HIGH BIODIVERSITY VALUE (HBV) ASSESSMENT REPORT

AMANAH SAHAM PAHANG BERHAD

LADANG ASPA BERABUNG

NOVEMBER 2020

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Date of Report	04 December 2020
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Organization Commissioning	AMANAH SAHAM PAHANG BERHAD. Tingkat 20/21, Kompleks Teruntum, Jalan Mahkota, 25000 Kuantan. Pahang Darul Makmur.
Location	Berabung, Mukim Pontian, District of Rompin, Pahang Darul Makmur.
Dates of Assessment	13th November – 15th November 2020
Size of Assessment Area	1,430.57 ha (3535.02 Acres)
Land Planned Use	Oil Palm Plantation
Certification Scheme	Roundtable Sustainable Palm Oil (RSPO) & Malaysian Sustainable Palm Oil (MSPO) Certification
Number of Pages	78 pages of main report, including maps, tables, and excluded pages of appendices.

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1. INTRODUCTION

1.1. Purpose of HBV Assessment

The primary purpose of this report is to identify the areas with potential *High Biodiversity Value* (HBV) within the project site; Ladang ASPA Berabung and provide guidance for their management in order to comply with the MSPO Certification Scheme. These *values* for conservation cover three broad areas of agricultural sustainability:

- Biological diversity, upon which sustainable agriculture depends;
- Environmental stability, the physical medium for agriculture; and
- The broad needs of society in the project area, as well as beyond.

Focusing on MSPO criteria (4.5.6 Status of rare, threatened, or endangered species and high biodiversity value area) 4.5.6.1 Indicator 1: information shall be collated that includes both the planted itself and relevant wider landscape-level considerations (such as wildlife corridors). This information should cover:

a) Identification of high biodiversity value habitats, such as rare and threatened ecosystems, that could be significantly by the grower(s) activities.
b) Conservation status (e.g. The International Union on Conservation of Nature and Natural Resources (IUCN) status on legal protection, population status and habitat requirement of rare, threatened, or endangered species), that could be significantly affected by the grower(s) activities.

4.5.6.2 Indicator 2: if rare, threatened or endangered species, or high biodiversity value, are present, appropriate measures for management planning and operations should include:

a) Ensuring that any legal requirement relating to the protection of the species are met.
b) Discouraging any illegal or inappropriate hunting, fishing or collecting activities and developing responsible measures to resolve human-wildlife conflicts.

4.5.6.3 Indicator 3: A management plan to comply with indicator shall be established and effectively implemented, if required. Site management is needed to minimize any reduction in the *value* of the areas that need to be conserved, and this is achieved by addressing the following items: -

- The identification of the HBV areas;
- The development of an HBV management plan; and
- The development of an HBV monitoring plan.

A secondary purpose for this document that goes beyond the needs for certification is to recommend management and monitoring plans for HBV to be implemented effectively by the plantation company through: -

- Ensuring that the institutional capacity to manage HBV areas is built into an integral part of their mainstream management practices;
- Having trained and experienced human resources available; and
- Provision of full and popular support of the state administrations and local communities to conserve HBV areas.

The objective of this survey is thus to identify HBV 1, 2 and 3 from the diversity of flora and fauna still present in the area and the types of vegetation found. This will be supported by various stand parameters that will be collected during the field survey such as the number of species of plants and vertebrate fauna and stand characteristics. HBV 4 will be assessed from the other observations on the environment and records from the field survey and maps while HBV 5 and 6 will be from the socio-economic survey.

1.2. HBV Overview and References Used

The definitions used in this assessment for HBV are based on the definitions given in two documents: the generic *'Common Guidance (CG) for the Identification of High Conservation Values. October 2013',* the definition in the former is given as:

HBV 1: Concentrations of biological diversity including endemic species, and rare, threatened or Endangered (RTE) species that are significant at global, regional or national levels.

HBV 2: Landscape-level ecosystems and mosaics. Intact forest landscapes and large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.

HBV 3: Rare, threatened, or endangered ecosystems, habitats or refugee.

HBV 4: Basic ecosystem services in Critical situations including protection of water catchments and control of erosion of vulnerable soils and slopes.

HBV 5: Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for example for livelihoods, health, nutrition, water), identified through engagement with these communities or indigenous peoples.

HBV 6: Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of Critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.

Source: Common Guidance for the Identification of High Conservation Values. October 2013

1.3. Background on Company

Amanah Saham Pahang (ASPA) was formed in year 1974 and wholly own by State Government of Pahang Darul Makmur. ASPA was formed based on the concept to provide opportunity to bumiputera in Pahang to involve in wood industries. ASPA has been given two responsibilities by the state government. First to increase the involvement of Bumiputera in wood industries and second, to increase the benefits from the forest products and implementing the sustainable wood industries. In an effort to diversify the company activities, ASPA starting to involve in palm oil and rubber estate covering 9,134.39 hectares (22,571.08 acres) in Bukit Ibam, Rompin District and Pekan. ASPA also making an investment on listed company in Bursa Malaysia and other viable company in various industries.

To achieve the national aspirations, ASPA are committed to comply with the sustainable palm oil and mill operation towards the Malaysian Sustainable Palm oil (MSPO) standard consist of 7 principle as a guidance for management based on three main sustainability that is economy, social and environment.

Demographics information

No.	Description	Ladang Berabung
1.	Year Established	2014
2.	Area (Ha)	1430.57
3.	District	Rompin
4.	Nearest town	Rompin
5.	Surrounding village	FELDA Selendang 3 and FELDA Berabung
6.	Number of workers	Local : 8 Foreign : 16
7.	Religion (%)	Islam (100%)
8.	Number of house (Staff and Workers)	Staff : 6 unit Workers : 5 unit
9.	Population	Male : 18 Female : -
10.	Breakdown of workers	Management : 8 Estate workers : 16

2. DESCRIPTION OF THE ASSESSMENT AREA

2.1. Site Description

Ladang ASPA Berabung is located in Berabung, Mukim Pontian, District of Rompin, Pahang Darul Makmur It is a lowland area and peat swamp. The nearest town is Kuala Rompin located approximately 35 km northeast from the estate. The nearest settlement within 10 km radius of the project site is resident of nearby estate, FELDA Berabung. There is a palm oil mill owned by FELDA Palm Industries Sdn. Bhd at the southeast of the estate. Pontian Dam located at the east the project site. Meanwhile, Anak Endau Dam is located 13 km at south of the estate.

Ladang ASPA Berabung is dominated by flat area covering 97.93% of the total hectare area. The geological condition consists of Pernian and Devonian characteristics. It composed predominantly of flat to gentle-dripping sandstone believed to be Jurassic to Early Cretaceuos age (EIA 2016).

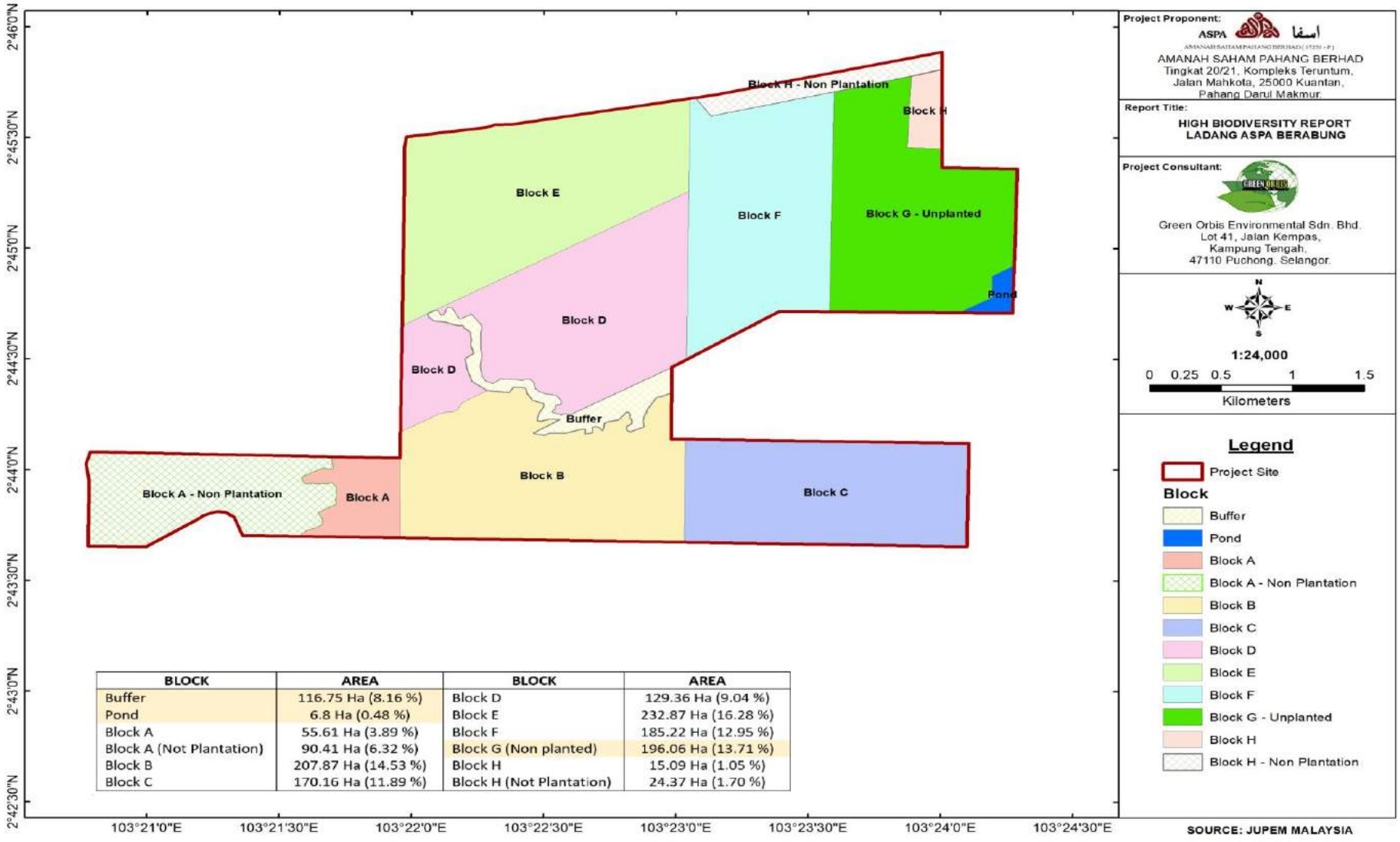
2.1.1.1. HBV Area

Ladang ASPA Berabung are currently divided into nine (9) major planting; Block A 144.745 Ha, Block B 233.739 Ha, Block C 170.146 Ha, Block D 228.768 Ha, Block E 232.877 Ha, Block F 185.213 Ha, Block G 196.058 Ha, Block H1 24.367 Ha and Block H2 15.087 Ha totaling the area 1,198.123 hectare. HBV area consists of buffer zone area, pond and unplanted area at Block G. The total hectare of buffer zone area is 116.75 Ha (8.16%), Pond 6.8 Ha (0.48%) and unplanted area Block G 196.06 Ha (13.71%). Detail HBV area were shown in the Figure 2.3.

