MEDCOENERGI
Geothermal

# Medco Cahaya Geothermal – Ijen Bondowoso 34 MW Project

Biodiversity Action Plan (BAP)

09 August 2023

Project No.: 0694710

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**Signature Page**

09 August 2023

# Geothermal Power Plant Project Ijen Bondowoso

## Biodiversity Action Plan (BAP)

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# 1 INTRODUCTION

## 1.1 Project Background

MEDCO CAHAYA GEOTHERMAL ("MCG") which is a subsidiary of Medco Power Indonesia plans to develop a 34 MW Geothermal Power plant project ("the Project") in Blawan Ijen, Bondowoso East Java.[1]

Based on the ESIA document, the geothermal development plans generally include construction and operation of the geothermal power units, construction of supporting infrastructure, and electricity transmission. These activities have potential to cause environmental impacts such as reduced air quality and water quality, changes in land use and biodiversity loss.

The Project site ioverlaps with two Endemic Bird Area (EBA), which is Java and Bali Forest EBA and Javan Coastal Zone EBA. The transmission line is also adjacent to Kawah Ijen Natural Reserve, Gunung Raung KBA and Gunung Ijen KBA. These areas are important habitats for several Indo-Malayan species. Project activities potentially provide edge effects in these areas.

This Biodiversity Action Plan (BAP) was prepared for the Project in accordance with International Finance Corporation (IFC) Performance Standards Guidelines to assess whether the Project meets relevant international environmental standards.

# 2 SCOPE

## 2.1 Scope of This Report

The development of the MCG Biodiversity Action Plan (BAP) follows IFC Guidance Note 6 (IFC, 2012). The BAP has been developed in consultation with some stakeholders and biodiversity experts and confirms that appropriate measures are in place to be successfully implemented. The ESIA is part of this process in that the ecological assessments of those studies provide the baseline upon which the BAP objectives and conservation priorities are based.

## 2.2 Aim and Objective

The aim of the MEDCO CAHAYA GEOTHERMAL (MCG) Biodiversity Act ion Plan (BAP) is to achieve "no net biodiversity loss" as a result of the Project by ensuring that the biodiversity is protected and enhanced where possible. .

The general objective of the BAP is to provide a comprehensive strategy and specific, implementable actions aimed at the protection and conservation of biodiversity during the construction and operation of the geothermal power plant. The specific objectives of the MCG BAP are to:

- Review existing biodiversity baseline information and legislative/ policy frameworks for the Study Area;
- Implement a consultation process with relevant stakeholders and biodiversity experts to inform priorities and actions for biodiversity conservation;
- Undertake a Critical Habitat Assessment to determine the IFC PS6 requirements for the Project;
- Identify priorities and actions for biodiversity conservation, in consultation with stakeholders and biodiversity experts;
- Identify institutional partnerships for implementing the BAP;
- Provide awareness raising and capacity building for the relevant stakeholders including local communities and organizations involved in BAP implementation;

[1]Following the completion of the first stage, the Project will continue onto the second stage and reach the full capacity of the Project at 110 MW. As the changes in the Project area will not be significant in the context of the BAP, this BAP will still be applicable for the maximum capacity of the power plant.

- Establish a monitoring and evaluation program for biodiversity allowing for the success of the BAP interventions to be assessed;
- Develop monitoring and evaluation plan to ensure that the measures out lined in the BAP are implemented;
- Ensure no-net loss of natural habitat and net gain in biodiversity as a result of the project.

## 2.3 Project Area

The geographical scope of the BAP covering the core area of the Gunung Raung KBA, which includes the whole territory of the Kawah Ijen Nature Reserve, as well as the eastern slope of the mountain along the transmission line to the substation facility, which overlaps with the Javan Coastal Zone KBA (see ***Figure 4.2***). This geographical scope is representing the Ecologically Appropriate Area of Analysis (EAAA), in line with IFC Guidance Note 6 (IFC, 2012). The area studied for the biodiversity surveys and monitoring comprises the forest around the MCG Geothermal Field only. Further details are given in ***Section 5***, Critical Habitat Assessment.

# 3 REGULATION, PLANNING AND THIRD PARTY REQUIREMENTS

## 3.1 International Regulation

Indonesia has ratified various international laws and convent ions in conservation and biodiversity, as described below.

### *3.1.1 Ramsar Convention*

The Ramsar Convention, commonly known as the Convention on Wetlands, is an international convention that promotes the conservation and sustainable use of wetland areas. The goal of the Convention is to conserve and wisely use all wetlands via local and national actions and international collaboration, as a contribution to attaining global sustainable development. Wetlands are defined broadly under the Convention. All lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peat lands, oases, estuaries, deltas and tidal flats, mangroves and other coastal regions, coral reefs, and all man-made sites like fish ponds, rice paddies, reservoirs, and salt pans are included.

### *3.1.2 World Heritage Convention*

The World Heritage Convention (WHC) aimed to protect the world's cultural and natural heritage. The WHC's definition of "natural heritage" may be compatible with biodiversity protection, which should include:

- "Natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view;
- Geological and physiographical formations and precisely delineated areas that constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation; and
- Natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation, or natural beauty."

The World Heritage Convention states that each State Party should be dedicated to the preservation of its distinct heritage sites. Heritage sites placed within the jurisdiction of a State Party shall be the responsibility of the State. The state is dedicated to protecting and conserving its heritage sites, using all available resources and, when appropriate, international assistance and collaboration.

### 3.1.3 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

The Washington Convention, commonly known as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Convention on Endangered Species is a multinational treaty designed to safeguard endangered plants and animals. It was created in response to a resolution passed by members of the International Union for Conservation of Nature (IUCN) in 1963. Its goal is to ensure that international trade in wild animal and plant specimens does not endanger the survival of the species in the wild.

### 3.1.4 Convention on Conservation of Migratory Species of Wild Animals (CMS)

The Convention for the Conservation of Migratory Species of Wild Animals, generally known as the Convention on Migratory Species (CMS), aims to protect migratory terrestrial, marine, and bird species over their entire range. It is an international convention negotiated under the aegis of the United Nations Environment Program that is concerned with the worldwide protection of species and ecosystems. The CMS includes a wide range of migratory species. Many mammals, including land mammals, marine mammals, and bats, as well as birds, fish, reptiles, and one insect, are included in CMS's Appendices. The African-Eurasian Migratory Waterbird Agreement (AEWA) is one of the instruments that covers 255 species of birds that are biologically dependent on wetlands for at least part of their yearly cycle. The Memorandum of Understanding on the Conservation of Migratory Sharks includes seven species of shark, the Indian Ocean and South-East Asia (IOSEA) Marine Turtle MoU six species of marine turtle, and the Raptors MoU 76 species of birds of prey.

### 3.1.5 The Convention on Biological Diversity (CBD)

The Convention on Biodiversity Diversity (CBD) was signed by 157 country leaders in Rio de Janeiro, Brazil. Indonesia is the 8th country to have ratified this regulation. The Convention has three main goals:

- Conservation of biological diversity (or biodiversity);
- Sustainable use of its components; and
- Fair and equitable sharing of benefits arising from genetic resources.

In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development.

## 3.2 National Regulation

Indonesia’s Environmental Law requires a project proponent to undertake an Environmental Impact Assessment (Analisis Mengenai Dampak Lingkungan or AMDAL) where it is considered that the project has the potential to result in significant environmental or social impacts. Further details are given in Chapter 6, Impact Assessment of the ESIA.

The following significant laws and regulations concern national legislation in respect to biodiversity are shown in ***Table 3.1***.

