        | Dak Yok       | Nam Xou      | Xan Xay   | Attapue  | 12/05/2021        |
| 120    | ING12           | other         | Dak Xuem      | Namzou       | Xan Xay   | Attapue  | 12/07/2021        |
| 121    | ING13           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay   | Attapue  | 12/08/2021        |
| 122    | ING07           | Triang        | Dak Dor       | NamZou       | Xan Xay   | Attapue  | 12/07/2021        |
| 123    | ING12           | Triang        | Dak Padoo     | Dak Ben      | Xan Xay   | Attapue  | 12/08/2021        |
| 124    | ING12           | Triang        | Dak Xied      | Namzou       | Xan Xay   | Attapue  | 12/06/2021        |
| 125    | ING09           | Triang        | Dak Tiem      | Xieng Luang  | Dakcheung | Sekong   | 8/11/2021         |
| 126    | ING15           | Triang        | Dakxeng       | Xiengluang   | Dakchueng | Sekong   | 10/12/2021        |
| 127    | ING06           | Triang        | Daksieng A    | Xiengluang   | Dakchueng | Sekong   | 12/11/2021        |
| 128    | ING07           | Triang        | Xieng Luang   | Xieng Luang  | Dakchueng | Sekong   | 10/13/2021        |
| 129    | ING01           | Triang        | Daktreub      | Xeingluang   | Dakchueng | Sekong   | 18/11/2021        |
| 130    | ING08           | Triang        | Dakyang       | XeingLuang   | Dakchueng | Sekong   | 6/11/2021         |
| 131    | ING08           | Triang        | Dak Yen       | Xiengluang   | Dakchueng | Sekong   | 11/06/2021        |
| 132    | ING12           | Triang        | TrongMueang   | Xiengluang   | Dakchueng | Sekong   | 10/11/2021        |
| 133    | ING15           | Triang        | DakDor        | Dakduem      | Dakchueng | Sekong   | 12/11/2021        |
| 134    | ING03           | Triang        | Dakden        | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 135    | ING07           | Triang        | Dakrun        |              | Dakchueng | Sekong   | 11/23/2021        |
| 136    | ING14           | Yae           | Dakbong       | Aekkalard    | Dakchueng | Sekong   | 11/22/2021        |
| 137    | ING11           | Triang        | Dakcheung     | Aekkalard    | Dakcheung | Sekong   | 20/11/2021        |
| 138    | ING07           | Triang        | Tongxieng     | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 139    | ING13           | Triang        | Dak pum       |              |           |          | 11/17/2021        |
| 140    | ING06           | Triang        | Daklern       | Aekkalard    | Dakchueng | Sekong   | 13/11/2021        |
| 141    | ING11           | Katu          | Plao          | Namdae       | Dakchueng | Sekong   | 18/11/2021        |
| 142    | ING13           | Katu          | Dakkung       | Namdae       | Dakchung  | sokong   | 14/11/2021        |
| 143    | ING11           | Triang        | Dakchom       | Namdae       | Dakcheung | Sekong   | 16/11/2021        |
| 144    | ING15           | Triang        | Ngonedone     | Aekkalard    | Dakchueng | Sekong   | 19/11/2021        |
| 145    | ING13           | Triang        | Dakmuan       | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village          | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|------------------|--------------|-----------|----------|-------------------|
| 146    | ING09           | Triang        | Daktaorknoy      | Xekhaman     | Dakchueng | Sekong   | 17/11/2021        |
| 147    | ING07           | Triang        | Dakdom           | Xekhaman     | Dakchueng | Sekong   | 16/11/2021        |
| 148    | ING07           | Triang        | Dak Nong         | Namxou       | Xan Xay   | Auttapue | 12/06/2021        |
| 149    | ING12           | Triang        | Dak Samor        | Namxou       | Xan Xay   | Auttapue | 12/05/2021        |
| 150    | ING13           | Triang        | Dak Yok          | Nam Xou      | Xan Xay   | Attapue  | 12/05/2021        |
| 151    | ING12           | other         | Dak Xuem         | Namzou       | Xan Xay   | Attapue  | 12/07/2021        |
| 152    | ING13           | Triang        | Nam Ngon<br>Neua | Nam Ngon     | Xan Xay   | Attapue  | 12/08/2021        |
| 153    | ING13           | Triang        | Dak Dor          | NamZou       | Xan Xay   | Attapue  | 12/07/2021        |
| 154    | ING12           | Triang        | Dak Padoo        | Dak Ben      | Xan Xay   | Attapue  | 12/08/2021        |
| 155    | ING12           | Triang        | Dak Xied         | Namzou       | Xan Xay   | Attapue  | 12/06/2021        |
| 156    | ING15           | Triang        | Dak Tiem         | Xieng Luang  | Dakcheung | Sekong   | 8/11/2021         |
| 157    | ING05           | Triang        | Dakxeng          | Xiengluang   | Dakchueng | Sekong   | 11/10/2021        |
| 158    | ING15           | Triang        | Xieng Luang      | Xieng Luang  | Dakchueng | Sekong   | 10/11/2021        |
| 159    | ING11           | Triang        | Daktreub         | Xiengluang   | Dakcheung | Sekong   | 18/11/2021        |