Buffer Zone Area Block G

Unplanted Area Block G

Buffer Zone Area Block D



BLOCK	AREA	BLOCK	AREA
Buffer	116.75 Ha (8.16 %)	Block D	129.36 Ha (9.04 %)
Pond	6.8 Ha (0.48 %)	Block E	232.87 Ha (16.28 %)
Block A	55.61 Ha (3.89 %)	Block F	185.22 Ha (12.95 %)
Block A (Not Plantation)	90.41 Ha (6.32 %)	Block G (Non planted)	196.06 Ha (13.71 %)
Block B	207.87 Ha (14.53 %)	Block H	15.09 Ha (1.05 %)
Block C	170.16 Ha (11.89 %)	Block H (Not Plantation)	24.37 Ha (1.70 %)

Figure 2.3: Ladang ASPA Berabung HBV map site

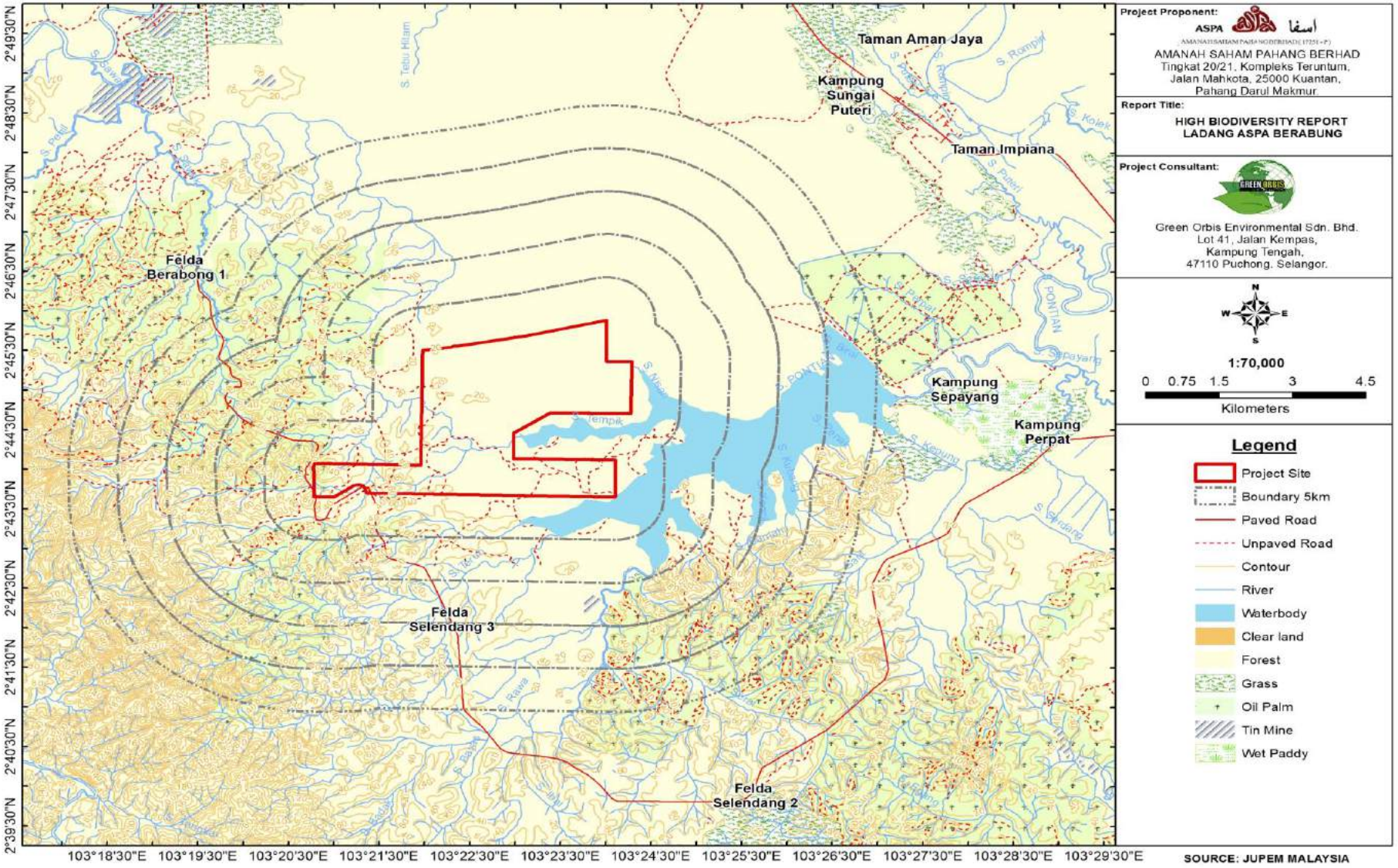


Figure 2.4: Map of Topography (Ladang ASPA Berabung)

Based on the analysis that had been conducted, the elevation of proposed project site are between 20m to 50m which divided into five (5) ranges. The major elevation that occupied the proposed project site are range between <20m to 40m which cover about 98.8% from the total project area. An elevation range between 40m to 50m is a minor elevation that occupied the proposed project site with coverage of 1.2% from the total area. Thus, the proposed project area can be classified as flat area. The details of an elevation in the proposed project site are shown **Figure 2.4** and **Figure 2.5**

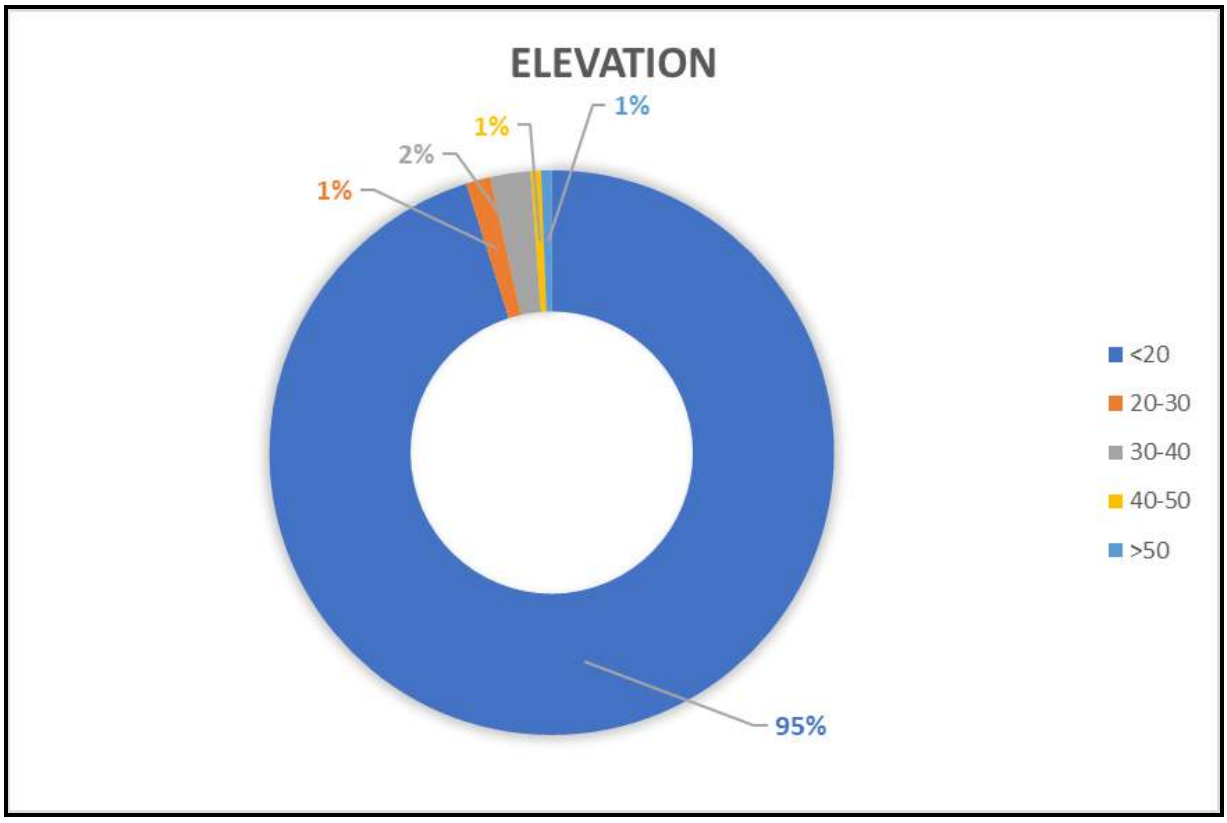


Figure 2.1: Elevation Analysis of the Proposed Project Site (Ladang ASPA Berabung)

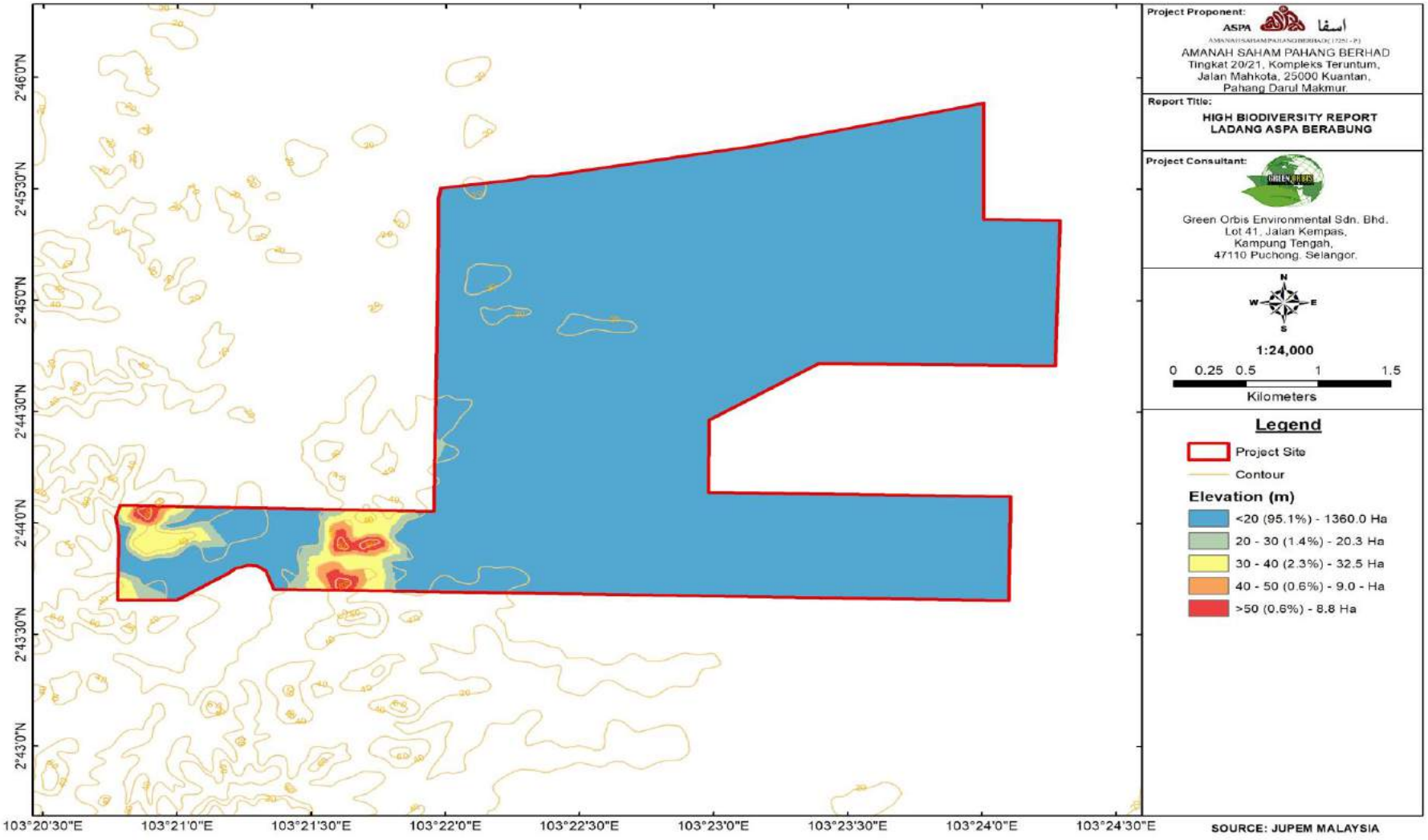


Figure 2.2: Elevation Analysis Map of Project Site (Ladang ASPA Berabung)

