
Public Summary

Forest Management Plan

1st January 2024 – 31st December 2033

ACACIA FOREST INDUSTRIES SDN BHD

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Abbreviations

AFI – [Acacia Forest Industries Sdn Bhd](#)

BFC – [Borneo Forestry Cooperative](#)

CSR – Community Social Relations

EIA – Environmental Impact Assessment

EMP – Environmental Management Plan

EPD – Environmental Protection Department

EVMS – Event Management System ([PeopleTray](#))

FMP – Forest Management Plan

GIS – Geographic Information System

HCV – [High Conservation Value](#)

HBP – Hijauan Bengkoka Plantations Sdn Bhd

ILO – [International Labour Organisation](#)

JV – Joint Venture Agreement

MTCC – [Malaysian Timber Certification Council](#)

MTCS – [Malaysian Timber Certification Scheme](#)

MC&I – [Malaysian Criteria & Indicator](#)

NTFP – Non Timber Forest Product

PFR – Permanent Forest Reserves

R&D – Research and Development

RTE – Rare, threatened and endangered species

SFD – Sabah Forestry Department

SAFODA – Sabah Forestry Development Authority

SAHO – Safety and Health Officer

SFM – Sustainable Forest Management

SFMLA - [Sustainable Forest Management Licence Agreements](#)



SIA – Social Impact Assessment

SOP -Standard Operating Procedure

1. Introduction

1.1. Scope and Purpose

The purpose of the Forest Management Plan (FMP) is to ensure that Acacia Forest Industries (AFI):

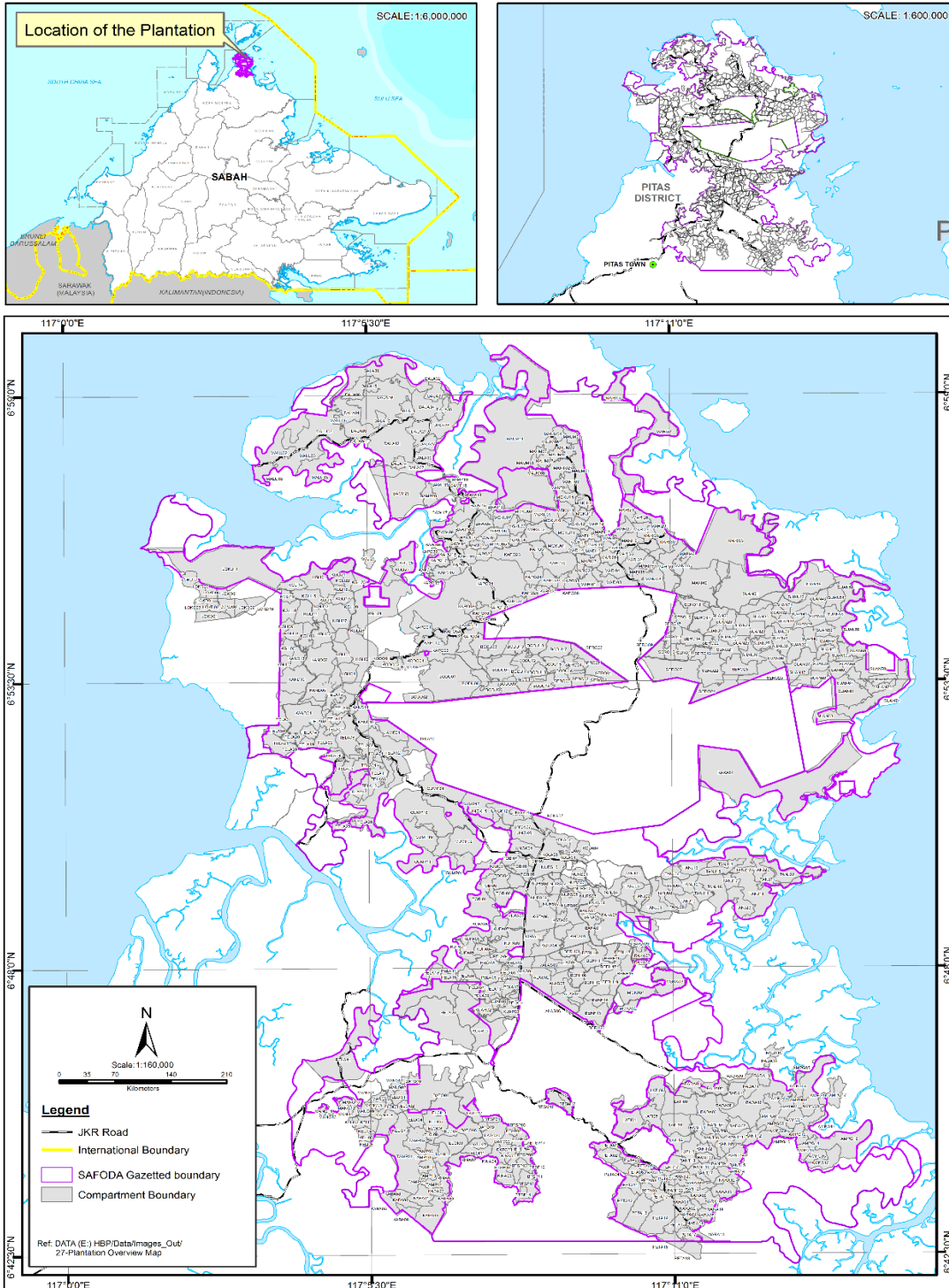
- set policies and objectives for management which are environmentally sound, socially beneficial and economically viable;
- has an implemented FMP which is entirely consistent with AFI policies and management objectives;
- has a FMP which describes the natural resource and explains how AFI will meet the Malaysian Criteria and Indicators for Sustainable Forest Management (MC&I SFM) under MTCS certification;
- regularly updates the FMP with results of monitoring, stakeholder engagement, new scientific and technical information and to respond to changing environmental, social and economic circumstances;
- makes available a summarised FMP, excluding confidential information to affected stakeholders and proactively engage with these stakeholders on the FMP; and
- Communicate the FMP to staff to guide them and to make informed management decisions.

1.2. Who we are

[AFI](#) is a joint venture company between Hijauan Bengkoka Plantations Sdn Bhd ([HBP](#) - 70%) and Sabah Forestry Development Authority ([SAFODA](#) – 30%). The primary objective of the shareholders, as defined in the [Joint Venture Agreement](#) (JV), is to plant and replant selected timber species in the designated area, and to sell the timber harvested, up until 2060 in a responsible and sustainable manner.

The management history of the area is documented in [Appendix A](#).

Figure 1.1 AFI



Note: For the latest map consult with the AFI Planning Department

2. Sustainable Forest Management

2.1. Certification

AFI believes in sustainable forest management and is proud of our certification under [MC&I \(SFM\)](#) by [Malaysian Timber Certification Scheme \(MTCS\)](#). Certification of our forest management systems, against the MC&I (SFM) standard provides an independent third-party assessment of AFI's performance against sustainability requirements. AFI requires that all staff, contractors, consultants and visitors comply with the MC&I SFM as described below.

Principle 1 – AFI shall comply with all applicable laws of Malaysia and respect international treaties and agreements to which Malaysia is a signatory.

Principle 2 – AFI shall ensure long-term tenure and use rights to the land is clearly define, documented and legally established.

Principle 3 – AFI shall recognised and respect the legal customary rights of the indigenous peoples to own, use and manage their land, territories and resources.

Principle 4 - AFI shall maintain or enhance the social and economic well-being of local community and forest workers.

Principle 5 – AFI shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and wide range of environmental and social benefits

Principle 6 – AFI shall conserve biological diversity and its associated values, water resources, soils and unique and fragile ecosystems and landscapes; and maintain the ecological functions and the integrity of the forest

Principle 7 – AFI FMP shall be prepared, written, approved, implemented and kept up-to – date appropriate to the tenure, scale and intensity of the operations. The long term objectives of management, and the means of achieving them shall be clearly stated.

Principle 8 – AFI shall conduct monitoring to assess the condition of the forest within the FMU, yields of forest products, chain of custody, management activities and their social and environmental impacts – appropriate to the scale and intensity of forest management.

Principle 9 – AFI shall maintain and enhance the attributes in high conservation value areas and decision regarding this area shall always be considered in the context of a precautionary approach.

2.2. Operating Rules

Natural and plantation forests in the State of Sabah are managed according to the [Sabah Forest Policy \(2018\)](#), which has been formulated on the basis of the [Forest Enactment \(1968\)](#), and is a comprehensive set of relevant international, national and state laws, rules and guidelines.

This legal basis serves the overall objective of the Sabah State Government to manage its forest resources in a sustainable manner and to fulfil the multiple economic, ecological and social needs of Sabah's people.

In line with the objectives of the [National Forest Policy](#) (1978, revised 1993) the principles of Sustainable Forest Management (SFM) are implemented through practising an integrated approach of:

- forest conservation;
- environmental protection;
- protection of biodiversity and genetic resources;
- production of timber and non-timber products;
- socio-economic development; and
- enhancement of research and education.

The ecological, social and economic functions of plantation forests play a significant role in conservation, protection and enhancement of Sabah's forest resources, including its vast biodiversity of forest ecosystems, habitats and species.

2.3. Sabah Legality Standard

The Sabah State Government has developed an integrated approach of conservation and sustainable forest management, through the establishment of a legally protected [Permanent Forest Reserves](#) (PFR), which is summarised in [Appendix B](#).

The Sabah Forestry Department ([SFD](#)) is responsible for ensuring that conditions under the Sustainable Forest Management License Agreements (SFMLA) are met. To ensure that forestry companies including AFI operations are in line with their SFMLA and operating legally, a [Sabah Legality Standard audit](#) for forestry operations are executed annually. This includes the following:

- a. Principle 1 - The right to harvest
 - Approval of the harvesting rights to the forest asset
 - Valid harvesting license
 - Approved EIA
 - A forest management plan
 - An annual work plan
 - Plantation development plan
 - Harvesting work plan
 - Area demarcation
 - Forest inventory and records
- b. Principle 2 - Forest Operation
 - Adherence to harvesting license conditions
 - Control of timber production
 - Log transportation license
 - Worker Health and Safety
- c. Principle 3 - Statutory Charges
 - Payment of royalty and duties
- d. Principle 4 - Other User Rights
 - Community benefits
 - Native user rights

AFI has demonstrated compliance with the Sabah Timber Legality Standard ([Sabah TLAS P1-4 Nov 2013](#)) and is audited by [Global Forestry Services](#) (GFS) on an annual basis. For the current legal Compliance Certificate - follow this link: [GFS 093 LVS](#).

2.4. Legal Framework

In managing the area, AFI will operate in accordance with the legal framework as detailed in [Appendix C](#).

AFI recognise that our plan for sustainable forest management is not a fixed one, but a journey. What constitutes a sustainably managed forest today will change over time as science improves, the market evolves, and stakeholder values change.

For AFI, sustainable forest management simply means looking after our environment, respecting our heritage and culture, considering our neighbours and stakeholders in our activities, keeping our people safe and growing a sustainable timber crop.

3. Policy Statement and Objectives

3.1. AFI Vision and Mission

Vision

To be the recognised leader in responsible, sustainable, and value-added plantation forestry in South East Asia.

Mission

AFI is a socially, environmentally responsible and sustainable plantation forestry company.

AFI provides employment and brings development in remote areas of Sabah.

AFI provides direct investment, exchange income, forestry knowledge and technical skills.

AFI expects to be judged on our social, environmental and economic performance, by our stakeholders, employees, customers and the communities in which we operate.

Objective

Our objective is to increase the value of the forestry asset under our control.

Firstly, by planting a genetically improved *Acacia sp.* and *Eucalyptus sp.* using a superior silvicultural practices by 2033 and secondly through the ongoing establishment of *Acacia sp.* and *Eucalyptus sp.* harvested areas from 2025.

AFI will achieve the vision and objective by:

1. Maximising productive land area.
2. Optimising biological growth.
3. Optimising operational costs and revenue.
4. Managing legal, commercial and physical risks.
5. Accurately describing and modelling our forest asset.
6. Operating in a sustainable and ethical manner.

3.2. Management Goals

In support of our vision, mission and objectives, AFI management will pursue the following management goals:

1. Abide by the applicable Malaysian laws, regulations and nationally-ratified international treaties, conventions and agreements ([Appendix C](#)).
2. Provide employment opportunities and enhance the social and economic wellbeing of AFI workers and local communities.
3. Implement and maintain sustainable forest management practices according to the Malaysian criteria and indicator for sustainable forest management (MC&I SFM) of the MTCS.
4. Provide a safe working environment for our staff, contractors and visitors.
5. Implement good risk management principles that will reduce the impact of extreme or high-risk events.
6. To protect the area from illegal harvesting, settlement and other unauthorized activities.
7. Develop commercial *Eucalyptus* and *Acacia* forests by 2025, to provide a sustainable supply of high-quality pruned logs.
8. Harvest the mature timber using environment-friendly harvesting systems.
9. Maintain or enhance environmental quality by safeguarding biodiversity, protecting soil and water resources.
10. Implement appropriate management practices to protect High Conservation Value areas (HCV) and other conservation areas from fires, pests, diseases and illegal encroachment.
11. Ensure that identified habitats for rare, threatened and endangered (RTE) species are protected from human disturbance.
12. Optimise costs by developing and implementing efficient systems and incorporating best practice.
13. Implement recommendations from research and development programmes.

14. Minimise/avoiding the use of chemical pesticides and fertilizers where applicable and prohibiting the use of banned pesticides in forest operations.
15. Diversify timber products and markets.
16. Support local communities by encouraging their participation in activities which complement those of the company and facilitate activities and programmes which improve their well-being.
17. Recognize and uphold the rights of local communities to protect and utilize their traditional knowledge.
18. Evaluate opportunities for improving the efficient use of resources and energy, and for reducing waste and greenhouse gas emissions.
19. Ensuring that the AFI tree breeding program is totally free of any form of Genetic Modification of AFI germplasm, either in the research & development programs or in the forest deployment programs.

3.3. Scope and the tenure of the FMP

This FMP meets the requirements of Principle 7 (Management Plan) of the Malaysian Criteria and Indicators for Sustainable Forest Management (MC&I SFM) which state “A management plan – appropriate to the tenure, scale and intensity of the operations – shall be prepared, written, approved, implemented and kept up-to-date. The long term objectives of management, and the means of achieving them, shall be clearly stated.”

The tenure of this FMP is from 1st January 2024 to 31 December 2033.

An **annual** review is undertaken to ensure the FMP is executed accordingly to plan. A full review will be undertaken in 2033.

4. General Information

4.1. Name, Location and Legal status

The FMP applies to a portion of SAFODA land gazetted in 1983 with an approximate area of 25,000 hectares. The forest area is located on the [Bengkoka Peninsula](#) in Pitas District in the north of Sabah, Malaysia. It stretches over an area of roughly 32 km (from North to South) by 25 km (from East to West) within the following geographical positions:

Northern latitude: 6° 59' 47" to 6° 42' 23"

Eastern longitude: 117° 2' 8" to 117° 15' 18"

4.2. Climate

The forest area is characterised by a typical marine-equatorial climate, with constant temperature, and high amounts of rainfall with some limited dry spell periods. During the period between November and February, the region is influenced by the [Northeast Monsoon](#), and between May and September by the [Southwest Monsoon](#).

The nearest public weather station to the AFI Estate is [Pitas Station](#) (\pm 20 km from site). The rainfall in Pitas is significant, with precipitation even during the driest month. This climate is considered to be a tropical rainforest climate according to the [Köppen-Geiger](#) climate classification. In Pitas, the average annual temperature is 28°C. The average rainfall is 2,621 mm per annum with the peak rainfall in December and January. The average number of daily sunshine is seven hours per day. The average relative humidity at Pitas Station ranges from 70% in July to 80% in December.

4.3. Geology and Soils

Soil classification in Sabah follows the system generated by the [Food and Agriculture Organization \(FAO, Rome\)](#) in 1967. The soil mapping units in Sabah are defined as [Soil Associations](#) which are derived from the parent material, the landform (terrain class), and the existence of dominant soil types as key parameters. The most dominant type is the [Brantian Association](#) which covers about 45% of the plantation area, followed by the [Maliau Association](#) which covers about 34.18%. The balance of 20.82% of the area is made up of seven other soil associations ([Appendix E](#)).

Soil condition in the Pitas area was identified by [Thomas et al. \(1976\)](#) as of alluvium soil parent materials and categorised to Group 2 and Group 3. Group 2 has minor limitations for agricultural development, and agricultural suitability is decreased by a tendency towards poor drainage. Soil Group 3 owns to one serious limitation to agricultural development, the success of any agricultural enterprise would depend on careful selection of crops and good management.

Pitas soils in Group 3 are divided into 2 sub-groups, i.e. Terraces and Flood plains group:

- a) In the Group 3 terraces, soils are sloping with 15-25 degree. These terrace soils are predominantly well-drained and deep. They have, however, been subject to strong leaching processes which are particularly marked in some summit areas by the development of almost sterile bleached sands (podzols). Accordingly, the plant nutrient status of these soils is in general low, imposing a serious limitation to agricultural development.
- b) In the Group 3 floodplains, soil parent materials are predominantly medium to fine-textured alluvium. In some places, the riverine alluvium overlies at depth old beach sands and sometimes peat deposits, the substratum for most agricultural plants, being deep, stone less, medium to fine-textured and with moderate levels of plant nutrients.

4.4. Topography

The forest area is predominantly flat along the coastline to rolling and undulating in the interior, with hill slopes between 0° and 25°. Only 1% of the forest area has slopes above 25°. Furthermore, the calculated “[Modified Soil Loss Equation](#)” for the forest area is low ([Kiwiheng, 2007 par. 1.4.1](#))

4.5. Land Use and Vegetation

The Bengkoka Peninsula is classified as coastal zone land. [Historically](#), it was predominantly covered by natural forests, most of which gradually disappeared between 1950 and 1980 because of repeated logging operations subject to little regulation, enforcement and control of government agencies.

The depletion of natural forest resources has changed the general landscape towards more diversification, consisting of a mix of the following land uses:

- Swamp, marshland and wetland forests at the periphery of the Bengkoka Peninsula, such as Mangrove Forest;
- Secondary forests containing mostly light-demanding pioneer species, with larger gaps of [Lalang grass](#) and shrubland;
- Forest plantations;
- Perennial and tree crops, such as [Oil palm](#) (*Elaeis guineensis*), Cocoa, Rubber, Coconut palms, and various species of fruit trees e.g. Mango, [Rambutan](#), [Jackfruit](#) and [Cempedak](#);
- Mixed cropland, such as scattered dry and wet rice cultivation, corn, tapioca, bananas, sweet potatoes, etc.; and
- Fallow land mostly used under shifting cultivation practices.

4.6. Infrastructure

The road network is made up of the following types of roads:

- Public Roads - AFI uses the 100 km of state-owned roading network to provide access to the site area. The road from Pitas to Kg Bongkol is a combination of seal and gravel road;
- Gravelled main roads - There is a total of 126 km of gravelled roads within the area. These are the main extraction routes and built to all-weather standards;
- Un-gravelled main roads - There is a total of 91.22 km of un-gravelled main roads which is currently active. These give access to the established plantation areas and provide dry-weather access for non-timber extraction activities; and
- Un-gravelled spur roads - 100 km of spur roads exist within the Joint Venture Area (JV). They were built for past logging operations and now provide limited access.

AFI has a site office, staff accommodation and a workshop in [Bongkol](#). There are two log-yards with basic accommodation for the staff in Datong and Bawing. The nursery is located next to the AFI office.

4.7. Adjacent lands

As mentioned before, the Bengkoka Peninsula is classified as coastal zone and was predominantly covered by natural forests, which gradually disappeared between 1950 and 1980 due to uncontrolled harvesting. General soils are classified within Group 2 and Group 3, which means that productive agriculture is limited.

The AFI plantations cover around 25,000 ha of the total 141,900 ha of the Pitas District. There are about 12,800 people from 54 villages living adjacent to the plantations area.

Bengkoka Forest Reserve and Tambalugu Forest Reserves with a total area of 6,467 ha is currently managed as a single Forest Management Unit (FMU) by Gerak Saga Sdn Bhd. Previously the two Forest Reserve were classified as Class I Forest Reserves (strictly protected). However, the status was changed to class II (commercial forest reserves) in 2017.

Livelihoods differ from village to village depending on the ethnicity and availability of capital. Some ethnicities, e.g. the Rungus and Kadazandusun, have a strong tradition as farmers while the Sungai and Bajau are primarily fishermen. The livelihoods of the communities are based on a mix of subsistence agriculture, cash crops, small-scale livestock, collection of forest products and fisheries. Livelihood strategies are diverse, depending on factors such as traditional and cultural values, access to markets and towns, availability of secure land tenure and opportunities for wage labour. Fruit and staple food, including areca, mango, jackfruit, breadfruit and rice, are grown by villages and are planted for their own consumption.

However, rubber and oil palm have become significant sources of livelihood in the past few years.

Abandoned land is common, where villages who own the land do not have adequate capital to open and manage it.

5. Forest Zoning

5.1. Forest Zoning

The total land area within the gazetted area is approximately 25,000ha. The total area within the Malaysian Timber Certification Scheme (MTCS) scope is 17,334ha¹ (Table 5.1). The area within the gazetted boundary, but excluded from the MTCS scope (previously FSC® scope area), ([MTCS Zone Map](#)) is an area which is not currently under AFI management, as per the SAFODA agreement signed in January 2018. The agreement specifically confirms AFI’s scope area and responsibilities.

The JV Area is divided into 48 units (forest) for administrative convenience. All are in the Bengkoka Peninsula.

The area is divided into four principal zones namely conservation, community, infrastructure and production areas. Some of the other open areas are earmarked to be converted into production areas in the future e.g. some fallow land.

The principal zones shall be protected from illegal harvesting, settlement and other unauthorised activities. The protection measures are contained within AFI Standard Operating Procedures.