| 160    | ING04           | Triang        | Dakyang          | XeingLuang   | Dakchueng | Sekong   | 6/11/2001         |
| 161    | ING10           | Triang        | Dakaor           | Xiengluang   | Dakchueng | Sekong   | 22/11/21          |
| 162    | ING07           | Triang        | Tongmueang       | Xiengluang   | Dakchueng | Sekong   | 10/11/2021        |
| 163    | ING15           | Triang        | DakDor           | Dakduem      | Dakchueng | Sekong   | 12/11/2021        |
| 164    | ING03           | Triang        | Dakden           | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 165    | ING12           | Triang        | Dakrun           | dakluem      | Dakchueng | Sekong   | 11/13/2021        |
| 166    | ING14           | Triang        | Dakbong          | Aekkalard    | Dakchueng | Sekong   | 11/22/2021        |
| 167    | ING11           | Triang        | Dakcheung        | Aekkalard    | Dakcheung | Sekong   | 20/11/2021        |
| 168    | ING02           | Triang        | Tongxieng        | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 169    | ING06           | Triang        | Daklern          | Aekkalard    | Dakchueng | Sekong   | 13/11/2021        |
| 170    | ING06           | Katu          | Plao             | Namdae       | Dakchueng | Sekong   | 14/11/2021        |
| 171    | ING11           | Triang        | Dakchom          | Namdae       | Dakcheung | Sekong   | 16/11/2021        |
| 172    | ING13           | Triang        | Ngonedone        | Aekkalard    | Dakchueng | Sekong   | 19/11/2021        |
| 173    | ING12           | Triang        | Dakmuan          | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 174    | ING12           | Triang        | Daktaorknoy      | Xekhaman     | Dakchueng | Sekong   | 17/11/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|-----------|----------|-------------------|
| 175    | ING03           | Triang        | Dakdom        | Xekhaman     | Dakchueng | Sekong   | 16/11/2021        |
| 176    | ING07           | Triang        | Dak Nong      | Namxou       | Xan Xay   | Auttapue | 12/06/2021        |
| 177    | ING13           | Triang        | Dak Samor     | Namxou       | Xan Xay   | Auttapue | 12/05/2021        |
| 178    | ING07           | Triang        | Dak Yok       | Nam Xou      | Xan Xay   | Attapue  | 12/05/2021        |
| 179    | ING13           | other         | Dak Xuem      | Namzou       | Xan Xay   | Attapue  | 12/07/2021        |
| 180    | ING13           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay   | Attapue  | 12/08/2021        |
| 181    | ING03           | Triang        | Dak Dor       | NamZou       | Xan Xay   | Attapue  | 12/07/2021        |
| 182    | ING13           | Triang        | Dak Padoo     | Dak Ben      | Xan Xay   | Attapue  | 12/08/2021        |
| 183    | ING12           | Triang        | Dak Tiem      | Xieng Luang  | Dakcheung | Sekong   | 8/11/2021         |
| 184    | ING10           | Triang        | Dakxeng       | Xiengluang   | Dakchueng | Sekong   | 10/11/2021        |
| 185    | ING13           | Triang        | Xieng Luang   | Xieng Luang  | Dakchueng | Sekong   | 10/11/2021        |
| 186    | ING11           | Triang        | Daktreub      | Xiengluang   | Dakcheung | Sekong   | 18/11/2022        |
| 187    | ING12           | Triang        | Dakyang       | XeingLuang   | Dakchueng | Sekong   | 6/11/2021         |
| 188    | ING05           | Triang        | Dak Yen       | Xiengluang   | Dakchueng | Sekong   | 11/06/2021        |
| 189    | ING14           | Triang        | Tongmueng     | Xiengluang   | Dakchueng | Sekong   | 10/11/2021        |
| 190    | ING15           | Triang        | DakDor        | DakDuem      | Dakchueng | Sekong   | 11/11/2021        |
| 191    | ING12           | Triang        | Dakden        | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 192    | ING12           | Triang        | Daklun        | dakluem      | Dakchueng | Sekong   | 11/13/2021        |
| 193    | ING03           | Triang        | Dakbong       | Aekkalard    | Dakchueng | Sekong   | 11/24/2021        |
| 194    | ING02           | Triang        | Dakcheung     | Aekkalard    | Dakcheung | Sekong   | 20/11/2021        |
| 195    | ING07           | Triang        | Tongxieng     | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 196    | ING10           | Triang        | Daklern       | Aekkalard    | Dakchueng | Sekong   | 13/11/2021        |
| 197    | ING10           | Katu          | Plao          | Namdae       | Dakchueng | Sekong   | 14/11/2021        |
| 198    | ING06           | Triang        | Dakchom       | Namdae       | Dakchueng | Sekong   | 16/11/2021        |
| 199    | ING13           | Triang        | Ngonedone     | Aekkalard    | Dakchueng | Sekong   | 20/11/201         |
| 200    | ING12           | Triang        | Dakmuan       | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 201    | ING07           | Triang        | Dak Nong      | Namxou       | Xan Xay   | Auttapue | 12/06/2021        |