Based on the slope analysis for the proposed project site, most of the project site is classified under slope 2°-6° and 6°-12° which covers 0.64 % and 1.91% proximately of the total proposed site. About 16.36 % of the area is under 0° to 2° slope about 96.05 %. About 0.01% above 25°-30° respectively. The detail of slope in the proposed project site are shown **Figure 2.6** and **Figure 2.7**

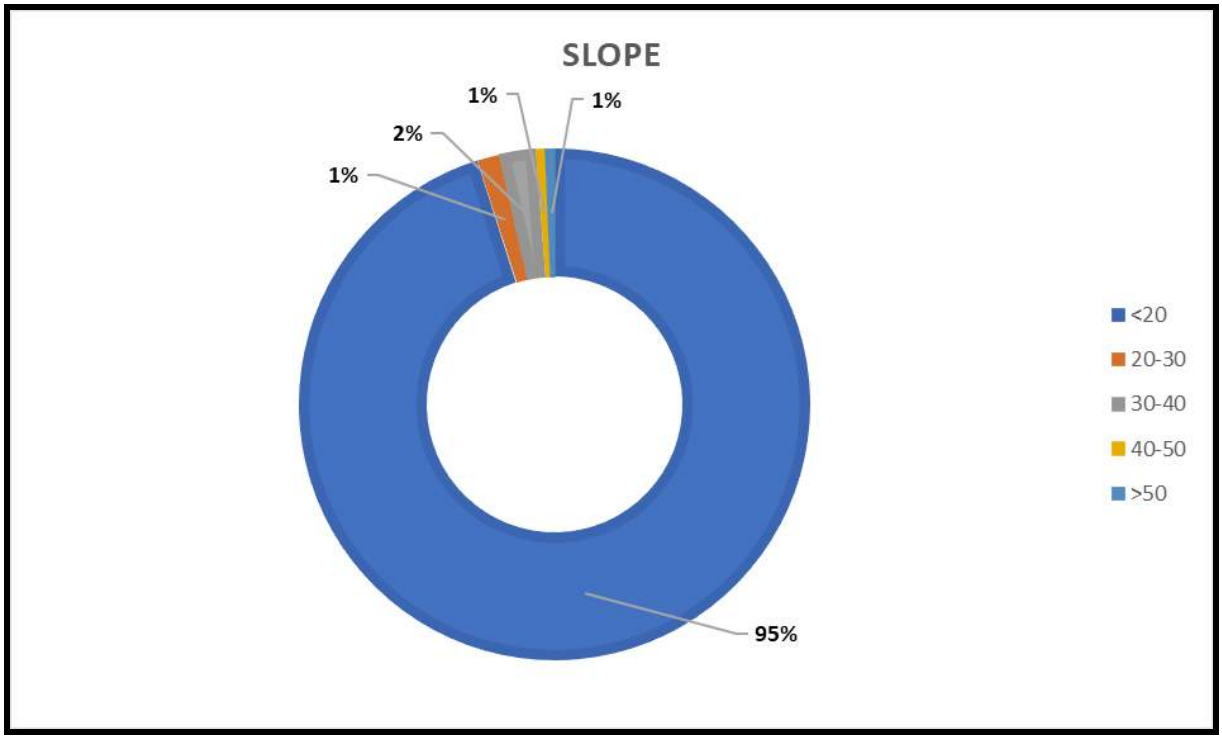


Figure 2.3: Slope Analysis of the Proposed Project Site (Ladang ASPA Berabung)

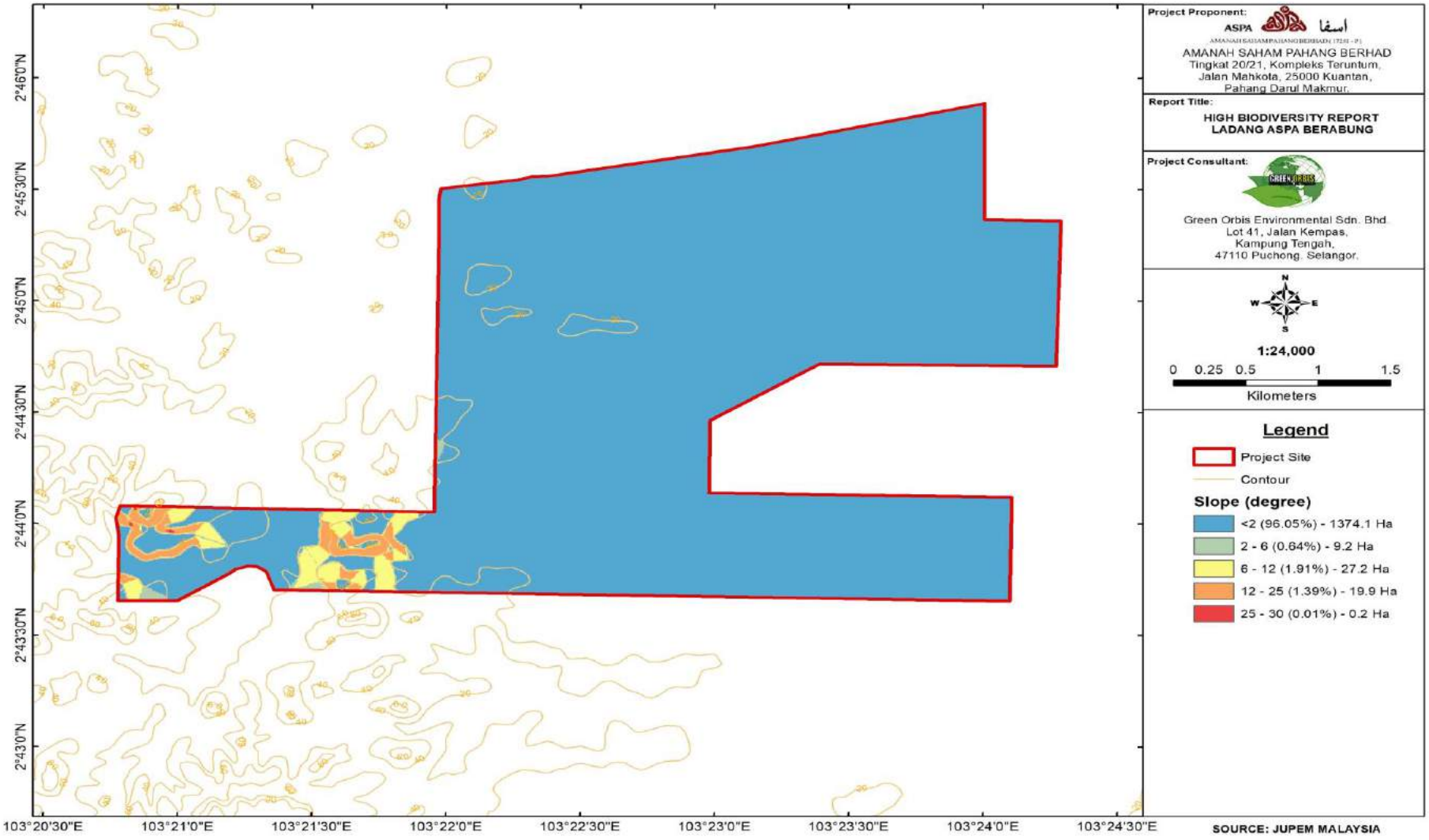


Figure 2.6: Slope Analysis Map of Project Site (Ladang ASPA Berabung)

3. HBV ASSESSMENT TEAM

NO	NAME	CERTIFICATION	ROLE
1.	Mustafa Bin Abdul Rahman	SS5131	Lead Assessor
	Graduated from University of Queensland PhD (Zoology), California State University M Sc (Environmental Health), and B Sc (Biological Science). Area of specialization in molecular Ecology and Wildlife Conservation. Working experience as assistant silviculturist (Sabah Forestry Development Authority), Senior Wildlife Officer (Department of Wildlife and National Parks Peninsular Malaysia), Environment Officer (Department of Environment Ministry of Science, Technology and the Environment, Malaysia), Acting Director (Centre for Technology Transfer and Consultancy (CTTC) University Malaysia Sarawak), Head of Plant and Animal Resource Management Programme (Faculty of Resource Science and Technology University Malaysia Sarawak), Deputy Dean (Undergraduate and Student Development Faculty of Resource Science and Technology University Malaysia Sarawak) and Director (Research and Innovation Management Centre University Malaysia Sarawak). Registered as subject consultant (SS 5131) on Flora and Fauna expert. He has a lot of experience in flora and fauna assessment for the past 20 years.		
2.	Mohd Hairimi bin Mohd Ali	EA 0101, C 1105, CESSWI 3756	Core Team
	Graduated from University Kebangsaan Malaysia with a Master's of Science (Environmental and Social Impact Assessment) and Bachelor of Sciences with Honours (Geography). He has been attended ISO 14001: 2004; Lead Assessor Training and Environmental Management Systems Lead Auditor Course, MSPO Auditor Training on December 2014 organized by IMPAC. He has been certified/registered as Environmental Auditor by Department of Environment Malaysia (EA 0101), Environmental Consultant (C1105); registered on Water Quality Monitoring & Baseline Assessment and Soil Erosion & Sedimentation Analysis, Certified Erosion Sediment and Storm Water Inspector (CESSWI 3756). He was involved for the past 10 years in environment auditing areas for palm oil mill, oil and gas, construction and factory operation and in Environmental Impact Assessment Report (EIA) for palm oil plantation. He is an environment practitioner and experienced auditor since 2014 for the mentioned RSPO and on 2015 for MSPO.		
3.	Nurliyana Bt Mohammad	C 5079	Core Team
	Graduated from The National University of Malaysia with a Master's of Science (Marine Biology) and Bachelor of Sciences with Honours (Marine Science). She started her carrier in an environmental consultant field since 2012 as Environmental Executive. Her knowledge and experience had led her involved in Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) especially in ecological, development and management of plantation. Thus, she had been certified as an Environmental Consultant (C5079) (Air quality monitoring and baseline assessment & Water quality monitoring and baseline assessment) by Department of Environmental Malaysia. Furthermore, she expended her knowledge by joining an ISO 9001:2015 QMS Lead Auditor, Malaysian Stormwater Organization (MSO) (AB 1221) and become an assistant for environmental audit which gave her an experience and details in palm oil mill, oil and gas, construction and factory operation.		
4.	Mohamad Azren Putra Bin Mat Desa	-	Core Team
	Graduated from Universiti Putra Malaysia with Bachelor of Science Forestry. Currently further study in Master of Science (Forest Management and Ecosystem Science) at the same university. Experienced in conducting field survey (forest) and involved in few researches including research on aromatic plants and on agarwood industry's study.		
5.	Fasihah Binti Mohd Yusuf	C 5066	Core Team
6.	Ahmad Fawwaz bin Hayadi	-	Core Team
7.	Mohd Fakaruddin Azman	-	Field Technician
8.	Syahrul Azroy Sham	-	Field Technician

4. TIMELINE AND METHODS

4.1. Timeline

Table 4.1: HBV assessment timeline

DATE	ACTIVITY
9th November 2020 – 13th November 2020	Desktop assessment
13th November 2020 – 15th November 2020	Field survey
14th November 2020 – 28th November 2020	Camera Trap Installation

4.2. Scoping Field Survey

Data from the scoping survey was used for building a preliminary ecological model and to generate a preliminary ecosystem map. The ecosystem map was used to plan the stratified sampling ground survey points, identify locations of sampling points, types of land use, river system, and hilly areas of the site.