Table 5.1 AFI Principle Zones

Principle Zone	Area (ha)
Conservation	1,750
Infrastructure and Other open areas	452
Production	15,132
TOTAL	17, 334

5.2. Conservation Areas

The biggest portion of the conservation area is mangrove and wetlands areas (70%) and river buffer (22%).

AFI has identified some of the conservation areas as HCVF as defined by the MTCS and AFI has a commitment to protect these areas.

5.3. Production Areas

The area currently stocked is 7,941ha and includes areas which were naturally regenerated (1,597 ha) and the area which has been planted (6,242 ha). The other area categorised as production includes area awaiting planting.

Table 5.3 Area Statement

Class	Jan 2024 (ha)¹
Temporary Unplanted	10,711
Stocked – <i>Acacia mangium</i>	2,682
Stocked – <i>Eucalyptus pellita</i>	5,157
Stocked - Trials	102
Open Areas	5,660
Other Areas	996
Total	25,278

¹The above area numbers are as off 1 Jan 2024. For the latest area numbers refer to AFI GIS database.

6. Harvesting

AFI depends on logs sales to generate revenue as a contribution towards its ongoing plantation development activities. The log sales from the originally planted [Acacia mangium](#) second rotation commenced in late 2016. The market is intended for both export and domestic expansion. The current market is dominated by the exports of sawlogs and chip logs, respectively to Vietnam and Indonesia. A small percentage was sold domestically.

The total production per annum from 2017 to 2019 was about 100,000 metric ton per annum, but harvesting operations ceased in July 2019 due to disease infestation on *Acacia Mangium* and financial constraint.

6.1. Forest Harvesting

Before harvesting operations ceased in July 2019, they were contracted out to timber harvesting contractors. Harvesting standards were written for all contractors and AFI staff involved in timber harvesting, extraction and haulage activities. The key objectives of the standards are as follows:

- Ensure the highest level of safety is achieved during operations. AFI uses the “[Guidelines on Occupational Safety and Health in Logging Operations](#)” from [DOSH](#) as safety recommendations;
- Maximising the value of standing timber;
- Protecting the environmental value of the forest; and
- Ensuring no loss of productivity to the site.

Detailed [harvesting plans](#) and associated [planting plans](#) are prepared on an annual basis addressing planning requirements, roading provision and transport planning. The annual harvesting area ranged from 800 to 1,000 ha per annum for this to be planted with Eucalyptus and Acacia.

A harvesting [system and risk review](#) were completed by independent consultants during 2016 for the *Acacia mangium* stand, and the following recommendations were made:

- Phase-out current harvesting system;
- Improve safety;
- Draft a tactical harvest plan;
- Phase-out the use of chainsaws; and
- Implement a management system.

The harvesting operations for the remaining *Acacia mangium* will commence in 2024 to 2026. The independent consultant recommendations as stated above will be used as a guideline. Table 6.1 below show the harvesting plans.

Table 6.1 Harvesting Plan

Year	Area (ha)	Species
2024	855	<i>Acacia mangium</i>
2025	1,398	<i>Acacia mangium & Eucalyptus pellita</i>
2026	1,458	<i>Acacia mangium & Eucalyptus pellita</i>
2027	626	<i>Eucalyptus pellita</i>
2028	626	<i>Eucalyptus pellita</i>
2029	1,312	<i>Acacia crassicarpa & Eucalyptus pellita</i>
2030	1,568	<i>Acacia crassicarpa & Eucalyptus pellita</i>
2031	1,568	<i>Acacia crassicarpa & Eucalyptus pellita</i>
2032	1,569	<i>Acacia crassicarpa & Eucalyptus pellita</i>
2033	1,583	<i>Acacia crassicarpa & Eucalyptus pellita</i>

There is no Annual Allowable Cut (AAC) calculation made for the *Acacia mangium* due to insufficient reliable planting records in the past and the decision is to replant this area to

Eucalyptus and others *Acacia sp.* as the preferred species in the future. Therefore, the management decided to fell this area as fast as possible.

The 5,451 ha of *Eucalyptus pellita* will be harvested during the period of this management plan. The growth and yield calculation of this species has been monitored through the Permanent Sample Plot (PSP), Mid Rotation Inventory (MRI) and Pre-Harvesting Inventory (PHI). Based on the current data, in average the *Eucalyptus pellita* would produce 185,000m³ per year on a 10-year growing cycle.

The harvesting system used to harvest the *Eucalyptus pellita* will be the same from the *Acacia mangium* harvesting system with minimize impact logging to preserve the top soils and soil damage.

7. Plantation Development and Management

7.1. Objectives

The primary objective is to provide the highest quality sawlogs at the lowest cost to optimise economic returns.

Secondary objectives are to provide employment opportunities for local (indigenous) people, local contracting companies, and to maintain or enhance environmental quality by safeguarding biodiversity and protecting soil and water resources.

7.2. Species and site matching

The matching of species to planting sites is an essential consideration in the successful establishment of commercial forest plantations.

[Acacia mangium](#) was the main species planted in this area, however, due to fungal root rots, predominantly Ganoderma species ([Eyles et al.2008](#)) and stem wilt/canker caused by Ceratocystics ([Tarigan et al.2011](#)) significant losses occurred. A decision was made to convert the existing *Acacia mangium* trees to genetically improved [Eucalyptus](#) during 2016 and to replant poorer and wet area with *Acacia crassicarpa*. The decision also supported by the followings;

1. [Risk Assessment of Eucalyptus pellita](#) and *Acacia crassicarpa*
2. Trial plot-3 years result.
3. Periodic reports on performance of *Eucalyptus pellita* an *Acacia crassicarpa*.

AFI Research and Development (R&D) continues their effort to search for suitable species conducive to the site in Bengkoka Peninsula. The potential species to be tested are briefly described in [Appendix F](#), together with their key characteristics.

The growth performance and timber quality of these species are tested by the R&D team on different sites in the Bengkoka Peninsula. Following a thorough evaluation of the overall

species suitability, particularly regarding growth, quality, and market, value decisions will be made on the inclusion of some of these species into the reforestation scheme.

7.3. Planting Materials

It is AFI's policy to use the best quality planting materials for its plantations.

The *Eucalyptus pellita* seed is currently purchased from SSB Tawau, Vietnam and the Philippines. A provenance trial on AFI's land is currently being managed as a seed orchard.

For [Eucalyptus urophylla](#), a small area has been planted from the trial tree seed planted in the 1980s. Seed from Vietnam also has been planted to check on the suitability as a future alternative.

In recent years, through intensive R&D tree breeding program, the candidates plus trees of *Eucalyptus pellita* are available by selecting mother trees with good growth performances either from R&D trials or plantation sites. The selected trees were captured from the field and then established as mother plants for cutting production at nursery. All the clones will be tested by setting up trials in the fields. The identical characteristics of the improved individual phenotypically, some of the current available clones have been mass produced for observation in a pilot operational scale (pre-commercialization trial). On top of that, a clonal site species matching and end-used target will be identified in order to improve and increase the tree plantation profitability. The details of R&D planting material prioritization have been explained in item 8.4.

The summary of the seed source of AFI planting materials is summarized in [Appendix P](#).

7.4. Size of the plantation area

The plan is to establish the maximum area of the JV area consistent with the need to protect environmental and social values. It is anticipated that this will result in the total plantation of about 10,000 ha.

7.5. Nursery

AFI has a central nursery located close to the main operation office at Bongkol (N 6°49’59.064”, E 117°9’23.512”). This is used to raise planting stock from seed and cuttings. Current practice is to sow, germinate and raise seedlings over a 10 to 12 week before despatch to the field for planting.

The nursery management is documented in a series of Standard Operating Procedures (SOPs) covering each operation undertaken in the nursery.

The nursery was rebuilt during 2017 so that AFI could produce better quality seedlings and accommodate the growth of cuttings.

7.6. Plantation Establishment and Maintenance

The forest asset area will be managed with the objective of producing high-quality saw logs and chip logs on a 10-year rotation and 5-year rotation respectively. Silviculture practices as described in [Appendix D](#) will be followed so that wood production is maximised.

The planting will be guided by yearly planting program as shown in Table 7.1 below;

Table 7.1 Yearly Planting Program (2024-2033)

Year	Area (ha)	Species
2024	1,673	<i>Eucalyptus pellita</i> (10 years) and <i>Acacia crassicarpa</i> (5 years)
2025	2,413	
2026	2,321	
2027	2,039	
2028	2,016	
2029	1,341	
2030	1,597	
2031	1,597	
2032	1,597	
2033	1,612	

TOTAL	18,206
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7.7. Pests and Diseases

AFI policy on pesticides is to avoid or aim at eliminating the use of chemical pesticides. To achieve this objective, AFI has developed its [Integrated Pest Management \(IPM\)](#) in 2021 to covers the company pest management and silviculture activities.

The major pests and diseases that are threatening the productivity of AFI's *Eucalyptus* plantations can be categorised into five diseases namely, leaf disease, wilt, stem canker, root and heart rot, while pest was identified namely leaf roller

AFI uses a combination of practices and control measures to manage pests and diseases, which includes regular monitoring and implementing research results in conjunction with external parties such as the [Borneo Forestry Cooperative](#) (BFC).

Other pests and disease controls include:

- Hygiene at the nursery to reduce the risk of pest and disease issues;
- Good quality seedlings to ensure tree vigour and good weed control;
- Selecting species and clones with resistance to pests and diseases in collaboration with the [BFC](#); and
- Limited use of chemical control through the application of fungicides or insecticides.

7.8. Fire Prevention and Control

The [fire management plan](#) divides the forest area into eight areas for effective fire control and suppression. Road networks are identified for accessibility and permanent water bodies such as ponds and streams, or rivers have been identified across the plantation.

The Fire Danger Rating (FDR) is used daily to manage fire management activities. Fire prevention and control is detailed in the [AFI Fire Management Plan](#).

8. Plantation Research and Development

8.1. Objectives

The R&D programs are designed to create a more valuable forest asset and sustainable business through improving planting material, silvicultural practices ([Appendix D](#)) and reducing biological risks.

8.2. Research and Development Objectives

R&D will be focused on achieving the following outcomes:

- a. To increase positive returns on investment to the shareholders through growing a tree crop primarily to produce larger dimension saw and veneer timber.
- b. To ensure social and environmental parameters set by the MC&I SFM are abided by.
- c. To minimise exposure to extreme and high risks to the plantation.

This is to be achieved through the following specific criteria:

1. Genetic improvements to the main crop (*Eucalyptus* and *Acacia* genus), capturing the first exponential genetic gains in both growth rate and timber properties within the next 5-10 years.
2. Developing on a more limited scale a second genus (or eucalypt species/hybrids) that give the company some flexibility in the event of disease outbreak and better use of some of the unproductive (sand/wet) sites.
3. Developing more cost-effective silvicultural techniques alongside genetic improvements.

8.3. Collaboration

To leverage AFI's exposure to R&D, the company will look to collaborate with other similar companies, and organisations, to maximise its opportunity in shared costs, information, and [germplasm](#).

This includes the following:

1. Signing a memorandum of understanding with other forestry companies e.g. [Gerak Saga SDN BHD](#), and maintaining positive local relationships with the [Sabah Forestry Department](#).
2. Being a member of research groups and cooperatives, including:
 - [University Malaysia Sabah](#).

8.4. R&D Prioritisation

R&D projects are evaluated and ranked using the following criteria:

- a. Ease of implementation.
- b. The time before value can be realised.
- c. Potential value gain or loss to the company.
- d. Cost of implementing the project.

9. Environment, Wildlife and High Conservation Value Forests

9.1. Environmental Impact Assessments

There are two Environmental Impact Assessments (EIA's) which are relevant to AFI areas. Firstly, the harvesting area [EIA](#) which previously fell under HBP responsibility was approved by the [Environment Protection Department \(EPD\)](#) in July 2007. The *“Proposed harvesting of 10,000 ha of Acacia mangium plantation trees at Bengkoka Peninsula, Pitas, Sabah by Mangium Plantation Sdn Bhd”* has been carried out by independent consultants, Kiwiheng Environmental Consultants.

Secondly, the replanting activity [EIA](#) of the area has been covered by the *“Proposed Replanting and Planting of 25,000 ha of Acacia mangium at Bengkoka Peninsula, District of Pitas, in Sabah by Acacia Forest Industries Sdn Bhd”* and also carried out by Kiwiheng Environmental Consultants in 2009 and approved by [Environmental Protection Department \(EPD\)](#) on 31 March 2010.

The harvesting EIA recommends specific mitigation (Kiwiheng, 2007 par 1.3.2) and monitoring measures which includes the following:

- Staggered harvesting at a maximum of 26,000m³ per month;
- Setting up riparian zones, limiting harvesting to drier months and protection of surface runoff into the Bengkoka, Mangkapon, Bongkol, Telaga and Malubang rivers;
- Protection of steep areas with no harvesting allowed;
- Implementing road design, road drainage, stream crossing, skid trails, landings and campsite specifications;
- Limit air, noise and traffic pollution;
- Implement fire hazard controls;
- Implement proper solid waste and oil waste controls;
- Implement proper sewage disposal controls;
- Ensure worker safety; and
- Ensure proper abandonment of site including removing structures and machines.

The EIA mitigation measures (Kiwiheng, 2007 Table 1.1) were monitored by AFI harvesting management for compliance. Any non-compliance were recorded in the EVMS according to the SOP.

The planting EIA requires an environmental management plan (EMP) to ensure a balanced development approach and to assist with biological protection of sensitive biological habitats, thus keeping impacts on the environment to a minimum. The EIA requires that an environmental monitoring report (Kiwiheng, 2009 par. 6.2) to be submitted to the [Environmental Protection Department](#) every four months.

The AFI EMP includes the following:

- Defined responsibilities;
- A specific set of objectives;
- Specific procedures to protect the environment; and
- Implemented mitigation controls.

It recommends specific mitigations measures (Kiwiheng, 2009 par 5.3 to 5.7) and a monitoring programme which includes the following:

- Implement an environmental management plan;
- Regulate clearing activities to minimise soil erosion;
- Provide at least 20m riparian zones to rivers and streams;
- Implement proper road drainage including crossing structures over streams and culverts to roads;
- Refrain from planting steep areas above 25°;
- Proper management of chemicals e.g. fuel, herbicides so that it cannot pollute the soil or streams;
- Preference is given to local communities for employment in the forest asset;
- Limit air, noise and traffic pollution;
- Implement fire hazard controls;

- Implement proper sewage disposal controls;
- Ensure worker safety; and
- Ensure proper abandonment of site including removing structures and machines.

9.2. High Conservation Value (HCVs)

As part of the requirements for certification, AFI is required to identify areas ([map](#)) with high conservation values and prescribe management which will ensure that those values are not adversely affected and, if possible, enhanced.

Strategies for maintaining HCVs may not necessarily preclude harvesting or replanting operation. However, the only way to maintain some HCVs will be through protection of the High Conservation Value Area (HCVA) that supports them.

The ‘Common Guidance for HCV Identification (2013) document offers guidance for the interpretation and identification of HCVs globally, for any type of ecosystem, and across all natural resource sectors and standards. In Malaysia, both the [Common Guidance for HCV Identification](#) and the [Malaysian National HCV Interpretation](#) shall be referred to and if there is any contradiction, the Common Guidance document shall prevail. As per MC&I SFM definition, HCVs are any of the following values (Table 9.2);

Table: 9.2 HCV Classification

HCV	Description
1	Species Diversity: Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels.
2	Landscape-level ecosystems and mosaics: Intact Forest Landscapes, large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional and national levels, and that contain viable population of

	the great majority of the naturally occurring species in natural patterns of distribution and abundance.
3	Ecosystems and habitats: Rare, threatened, or endangered ecosystems, habitats or refugia.
4	Critical ecosystem services: Basic ecosystems services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.
5	Community needs: 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.
6	Cultural values: 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.

During 2010 a multi-disciplinary team lead by Anna Wong conducted an HCV assessment. The biodiversity, ecosystem service values, social and cultural values were assessed. It was found that five of the six major values, as listed in the Malaysia [toolkit](#) was identified.

The assessment includes a small number of HCV biodiversity species that were present in this forest asset and surrounding areas, as well as markings of critically endangered wildlife (HCV 1.2) were observed during the assessment raise the importance of properly managing this forest.

During the survey, one critically endangered and three between vulnerable and endangered wildlife species (HCV 1.2) were identified under [Schedule I of Sabah Wildlife Conservation Enactment, 1997](#) (Table 9.3).

The biodiversity sub-value that assesses whether there are areas that contain habitat temporarily used by species was also found to be present (HCV 1.4).

A small number of the significant value of tree species were found. Patch of forested areas was conserved by the management within the *Acacia mangium* area, which include Wasoi Forest (HCV 3).

The survey also found that most of the trees along the river or stream were not logged, with the riparian reserve remaining intact (HCV 4.2). Also, on steep forest areas showing more than 25° slope harvesting was not carried out to avoid erosion (HCV 4.2).

Plantation management is very aware of the destructive potential of forest fires and has tried to prevent that, together with the rehabilitation programme initiated by Sabah Forestry Department to plant 50,000 seedlings of natural tree species (9 species) in Bengkoka Forest Reserve (HCV 4.3). Sabah Forestry Department also initiated community forestry in four villages by planting some rubber trees (HCV 4.3).

Results of the assessment for social and cultural values suggested that the majority of communities still depend on the forest (HCV 5) to some degree, with various communities utilising the protection forests adjacent to the plantation for hunting and collecting Non-Timber Forest Products (NTFP). Most communities in the interior do hunt for wild meat and do fishing besides their agricultural farming activities. Based on the villagers' information, they gained a significant amount of NTFP from the surrounding protection forest.

The company management has conserved graveyards within the plantation area, as some of the local communities have lived in the villages for about three generations (HCV 6).

In 2018, AFI appointed [EnviroSolutions & Consulting Sdn Bhd](#) to conduct a re-assessment of [HCV](#), Critical Habitat Assessment and Ecosystem Service Review and to develop a monitoring plan and conservation management strategy. The major finding during the assessment in 2018 is that mangrove and swampy areas became classified as a new HCV area.

The consultant identified the effectiveness indicators for AFI to observe.


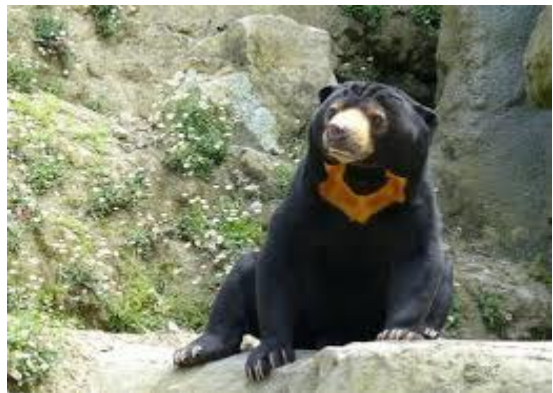
As per required in Malaysian Timber Certification Scheme, there are updates on the HCVs and its management and monitoring in AFI based on the latest guidelines – Malaysian National Interpretation for the Identification of High Conservation Values; and Malaysian National Interpretation for the Management and Monitoring of High Conservation Values. The summary of the updates was attached in [Appendix K](#).



To meet MC&I SFM principles, AFI needs to ensure the following actions:

- Implement the proposal and a plan to actively manage the Tembadau, sun bear, Proboscis monkey and clouded leopard population occurring in the plantation and adjacent forested areas;
- Assist the local government in the implementation of a comprehensive program that focuses on improving water supply to the local community;
- Develop and implement a plan that ensures the sustainability of further harvests of the Acacias or Eucalyptus near to the Forest Reserve and riparian;
- [Mapping of boundaries of mangrove](#) forests must be carried out by Sabah Forestry Department whereas mapping of riparian buffer zones of at least 5-meter width on both sides of Sg. Malubang, as far as these falls under the plantation area should be done by AFI, as well as the identified sensitive area in Wasoi and incorporate these into the harvesting plan of AFI.
- The boundaries are to be physically demarcated on the ground as well. Updating of forest land use map through the latest satellite imagery to monitor its changes is relevant.

- The management should continuously conserve the patch of forested area i.e Wasoi Forest for the sustainability of natural plant species and wildlife populations in the long term;
- Reduce the conflicts between local communities, AFI, SAFODA and the Government on land issues; and
- Assist in the development and implementation of a development program for the local communities to upgrade their standard of living.

Table 9.3 Totally Protected Animals

Species	Photo
Tembadau or banteng (<i>Bos javanicus</i>)	
Sun bear (<i>Helarctos malayanus</i>)	

Proboscis monkey (Nasalis larvatus)	
Clouded leopard (Neofelis nebulosa)	

9.3. Management of HCVs

Taking into consideration the results and recommendations of the HCV study AFI has developed the following management objectives concerning High Conservation Values as per the [HCV SOP](#):

- a. To identify and assess the High Conservation Values (HCV) as defined in the [WWF High Conservation Value Toolkit for Malaysia](#) and [HCV Resource Network Common Guidance for the Identification of High Conservation Values](#).
- b. To provide guidelines on the monitoring measures carried out in areas given the High Conservation Values and Protected Areas status.
- c. To protect patches of diverse natural vegetation (with scattered old plantation trees) within the plantation harvest areas where there is a chance.

The AFI [Biodiversity Management & Monitoring Plan \(BMMP\)](#) incorporates the recommendations to enhance the management of HCV areas. The conservation management plan includes the identification and protection of rare, threatened and endangered species. [Appendix G, H](#) and [K](#) contains specific actions that need to be executed to ensure compliance for HCVs management.

9.4. Monitoring of HCVs

AFI has developed a work instruction for HCV monitoring guided by the Biodiversity Management & Monitoring Plan for AFI (BMMP) prepared by a consultant in 2018. The HCV areas monitored through the work instruction are the following;

- i. Identified HCV Area in 2010.
- ii. Mangrove area-Additional HCV identified in 2018.
- iii. Swamp-Additional HCV identified in 2018.