| 202    | ING13           | Triang        | Dak Samor     | Namxou       | Xan Xay   | Auttapue | 12/05/2021        |
| 203    | ING03           | Triang        | Dak Yok       | Nam Xou      | Xan Xay   | Attapue  | 12/05/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District   | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|------------|----------|-------------------|
| 204    | ING12           | other         | Dak Xuem      | Namzou       | Xan Xay    | Attapue  | 12/07/2021        |
| 205    | ING12           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay    | Attapue  | 12/08/2021        |
| 206    | ING13           | Triang        | Dak Dor       | NamZou       | Xan Xay    | Attapue  | 12/07/2021        |
| 207    | ING12           | Triang        | Dak Padoo     | Dak Ben      | Xan Xay    | Attapue  | 12/08/2021        |
| 208    | ING08           | Triang        | Dak Tiem      | Xieng Luang  | Dakcheung  | Sekong   | 8/11/2021         |
| 209    | ING04           | Triang        | Dakxeng       | Xiengluang   | Dakchueng  | Sekong   | 11/10/2021        |
| 210    | ING10           | Triang        | Xieng Luang   | Xieng Luang  | Dakchueng  | Sekong   | 10/11/2021        |
| 211    | ING11           | Triang        | Daktreub      | Xiengluang   | Dakcheung  | Sekong   | 18/11/2022        |
| 212    | ING08           | Triang        | Dakyarng      | Dakyarng     | Dakchueng  | Sekong   | 18/11/2021        |
| 213    | ING13           | Triang        | Dak Yen       | Xiengluang   | Darkjeang  | Sekong   | 11/06/2021        |
| 214    | ING04           | Triang        | DakDor        | DakDuem      | Dakchueng  | Sekong   | 11/11/2021        |
| 215    | ING12           | other         | Dakden        | Dakduem      | Dakchueng  | Sekong   | 11/11/2021        |
| 216    | ING13           | Triang        | Dakrun        |              | Dakchueng  | Sekong   | 11/13/2021        |
| 217    | ING03           | Triang        | Dakbong       | Aekkalard    | Dakchueng  | Sekong   | 11/24/2021        |
| 218    | ING04           | Katu          | Dakcheung     | Aekkalard    | Dakcheung  | Sekong   | 20/11/2021        |
| 219    | ING09           | Triang        | Tongxieng     | Aekkalard    | Dakchueng  | Sekong   | 15/11/2021        |
| 220    | ING10           | Triang        | Daklern       | Aekkalard    | Dakchueng  | Sekong   | 13/11/2021        |
| 221    | ING10           | Katu          | Plao          | Namdae       | Dakchueng  | Sekong   | 14/11/2021        |
| 222    | ING10           | Triang        | dakchom       | Namdae       | Dakchueng  | Sekong   | 16/11/2021        |
| 223    | ING11           | Triang        | Ngonedone     | Aekkalard    | Dakchueng  | Sekong   | 22/11/2021        |
| 224    | ING12           | Triang        | Dakmuan       | Xekhaman     | Dakchueg   | Sekong   | 18/11/2021        |
| 225    | ING12           | Triang        | Dak Samor     | Namxou       | Xan Xay    | Auttapue | 12/05/2021        |
| 226    | ING12           | Triang        | Dak Yok       | Nam Xou      | Xan Xay    | Attapue  | 12/05/2021        |
| 227    | ING13           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay    | Attapue  | 12/08/2021        |
| 228    | ING13           | Triang        | Dak Dor       | NamZou       | Xan Xay    | Attapue  | 12/07/2021        |
| 229    | ING12           | Triang        | Dak Padoo     | Dak Ben      | Xan Xay    | Attapue  | 12/08/2021        |
| 230    | ING12           | Triang        | Dak Tiem      | Xieng Luang  | Dak Cheung | Sekong   | 8/11/2021         |
| 231    | ING11           | Triang        | Xieng Luang   | Xieng Luang  | Dakchueng  | Sekong   | 10/11/2021        |
| 232    | ING02           | Triang        | Daktreub      | Xiengluang   | Dakcheung  | Sekong   | 18/11/2021        |



| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District   | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|------------|----------|-------------------|
| 233    | ING07           | Triang        | Dakking       |              | Dakjueng   | Sekong   | 18/11/2021        |
| 234    | ING13           | Triang        | Dakvaiy       | Xiengluang   | Dakchueng  | Sekong   | 11/6/2021         |
| 235    | ING11           | Triang        | Dakdor        | Dakduem      | Dakcheung  | Sekong   | 12/11/2021        |
| 236    | ING12           | Triang        | Dakden        | Dakduem      | dakchueng  | sekong   | 11/11/2021        |
| 237    | ING07           | Triang        | Dakrun        |              | Dakchueng  | Sekong   | 11/13/2021        |
| 238    | ING07           | Triang        | Dakbong       | Aekkalard    | Dakchueng  | Sekong   | 11/24/2021        |
| 239    | ING05           | Yae           | Dakcheung     | Aekkalard    | Dakcheung  | Sekong   | 20/11/021         |
| 240    | ING09           | Triang        | Tongxieng     | Aekkalard    | dakchueng  | sekong   | 15/11/2021        |