4.3. Desktop Study

The desktop study involved compilation of all already available data – reports, maps and administrative and legal documents related to the land use of the area of interest and their incorporation into a GIS database. This is followed by the generation of various 'layers 'of information and maps which are used for preliminary determination of sample points for field surveys and also further analysis.

The first step for HBV management is to build an ecological map model, which allows us to understand how the species present are related to its physical environment, and how this biological community has built up ecological relationships. As land clearance and plantation development will impose changes, we need to understand how these changes will impact the community.

4.4. Flora Composition Assessment

Using the information from the scoping field survey and desktop study, the field sampling sites are selected to ensure that all model types are represented and surveyed. Extra points are selected in case some others are not accessible in the field due to various constraints.

Two practical approaches are taken;

- establishing plots and detailed enumeration and
- A visual transect walkabout/ trekking with regular stops for notes and spot sampling.

For areas without much tree vegetation such as open areas of grassland or fern and scrubby vegetation, a list of plant species found in the area is recorded.

4.5. Fauna Composition Assessment

The priority for the animal survey was to ensure that each of the model ecological types was included in the field survey exercise. Using the sampling sites selected for botanical assessment species presence was recorded from:

- Direct observations and photographs
- Calls
- Tracks and signs
- Camera Traps
- Traps

The survey was conducted during daytime and day active vertebrates and invertebrates were recorded. A few surveys were also conducted at night to assess nocturnal species in the area. Species captured by camera traps are also included in the assessment. The plot for fauna composition assessment was chosen by their location that is usually an unplanted area or border with forest reserve. This location were chosen because the potential fauna diversity that may require from that location.

The species list gave baseline data against which future monitoring can quantify changes in species richness, and model changes in species and ecological equilibrium levels. The results give a baseline list for the animal species present and allowed us to build a model of the current biological community and identify the habitat conditions on which this community depends. Since any alteration in habitat will have an effect on the dependent animal communities, the task for this assessment was to address stakeholder expectations for conservation, and develop a management and monitoring plan minimize the significance of future impacts from plantation development.

4.6. Data Analysis

4.6.1. Vegetation and plant species

Compilation of vegetation types and species list for different vegetation types; dominant tree families and species and common herb and shrub species will indicate the vegetation types of the area surveyed. Stand characteristics from detailed enumeration – density of trees, basal area, etc. will indicate the state on condition of the stand; whether in an early stage of succession or late – an indication of state of disturbance of the area. Relate to soil conditions and satellite imagery; locations and vegetation types of the whole area/ landscape.

4.6.2. Wildlife

Compile list of wildlife according to main taxa – fishes, amphibians and reptiles, birds and mammals. Relate to environmental conditions of habitats (successional state) of locations.

4.6.3. Conservation Status of ecosystems and species

Identification of conservation status of ecosystems and species of plants and animals recorded is based on lists from the Wildlife Conservation (Amendment of Schedule) Order 2012, IUCN (Red List), and NGOs such as Birdlife International and WWF. The local or national protected species are also referred to. Different categories of Red List and protection status will infer HBV1 to the site.

5. FINDINGS AND RESULTS

Following the sequence from HBV 1 to HBV6, we begin with looking at biological diversity – HBV 1-3, followed by geophysical issues – HBV 4, and ending with discussion on social issues – HBV 5 & 6.

5.1. Ecology

5.1.1. Flora Composition Assessment

Based on the previous study (EIA 2016) the estate area were covered by floristic composition are divided into five categories in of habit of the plants which is tree, lianas (climbers), fern/fern-allies, herbaccoues and rattans/palm. In term of species diversity, flora form Euphorbiace family was highly diverse than the other plant family which recorded 28 different species with 17 species on tree and 11 species on shrubs. Then followed by Rubiace with recorded 20 species in total with 4 species of tree, 5 species of climber, 5 species of shrub and 6 species of herbaceous.

No.	Picture	Scientific Name	Local Name	Family Name
1.		*Dyera costulata*	Jelutong	*Apocynaceae*

2.		*Mesua ferra*	Penaga lilin	*Calophyllaceae*
3.		*Macaranga triloba*	Mahang merah	*Euphorbiaceae*

4.		*Palm sp.*	Palma	*Arecaceae*
5.		*Durio sp*.	Durian	*Malvaceae*

6.		*Blechnum orientale*	Paku lipan	*Blechnaceae*
7.		Melastoma malabathricum	Senduduk	Melastomataceae
8.		*Calamus sp.*	Rotan	*Arecaceae*

9.		*Leea sp.*	Memali	*Leeaceae*
10.		*Allium ursinum*	Bawang putih liar/Bawang putih medan	*Amaryllidaceae*
11.		*Adelobotrys sp.*	N/A	*Melastomataceae*

12.		*Cinnamomon sp*.	Kayu manis	*Lauraceae*
13.		*Ficus benjamina*	Ficus	*Moraceae*

5.2. Conservation status

For trees, lianas, ferns/ferns-allices, herbaceous and rattans/palms are based on conservation status listed by International Union for Conservation of Nature and Nature and Natural Resources (IUCN) Red List of threatened species and Malaysia Plant Red List (by FRIM). Noted that Malaysia Plant Red List covered family Dipterocarpaceae only and other species out of Dipterocarps group was not yet recorded. Status code used in the following reported is as in Table 5.1 (Status Code of Flora Species).

Table 5.1 Status Code of Flora Species Based on IUCN Red List

STATUS CODE	DESCRIPTION
EX	Extinct
CR	Critically Endangered
EN	Endangered
VU	Vulnerable
NT	Near Threatened
LC	Least Concern
DD	Data Deficient
ENDEMIC	Species which are originally of species on their specific distribution
NE	Not Evaluated

The survey were done focusing on buffer zone and unplanted area at the Block G. The list of species recorded as per Table 5.2

Table 5.2: List of Flora Observed and Expected within Project Site

NO	FAMILY	SPECIES	MALAYSIA STATUS	IUCN STATUS
1.	*Acanthacace*	*Asytasia gangetica*	NE	NE
2.	*Ancistrocladaceae*	*Ancistrocladus tectorius*	NE	NE
3.	*Apocynaceae*	*Dyera costulata*	NE	NE
4.	*Arecaceae*	*Palm sp.*	NE	NE
		Calamus sp.	*NE*	*NE*
5.	*Amaryllidaceae*	*Allium ursinum*	NE	NE
6.	*Araliaceae*	*Arthrophyllum diversifolium Blume.*	NE	NE
7.	*Burseraceae*	*Santiria tomentosa Blume.*	NE	LC
		Canarium littorale Blume.	NE	LC
7.	*Blechnaceae*	*Blechnum orientale*	NE	NE
8.	*Cabombaceae*	*Cabomba furcata*	NE	NE
9..	*Calophyllaceae*	*Mesua ferra*		
10..	*Cyperaceae*	*Scleria lithosperma (L.) Sw.*	NE	NE
		Scleria sumatrensis Retz.		
		Mapania cuspidata		
11.	*Euphorbiaceae*	*Macaranga triloba*	NE	NE
12.	*Elaeocarpaceae*	*Elaeocarpus griffithii*	NE	NE
13.	*Leeaceae*	*Leea sp.*	NE	NE
14.	*Lauraceae*	*Cinnamon sp.*	NE	NE
15.	*Melastomataceae*	*Adelobotrys sp.*	NE	NE
		Dissochaeta celebica Blume.		
		Melastoma malabathricum L.		
		Clidemia hirta (L.) D. Don.		

16.	*Moraceae*	*Ficus bejamina*	NE	NE
		Ficus uncinata (King)		
		Artocarpus elasticus.		
		Artocarpus scortechinii King.		
17.	*Myristicaceae*	*Gymnacranthera farquhariana*	NE	NE
		Knema conferta (King) Warb.		
		Knema hookeriana		

5.2.1. Fauna Composition Assessment

Animal life is fairly rich, comprising a high diversity of birds but with moderate diversity of mammals, reptiles and amphibians. This is probably because the existing habitat of the study area is a secondary forest regrowth that has been much disturbed over the years. A total of 14 species of mammals, reptiles and amphibians were listed, and these include the Malayan Tapir, Sun Bear, long-tailed macaques, wild boars, bats, civets, and squirrels and other rodents, monitor lizard, python and common snakes, lizards and amphibians.

A total of more than 70 species of birds, 14 species of mammals and 9 Herpetofauna (Reptiles & Amphibians) are recorded. High abundance of common tropical birds like Edible Nest Swiflet, Common Myna, Pacific Swallow, Scally-Breasted Munia, White-Breasted Waterhen and Changeable Hawk Eagle are also recorded **(Table 5.2).** During the survey a few methods were used to identify fauna composition, these methods are; camera trap, mist net, rodent trap and fish nets. Camera trapping did yield some visual records as well as some birds and bats were caught using mist-nets and these were identified and released at the point of capture. Animals tracks such as foot print, faeces, soil disturbance, scratch mark etc. were used as one of the methods to identified fauna composition that exist within the project site.

Although most of the unplanted area site is relatively small and does not have much diversity of vegetation types, it harbors a relatively high diversity of plant species with a diversity of plant forms – herbs, shrubs, trees and palms. And a reasonably good spread of successional stages. This diversity is also reflected in the diverse vertebrate fauna found in the site.