**Table 3.1 Indonesia Regulations Regarding Biodiversity**

| No | Regulation | Substance |
|---|---|---|
| 1 | Law No. 5 of 1990 on Biological Natural Resources Conservation and its Ecosystems | Stressing safeguards such as buffer system protection, preservation of biodiversity, prohibited activities and sanctions. The Act also gives a descript ion of the nature reserve zone, community, and conservation area. Emphasizes land conservation. |

| No | Regulation | Substance |
|---|---|---|
| 2 | Government Regulation (GR) No. 68 of 1998 on Wildlife Reserve and Natural Conservation Zones | The aim of this regulation is to manage of Wildlife Reserves and Nature Conservation Zones, to establish and foster the protect ion of biological resources and ecosystem balance, so that efforts to raise the prosperity and quality of life of the community can be supported. |
| 3 | Government Regulation (GR) No. 7 of 1999 on Flora and Fauna Species Conservation | The conservation of flora and fauna has the following objectives: to avoid extinct ion of flora and fauna species; to safeguard genetically purity and species diversity of flora and fauna; to conserve the equilibrium and stability of the ecosystem so as to be useful for the sustainable well-being of mankind. |
| 4 | Law No. 26 of 2007 on Spatial Planning | Management of protected areas, the area of cultivation and conversion, and management of protected areas |

## 3.3 Third Party Requirements

### *3.3.1 Overview*

The IFC PS6 (IFC, 2012) and Guidance Note 6 (IFC, 2019) have been used for the Project as best practice and international standards. In accordance with IFC PS6, habitats are divided into modified, natural, and critical habitats. Critical habitats can be either modified or natural habitats supporting high biodiversity value, including:

- Habitat of significant importance to critically endangered and/ or endangered species (IUCN Red List);
- Habitats of significant importance to endemic and/ or restricted-range species;
- Habitat supporting globally significant concentrations of migratory species and/ or congregator species;
- Highly threatened and/ or unique ecosystems; and/ or
- Areas associated with key evolutionary processes.

### *3.3.2 International Finance Corporation (IFC) Standards and Guidance*

# 4 BIODIVERSITY BASELINE

## 4.1 Methodology

### *4.1.1 Desktop Study*

The following data sets listed in ***Table 4.1*** below were consulted for the biodiversity assessment.

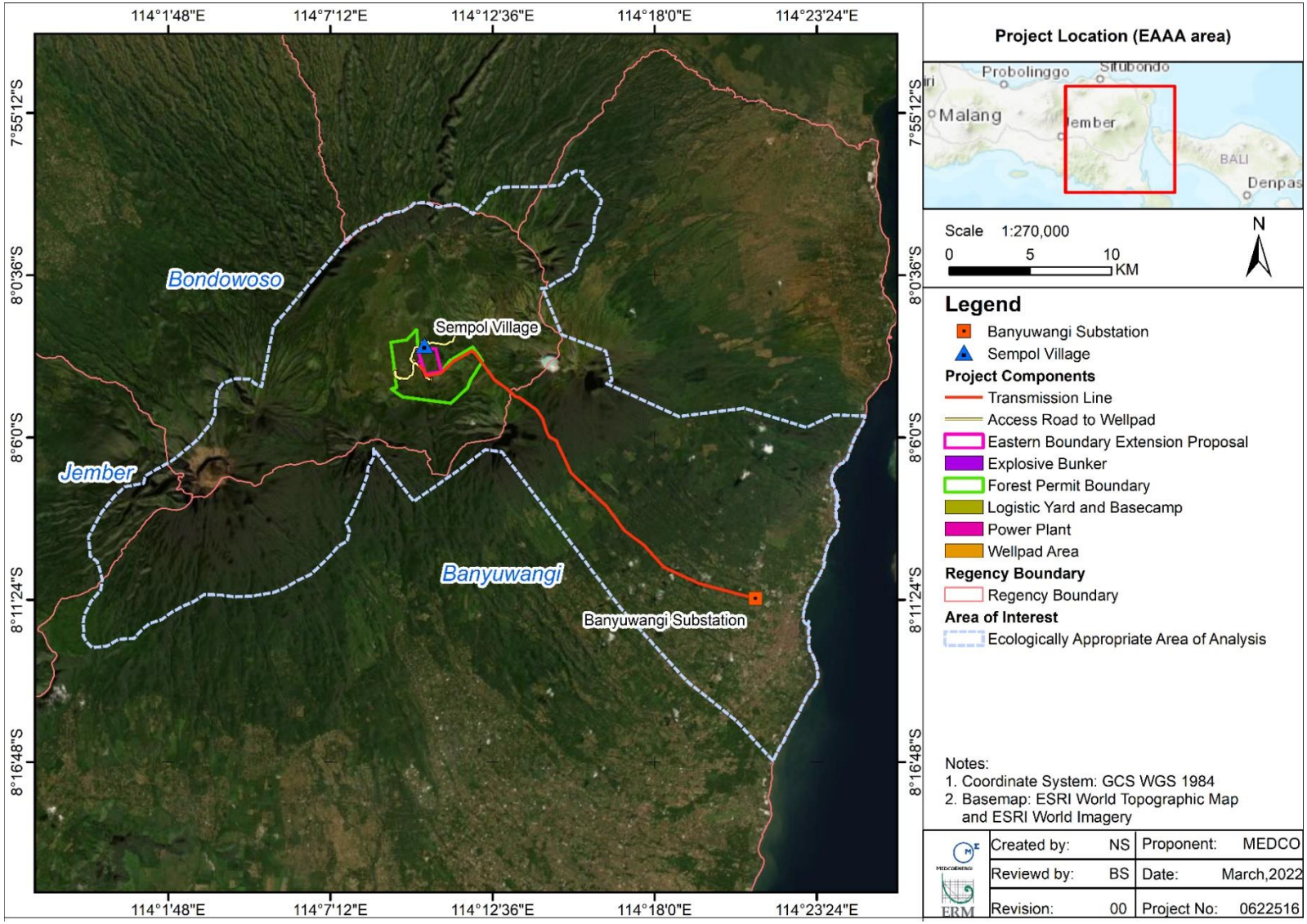
**Table 4.1 Data sources used for biodiversity assessment**

| No | Data | Source |
|---|---|---|
| 1 | IUCN Threatened Species Grid | IBAT download |
| 2 | World Database of Protected Areas | IBAT |
| 3 | Key Biodiversity Areas | IBAT |
| 4 | Endemic Bird Areas | IBAT |
| 5 | RAMSAR Wetlands | IBAT |
| 6 | World Heritage Sites | UNESCO |

### *4.1.2 Study Area*

The main purpose of the study is to identify the home range and habitats of wildlife, especially endangered species. The biodiversity study focused on the area within EAAA (***Figure 4.1***).

## Figure 4.1 EAAA Map



### 4.1.3 Field Survey

In general, the transect survey focused on habitats used by flora and fauna, particularly in the area of EAAA. Two seasons biodiversity study conducted on February and June 2022 with the focus of study including terrestrial biodiversity, aquatic biodiversity. Vantage survey for birds were conducted separately from other field survey in June, July, and August 2022.

255 species of terrestrial fauna, 345 species of flora, three fishes and 18 aquatic macroinvertebrate were recorded from wet and dry season baseline survey. 33 species are high conservation value species, the full list is presented in Chapter 4.3, Terrestrial and Aquatic Biodiversity in ESIA.

## 4.2 Protected and Nature Conservation Area

Kawah Ijen Natural Reserve was designated based on the Minister of Agricultural decree No.1017/Kpts-II/Um/12/ of 1981, this decree including 2,468 ha of:

- Montane Rain Forest, this area distributed between 1,000 and 2,500 m above sea level. The vegetation found is a combination of Mountain Rain Forest and Sub Alpine Rain Forest dominated by Compositae (Eidelweiss) and Ericaceae (Vaccinium).
- Sub Alpine Rain Forest, this area distributed between 2,500 and 4,000 m above sea. The vegetation is dominated by shrubs and shrubs, given the unfavourable environmental conditions and the increasing influence of sulphur compounds.