The details of the work instruction shown in [Appendix J](#) and summarize in [Appendix L](#).

The environment section is leading the responsible for the HCV monitoring. The section will collect data from the field, analysing and making recommendations. This could lead to a revision of management strategies and actions. A potential collaboration with the local university, research organisations, or environmental conservation organisations is always the option for AFI.

10. Risk Management

AFI follow the [ISO45001](#) standard risk management framework to manage its risks. As part of the risk management process at AFI, risks and mitigating controls are monitored and reviewed regularly to ensure that:

- Assumptions about risks remain valid;
- Assumptions on which risks assessments are based remain valid;
- Expected results are achieved;
- Risk assessments techniques are properly applied; and
- Risk mitigation actions are effective.

AFI update and review all risks for the company on an ongoing basis. The [on-line EVMS Risk Register](#) is used for this purpose. The risks are reviewed by the AFI board of director on a quarterly basis to ensure extreme risks are well mitigated.

AFI employ a Safety and Health Officer ([SAHO](#)) as per section 29 (3) of the [Occupational Safety and Health Act of 1994](#). The SAHO is employed for the purpose to ensure due observance at AFI. The SAHO at AFI complies to section 29 (4) of the Occupational Safety and Health Act of 1994, where the safety and health officer shall possess such qualifications or have received training prescribed by the Ministry from time to time by notification in the Government Gazette.

Apart from the SAHO, the supervisor of each activity has been given the training to ensure that safety aspects are not being neglected. Toolbox talks regarding safety procedures before any activities start are compulsory.

AFI have an internal audit team and [safety and health committee](#) that conducts periodic inspections to ensure the safety requirements have been fulfilled.

AFI use safety instructions or SOPs to regulate the safety aspects of our activities. All non-compliances to the SOPs are captured in the EVMS and managed accordingly to ensure learning and the non-occurrence of the event.

11. Community

11.1. Social impact assessment

The Pitas area, prior to the SAFODA project, consisted mainly of shifting cultivators mostly from the [Rungus](#) and Tombonuo indigenous groups. Their livelihoods derived primarily from growing rice, hunting, gathering and fishing.

In 1983, after many failed attempts to economically develop the area through various agricultural schemes, the Sabah government decided to establish an *Acacia mangium* plantation in the region. The aim of the SAFODA project was to improve the livelihoods of the local communities through re-settlement and the creation of job opportunities. The gazettelement and establishment of the plantation area was done in several geographical phases. While some community areas were eventually degazetted from the SAFODA project, what is nowadays known as native customary rights were not systematically mapped nor considered from the onset. Community briefings and consultations were carried out by external consultants hired by SAFODA (McGowan, 1983), but the process to obtain consent from pre-settler communities was not robustly documented nor up to the FPIC standards of the present day. At the time only 200 households were formally given the chance to resettle in Bongkol and provided with a house, work, public utilities and a land title for a small plot of land, plus a share of future harvesting revenue. Written records of the agreements with the “peneroka” still exist. The remaining population was either promised but not offered the same terms due to financial difficulties faced by SAFODA (leaving an impression of “unfulfilled promises”), or never agreed to the relocation to Bongkol. To exacerbate the situation, the boundary of the project area gazetted to SAFODA was not demarcated on the ground at the time (and is still a work-in-progress), which has resulted in wide-scale land claims, active encroachment and distrust of SAFODA.

Since these poor beginnings, there has been no attempt to conduct organized and effective engagement with the communities by SAFODA or any of their business partners prior to Hijauan Bengkoka Plantations Sdn Bhd. This lack of community engagement brought about

increased distrust and jeopardized any meaningful relationship between the communities and AFI. Therefore, one of the inherited major threats, if not the greatest threat, to AFI is the poor relations with the communities and their continued perception that the land is theirs.

There have been numerous community studies done for the area which support this view:

- Recommended Social Strategy, TFT, 2010
- SIA report, Kiwiheng Wood and Environmental Consultants 2009
- Review of SIA report, TFT, 2010
- Study of Native Land Matters, Forest Solutions, 2012

All these studies as well as the updated SIA report, SAGE, 2017 recommended to proactively engage the communities to resolve land claims and plan together for the future development of the area. AFI acts on these recommendations so that the communities can become partners in the plantation. The status can be summarised as follows:

- Local communities have no trust and confidence in SAFODA as a government agency that would drive the process of sustainable development on the Bengkoka Peninsula;
- Both land encroachment and land claims within the SAFODA gazetted area have strongly increased in recent years, indicating a lack of acceptance towards SAFODA as the rightful land custodian;
- There is a clear indication that most of the communities do not recognize SAFODA as the rightful legal land custodian because the area is only given a Gazette Notice status instead of Titled Land status. This perception among the communities has driven further encroachment;
- The Police reports made on land encroachment are not being dealt with within a reasonable time frame, and there is little to no response indicating active intervention. The communities regard this as a support of their interpretation of an 'open' state land status with opportunities for land claims;

- The law enforcement authorities and public prosecution have not taken an active stance in assisting SAFODA to enforce its land rights to the area;
- In some areas harvested by AFI, reforestation activities by the company are hampered or even made impossible due to the strong resistance of local communities;
- Past procedures and practices of dealing with land conflicts have not resulted in significant progress and problem solution; and
- SAFODA has lost control over its gazetted area and shies away from communities and individual households progressively reclaiming the plantation land.

Because of these developments, AFI is facing substantial losses in the plantation area.

11.2. Community Strategy

In recent years, AFI has commissioned several strategic reports in an attempt to meet these social problems through a more inclusive and effective approach.

During 2015 a [Social Baseline Survey](#) was carried out in 59 villages within the Bengkoka Peninsula with the intention to provide insights into the demographic and socio-economic characteristics of the local population, as well as their perception and dynamics of land conflict within the gazetted area. The study identified several gaps and recommended the following management strategies:

- complete the boundary survey which includes community participatory mapping;
- effectively engage communities based on indigenous values;
- recruit additional CSR project officers to implement CSR management strategy;
- implement CSR intervention projects e.g. education programs, scholarships, health programs in collaboration with Government agencies; and
- implement effective data management on land use conflict events.

As a follow-up to this study, a Participatory Mapping exercise was conducted in 2015-2016 with the intention to further understand the extent of community land claims and map all culturally or socially significant sites (such as burial grounds, water catchment areas, etc.) to manage in accordance with HCV guidance. Unfortunately, many community members misconstrued the participatory mapping exercise as a first step towards having their land claims on SAFODA's gazette rubberstamped.

In 2017, AFI held a Community-Based Natural Resources Management Workshop, during which the community was given more information on land issues, the environment, wildlife protection or the availability of government assistance. Sabah government agencies such as the [Wildlife Department](#), [Agriculture Department](#), [Veterinary Department](#) and [Department of Irrigation and Drainage](#) gave talks during the workshop.

On the basis of the feedback and presentations by the community during this workshop, AFI put together the 2018-2022 [Stakeholder Engagement and Community Development Plan \(SEP&CDP\)](#). This plan provides specific guidelines on structured and culturally appropriate engagement with the community, resolution of disputes and grievances, and implementation of community development plans. A Community Forestry Program was inaugurated in 2019 also stemming from the workshop findings.

Ultimately, AFI views the community as a partner and aspires to overcome all historical land disputes to give way to managing the plantation safely, productively and to the benefit of both parties. With this vision, in 2019 AFI started developing the AFI Community Partnership Skim (or SUKA, in the Bahasa Melayu version of the acronym). The premise of SUKA can be summarized as follows: AFI offers to share economic benefits with the communities (i.e. cash transfers to resident family units and a share of the harvesting revenue) in exchange for the communities' active stewardship of AFI's plantation. Any damages to AFI's tree crops or further acts of trespassing into SAFODA's gazette land result in penalties applied to the economic benefits. It is hoped that SUKA will be tested on a pilot basis in the near future and if successful, it has the potential to be scaled up.

11.3. Indigenous Peoples

There is no official register or government-endorsed public list of indigenous peoples in Sabah. Official sources identify between 32 and 39 groups, who communicate in over 50 languages and 80 dialects. The Kadazandusun is considered the largest group, followed by the Bajau and the Murut. Local laws define “Orang Asal” or “Native” as:

- (a) any person both of whose parents are or were members of a people indigenous to Sabah; or
- (b) any person ordinarily resident in Sabah and being and living as a member of a native community, one at least of whose parents or ancestors is or was a native within the meaning of paragraph (a) hereof; or
- (c) any person who is ordinarily resident in Sabah, is a member of the Suluk, Kagayan, Simonol, Sibutu or Ubian people or of a people indigenous to the State of Sarawak or the State of Brunei, has lived as and been a member of a native community for a continuous period of three years preceding the date of his claim to be a native, has borne a good character throughout that period and whose stay in Sabah is not limited under any of the provisions of the [Immigration Act, 1959/63 \[Act 155.\]](#)

Provided that if one of such person's parents is or was a member of any such people and either lives or if deceased is buried or reputed to be buried in Sabah, then the qualifying period shall be reduced to two years; or

- (d) any person who is ordinarily resident in Sabah, is a member of a people indigenous to the Republic of Indonesia or the Sulu group of islands in the Philippine Archipelago or the States of Malaya or the Republic of Singapore, has lived as and been a member of a native community for a continuous period of five years immediately preceding the date of his claim to be a native, has borne a good character throughout that period and whose stay in Sabah is not limited under any of the provisions of the [Immigration Act, 1959/63 \[Act 155.\]](#)

Contrary to the definition by the UN, the indigenous groups make up the majority of Sabah's population. Moreover, historical links to territories, natural resources, and cultural and social distinctiveness are increasingly weakened by phenomena such as urbanization, domestic migration, intermarriages between ethnicities, preponderance of Malay and English language in education, etc. These dynamics also affect the communities living in or adjacent to AFI's operational area in the Bengkoka Peninsular, to the point where it is difficult to draw a clear line between "indigenous peoples" and "local communities".

Further information about indigenous peoples in Sabah and specifically in AFI's operational area is included in [Appendix O](#).

12. Social Issues

12.1. Legal Employment

Legal requirements for employment of AFI personnel and contractors include the requirement for contracts, obligatory insurances, competency certificates, relevant training, and payment of social and income taxes withheld by AFI.

There are applicable laws and regulations that cover the employment of people in Malaysia and specifically within Sabah ([Appendix C](#)).

The following legal authorities regulate the employment of people in Malaysia:

1. [Department of Labour Sabah](#)
2. [Occupational Health and Safety Department](#)
3. [Industrial Court of Malaysia](#)
4. Social Security Organisation ([SOSCO](#))
5. Employees Provident Fund ([EPF](#))
6. [Immigration Department](#)

The piece of legislation governing employment rights in Sabah is the Sabah Labour Ordinance ([SLO](#)). The SLO covers all persons with a monthly salary not exceeding 2,500MYR.

In addition, the SLO covers all persons, regardless of wage, engaged in the following professions: manual labour, supervision of manual labour, the operation of propelled machinery, recruitment of labour, engaged in ships and domestic servants. The coverage of manual labour means that the SLO effectively covers a large majority of the AFI workers and its contractors.

Employees covered by the SLO have the following minimum terms and conditions of employment:

- Maximum hours of work per day and per week;
- Overtime payment for work more than normal hours of work;

- Protection from deduction of wages;
- Paid annual leave/vacation leave;
- Paid sick leave;
- 16 paid public holidays, five of which are determined by law;
- Termination notice period;
- Payment of termination benefits, except in cases where the termination of employment is due to misconduct or poor performance; and
- A [minimum wage](#) of RM 1,500.00 per month for monthly rated workers or RM 57.69 per day (8 hours) for daily-rated workers working 6 days a week.

12.1.1 Gender Equality

AFI will not make employment decisions on the basis of personal characteristics unrelated to inherent job requirements, and will base the employment relationship on the principle of equal opportunity and fair treatment, and will not discriminate with respect to any aspect of the employment relationship.

12.2. Foreign Workers

Malaysia depends on immigration to supply its workforce. The population of Malaysia stands at just [32 million](#), and population growth is relatively low, estimated at 1.3 percent in 2019. While Malaysia has a [low unemployment](#) rate of 3.3%, the population is steadily aging, with an estimated [14.4 per cent](#) over 55 years of age in the year 2017. The size of the workforce was estimated at just [15.1 million](#) in 2018, of which 2.7 million are [illegal migrants](#) in Sabah alone. Additionally, Malaysians are relatively wealthy compared to other populations in the region, with per capita income of [USD 11,028](#) compared to the Philippines ([USD 2,753](#)). There is therefore little supply of Malaysian labour for low-wage jobs perceived as dirty, dangerous, or demeaning. This creates a significant need for migrant labour in sectors including agriculture, construction, forestry and palm oil industries.

Malaysian law states that all job vacancies must be offered to Malaysian nationals before opening for migrant applications. In the case of vacancies, particularly in the case of plantation workers, which is the norm in the forestry industry, an application to the [Immigration Department](#) is made by the contractor and if successful, the Immigration Department will grant the employer with a license to import foreign workers.

The application for foreign worker visas requires specific procedures and rules that need to be followed. These [rules](#) from the Immigration Department include that foreign workers must be between the age of 18 and 45 years.

AFI have major risks about the employment of foreign workers by AFI contractors. They include:

- Illegal foreign workers employed by AFI contractors caused by demanding visa application process resulting in the employment of illegal workers;
- Poor employment practices caused by the contractors exploiting illegal workers resulting in unfairly treated workers, sub-standard working and living conditions; and
- Shortage of workers caused by the demand for workers in the palm oil industry resulting in contractors taking on illegal workers forced labour workers and children under the age of 18 years ([TIP Report p.233](#)).

AFI requires that contractors adhere to the terms and conditions within their contract, which complies with the minimum standards set out in the law. Regular checks are performed to ensure that these conditions are met. The contract agreement includes the following:

- a. Contract
- b. Schedule A – Scope of Works
- c. Schedule B – Code of Practise for Forest Plantation
- d. Schedule C – EIA requirements
- e. Schedule D – Standard Operating Procedure
- f. Schedule E – Health and Safety
- g. Schedule F – Work Rates

12.3. Health and Safety

Working in a forestry environment is one of the most hazardous industrial sectors ([ILO, 1998](#)). It is the responsibility of AFI to ensure the safety of employees, contractors, consultants and visitors, which require the following:

- AFI to make every effort to reduce hazards to as low as possible;
- To comply with all relevant laws, regulations and codes of practice regarding health and safety;
- To initiate and maintain a safety culture, which includes the participation of workers and contractors in promoting safe working conditions;
- To maintain a health and safety policy and relevant safety requirements for activities incorporated into SOP;
- To maintain an Event Management System (EVMS or [PeopleTray](#)) where all, near misses, hazards, incidents and accidents are recorded and managed according to the [SOP](#);
- To ensure all contractors adhere to relevant safety requirements;
- To mandate the right of employees or contractors to stop work whenever a risk of serious injury is apparent;
- To ensure that all workers and contractors are sufficiently trained in the tasks they are assigned to, hold relevant competence skills, are informed about all identified risks, are made aware of relevant laws and are trained in the use of personal protective equipment.
- To ensure that equipment, tools and vehicles are maintained in a safe and serviceable condition;
- To provide supervision with the regular inspection as to ensure workers and contractors perform their work with due regard to their health and safety;
- To maintain an isolated work procedure to ensure that all workers who operate alone or in isolated place are safe;

- To provide access to regular medical examinations so that relevant occupational diseases are detected and managed as early as possible;
- To ensure access to first aid, rescue and emergency medical care; and
- To ensure that duties of managers, supervisors, contractors and the workers are clearly communicated to them.

The main components guiding Occupational Health and Safety (OSH) in Malaysia are the [Occupational Safety and Health Act 1994](#), the [Factories and Machinery Act 1967](#), the [Petroleum Act \(safety measures\) 1984](#).

Of special relevance to the forestry industry are concerns such as:

- Legally required protection and training, safety requirements of machinery and safety requirements in relation to chemical usage;
- Section 15(1) of the Occupational Safety and Health Act 1994 states that it is the duty of every employer and self-employed person to ensure the safety and welfare of all his employees while at work;
- The act further states in section 24(1c) that it is the duty of the employer to provide the necessary protective equipment for the workers. The employer has the duty to ensure the usage of the protective equipment; and
- The employer should provide a first-aid kit, sanitary installations necessary training to the employees.

An important feature of the Occupational Safety and Health Act 1994 is that it is based on the concept of self-regulation (which AFI adheres to), meaning that health and safety concerns should be handled by whoever creates the risks. Self-regulation comes in one of three forms:

- Voluntary self-regulation;
- Mandated full self-regulation; and
- Mandated partial self-regulation.

Voluntary self-regulation is pure self-regulation, where AFI makes the rules and enforces these rules without government intervention. Mandated full self-regulation means that both rules and enforcement are handled by the AFI or industry, but subject to government monitoring and enforcement, if necessary. Finally, mandated partial self-regulation means that the company or industry can choose to either make the rules or enforce the rules, but not both.

The OSH legal requirements relevant to the forestry industry shows a Malaysian regulatory framework that is protective of its workers. This protection is indeed necessary, as workers in forest plantations face several OSH hazards daily:

- Injuries or death from cutting down trees;
- Injuries from operating vehicles and other equipment e.g. chainsaws in the log yard;
- Bites from insects and snakes;
- Slips, trips and falls from walking in the forest and log yard;
- Working alone;
- Hearing damage from operating noisy equipment;
- Firefighting;
- Extreme heat, sun exposure causing heating, dehydration and increased risk of skin cancer; and
- Injuries from heavy lifting and carrying as well as repetitive movements.

12.4. ILO Conventions

Legally required personnel protection equipment for persons involved in plantation activities and safety requirements to machinery used. Legally required safety requirements in relation to chemical usage. The health and safety requirements that shall be considered relate to operations on the plantation. Risk relates to situations/areas where health and safety regulations are consistently violated to such a degree that puts the health and safety of

plantation workers at significant risk throughout plantation establishment and management operations.

Malaysia has only ratified six of the [eight fundamental ILO conventions](#) and further denounced convention number 105, meaning that five of eight conventions currently are in force. However, from the legislation above it is evident that Malaysia has an encompassing legal framework for labourers effectively covering the eight fundamental conventions of employment. Additionally, the Anti-Trafficking in Persons and Anti-Smuggling of Migrants Act 2007 signifies an increased Malaysian awareness on the issue of human trafficking and illegal immigration, which is a serious issue in the forestry and palm oil sector. While the increased intention towards human trafficking and smuggling is a positive and indeed necessary development, little attention is awarded to the rights of migrant workers. Malaysia has not ratified [ILO Convention 97](#) (Migration for Employment Convention) and [ILO Convention 143](#) (Migrant Workers - Supplementary Provisions) or the United Nations International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families.

Despite the existence of an encompassing legal framework, there exist several cases of alleged illegal labour, human trafficking, child labour and abuses of foreign workers in Sabah. Abuses include lack of safety training, inadequate housing, unfair withholding of pay and a lack of medical insurance in case of injury.

AFI has the following control measures in place to ensure foreign workers are treated fairly:

- A clear [policy and compliance system](#) are in place that prohibits AFI and our contractors to employ illegal foreign workers and child labour (minimum age for employment 18 years);
- AFI staff regularly seeks evidence for compliance of contractors regarding pay conditions, minimum wage and living conditions;
- AFI staff check that contractors pay the salaries to workers and declared relevant information to authorities; and

- AFI staff check that no forced or compulsory labour is involved in our operations.

AFI is committed to recognize and uphold the principles and rights at work as define in the [ILO Declaration on Fundamental Principles and Rights at Work \(1998\)](#) based on eight ILO Core Labour Conventions.

12.5. United Nations Declaration on Rights of Indigenous People ([UNDRIP](#))

Malaysia voted to adopt the UN Declaration on the Right of Indigenous People (UNDRIP) in 2007, but has not ratified the [ILO Convention No.169](#). Malaysia is home to three big indigenous communities, namely the Orang Asli, the Orang Ulu and the Anak Negeri, all of which consist of multiple tribes. The Orang Asli are Indigenous to Peninsular Malaysia and are made up of 18 indigenous communities within the Negrito (Semang), the Senoi, and the Aboriginal-Malay. Together, these indigenous communities make up approximately 210,000 people, or 0.7% of the population of Peninsular Malaysia. The Orang Ulu, or Dayak, are indigenous to Sarawak, and include the Iban, Bidayuh, Kenyah, Kayan, Kedayan, Lunbawang, Punan, Bisayah, Kelabit, Berawan, Kejaman, Ukit, Sekapan, Melanau, and Penan. Together, these populations make up approximately 1.9 million people, or 70.5% of the Sarawak population. The Anak Negeri are indigenous to Sabah, consisting of 39 distinct indigenous peoples, largely the Dusun, Kadazan, Murut, Paitan, and Bajau. The Anak Negeri constitute approximately 2.2 million people, or 58.6% of the Sabah population.

AFI is committed to recognize and uphold the rights, customs and culture of Indigenous People as define in the UNDRIP and ILO Convention 169 (1989).

13. Financial Management and Resources

Financial management allows operational planning remain sustain and viable. For this purpose, an estimated budget plan for the next 10 years has been prepared.

Variable Cost

Timber harvesting

These costs will mainly be incurred by AFI for harvesting the matured forest at an annual rate of about 1,300 hectares. Depending on the area to be harvested, the cost will range between RM2.7 million to RM33.9 million per annum.

Plantation establishment and maintenance cost

Plantation establishment and maintenance cost will be incurred by AFI from Year 2024 onwards, ranging between RM8.0 million to RM15.2 million per year, assuming an average annual planting area of about 1,800 hectares.

Fixed Cost

General and administration overheads included expenses like salary & wages, training, safety, environment monitoring, community & social development expenses and other general overheads. General and administration overheads amounted to RM5.6million per annum.