Camera Trap

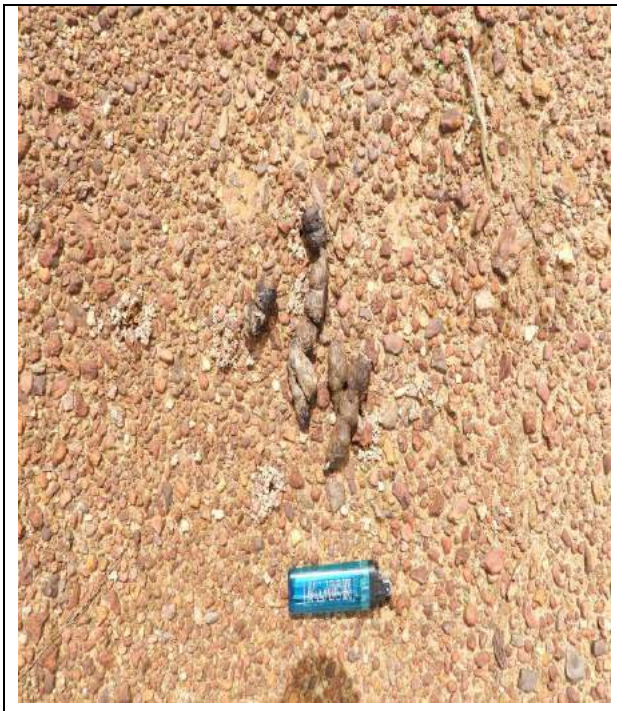
Mist Net

Small Mammal Trap

Bird Transect

Fish Net

Foot Print



Animal Feces

Soil Disturbance

Figure 5.1: Methods for Fauna Survey

5.2.1.1. Birds, Mammals & Herpetofauna

A total of 14 species of mammals, reptiles and amphibians were listed, and these include the Tapir, Sun Bear, long-tailed macaques, pig-tailed macaques, wild boars, bats, civets, squirrels and other rodents, monitor lizard, python and common snakes, lizards and amphibians were observed and expected during the survey, as recorded in the checklist of **Table 5.2**. All the fauna that had been listed are compared with the IUCN and Wildlife Conservation (Amendment of Schedule) Order 2012. Based on bird transect calculation of bird density in the project site, it is estimated that there would be about 189 birds, 636 birds for every 10 ha of the habitat (**Appendix 1**).

Grey-headed Fish Eagle (*Haliaeetus icthyaetus*) Totally Protected (IUCN - NT)

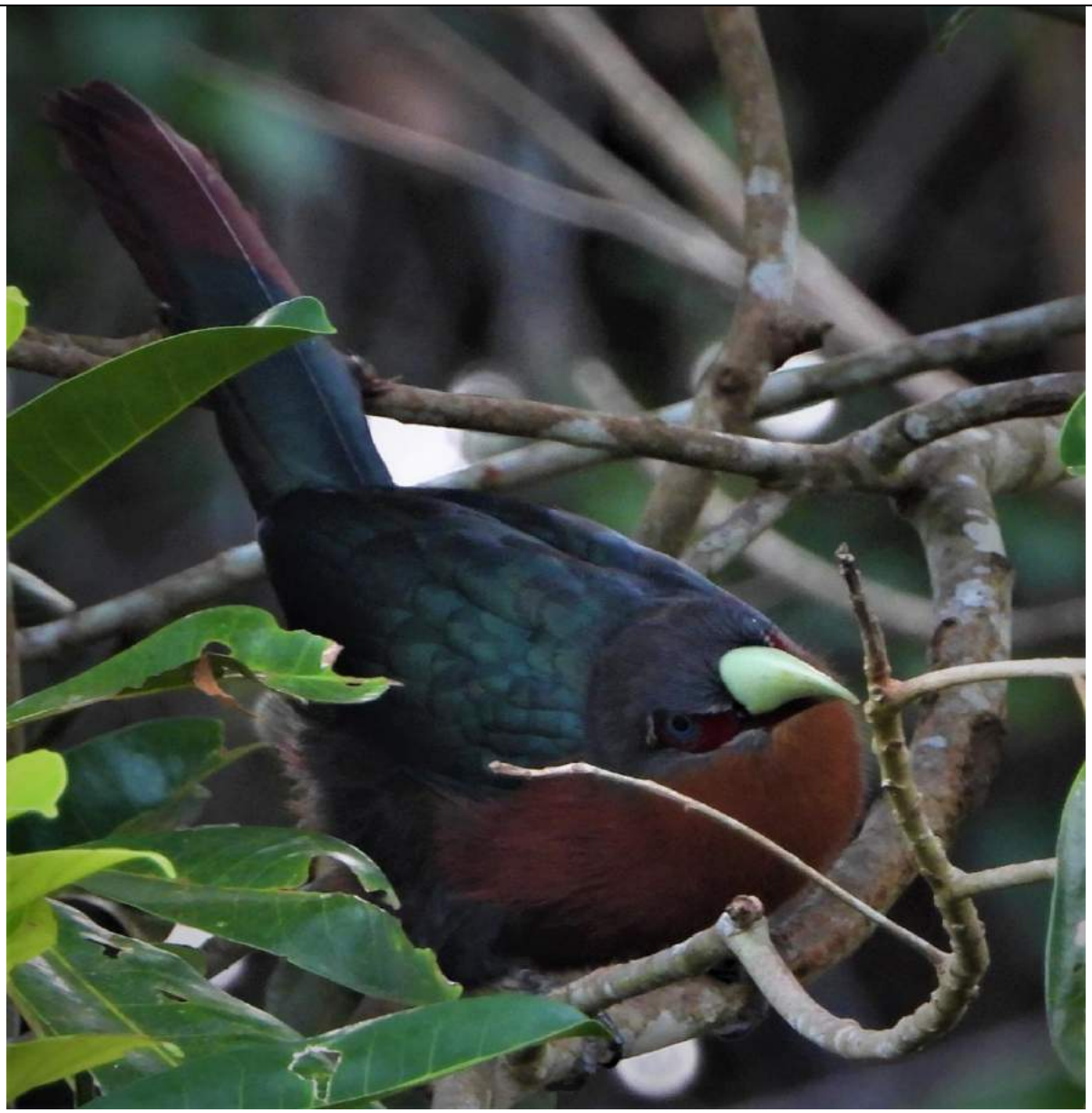
Wallace's hawk-eagle (*Nisaetus nanus*) Totally Protected (IUCN - VU)

Crested serpent eagle (*Spilornis cheela*) Totally Protected (IUCN- LC)

Oriental honey buzzard (*Pernis ptilorhynchus*) Totally Protected (IUCN-LC)

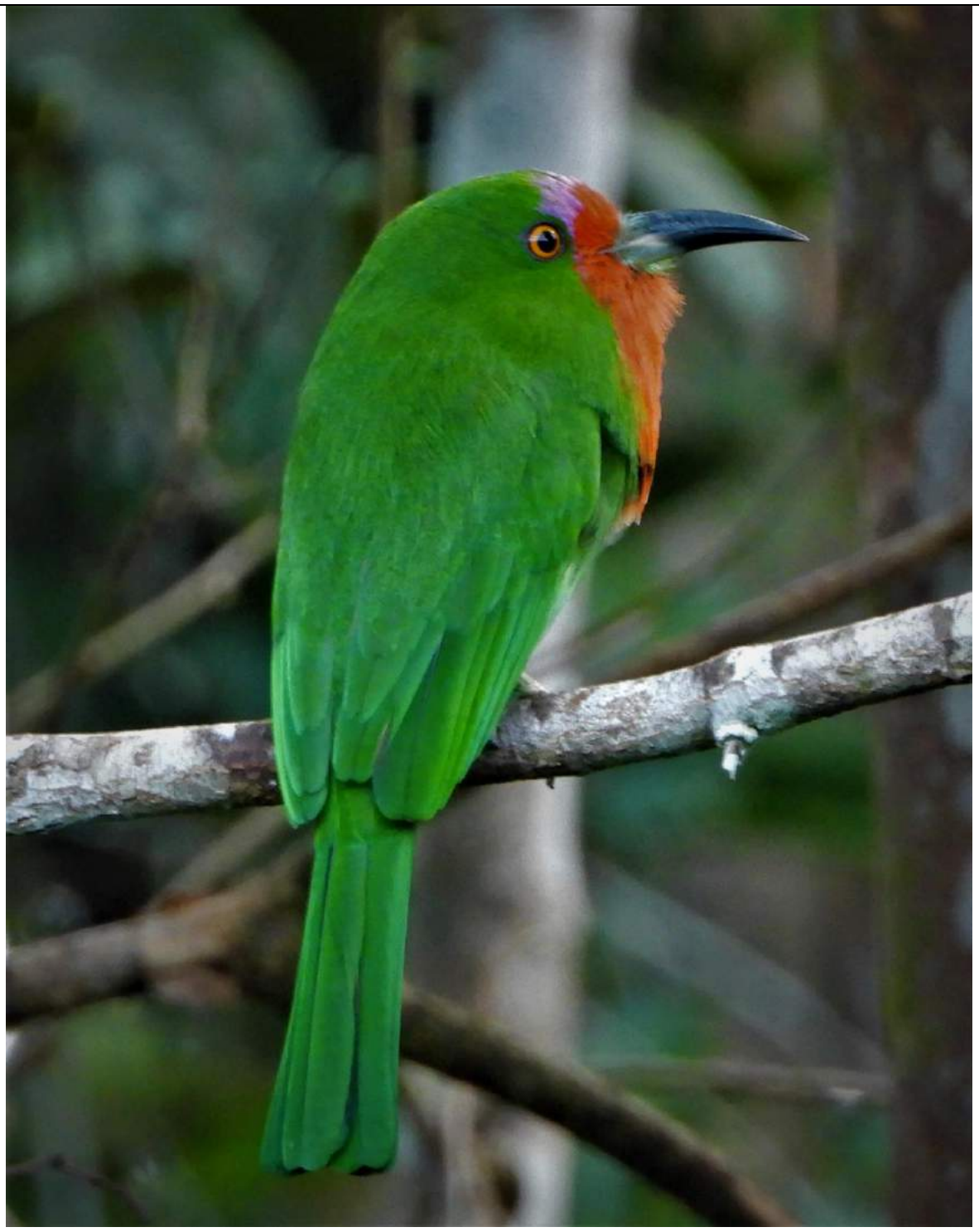
Lesser green leafbird (*Chloropsis cynopogon*) Totally Protected (NT)

Chesnut-bellied malkoha (*Phaenicophaeus sumatranus*) Totally Protected (IUCN-NT)



Chesnut-breasted malkoha (*Phaenicophaeus curvirostris*) Totally Protected (IUCN-LC)

Black-bellied malkoha (*Phaenicophaeus diardi*) Totally Protected (IUCN-NT)



Red-bearded bee-eater (*Nyctyornis amictus*) Totally Protected (IUCN-LC)

Oriental dollarbird (Eurystomus orientalis) (IUCN-LC)

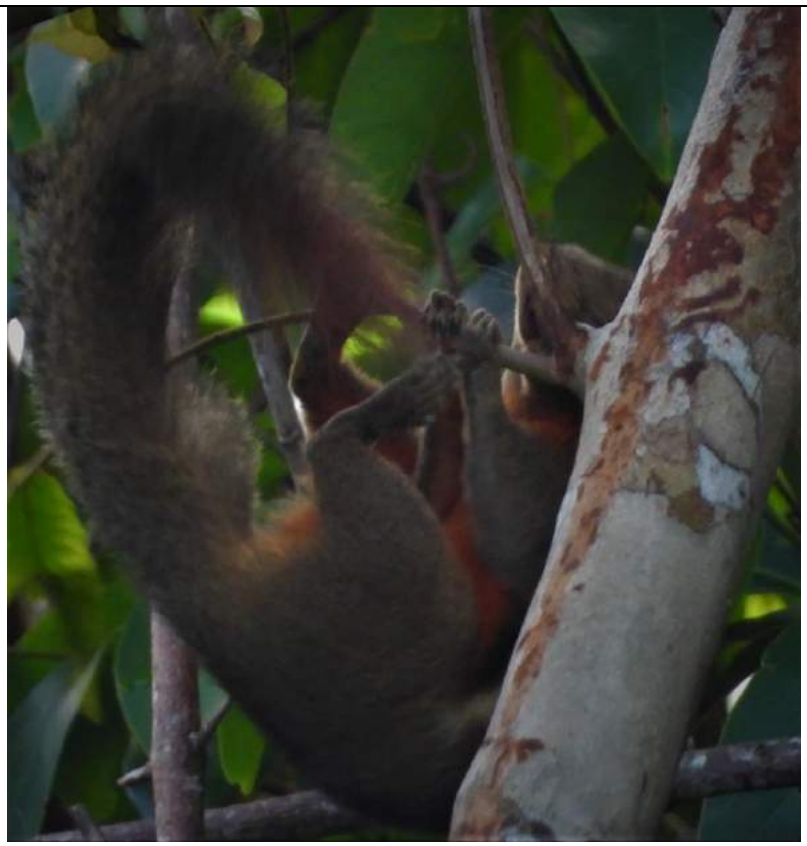
White-throated kingfisher (*Halcyon Smyrnensis*) Totally Protected (IUCN-LC)