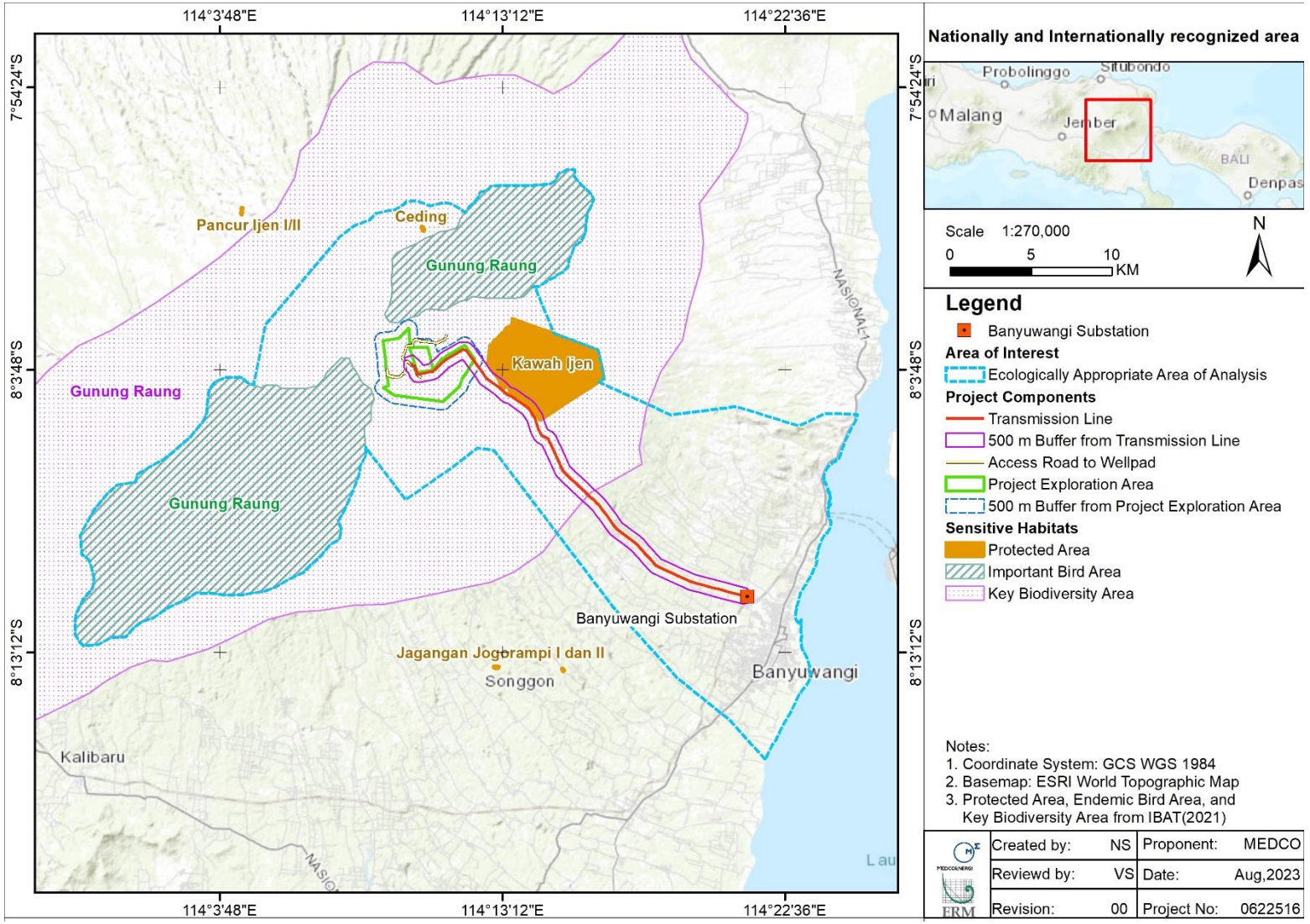
The ***Figure 4.2*** below show the Protected Area location within EAAA. The project location is approximately 0.82 km away from the Protected Area. While the transmission line's initial section is adjacent to the Protected Area's southwest boundary.

## 4.3 Key Biodiversity Area

There are two KBAs / IBAs located within 1 km of the Project: Gunung Raung to the north and Gunung Ijen to the south-west. A trigger species of these KBAs is the Javan Hawk-eagle (*Nisaetus bartelsi*) listed as Endangered on the IUCN Red List. The KBAs are shown in ***Figure 4.2***.

Figure 4.2

## Figure 4.2 EAAA, National and International Conservation Areas



## 4.4 Habitat Characteristic

IFC PS6 identifies two classes of 'habitats' Natural Habitat and Modified Habitat, based on the extent of human modification of the ecosystems. Heavily disturbed and converted ecosystems are considered modified habitat, such as urban areas and monoculture plantations. It is important to note that both natural and modified habitat can be considered as a critical habitat. However, a largely modified surrounding landscape could suggest that it is less likely that significant biodiversity values could be present in significant concentrations to trigger the IFC criteria for critical habitat.

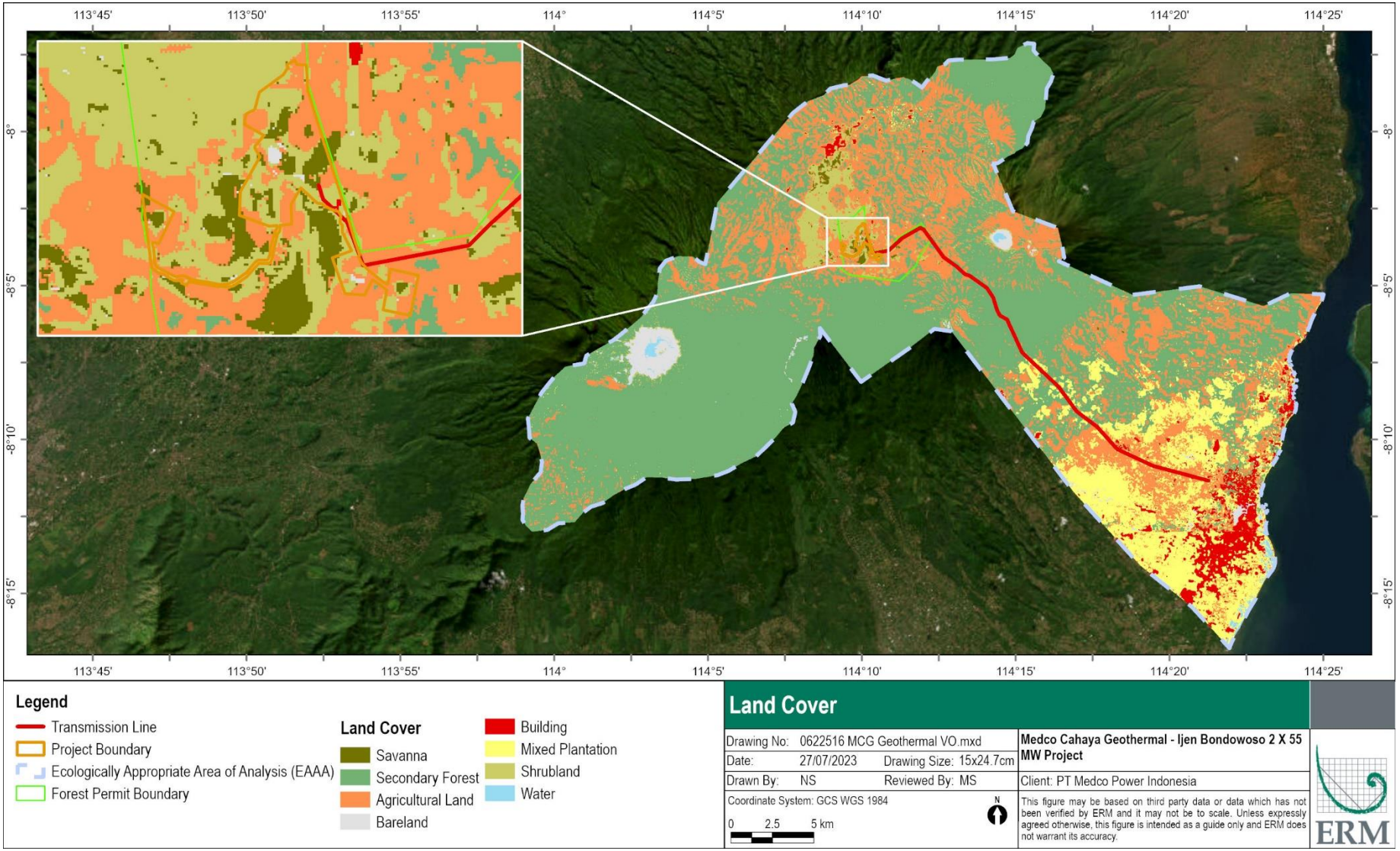
Based on Spatial analyses on the project layout, ERM understands that land cover within the EAAA and the project site were dominated by shrub land and agricultural area. ***Table 4.2*** below show area details for each land use type. It is also noted that there is community settlement, access road, river body and natural lake in the surrounding area. Natural habitat and modified habitat boundary are show in ***Table 4.2***.