Revenue

The forest revenues will be generated from the sales of Acacia and Eucalyptus logs, either as saw logs of various grades or chip logs.

Net timber revenue from Years 2024 to 2034 will range between RM5.9 million to RM62.6 million annually, depending on the total area harvested.

Cash flow projection

From Years 2024 to 2028, AFI will gradually increase the total planted area to 13,000 hectares. As such, the cash flow from operations during this period is negative as more investment is required to establish the 13,000-hectare plantation. As the new stands planted in Year 2024 have reached maturity in Year 2029, the cash flow from operations will turn to solid positive numbers, indicating an economically viable business over the long term.

14. Implementation and Monitoring

AFI conducts comprehensive monitoring programs to better understand and improve our management and governance practices across environmental, social, and economic disciplines. This includes a monitoring and reporting checklist to ensure that all items addressed in the FMP are reviewed and updated as per the schedule in [Appendix M](#).

Key objectives of the monitoring and auditing program are to:

- Ensure AFI complies with relevant environmental legislation and licensing commitments;
- Ensure the timber resource is managed sustainably;
- Reduce the impact of extreme and high risks through effective recommendations;
- Identify and measure the environmental and social trends or changes in a manner that enables an analysis of the root cause of any changes or anticipated changes;
- Early warning of potential impacts, the extent of predicted impacts and any unforeseen impacts associated with AFI's activities; and
- Evaluate the adequacy of all management measures (e.g. policies and SOPs) are implemented to ensure continuous improvement of management measures and practices.

The above leads to the development of strategies to ensure that our aspiration that the company manages its activities sustainably and meets our target of continual improvement. Monitoring undertaken by AFI is consistent with our commitments to MC&I SFM. This includes monitoring of:

14.1. Log production

Although harvesting operations have a gap for the past three to four years, harvesting SOP and the road development SOP were reviewed annually.

The actual log production recovery will be tracked against the plan on a stand-to-stand basis and reported monthly in the plantation monitoring report.

14.2. Markets

Prior to harvesting operation, the re-establishment of communication with existing and potential new markets will be re-scaled again.

14.3. Nursery Seedling Quality

Seedling growth and quality are managed through the nursery SOPs, which are already approved and used.

14.4. Growth Rates

All commercial stands are enumerated as per the relevant SOP and the data is captured, where stand analysis and volume predictions are calculated using AFI growth models. Currently, AFI uses the BFC *E. pellita* growth model to monitor stand growth rates. The model is currently used to predict stand volumes. The forest inventory (PSP and TSP) data will be used in this growth model.

14.5. Age class distribution

Accumulates relevant stand data that includes planting dates, silvicultural treatments, timber volume availability, spatial data, and plantation growth rates - provides the basis for the annual valuation and reviewed regularly

14.6. Monitoring of silvicultural operations

As part of the contract administration procedures of the Company, all establishment and maintenance operations must be supervised by an AFI staff member who is responsible for ensuring that the contractors understand and implement the requirements regarding quality, environmental, and health & safety.

All silviculture work will be planned and the Assistant manager will issue a [Work Order](#), after approval by the Senior Plantation Manager or Head of Department to the contractor. The Assistant manager will monitor the work and once the work has been

satisfactorily completed in compliance with the requirements as set out in the SOP or work instruction, a ticket will be issued for updating compartment records and for payment in the SAGE system as shown in the attached [Supplier Process Flow](#).

14.7. Resource Monitoring

AFI forest inventory strategy for Eucalyptus covers six types of sampling:

1. Six-month Vigour Survey (2% sample - [SOP](#)) to obtain stocking, tree height, and growth performance data for recently planted stands. The purpose of collecting this information is to determine whether the establishment has been deemed successful, identify poorly performing areas, and ensure effective plantation management is being implemented.
2. Permanent Sample Plots ([PSP-SOP](#)) are measured annually in accordance with the annual inventory plan. Data is compiled, analysed and the volume prediction per stand is updated.
3. Pre or Post-thinning check-inventory (5% sample of those stands that are thinned) to test for the quality of marking for thinning and to provide data for volume projections in those stands that have been thinned.
4. Mid-rotation at (4% sample- [SOP](#)) to provide data on a compartment's standing volume and data used for projecting future volumes. These are conducted in thinned stands at the age of five to six years. Pre-harvest cruising (3% sample) to provide data on a compartment's standing volume before the final cut.
5. Pre-harvest cruising (4% sample) to provide data on a compartment's standing volume before the final cut.
6. Damage assessment enumerations. These are similar to thinning checks, but require the collection of additional data. This data depends on the type and severity of the damage. The sampling intensity may vary according to the distribution and intensity of the damage.

14.8. Compartment Records

The records of each compartment area are maintained by AFI until it is fully harvested through the GIS database.

14.9. Forest health and pest control

Each incident involving forest health is captured in the EVMS (PeopleTray) for investigation and follow-up.

14.10. Nutrient levels

The SOP for fertiliser application guides the risks, procedures, and equipment associated with the operation.

14.11. Pesticide use

In understanding the risks associated with chemicals, an SDS register contains all the hazards and first aid measures if exposed to the particular chemical. Furthermore, the SOP on chemical weed control guides the usage and application of herbicides.

14.12. Waste Management

Forestry operations in AFI generate a substantial amount of solid and schedule waste (spent lubricating oil, spent hydraulic oil, and cotton rags contaminated with oil). The SOP on waste management guides AFI to manage its waste materials. Domestic waste generated in our office and accommodation area is disposed of in a landfill pit allocated for this purpose.

14.13. High-risk operations

a. Harvesting

At this stage, no harvesting is taking place at AFI but up to July 2019, each AFI harvesting operation had at least one AFI staff member who was responsible for

supervising the activities of the contractors. These AFI staff members were responsible for monitoring the daily production and assessing all harvesting operations monthly using the AFI General Checklists and detailed corrective actions in a Corrective Action Required (CAR) report are drafted. It was given to the contractor and the Senior Plantation Manager or HOD. CARs are monitored monthly until resolved or “closed”.

b. Fire Protection

The Forest Fire Management Plan draws together all the relevant information and procedures for preventing and containing fires.

14.14. Resource Consents

Before any operations of significant potential impact take place, the affected community and/or stakeholders are notified and given the chance to provide feedback. All records of interactions are saved by the Social Department.

14.15. Stream quality

Stream quality is measured regularly by AFI in-house team and independent consultants.

14.16. Complaints and disputes

AFI actively manages an external and internal grievance and complaints system and appropriate training have been provided in the use of these systems. Additionally, the staff is encouraged to report any complaints and disputes through the grievances form for management consideration and resolution.

14.17. Illegal activities

Illegal activities are captured in the EVMS system for investigation and follow-up.

14.18. Recreation and forest use

At this stage, the recreational use of forests policy is under development.

14.19. Socio-economic values

The Child Labour Prevention SOP addresses the zero-tolerance [“No Child Labour”](#) policy in place for AFI. This Policy is further reinforced in the AFI Transparency Statement for Modern Slavery.

14.20. Financial performance & expenditure

Financial performance is managed through a series of procedures and the AFI Budget and Management Plan. Monitoring is done every month through the AFI Monthly Report and Detail Financial Statements by the accounting department.

14.21. Operational quality

To ensure functional quality, various SOPs are in place to manage the process.

14.22. Health and Safety

The Occupational Health and Safety System, is focused on risk assessment, the mitigation thereof, recording of hazards, incidents, accidents, and the use of that data to help reduce impacts to people, assets and is very important to the general environment. The AFI Health and Safety Policy and systems assist AFI to operate a safe operation. This is further reinforced by regular internal audits and annual external surveillance audits.

Workcamps and staff accommodation are regularly inspected to ensure that standards are met.

14.23. Weather and fire risk

AFI has a weather station in our plantation office that constantly measures current weather conditions and these are recorded in a daily weather report.

14.24. Community Engagement, Development and Community Forestry

Community engagement is an ongoing process that includes a dedicated AFI manager and a community team which engages with the community regularly. The [AFI Stakeholder Engagement and Community Development Plan](#) guide AFI provides guidance to manage these activities, including the community grievances mechanism. The AFI Community forestry project was implemented in one community area with multiple participants and the project will be expanded into other areas to meet the obvious demand as finances become available. A new program called the SUKA scheme is also being rolled out in a one-year pilot project in two community areas that have expressed a desire to participate in the project.

14.25. Payment of Wages

AFI is using the [Quick Pay Payroll System](#) to ensure smooth payment of salary to its staff. The system is also good at keeping and tracking payment records.

14.26. Staff Training

All staff training needs are identified annually, provision is made in the budget, and once training is completed this is then recorded in the Training Register. Training needs are based on the individual development needs of staff that is driven by the AFI Performance Appraisal System, as well as the broader training requirements to meet company needs.

14.27. Gender Equality

The HR department is responsible to ensure the gender equality policy is adhered to.

14.28. Fire awareness with villagers

The community will be briefed by AFI on open burning, detecting and reporting of fires, fire control, and the dangers of forest fires.

14.29. Monitoring of environmental performance

AFI has a Conservation section managed by its Compliance Manager and an Executive who is responsible for ensuring that operations comply with the requirements of the EIA and meet the environmental standards that are required for forest certification as set out in the Criteria and Indicators (C&I) published by MC&I SFM.

AFI Conservation section is required to visit each harvesting site in the JV Area during the preparation of the harvesting plan and during the compartment closure to ensure all the environmental mitigation has been adhered to.

AFI submits a report to EPD every 4 months in the format set out in the 2007 and 2009 EIAs. The report needs to be prepared by the EIA consultant registered with EPD. This comprehensive report includes photographs of areas where operations are taking place focusing on fuel storage, waste management, soil disturbance, and water quality.

14.30. HCV Monitoring

AFI has developed a work instruction for HCV monitoring guided by [the Biodiversity Management & Monitoring Plan for AFI \(BMMP\)](#) prepared by a consultant in 2018. The HCV monitoring will cover the following aspect;

- i. Type of HCV
- ii. Frequency
- iii. Parameters

A specific procedure for each category of the HCV has been defined. The details of the work instruction shown in [Appendix J](#). A summary of HCV management and monitoring shown in [Appendix L](#).

AFI will utilize the Microsoft Access Database created by WWF Malaysia as a tool to measure the mammal's relative abundance index (RAI) as an indicator of management effectiveness implemented. The camera trap sightings feed into this database and provide the RAI reading.

14.31. Procedures to identify and protect HCV

As detailed in the section for harvesting, land development will ensure that conservation areas identified in the EIA are marked on all maps. Office and field procedures are in place to identify additional areas with high conservation values and to monitor existing HCV areas. Reserves will be created where necessary to protect conservation values and these will be added to the harvesting and plantation development plans and contractors will be briefed before harvesting or development starts. AFI supervisors will ensure compliance with the EIA and other operational guidelines including those required for forest certification.

14.32. Forest Protection

The main contributor to forest fires is mainly caused by humans and to a lesser degree by lightning strikes. Controlling access and educating communities, contractors, and employees about the dangers of fire and generally increasing awareness about the causes of forest fires are the most effective ways of preventing fire.

Measures to be taken by contractors and AFI personnel living and operating in the JV Area are as follows:

- Forest Fire Management Plan (FFMP) coordinating fire protection activities;
- No open burning;
- Spark arrestors to be fitted to equipment working in the forest;
- Work to cease when fire danger is extreme;
- No smoking during work. Smoking is only allowed during specified breaks in an area away from, or cleared of inflammable debris; and
- Annual fire training to be given to all persons working in the forest. Fire drills are to be held when fire danger is extreme.

Those who are working in the forests and from communities living in the neighbouring State land or private land are the main risk of the fire incident. These risks are mitigated by training and awareness programmes conducted on an annual basis for all forest workers (both direct employees and contractors and their employees).

AFI has a forest certification department ([Organisational Chart](#)) responsible for forest certification activities. The department also conducts a periodic internal audit to ensure the operation complies with the requirement for MC&I SFM and other legal requirements. As per the previous paragraph, all non-compliances are captured in PeopleTray for action.

14.33. Wildlife awareness

A wildlife awareness course is planned in partnership with the Sabah Wildlife Department for the residents of the villages close to the JV Area. The purpose will be to create awareness of the wildlife in the region and describe the measures that need to be taken to conserve it. This programme will also result in a few villagers being trained as honorary wildlife wardens. Honorary wildlife wardens will be responsible to patrol and monitor illegal hunting activities. AFI has a few honorary wildlife wardens amongst its staff.

No hunting signs will be maintained where possible at selected road access points to the JV Area.

14.34. Environmental incidents

All environmental incidents are managed through the Event Management system and are recorded in PeopleTray. All serious incidents are reviewed during Management meeting.

Appendix A: AFI History

The first trial plantation of *Acacia mangium* in the Bengkoka Plantation was established in 1981 by SAFODA, who subsequently established the whole plantation area.

In 1982 SAFODA introduced the Re-forestation and Resettlement Scheme at Bongkol which involved the resettlement of 200 local families into a centralised housing scheme. This was the first attempt in the state of Sabah to resettle shifting cultivators into settlement housing, using forest plantation establishment as the vehicle for economic development.

A 4,000 ha pilot forest plantation was then financed under a World Bank loan pilot project between 1985 and 1989. During this period SAFODA's personnel were trained in large-scale plantation establishments. The total area planted during the period 1981 to 1998 was 17,076 ha.

On 25 June 1999 Kilang Papan Dasatu Sdn. Bhd. (KPD) signed a Sale and Purchase Agreement with SAFODA for the rights to harvest the 17,000 ha of established *Acacia mangium* plantations. In early 2000 these rights were transferred to another subsidiary company named Serisar Forest Plantation and Products Sdn. Bhd. (SFPP), which started harvesting operations in the area in late 1999.

Logging started from the present Telaga camp where a 4 km road was built to connect with the existing Kg. Telaga - Bongkol road. During the period 2000 to end 2002 a total area of 1,460 ha was harvested by SFPP.

SFPP concentrated on harvesting the plantations, whilst KPD focused on the sawing of logs at their sawmill in Mempakad, Pitas District. The company also undertook efforts to seek joint venture partners from overseas to produce Acacia woodchips for export.

On 24 January 2003 SFPP signed a Joint Venture Agreement (JVA) with SAFODA to form a Joint Venture Company on a 50:50 equity basis to plant and replant an area of 25,000 ha with timber species for a period ending by the year 2060.

Due to a change of company ownership in 2003 SFPP was renamed Mangium Plantations Sdn. Bhd. (MPSB) whilst its listed mother company was renamed Mangium Industries Berhad (MIB).

MIB was responsible for constructing a woodchip mill at Telaga in 2004, which started production by the end of the year 2005. During the period 2003 to March 2008, a total area of 4,969 ha was harvested by MPSB.

Following the JVA signed in 2003 a joint venture company called Acacia Forest Industries Sdn. Bhd. (AFISB) was formed on 6 October 2004. The objective of this company was to carry out replanting of existing Acacia forests and undertake new plantings to achieve an overall planted area of 25,000 ha. The lease period covered by this JVA was 60 years.

Due to the impressive initial re-growth of natural regeneration in the harvested areas, it was initially decided not to carry out planting but to thin the advanced natural regeneration for pulpwood production.

In April 2008 the entire shareholding of MPSB and the woodchip mill company in Telaga was acquired by Global Emerging Markets Forestry Investors (GEMFI). Both assets was managed via the holding company Hijauan Asia Sdn. Bhd. (HA), based in Mentakab, Pahang. Following the take-over, MPSB was renamed Hijauan Bengkoka Plantations Sdn. Bhd. (HBP).

The total harvested area by the end of the year 2011 was 8,563 ha leaving a balance of 7,179 ha (remaining SAFODA planted area) of mature *Acacia mangium* forest from the first rotation. In June 2011 HBP obtained FSC® FM. It continued to harvest the remaining SAFODA area until this area was 80% completed in mid-2016. The shareholder then decided, including staff and contractors were merged into a single entity under the management of AFI. Upon the expiry of the HBP FSC® certificate, the audit for the new FM certificate was under the name of AFI, using the same harvesting operating practices and procedures previously used by HBP, but also including its existing Silvicultural operating practices and procedures.

Appendix B: Sabah Forestry Integrated Approach

The Sabah State Government has developed an integrated approach of conservation and sustainable forest management, through the establishment of a legally protected Permanent Forest Reserves (PFR) as per the [Forest Enactment of Sabah No. 2 of 1986](#), Section 5:

- Class I - Protection Forests for long-term natural forest conservation;
- Class II – Commercial Forests for the supply of timber and other produce to meet general demands of trade;
- Class III, IV, V - Domestic, Amenity and Mangrove Forests for the supply of timber and other produce for local consumption;
- Class VI - Virgin Jungle Reserve for forest research purposes; and
- Class VII - Wildlife Reserves for the protection of wildlife.

Most of the State's forest commercial forest reserves are monitored by the [SFD](#), through the issuance of Sustainable Forest Management Licence Agreements (SFMLA) to private sector companies.

Forest plantations have been developed since 1974 when the Sabah State Government recognised that the long-term demand for timber could not be satisfied from natural forests alone.

According to SFD forest plantations should serve the following functions:

- Supplement and complement the supply from natural forests to ensure adequate wood supply and sustain the wood-based industries;
- Produce large volumes of timber within a short rotation to relieve pressure on harvesting natural forests;
- Make use of degraded soils to ameliorate the conditions of these sites and maximize the utilization potential of idle lands;
- Provide employment opportunities, especially for populations in the rural areas; and

- Diversify Sabah's economy and reduce the outflow of foreign exchange, through the manufacturing of wood and paper products for domestic consumption, as well as for export markets, and to provide opportunities for the private sector to diversify its economic activities.

Since the establishment of the first plantations in 1974, more than 200,000 ha of forest plantations were developed, mainly by government bodies and companies such as Sabah Softwoods Sdn. Bhd., Sabah Forest Industries Sdn. Bhd, [Innoprise Corporation Sdn. Bhd.](#), SAFODA and several others.

The most important species planted so far include *Acacia mangium*, [Falcataria moluccana](#), [Tectona grandis](#), [Gmelina arborea](#), [Eucalyptus deglupta](#) and a range of high-value indigenous timber species.

Besides SFD as the primary custodian of the state's forest resources, the Sabah State Government also established SAFODA in 1976. The objectives of SAFODA are:

- To establish large scale commercial plantations to produce timber and other wood products;
- To rehabilitate wastelands for productive use;
- To protect and restore the environment through reforestation activities;
- To promote the active participation of the private sector in forest plantation and/or downstream activities;
- To carry out research and development activities in relation to forest plantation techniques, downstream processing and marketing;
- To uplift the socio-economic status of the local rural inhabitants; and
- To develop the expertise of SAFODA's employees in the forest-related industry through education and on-the-job training.

Appendix C: Legislative Framework for the management of AFI

Source: [Legal Compliance Register](#)

Malaysian Federal Laws and Regulations	Sabah State Legislation, regulatory framework and other policies	How we comply
Federal Constitution		AFI uploads the Malaysian Constitution as required.
Employees’ Social Security Act, 1969		AFI adheres to all the provisions and relevant regulations under this law by paying all the required contributions for our employees, furnishing our returns on time and maintaining our registers.
Environmental Quality Act, 1974		AFI manages the environment so that it is conducive to public health, welfare or safety and that we protect the environment from the effects of wastes, discharges, emissions and deposits.
Environmental Quality (Scheduled Wastes) Regulations, 2005		AFI manages schedule waste, and specifically oily residue from workshops (SW312) and herbicides (SW425) according to the regulations in this act.
Factories and Machinerics Act, 1967		AFI complies to the articles and regulations under this law, which includes providing a safe workplace for all our employees, contractors and visitors.

<p>Human Rights Commission of Malaysia Act, 1999</p>		<p>AFI adheres to the law by protecting and promoting human rights.</p>
<p>Industrial Relation Act, 1967</p>		<p>AFI protects the right of our employees, promotes industrial harmony and settle disputes within the framework of this law.</p>
<p>Occupational Safety and Health Act, 1994 and Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations, 2000</p>		<p>AFI will secure the safety, health and welfare of all persons at our worksite and protect them against risks to safety or health as per this law and its regulations which include the safe handling of chemicals.</p>
<p>Pesticide Act, 1974</p>		<p>AFI will ensure that we meet the requirements within this Act.</p>
<p>Plant Quarantine Act, 1976</p>		<p>AFI will ensure the import of seed or plant materials shall be done in such a way to adhere to the provisions of this act.</p>
<p>Trade Unions Act, 1959 (Act 262)</p>		<p>AFI will ensure that we meet the requirements within this Act.</p>
<p>Workmen's Compensation Act, 1952</p>		<p>AFI will ensure that we meet the requirements within this Act.</p>
<p>Employment (Restriction) Act of 1968</p>		<p>AFI will ensure that this Act, which provides for the restrictions of employment for persons who are not citizens of Malaysia, is adhered to.</p>



<p>Employment (Information) Act of 1953</p>		<p>AFI will ensure that this Act, which provides for the collecting of employment information, is adhered to.</p>
<p>Children and Young Persons (Employment) Act 1966</p>		<p>AFI will ensure that this Act, which provides for the restrictions on the employment of children and young persons, is adhered to.</p>
<p>Anti-Trafficking in Persons and Anti-Smuggling of Migrants Act 2007 (Amendment 2010)</p>		<p>AFI will ensure that this Act, which is to prevent and combat trafficking in persons and smuggling of migrants, is adhered to.</p>
	<p>Sabah State Constitution</p>	<p>AFI uploads the Sabah State Constitution as required.</p>
	<p>Biodiversity Enactment 2000</p>	<p>AFI support the articles within the Biodiversity Enactment of 2000.</p>
	<p>Environment Protection Enactment 2002 and Environment Protection (Prescribed Activities) (Environmental Impact Assessment) Order, 2005</p>	<p>AFI will carry out the provisions of enactment to protect the environment and implement prevention and /or mitigation strategies to ensure any adverse effect on the environment is limited.</p>
	<p>Forest Enactment 1968 and Forest Rules, 1969</p>	<p>AFI adheres to the provisions of this enactment by the preservation of natural forests and implementing the requirements in dealing with forest produce.</p>

	Sabah Labour Ordinance CAP.67	AFI will apply the regulations as per this ordinance.
	Interpretation (Definition of Native) Ordinance, 1952	AFI will apply the regulations as per this ordinance.
	Land Ordinance, 1930 (Sabah Cap. 68)	AFI will apply the regulations as per this ordinance.
	Native Court (Native Customary Laws) Rules, 1995	AFI will apply the regulations as per this ordinance.
	State Cultural Heritage (Conservation) Enactment, 1997	AFI will apply the regulations as per this enactment.
	Water Resources Enactment, 1998	AFI will apply the regulations as per this enactment.
	Wildlife Conservation Enactment, 1997	AFI will apply the regulations as per this enactment.
Company Act 2016		AFI will ensure that we meet the requirements within this Act.
Malaysian Financial Reporting Standards (MFRS)		AFI will ensure that we meet the requirements within these Standards.