White Breasted Waterhen (*Amaurornis phoenicurus*)Protected (IUCN-LC)

Lesser adjutant (*Leptoptilos javanicus*) Totally Protected (IUCN-VU)

Yellow-vented bulbul (*Pycnonotus goiaver*) (IUCN –LC)

Red junglefowl (*Gallus gallus*) Protected (IUCN-LC)



Horse-tailed squirrel (*Sundasciurus hippurus*) (IUCN-NT)

Wild boar (*Sus scrofa*) Protected (IUCN-LC)

Long-tailed macague (*Macaca fascicularis*) Protected (IUCN-VU)

Lesser short-nosed fruit bat (*Cynopterus brachyotis*) (IUCN-LC)

Ricefield rat (*Rattus argentiventer*)

Leopard Cat (*Prionailurus bengalensis*)

Figure 5.2 : Fauna Composition within Project Site

5.2.1.2. Camera Trap Findings

Four sets of camera trap has been installed at unplanted area Block G (1 Set), Block B (2 Set), and Buffer Zone Area (1 Set). Camera trap were installed based on the most potential area to capture the fauna observed based on the evidence of foot print during the survey around the estate.

Long Tailed-Macque (Kera)

Wild Boar (Babi Hutan)

Pig Tailed-Macaque (Beruk)

Red Junglefowl (Ayam Hutan)

Corvus (Burung Gagak)

Lesser Adjutant (Burung Botak Kecil)

Malayan Civet (Musang Tenngalong)

Malayan Tapir (Tapir)

Sun Bear (Beruang Matahari)

Leopard Cat (Kucing Batu)

Malayan Porcupine (Landak Raya)

Table 5.3 Summary of Fauna captured by the Camera Trap.

AREA	FINDINGS/ CONSERVATION STATUS
1. Unplanted Area Block G (Camera 1)	1. Malayan Tapir (*Tapirus Indicus*) EN, TP 2. Wild Boar (*Sus Crofa*) LC, P. 3. Pig Tailed Macaque (Macaca nemestrina) EN, P. 4. Long Tailed Macaque (*Macaca fasicularis*) VU, P. 5. Lesser Adjutant (*Leptoptilos javanicus*) VU, TP.
2. Block B (Camera 2 and 3)	1. Malayan Tapir (*Tapirus Indicus*) En, TP. 2. Wild Cat (*Prionailurus bengalensis*) LC, TP. 3. Corvus (*Corvidae*) NE, NP 4. Wild Boar (*Sus Crofa*) LC, P. 5. Malayan Porcupine (*Hystrix brachyuran*) LC, P. 6. Long tailed Macaque (*Macaca fasicularis*) VU, P. 7. Red Junglefowl (Gallus gallus) LC, P. 8. Sun Bear (*Helarctos Malayanus)* VU, TP.
3. Buffer Zone (Camera 4)	1. Malayan Civet (*Viverra tangalunga*) LC, TP. 2. Mengkarung (*Eutropis multifasciata*) NE, NP. 3. Tikus Sawah (Rattus argentiventer) LC, NP.

5.2.1.3. Fish and Aquatic Life

Common freshwater fishes such as Rasbora or Seluang (family Cyprinidae), Gourami or Sepat (*Trichogaster* spp.), Baung (*Mystus* sp.), Lampan (*Purtius Schwerfeldii*), Haruan (*Channa striatus*) and several individuals of small freshwater shrimps (*Macrobrachium* spp.) from Family Palaemonidae, were caught using fish nets. The checklist of fauna observed and expected to be found within the Project site is given in **Table 5.3**.

Sepat (*Trichogaster trichopterus*)

Figure 5.3: Fish and Aquatic Life Composition

5.2.1.4. Herpetofauna

There is a restricted number of reptilian and amphibian species in the project area, comprising mainly snakes (9 species), monitor lizards, and skinks (**Table 6-23**). Some four species of amphibians were recorded in the vicinity of the project area (**Table 6-23**) and some of the common ones are the frogs *Hylarana erythraea*, and *Fejervarya imnocharis,* and the common toad *Duttaphrynus melanostictus*

Table 5.4: List of Fauna Composition Expected Within Project Site

No.	Family	Scientific Name	Local Name & Conservation Status
Birds			
1	*Aeginthina*	*Aegithina viridissima*	Kunyit Bakau NT,TP
2.	*Aegithinidae*	Aegithina tiphia	Kunyit Pacat LC, TP.
3.	*Alcedinidae*	Alcedo meninting	Pekaka Bintek-bintek LC,TP
4.		Halcyon smyrnensis	Pekaka Belukar LC, TP.
5.	Accipitridae	*Spilornis cheela*	Crested Serpent Eagle LC,TP
6.		Pernis ptilorhynchus	Lang Lebah LC, TP.
7.		Nisaetus cirrhatus	Changeable Hawk Eagle LC, NP
8.		Nisaetus nanus	Lang Selat VU, TP.
		Haliaeetus ichthyaetus	Lang Kepala Kelabu NT, TP.
9.	Ardeidae	Ardeola bacchus	Pucung Cina LC, TP.
10.	Anatidae	Anas crecca	Itik Eropah LC,TP.
11.	*Apodidae*	Aerodramus fuciphagus	Layang-layang LC, NP.
12.	Bucerotidae	Anthracoceros malayanus	Enggang Gatal Birah VU,TP.
13.	Ciconiidae	Leptoptilos javanicus	Botak Kecil VU, TP.
14.	Cisticolidae	Orthotomus ruficeps	Perenjak Bukit LC, TP.
15.	Campephagidae	Pericrocotus divaricatus	Mas Padang LC, TP.
16.	Columbidae	Spilopelia chinensis	Terkukur LC, NP.
17.	Cisticolidae	Orthotomus sericeus	Perenjak Rimba LC, TP.

No.	Family	Scientific Name	Local Name & Conservation Status
18.	Caprimulgidae	Chordeilinae	Tukang Kubur TP
19	Charadriidae	Vanellus indicus	Rapang Duit LC, TP.
20.	Chloropseidae	Chloropsis cyanopogon	Daun Kecil NT, TP.
21.	Chloropseidae	Chloropsis sonnerati	Daun Besar EN, TP.
22.	Corvidae	Corvus macrorhynchos	Gagak LC, NP.
23.	Coraciidae	Eurystomus orientalis	Tiong Batu LC, TP.
24.	Cuculidae	Phaenicophaeus curvirostris	Cenok Birah LC, TP.
25.		Phaenicophaeus diardi	Cenok Perut Hitam NT, TP.
26.		Phaenicophaeus sumatranus	Cenok Kecil NT, TP.
27.	Dicruridae	Dicrurus paradiseus	Cecawi Anting-anting LC, TP
28.		Dicrurus remifer	Cecawi Hamba Kera LC, TP.
29.		Dicrurus leucophaeus	Cecawi Rantau LC, TP.
30.	Estrildidae	Lonchura punctulata	Scaly-breasted Munia LC.
31.	Phasianidae	*Gallus gallus*	Red Jungle Fowl LC, P
32.	*Rallidae*	Amaurornis phoenicurus	Ruak-Ruak LC, P.
33.	*Sturnidae*	Acridotheres tristis	Tiung LC, NP.
34.		Gracula religiosa	Tiung Mas LC, P.
35.	Laniidae	Lanius schach	Tirjup Ekor Panjang LC, TP.
36.	Leiothrichidae	Pterorhinus mitratus	Chesnut-capped laughingthrush NT.
37.	Muscicapidae	Copsychus malabaricus	Murai Batu LC, P.
38.	Pellorneidae	Pellorneum malaccense	Short-tailed Babler NT,
39.		Pellorneum rostratum	White-chested babler NT.
40.	Picidae	Dryocopus javensis	Belatuk Gajah LC, TP.
41.	Pycnonotidae	*Pycnonotus goiavier*	Merbah Jambul LC
42.		Ixodia squamata	Merbah Berbisik NT, TP.
43.		Alophoixus phaeocephalus	Merbah Perut Kuning LC, TP.
44.		Pycnonotus plumosus	Merbah Belukar LC, TP.

No.	Family	Scientific Name	Local Name & Conservation Status
45.	Hirundinidae	Hirundo tahitica	Sualo Batu LC, TP.
46.	Monarchidae	Terpsiphone affinis	Paradise Flycatcher LC, P.
47	Meropidae	Nyctyornis amictus	Berek-Berek Janggut Merah LC, TP.
Mammals			
1.	Tapiridae	*Tapirus Indicus*	Malayan Tapir EN, TP
2.	Ursidae	*Helarctos malayanus*	Beruang Matahari VU, TP.
3.	Cercopithecidae	*Macaca fascicularis*	Kera LC, P
4.	Cercopithecidae	*Macaca nemestrina*	Beruk LC, P
5.	Cynocephalidae	*Cynocephalus variegatus*	Kubung LC, P
6.	Hylobatidae	*Hylobates syndactylus*	Siamang LC, P
7.	Hystricidae	*Hystrix brachyura*	Landak Raya LC, P
8..	Pteropodidae	*Cynopterus brachyotis*	Kelawar Buah LC, NP.
9.	Sciuridae	*Sundasciurus hippurus*	Tupai Ekor Kuda NT, NP.
10.	Suidae	*Sus scrofa*	Babi LC, P
11..	Felidae	Prionailurus bengalensis	Kucing Batu LC, TP
12.	Viverridae	*Viverra tangalunga*	Musang tenggalung LC, TP
13.	Viverridae	*Paradoxurus hermaphroditus*	Common Palm Civet LC, TP
14.	Cercopithecidae	*Trachypithecus obscurus*	Dusky Leaf-monkey LC, P
No.	**Family**	**Scientific Name**	**Local Name & Conservation Status**
Herpetofauna (Reptiles & Amphibians)			
1	Agamidae	*Draco sumatranus*	Cicak Kobin LC, P
2	Boidae	*Malayopython reticulatus*	Ular Sawa Batik LC, P
3	Colubridae	*Ahaetulla prasina*	Ular Pucuk LC, P
4	Elapidae	*Naja sumatrana*	Ular Senduk Sembur LC, P
5	Elapidae	*Ophiophagus hannah*	Tedung Selar LC, P
6	Scincidae	*Eutropis multifasciata*	Mengkarung LC, NP
7	Varanidae	*Varanus salvator*	Biawak Air LC, P

No.	Family	Scientific Name	Local Name & Conservation Status
8	Microhylidae	*Kaloula pulchra*	Katak Puru LC, NP
9	Ranidae	*Hylarana erythraea*	Katak Pisang LC, NP

Table 5.5 Summary of Fauna Status Found in the Ladang Aspa Berabung.