The habitat types to be directly impacted by the project will predominantly consist of modified habitat (45.22 ha of shrubland, 43.12 ha of agricultural area, 3.02 ha of bareland, and 0.4 ha of building), while the natural habitat to be directly impacted by the project consisted of 19.10 ha of savanna and 0.12 ha of secondary forest.

**Table 4.2 Area of Land Use in EAAA**

| Land Use Type | Area (ha) | Habitat Type | Impacted by the project (ha) | Impacted by the project (%) |
|---|---|---|---|---|
| Agricultural area | 16,753.33 | Modified habitat | 43.12 | 0.26 |
| Bareland | 984.87 | Modified habitat | 3.02 | 0.31 |
| Building | 2,126.02 | Modified habitat | 0.40 | 0.02 |
| Mixed Plantation | 7,435.56 | Modified habitat | - | - |
| Shrubland | 2,277.06 | Modified habitat | 45.22 | 1.99 |
| Water | 248.56 | Modified habitat | - | - |
| Savanna | 279.90 | Natural habitat | 19.10 | 6.82 |
| Secondary Forest | 39,418.86 | Natural habitat | 0.12 | <0.01 |

## Figure 4.3 Land Cover in EAAA



# 5 CRITICAL HABITAT ASSESSMENT

## 5.1 Background Information

Desktop reviews and the biodiversity evaluated critical habitat criteria based on GN55, IFC PS6, 2012. Critical habitat is the most significant and highest priority areas on the planet for biodiversity conservation. It takes into account both global and national priority-setting systems and builds on the conservation biology principles of 'vulnerability' (degree of threat) and 'irreplaceability' (rarity or uniqueness). Critical habitat assessment is analysis of the significant areas for biodiversity and conservation. Critical habitat criteria following form the basis of any critical habitat assessment:

- Criterion 1: Critically Endangered (CR) and/ or Endangered (EN) species at global and/ or national level
- Criterion 2: Endemic and/ or restricted-range species
- Criterion 3: Migratory and/ or congregatory species
- Criterion 4: Highly threatened and/ or unique ecosystems
- Criterion 5: Key evolutionary processes

## 5.2 Determination of Critical Habitat

This critical habitat screening finds that portions of the EAAA potentially qualifies as critical habitat under IFC PS6 criteria 1, 2 and 4. A total of eight species (one insect species, one mammal species, and six bird species) have been identified as potentially critical habitat-qualifying biodiversity features (***Table 5.1***).

**Table 5.1 Potential Critical Habitat Triggered Species**

| S/N | Common Name | Scientific Name | IUCN Red List | Presence in EAAA | Presence Likelihood | Screening | CH Screening Assessmen |
|---|---|---|---|---|---|---|---|
| **Insect** | | | | | | | |
| 1 | - | *Atrophaneura luchti* | EN | Unconfirmed | Unlikely | Criterion 1, 2 | out |
| **Mammal** | | | | | | | |
| 2 | Javan Tailless Fruit Bat | *Megaerops kusnotoi* | VU | Unconfirmed | Unlikely | Criterion 1 | out |
| **Bird** | | | | | | | |
| 3 | White-faced Partridge | *Arborophila orientalis* | VU | Unconfirmed | Possible | Criterion 1 | in |
| 4 | Javan Hawk-eagle | *Nisaetus bartelsi* | EN | Confirmed | Possible | Criterion 1 | in |
| 5 | Javan Scops-owl | *Otus angelinae* | VU | Unconfirmed | Possible | Criterion 1 | in |
| 6 | Javan Flameback | *Chrysocolaptes strictus* | VU | Unconfirmed | Possible | Criterion 1 | in |
| 7 | Javan Blue-banded Kingfisher | *Alcedo euryzona* | CR | Unconfirmed | Possible | Criterion 1 | out |
| 8 | Javan Leafbird | *Chloropsis cochinchinensis* | EN | Confirmed | Possible | Criterion 1 | in |

### *5.2.1 Criteria 1-3*

According to Critical Habitat screening in ESIA, eight species are considered as potential species to trigger critical habitat. Three species are unlikely to trigger critical habitat, while the other five species are likely to trigger critical habitat criteria (see species specific discussions after Table 5.2). Only two of six species were confirmed to be presence.