Appendix D: Silvicultural Practices

[*Eucalyptus pellita*](#) is a tree species that is endemic to north-eastern Queensland in Australia.

It is often planted in humid and sub-humid tropical lowland regions at elevations up to 800 metres. It grows best in areas where the mean annual temperature ranges from a cool month of 4 - 19°C to a hot month of 24 - 34°C and where the mean annual rainfall is within the range 900 - 4,000mm and where there is all year round or summer rainfall.

It grows best in well-drained soils ranging from shallow sands on sandstone ridges to shallow sandy podzols and deep forest loams.

The tree grows fast and forms a dense crown that shades out weeds once it is established.

The estate area will be managed with the objective of producing saw logs with 12-year rotations. To maximise wood production, it is important that the trees are planted into a weed-free site and that weeds are controlled until the canopy closes, the regime detailed in below is designed to do this.

Plan of activities	Activities to be followed
Land Clearing	<p>Land clearing is done in unplanted gaps and in regenerated areas. Prior to felling operation under brushing is carried out to slash all vegetation <10 cm in diameter to enable access and ensure safety and productivity.</p> <p>Felling is then carried out to fell and cross-cut all standing residual trees using a chainsaw to allow for site preparation for planting activities.</p>
Site preparation	<p>Mechanical crushing is adopted to crush felled trees & piled wood residues and spread evenly over the planting site using an excavator. Lining is then carried out to pre-mark planting</p>

	<p>lines at the correct spacing. As far as possible, planting lines are oriented in East-West direction.</p> <p>Where mechanical crushing is not advisable due to terrain constraint, opening planting path is adopted to make a clear path through the wood debris for ease of planting work by lopping felled trees and ensuring wood debris lie flat on the ground. This path follows the marked planting line. The pre-planting spray is undertaken to eradicate all weeds, new regeneration of acacias and other plant regrowth to ensure the site is free of actively growing weeds.</p> <p>Fieldwork inspection on all the above activities is done prior to the planting work.</p>
Espacement	3m x 3m
Planting season	Whole year-round
Pit size	Hole size is 30cm x 30cm x 30 cm on normal site and 40cm x 40cm x 30cm on compacted site.
Planting / Seedling	
Fertiliser	<p>DAP fertilizer (Diammonium Phosphate 46%) is applied by making 2 insertions around the seedling at 10 cm from the stem base. Dosage is 85 g/tree (17g of elemental of phosphorus) for <i>Eucalyptus pellita</i>.</p>
Water absorbent	<p>Soil is loosened and subsequently, 250 ml of Aguasorb gel (if required is then placed at the base in the centre of the planting hole before putting the seedling in place. The seedling's root must touch the gel to enable it to draw water. The hole is then backfilled and the soil around the seedling stem is gently firmed to ensure there is no air pocket.</p>

Blanking	Blanking or supplying is to be carried out 3 to 4 weeks after planting to replace all dead, dying, damaged or unhealthy seedlings.
Weeding	A series of weeding rounds is carried out to eliminate Acacia regeneration and invasive weeds. It is envisaged that six rounds of weeding are sufficient <i>Eucalyptus</i> planting before canopy closure is attained. Depending on site circumstances the 1st round is done by manual slashing and the subsequent rounds by spraying of Glysohate mixed with Metsufuron are used as a pre-planting spray.
Quality Control	Quality control assessment is to be done two weeks from the completion of planting.
Pruning	<p>1st Pruning at age 9 months – pruning up to the height of 2m</p> <p>2nd Pruning at age 15 months – pruning up to the height of 4m</p> <p>3rd Pruning at age 21 months – pruning up to the height of 6m</p>
Thinning	<p>At age 24 months – reduce to 800 stems per hectare (sph)</p> <p>At age 48 months – reduce to between 500 and 600 sph</p>

Appendix E: Soils

Soil suitability groups from ([Thomas et al., 1976](#)):

1. Soil Suitability Group 1 Soils with no limitations to agricultural development

These are generally deep, permeable and well-aerated soils with good reserves for moisture; and they are either well supplied with plant nutrients or readily responsive to fertilisers. They are developed on level or almost level land where the upper slope limit is 5°. Having no limitations to agricultural development, the soils are capable of growing a wide range of crops.

2. Soil Suitability Group 2 Soils with few minor limitations to agricultural development

The limitations may include, alone or in combination, imperfect or poor drainage with a water table occurring for a significant proportion of the year within 120 cm of the surface, rock or similar impenetrable materials occurring between 50 cm and 120 cm of the surface, extreme coarse textures, or moderate slopes generally falling within the 5-15° range which would not require any expensive form of antierosion control, or shallow peat deposits never more than 50 cm in depth.

Although a wide range of crops can be grown on such soils the choice is generally more restricted, and yields can be expected to be less than from Group 1 soils.

3. Soil Suitability Group 3 Soils with one serious limitation to agricultural development

This includes soils which are limited for agricultural development because they are on strongly sloping land in the 15 — 25° range, soils on deposits of peat varying in depth from 50 cm to 120 cm, very poorly drained soils in which swamp conditions sometimes prevail, very poorly structured soils, or soils with a very restricted rooting space due to rocks at shallow depths i.e., within 50 cm of the soil surface, or soils showing acute plant nutrient deficiencies. To thrive on this group of soils crops must be specifically adapted to the adverse soil conditions.

The group is therefore unsuited to diversified agriculture, and the success of any agricultural enterprise would depend on careful selection of crops and good management.

4. Soil Suitability Group 4 Soils with more than one serious limitation to agricultural development

This group would commonly include, for example, shallow soils developed on strongly sloping sites, or shallow soils with acute mineral deficiencies and strongly indurated subsurface horizons such as found in many podzols, very poorly drained and saline soils in which permanent swamp conditions prevail. These disadvantages greatly restrict the range and yield of crops and result in a strong risk element for the agricultural enterprise even with a high standard of management.

5. Soil Suitability Group 5 Soils with at least one very serious limitation to agricultural development

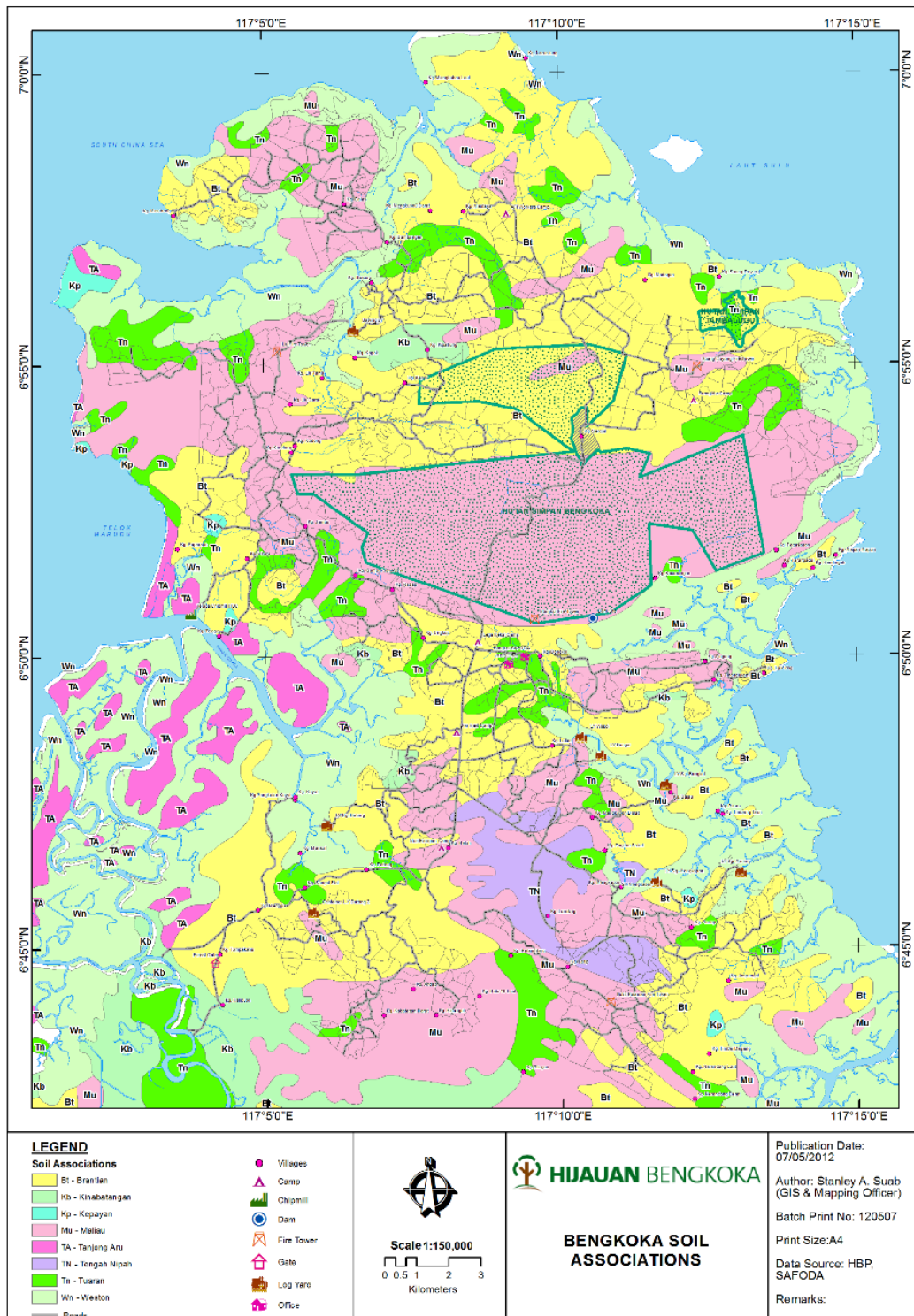
This would include soils developed on steep lands in which slopes greater than 25° predominate, extremely stony, rocky and boulder-strewn soils or bare rocks, soils with toxic levels of certain elements, and peat deeper than 120 cm.

Agriculture on such soils would generally be inadvisable or even impossible, but they may have a wide range of capability for forestry, hydrological or wildlife purposes

Area Summary by Soil Association

Soil Association	Area %
Brantian (Bt)	45
Maliau (Mu)	34.18
Tuaran (Tn)	8.32
Weston (Wn)	9.21
Tengah Nipah (TN)	1.58
Kinabatangan (Kb)	1.86
Kepayan (Kp)	0.21

Distribution of Soil Associations with forest compartments in the Bengkulu Peninsula



Soil Associations typically contain a few different soil families which differ in soil texture and nutrient contents and hence, they can only give a very broad idea of the growth potential of a given forest site.

The Brantian Association

This association extends over flood plains, meander belts and valleys on the west coast and Bengkoka northeast coast, and on coastal or inland terraces. The terraces are mostly flat to slightly undulating with short steep slopes in dissected parts. The alluvium is medium to fine-textured but occasionally coarse-textured and stony.

The Maliau Association

This association mostly contains various types of sandstones composed of fine sands, which vary in colour from white to yellowish red. Low fertility Podzolic Soils are frequently formed by this association. The Agricultural Department classified these soils as unsuitable for agricultural development.

Soils are physically stable, texturally and structurally good (subangular blocky), well-drained in surface and subsurface horizons, moderately deep, moderately steep, to steep, with low content of nutrients including C, N, Ca, Mg, K, P and moderate CEC in humic horizons, low nutrient content and low CEC in underlying horizons.

The Maliau Association production capability is like that of Brantian influenced by frequent changes in soil texture/chemistry causing significant variations in tree growth not only between stands but also within the stand itself.

The Tuaran/Kinabatangan Associations

This formation is found at the meander belts of main rivers, on the alluvium of variable texture, and is often used for shifting cultivation and permanent agriculture.

The Tuaran/Kinabatangan associations are represented by Gleyic Acrisols developed on recent alluvial deposits of meander belts and floodplains respectively.

Tuaran/Kinabatangan associations are like Brantian, Maliau and Tengah Nipah Associations, with moderate productivity influenced by permanent soil wetness.

The Tengah Nipah Association

The Tengah Nipah association is like the Brantian and Maliau associations with moderate production capability, influenced by frequent changes in soil texture/chemistry causing significant variations in plant growth not only between stands but also within stands.

The Weston association

The Weston association is represented by Thionic Fluvisols developed on tidal swamps is considered as unproductive and irrelevant for forest plantation objectives.

Appendix F: Potential timber species for future plantation establishment

Scientific name	Common Name	Wood Type	Density range (kg/m ³)	Uses
<i>Acacia hybrid</i>	Acacia hybrid	Light hardwood	406-644	Construction, boat building, furniture, cabinet, veneer, particleboard, paper
<i>Acacia crassicarpa</i>	Acacia crassicarpa	Heavy hardwood	670-920	Charcoal, kraft pulping, construction, furniture making, woodworking project
<i>Eucalyptus pellita</i>	Pellita	Heavy hardwood	632-688 (7-23 years old)	Paper, wood wool/excelsior, charcoal, pharmaceutical products, oils
<i>Falcataria moluccana</i>	Batai	Light hardwood	300-500 (12%)	General utility purposes, picture frames, artificial limbs, veneer for plywood
<i>Azadirachta excelsa</i>	Sentang	Light-medium hardwood	550-780	Light construction, joinery, furniture, interior finish, panels, partitions, packing cases
<i>Xylia xylocarpa</i>	Burmese Ironwood	Heavy hardwood	500-800	Heavy construction, flooring, marine piling, furniture, turnery, shipbuilding
<i>Neolamarckia cadamba</i>	Laran	Light Hardwood	290-465	Light construction, beams, rafters, packing cases, ceiling boards, toys, furniture, core

				veneer in plywood, particleboard, cement-bonded boards, hardboard, paper
<i>Duabanga moluccana</i>	Magas	Light Hardwood	270-560	Light construction, furniture, mouldings, interior fittings, cupboards, veneer, plywood
<i>Khaya ivorensis</i> <i>K. senegalensis</i> <i>K. anthoteca</i>	African Mahogany	Medium Hardwood	460-800	Furniture and cabinets, decorative interior finishing, staircases, panelling, flooring, handrails, turnery, decorative veneer, plywood

Note: Lee Y.F., A. Mohammad & Arthur Y.C. Chung - A guide to Plantation Forestry in Sabah. Sabah Forest Records No. 16. Sabah Forestry Department (2008).

Appendix G: Environment impact and mitigation

Impact	Mitigation
Soil erosion	<ul style="list-style-type: none"> • Do not log areas with slopes greater than 25°. • Mark areas to be excised for erosion risk. • Revegetate cleared areas as soon as possible. • Minimise new road construction by utilising the existing road. • Soil erosion control practice such as <i>diversion of ditches, bench terraces, brush sediment barriers</i> and <i>silt traps</i> to be used where applicable.
Water quality	<ul style="list-style-type: none"> • Riparian reserve for river width < 3m should be 10 m. • Riparian reserve for river width > 3m should be 20 m. • No activities allowed within the riparian reserve. • Road construction should be away from the river and carefully laid out • Clearing should be done parallel to contour lines, starting from high to low ground. • Timing of road construction or road upgrading should be done during less rainfall. • The road should not cross main streams unless appropriate crossing structure is built. • Avoid pushing excess spoil into gullies and the edges of road embankments during road maintenance. • Use appropriate machinery (less heavy) in the land clearing to minimise disturbance to the soil. • Reduce the duration of land exposure to natural elements.

<p>Ecological Protection</p>	<ul style="list-style-type: none"> • Staggered planting to provide adequate opportunity for the fauna to escape and seek refuge in the nearby area. • Identified any protected trees. • Prohibit animal hunting within or near the project site. • To notify local authorities on the discovery of any protected flora and fauna species and other unique plant species.
<p>Safety</p>	<ul style="list-style-type: none"> • Provide PPE to the workers. • Record all incidents, near misses, unsafe acts and bodily potential hazardous situation.
<p>Traffic and Transportation Control</p>	<ul style="list-style-type: none"> • Erect appropriate traffic signs at the junction of the access road to the project site. • Driver must strictly maintain proper road courtesy. • Avoid overloaded lorries.
<p>Chemicals</p>	<ul style="list-style-type: none"> • Agrochemical needs to be properly stored and handle. • The usage of a chemical must be recorded. • No fertiliser and chemical application during rainy days. • Close supervision and regulate method, dosage timing and frequency of the application of fertiliser. • Timing, climate (wind direction, rain) and season to be observed in the foliar spraying of agrochemicals.
<p>Forest fires</p>	<ul style="list-style-type: none"> • Open burning is strictly prohibited. • Control public access to forest plantation areas. • Fuel and oil material are properly stored, keep under shaded and cool conditions. • Equipment and facilities such as permanent water supply point (accessible), mobile water tanks, fire extinguishers and fire towers must be made available.
<p>Socio-Economic</p>	<ul style="list-style-type: none"> • Give preference to the local for employment.

	<ul style="list-style-type: none"> • Employment of foreign labour should comply with the Immigration and Labour Rules and Regulations. • Ensure the local population water supply and their livelihood are not affected by the project development. • Provide appropriate buffer zone to ensure no trespassing into local villages areas. • Ensure there are safe accessible roads for the local population.
Waste management	<ul style="list-style-type: none"> • Container for fuel and fuel enhancers should be collected and stored properly for disposal by a dealer authorised by the Department of Environment (DOE). • Used lubricants and oil should be collected for reuse and/or disposed of as schedule waste. • Fuel dispensing bunded and sheltered. • Maintenance of vehicles and machinery should be located at least 30 m from any source of water. • Adequate waste bins should be provided at the worker’s quarter. • Dumpsite must be made available. • All solid waste such as bottles, tins, plastics and iron must be collected separately and be recycled. • No direct discharge of raw sewage into the waterways. • Septic tanks should be properly built (JKR Standard- Section 2) and managed.
Infrastructure abandonment	<ul style="list-style-type: none"> • Remove all structures when site no longer use. • Revegetation at the abandoned project site.

Appendix H: Summary of SOP’s for identifying and protecting HCV

Component	Details
Collection of information	<ul style="list-style-type: none"> • Obtain maps, EIA Report, HCV report, remote imagery (if any) etc. • Mark up map with all protected areas, slope>25°, riparian reserves etc. • Consult with Plantation Manager, Supply Chain Manager, Resource Manager, Environment Manager and Social Manager to understand any special requirements with respect to environmental and social matters. These officers will also consult with other stakeholders including neighbouring communities. These requirements are to be included on the map. • Consolidate any exclusion zone(s) to improve connectivity with other excluded areas to enhance wildlife habitats.
Ground truthing	<ul style="list-style-type: none"> • Take a map from Component 1 to the field and locate the boundary of any exclusion zone. Check that mapped area properly excludes steep areas. • Check for the presence of cultural features, salt-licks or flora or fauna on the HCV checklist and mark on the map. • On return to the office adjust boundaries to match field situation and include salt-licks and sites of cultural importance to the exclusion zone(s). This map then becomes the base map for the preparation of the CHP. • Record exclusion zones and other features identified during this process on the GIS and ensure that they are included in all operational maps including the harvesting plan.

<p>Marking</p>	<ul style="list-style-type: none"> • Take a map from Component 2 to field and clearly mark exclusion zones with blue paint. Signs should be erected where there are areas of special value such as burial sites and other cultural features.
<p>Monitoring</p>	<ul style="list-style-type: none"> • Inspect road building and extraction activities ensure that exclusion areas are not affected. Continue to look for items on the HCV checklist and protect if found.