| 241    | ING10           | Triang        | Daklern       | Aekkalard    | Dakchueng  | Sekong   | 13/11/2021        |
| 242    | ING07           | Triang        | Plao          | Namdae       | Dakchueng  | Sekong   | 14/11/2021        |
| 243    | ING10           | Triang        | dakchom       | Namdae       | Dakchueng  | Sekong   | 16/11/2021        |
| 244    | ING11           | Triang        | Ngonedone     | Aekkalard    | Dakchueng  | Sekong   | 19/11/2021        |
| 245    | ING12           | Triang        | Dakmuan       | Xekhaman     | Dakchueng  | Sekong   | 18/11/2021        |
| 246    | ING12           | Triang        | Dak Yok       | Nam Xou      | Xan Xay    | Attapue  | 12/05/2021        |
| 247    | ING12           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay    | Attapue  | 12/08/2021        |
| 248    | ING03           | Triang        | Dak Dor       | NamZou       | Xan Xay    | Attapue  | 12/07/2021        |
| 249    | ING07           | Triang        | Dak Tiem      | Xieng Luang  | Dak Cheung | Sekong   | 8/11/2021         |
| 250    | ING12           | Triang        | Xieng Luang   | Xieng Luang  | Dakchueng  | sekong   | 10/11/2021        |
| 251    | ING11           | Triang        | Daktreub      | Xiengluang   | Dakcheung  | Sekong   | 18/11/2021        |
| 252    | ING06           | Triang        | Dakbrang      | Dakyang      | Dakchueng  | Sekong   | 11/18/2021        |
| 253    | ING15           | Triang        | Dak Yen       | Xiengluang   | Dakchueng  | Sekong   | 6\11\2021         |
| 254    | ING11           | Triang        | Dakdor        | Dakduem      | Dakcheung  | Sekong   | 12/11/2021        |
| 255    | ING09           | Triang        | Dakden        | Dakduem      | Dakchueng  | sekong   | 11/11/2021        |
| 256    | ING05           | Yae           | Dakrun        |              | Dakchueng  | Sekong   | 11/13/2021        |
| 257    | ING07           | Triang        | Dakbong       | Aekkalard    | Dakchueng  | Sekong   | 11/23/2021        |
| 258    | ING06           | Triang        | Dakchueng     | Aekkalard    | Dakchueng  | Sekong   | 20/11/2021        |
| 259    | ING13           | Triang        | Tongxieng     | Aekkalard    | Dakchung   | sokong   | 15/11/2021        |
| 260    | ING08           | Triang        | Daklern       | Aekkalard    | Dakchueng  | Sekong   | 13/11/2021        |
| 261    | ING02           | Katu          | Plao          | Namdae       | Dakchueng  | Sekong   | 14/11/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District   | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|------------|----------|-------------------|
| 262    | ING08           | Triang        | Dakchom       | Namdae       | Dakchueng  | Sekong   | 16/11/2021        |
| 263    | ING10           | Triang        | Ngonedone     | Aekkalard    | Dakchueng  | Sekong   | 19/11/2021        |
| 264    | ING10           | Triang        | Dakmuan       | Xekhaman     | Dakchueng  | Sekong   | 18/11/2021        |
| 265    | ING13           | Triang        | Dak Yok       | Nam Xou      | Xan Xay    | Attapue  | 12/5/2021         |
| 266    | ING13           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay    | Attapue  | 12/8/2021         |
| 267    | ING13           | Triang        | Dak Dor       | NamZou       | Xan Xay    | Attapue  | 12/7/2021         |
| 268    | ING08           | Triang        | Dak Tiem      | Xieng Luang  | Dak Cheung | Sekong   | 8/11/2021         |
| 269    | ING06           | Triang        | Daktreub      | Xiengluang   | Dakcheung  | Sekong   | 18/11/2021        |
| 270    | ING09           | Triang        | Dak Yen       | Xiengluang   | Dakchueng  | Sekong   | 6/11/2021         |
| 271    | ING06           | Triang        | Dakdor        | Dakduem      | Dakchueng  | Sekong   | 12/11/2021        |
| 272    | ING11           | Yae           | Dakrun        |              | Dakchueng  | Sekong   | 14/11/2021        |
| 273    | ING07           | Yae           | Dakbong       | Aekkalard    | Dakchueng  | Sekong   | 11/21/2021        |
| 274    | ING06           | Triang        | Dakchueng     | Aekkalard    | Dakchueng  | Sekong   | 20/11/2021        |
| 275    | ING13           | Triang        | Tongxieng     | Aekkalard    | Dakchung   | sokong   | 15/11/2021        |
| 276    | ING08           | Triang        | Daklern       | Aekkalard    | Dakchueng  | Sekong   | 13/11/2021        |
| 277    | ING08           | Katu          | Plao          | Namdae       | Dakchueng  | Sekong   | 14/11/2021        |
| 278    | ING08           | Triang        | Dakchom       | Namdae       | Dakchueng  | Sekong   | 16/11/2021        |
| 279    | ING08           | Triang        | Ngonedone     | Aekkalard    | Dakchueng  | Sekong   | 19/11/2021        |
| 280    | ING10           | Triang        | Dakmuan       | Xekhaman     | Dakchueng  | Sekong   | 18/11/2021        |
| 281    | ING03           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay    | Attapue  | 12/8/2021         |