## Table 5.2 Summary of Species Ecological Information

| Species | Detail |
|---|---|
| (*Atrophaneura luchti*) | **Habitat** – This species restricted to the Ijen mountains in the far east Java as it is the holotypic area. The information regarding to it habitat and foodplant is poor. It is likely that its hostplant belongs to the family Aristolochiaceae. The attitude at which *A. luchti* occurs is unknown, but it is likely to be at medium or high elevations.<br>**Threat** – According to information from IUCN, specific threats to this range-restricted species are still unknown, and more research in this area is recommended. However, it is likely that the species is threatened by the growing human population of Java, which leads to increasing deforestation for urbanisation.<br>**Impact from project** – No suitable habitat for this species was found in the Project area, so the Project is not expected to result in any direct impacts. |
| Javan Tailless Fruit Bat (*Megaerops kusnotoi*) | **Habitat** – The habitat of Javan Tailless Fruit Bat is typically found in both lowland and montane tropical evergreen forest. This species is endemic to Indonesia, it can be found in Java, Bali, and Lombok, their type locality is at 700 m and they also occur in higher elevations. Javan Tailless Fruit Bat is assumed to be a foliage-roosting species that roosts singly or in small groups,<br>**Threat** – Due to the logging and wood harvesting, this species is threatened by continuing loss their habitat. Without proper roosting areas, bats may be forced to leave their territory or expose to unfavourable environmental conditions.<br>**Impact from project** – Land clearance from the project activities can result in the direct destruction of Javan Tailless Fruit Bat roosting sites and their foraging areas. As their habitat is continuingly reduced, it leading to their population might be declined. Artificial lights from the projects could interfere light cycles that they rely on it for navigation and foraging. Moreover, construction activities can generate loud noise and vibrations, which can be highly disruptive to fruit bats. |
| White-faced Partridge (*Arborophila orientalis*) | **Habitat** – White-faced Partridge is apparently restricted to the eastern part of east Java, Indonesia. Their distribution range cover from Yang highlands eastwards to westside of Ijian mountain. This species prefers montane evergreen forest as their habitat, usually from 500 – 1,000 m on mountains and might tend to be higher up to 2,200 m as their upper elevation limit.<br>**Threat** – This species is frequently caught, eaten, and traded by human on Java, which decrease their population. The forest degradation by logging and wood harvesting around their habitat also can result in fragmentation of its natural habitat, they typically living on the ground, therefore, they might be limited their movement and dispersal.<br>**Impact from project** – The construction often involves clearing land, including the removal of vegetation and trees. These activities can result in deforestation and forest fragmentation. When their habitat has been altered, they may be unable to find suitable places for nesting and foraging. The loud noise from construction sites can disturbance the behaviour and stress levels of White-faced Partridge, they might leave their nesting sites or habitat. The transportation of vehicle within the project areas might cause mortality effect to this species as well. |
| Javan Hawk-eagle (*Nisaetus bartelsi*) | **Habitat** – Javan Hawk-eagle is found on the island of Java, Indonesia. Their distribution range are quite restricted to patches of forest, it frequently be found in humid forest, secondary and primary evergreen forest and tropical semi-deciduous forest, which preferring slopes with high vegetation cover, it is most often at 500 – 2,000 m from sea level as their upper elevation limit. Juveniles and immatures are recorded in woodland and some cultivated habitats. For Javan hawk-eagle nesting trees consisted of 5 dominated species, which are *Altingea excelsa*, *Litsea* sp., *Macaranga rhizinoides, Agathis dammara*, and *Nephelium juglandifolium*, tree height between 26 – 55 m and height of nests between 18 – 41 m[2].<br>**Threat** – The key threats that this species is facing are habitat loss and trade. It is likely that people in Java sold Javan hawk-eagle openly in bird markets. The uncontrollable conversion of land even in the protected area to agricultural areas also cause threats to this species.<br>**Impact from project** – The habitat loss from land clearance can decrease their habitats, this species typically nest in tall trees, and they need large, undisturbed areas for hunting their food. When their habitats are decreasing, therefore, Javan hawk-eagle will not find any suitable place for bleeding. An excessive noise from construction also could interrupt their behaviour, interfere their hunting success, and leading to increased stress of this species. |
| Javan Scops-owl (*Otus angelinae*) | **Habitat** – This species is found endemic to the island of Java, Indonesia, it is also known to be found around mountains. The tropical upper montane forest between 1,000 – 2,000 m are their common habitats. It seems likely that this species is restricted to a few montane areas in west Java.<br>**Threat** – Due to the widespread agricultural encroachment by shifting cultivators, this species is threatened by continuing loss their forest habitat. The localised project development is probably increasing threat around the lower part of its range 1,000 – 1,500 m, particularly on unprotected mountain slopes. |

[2] Septiana, Wardi & Munawir, Ahmad & Pairah, Pairah & Sodahlan, Moch & Irawan, Yosi & Santosa, Yanto & Prasetyo, Lilik. (2020). *Distribution and Characteristics of Javan Hawk Eagle Nesting Trees in Gunung Halimun Salak National Park*, Indonesia. Jurnal Biodjati. 5. 182-190.

| Species | Detail |
|---|---|
| | **Impact from project** – Land clearance from the project activities can result in the direct destruction of Javan Scops-owl natural habitats and their foraging areas. As their habitat is continuingly reduced, it leading to their population might be declined. Moreover, construction activities can generate loud noise, which can be highly disruptive to owl behaviours, it is nocturnal creatures that might be interfered with their ability to locate prey by excessive noise. |
| Javan Flameback (*Chrysocolaptes strictus*) | **Habitat** – Java Flameback appears only from eastern Java and Bali, Indonesia. This species is known to living in lowland forest habitats. Moreover, Baluran national park seems to be a key important area for this species.<br>**Threat** – The key threats that this species is facing are habitat loss due to agricultural expansion, logging, mining, the development and uncontrolled wildfire. Since this species is living in lowland areas, the increasing of human population might require more areas form its natural habitats, which leading to deforestation for housing and urban areas.<br>**Impact from project** – The habitat loss from land clearance can decrease their habitats, this species typically nests in trees, and they need undisturbed areas for foraging their food. When their habitats are decreasing, therefore, Javan Flameback could not find any suitable place for bleeding and nesting. This species has drumming behaviour for communication within their population and locating insects in the trees, the excessive noise from project activities can disrupt these drumming behaviours. |
| Javan Blue-banded Kingfisher (*Alcedo euryzona*) | **Habitat** – Javan Blue-banded Kingfisher is endemic to only Java, Indonesia. It is commonly be found in the rocky or slow flowing streams and larger rivers running through lowlands forest, usually humid evergreen forest and also back-mangroves and mixed dipterocarp-dominated forest.<br>**Threat** – The key threats that this species is facing are habitat loss due to agricultural expansion, logging, mining, the development and uncontrolled wildfire. Since this species is living in lowland areas, the increasing of human population might require more areas form its natural habitats, which leading to deforestation for housing and urban areas.<br>**Impact from project** – Javan Blue-banded Kingfisher rely on aquatic habitats, such as rivers, streams and wetland, their natural habitats might be lost by project land clearance or construction nearby their habitats. The introduction of pollutants from project activities into surface water will negatively impact the water quality of its habitats, these could reduce fish populations, which are essential prey for this species. |
| Javan Leafbird (*Chloropsis cochinchinensis*) | **Habitat** – This Javan Leafbird is endemic to the Java Island, Indonesia. It can be found in evergreen, semi-evergreen lowland forest, peatswamp-forest, well-grown secondary forest and nearby mixed orchards, typically from lowland plains to 1,800 m as their upper elevation limit.<br>**Threat** – This species is frequently caught and traded to be cage bird for many years. the increasing of human population around the area might increase the demand of this species in the markets. And the deforestation within their habitats results in decrease their natural habitats, which can decrease their population as well.<br>**Impact from project** – The habitat loss from land clearance can decrease their habitats, this species typically builds its nest in trees. The introduction of workers into the project areas might increase their risks to be caught by trapping or other ways to cage them. The loud noise from construction sites can disturbance the behaviour and stress levels of Javan Leafbird, they might leave their nesting sites around the trees or habitat. |

#### *5.2.1.1 Atrophaneura luchti – Not triggered*

This restricted range species has an extent of occurrence (EOO) of 1,000-2,000 km². It has only been recorded from the Ijen mountain range where it is thought to likely occur at a medium to high altitude where forested areas still occur. No population numbers of this species exist. There were no records of the species from baseline studies.

According to Collins et al. (1985)[3] this butterfly species was found in forest areas between medium and high altitude and mostly associated with the plant family of Aristolochiaceae. Based on the flora baseline survey, the project area is characterized by a shrubland type of habitat and no Aristolochiaceae plant species have been recorded from field survey.

The EAAA for the species should be aligned with the distribution of forests medium and high altitude. Given this constraint, it can be assumed that the Project is outside the suitable habitat for this species and therefore outside the EAAA.

[3] Collins, N.M. and Morris, M.G. 1985. Threatened Swallowtail Butterflies of the World. The IUCN Red Data Book. IUCN, Gland and Cambridge.

In addition, based on the review of the impacts generated by the project as per Chapter 6 in ESIA, it is unlikely that negative impacts would affect the population of such species in the surrounding areas of the project.

#### *5.2.1.2 Javan Tailless Fruit Bat (Megaerops kusnotoi) – Not triggered*

This VU species has an EOO of 106,897 km². It is endemic to the islands of Java, Bali, and Lombok. This species is known to occur in tropical evergreen forests at lowland areas, but likely to also occur at higher elevations. No population numbers of this species exist. There were no records of the species from baseline studies.

This species was first identified and proposed by Hill & Boeadi in 1978 based on specimens caught at an altitude of 700 m at Hanjuang Ciletuh, Lengkong, Sukabumi Selatan, West Java. However, the species is likely to occur in lowland primary forest[4]. Based on the flora baseline survey, the project area including transmission line are classified as shrubland and secondary forest habitats.

The EAAA for the species should be aligned with the distribution of primary lowland forests. Given this constraint, it can be assumed that the Project is outside the suitable habitat for this species and therefore outside the EAAA.