Appendix I: Species List

Flora

No.	Species	Family	Habit	Distribution
1	<i>Acacia mangium</i>	LEGUMINOSAE	Tree	Very common
2	<i>Acacia melanoxylon</i>	LEGUMINOSAE	Tree	Common
3	<i>Alphitonia incana</i>	RHAMNACEAE	Tree	Common
4	<i>Alstonia angustiloba</i>	APOCYNACEAE	Tree	Common
5	<i>Alstonia scholaris</i>	APOCYNACEAE	Tree	Common
6	<i>Arenga undulatifolia</i>	PALMAE	Tree	Common
7	<i>Artocarpus dadah</i>	MORACEAE	Tree	Rare
8	<i>Artocarpus elasticus</i>	MORACEAE	Tree	Rare
9	<i>Artocarpus heterophyllus</i>	MORACEAE	Tree (Edible fruit)	Rare
10	<i>Artocarpus tamaran</i>	MORACEAE	Tree	Rare
11	<i>Bauhinia sp.</i>	LEGUMINOSAE	Climber	Common
12	<i>Bauhinia sp.</i>	LEGUMINOSAE	Climber	Rare
13	<i>Blechnum orientale</i>	BLECHNACEAE	Herb	Common
14	<i>Blumea balsamifera</i>	COMPOSITAE	Shrub	Common
15	<i>Bridelia stipularis</i>	EUPHORBIACEAE	Climber	Localized
16	<i>Brucea javanica</i>	SIMAROUBACEAE	Shrub	Rare
17	<i>Callicarpa candicans</i>	VERBENACEAE	Shrub	Common
18	<i>Calopogonium mucunoides</i>	LEGUMINOSAE	Creeper	Very common
19	<i>Carica papaya</i>	CARICACEAE	Tree (Edible fruit)	Rare
20	<i>Caryota mitis</i>	PALMAE	Tree	Common
21	<i>Cassia spectabilis</i>	LEGUMINOSAE	Tree	Localized
22	<i>Costus speciosus</i>	COSTACEAE	Herb	Common
23	<i>Cratoxylum sp.</i>	HYPERICACEAE	Tree or shrub	Common
24	<i>Cyclea elegans</i>	MENISPERMACEAE	Climber	Rare
25	<i>Dacryodes laxa</i>	BURSERACEAE	Tree	Rare
26	<i>Decaspermum fruticosum</i>	MYRTACEAE	Tree	Common
27	<i>Dicranopteris linearis</i>	GLEICHENIACEAE	Herb	Localized
28	<i>Dillenia suffruticosa</i>	DILLENACEAE	Shrub	Very common
29	<i>Dinochloa scandens</i>	GRAMINAE	Creeper	Common
30	<i>Donax canaeformis</i>	MARANTACEAE	Herb	Common
31	<i>Duabanga grandiflora</i>	SONNERATIACEAE	Tree	Rare
32	<i>Etlingera triorgyalis</i>	ZINGIBERACEAE	Herb	Very common
33	<i>Eupatorium odoratum</i>	COMPOSITAE	Shrub	Common
34	<i>Eurya accuminata</i>	THEACEAE	Tree	Common
35	<i>Eurycoma longifolia</i>	SIMAROUBACEAE	Tree	Common

36	<i>Fagraea racemosa</i>	LOGANIACEAE	Tree	Common
37	<i>Ficus aurata</i>	MORACEAE	Tree	Common
38	<i>Ficus callosa</i>	MORACEAE	Tree	Rare
39	<i>Ficus fistulosa</i>	MORACEAE	Tree	Common
40	<i>Ficus septica</i>	MORACEAE	Tree	Rare
41	<i>Flacourtia rukam</i>	FLACOURTIACEAE	Tree	Rare
42	<i>Ipomoea cairica</i>	CONVOLVULACEAE	Creeper	Very common
43	<i>Lantana camara</i>	VERBENACEAE	Shrub	Common
44	<i>Leea indica</i>	LEEACEAE	Shrub	Common
45	<i>Licania splendens</i>	CHRYSOBALANACEAE	Tree	Common
46	<i>Lygodium circinnatum</i>	SCHIZAEACEAE	Climber	Common
47	<i>Lygodium flexuosum</i>	SCHIZAEACEAE	Climber	Common
48	<i>Lygodium salicifolium</i>	SCHIZAEACEAE	Climber	Common
49	<i>Macaranga gigantifolia</i>	EUPHORBIACEAE	Tree	Rare
50	<i>Macaranga sp.</i>	EUPHORBIACEAE	Tree	Rare
51	<i>Macaranga tanarius</i>	EUPHORBIACEAE	Tree	Common
52	<i>Macaranga triloba</i>	EUPHORBIACEAE	Tree	Rare
53	<i>Mallotus macrostachyus</i>	EUPHORBIACEAE	Tree	Common
54	<i>Mallotus mollissimus</i>	EUPHORBIACEAE	Tree	Common
55	<i>Mallotus paniculatus</i>	EUPHORBIACEAE	Tree	Common
56	<i>Mangifera indica</i>	ANACARDIACEAE	Tree (Edible fruit)	Rare
57	<i>Melastoma malabathricum</i>	MELASTOMATAACEAE	Shrub	Common
58	<i>Melicope confusa</i>	RUTACEAE	Tree	Common
59	<i>Merremia borneensis</i>	CONVOLVULACEAE	Creeper/Climber	Very common
60	<i>Mikania micranta</i>	COMPOSITAE	Climber	Very Common
61	<i>Murraya koenigii</i>	RUTACEAE	Shrub	Common
62	<i>Musaenda frondosa</i>	RUBIACEAE	Shrub	Rare
63	<i>Nauclea orientalis</i>	RUBIACEAE	Tree	Localized
64	<i>Pandanus sp.</i>	PANDANACEAE	Herb	Common
65	<i>Parkia speciosa</i>	LEGUMINOSAE	Tree	Rare
66	<i>Passiflora edulis</i>	PASSIFLORACEAE	Climber	Rare
67	<i>Passiflora foetida</i>	PASSIFLORACEAE	Climber	Common
68	<i>Pennisetum purpureum</i>	GRAMINAE	Herb	Very common
69	<i>Pericamphyllus glaucus</i>	MENISPERMACEAE	Climber	Common
70	<i>Phyllanthus niruri</i>	EUPHORBIACEAE	Herb	Common
71	<i>Planchonella ovovata</i>	SAPOTACEAE	Tree	Common
72	<i>Polygala paniculata</i>	POLYGALACEAE	Herb	Common
73	<i>Psychotria aurantiaca</i>	RUBIACEAE		Common
74	<i>Rubus mollacanus</i>	ROSACEAE	Climber	Common
75	<i>Scleria bancana</i>	CYPERACEAE	Herb	Common

76	<i>Smilax spp.</i>	SMILACAEAE	Climber	Common
77	<i>Solanum erianthum</i>	SOLANACEAE	Shrub	Rare
78	<i>Spathoglottis plicata</i>	ORCHIDACEAE	Herb	Rare
79	<i>Spermacoce latifolia</i>	RUBIACEAE	Herb	Common
80	<i>Stachytarpheta indica</i>	VERBENACEAE	Herb	Common
81	<i>Stenochlaena palustris</i>	POLYPODIACEAE	Climber	Common
82	<i>Strobilanthes sp.</i>	ACANTHACEAE	Herb	Localized
83	<i>Trema orientalis</i>	ULMACEAE	Tree	Common
84	<i>Tristania grandiflora</i>	MYRTACEAE	Tree	Common
85	<i>Uncaria borneensis</i>	RUBIACEAE	Climber	Common
86	<i>Uvaria littoralis</i>	ANNONACEAE	Climber	Common
87	<i>Vitex pinnata</i>	VERBENACEAE	Tree	Rare
88	<i>Vitex pubescens</i>	VERBENACEAE	Tree	Common
89	<i>Widelia triloba</i>	COMPOSITAE	Creeper	Localized

Fauna

No.	Species name	Common Name	Status
1.	<i>Nasalis larvatus</i>	Proboscis monkey	Vulnerable to Endangered
2.	<i>Bos javanicus</i>	Tembadau	Endangered
3.	<i>Cervus unicolor</i>	Sambar deer	Least concern
4.	<i>Sus barbatus</i>	Bearded Pig	Least concern
5.	<i>Tragulus javanicus</i>	Lesser mouse deer	Least concern
6.	<i>Muntiacus muntjac</i>	Barking deer	Least concern
7.	<i>Viverra zangalunga</i>	Civet cat / Malay civet	
8.	<i>Hystrix brachyuran</i>	Common Porcupine	Common
9.	<i>Manis javanica</i>	Pangolin	Least Concern
10.	<i>Macaca fascicularis</i>	Longtail Macaque	Common
11.	<i>Macaca nemestrina</i>	Pig tail Macaque	Common
12.	<i>Presbytis rubicunda</i>	Red leaf monkey	Threatened
13.	<i>Callosciurus notatus</i>	Plantain Squirrel	Common
14.	<i>Unknown sp.</i>	Flying squirrel	Common
15.	<i>Rattus rattus</i>	Rat	Common
16.	<i>Paradoxurus hermaphroditus</i>	Munsang / Common Palm Civet	Common
17.	<i>Neofelis nebulosa</i>	Harimau dahan	Vulnerable to Endangered
18.	<i>Tupaia minor</i>	Lesser Treeshern	Common
19.	<i>Helarctos malayanus</i>	Sun Bear	Vulnerable to Endangered
20.	<i>Tarsius bancanus</i>	Western Tarsier	Least Concern
21.	<i>Macroglossus minimus</i>	Long-tongued Nectar Bat	Common

*To reconfirm fauna status

[Appendix J: Work Instruction for HCV monitoring](#)

High Conservation Value Monitoring

For the purposes of this monitoring procedure, HCV areas are considered (i) 921 ha mangrove areas; (ii) 51 ha natural forest of Wasoi area and (iii) additional wetlands (309 ha) defined as by ESC Consultant for the 2018 BMMP; (iv) Bengkoka Forest Reserve buffer ; and (v) Tambalugu Forest Reserve buffer (refer to Figures 1).

A. Objectives:

1. Determine and confirm the boundaries of the project area to ensure that no activities encroach any HCV
2. Ensure all AFI activities avoid HCV area and designated buffers (refer also to Pre-Clearance Monitoring and Operations Monitoring).
3. To record and map the floral and faunal species composition and general health of the ecosystem for each HCV area.
4. Record and map rare, threatened, and endangered (RTE) flora and assess changes over time.
5. Record and map rare, threatened, and endangered (RTE) fauna through camera trapping and assess changes over time.
6. To ensure that appropriate buffer areas to HCV are adhered to and to record the vegetative cover in buffer zones.
7. To assess survival and growth of enrichment plantings where applicable
8. AFI to ensure that the buffer zone to mangrove areas is > 50 m for Bengkoka Peninsular Mangrove Forest Reserve (Class V), > 20 m to mangrove and swamp areas, and > 20 m for Bengkoka and Tambalugu Forest Reserve.
9. Continue photographing remaining areas so that demarcation of Mangrove Forest can be monitored.
10. AFI to continue the preservation effort including to continue to classify mangrove areas as Protected Areas and as priority in conservation plan in addition to WFR and Existing Natural Forest within AFI boundary. This effort can contribute as an added value to Biodiversity Offsets
11. Monitor the survival / mortality rate for enrichment planting in WFR with *Dryabalanops lanceolata*.

B. Frequency

1. Routine HCV monitoring will be conducted semi-annually (every 6 months) in the mangrove, additional wetlands area, forest reserve, and additional HCV (refer to Figure 1).
2. Annual flora / fauna assessments to be conducted and reported
3. Camera trapping data downloaded monthly

C. Monitoring Parameters

1. Flora, delineated by native / non-native invasive, Acacia, RTE, enrichment planting
 - a. % cover: natives, invasives, RTE species at herbaceous, shrub, and tree canopy levels
 - b. Height, diameter at breast height (dbh) of a subsample
 - c. Survival (%) of enrichment plantings
2. Buffer areas
 - a. Qualitative assessment of AFI avoidance / impact to buffer area vegetation and habitat
 - b. Existence of delineated stream buffers and effectiveness of management for impact avoidance
3. Fauna – camera trapping results to provide species level information and inform population trend estimates.

D. Procedure

HCV Flora

AFI will conduct mapping and census of floral species throughout the AFI HCV areas, as follows

1. Permanent sample plots (PSP) will be established as reference sites within HCV areas and buffer areas. PSP will be 7.98 m² square or circular plots.
2. During PSP establishment, AFI will take GPS readings of the PSP center (circular plot) or corners (square plot) and mark these in the field.
3. Quantitative assessment - in each plot, AFI will measure (annually):
 - a. Percent absolute cover herbaceous layer (0 – 0.8 m height), shrub layer (0.8 – 3m), and tree layer (>3 m)
 - b. Select trees will be tagged for annual diameter (dbh) and height measurement
 - c. Number of rare, threatened, or endangered (RTE) trees in PSP plot.
 - d. Absolute cover of RTE herbs and shrubs in PSP plot.
 - e. Relative cover: native flora, non-native flora, bare ground (equals 100% cumulatively)
4. Enrichment Planting
 - a. Species planted, date planted, approximate number per hectare planted
 - b. Survival
 - c. Health and vigour of enrichment trees
5. Qualitative assessment – AFI will evaluate the following in HCV and buffer areas
 - a. Plant health – photographs and evaluation of overall health and vigour of vegetation
 - b. HCV status – likely causes of changes in vegetative cover, with impacts noted and cause of reductions estimated (i.e. AFI operations, community egress, etc.)
 - c. Buffer area status – average width of the buffer zone, likely causes of changes in vegetative cover, with impacts noted and cause of reductions estimated (if applicable)
 - d. Measures recommended to avoid future impacts
 - e. Measures recommended to enhance HCV and buffer area native flora cover

HCV Fauna

AFI will strategically place camera traps to record animal sightings within HCV areas, in HCV buffers, and plantation areas (ad hoc locations). AFI will download photographs monthly, and record:

1. Species level taxonomic information, or where not feasible, Family taxonomy
2. Gender
3. Adult / juvenile status.
4. Date / time recorded

These data will provide certainty regarding confirmed existence, will inform estimates of population trends to the extent feasible, and habits (nocturnal, diurnal, seasonal patterns).



Permanent Sampling Plot Datasheet

Monitor(s)			
Date / Time			
PSP#			
Coordinates	x	y	
PSP area (m2)			
Tree Layer (> 2m)			
Species	Height	Diameter (dbh)	IUCN Status
Shrub Layer (0.5 - 2m)			
Species	Percent Cover	Native / Non-Native	IUCN Status
Herbaceous Layer (<0.5m)			
Species	Percent Cover	Native / Non-Native	IUCN Status



HCV Monitoring Template

Monitor(s)						
Date / Time						
HCV Type (mangrove, forest reserve, etc)						
Location						
Coordinates		x		y		
Enrichment Planting			Buffer Areas			
Baseline	Species planted		Width of buffer			
	Planting year		Vegetative cover (%)			
	No. trees planted per ha		Invasive plants (relative cover)			
Results	Survival (%)		Comments / recommendations to enhance HCV			
	Average Height					
	Health assessment					
Native Plants - Dominant and RTE species						
Tree species	Height	dbh			IUCN Status	
1						
2						
3						
4						
5						
Shrubs	Height	dbh	IUCN Status			
1			Management measure recommended to avoid impacts or remedy current impacts			
2						
3						
4						
5						
Herbs	Height	dbh			IUCN Status	
1						
2						
3						
4						
5						
Invasive Plants		Cover (%)				
1						
2						
3						
4						
5						

Pre-Clearance Monitoring and Operations Monitoring

1. Objectives:

Pre-Clearance Surveys

1. Pre-disturbance survey needs to be conducted before land preparation activities to ensure the avoidance of impacts to HCV, important flora and fauna species, and buffer areas.
2. Establish inventory for observed and known species of value prior to clearing / land preparation
3. To identify rare, threatened, or endangered (RTE) flora within the clearance footprint to schedule transplant to Wasoi or the forest reserve area when vegetation is small enough, or demarcation for avoidance for large RTE flora within the planned plantation footprint.
4. To clearly demarcate avoidance areas (buffers, HCV) to ensure that clearance operators leave vegetation in place and do not enter areas with heavy machinery. The width of buffer zone that should be applied to locations adjacent to sensitive areas or HCV is 50 m; 20 m for streams > 3m wide and 5m for streams < 3m wide. All worker accommodation and biomass / solid waste compartments will be located > 30 m from the waterway, while workshops having chemicals / oil will be situated > 50 m from waterways.
5. To clearly demarcate slopes greater than 25° as for prohibition of vegetation clearance / plantation establishment.
6. To protect nesting areas adjacent to plantation areas from disturbance
7. Identify critical sites for protection (e.g. saltlicks, fruit trees, hollow logs, nesting/ roosting sites etc.) and prohibit tree felling and disturbance in these areas.
8. Locate and preserve current wildlife corridors based on identified roaming areas for RTE species.
9. Reconfirm mapping and conditions prior to clearing activities so that markings can effectively indicates buffer zone, steep areas to be avoided/ for rehabilitation, and plantation areas.

Operations Surveys

1. Spot-check AFI operations staff and / or contractors to identify whether HCV and buffer areas are avoided.
2. AFI to review new plantation areas for any possible flora species that could be transplanted into the Wasoi and/or the forest reserve area to preserve any flora of potential value.
3. To ensure the buffer zones adjacent seasonal stream and perennial streams are adequate to minimise direct input of nutrients and sediment to the waterbody (sufficient buffer zone based on the width of the waterway between the banks that has been adopted by EPD Sabah including to any seasonal stream).
4. Maintain floral and faunal registry before, during and after activity to facilitate planning to cultivate native plant species that are impacted or during revegetation during the closure phase.

2. Frequency

1. Pre-clearance survey – all sites to be visited in advance of any ground disturbing activity for areas schedule for clearance, preparation for plantation establishment
2. Operations surveys – all sites to be visited during vegetation clearance / site preparation to ensure contractors / staff adhere to HCV buffer area, stream buffer area, and HCV avoidance areas. Monitoring sites will be selected randomly.

3. Procedure

AFI staff to conduct Pre-Clearance Surveys, as follows:

1. Each unit planned for vegetation clearing and site preparation will be mapped, with polygons produced to illustrate annual clearance areas.
2. Clearance polygons will be mapped with HCV areas and streams included on maps to delineate buffer area requirements and avoidance areas.



3. Where planned clearance intersects streams or HCV area, AFI will flag buffer areas in the field and record GPS boundary markers.
4. The buffer areas and HCV extent will be clearly communicated to clearance contractors. Contractors will be informed of the requirement to avoid these areas, leave all buffer area and HCV vegetation intact, and prohibition of placing vegetative residue or other waste within 50 m of all watercourses.
5. Contractors will be informed of the consequences of clearing HCV and HCV / stream buffers (In the event of damages or obstruction to this area caused by the contractor, the contractor shall make good such damage or destruction at his own cost and expense and any damage to the HCV area or its vicinity shall lead to instant termination of contract.)

AFI staff to conduct Operations Surveys, by spot checking contractors for the following:

1. Clearance work is conducted within delineated area, avoiding HCV, HCV buffers, other designated avoidance areas
2. Debris from clearance is stacked at least 50 m from watercourse.

Monitor(s)		Date / Time	
Unit Location	Coordinates	X	Y
Pre-Clearance Checklist		Yes	No
Survey for RTE species conducted?			
RTE flora present?			
RTE Species			
1			
2			
3			
Can be transplanted?			
Must be protected in place?			
Coordinates of trees / plants to protect in-place			
Protection area marked-off within clearance area?			
Stream within 50 m of planned clearance area?			
Stream buffer width to be applied?			
Buffer marked with flagging?			
Contractors to be contacted regarding protection measures			
Slopes > 25 degrees?			
No clearance area clearly marked for steep slopes?			
Buffer from HCV needed?			
Sediment trap needed?			
Describe sediment trap / GPS location			
Actions necessary to ensure contractors avoid buffer areas, steep slopes, RTE trees, and plans for juvenile RTE transplanting			

Pre-clearance photographs



Operations Monitoring						
Plantation Unit						
Location		Coordinates	Lat	Long		
Monitoring Date		Monitor(s)				
Operations Checklist				Yes	No	N/A
Stream buffer areas avoided?						
RTE retention trees protected?						
Saplings planned for transplant moved prior to clearance?						
Slopes > 25 degrees protected from clearance?						
Buffer from HCV applied if applicable?						
Sediment Trap implemented>						
Remedial Actions Undertaken						
Recommendations for avoiding similar issues in the future						

Operations Photographs

In-Situ Water Quality Monitoring

The focus of water quality monitoring for AFI comprises assessing the physical and chemical conditions of Class IIB waterbodies and their tributaries to ensure thresholds are not exceeded because of AFI activities. As the Biological Management and Monitoring Plan calls for measuring several parameters that are measured in a laboratory, with short holding times for water samples, the water quality monitoring regime is divided into the in-situ characterisation that will be conducted by AFI staff and the sampling routine for laboratory assessment conducted by consultants. This SOP is for AFI in-situ water quality monitoring and qualitative assessments.

A. Objectives

1. To conduct a baseline monitoring of water quality parameters for potentially impacted waterbodies upstream of plantation parcels prior to preparation activities for streams within the river systems of Sg. Telaga, Sg. Bongkol, Sg. Melubang, Sg. Kakarangan and Telok Marudu (refer to Figures 1).
2. To monitor water quality upstream and downstream of AFI site preparation activities / harvesting to allow for assessment of potential impacts.
3. To monitor the waterbody buffer areas to ensure that AFI / contractors avoid any disturbance to vegetation / soil in these areas, ensuring the buffer areas meet AFI standards (conditions and area). Buffer areas are 20m from streambanks for waterbodies > 3m wide and 5m for streams < 3m wide.
4. To assess the efficacy of stormwater, erosion, and sediment controls such as drainage ditches / sediment traps as applies.
5. To visually assess for evidence of polluted runoff (debris / chemicals) from AFI activities at / adjacent monitored streams.
6. Data shall be recorded in a database that allows for evaluation of trends in addition to thresholds.

B. Monitoring Parameters

In situ water quality monitoring will include:

- pH
- Turbidity (NTU) or Total Suspended Solids (TSS)
- Temperature
- Dissolved Oxygen (DO).
- Oxidation / Reduction Potential (ORP)
- Etc (whatever the Hana has)

C. Frequency

AFI will conduct water quality monitoring at least monthly for each of the five (5) waterbodies listed above, with upstream and downstream sampling conducted on the same day for each stream.

AFI will also schedule monitoring prior to vegetation clearing and during harvest at appropriate locations.

D. Procedure

Water quality monitoring will be conducted as follows:

1. Prior to leaving the office, AFI staff will calibrate the multi-parameter water quality monitoring device, according to the instructions provided by the manufacturer.
2. All AFI safety procedures for operating in or near water shall be followed, including the use of life vests for individuals that cannot swim.
3. At each waterbody to be measured, an upstream and downstream monitoring site will be selected. No tributaries may empty into the stream between the upstream and downstream site.
4. At each monitoring location, GPS coordinates, date / time of sampling, monitor names, and water quality parameter values.
5. At each site, the WQ probe record readings at approximately 60% depth from the surface, unless the waterbody is too deep, whereby readings will be taken at least 50 cm below the surface.
6. The probe should point upstream to avoid turbidity or other influence from the monitor who may be standing in the water.
7. The probe will be inserted into the water for long enough for the pH reading to stabilize. The monitor will record all values after this point.