| 282    | ING10           | Triang        | Dak Tiem      | Xieng Luang  | Dak Cheung | Sekong   | 8/11/2021         |
| 283    | ING06           | Triang        | Daktreub      | Xiengluang   | Dakchueng  | Sekong   | 18/11/2021        |
| 284    | ING04           | Triang        | Dak Yen       | Xiengluang   | Dakchueng  | Sekong   | 11/6/2021         |
| 285    | ING06           | Triang        | Dakdor        | Dakduem      | Dakchueng  | Sekong   | 11/11/2021        |
| 286    | ING05           | Triang        | Dakrun        |              |            |          | 11/13/2021        |
| 287    | ING08           | Triang        | Dakbrong      | Aekkalard    | Dakchueng  | Sekong   | 21/11/2021        |
| 288    | ING06           | Yae           | Dakchueng     | Aekkalard    | Dakchueng  | Sekong   | 20/11/2021        |
| 289    | ING13           | Triang        | Tongxieng     | Aekkalard    | Dakchung   | sokong   | 15/11/2021        |
| 290    | ING02           | Triang        | Daklern       | Aekkalard    | Dakchueng  | Sekong   | 11/13/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District   | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|------------|----------|-------------------|
| 291    | ING08           | Katu          | Plao          | Namdae       | Dakchueng  | Sekong   | 14/11/2021        |
| 292    | ING06           | Triang        | Dakchom       | Namdae       | Dakchueng  | Sekong   | 16/11/2021        |
| 293    | ING06           | Triang        | Ngonedone     | Aekkalard    | Dakchueng  | Sekong   | 19/11/2021        |
| 294    | ING10           | Triang        | Dakmuan       | Xekhaman     | Dakchueng  | Sekong   | 18/11/2021        |
| 295    | ING12           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay    | Attapue  | 12/8/2021         |
| 296    | ING13           | Triang        | Dak Tiem      | Xieng Luang  | Dak Cheung | Sekong   | 8/11/2021         |
| 297    | ING06           | Triang        | Daktreub      | Xiengluang   | Dakchueng  | Sekong   | 18/11/2021        |
| 298    | ING10           | Triang        | Dak Yen       | Xiengluang   | Dakchueng  | Sekong   | 11/6/2021         |
| 299    | ING06           | Triang        | Dakdor        | Dakduem      | Dakchueng  | Sekong   | 11/11/2021        |
| 300    | ING07           | Triang        | Dakrun        |              | Dakchueng  | Sekong   | 13/11/2021        |
| 301    | ING08           | Triang        | Dakbrong      | Aekkalard    | Dakchueng  | Sekong   | 21/11/2021        |
| 302    | ING10           | Triang        | Dakchueng     | Aekkalard    | Dakchueng  | Sekong   | 20/11/21          |
| 303    | ING13           | Triang        | Tongxieng     | Aekkalard    | Dakchung   | sokong   | 17/11/2021        |
| 304    | ING04           | Triang        | Daklern       | Aekkalard    | Dakchueng  | Sekong   | 11/13/2021        |
| 305    | ING03           | Katu          | Plao          | Namdae       | Dakchueng  | Sekong   | 11/14/2021        |
| 306    | ING14           | Triang        | Dakchom       | Namdae       | Dakchueng  | Sekong   | 11/16/2021        |
| 307    | ING07           | Triang        | Ngonedone     | Aekkalard    | Dakchueng  | Sekong   | 19/11/2021        |
| 308    | ING14           | Triang        | Dakmuan       | Xekhaman     | Dakchueng  | Sekong   | 18/11/2021        |
| 309    | ING12           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay    | Attapue  | 12/8/2021         |
| 310    | ING03           | Triang        | Dak Tiem      | Xieng Luang  | Dak Cheung | Sekong   | 8/11/2021         |
| 311    | ING04           | Triang        | Daktreub      | Xiengluang   | Dakchueng  | Sekong   | 18/11/2021        |
| 312    | ING14           | Triang        | Dak Yen       | Xiengluang   | Dakchueng  | Sekong   | 6/11/2021         |
| 313    | ING10           | Triang        | Dakdor        | Dakduem      | Dakchueng  | Sekong   | 11/11/2021        |
| 314    | ING07           | Triang        | Dakrun        |              | Dakchueng  | Sekong   | 13/11/2021        |
| 315    | ING08           | Triang        | Dakbrong      | Aekkalard    | Dakchueng  | Sekong   | 22/11/2021        |
| 316    | ING10           | Triang        | Dakchueng     | Aekkalard    | Dakchueng  | Sekong   | 20/11/21          |
| 317    | ING15           | Triang        | Tongxieng     | Aekkalard    | Dakchueng  | Sekong   | 15/11/2021        |
| 318    | ING02           | Triang        | Daklern       | Aekkalard    | Dakchueng  | Sekong   | 11/13/2021        |
| 319    | ING14           | Katu          | Plao          | Namdae       | Dakchueng  | Sekong   | 11/14/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District   | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|------------|----------|-------------------|
| 320    | ING14           | Triang        | Dakchom       | Namdae       | Dakchueng  | Sekong   | 11/16/2021        |