In addition, based on the review of the impacts generated by the project as per Chapter 6 in ESIA, it is unlikely that negative impacts would affect the population of such species in the surrounding areas of the project.

#### *5.2.1.3 White-faced Partridge (Arborophila orientalis) – Triggered*

There were no records of the species from baseline studies however the species is known to occur within Mount Ijen. It is a restricted range species with an EOO of 10,800 km². This species is known to occur in montane evergreen forest, at elevations between 500-2,200 m above sea level. The global population estimate is between 10,000-19,999 mature individuals[5]. The estimated number of individuals in EAAA (692.76 km²) is 641 individuals (10,000 used in calculation to attain conservative result), which accounts for 6.41 % of the global population. The species population within the EAAA is likely to trigger critical habitat under criterion 1.

#### *5.2.1.4 Javan Hawk-eagle (Nisaetus bartelsi) – Triggered*

The presence of this species in EAAA was confirmed by baseline studies. This EN species only occurs on the island of Java and Bali, Indonesia. It is considered to be a scarce species that is restricted to patches of remaining forest on the islands, frequently occurring at elevations of 500-1000 m above sea level. Juveniles and immatures are recorded in woodland and some cultivated habitats before moving to secondary and primary evergreen forest as adults[6]; this behaviour suggests that unsuitable habitats may not represent barriers to dispersal.

The global population estimate is between 600-900 individuals[7]. The EOO of this species is 126,000 m. Therefore, the EAAA (692.76 km²) is estimated to contain approximately 3 individuals (600 used in calculation to attain conservative result), which accounts for 0.55% of the global population. The species population within the EAAA is likely to trigger critical habitat under criterion 1.

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[7] BirdLife International. 2017. Nisaetus bartelsi (amended version of 2016 assessment). The IUCN Red List of Threatened Species 2017: e.T22696165A110050373. https://dx.doi.org/10.2305/IUCN.UK.2017-1.RLTS.T22696165A110050373.en. Accessed on 27 July 2023.

### 5.2.1.5 Javan Scops-owl (Otus angelinae) – Triggered

There were no records of the species from baseline studies. It inhabits tropical upper montane forest between 1,000 m and 2,000 m[8]. This VU species is known to occur only in West Java and thought to also likely occur in highland areas of East Java where the EAAA is located.

The global population estimate is between 1,500-7,000 mature individuals. The EOO of this species is 75,800 km². Therefore, the EAAA (692.76 km²) is estimated to contain approximately 14 individuals (1,500 used in calculation to attain conservative result), which accounts for 0.91% of the global population. The species population within the EAAA is likely to trigger critical habitat under criterion 1.

### 5.2.1.6 Javan Flameback (Chrysocolaptes strictus) – Triggered

There were no records of the species from baseline studies however the species is known to occur within Mount Ijen. This VU species occurs only in East Java, and Bali. It is tolerant of habitat modification and can occur in a range of habitat types (forest, shrubland, and plantation)[9].

The global population estimate is between 2,500-9,999 mature individuals[10]. The EOO of this species is 49,500 km². Therefore, the EAAA (692.76 km²) is estimated to contain approximately 35 individuals (2,500 used in calculation to attain conservative result), which accounts for 1.4% of the global population. The species population within the EAAA is likely to trigger critical habitat under criterion 1.

### 5.2.1.7 Javan Blue-banded Kingfisher (Alcedo euryzona) – Not Triggered

There were no records of the species from baseline studies. It is generally sedentary on rocky or slow-flowing streams and larger rivers running through forest, most commonly in the lowlands, but ascending locally to 1,500 m[11].

The global population estimate is between 50-249 mature individuals. The EOO of this species is 173,000 km². Therefore, the EAAA (692.76 km²) is estimated to contain approximately 0.2 individuals (1,500 used in calculation to attain conservative result), which accounts for 0.4% of the global population. The species population within the EAAA is not exceed threshold of critical habitat criterion 1. Therefore, it is unlikely to trigger that criterion.

### 5.2.1.8 Javan Leafbird (Chloropsis cochinchinensis) – Triggered

The presence of this species in EAAA was confirmed by baseline studies. This species favours humid forest edge and secondary growth and is also found in evergreen and semi-evergreen lowland forest, peat swamp forest, well-grown secondary forest, and nearby mixed orchards, from the lowland plains to 1,800 m[12].

No EOO information of this species exist. As it is restricted to Java Island, global population assume to be persisted only in 128,297 km² area of Java Island. Symes et al. 2018[13] has been suspected that the population of the species might decline as high as 90% due to over exploitation for cagebird trade all over Java Island. Human density in the area contributes to the species' major threat which is hunting pressure. The combination of major threat and expected low population is considered as a

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[12] Wells, D. R. (2005). Family chloropseidae (Leafbirds). Handbook of the Birds of the World, Cuckoo-shrikes to Thrushes, 10, 252-267.

[13] Symes, W. S., Edwards, D. P., Miettinen, J., Rheindt, F. E., & Carrasco, L. R. (2018). Combined impacts of deforestation and wildlife trade on tropical biodiversity are severely underestimated. Nature communications, 9(1), 4052.

crucial factor influencing lo population in the EAAA. Therefore, the species population with in EAAA is not expected to exceed the threshold of critical habitat criteria 1 and 2.

### 5.2.2 Criterion 4

### 5.2.3 The EAAA includes the Kawah Ijen Natural Reserve area, which is located i north of the project boundary. Kawah Ijen Natural Reserve is classified as a IUCN Category III protected area, so does not automatically trigger critical habitat criterion 4. Criterion 5

IFC PS6 describes this Criterion trigger to be one of the following:

- Physical features of a landscape that might be associated with particular evolutionary processes (for example isolated areas, areas of high endemism, spatial heterogeneity, environmental gradients, edaphic interfaces, biological corridors or sites of demonstrated importance to climate change adaptation); and/or
- Subpopulations of species that are phylogenetically or morpho-genetically distinct and may be of special conservation concern given their distinct evolutionary history. The latter includes evolutionarily significant units and evolutionarily distinct and globally endangered species.

The freshwater and terrestrial EAAA does not contain landscape that maybe associated with particular evolutionary processes, therefore, the EAAA would not qualify the Project as Critical Habitat under Criterion 5.

## 6 IMPACT MITIGATION

It is recommended that the following mitigation measures be applied in relation to habitat impacts during construction:

| Mitigation Hierarchy | Action |
|---|---|
| Avoidance and Minimization | No clearing of natural critical habitats occurs outside the designated areas of disturbance of the project area. |
| Avoidance and Minimization | Access roads will be defined before the beginning of the construction activities. Some of the public roads may be used for access. Driving off the access roads by the construction vehicles taking part of the construction activities will not be allowed. |
| Minimization | Speed of vehicles will be limited, in order to limit emission of dust in non-paved access roads and in order to limit the risk of accidents with fauna. |
| Minimization | If possible, staging vegetation clearance following the development progress will be conducted, to enable fauna to move to other areas. |
| Minimization | Clearing vegetation outside of designated areas will be prohibited for Project staff, workers, all contractors and personnel engaged in or associated with the Project, with penalties levied, including fines and dismissal, and prosecution under the relevant laws for clearing vegetation outside designated areas. |
| Minimization | The Project owner shall provide training to staff and workers on all rules, regulations and information concerning restrictions related to unauthorised clearing of vegetation, as well as the punishment that can expected if any staff or worker or other person associated with the Project violates rules and regulations. |
| Minimization | Adopt and enforce a no hunting, poaching, or collection policy within the Project area, especially including all construction workers; |
| Minimization | The planned vegetation clearance area for the construction works shall be clearly identified and marked to avoid accidental clearing. |
| Minimization | Feeding of any wildlife fauna is strictly forbidden and ensure all food waste is properly disposed to minimize unwanted pests and wildlife-human interactions. |
| Minimization | Implement Good International Industry Practice for mitigating impacts from transmission lines on birds (e.g., Birdlife International guidelines) |
| Restoration | All land rehabilitation will be undertaken using native indigenous species. The area of landscaping within the Project area shall re-establish habitat values. |

| Mitigation Hierarchy | Action |
|---|---|
| Offset | A biodiversity offset feasibility assessment and management plan shall be developed after the offset site is determined. This program will re-establish habitat for the endangered and endemic trigger species. |