For the qualitative assessment, the monitor will:

1. Take photographs of the stream buffers, and stormwater / erosion control ditches (if applicable);
2. Record observations of chemicals or debris from AFI operations that have or have the potential to affect water quality.
3. Assess and take photographs of erosion features or other issues requiring management to minimize the potential for water quality impacts.

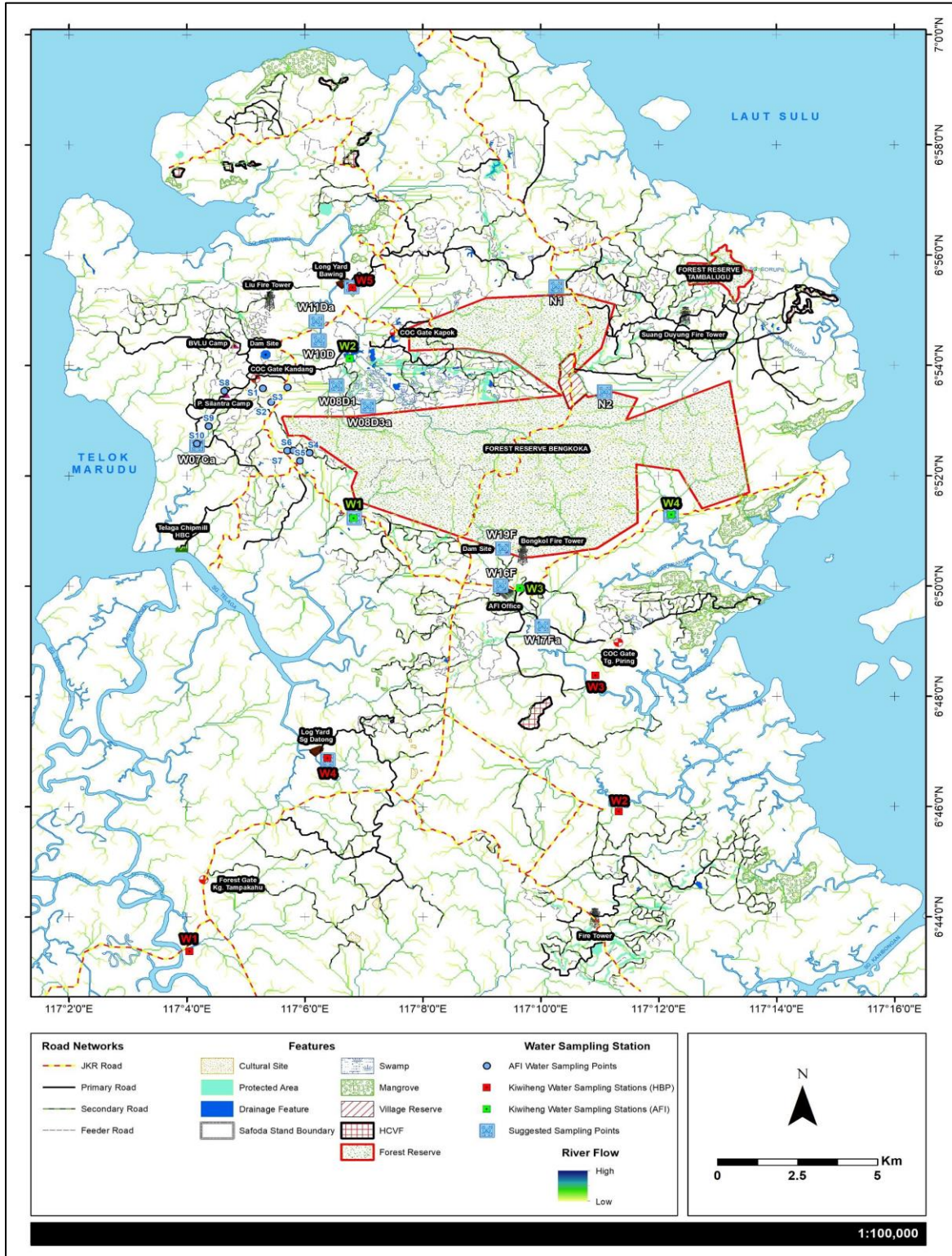


Figure 2: Telok Marudu, Sg. Telaga, Sg. Melubang, Sg. Bongkol and Sg. Kakarangan River System and Indicative In-Situ Monitoring Locations



Water Quality Monitoring Form

Date		
Time		
Monitor(s)		
Stream Name		
River System		
Upstream location (GPS Coordinates)		
Downstream location (GPS Coordinates)		
Parameter	Unit	Reading
Dissolved Oxygen	mg/L	
Turbidity	NTU	
pH	-	
Oxidation / Reduction Potential	mg/L	
Comments:		
Photograph 1	Photograph 2	
Photograph 3	Photograph 4	

Appendix K: HCV

HCV 1 - Protected Areas

All forest areas that have been legally gazetted as Protected Areas under Malaysian legislation (either Federal or State) are automatically classified as HCV 1. The Master List of Protected Areas in Malaysia (Class I in Sabah), commissioned by the Ministry of Natural Resources & Environment applies as a reference list.

There is two Class II Forest Reserves adjacent to the plantation, namely Bengkoka Forest Reserve (FR) and Tambalugu Forest Reserve. Both reserves fall under the jurisdiction of the Sabah Forestry Department.

Natural forests on dry land are rare in the North of Sabah. Both Forest Reserves are dominated by secondary forests mixed with Acacia species. The Bengkoka FR harbours a substantial portion of native plant species, whereas the vegetation in Tambalugu FR has been degraded into permanent and unproductive grassland. Several forest fires since the 1980s have affected the FR and the plantation. Before the FR was gazetted as Protection Forest in 1984 it had been logged several times. Most of the forests in the reserve were originally dominated by the Lowland Kerangas/Heath Forest Type. Based on previous reconnaissance surveys, the soils are characterized as Podzols, appearing as bleached white sand substrates with very low nutrient levels.

Acacia mangium trees are also commonly found in the Bengkoka FR. Mature stands of the species were abundant along the boundaries and inside Bengkoka FR. Buffer zones were not present on the boundaries of the reserves. Planting of *Acacia mangium* had been carried out inside certain parts of Bengkoka FR before the reserve was gazetted. *Acacia mangium* is known to be an aggressive, light-demanding pioneer species that quickly colonise forest canopy gaps and other open areas, such as roadsides and any fresh land clearings.

The forest floor in Bengkoka FR is dominated by a fern of the genus *Gleichenia*, together with other small shrubs and herbal plants. In total, 89 plant species from 46 families were found during the survey. The records include several species of common edible fruit trees such as papaya (*Carica papaya*), mango (*Mangifera indica*) and jackfruit (*Artocarpus heterophyllus*).

The *Euphorbiaceae*, a large family of flowering plants recorded the highest number of plant species found in the reserve.

HCV 1 - Threatened and Endangered Species

Any area occupied by species categorised as either Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) on the IUCN Red List, CITES Appendix I, or listed as protected under Malaysian legislation is also considered as HCV 1. However, for practical reasons forest managers need to limit field surveys of fauna to mammals, birds and herpetofauna, unless there are other species in the area which require specific attention.

Flora

Important plant species listed under CITES Appendix I or II are absent from the plantation area. However, plant species categorized as critically endangered (CR) by IUCN Red List were found, namely White Lauan (*Parashorea malaanonan*) and Thinkadu (*Parashorea stellata*) (CR). All the Dipterocarpaceae species, including the CR species, were found in Wasoi Compartment. All species found are typical for natural forests that dominated the Bengkoka Peninsula before its exploitation. A plant species are known for its high medicinal value tongkat ali (*Eurycoma longifolia*), also occurred in both the Wasoi Compartment and near Compartment GP 4.

Additionally, several plant species protected by Sabah State legislation were identified. The species are protected under Schedule II ([Part II](#)) in Wildlife Conservation Enactment 1997, whereby their collection is regulated under license. This includes wild gingers, (*Alpinia conchigera*), (*Etingera triorqyalis*), and Globba sp., as well as species of Palmae, including which were Botu (*Caryotamitis*) and Polod (*Arenqa undulatifolia*).

Fauna

Altogether eleven species of reptiles have been identified, whereof nine species were snakes, one crocodile species and two species of lizards. The crocodile ([Crocodylus porosus](#)) was reported by villagers to appear at the Telaga Jetty. Crocodiles also occur in the Datong river.



Picture of the Saltwater crocodile

The monitor lizard ([Varanus salvator](#)) is very common in this area where it was spotted along the roadside to Kampong Gumpa, and Mangkapon.

Two species of Pythonidae were found, namely the short python ([Python curtus](#)) and the reticulated python ([Python reticulatus](#)). The poisonous king cobra ([Ophiophagus Hannah](#)) was reported to be commonly seen along the roadside of the plantation. The less poisonous snake identified is Wagler's pit-viper ([Tropidolaemus wagleri](#)), though the bite can be very painful was commonly found in Telaga. The other snakes found include the striped bronze-back ([Dendrelaphis caudolineatus](#)) in Telaga, the yellow-ringed cat snake or mangrove snake ([Boiga dendrophila](#)) in Bawing river, the triangle keelback ([Xenochrophis trianquliqera](#)) at the waterfall of Bengkoka Forest Reserve, and the green vine snake ([Ahaetulla prasina](#)) at Jalan Bongkol. A black-banded skink ([Mabuya rudis](#)) was also recorded.

Amphibians

Nine amphibian species from three families of frogs were found in and around Kampong Bongkol and other parts of the plantation. The three families include Ranidae, Microhylidae and Rhacophoridae.

Frogs are quite abundant and commonly found in the plantation. Most of them include the commensal frogs that are used to being associated with humans, such as grass frog ([Fejervarya limnocharis](#)), Kuhl's creek frog ([Limnonectes kuhli](#)), Cricket frog ([Rana nicobarensis](#)), Brown bullfrog ([Kaloula baleata](#)) and Four-Line tree frog ([Polypedates leucomystax](#)).

Three species from the family of tree frogs, Rhacophoridae were encountered, namely frilled tree frog ([Rhacophorus appendiculatus](#)), Four-Line tree frog ([Polypedates leucomystax](#)), and Dark Eared tree frog ([Polypedates macrotis](#)).

Freshwater fish and other aquatic life

Six species of freshwater fish, green turtle, belangkas, soft shelled turtles, mangrove crabs and shrimps were observed in the Bengkoka Plantation and surrounding areas, such as Telaga, Datong River and Bawing River. The common fish were puteh ([Puntius bramoides](#)), turungau ([Puntius binotatus](#)) and a newly described species, the yellow fighting fish betta chini were found between Jalan Bongkol and Wasoi. The ikan semilang *Mystus sp.*, ikan kapoh and ikan barakuda occur in many rivers and streams. In addition, the mangrove areas nearby kampong Mengkapon and Telaga provide suitable habitats for all species of mangrove crabs, turtles and shrimps. None of these species found is listed under any protection category.

Mammals

A total of 21 species of mammals, including bats, are found in the Bongkol areas. Several species of big mammals found here include the Sun bear ([Helarctos malayanus](#)), the Red muntjac ([Muntiacus muntjac](#)), the Sambar deer ([Cervus unicolor](#)), the longtail Macaque ([Macaca fascicularis](#)) and the bearded pig ([Sus barbatus](#)).

In addition, some smaller mammals are also found, such as the Civet cat/Malay civet, common palm civet, House rat, nectar Bats, plantain squirrel, flying squirrel, Lesser treehern and pangolin.

Some Flying Squirrels were found in Telaga, whereas the plantain squirrel was only found in Bengkoka Forest Reserve.

Aves

A total of 46 bird species from 27 families found in the plantation. The Wasoi Forest area was found to host the highest number of bird species, with 28 species from 18 families, followed by the Jawi-Jawi area with 24 species from 18 families, and 18 species from 16 families in the Bengkoka Forest Reserve. There were some common local residents, common to lowland and endemic to Borneo, migratory birds or winter visitors, with some mangrove and shorebirds present in the plantation and surrounding areas.

A few species of Kingfishers, as well as the Brahminy kite ([*Haliastur indus*](#)), Grey heron and mangrove whistler typically occupy the mangrove forest and coastal area habitats, but notably, the kingfisher species also appeared in the Bengkoka Forest Reserve. The other common species include the bulbuls, babblers, Pacific swallow, spotted necked dove, little spiderhunter, yellow-vented bulbul, and lesser coucal. None of these bird species is currently listed under any Enactment or other national or international protection category.



Photo: Brahminy Kite

1.1. Endemism

Any forest containing endemic species (defined as being unique for a specific geographical location or habitat) identified by [Forest Research Institute Malaysia \(FRIM\)](#), [Malaysian Nature Society \(MNS\)](#), [Sarawak Forestry Corporation \(SFC\)](#), Malaysian Forestry Departments and published literature, particularly in the case of high concentrations or highly restricted distribution, can be considered as forest containing HCV ([HCVF Toolkits for Malaysia, 2009](#)).

No endemic plant species were found in high concentrations, and no highly restricted distributions of any species were observed.

Since the Proboscis Monkey ([Nasalis larvatus](#)) was also recorded from sites along the *Acacia mangium* plantation boundary the current management activities obviously do not disturb this species. Its core habitat is the Mangrove forest which has been left undisturbed. In some cases, the species has been observed to move into the periphery of the Acacia plantation. No density figures are available yet, to determine whether this species has a viable population.

The Clouded Leopard ([Neofelis nebulosa](#)) as the largest cat is known to occur in Borneo was found to be present in this area which again would indicate that the plantation and its surroundings offer a suitable habitat with food resources for this species. No figures currently exist on the number of individuals.

Prominent signs of the Sun Bear ([Helarctos malayanus](#)) were seen in Wasoi forest, with claw marks gouged into tree trunks during the tree climb. The species can survive in Wasoi forest, meaning that the forest structure and environment in these forest patch provide suitable habitat and food resources for the Sun Bear. The number of individuals, however, is not known and a special study is currently underway.

The Tembadau or Banteng ([Bos javanicus](#)) was reported to be found in the centre of Bengkoka Forest Reserve, and also in Kampong Beluh, between Kampong Maringgian and Tambalugu, between Kampong Ampungoi and Kampong Beluh. These areas still provide suitable habitats for this highly endangered species which has been progressively suffering from forest degradation.

Various Kingfisher species, the Brahminy Kite and the Grey Heron were recorded to be present in the coastal area and Mangrove forests.

8.2.3 Critical Temporal Use

Any forested area which is important to wildlife for feeding, nesting, roosting, migration, or which contains saltlicks is classified under the HCV 1 category.

Some migratory birds like Cattle Egret ([Bubulcus ibis](#)) were plenty in the newly opened areas, probably after harvesting of Acacia. This is the most common egret which feeds on grassland insects, not fish, often observed on or around grazing cattle or buffaloes, by the roadside and on a rubbish dump. Sabah has been identified as the large winter roosts area and their population is increasing though there are no local breeding records yet.



Raptor watch used to be carried out by the Malaysian Nature Society (MNS) in selected areas of Sabah, including Telaga since this area, serves as a migratory route for raptors. There is a

total of 18 species of migratory raptors in Borneo such as kites, buzzards, accipiter's, falcons, harriers, ospreys and kestrels. Some of these raptors fly through Telaga to reach Pulau Balambangan and Pulau Banggi. The Telaga area is an area serving as a critical temporary site for raptors.

Appendix L: Summary of AFI HCV Management and Monitoring (updated based on Malaysian National Interpretation for the Identification of High Conservation Values, 2018)

HCVs	ID	GENERAL HCV MANAGEMENT OBJECTIVE	SPECIFIC HCV MANAGEMENT OBJECTIVE	MANAGEMENT TARGETS	MANAGEMENT STRATEGIES		OPERATIONAL MONITORING ¹	STRATEGIC MONITORING ²	THREAT MONITORING ³
					AREAS	PRESCRIPTIONS			
HCV 1 Species diversity	Concentration of biological diversity, Threatened and Endangered Species [Listed Fauna]: Mammals, birds	To conserve and/or enhance the biological diversity in AFI gazetted areas.	a) To manage the AFI area in order to provide diverse and productive wildlife habitats and habitat components. b) To protect RTE or species of special concern (sun bears, Proboscis monkey) and manage them to sustainable levels.	Wildlife population stable or increasing (sun bears and Proboscis monkey as indicator)	AFI gazetted area	<ul style="list-style-type: none"> • Curb the occurrence of poaching. • Wildlife experts are to be approached to assist in enhancing the present system. 	Regular monitoring patrols to: <ul style="list-style-type: none"> • Maintain HCV area boundaries • To apply a sufficient buffer zone to areas where species with threatened categories are present/ roaming. • To ensure all roaming areas are connected through sufficient wildlife corridors. 	<ul style="list-style-type: none"> • To conduct conservation of habitat by not converting it to plantation areas or any other use as to ensure no interruptions to the food source. • To conduct yearly registration of species under threatened categories to ensure its availability and to review the trends. 	<ul style="list-style-type: none"> • Hunting monitoring patrols (more targeted, extensive than operational monitoring) • Opportunistic observations of hunting indicators. • To conduct public awareness campaigns to sustain the species with threatened categories in their area. • To persuade the wildlife department to stop issuing hunting licences to areas where species of value are roaming that include in Bengkoka Peninsula to avoid

¹ Operational monitoring evaluates whether management plans are being implemented.

² Strategic/effectiveness monitoring aims to assess whether HCVs are being maintained by current management plans.

³ Threat monitoring aims to assess any changes in threats to HCVs.

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									food chain disruption and accidental kill.
	Concentration of biological diversity, Threatened and Endangered Species [Listed Flora]: IUCN Red List & CITES-listed	Adherence to Schedule 1 (part II) and Schedule 2 (part II) of Sabah's Wildlife Conservation Enactment 1997 To conserve and/or enhance the biological diversity in AFI.	To maintain habitats and protect plant flora species listed under Schedule 1 in Wildlife Conservation Enactment 1997.	No protected species are harmed during the plantation development activities. No intrusion on the habitats of the identified protected species.	Wasoi and Tanjung Piring, including its buffers and riparian buffers.	<ul style="list-style-type: none"> The trees listed as prohibited should be clearly marked out both on ground and the HCV maps. Enhance staff botanical knowledge on species. Field staff are required to go for annual botanical training/refreshers courses. Mitigation when changes (threats) are detected. 	Regular monitoring patrols to: <ul style="list-style-type: none"> Maintain HCV area boundaries To apply a sufficient buffer zone to areas where species with threatened categories are present/ roaming. 	Aerial survey. Monitoring system for flora assemblages/ richness.	To monitor any encroachment or other illegal activities to the HCV area by observing any signs of trespassing beyond the buffer zone. Any signs of encroachment should be reported and dealt with immediate mitigations actions.
	Endemic Species IUCN Endemic listed mammal: Proboscis monkey (<i>Nasalis larvatus</i>)	To conserve and/or enhance the biological diversity in AFI gazetted areas. Enhance the wildlife management plans.	<ul style="list-style-type: none"> To maintain and enhance the monitoring to be carried out on an annual basis to allow for effective enforcement of wildlife monitoring systems. To understand the species behaviour and 	Wildlife population intact	Entire AFI area	<ul style="list-style-type: none"> Reconfirm the existence of species before conducting the activities. Ensure there is enough space/ wildlife corridor for the species to move out (either temporarily or permanently, if required). If required, contact the related department for the relocation and to introduce/preserve the 	Regular monitoring patrols to: <ul style="list-style-type: none"> Maintain HCV area boundaries To apply a sufficient buffer zone to areas where species with threatened categories are present/ roaming. To ensure all roaming areas are connected through sufficient wildlife corridors. 	<ul style="list-style-type: none"> To conduct conservation of habitat by not converting it to plantation areas or any other use as to ensure no interruptions to the food sources. To conduct yearly registration of species under threatened 	<ul style="list-style-type: none"> Hunting monitoring patrols (more targeted, extensive than operational monitoring). Opportunistic observations of hunting indicators. To conduct public awareness campaigns to sustain the species with threatened categories in their area.