| 321    | ING07           | Triang        | Ngonedone     | Aekkalard    | Dakchueng  | Sekong   | 19/11/2021        |
| 322    | ING14           | Triang        | Dakmuan       | Xekhaman     | Dakchueng  | Sekong   | 18/11/2021        |
| 323    | ING12           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay    | Attapue  | 12/8/2021         |
| 324    | ING03           | Triang        | Dak Tiem      | Xieng Luang  | Dak Cheung | Sekong   | 8/11/2021         |
| 325    | ING07           | Triang        | Daktreub      | Xiengluang   | Dakchueng  | Sekong   | 17/11/2021        |
| 326    | ING14           | Triang        | Dak Yen       | Xiengluang   | Dakchueng  | Sekong   | 11/6/2021         |
| 327    | ING10           | Triang        | Dakdor        | Dakduem      | Dakchueng  | Sekong   | 11/11/2021        |
| 328    | ING07           | Triang        | Dakrun        |              | Dakchueng  | Sekong   | 13/11/2021        |
| 329    | ING15           | Triang        | Dakbong       | Aekkalard    | dakchueng  | Sekong   | 21/11/2021        |
| 330    | ING15           | Triang        | Dakchueng     | Aekkalard    | Dakchueng  | Sekong   | 20/11/21          |
| 331    | ING11           | Triang        | Tongxieng     | Aekkalard    | Dakcheung  | Sekong   | 16/11/2021        |
| 332    | ING02           | Triang        | Daklern       | Aekkalard    | Dakchueng  | Sekong   | 11/15/2021        |
| 333    | ING14           | Triang        | Dakchom       | Namdae       | Dakchueng  | Sekong   | 11/16/2021        |
| 334    | ING15           | Triang        | Ngonedone     | Aekkalard    | Dakchueng  | Sekong   | 19/11/2021        |
| 335    | ING14           | Triang        | Dakmuan       | Xekhaman     | Dakchueng  | Sekong   | 18/11/2021        |
| 336    | ING12           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay    | Attapue  | 12/8/2021         |
| 337    | ING04           | Triang        | Daktiem       | Daktiem      | Dakchueng  | Sekong   | 8/11/2021         |
| 338    | ING07           | Triang        | Daktreub      | Xiengluang   | Dakchueng  | Sekong   | 18/11/2021        |
| 339    | ING02           | Triang        | Dak Yen       | Xiengluang   | dakchueng  | sekong   | 11/6/2021         |
| 340    | ING10           | Triang        | Dakdor        | Dakduem      | Dakchueng  | Sekong   | 12/11/2021        |
| 341    | ING11           | Katu          | Dakrun        |              | Dakchueng  | Sekong   | 20/11/2021        |
| 342    | ING11           | Triang        | Dakbrong      | Aekkalard    | Dakchueng  | Sekong   | 21/11/2021        |
| 343    | ING08           | Triang        | Dakchueng     | Aekkalard    | Dakchueng  | Sekong   | 20/11/2021        |
| 344    | ING11           | Triang        | Tongxieng     | Aekkalard    | Dakcheung  | Sekong   | 15/11/2021        |
| 345    | ING02           | Triang        | Daklern       | Aekkalard    | Dakchueng  | Sekong   | 11/17/2021        |
| 346    | ING02           | Triang        | Dakchom       | Namdae       | Dakchueng  | Sekong   | 11/16/2021        |
| 347    | ING02           | Triang        | Ngonedone     | Aekkalard    | Dakchueng  | Sekong   | 19/11/2021        |
| 348    | ING14           | Triang        | Dakmuan       | Xekhaman     | Dakchung   | Sekong   | 18/11/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village       | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|---------------|--------------|-----------|----------|-------------------|
| 349    | ING12           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay   | Attapue  | 12/8/2021         |
| 350    | ING15           | Triang        | Daktiem       | Daktiem      | Dakchueng | Sekong   | 8/11/2021         |
| 351    | ING02           | Triang        | Daktreub      | Xiengluang   | Dakchueng | Sekong   | 18/11/2021        |
| 352    | ING15           | Triang        | DakAor        | Xiengluang   | Dakchueng | Sekong   | 22/11/2021        |
| 353    | ING07           | Triang        | Dakdor        | Dakduem      | Dakchueng | Sekong   | 12/11/2021        |
| 354    |                 | Yae           | Dakrun        | Dakluem      | Dakchueng | Sekong   | 13/11/2021        |
| 355    | ING13           | Katu          | Dakbong       | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |
| 356    | ING08           | Triang        | Dakchueng     | Aekkalard    | Dakchueng | Sekong   | 20/11/2021        |
| 357    | ING06           | Triang        | Tongsieng     | Aekkalard    | Dakchueng | Sekong   | 17/11/2021        |
| 358    | ING11           | Triang        | Daklern       | Aekkalard    | Dakchueng | Sekong   | 11/13/2021        |
| 359    | ING04           | Triang        | Dakchom       | Namdae       | Dakchueng | Sekong   | 11/16/2021        |
| 360    | ING14           | Triang        | Ngonedone     | Aekkalard    | Dakchueng | Sekong   | 19/11/2021        |