The following monitoring measures are recommended:

- Regular (weekly) checks during construction are to occur along all project boundaries to ensure compliance with clearing within marked boundaries;
- Records are to be kept and regularly reviewed (3 monthly) for implementation of the workforce training program for fauna/flora awareness;
- Records are to be kept and regularly reviewed (3 monthly) of all personnel entering and exiting the project area through checkpoints, including results of all random inspections undertaken for poached flora/fauna; and
- A monitoring plan should be carried out to record invasive alien species in the project area of influence aimed at removing new populations and preventing them from spreading throughout the AoI. In addition, prompt revegetation (i.e., sowing of native herbaceous species and/or planting native shrubs/trees) on bare soil with natural or semi-natural vegetation will reduce the spread of alien species.

Monitoring of rehabilitation success/failure is to occur on all replanting sites. Monitoring is to consist of regular inspections (3 monthly) to determine plant establishment. Where plant establishment is determined to have failed, reestablishment is to occur.

# 7 BIODIVERSITY ACTION PLAN

## 7.1 Overview

This section sets out the proposed actions to be undertaken for the habitats and species of conservation value identified in Chapter 5 with the aim of achieving no net loss to biodiversity and a net gain in critical habitats in accordance with IFC PS6 (IFC, 2012).

## 7.2 Priority Species and Associated Habitats

This BAP document for the MCG Project focuses on:

- Documenting methods to achieve no net loss for natural habitat; and
- Documenting methods to achieve net gain in biodiversity for the triggered CH species.

## 7.3 Action Plan

The following section highlights the main actions required as part of the BAP. The action type as identified within the mitigation hierarchy is also given as shown in ***Table 7.1***.

The Project will disturb 19.22 ha of natural habitat (19.10 ha of savannah and 0.12 ha of secondary forest). The Project will achieve no net loss of natural habitat by restoring similar habitats in suitable areas on-site using native species. These habitats will be replaced on a 2:1 basis and will be monitored for successful establishment for three years.

The Project triggers critical habitat for five bird species. Only two of these five species have actually been observed within the Project area. All five of these species are unlikely to be affected by construction activity as they are mobile and can move from the area of disturbance, if present. During operations the project is proposing to implement measures consistent with good international industry practice, especially relative to the powerline (e.g., bird diverters), which probably poses the greatest risk. The powerline is only 28.3 km long and only a 150 kV line, but, nevertheless, could still pose a potential collision risk for soaring birds, like the Javan Hawk-eagle. Considering the size and length of

the transmission line and the proposed mitigation measures, the risk of mortality for any of these species is considered to be quite low.

The Project Sponsor proposes to conduct biodiversity monitoring and evaluation for the project, and especially along the transmission line (e.g., carcass surveys) for the first two years of project operations. If carcasses for any of the five critical bird species, or a significant number of individuals of other bird species, are found, the Project will implement an adaptive management plan. This Adaptive Management Plan will include consultations with local (e.g., Burung International, Birdlife International's Indonesia partner) and international experts to understand the causal factors to the mortality and modify the Project accordingly.

## Table 7.1 Detailed Action Plan

| Proposed Actions | Mitigation Hierarchy | | | | | Duration | Target and Indicator |
|---|---|---|---|---|---|---|---|
| | Avoidance | Minimization | Restoration | Offset | Additional Action | | |
| Prepare habitat maps for avoidance plan by conduct intensive survey combine with satellite imagery. | / | / | | | | Before construction stage | **Target**: Obtain habitat information for Project site and prepare maps before construction.<br>**Indicator**: Detailed habitat maps prepared and issued before construction. |
| Conduct biodiversity monitoring of the 5 CH species and their habitats within the Project area, especially along the transmission line (e.g, carcass surveys) | | | | | / | Pre-Construction, Construction and Operation stage | **Target**: Validate monitoring 5 CH species<br>**Indicator**: Updated database and information of biodiversity in Project area. |
| Implement adaptive management measures if biodiversity monitoring documents impacts to any critical habitat species | | | | | / | Pre-Construction, Construction and Operation stage | **Target**: Reduce impact to any critical habitat species.<br>**Indicator**: Less or no report regarding to impact on any critical habitat species. |
| Control of invasive alien species. | | / | | | | Pre-Construction, Construction and Operation stage | **Target**: No invasive alien species is to be introduced or spread as a result of the Project.<br>**Indicator**: Project does not introduce invasive alien species to the Project site as a result of Project activities. |
| Conduct habitat rehabilitation with native vegetation in Project area. | | | / | | | During Project period | **Target**: Secondary Forest and disturbed area surrounding Project footprint, triggered species' habitats.<br>**Indicator**: improvement in quality of secondary forest and disturbed areas, especially triggered species' habitats accordance with NNL target. |
| | | | | | | | |
| Financial support to Burung Indonesia to support conservation project on majority of trigger species for critical habitat. | | | | / | / | During Project | **Target**: Improve the protection effort on majority of trigger species for critical habitat.<br>**Indicator**: Annual report of Burung Indonesia's conservation project on trigger species for critical habitat in EAAA. |

| Proposed Actions | Mitigation Hierarchy | | | | | Duration | Target and Indicator |
|---|---|---|---|---|---|---|---|
| | Avoidance | Minimization | Restoration | Offset | Additional Action | | |
| Establish communication system for reporting incidents such as poaching, wildlife conflict, illegal forest clearing in the Natural Reserve area, and forest fires. | | | | | / | During Project | **Target**: Good communications between MCG and management of to Kawah Ijen Natural Reserve.<br>**Indicator**: The establishment of incident response protocol with to Kawah Ijen Natural Reserve. |
| Raise awareness of guest and employee staff of MCG | | | | | / | During Project | **Target**: All guests and employees of MCG are aware of the importance of ecosystem, biodiversity, and the habitat, especially endangered species.<br>**Indicator**: Number of staff and contractors reached through site induction programs, toolbox talks, and training. Number of leaflets, office posters, etc. |
| Raise awareness in the local communities on the importance of endangered species and relevant national laws. | | | | | / | During Project | **Target**: Reduce threat to Kawah Ijen Natural Reserve, endangered species and the habitat and reduce the land clearing in protected area.<br>**Indicator**: Posters, billboards, banners of species conservation and habitat, conservation posted at public places, environmental education in schools. |
| Routinely meet stakeholders to share updated information related environment, especially biodiversity and habitats. | | | | | / | During Project | **Target**: Sustainable communication with stakeholder and sharing information.<br>**Indicator**: Minute of meeting of stakeholder. |

## 7.4 Role and Responsibilities

In addition to the measures defined by the mitigation hierarchy, the BAP also includes a number of actions that can be classified as enhancements in that they create additional biodiversity value on the ground and actions that do not directly lead to value creation, but rather indirectly may have a positive effect on the area, e.g. education of local communities or research. These enhancement actions are called 'Additional Conservation Actions' (ACAs). Summaries of action plan and responsibilities of and stakeholder partnership are presented in Table.