Protection Status (Wildlife Conservation)	IUCN-RL-STATUS
Wildlife Conservation (Amendment of Schedule) Order 2012	IUCN Red List of Threatened Species (2008)
TP – Totally Protected 1. Birds – 33 Species 2. Mammals – 5 Species	EN- Endangered 1. Mammals – 1 Species
	NT- Near Threatened 1. Birds – 7 Species 2. Mammals – 1 Species
P- Protected 1. Birds – 5 Species 2. Mammals – 7 Species	VU- Vulnerable 1. Birds – 3 Species 2. Mammals – 1 Species
NP- Not Protected 1. Birds – 5 Species 2. Mammals – 2 Species 3. Reptiles & Amphibians– 3 Species	LC- Least Concern 1. Birds – 33 Species 2. Mammals – 11 Species 3. Reptiles & Amphibians – 9 Species

5.3. HBV Outcomes and Justification.

HBV assessment of Ladang ASPA Berabung Estate were conducted by Green Orbis Environmental Sdn. Bhd. The assessment was carried out from 13th November 2020 to 15th November 2020 by a team leader Professor Dr. Mustafa Abdul Rahman with other ecological and social experts focussing on all six HBVs. The assessment included satellite imaginary analysis, extensive field surveys, and public consultations with the communities living in the project area. The HBV assessment report included recommendations for the management and improvement of HBV found within the project area. Guidelines for HBV have been drafted for Peninsular Malaysia. However, as far as management of natural resources is concerned, Sabah has always considered itself to be a separate jurisdictional area. In view of this, the HBV Common Guidance for HBV Identification is used

The assessment revealed that HBV 1.2 is present in the form of several flora and fauna species. The HBV 1.4 is potentially present as the wetlands (rivers and streams) are potentially used by migratory birds. HBV3 is present in the form of priority habitats for some species of animal. For erosion control, the presences of fragmented riparian vegetation which are not legally gazetted were noted along the major rivers draining the project area and flowing through the plantation area. These forests are significant in the long term to enhance wildlife corridors and minimize stream bank erosions and sediment load of the rivers (potential HBV4.2). HBV 2, HBV 5 and HBV 6 were not identified during assessment.

Table 5.6: : Identification and Analysis of HBVs Presence Within The Project Site

HBV	Sub-HBV	Present	Potentially Present	Absent
HBV 1 Biodiversity Values	1.1) All forest areas that have been legally gazette as Protected Areas under Malaysian legislation (either federal or state).			Surrounded by Oil Palm Plantation owned by other parties such as FELDA and Royal Pahang Polo Club Sdn. Bhd.
	1.2) Any species categorized as either Critically Endangered (CR), Endangered (EN) or Vulnerable (VU), on the IUCN Red List, Appendix I of CITES or listed as protected under Malaysian legislation (federal or state).	Presence of the following species were noted: -present of one species EN (Endangered) species (*Tapirus indicus*) - NT (Near Threatened) - 7 Species of Birds and 1 Species of Mammals - VU (Vulnerable) - 3 Species of Birds and 1 Species of Mammals) - TP (Totally Protected) - 33 Species of Birds and 5 Species of Mammals - P (Protected) - 5 Species of Birds and 7 Species of Mammals		
	1.3) Any forest containing endemic species as identified by FRIM, MNS, SFC, Forestry Departments and published literature, particularly in high concentrations or highly			From the 11 Species recorded 2 LC (Least Concern) and 9 NE (Not Evaluated).

	restricted distribution.			
	1.4) Any forest area which is important to wildlife for feeding, nesting, roosting, migration or contains saltlicks	Present of 1 Endangered species of mammals (Tapir) and 1 Vulnerable species (Sun Bear). Presence of 1 species of migratory birds Lesser Adjutant (Burung Botak kecil)		
HBV 2 Landscape Level Forests				Not identified as the plantation is located surrounded oil palm plantations and logged over forest areas
HBV 3 Eco-System	Any forest area that contains an ecosystem/habitat type identified as a priority for protection	Unplanted and buffer zone area with evidence of wild life species categorize as near threatened and vulnerable • Evidence of 2 species of mammals (Malayan Tapir and Sun Bear) • Evidence of 10 species of Birds.		
HBV 4 Services of Nature	4.1) Dam catchment areas and any forest area legally gazette as a Protection Forest for water catchment under the National Forestry Act 1984			Not identified as there is no dam catchment area around the Estate. Pontian Dam were located outside of the boundary of the Ladang ASPA Berabung on the East side.
	4.2) Forest areas that have been legally protection	Vegetation riparian buffer reserves along rivers are intact with varying width and		

	or conservation under federal and state laws	quality along the oil palm blocks. • Sungai Tempek • Sungai Nisan • Sungai Teroh		
	4.3) Any specific areas that can act as barriers to provide protection of forests, especially forests with high conservation values			Not Identified
HBV 5 Basic needs of local communities.				Not Identified
HBV 6 Cultural identity of local communities				Not Identified

6. HBV MANAGEMENT AND MONITORING

The HBV Management and Monitoring Plan has adopted an integrated landscape approach which includes the conservation of species and maintains connectivity of protected areas and adjacent forests. Communication with local communities and other companies should also be undertaken to ensure the effective conservation and sustainable management of the estates within the landscape. The management of HBVs focuses on the following: -

1. Improving capacity in management of the HBV sites as the HBV sites areas species rich, and require constant monitoring.
2. HBV areas should be clearly demarcated, especially in areas that are on the estate boundary
3. Definite working maps and the construction of visible boundary markers with effective signage should be put in place.
4. Socialize with staff, workers, and local communities about the HBV areas, their functions and the restrictions.

6.1. HBV Threats Assessment

The threat assessment is an important component of this HBV assessment from a management perspective because the identified threats need to be continuously managed throughout the lifespan of the oil palm enterprise to ensure the maintenance of the HBVs identified and to enable the possibility of their enhancement. To minimize threat impacts on wildlife species, management would need to focus on the source of the threat – people and their activities. So, this would include securing support from local stakeholders to respect legal protections, and agreement to minimise disturbance in their habitat areas.

Summarised in Table 6.1 below is the threats assessments for all HBVs identified. It contains a brief description of the HBV components present linked to current potential threats. The threats identification process required detailed information and feedbacks from local

communities and another stakeholder. In addition, a realistic take on the threats was compiled based on first-hand information during and after the entire assessment process. Consolidation of all findings and opinions from stakeholders were analysed according to HBV components.

Table 6.1: Identification of Threats to Various HBV

HBV	Area of Concern	Current Potential Threat Assessment (Current)
1	RTE and endemics species Status: Present	• RTE species will have forest habitat space reduced • Internal hunting pressure. • External collection of wildlife trade
2	Ecosystems, habitats and refugee Status: Potentially Present	• Impacts adjacent development • Increasing potential for (illegal) smallholder oil palm development by the local communities
4	Soil Erosion Control Fire Control Water Quality Biodiversity – Riparian buffers as biological corridor. Soil formation Pollination, seed dispersal and pest controls Status: Present	• Minor and localized land clearing only during re-planting or smallholder • Smallholder replanting adjacent to the concession (if identified). • Pollution due to usage of agrochemicals • Additional pollution from workers' settlement (household waste and sewage). • Potential oil and chemical spillage from estate facilities and activities. • Loss of riparian buffers • Increase sediment load • Polluted rivers may affect or diminish local communities' resources. • Discharge of sewage into river may pose health hazard (water-borne disease). • Road and bridge building can dissect riparian buffers. • Localised construction – soil erosion can increase river sediments load impacting the river species population and biodiversity. • Developed areas break or disrupt biological corridors and prevent movement and dispersal of animals and plants.

6.2. HBV Management and Monitoring Recommendations

6.2.1. HBV Management Implementation

HBV management is concerned with maintaining pre-development biophysical conditions in areas that have been set aside for conservation. The objective here is to maintain a desired stable ecological equilibrium despite an inevitable reduction of species richness from the reduced area. The passive threats can be mitigated by securing connectivity to biological source areas, while the other active threats have to involve effective socialization and the winning of conservation management support from the relevant stakeholders. Saying so, some of the management activities that are important for dealing with various issues are shown in **Table 6.2** below:

Table 6.2: Management activities proposed for some important issues

No.	Issues	Management Activity
1	Commitment to MSPO principles	Transparency and commitment and implementation of guidelines
2	Developing SOPs	Developing SOPs for all departments and activities
3	Communications	Active role in socialization with stakeholders through regular meetings
4	Field work and monitoring of HBV areas	Effective field management and monitoring and follow up at different stages of plantation development
5	Develop objectives for HBV areas	Oversee appropriate development within HBV areas, buffers and corridors;
6	Effective Socialization	To obtain stakeholder consensus on all activities in estate and effective two-way communication
7	Quality Management	Continuous monitoring and improvement in all aspects of management; adaptive management cycle

6.3. HBV Management and Monitoring Recommendations

The proposed HBV management and monitoring recommendations are summarised in **Table 6.3**. These recommendations are to be incorporated into the company's management and monitoring plan.

Table 6.3: Recommendations for managing and monitoring identified threats to HBV.

HBV	Management Recommendations	Monitoring Recommendations
HBV 1: RTE and endemics species Present	• Safe guard existing habitat, and to seek for advise form the PERHILITAN regarding the findings of Endangered and Vulnerable mammals species (Malayan Tapir and Sun Bear) • Established an emergency response plan regarding wildlife issues that potentiality raised in the estate. • Mark and label boundaries of HBV areas. • Promote awareness and compliance with expected behaviors on forest disturbance, hunting and live animal collecting in all conservation areas – Precautionary approach. • Restriction of types and quantity of agro-chemical used and method of application. • Control chemical use to minimize the risk of accumulation of persistent chemicals in local wildlife, especially food animals for predators • In response to company policies, proscribe and enforce wildlife related rules.	• Conduct a meeting with PERHILITAN to seek for advice regarding the finding of the HBV report. • Established an ERP for wildlife. • Inspection & maintenance of boundary markers. • Monitoring of RTE species • Monitoring of biodiversity indicators. • Monitoring of hunting and collection of RTE species. • Regular enforcement of estate best practices SOPs and biological controls.

HBV 3: Ecosystems, Habitats and refugee (Unplanted Area) Present	• Mark and label boundaries of HBV areas. • Ensure HBV areas within and around plantation areas remain intact. • Socialise with local communities and control encroachment by local communities in the HBV 3 areas. • Avoid construction of new roads that can fragment the continuity of forest. • Maintain communication with management of adjacent development to reduce trans-boundary impacts.	• Inspection and patrolling of HBV boundaries • Monitor encroachment and activities outside that can be detrimental to HBV 3 areas. • Monitor local communities interest and activities in the HBV 3 area • Maintain continuous socialization and provide sustainable projects to offset the need of local communities' encroachment in HBV 3 areas. • Monitor activities of development and road building/ land • Clearing or replanting contractors to avoid fragmentation of HBV 3 areas (especially during replanting).