| 361    | ING14           | Triang        | Dakmuan       | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 362    | ING12           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay   | Attapue  | 12/8/2021         |
| 363    | ING09           | Triang        | Daktiem       | Daktiem      | Dakchueng | Sekong   | 8/11/2021         |
| 364    | ING01           | Triang        | Daktreub      | Xiengluang   | Dakchueng | Sekong   | 18/11/2021        |
| 365    | ING07           | Triang        | Dakdor        | Dakduem      | Dakchueng | Sekong   | 12/11/2021        |
| 366    | ING12           | Triang        | Dakrun        |              | Dakchueng | Sekong   | 13/11/2021        |
| 367    | ING10           | Triang        | Dakbong       | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |
| 368    | ING08           | Triang        | Dakchueng     | Aekkalard    | Dakchueng | Sekong   | 20/11/2021        |
| 369    | ING06           | Triang        | Tongsieng     | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 370    | ING11           | Triang        | Daklern       | Aekkalard    | Dakchueng | Sekong   | 11/13/2021        |
| 371    | ING05           | Triang        | Dakchom       | Namdae       | Dakchueng | Sekong   | 11/16/2021        |
| 372    | ING14           | Katu          | Ngonedone     | Aekkalard    | Dakchueng | Sekong   | 20/11/2021        |
| 373    | ING03           | Triang        | Dakmuan       | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 374    | ING12           | Triang        | Nam Ngon Neua | Nam Ngon     | Xan Xay   | Attapue  | 8/12/2021         |
| 375    | ING13           | Triang        | Daktiem       | Daktiem      | Dakchueng | Sekong   | 8/11/2021         |
| 376    | ING10           | Triang        | Daktreub      | Xiengluang   | Dakchueng | Sekong   | 23/11/21          |

| HH No. | Enumerator Code | Ethnic origin | Village   | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|-----------|--------------|-----------|----------|-------------------|
| 377    | ING07           | Triang        | Dakdor    | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 378    | ING13           | Triang        | Dakrun    |              | Dakchueng | Sekong   | 13/11/2021        |
| 379    | ING10           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |
| 380    | ING10           | Triang        | Dakchueng | Aekkalard    | Dakchueng | Sekong   | 20/11/21          |
| 381    | ING06           | Triang        | Tongsieng | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 382    | ING13           | Triang        | Dakchom   | Namdae       | Dakchueng | Sekong   | 11/16/2021        |
| 383    | ING13           | Triang        | Ngonedone | Aekkalard    | Dakchueng | Sekong   | 19/11/2021        |
| 384    | ING03           | Triang        | Dakmuan   | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 385    | ING03           | Triang        | Daktiem   | Daktiem      | Dakchueng | Sekong   | 8/11/2021         |
| 386    | ING08           | Triang        | Daktreub  | Xiengluang   | Dakchueng | Sekong   | 18/11/2021        |
| 387    | ING04           | Triang        | Dakdor    | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 388    | ING13           | Triang        | Dakrun    |              | Dakchueng | Sekong   | 13/11/2021        |
| 389    | ING09           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 11/22/2021        |
| 390    | ING01           | Triang        | Dakchueng | Aekkalard    | Dakchueng | Sekong   | 20/11/21          |
| 391    | ING10           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 392    | ING13           | Triang        | Dakchom   | Namdae       | Dakchueng | Sekong   | 11/16/2021        |
| 393    | ING14           | Triang        | Ngonedone | Aekkalard    | Dakchueng | Sekong   | 20/11/2021        |
| 394    | ING03           | Triang        | Dakmuan   | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 395    | ING11           | Triang        | Daktiem   | Daktiem      | Dakchueng | Sekong   | 8/11/2021         |
| 396    | ING08           | Triang        | Daktreub  | Xiengluang   | Dakchueng | Sekong   | 18/11/2021        |
| 397    | ING08           | Triang        | Dakdor    | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 398    | ING14           | Triang        | Dakrun    | Dakrun       | Dakchueng | Sekong   | 11/13/2021        |
| 399    | ING09           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 11/22/2021        |
| 400    | ING07           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 22/11/2021        |
| 401    | ING10           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 402    | ING15           | Triang        | Dakmuan   | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 403    | ING08           | Triang        | Daktreub  | Xiengluang   | Dakchueng | Sekong   | 23/11/2021        |
| 404    | ING08           | Triang        | Dakdor    | Dakduem      | Dakchueng | Sekong   | 12/11/2021        |
| 405    | ING14           | Triang        | Dakrun    | Dakrun       | Dakchueng | Sekong   | 11/13/2021        |