**Table 7.2 Summaries of Detailed Action Plan and Responsibilities**

| Proposed Action Plan | Mitigation Hierarchy | | | | | Responsible | Partnerships and Stakeholders |
|---|---|---|---|---|---|---|---|
| | Avoidance | Minimization | Restoration | Offset | Additional Action | | |
| Prepare habitat maps for avoidance plan by conduct intensive survey combine with satellite imagery. | / | / | | | | Staff of MCG | |
| Conduct biodiversity monitoring of the 5 CH species and their habitats within the Project area, especially along the transmission line (e.g, carcass surveys) | | | | | / | Staff of MCG | |
| | | | | | | | |
| Implement adaptive management measures if biodiversity monitoring documents impacts to any CH species | | | | | / | Staff of MCG | |
| Control of invasive alien species. | | / | | | | Staff of MCG and Contractors | |
| Conduct habitat rehabilitation with native vegetation in Project area. | | | / | | | Staff of MCG and Contractors | |
| Financial support to Burung Indonesia to support conservation project on majority of trigger species for critical habitat. | | | | / | / | Staff of MCG | Burung Indonesia |
| Establish communication system for reporting incidents such as poaching, wildlife conflict, illegal forest clearing in the Natural Reserve area, and forest fires. | | | | | / | Staff of MCG | Kawah Ijen Natural Reserve management |

| Proposed Action Plan | Mitigation Hierarchy | | | | | Responsible | Partnerships and Stakeholders |
|---|---|---|---|---|---|---|---|
| | Avoidance | Minimization | Restoration | Offset | Additional Action | | |
| Raise awareness of guest and employee staff of MCG | | | | | / | Staff of MCG | |
| Raise awareness in the local communities on the importance of endangered species and relevant national laws. | | | | | / | Staff of MCG | Local Government (education and culture agency), customary leaders |
| Routinely meet stakeholders to share updated information related environment, especially biodiversity and habitats. | | | | | / | Staff of MCG | |

# 8 BIODIVERSITY MONITORING AND EVALUATION PLAN

## 8.1 Short-term Biodiversity Monitoring

Short-term biodiversity monitoring will be undertaken over a minimum of five years to incorporate the preconstruction, construction and early operational phases of the Project. The aims of the monitoring will be to provide more detailed baseline data where gaps were identified in the original ESIA and to ensure the mitigation strategy is appropriate to the magnitude of impacts. The methodology to be used will be scientifically robust and will use the Before-After-Control-Impact (BACI) approach. The surveys will be carried out in collaboration with biodiversity experts/NGOs.

### *8.1.1 Monitoring during Construction*

For the construction phase the monitoring activities will include:

- Daily monitoring of construction areas for leaks, spills, releases, improper waste disposal, and unexpected occurrences.
- Weekly monitoring of construction areas for general disturbance, and more intense when there are potential wildlife conflict findings.
- Monthly inspection of construct ion areas to monitor temporary working area size, number and extent of temporary access routes, construction vehicle use of specified access routes, levels of noise and light disturbance.
- Monitoring of vegetation, endangered species and birds, mammals, reptiles, and amphibians before vegetation clearance.
- Monthly check of camera traps to monitor presence of terrestrial mammals, ground-dwelling bird, especially priority species during the biodiversity monitoring period.
- Monthly update and data compilation of the presence of endangered species on Project area.
- Daily monitoring of wildlife conflicts on transmission line route.
- Daily Monitoring of MCG access roads to secure them from poaching activity, in cooperation with Security department.

### 8.1.2 Post Construction Monitoring

Additional monitoring will check for evidence of bird and primate incidents (e.g., carcass surveys) related to power plant and powerline. This monitoring will happen monthly for three years.

## 8.2 Long-term Biodiversity Monitoring

A detailed long-term monitoring plan will be developed by MCG. The habitat and High Conservation Value species identified in the baseline biodiversity surveys will be surveyed to monitor their presence and population trends. The survey will focus on (but it will not be limited to) habitats of high importance like secondary forest, mature agroforest and stream detected in the area. The presence of potential invasive species will be monitored project-wise and mitigation/remediation action will be implemented if a diffusion of these species is detected.

Long-term biodiversity monitoring will be undertaken following the same survey methods used for the short-term biodiversity monitoring to allow for direct comparison of the data and to identify changes in species distribution and abundance. Biodiversity surveys should be implemented for all the duration of the project (Construction and Operation Phase). The survey should focus on the presence of habitat and species of High Conservation value, identified in the baseline biodiversity surveys. This will include surveys for primates (vocalization and nest searching), terrestrial mammals (camera trapping), birds, reptiles and amphibians that may trigger critical habitat (ESIA, Chapter 4.3).

The long-term monitoring will be undertaken over a minimum period of twenty years, with surveys being repeated in years 10, 15 and 20 after the start of operation. The surveys will also be coordinated to coincide with the monitoring to be determined as part of the Biodiversity Offset and Ecological Management Plan (BOEMP) as well the on-site forest recreation.

## 8.3 Evaluation

Following completion of each of the biodiversity monitoring surveys the results will be evaluated by the external ecological consultant in conjunction with the NGO and MCG. Any Critically Endangered, Endangered, protected and/or endemic species not previously identified in the Project Area will be assessed under IFC PS6 criteria and included as additional priority species within this BAP. The mitigation measures and actions included in the BAP will also be reviewed against the results of priority species and relevant changes made where deemed necessary.

### 8.3.1 Project Impacted Area Landscape

Project impacted area was defined as the EAAA (***Figure 4.1***) in the ESIA document. Some

parameters monitored are:

- Land cover and land use changes
- Habitat type changes related to biodiversity

Methodological approaches used are remote sensing and spatial analysis. Land cover was obtained from interpretation of satellite images with guidance of ground t ruth data. Land cover and land use change analysis uses time series data. Habitat analysis data are defined with analyses of species location finding and literature review or botanist field survey data of characteristics of vegetation composition. Habitat mapping is developed by combining present land-cover and land use data with detailed vegetation information. In future, the BOMEP will repeat the habitat classification every three years.

### 8.3.2 Species Population Level

Species or population levels are analyzed by monitoring time-series data. The study to identified distribution groups Critical Habitat triggered species are required. Monitoring data are updated with recorded populations of each species. The method used is line transect with a focus on obtaining data

on populations of the bird groups. For ground-dwelling bird, camera traps are used and findings discussed with species experts to identify groups.

### *8.3.3 Evaluation*

This monitoring will be periodically evaluated to determine its effectiveness in meeting the objectives, and identifying any necessary remediation. The findings of the above monitoring program will be evaluated every six years and the outcomes will be used to adapt the management and ongoing mitigation measures. Management interventions will need to be identified when there is a negative trend in the areas of natural habitat and/ or the connectivity of the habitats. The threshold for interventions will be when the area of any natural habitat has significantly decreased.

## 9 ACHIEVING NO NET LOSS AND NET GAIN

The Project will disturb 19.22 ha of natural habitat (19.10 ha of savannah and 0.12 ha of secondary forest). The Project will achieve no net loss of natural habitat by restoring similar habitats in suitable areas on-site using native species. These habitats will be replaced on a 2:1 basis and will be monitored for successful establishment for three years.

The Project triggers critical habitat for five bird species. Only two of these five species have actually been observed within the Project area. All five of these species are unlikely to be affected by construction activity as they are mobile and can move from the area of disturbance, if present. During operations the project is proposing to implement measures consistent with good international industry practice, especially relative to the powerline (e.g., bird diverters), which probably poses the greatest risk. The powerline is only 28.3 km long and only a 150 kV line, but, nevertheless, could still pose a potential collision risk for soaring birds, like the Javan Hawk-eagle. Considering the the size and length of the transmission line and the proposed mitigation measures, the risk of mortality for any of these species is considered to be quite low.

The Project Sponsor proposes to conduct biodiversity monitoring and evaluation for the project, and especially along the transmission line (e.g., carcass surveys) for the first two years of project operations. If carcasses for any of the five critical bird species, or a significant number of individuals of other bird species, are found, the Project will implement an adaptive management plan. This Adaptive Management Plan will include consultations with local (e.g., Burung International, Birdlife International's Indonesia partner) and international experts to understand the causal factors to the mortality and modify the Project accordingly.

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