HBV 4: Flood Regulation Soil Erosion Control Fire Control Water Quality Biodiversity – Riverine buffers as biological corridor. Soil formation Present	• Maintaining riparian buffers to attenuate flood. • Develop appropriate SOP to manage riparian buffers and establish strict enforcement. • Develop SOP for chemical spraying and fertilizer application in areas close to the river buffer. • SOPs for replanting and preparation of peat soil areas. • SOPs for best management practices on peat soil area. • Mark and label boundaries of HBV 4 areas. • Maintain riparian reserve • SOP for monitoring water quality and riparian buffers. • SOP to monitor quality of in-coming water resource and outgoing supply and Identify parameters for monitoring water quality • Establish proper drainage of sewage household waste water (ensure that this is not discharges in rivers that downstream settlement who uses the water for their basic needs). • Enforced containment procedures of oil and chemical spillage so it does not leak / flow into rivers.	• Regular review of effectiveness of SOP. • Monitoring intactness of riparian reserves. • Educate and socialize to local communities on the importance of maintaining riparian reserved and biological connectivity. • Water quality monitoring through regular water analysis at strategic points.

APPENDIX

PROJECT	**ASPA BERABUNG**
DATE	**14-Nov-20**
TIME	**7.00 AM - 8.00 AM**
TRANSECT LINE DISTANCE	**3000 m**

	LIST OF SPECIES	NO. OF BIRDS	DISTANCE (D), m	ANGLE (°)
1	Green Iora	2	30	35
2	Blue-eared Kingfisher	1	20	45
3	Edible Nest Swiftlet	1	15	52
4	White-breasted Waterhen	1	30	10
5	Chestnut-capped Laughing Thrush	1	40	85
6	Black Hornbill	1	20	15
7	Greater Racket-tailed Drongo	1	40	80
8	Long-tailed Shirike	1	30	65
9	Blue-eared Kingfisher	1	20	30
10	Scaly-breasted Munia	1	15	15
11	Red Junglefowl	1	12	10
12	Stripped Wren Babbler	1	15	35
13	White-breasted Waterhen	1	35	35
14	White-breasted Waterhen	12	20	20
15	Grey-headed Fish Eagle	2	25	15
16	Emerald Dove	1	20	20
17	Red Junglefowl	1	30	35
18	Creasted Serpent Eagle	2	5	25
19	Creasted Serpent Eagle	1	10	5
20	Nightjar sp.	3	15	5
21	Common Myna	10	5	3
22	White-breasted Waterhen	1	5	80
23	White-rumped Shama	1	20	85
24	Lesser Racket-tailed Drongo	1	30	35
25	Lesser Green Leafbird	1	10	25
26	Chinese Pond Heron	1	25	80
27	Ashy Minivet	1	25	30
28	Scally-breasted Munia	10	20	80
29	Short-tailed Babbler	1	40	35
30	Yellow-vented Bulbul	1	25	75
31	Scally-breasted Bulbul	2	15	85
32	Common Myna	4	40	25
33	Common Iora	1	30	30
34	Yellow-bellied Bulbul	1	15	25
35	White-chested Babbler	1	25	20
36	Creasted Serpent Eagle	1	50	15
37	Red Junglefowl	3	30	20

38	White-bellied Woodpecker	2	30	35
39	Olive-winged Bulbul	1	25	20
40	Oriental Honey Buzzard	4	50	80
41	Spotted-necked Dove	1	50	35
42	Rufous-tailed Tailorbird	1	15	80
43	Changeable Hawk Eagle	4	40	30
44	Spotted-necked Dove	2	5	75
45	Lesser Adjutant	1	50	50
46	Common Teal	3	20	10
47	Blue-eared Kingfisher	1	5	15
48	White-breasted Waterhen	1	30	20
49	Large-billed Crow	1	30	20
50	Ashy Drongo	1	30	20
51	Lesser Green Leafbird	1	25	30
52	Green Iora	1	25	30
53	Hill Myna	1	50	45
54	Red-wattled Lapwing	1	15	25
55	Common Myna	15	25	15
56	Red Junglefowl	1	40	2
57	Common Myna	15	20	20
58	White-throated Kingfisher	1	15	15
59	Common Myna	4	15	15
60	Red Junglefowl	1	30	5
61	Pacific Swallows	20	30	5
62	Grey-headed Fish Eagle	1	20	35
63	Greater Green Leafbird	1	10	85
64	Hill Myna	1	25	25
65	Short-tailed Babbler	1	30	65
66	Ashy Tailorbird	1	30	85
67	Large-billed Crow	1	25	35
68	Red Junglefowl	1	30	2
69	Edible Nest Swiftlet	20	30	65
70	Asian Paradise Flycatcher	1	10	85
	No. of Birds	189		

Sine Angle (a)	a X D
0.57	17.21
0.71	14.14
0.79	11.82
0.17	5.21
1.00	39.85
0.26	5.18
0.98	39.39
0.91	27.19
0.50	10.00
0.26	3.88
0.17	2.08
0.57	8.60
0.57	20.08
0.34	6.84
0.26	6.47
0.34	6.84
0.57	17.21
0.42	2.11
0.09	0.87
0.09	1.31
0.05	0.26
0.98	4.92
1.00	19.92
0.57	17.21
0.42	4.23
0.98	24.62
0.50	12.50
0.98	19.70
0.57	22.94
0.97	24.15
1.00	14.94
0.42	16.90
0.50	15.00
0.42	6.34
0.34	8.55
0.26	12.94
0.34	10.26

No. of Birds	189	
Total a X D	934.81	m
Mean	4.95	m
Mean x 2	9.90	m
Area	29700.00	m square
Ha	2.97	Ha
Density of bird	63.64	birds/Ha
	636	birds/ 10 Ha
No of Spp	44	spp
Total a x D	934.8	m
Mean	4.95	m
Mean x 2	9.90	m
Area	29700.00	m square
	2.97	Ha
Density of Spp	44/2.97	
	14.8	spp/Ha
	148	spp/10 Ha

0.57	17.21
0.34	8.55
0.98	49.24
0.57	28.68
0.98	14.77
0.50	20.00
0.97	4.83
0.77	38.30
0.17	3.47
0.26	1.29
0.34	10.26
0.34	10.26
0.34	10.26
0.50	12.50
0.50	12.50
0.71	35.36
0.42	6.34
0.26	6.47
0.03	1.40
0.34	6.84
0.26	3.88
0.26	3.88
0.09	2.61
0.09	2.61
0.57	11.47
1.00	9.96
0.42	10.57
0.91	27.19
1.00	29.89
0.57	14.34
0.03	1.05
0.91	27.19
1.00	9.96

PROJECT	**ASPA BERABUNG**
DATE	**14-Nov-20**
TIME	**7.00 AM - 8.00 AM**
TRANSECT LINE DISTANCE	**3000 m**

	LIST OF SPECIES	**NO. OF BIRDS**	
1	Ashy Drongo	1	1
2	Ashy Minivet	1	1
3	Ashy Tailorbird	1	1
4	Asian Paradise Flycatcher	1	1
5	Black Hornbill	1	1
6	Blue-eared Kingfisher	1	
7	Blue-eared Kingfisher	1	
8	Blue-eared Kingfisher	1	1
9	Changeable Hawk Eagle	4	1
10	Chestnut-capped Laughing Thrush	1	1
11	Chinese Pond Heron	1	1
12	Common Iora	1	1
13	Common Myna	10	
14	Common Myna	4	
15	Common Myna	15	
16	Common Myna	15	
17	Common Myna	4	1
18	Common Teal	3	1
19	Creasted Serpent Eagle	2	
20	Creasted Serpent Eagle	1	
21	Creasted Serpent Eagle	1	1
22	Edible Nest Swiftlet	1	
23	Edible Nest Swiftlet	20	1
24	Emerald Dove	1	1
25	Greater Green Leafbird	1	1
26	Greater Racket-tailed Drongo	1	1
27	Green Iora	2	
28	Green Iora	1	1
29	Grey-headed Fish Eagle	2	
30	Grey-headed Fish Eagle	1	1
31	Hill Myna	1	
32	Hill Myna	1	1
33	Large-billed Crow	1	
34	Large-billed Crow	1	1
35	Lesser Adjutant	1	1
36	Lesser Green Leafbird	1	
37	Lesser Green Leafbird	1	1

38	Lesser Racket-tailed Drongo	1	1	
39	Long-tailed Shirike	1	1	
40	Nightjar sp.	3	1	
41	Olive-winged Bulbul	1	1	
42	Oriental Honey Buzzard	4	1	
43	Pacific Swallows	20	1	
44	Red Junglefowl	1		
45	Red Junglefowl	1		
46	Red Junglefowl	3		
47	Red Junglefowl	1		
48	Red Junglefowl	1		
49	Red Junglefowl	1	1	
50	Red-wattled Lapwing	1	1	
51	Rufous-tailed Tailorbird	1	1	
52	Scally-breasted Bulbul	2	1	
53	Scally-breasted Munia	10		
54	Scaly-breasted Munia	1	1	
55	Short-tailed Babbler	1		
56	Short-tailed Babbler	1	1	
57	Spotted-necked Dove	1		
58	Spotted-necked Dove	2	1	
59	Stripped Wren Babbler	1	1	
60	White-bellied Woodpecker	2	1	
61	White-breasted Waterhen	1		
62	White-breasted Waterhen	1		
63	White-breasted Waterhen	12		
64	White-breasted Waterhen	1		
65	White-breasted Waterhen	1	1	
66	White-chested Babbler	1	1	
67	White-rumped Shama	1	1	
68	White-throated Kingfisher	1	1	
69	Yellow-bellied Bulbul	1	1	
70	Yellow-vented Bulbul	1	1	
	No of Spp		44	Spp

Common Iora
Stripped Wren Babbler
Cream-vented Bulbul
Little Spiderhunter
Lesser Green Leafbird
Oriental Pied Hornbill
Rufous-crowned Babbler
Oriental Pied Hornbill
Blue-eared Kingfisher
Green Broadbill
Chessnut-winged Babbler
Stripped Tit Babbler
Chessnut-winged Flycatcher
Yellow-eared Spiderhunter
Black-naped Blue Monach
Black and Yellow Broadbill
Little Spiderhunter
Scaly-breasted Bulbul
Grey-throated Bubbler
Little Spiderhunter
Green Broadbill

Scaly-crowned Babbler
Rufous-crowned Babbler
Blue-throated Flycatcher
White-crowned Forktail
Scaly-crowned Babbler
Cream-vented Bulbul
Puff-throated Bulbul
Lesser Green Leafbird
Chestnut-winged Flycatcher
Little Spiderhunter
Red-wisked Bulbul
Red-wisked Bulbul
Olive-winged Bulbul
Olive-winged Bulbul
Maroon-breasted Monarch
Ochraceous Bulbul
Greater Leafbird
Scaly-crowned Bubbler
Green Broadbill
Oriental Pied Hornbill
Sooty-caped Babbler
Black-necked Tailorbird
Ashy Tailorbird
Lesser Green Leafbird
Red-crowned Barbet
Yellow-bellied Bulbul
Chestnut-capped Laughingthrush
Black-browed Barbet
Ashy Minivet
Gold-whiskered Barbet
Rufous-bellied Malkoha
Crimson Sunbird
Crested Surpent Eagle
Black-headed Bulbul
Black-headed Bulbul