| 406    | ING12           | Yae           | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village   | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|-----------|--------------|-----------|----------|-------------------|
| 407    | ING08           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 408    | ING09           | Triang        | Dakmuan   | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 409    | ING06           | Triang        | Daktreub  | Xiengluang   | Dakchueng | Sekong   | 18/11/2021        |
| 410    | ING14           | Triang        | Dakdor    | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 411    | ING14           | Yae           | Dakrun    | Dakduem      | Dakchueng | Sekong   | 11/13/2021        |
| 412    | ING01           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |
| 413    | ING08           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 15/11/2021        |
| 414    | ING09           | Triang        | Dakmuan   | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 415    | ING06           | Triang        | Daktreub  | Xiengluang   | Dakchueng | Sekong   | 18/11/2021        |
| 416    | ING14           | Triang        | Dakdor    | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 417    | ING13           | Triang        | Dakrun    |              | Dakchueng | Sekong   | 23/11/2021        |
| 418    | ING13           | Yae           | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 21/11/2021        |
| 419    | ING08           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 17/11/2021        |
| 420    | ING09           | Triang        | Dakmuan   | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 421    | ING14           | Triang        | Dakdor    | Dakduem      | Dakchueng | Sekong   | 11/22/2021        |
| 422    | ING13           | Triang        | Dakrun    |              |           |          | 11/23/2021        |
| 423    | ING09           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 21/11/2021        |
| 424    | ING14           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 11/15/2021        |
| 425    | ING09           | 1. Laos       | Dakmuan   | Xekhaman     | Dakchueng | Sekong   | 18/11/2021        |
| 426    | ING07           | Triang        | Dakdor    | Dakdor       | Dakchueng | Sekong   | 12/11/2021        |
| 427    | ING06           | Triang        | Dakdor    | Dakduem      | Dakchueng | Sekong   | 11/11/2021        |
| 428    | ING09           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 21/11/2021        |
| 429    | ING14           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 11/15/2021        |
| 430    | ING05           | 2. Triang     | Dakmuan   | Xekhaman     | Dakchueng | Sekong   | 11/18/2021        |
| 431    | ING15           |               | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 21/11/2021        |
| 432    | ING03           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 11/15/2021        |
| 433    | ING04           | Triang        | Dakbong   | Aekkalard    | Dakchueng | sekong   | 21/11/2021        |
| 434    | ING03           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 11/15/2021        |
| 435    | ING07           | other         | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 21/11/2021        |
| 436    | ING14           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 11/23/2021        |

| HH No. | Enumerator Code | Ethnic origin | Village   | Sub-District | District  | Province | Date (DD/MM/YYYY) |
|--------|-----------------|---------------|-----------|--------------|-----------|----------|-------------------|
| 437    | ING13           | Yae           | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 21/11/2021        |
| 438    | ING14           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 11/23/2021        |
| 439    | ING06           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 21/11/2021        |
| 440    | ING10           | Triang        | Tongxieng | Aekkalard    | Dakchueng | Sekong   | 17/11/2021        |
| 441    | ING02           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 21/11/2021        |
| 442    | ING05           | Katu          | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |
| 443    | ING13           | other         | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 11/24/2021        |
| 444    | ING06           | Yae           | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 11/21/2021        |
| 445    | ING01           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 21/11/2021        |
| 446    | ING09           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 22/11/2021        |
| 447    | ING04           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 22/11/2021        |
| 448    | ING06           | Triang        | Dakbong   | Aekkalard    | Dakchueng | Sekong   | 21/11/2021        |