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			ecology needs better.			species outside its native habitats. <ul style="list-style-type: none"> • Consult and work together with or request assistance from experts/ educational/ conservation bodies (WWF, universities, conservation society, etc.) for the conservation of the species whenever necessary. 		categories to ensure its availability and to review the trends.	<ul style="list-style-type: none"> • To persuade wildlife department to stop issuing hunting licence to areas where species of value are roaming that include in Bengkoka Peninsula to avoid food chain disruption and accidental kill.
HCV 2 Landscape-level ecosystems and mosaics	<i>No HCV 2 locations were detected.</i>	-	-	-	-	-	-	-	-



<p>HCV 3 Ecosystems and habitats</p>	<p>a) Rare ecosystem Mangrove forest and wetland area.</p> <p>b) Threatened habitat Natural forest of Wasoi and riparian buffer zones.</p>	<p>Reduce the impacts of the edge effects exerted on the natural forest and rare area caused by plantation development within AFI gazetted area.</p>	<p>Plantation development activities (including harvesting) do not encroach into the natural forest of Wasoi, mangrove forest, wetland area and buffer zones.</p>	<p>Zero trespassing into the natural forest of Wasoi, mangrove forest, wetland area and riparian buffer zones.</p> <p>No reduction of the 841 ha of mangrove area.</p>	<p>The common boundary for the natural forest of Wasoi, mangrove forest, wetland area and riparian buffer zones.</p>	<ul style="list-style-type: none"> • Determine and confirm the boundaries of the project area to ensure that no activities encroach any HCV 3 management areas. • Application and maintain of a 50m buffer to protected areas. • Boundary marking with blue paints. 	<ul style="list-style-type: none"> • To monitor Wasoi forest area boundaries as to ensure the delineation remains the same as in 1984. • Application of buffer zone as described in BMMP and HCVF reports. 	<ul style="list-style-type: none"> • Aerial survey • To monitor the population and condition of native flora and fauna in forest reserve areas. 	<ul style="list-style-type: none"> • To monitor any encroachment to the natural forest of Wasoi by observing any signs of trespassing beyond the buffer zone. Any signs of encroachment should be reported and dealt with immediate mitigations actions. • Produced map demarcating 841 ha mangrove forest area within AFI boundary. • To monitor mangrove areas boundaries as to ensure the delineation remains the same as mapped out by AFI and by Sabah Forestry Department.
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HCV 4 Ecosystem services	Protection of water catchment area 30 m wide buffer areas within plantation area	Preserving water qualities and its entities.	Water quality is protected especially at dams located in Kg. Liu and Bengkoka FR.	To ensure healthy water qualities all over AFI gazetted areas.	Dams located in Kg. Liu and Bengkoka FR	No plantation activities are to be conducted by AFI within the buffer areas that separate the plantation zone and the tributaries. In addition, as agreed in 2010, all dormitories for workers and any biomass/ solid waste compartments should be located > 30 m from the riverbank/ waterway, while workshops including toxic/ oil compartments should not be situated < 50 m of the riverbank/ waterway.	<ul style="list-style-type: none"> To monitor water quality by periodic sampling to DO, pH, BOD, COD, TSS, and NH3-N in the BFR watershed. To monitor water quality improvement, result by periodic sampling to DO, pH, BOD, COD, TSS, and NH3-N to tap water that is sourced from AFI dam in BFR. 	<ul style="list-style-type: none"> Aerial survey. Interview with local communities at least once in a 6-months period. 	Monthly monitoring records. Any signs of illegal activities within the catchment area will be reported and dealt with immediate mitigations actions.
	Area that contains steep slopes of over 25 degrees and riparian reserves.	No harvesting or degrading activities inside or near steep areas and riparian reserves.	All steep areas and riparian reserves are marked on map	No encroachment or degrading activities such as harvesting inside steep areas and riparian reserves to avoid soil erosion.	Riparian and steep slope areas	<ul style="list-style-type: none"> No plantation to be done within riparian and steep slopes. Areas with 25 degrees and above were delineated and marked with red paint. 	Regular monitoring patrols to: <ul style="list-style-type: none"> Maintain HCV area boundaries as described in BMMP and HCVF reports. Prevent forest/vegetation clearance on slopes. Monitor consistency of map and physical boundaries of steep areas by ensuring clear visibility of markings. 	<ul style="list-style-type: none"> Soil erosion monitoring Monitoring sedimentation levels Surveys of vegetation structures key to preventing erosion. 	Monthly monitoring records. Any signs of illegal activities within steep areas and riparian reserves will be reported and dealt with immediate mitigations actions.

Forest Management Plan



<p>HCV 5 Community Needs</p>		<p>Preserve wellbeing of communities</p>	<p>Ensuring that the water catchment area and HCV 6 is not negatively impacted by activities in the AFI management area.</p>	<p>To ensure healthy water qualities all over AFI gazetted areas.</p>	<ul style="list-style-type: none"> • Dams were observed located in two areas which are in Kg. Liu and Bengkoka FR. • ±59 scattered existing villages within the project site 	<ul style="list-style-type: none"> • AFI to follow mitigation measures in BMMP to ensure the preservation of water quality from BFR to downstream areas. Water management in BFR may require joint effort with GSSB, therefore coordination for the preservation of BFR catchment area should be established between GSSB and AFI. • AFI also suggested continuing the water treatment plan for Bongkol areas to benefit the local communities. • To continue to conduct multi-stakeholder consultations between local communities and forest and local authorities to identify and protect specific forest compartments/ zones/ components according to the basic needs they support. 	<ul style="list-style-type: none"> • To monitor the application of mitigation to improve water quality by periodic sampling to DO, pH, BOD, COD, TSS, and NH3-N to streams that are affected by plantation areas. • To monitor water quality improvement, result by periodic sampling to DO, pH, BOD, COD, TSS, and NH3-N to tap water that is sourced from AFI dam in BFR. • To monitor water quality improvement results by periodic sampling to DO, pH, BOD, COD, TSS, and NH3-N in BFR watershed. 	<ul style="list-style-type: none"> • Aerial survey. • Interview with local communities at least once in a 6-months period. 	<p>Monthly monitoring records. Any signs of illegal activities within the catchment area will be reported and dealt with immediate mitigations actions.</p>
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Forest Management Plan



<p>HCV 6 Cultural Values</p>	<p>Villages, forest reserves, cultural sites, tombs, and village reserves</p>	<p>Sensitive areas are well preserved.</p>	<p>Sensitive areas remained intact inclusive of its entities.</p>	<p>No land development activities to be done in the sensitive areas.</p>	<p>Sensitive areas which include the villages, forest reserve, tombs, and village reserves have been mapped out. Areas in the vicinity of Kg. Mantaya, Kg. Kandang/Kodong, Kg. Bawing, Kg. Kapok Kg. Maringan, Kg Seropil, Kg Ungkup, Kg. Lukan, Kg. Boluuh, Kg. Andap, Kg. Katabasan Darat, Kg. Latip, Kg. Radap, and Kg. Ampungoi were observed to be essential location to HCV 6.</p>	<ul style="list-style-type: none"> • To avoid any identified sensitive areas to be part of AFI plantation areas. • To continue to conduct multi-stakeholder consultations between local communities and forest and local authorities to identify and protect specific forest compartments/ zones/ components according to their traditional cultural, ecological, economic or religious importance. This effort can ensure the availability of updated data related to HCV 6. 	<ul style="list-style-type: none"> • To monitor sensitive areas by observing the condition, boundaries and population of its inhabitants. 	<ul style="list-style-type: none"> • Interview with local communities at least once in a 6-months period. 	<p>Monthly monitoring records. Any signs of illegal activities within the catchment area will be reported and dealt with immediate mitigations actions.</p>
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Appendix M: Checklist

No	Item	Reference	Manager	Plan Date
1	Update AFI maps	1.1	Plantation Manager	Annually in January
2	Review JV contract agreement	1.2	CFO	Annually in March
3	Review the FMP compliance arrangements and training of all staff, contractors, consultants and visitors for MC&I SFM principles.	2.1	Compliance Manager	Annually in April
4	Review the FMP compliance arrangements and training of all staff, contractors, consultants and visitors.	2.1	Plantation Manager	Annually in April
5	Review the legal framework in Appendix C for any additions or changes to laws.	2.3	Compliance Manager	Annually in July
6	Review requirements and control measures to ensure compliance to SABAH TLAS P1-4	2.3	Compliance Manager	Annually in October
7	Review AFI objectives, test if objectives were met and implement mitigating controls if not.	3.1	CEO	Annually in February
8	Review the sixteen AFI management objectives, test if objectives were met and implement mitigating controls if not.	3.2	CEO	Annually in February
9	Review and update the Forest Management Plan.	3.3	Plantation Manager	Annually in February



10	Review FMP Chapter 4 for any changes or updates	4	Plantation Manager	Annually in February
11	Update the FMP area numbers with the forest zone area.	5.1 – 5.3	Plantation Manager	Annually in January
12	Review long and short-term harvesting plans and sign-off by General Manager.	6.1	Plantation Manager	Annually in November
13	Review log specifications	6.1	CEO	Annually in October
14	Review the recommendations of the harvesting systems study CMO	6.1	Plantation Manager	Annually in October
15	Review objectives, test if objectives were met and implement mitigating controls if not.	7.1	Plantation Manager	Annually in February
16	Review AFI research and development specie trails.	7.2	Plantation Manager	Annually in November
17	Review and update Appendix D – Silvicultural Regimes.	7.4	Plantation Manager	Annually in February
18	Update disease management with current monitoring plans and results (PeopleTray)	7.7	Plantation Manager	Annually in February
19	Update fire management plan	7.8	Plantation Manager	Annually in April
20	Review R&D departments KPI’s and objectives.	8.2	Plantation Manager	Annually in February
21	Review collaboration successes with other institutions.	8.3	Plantation Manager	Annually in February
22	Review and update the R&D development plan.	8.4	Plantation Manager	Annually in February



23	Review EIA recommendations and mitigation controls	9.1	Compliance Manager	Annually in October
24	Submit Environmental monitoring report to EPD	9.1	Compliance Manager	Every 4 months
25	Review Appendix J to ensure mitigation measures are implemented and verified	9.2	Compliance Manager	Annually in March
26	Review AFI conservation policy and integrate new requirements on species and habitat conservation and protection.	9.6	Compliance Manager	Annually in March
27	Review the effectiveness of management objectives for HCVF	9.6	Compliance Manager	Annually in March
28	Review first-party HCVF audits by AFI's supervisory staff members for compliance.	9.7	Compliance Manager	Annually in March
29	Review second party HCVF audits by AFI Conservation Executive and the Operations Manager, including compliance with the harvesting and road-building plan.	9.7	Compliance Manager	Annually in March
30	Review Conservation department HCVF field data and recommendations.	9.7	Compliance Manager	Annually in March
31	Review and update the Community Engagement Plan	10.2	Community Relation Manager	Annually in March and July
32	Review audits and root causes for contractor's audits and checklists	11.1	Compliance Manager	Monthly



33	Review and update contractor contract and schedules	11.1	Financial Manager	Annually in August
34	Review the effectiveness of health and safety guidelines and ensure alignment with national laws	11.2	Plantation Manager	Annually in September
35	Review recommendations and events reported by AFI SAHO	11.2	Plantation Manager	Annually in September
36	Review SAHO license for compliance and identify training needs	11.2	Plantation Manager	Annually in June
37	Review supervisor training for forest activities	11.2	Plantation Manager	Annually in September
38	Review effectiveness of Toolbox talks	11.2	Compliance Manager	Annually in March and July
39	Review all non-compliances as captured in PeopleTray and measure the effectiveness of mitigations put in place.	11.2	Compliance Manager	Monthly
40	Review foreign worker audits	11.2	CEO	Annually in September
41	Review and update risk register in PeopleTray and ensure extreme and high risks mitigation controls are in place	11.3	CEO	Quarterly
42	Review illegal foreign workers and child labour policy	11.4	HR Manager	Annually in August
43	Complete (PeopleTray) audit on contractor compliance:	11.4	HR Manager	Annually in August

	<ul style="list-style-type: none"> a) Illegal / Child workers / Forced b) Minimum pay conditions c) Living conditions d) Compulsory payments 			
44	Review and update the Long-Term Financial Plan	12	CFO	Annually in December
45	Review SOP for identification and protection of HCVF, including <ul style="list-style-type: none"> e) Briefing for contractors before harvesting or development starts. f) Training AFI supervisors on operational guidelines in forest certification. 	13.1	Compliance Manager	Annually in August
46	Fire awareness training for all communities within Bongkol area.	13.2	Community Relation Manager	Annually in May
47	Present wildlife awareness course and implement the honorary wildlife warden system.	13.3	Compliance Manager	Bi-annually in June
48	Review environmental monitoring measures for effectiveness	Appx G	Compliance Manager	Annually in March
49	Review SOPs for effectiveness	Appx H	Compliance Manager	Annually in March
50	Review HCVF monitoring measures for effectiveness	Appx J	Compliance Manager	Annually in March
51	Review HCV management summary for effectiveness.	Appx L	Compliance Manager	Annually in July



Appendix N: Planning and Monitoring Framework

No	Management Plan	Element Being Monitored	Monitoring Periodicity	Responsible Position	MC&I SFM Criterion
		Forest management shall comply with all applicable federal, state and local laws and administrative requirements.	Annual	CFO	1.1
		All applicable and legally prescribed fees, royalties, taxes, and other charges shall be paid.	Annual	CFO	1.2

Appendix O: Indigenous People

Anthropological and linguistic studies have identified a wider range of indigenous groups and sub-groups with presence in Sabah, with some examples as follows:

Sabah's Indigenous Communities

Bornean Group	Sub-Groups
DUSUN	Dusun, Coastal Kadazan, Kimaragang, Eastern/Labuk Kadazan, Suang Lotud, Kuijau, Tatana, Dusun Sungai, Tangara, Bisaya, Rungus, Dumpas and Sonsogon
PAITAN	Tambonuo, Upper Kinabatangan, Sinabu, Lobuu, Rumanau, Abai Sungai and Lingkabau
MURUT	Kolod/Okolod, Gana, Kalabakan, Sabangkung, Serudung, Tagal, Sumambu, Baukan, Nabai, Timugon, Paluan and Lundayeh
DAYAK	Iban
Non-Bornean Group	Sub-Groups
Originally from the Philippines	Bonggi (Palawan), Illanun (Lanao, Mindanao), Suluk (Jolo), Tausug, Bajau (Southern Philippines)
Originally from Indonesia	Bugis (Sulawesi), Idaa'an, Tidung, Cocos (Cocos Islands, Australia) and Kedayan

(Note: The Bugis are not recognized by the Government of Sabah as native.)

(Source:

https://www.undp.org/content/dam/rbap/docs/Research%20&%20Publications/democratic_governance/RBAP-DG-2006-NRM-Malaysia.pdf)

Ethnic groups by linguistic relationships

KADAZANDUSUN	MURUT
BISAYA	BOOKAN
CENTRAL DUSUN	GANA
COASTAL KADAZAN	KALABAKAN
DUMPAS	KENINGAU MURUT

KIMARAGANG	OKOLOD
KUIJAU	PALUAN
LABUK-KINABATANGAN KADAZAN	SELUNGAI
LOTUD	SEMBAKUNG
MANGKAAK	SERUDUNG
MINOKOK	TAGAL
PAPAR	TENGARA
RUNGUS	TIDUNG
TATANA'	TIMUGON
TEMPASUK DUSUN	
TINAGAS	BAJAU
TOBILUNG	KAGAYAN
	SOUTHERN SAMA
	UBIAN
OTHER	WEST COAST BAJAU
BONGGI	
BUGIS	PAITAN
COCOS ISLANDS MALAY	KALABUAN
IDA'AN	LOBU
IRANUN	MAKIANG
KEDAYAN	SINABU'
LUNDAYEH SULUK	SUNGAI
	TOMBONUO
	UPPER KINABATANGAN

Note: The Bugis are not recognized by the Government of Sabah as native.

(Source:

https://www.sil.org/system/files/reapdata/99/01/97/99019703210373623994968068483796397544/50499_Combrink_Indigenous_groups_Sabah_2.pdf)

The geographic distribution of Sabah’s main indigenous groups is as follows:

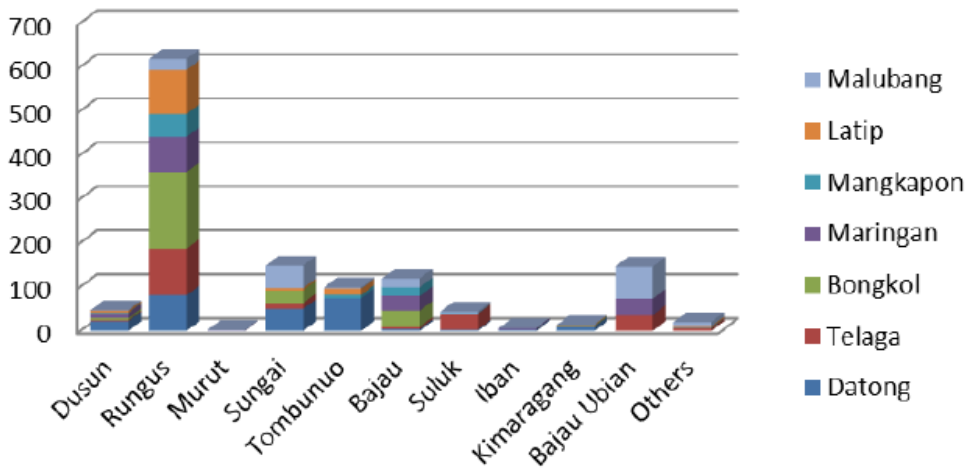


The Social Baseline Study finalized in 2015 in/around AFI’s operational area sought to map the demographic characteristics of the local population. The study found that over 12,000 people live within/in the vicinity of the operational area. The ethnic composition was mainly dominated by the Rungus (52%) which are traditionally the local inhabitants of Kudat, Kota Marudu and the western part of Bengkoka Peninsula, followed by the Sungai

(13%), the Bajau (10%), the Tombonuo (9%) and smaller proportions of Dusun, Murut, Iban, Bajau Ubian, Suluk, and Kimaragang indigenous groups.

The study highlighted that the traditional dwellers of the Bengkoka Peninsula were the Tombonuo, but with the emergence of modern infrastructure, the Rungus slowly overtook the Tombonuo territory. The Tombonuo were predominantly found in Datong and Latip clusters while the Rungus had a strong presence in Bongkol, Telaga, and Latip as well. The Bajau (including Bajau Ubian and Suluk) formed coastal communities in Telaga, Malubang, Maringan and Bongkol clusters.

Ethnic Profile by Cluster



(Source: SOCIAL BASELINE SURVEY REPORT, Demography and Socio-Economic Assessment of 59 Villages at Bengkoka Peninsula, 2015).

It is important to highlight that while most of the respondents of the Social Baseline Study (73%) declared to be from Pitas district, the remainder originated from various other districts of Sabah, namely Tamparuli, Kota Belud, Kudat, Kota Marudu, Tuaran, Kota Kinabalu, Keningau and Tambunan. This speaks to a pattern of recent incoming migration that has affected the Bengkoka Peninsula, where AFI operates, through the arrival of “new settlers” who do not have historical ties with the territory.

In addition, the Bengkoka Peninsula is also home to other ethnic groups that are not considered “Orang Asal” or “Anak Negeri” by the local laws. This includes, for example, the Malay, the Indian and the Chinese ethnic communities.

Appendix P: Seed source

NO	SPECIES	SEEDLOT NUMBER	PROVENANCES	MODE	SUPPLIER	Remark
1	<i>E. pellita</i>	SSB13177	SPA Block 48C, Brumas (ex-SSO Ingham-21041)	Purchase	SSB, Tawau, Sabah	
2	<i>E. pellita</i>	SSB17042	SPA Block 48C, Brumas (ex-SSO Ingham-21041)	Purchase	SSB, Tawau, Sabah	
3	<i>E. pellita</i>	SSB16005	SPA Block 48C, Brumas (ex-SSO Ingham-21041)	Purchase	SSB, Tawau, Sabah	
4	<i>E. pellita</i>	SSB14036	SPA Block 48C, Brumas (ex-SSO Ingham-21041)	Purchase	SSB, Tawau, Sabah	
5	<i>E. pellita</i>	SSB15160	SPA Block 48C, Brumas (ex-SSO Ingham-21041)	Purchase	SSB, Tawau, Sabah	
6	<i>E. pellita</i>	SSB16002	SPA Block 48C, Brumas (ex-SSO Ingham-21041)	Purchase	SSB, Tawau, Sabah	
7	<i>E. pellita</i>	SSB17011	SPA Block 48C, Brumas (ex-SSO Ingham-21041)	Purchase	SSB, Tawau, Sabah	
8	<i>E. pellita</i>	00410	SSO Quy Nhon	Purchase	IFTIB, Ha Noi, Vietnam	
9	<i>E. pellita</i>	00408	SSO Bau Bang	Purchase	IFTIB, Ha Noi, Vietnam	
10	<i>E. pellita</i>	EP-PT5315	53 families ex Philippines Bulk	Purchase	Bukidnon Breeze Greenfarm Seed Orchard, Philippines	
11	<i>E. pellita</i>	GF0115-EP	37 families ex Philippines Bulk	Purchase	ESL Greenfarm Seed Orchard, Philippines	
12	<i>E. pellita</i>	AFI001-16	AFI - SPA 2012 (Ex SSO Bau Bang - 21217) - 7007916	Collection	AFI Research Team	
13	<i>E. pellita</i>	AFI002-16	AFI - SPA 2012 (Ex SSB12026 - CSIRO Super Bulk - ex Dampier SSO) - 600916	Collection	AFI Research Team	
14	<i>E. pellita</i>	AFIB001-17	AFI SPA Progeny & Seed Sources (8 families) - 161722	Collection	AFI Research Team	
15	<i>E. pellita</i>	AFI001-17	AFI - SPA 2012 (Ex SSO Bau Bang - 21217) - 7211617	Collection	AFI Research Team	
16	<i>E. pellita</i>	AFI002-17	AFI - SPA 2012 (Ex SSO Bau Bang - 21217) - 7121617	Collection	AFI Research Team	
17	<i>E. pellita</i>	AFI003-17	AFI - SPA 2012 (Ex T1C 06 - ex ATSC) - 132517	Collection	AFI Research Team	
18	<i>E. pellita</i>	AFI004-17	AFI - SPA 2012 (Ex SSB12025 - SSB SPA 48C) - 233417	Collection	AFI Research Team	
19	<i>E. pellita</i>	AFI005-17	AFI - SPA 2012 (Ex SSB12025 - SSB SPA 48C) - 612417	Collection	AFI Research Team	
20	<i>E. pellita</i>	AFI190002	AFI - SPA1 (ex 2012 Seed Source Trial)	Collection	AFI Research Team	Seed still available
21	<i>A. crassiparpa</i>	PARC 2014	50 families Fiji SSO Bulk	Purchase	Fiji	Seed still available
22	<i>E. pellita</i>	Poly-clone	50 clones bulk (BFC 2012,2013 &2014)	Cutting	AFI Research Team	Pre-commercialization trial
23	<i>E. pellita</i>	Mono-clone	Single clone (AFI-SSO 2-14)	Cutting	AFI Research Team	Pre-commercialization trial